Australian Government

Civil Aviation Safety Authority

Part 61 Manual of Standards (MOS) (as amended)

made under regulations 11.068 and 61.035 of the *Civil Aviation Safety Regulations 1998* and section 4 of the *Acts Interpretation Act 1901*.

This compilation was prepared on 18 May 2021 taking into account amendments up to *Part 61 Manual of Standards Amendment Instrument 2021 (No. 2)*. It is a compilation of the Part 61 Manual of Standards (MOS) as amended and in force on 18 May 2021.

Prepared by the Advisory & Drafting Branch, Legal, International & Regulatory Affairs Division, Civil Aviation Safety Authority, Canberra.

Compilation No. 5.

Part 61 Manual of Standards Instrument 2014

1 Name of instrument

1.1 This instrument is the Part 61 Manual of Standards for Part 61 of the *Civil Aviation Safety Regulations 1998* (***CASR 1998***).

1.2 This instrument is called the *Part 61 Manual of Standards Instrument 2014*.

1.3 In this instrument, unless the contrary intention appears, a reference to “this MOS” or “the MOS” means the *Part 61 Manual of Standards Instrument 2014*.

3 Scope

Under regulation 61.035 of CASR 1998, and for Part 61 of CASR 1998, this MOS sets out matters relating to:

(a) flight crew licences, ratings and endorsements; and

(b) the use of an ACAS; and

(c) aeronautical radio operations; and

(d) aeroplane taxiing; and

(e) conditions on flight examiner ratings.

4 Condition on flight examiner ratings

For paragraph 98 (5A) (1) (a) and subsection 98 (5D) of the *Civil Aviation Act 1988*, and regulation 11.068 of CASR 1998, it is a condition on the following:

(a) a flight examiner rating;

(b) an approval under regulation 61.040 to conduct a flight test or a proficiency check;

issued before or after this MOS, that when conducting a flight test or a proficiency check the holder of the rating, or of the approval, must comply with the requirements of, and take into account the recommendations in, the *Flight Examiner Handbook* as in force and published on the CASA website at the time of the flight test or proficiency check.

5 Definitions

5.1 In this MOS, unless the contrary intention appears:

cell, for a column of a table in a Schedule of this instrument, means each individual, undivided unit into which the column is subdivided.

in accordance with published procedures, for carrying out an activity in relation to an aircraft, means carrying out the activity in accordance with the applicable requirements (if any) set out in each of the following:

(a) the aircraft flight manual;

(b) the aircraft operator's operations manual;

(c) the Aeronautical Information Publication (AIP);

(d) another operational document applicable to the activity that is approved in writing by CASA or the operator.

5.2 In this MOS, unless the contrary intention appears, an abbreviation has the meaning given to it by the Dictionary of abbreviations in Schedule 1A.

5.3 Unless the contrary intention appears, if an abbreviation used in this MOS is not given a meaning under Schedule 1A, the abbreviation has the meaning that is given to it by the prevalent usage, custom and practice of the aviation industry.

5.4 To avoid doubt, in this MOS neither a unit code nor an examination code is an abbreviation within the meaning of subsection 5.2 or 5.3.

5.5 Unless the contrary intention appears, a reference in this instrument to a numbered provision that commences with the number 61 is a reference to the provision of that number in Part 61 of CASR 1998.

5.6 Unless the contrary intention appears, if a Schedule to this MOS contains matter that is expressly described as being for guidance only, then, despite the matter being in the Schedule, the matter is not part of the Schedule.

Note Subsection 5.6 is intended to allow the Tables of Contents for Schedules to retain their status as guidance material only which may be varied editorially, including for any subsequent compilations.

6 Recreational pilot licences — general English language proficiency standard

6.1 The general English language proficiency standard is as set out in Section 1 of Schedule 2.

Note See the Table of Contents at the front of Schedule 2 to find the general English language proficiency standards.

6.2 The assessment mentioned in subclause 5.1.1 of Section 1 of Schedule 2, and the requirement specified in subclause 5.1.2, are each part of the standard.

6.3 The general English language proficiency tests are as set out in paragraph 5.1.2 (f) of Section 1 of Schedule 2.

6.4 For subsection 6.3, achieving the minimum grade specified for each test is part of each test.

7 Aviation English language proficiency standards and maintenance of English language proficiency

7.1 The aviation English language proficiency standard is as set out in Section 1 of Schedule 2.

Note See the Table of Contents at the front of Schedule 2 to find the aviation English language proficiency standards.

7.2 The ICAO level 4, level 5 and level 6 aviation English language proficiency standards (rating scales) are as set out in Section 2 of Schedule 8.

Note See the Table of Contents at the front of Schedule 8 to find the ICAO level 4, level 5 and level 6 aviation English language proficiency standards (rating scales).

8 Units of competency for flight training, use of ACAS, aeronautical radio operations, and taxiing

8.1 The units of competency for each of the following matters are as set out in the Appendix of a Section in Schedule 1 that is for the particular matter:

(a) a flight crew licence with an aircraft category rating, a flight crew rating on a licence, or an endorsement on a rating;

(b) a design feature endorsement or a flight activity endorsement;

(c) use of an ACAS;

(d) an aeronautical radio operator certificate;

(e) a certificate of competency for taxiing aeroplanes of a particular class or type rating.

Note See the Table of Contents at the front of Schedule 1 to find the reference to any particular matter listed in paragraphs (a) to (e) above.

8.2 For an Appendix mentioned in subsection 8.1, each unit of competency mentioned in a cell in column 2 of the practical flight standards table in the Appendix (the ***unit of competency***) has the unit code mentioned in the corresponding cell in column 1 (the ***unit code***).

8.3 For subsection 8.2, the requirements of the unit of competency are set out in the document whose unit code is mentioned in the cell in column 1 that corresponds to the unit of competency.

8.4 For subsection 8.3, the unit coded document containing the requirements of the unit of competency is the document in Schedule 2 which has the same unit code.

Note See the Table of Contents at the front of Schedule 2 for an alphabetical list of unit codes.

8.5 The competency required of a person by each unit of competency mentioned in Schedule 2 (the ***unit***) is the ability to do the following:

(a) perform each of the elements mentioned in clause 2 of the unit:

(i) according to the performance criteria mentioned for the element; and

(ii) within the range of variables mentioned in clause 3 for the unit; and

(iii) for practical flight — within the flight tolerances mentioned in the table in Section 1 of Schedule 8 that is for the category of aircraft (where applicable) and for the licence or rating; and

(b) demonstrate the underpinning knowledge for each unit, as mentioned in clause 4 of the unit.

Note A unit of competency in Schedule 2 usually comprises: (1) the unit description, (2) its elements and performance criteria, (3) the range of variables across which these criteria are to be applied, and (4) the minimum underpinning knowledge for (2) and (3).

9 Other approved courses

RESERVED (CASR 61.040 and 61.210)

10 Aeronautical knowledge standards

10.1 The aeronautical knowledge standards for a flight crew licence with an aircraft category rating, a flight crew rating on a licence or an endorsement on a rating are as set out in the Appendix of a Section in Schedule 1 that is for the licence, rating or endorsement.

Note See the Table of Contents at the front of Schedule 1 to find any particular licence, rating or endorsement.

10.2 For an Appendix mentioned in subsection 10.1, each unit of knowledge mentioned in a cell in column 2 of an aeronautical knowledge standards table in the Appendix (the ***unit of knowledge***) has the unit code mentioned in the corresponding cell in column 1 (the ***unit code***).

10.3 For subsection 10.2, the requirements of the unit of knowledge are set out in the document whose unit code is mentioned in the cell in column 1 that corresponds to the unit of knowledge.

10.4 For subsection 10.3, the unit coded document containing the requirements of a unit of knowledge is the document in Schedule 3 which has the same unit code.

10.5 The standard of knowledge required of a person by each unit of knowledge mentioned in Schedule 3 is the ability to demonstrate, to the appropriate level, knowledge of the elements, topics and specific content described in each clause of the unit.

10.6 For subsection 10.5:

(a) an element, generally identifying a knowledge area within the unit of knowledge, is indicated in bold, underlined print, and numbered as a clause; and

(b) a topic (if any), further defining a knowledge area within an element, is indicated in bold print and numbered as a subclause; and

(c) specific content, describing in detail the relevant content of the topic (if any), or the element, is indicated in plain print and numbered as subclauses, paragraphs, subparagraphs and sub-subparagraphs as the case may be.

11 Aeronautical knowledge examinations, pass standards and time

11.1 The aeronautical knowledge examinations for a flight crew licence with an aircraft category rating, a flight crew rating on a licence, or an endorsement on a rating are as set out in the table in the Section of Schedule 4 that is for the licence, rating or endorsement (the ***table***).

11.2 For subsection 11.1, the examination for each examination subject mentioned in a cell in column 2 of the table (the ***subject***) has the examination code, the pass standard and the time limit mentioned in the cell in column 1, column 3 and column 4 (respectively) of the table that corresponds to the subject.

Note The examination codes mentioned in the cells in column 1 of the table are for examination administration purposes only.

12 Flight tests — competency standards

12.1 In this section, references to a "flight examiner" are taken to include the following when conducting a flight test:

(a) CASA;

(b) the holder of an approval under regulation 61.040 to conduct the flight test.

12.2 The competency standards for a flight test for a flight crew licence with an aircraft category rating, a flight crew rating on a licence, or an endorsement on a rating are as set out in the Appendix in Schedule 5 that is for the licence, rating or endorsement flight test.

Note See the Table of Contents at the front of Schedule 5 to find the reference to any particular flight test.

12.3 For subsection 12.2, the competency standards for a flight test mentioned in an Appendix in Schedule 5 comprise the following:

(a) the flight test requirements mentioned in the Appendix for the test;

(b) the knowledge requirements mentioned in the Appendix for the test;

(c) the activities and manoeuvres mentioned in the Appendix for the test, but:

(i) subject to the operational scope and conditions mentioned in the Appendix for the test; and

(ii) within the flight tolerances mentioned in the table in Section 1 of Schedule 8 that is for the category of aircraft (where applicable) and for the licence, rating or endorsement.

Note For subparagraph (c) (ii), the aircraft category is identified in the title of the relevant table in Schedule 8, and the licence, rating or endorsement is identified in the "Applicability" clause of the relevant table.

12.4 For paragraph 12.3 (c), when conducting a flight test, the flight examiner must determine if an applicant has demonstrated the required competency in the activities and manoeuvres mentioned in the relevant Appendix for the test.

12.5 For subsection 12.4, for each of the activities and manoeuvres, the required competency must be demonstrated by reference to the flight examiner's representative sample of competency standards for the relevant activity or manoeuvre.

12.6 For subsection 12.5, the representative sample of competency standards must be chosen from the units of competency in Schedule 2 that are relevant to the activity or manoeuvre.

12.7 For subsection 12.6, the relevant units of competency in Schedule 2 from which the representative sample of competency standards must be drawn, are identified in the Note accompanying the description of each activity or manoeuvre.

Note 1 The respective Notes refer to the unit codes of the relevant units of competency in Schedule 2. See the Table of Contents at the front of Schedule 2 for an alphabetical list of unit codes.

Note 2 For flight training, the applicant must have met the competency standard in each relevant unit of competency in Schedule 2, in accordance with subsection 8.5 of this MOS. For a flight test, the applicant must demonstrate, in the range of activities and manoeuvres mentioned in Schedule 5, competency against the flight examiner's representative sample of the competency standards in these units of competency. For a flight test, the competency required of a person by a unit of competency does not require specific testing of the underpinning knowledge in Schedule 2.

13 Proficiency checks — competency standards

13.1 In this section, references to a "flight examiner" are taken to include the following when conducting a proficiency check:

(a) CASA;

(b) the holder of an approval under regulation 61.040 to conduct the proficiency check.

13.2 The competency standards for a proficiency check for a flight crew rating on a licence, or an endorsement on a rating are as set out in the Appendix in Schedule 6 that is for the rating proficiency check.

Note See the Table of Contents at the front of Schedule 6 to find the reference to any particular proficiency check.

13.3 For subsection 13.2, the competency standards for a proficiency check mentioned in an Appendix in Schedule 6 comprise the following:

(a) the proficiency check requirements mentioned in the Appendix for the check;

(b) the knowledge requirements mentioned in the Appendix for the check;

(c) the activities and manoeuvres mentioned in the Appendix for the check, but:

(i) subject to the operational scope and conditions mentioned in the Appendix for the check; and

(ii) within the flight tolerances mentioned in the table in Section 1 of Schedule 8 that is for the category of aircraft (where applicable) and for the flight crew rating.

Note For subparagraph (c) (ii), the aircraft category is identified in the title of the relevant table in Schedule 8, and the rating is identified in the "Applicability" clause of the relevant table.

13.4 For paragraph 13.3 (c), when conducting a proficiency check, the flight examiner must determine if an applicant has demonstrated the required competency in the activities and manoeuvres mentioned in the relevant Appendix for the check.

13.5 For subsection 13.4, for each of the activities and manoeuvres, the required competency must be demonstrated by reference to the flight examiner's representative sample of competency standards for the relevant activity or manoeuvre.

13.6 For subsection 13.5, the representative sample of competency standards must be chosen from the units of competency in Schedule 2 that are relevant to the activity or manoeuvre.

13.7 For subsection 13.6, the relevant units of competency in Schedule 2 from which the representative sample of competency standards must be drawn are identified in the Note accompanying the description of each activity or manoeuvre.

Note For a proficiency check, the applicant must demonstrate, in the range of activities and manoeuvres mentioned in Schedule 6, competency against the flight examiner's representative sample of the competency standards in these units of competency. For a proficiency check, the competency required of a person by a unit of competency does not require specific checking of the underpinning knowledge in Schedule 2.

14 Flight reviews — competency standards

14.1 The competency standards for a flight review for a flight crew rating on a licence are as set out in the Appendix in Schedule 7 that is for the rating flight review.

Note See the Table of Contents at the front of Schedule 7 to find the reference to any particular flight review.

14.2 For subsection 14.1, the competency standards for a flight review mentioned in an Appendix in Schedule 7 comprise the following:

(a) the flight review requirements mentioned in the Appendix for the flight review;

(b) the knowledge requirements mentioned in the Appendix for the flight review;

(c) the practical flight standards mentioned in the Appendix for the flight review, but within the flight tolerances mentioned in the table in Section 1 of Schedule 8 that is for the category of aircraft (where applicable) and for the rating.

Note For paragraph (c), the aircraft category is identified in the title of the relevant table in Schedule 8, and the rating is identified in the "Applicability" clause of the relevant table.

14.3 For an Appendix mentioned in subsection 14.1, each unit of competency mentioned in a cell in column 2 of the practical flight standards table in the Appendix (the ***unit of competency***) has the unit code mentioned in the corresponding cell in column 1 (the ***unit code***), subject to the modification (if any) specified in column 3.

14.4 For subsection 14.3, the requirements of the unit of competency are set out in the document whose unit code is mentioned in the cell in column 1 that corresponds to the unit of competency.

14.5 For subsection 14.4, the unit coded document containing the requirements of the unit of competency is the document in Schedule 2 which has the same unit code.

Note See the Table of Contents at the front of Schedule 2 for an alphabetical list of unit codes.

14.6 For a flight review, the competency required of a person by each relevant unit of competency mentioned in Schedule 2 (the ***unit***) is the ability to perform each of the elements mentioned in clause 2 of the unit, according to the performance criteria mentioned for the element, within the range of variables mentioned in clause 3 for the unit, but subject to the modifications (if any) specified in column 3 of the practical flight standards table in Schedule 7.

Note For a flight review, the competency required of a person by a unit of competency does not require specific testing of the underpinning knowledge in Schedule 2.

15 CPL(H) training — applicants under paragraph 61.615 (1B) (b) who have not completed integrated training

For paragraph 61.615 (1B) (b), an applicant for the commercial pilot licence (helicopter) (***CPL(H)***), who has not completed an integrated training course, must complete training in accordance with the requirements specified in Schedule 9.

Schedule 1A Dictionary of abbreviations

Abbreviation	Meaning
ACAS	Airborne collision avoidance system
ACN	Aircraft classification number
AD	Aerodrome
ADC	Air data computer
ADF	Automatic direction finder
ADIZ	Air defence identification zones.
AEL	Aviation English language
AFCS	Automatic flight control system
AFM	Aircraft flight manual
AFOR	Area forecast
AGL	Above ground level
AIC	Aeronautical information circular
AIP	Aeronautical information package
AIREP	Air report
AK	General aeronautical knowledge
ALA	Aerodromes and aeroplane landing areas
ALC	Approved load controlled
ALT	Altitude
AMP	Aerial application management plan
ANP	Actual navigation performance
AOA	Angle of attack
AOC	Air operator’s certificate
AOM	Aerodrome operating manual
AP	Auto pilot
APU	Auxiliary power unit
ARS	Attitude retention system
ASI	Air speed indicator
AT	Auto throttle
ATC	Air traffic control
ATIS	Aerodrome terminal information service
ATPL	Air transport pilot licence
ATS	Air traffic service

AUW	All up weight
AVADS	Auto voice activated decision system
BAK	Basic aeronautical knowledge
BHP	Brake horsepower
CAAP	Civil Aviation Advisory Publication
CAO	Civil Aviation Order
CAS	Calibrated air speed
CASA	Civil Aviation Safety Authority
CASR 1998	*Civil Aviation Safety Regulations 1998*
CAT	Clear air turbulence
CBT	Computer-based test
CDFA	Continuous descent flight angle
CDI	Course deviation indicator
CDP	Climb descent procedure
CG	Centre of gravity
CHT	Cylinder head temperature
CP	Critical point
CPL	Commercial pilot licence
CRM	Crew resource management
CSU	Constant speed unit
CTA	Controlled airspace
CTAF	Common traffic advisory frequency
CTR	Control zone
CVR	Cockpit voice recorder
DA	Density altitude
DALR	Dry adiabatic lapse rate
DAME	Designated aviation medical examiner
DAP	Departure and approach
DFDR	Digital flight data recorder
DFE	Design feature endorsement
DME	Distance measuring equipment
EAS	Equivalent air speed
EET	Estimated elapsed time
EFIS	Electronic flight instrument system
EGT	Exhaust gas temperature

EICAS	Engine indication and crew alerting system
ELR	Environmental lapse rate
EPR	Engine pressure ratio
EPT	Effective performance time
ERC	En route chart
ERSA	En route supplement Australia
ETA	Estimated time of arrival
ETD	Estimated time of departure
ETI	Estimated time interval
ETOPS	Extended range twin operations
ETP	Equi-time point
FAE	Flight activity endorsement
FAF	Final approach fix
FD	Flight director
FIA	Flight information area
FIR	Flight information region
FMS	Flight management systems
FSTD	Flight simulation training device
g	Gravitational force
GAL	Gallon
G-LOC	G-induced loss of consciousness
GNSS	Global navigation satellite system
GPU	Ground power unit
GPWS	Ground proximity warning systems
GS	Ground speed
HDG	Heading
HF	High frequency
HLS	Helicopter landing site
HPAV	Horse power available
HPREQ	Horse power required
HUMS	Health usage monitoring system
H-V	Height-velocity
IAF	Initial approach fix
IAL	Instrument approach and landing
IAP	Instrument approach procedure

IAS	Indicated air speed
ICAO	International Civil Aviation Organization
ICTZ	Inter-tropical convergence zone
IELTS	International English language testing system
IFR	Instrument flight rules
ILS	Instrument landing system
IMC	Instrument metrological conditions
INS	Inertial navigation system
ISA	International standard atmosphere
IVSI	Instantaneous vertical speed indicator
JPT	Jet pipe temperature
KDR	Knowledge deficiency report
KG	Kilogram
KIAS	Knots indicated air speed
LA	Landing area
LB	Pound
LDA	Landing distance available
LDP	Landing decision point
LDR	Landing distance required
LG	Landing gear
LLZ	Localizer
LMT	Local mean time
LNAV	Lateral navigation
LPV	Localiser precision with vertical guidance
LRC	Long range cruise
LSALT	Lowest safe altitude
LSB	Lower side band
LTE	Loss of tail rotor effectiveness
LTR	Litre
LVC	Live, virtual and constructive (simulators)
MAC	Mean aerodynamic chord
MAPt	Missed approach point
MDA	Minimum descent altitude
MEL	Minimum equipment list
Met	Meteorology

MF	Medium frequency
MLS	Microwave landing system
MLW	Maximum landing weight
MOS	Manual of Standards
MP	Manifold pressure
MPL	Multi-crew pilot licence
MSA	Minimum sector altitude
MSL	Mean sea level
MTOW	Maximum take-off weight
MZW	Mid-zone weight
NDB	Non-directional beacon
NGT	Night
NM	Nautical mile
NOTAM	Notice to Airmen
NPA	Non precision approach
NVFR	Night visual flight rules
NVG	Night vision goggles
NVIS	Night vision imaging system
OAT	Outside air temperature
OCTA	Outside controlled airspace
OEI	One engine inoperative
OGE	Out of ground effect
OH&S	Occupational health and safety
PAL	Pilot-activated lighting
PAPI	Precision approach path indicator
PBN	Performance based navigation
PCN	Pavement classification number
PEC	Pressure error correction
PF	Pilot flying
PIF	Private instrument flight
PIFR	Private IFR rating
PIO	Pilot induced oscillation
PM	Pilot monitoring
PNR	Point of no return
POH	Pilot operating handbook
PPL	Private pilot licence

PRD	Prohibited/restricted/danger areas
PUS	Permissible unserviceability
RA	Resolution advisory
RAF	Relative air flow
RAIM	Receiver autonomous integrity monitoring
RFM	Rotorcraft flight manual
RMI	Remote magnetic indicator
RNAV	Route navigation
RNP	Required navigation performance
ROC	Rate of climb
ROD	Rate of descent
RPL	Recreational pilot licence
RPM	Revolutions per minute
RRPM	Rotor rpm
RT	Radio transmission
RVR	Runway visual range
RVSM	Reduced vertical separation minima
SALR	Saturated adiabatic lapse rate
SAR	Search and rescue
SARTIME	Search and rescue time
SARWATCH	Search and rescue watch
SAS	Stability augmentation system
SID	Standard instrument departure
SIGWX	Significant weather
SOP	Standard operating procedures
SSB	Single side band
SSR	Secondary surveillance radar
STAR	Standard arrival route
TA	Traffic advisory
TAF	Terminal area forecast
TAS	True air speed
TAT	Total air temperature
TCAS	Traffic collision avoidance system
TEM	Threat error management
TGT	Turbine gas temperature

THP	Thrust horsepower
TIT	Turbine inlet temperature
TMG	Track made good
TODA	Take-off distance available
TODR	Take-off distance required
TOEFL CBT	Test of English as a foreign language computer-based test
TOEFL IBT	Test of English as a foreign language internet-based test
TOEFL PB	Test of English as a foreign language paper-based test
TOEIC	Test of English for international communication
TR	Track
TTF	Trend type forecast
TWS	Take-off warning system
UAS	Undesired aircraft states
UHF	Ultra high frequency
USB	Upper side band
UTC	Universal time coordinate
VASI	Visual approach slope indicator
VFR	Visual flight rules
VHF	Very high frequency
VIS	Visibility
VMC	Visual metrological conditions
VMO	Velocity maximum operating
VNAV	Vertical navigation
VNE	Velocity never exceed
VNO	Velocity normal operating
VOLMET	Metrological information for aircraft in flight
VOR	Very high-frequency omni-directional range
VS	Vertical speed
VSI	Vertical speed indicator
VTC	Visual terminal chart
W/V	Wind velocity
WAAS	Wide area augmentation system
WAC	World aeronautical chart
WX	Weather
ZFW	Zero fuel weight

Schedule 1 Directory of units of competency and units of knowledge

The following Table of Contents and Index of Competency Unit codes are for guidance only and are not part of the Schedule.

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Section B General

Language proficiency

Appendix B.1 General English language proficiency

Standards

Unit code	Unit of competency
GEL	General English language proficiency

Appendix B.2 Aviation English language proficiency

Standards

Unit code	Unit of competency
AEL	Aviation English language proficiency

Multi-crew cooperation

Appendix B.3 Multi-crew cooperation (MCC)

Aeronautical knowledge standards

Unit code	Unit of competency
AHFC	ATPL Human factors

See relevant underpinning knowledge in the Unit of competency

Practical flight standards

Unit code	Unit of competency
MCO	Manage flight during multi-crew operations

Airborne Collision Avoidance System (ACAS)

Appendix B.4 Airborne Collision Avoidance System (ACAS)

Aeronautical knowledge standards – reserved

Practical flight standards

Unit code	Unit of competency
CAS	Operate Airborne Collision Avoidance System (ACAS)

Aeronautical radio operator (CASR Part 64)

Appendix B.5 Aeronautical radio operator (CASR Part 64)

Aeronautical knowledge standards

Unit code	Unit of competency
RARO	Aeronautical radio operation

Practical flight standards

Unit code	Unit of competency
C3	Operate aeronautical radio

Section G Recreational pilot licence (RPL)

Appendix G.1 Aeroplane category rating (RPL)

Aeronautical knowledge standards

Unit code	Unit of knowledge
BAKC	Basic aeronautical knowledge
RFRC	RPL Flight rules and air law
RMTC	RPL Meteorology
PHFC	PPL Human factors
RBKA	Basic aeronautical knowledge – aeroplane

Practical flight standards – aeroplane category rating

Unit code	Unit of competency
C1	Communicating in the aviation environment
C2	Perform pre- and post-flight actions and procedures
C4	Manage fuel
C5	Manage passengers and cargo
NTS1	Non-technical skills 1
NTS2	Non-technical skills 2
A1	Control aeroplane on the ground
A2	Take-off aeroplane
A3	Control aeroplane in normal flight
A4	Land an aeroplane
A5	Aeroplane advanced manoeuvres
A6	Manage abnormal situations – single-engine aeroplanes
IFF	Instrument flight full panel

Appendix G.2 Helicopter category rating (RPL)

Aeronautical knowledge standards

Unit code	Unit of knowledge
BAKC	Basic aeronautical knowledge
RFRC	RPL Flight rules and air law
PHFC	PPL Human factors
RBKH	Basic aeronautical knowledge – helicopter

Practical flight standards – helicopter category

Unit code	Unit of competency
C1	Communicating in the aviation environment

Unit code	Unit of competency
C2	Perform pre- and post-flight actions and procedures
C4	Manage fuel
C5	Manage passengers and cargo
NTS1	Non-technical skills 1
NTS2	Non-technical skills 2
H1	Control helicopter on the ground – stationary
H2	Control helicopter in lift-off, hover and landing
H3	Taxi helicopter
H4	Take-off helicopter and approach to hover
H5	Control helicopter in normal flight
H6	Control helicopter during advanced manoeuvres
H7	Manage abnormal situations and emergencies – helicopter

Appendix G.3 Gyroplane category rating (RPL) – *Reserved*

Appendix G.4 Airship category rating (RPL) – *Reserved*

Appendix G.5 Controlled aerodrome endorsement

Practical flight standards

Unit code	Unit of competency
CTR	Operate at a controlled aerodrome

Appendix G.6 Controlled airspace endorsement

Practical flight standards

Unit code	Unit of competency
CTA	Operate in controlled airspace

Appendix G.7 Flight radio endorsement

Aeronautical knowledge standards

Unit code	Unit of competency
RARO	Aeronautical radio operation

Practical flight standards

Unit code	Unit of competency
C1	Communicating in the aviation environment

Unit code	Unit of competency
C3	Operate aeronautical radio

Appendix G.8 Recreational navigation endorsement

Practical flight standards

Unit code	Unit of competency
C1	Communicating in the aviation environment
NAV	Navigate aircraft
ONTA	Operate at non-towered aerodrome
OGA	Operate in Class G airspace

Section H Private pilot licence (PPL)

Appendix H.1 Aeroplane category rating (PPL)

Aeronautical knowledge standards

Unit code	Unit of knowledge
BAKC	Basic aeronautical knowledge
RFRC	RPL Flight rules and air law
RMTC	RPL Meteorology
PHFC	PPL Human factors
RBKA	Basic aeronautical knowledge – aeroplane
PAKC	PPL Aeronautical knowledge
PFRC	PPL Flight rules and air law
PHFC	PPL Human factors
PNVC	PPL Navigation
PMTC	PPL Meteorology
POPC	PPL Ops, performance and planning
PAKA	PPL Aeronautical knowledge – aeroplane
PFRA	PPL Flight rules and air law – aeroplane
POPA	PPL Ops, performance and planning – aeroplane

Practical flight standards

Unit code	Unit of competency
C1	Communicating in the aviation environment
C2	Perform pre- and post-flight actions and procedures
C3	Operate aeronautical radio
C4	Manage fuel
C5	Manage passengers and cargo
NTS1	Non-technical skills 1
NTS2	Non-technical skills 2
NAV	Navigate aircraft
A1	Control aeroplane on the ground
A2	Take off
A3	Control aeroplane in normal flight
A4	Land an aeroplane
A5	Aeroplane advanced manoeuvres
A6	Manage abnormal situations – single-engine aeroplanes
IFF	Instrument flight full panel
RNE	Radio navigation – en route

Unit code	Unit of competency
ONTA	Operate at non-towered aerodrome
OGA	Operate in Class G airspace
CTR	Operate at a controlled aerodrome
CTA	Operate in controlled airspace

Appendix H.2 Helicopter category rating (PPL) — Integrated training

Aeronautical knowledge standards

Unit code	Unit of knowledge
BAKC	Basic aeronautical knowledge
RFRC	RPL Flight rules and air law
PHFC	PPL Human factors
RBKH	Basic aeronautical knowledge – helicopter
PAKC	PPL Aeronautical knowledge
PFRC	PPL Flight rules and air law
PHFC	PPL Human factors
PNVC	PPL Navigation
PMTC	PPL Meteorology
POPC	PPL Ops performance and planning
PAKH	PPL Aeronautical knowledge – helicopter
PFRH	PPL Flight rules and air law – helicopter
POPH	PPL Ops, performance and planning – helicopter

Practical flight standards

Unit code	Unit of competency
C1	Communicating in aviation environment
C2	Perform pre- and post-flight actions and procedures
C3	Operate aeronautical radio
C4	Manage fuel
C5	Manage passengers and cargo
NTS1	Non-technical skills 1
NTS2	Non-technical skills 2
NAV	Navigate aircraft
H1	Control helicopter on the ground – stationary
H2	Control helicopter in lift-off, hover and landing
H3	Taxi helicopter
H4	Take-off helicopter and approach to hover

Unit code	Unit of competency
H5	Control helicopter in normal flight
H6	Control helicopter during advanced manoeuvres
H7	Manage abnormal situations and emergencies – helicopter
IFF	Instrument flight full panel
RNE	Radio navigation – en route
ONTA	Operate at non-towered aerodrome
OGA	Operate in Class G airspace
CTR	Operate at a controlled aerodrome
CTA	Operate in controlled airspace

Appendix H.2A Helicopter category rating (PPL) — Non-integrated training

Aeronautical knowledge standards

Unit code	Unit of knowledge
BAKC	Basic aeronautical knowledge
RFRC	RPL Flight rules and air law
PHFC	PPL Human factors
RBKH	Basic aeronautical knowledge – helicopter
PAKC	PPL Aeronautical knowledge
PFRC	PPL Flight rules and air law
PHFC	PPL Human factors
PNVC	PPL Navigation
PMTC	PPL Meteorology
POPC	PPL Ops performance and planning
PAKH	PPL Aeronautical knowledge – helicopter
PFRH	PPL Flight rules and air law – helicopter
POPH	PPL Ops, performance and planning – helicopter

Practical flight standards

Unit code	Unit of competency
C1	Communicating in aviation environment
C2	Perform pre- and post-flight actions and procedures
C3	Operate aeronautical radio
C4	Manage fuel
C5	Manage passengers and cargo
NTS1	Non-technical skills 1
NTS2	Non-technical skills 2

Unit code	Unit of competency
NAV	Navigate aircraft
H1	Control helicopter on the ground – stationary
H2	Control helicopter in lift-off, hover and landing
H3	Taxi helicopter
H4	Take-off helicopter and approach to hover
H5	Control helicopter in normal flight
H6	Control helicopter during advanced manoeuvres
H7	Manage abnormal situations and emergencies – helicopter
RNE	Radio navigation – en route
ONTA	Operate at non-towered aerodrome
OGA	Operate in Class G airspace
CTR	Operate at a controlled aerodrome
CTA	Operate in controlled airspace

Appendix H.3 Powered-lift category rating (PPL) – *Reserved*

Appendix H.4 Gyroplane category rating (PPL) – *Reserved*

Appendix H.5 Airship category rating (PPL) – *Reserved*

Section I Commercial pilot licence (CPL)

Appendix I.1 Aeroplane category rating (CPL)

Aeronautical knowledge standards

Unit code	Unit of knowledge
BAKC	Basic aeronautical knowledge
RFRC	RPL Flight rules and air law
RMTC	RPL Meteorology
PHFC	PPL Human factors
RBKA	Basic aeronautical knowledge – aeroplane
PAKC	PPL Aeronautical knowledge
PFRC	PPL Flight rules and air law
PHFC	PPL Human factors
PNVC	PPL Navigation
PMTC	PPL Meteorology
POPC	PPL Ops, performance and planning
PAKA	PPL Aeronautical knowledge – aeroplane
PFRA	PPL Flight rules and air law – aeroplane
POPA	PPL Ops, performance and planning – aeroplane
CAKC	CPL Aeronautical knowledge
CADC	CPL Aerodynamics
CFRC	CPL Flight rules and air law
CHFC	CPL Human factors
CNVC	CPL Navigation
CMTC	CPL Meteorology
COPC	CPL Ops, performance and planning
CAKA	CPL Aeronautical knowledge – aeroplane
CADA	CPL Aerodynamics – aeroplane
CFRA	CPL Flight rules and air law – aeroplane
COPA	CPL Ops, performance and planning – aeroplane

Practical flight standards

Unit code	Unit of competency
C1	Communicating in the aviation environment
C2	Perform pre- and post-flight actions and procedures
C3	Operate aeronautical radio
C4	Manage fuel
C5	Manage passengers and cargo

Unit code	Unit of competency
NTS1	Non-technical skills 1
NTS2	Non-technical skills 2
NAV	Navigate aircraft
A1	Control aeroplane on the ground
A2	Take-off aeroplane
A3	Control aeroplane in normal flight
A4	Land aeroplane
A5	Aeroplane advanced manoeuvres
A6	Manage abnormal situations – single-engine aeroplanes
IFF	Instrument flight full panel
IFL	Limited instrument panel manoeuvres
RNE	Radio navigation – en route
ONTA	Operate at non-towered aerodrome
OGA	Operate in Class G airspace
CTR	Operate at a controlled aerodrome
CTA	Operate in controlled airspace

Appendix I.2 Helicopter category rating (CPL) — Integrated training

Aeronautical knowledge standards

Unit code	Unit of knowledge
BAKC	Basic aeronautical knowledge
RFRC	RPL Flight rules and air law
PHFC	PPL Human factors
RBKH	Basic aeronautical knowledge – helicopter
PAKC	PPL Aeronautical knowledge
PFRC	PPL Flight rules and air law
PHFC	PPL Human factors
PNVC	PPL Navigation
PMTC	PPL Meteorology
POPC	PPL Ops performance and planning
PAKH	PPL Aeronautical knowledge – helicopter
PFRH	PPL Flight rules and air law – helicopter
POPH	PPL Ops, performance and planning – helicopter
CAKC	CPL Aeronautical knowledge
CADC	CPL Aerodynamics
CFRC	CPL Flight rules and air law

Unit code	Unit of knowledge
CHFC	CPL Human factors
CNVC	CPL Navigation
CMTC	CPL Meteorology
COPC	CPL Ops, performance and planning
CAKH	CPL Aeronautical knowledge – helicopter
CADH	CPL Aerodynamics – helicopter
CFRH	CPL Flight rules and air law – helicopter
COPH	CPL Ops, performance and planning – helicopter

Practical flight standards

Unit code	Unit of competency
C1	Communicating in the aviation environment
C2	Perform pre- and post-flight actions and procedures
C3	Operate aeronautical radio
C4	Manage fuel
C5	Manage passengers and cargo
NTS1	Non-technical skills 1
NTS2	Non-technical skills 2
NAV	Navigate aircraft
H1	Control helicopter on the ground – stationary
H2	Control helicopter in lift-off, hover and landing
H3	Taxi helicopter
H4	Take-off helicopter and approach to hover
H5	Control helicopter in normal flight
H6	Control helicopter during advanced manoeuvres
H7	Manage abnormal situations and emergencies – helicopter
IFF	Instrument flight full panel
IFL	Limited instrument panel manoeuvres
RNE	Radio navigation – en route
ONTA	Operate at non-towered aerodrome
OGA	Operate in Class G airspace
CTR	Operate at a controlled aerodrome
CTA	Operate in controlled airspace

Appendix I.2A Helicopter category rating (CPL) — Non-integrated training

Aeronautical knowledge standards

Unit code	Unit of knowledge
BAKC	Basic aeronautical knowledge
RFRC	RPL Flight rules and air law
PHFC	PPL Human factors
RBKH	Basic aeronautical knowledge – helicopter
PAKC	PPL Aeronautical knowledge
PFRC	PPL Flight rules and air law
PHFC	PPL Human factors
PNVC	PPL Navigation
PMTC	PPL Meteorology
POPC	PPL Ops performance and planning
PAKH	PPL Aeronautical knowledge – helicopter
PFRH	PPL Flight rules and air law – helicopter
POPH	PPL Ops, performance and planning – helicopter
CAKC	CPL Aeronautical knowledge
CADC	CPL Aerodynamics
CFRC	CPL Flight rules and air law
CHFC	CPL Human factors
CNVC	CPL Navigation
CMTC	CPL Meteorology
COPC	CPL Ops, performance and planning
CAKH	CPL Aeronautical knowledge – helicopter
CADH	CPL Aerodynamics – helicopter
CFRH	CPL Flight rules and air law – helicopter
COPH	CPL Ops, performance and planning – helicopter

Practical flight standards

Unit code	Unit of competency
C1	Communicating in the aviation environment
C2	Perform pre- and post-flight actions and procedures
C3	Operate aeronautical radio
C4	Manage fuel
C5	Manage passengers and cargo
NTS1	Non-technical skills 1
NTS2	Non-technical skills 2

Unit code	Unit of competency
NAV	Navigate aircraft
H1	Control helicopter on the ground – stationary
H2	Control helicopter in lift-off, hover and landing
H3	Taxi helicopter
H4	Take-off helicopter and approach to hover
H5	Control helicopter in normal flight
H6	Control helicopter during advanced manoeuvres
H7	Manage abnormal situations and emergencies – helicopter
RNE	Radio navigation – en route
ONTA	Operate at non-towered aerodrome
OGA	Operate in Class G airspace
CTR	Operate at a controlled aerodrome
CTA	Operate in controlled airspace

Appendix I.3 Powered-lift category rating (CPL) – *Reserved*

Appendix I.4 Gyroplane category rating (CPL) – *Reserved*

Appendix I.5 Airship category rating (CPL) – *Reserved*

Section J Multi crew Pilot Licence (MPL)

Appendix J.1 Aeroplane category rating (MPL)

Aeronautical knowledge standards

Unit code	Unit of knowledge
BAKC	Basic aeronautical knowledge
RFRC	RPL Flight rules and air law
RMTC	RPL Meteorology
PHFC	PPL Human factors
RBKA	Basic aeronautical knowledge – aeroplane
PAKC	PPL Aeronautical knowledge
PFRC	PPL Flight rules and air law
PHFC	PPL Human factors
PNVC	PPL Navigation
PMTC	PPL Meteorology
POPC	PPL Ops, performance and planning
PAKA	PPL Aeronautical knowledge – aeroplane
PFRA	PPL Flight rules and air law – aeroplane
POPA	PPL Ops, performance and planning – aeroplane
CAKC	CPL Aeronautical knowledge
CADC	CPL Aerodynamics
CFRC	CPL Flight rules and air law
CHFC	CPL Human factors
CNVC	CPL Navigation
CMTC	CPL Meteorology
COPC	CPL Ops, performance and planning
CAKA	CPL Aeronautical knowledge – aeroplane
CADA	CPL Aerodynamics – aeroplane
CFRA	CPL Flight rules and air law – aeroplane
COPA	CPL Ops, performance and planning – aeroplane
AAGC	ATP Aircraft general knowledge – common
AAGA	ATP Aircraft general knowledge – aeroplane
AFRC	ATP Flight rules and air law – common
AFRA	ATP Flight rules and air law – aeroplane
AHFC	ATP Human factors
ANVC	ATP Navigation – common
ANVA	ATP Navigation – aeroplane

Unit code	Unit of knowledge
AMTC	ATP Meteorology – common
AMTA	ATP Meteorology – aeroplane
AFPC	ATP Flight planning – common
AFPA	ATP Flight planning – aeroplane
APLC	ATP Performance and loading – common
APLA	ATP Performance and loading – aeroplane
IREX	Instrument rating

Practical flight standards

Unit code	Unit of competency
C1	Communicating in the aviation environment
C3	Operate aeronautical radio
C2	Perform pre- and post-flight actions and procedures
NTS1	Non-technical skills 1
NTS2	Non-technical skills 2
C5	Manage passengers and cargo
IFF	Full instrument panel manoeuvres
IFL	Limited instrument panel manoeuvres
NAV	Navigate aircraft
RNE	Radio navigation – en route
MCO	Manage flight during multi-crew operations
CIR	Conduct an IFR flight
TR-MEA	Type rating multi-engine aeroplane
IAP2	Conduct an instrument approach 2D
IAP3	Conduct an instrument approach 3D

Section K Air transport pilot licence (ATPL)

Appendix K.1 Aeroplane category rating (ATPL)

Aeronautical knowledge standards

Unit code	Unit of knowledge
AAGC	ATP Aircraft general knowledge – common
AAGA	ATP Aircraft general knowledge – aeroplane
AFRC	ATP Flight rules and air law – common
AFRA	ATP Flight rules and air law – aeroplane
AHFC	ATP Human factors
ANVC	ATP Navigation – common
AMTC	ATP Meteorology – common
AFPC	ATP Flight planning – common
AFPA	ATP Flight planning – aeroplane
APLC	ATP Performance and loading – common
APLA	ATP Performance and loading – aeroplane
IREX	Instrument rating

Practical flight standards

Unit code	Unit of competency
C2	Perform pre- and post-flight actions and procedures
C3	Operate aeronautical radio
C5	Manage passengers and cargo
NTS1	Non-technical skills 1
NTS2	Non-technical skills 2
IFF	Full instrument panel manoeuvres
IFL	Limited instrument panel manoeuvres
RNE	Radio navigation – en route
MCO	Manage flight during multi-crew operations
CIR	Conduct an IFR flight
IAP2	Conduct an instrument approach 2D
IAP3	Conduct an instrument approach 3D
TR-MEA	Type rating multi-engine aeroplane

Appendix K.2 Helicopter category rating (ATPL)

Aeronautical knowledge standards

Unit code	Unit of knowledge
AAGC	ATP Aircraft general knowledge – common

Unit code	Unit of knowledge
AAGH	ATP Aircraft general knowledge – helicopter
AFRC	ATP Flight rules and air law – common
AFRH	ATP Flight rules and air law – helicopter
AHFC	ATP Human factors
ANVC	ATP Navigation – common
AMTC	ATP Meteorology – common
AFPC	ATP Flight planning – common
AFPH	ATP Flight planning – helicopter
APLC	ATP Performance and loading – common
APLH	ATP Performance and loading – helicopter

Practical flight standards

Unit code	Unit of competency
C2	Perform pre- and post-flight actions and procedures
C3	Operate aeronautical radio
C5	Manage passengers and cargo
NTS1	Non-technical skills 1
NTS2	Non-technical skills 2
IFF	Full instrument panel manoeuvres
IFL	Limited instrument panel manoeuvres
NAV	Navigate aircraft
RNE	Radio navigation – en route
MCO	Manage flight during multi-crew operations
HSE	Helicopter single-engine class/type rating
HME	Helicopter multi-engine type rating

Appendix K.3 Powered-lift category rating (ATPL) – *Reserved*

Section L Aircraft ratings and endorsements

Pilot class ratings and design feature endorsements

Appendix L.1 Single-engine aeroplane class rating

Practical flight standards

Unit code	Unit of competency
C2	Perform pre- and post-flight actions and procedures
C4	Manage fuel
NTS1	Non-technical skills 1
NTS2	Non-technical skills 2
A1	Control aeroplane on the ground
A2	Take-off aeroplane
A3	Control aeroplane in normal flight
A4	Land aeroplane
A5	Aeroplane advanced manoeuvres
A6	Manage abnormal situations – single-engine aeroplanes

Appendix L.2 Single-engine helicopter class rating

Practical flight standards

Unit code	Unit of competency
C2	Perform pre- and post-flight actions and procedures
C4	Manage fuel
NTS1	Non-technical skills 1
NTS2	Non-technical skills 2
H1	Control helicopter on the ground – stationary
H2	Control helicopter in lift-off, hover and landing
H3	Taxi helicopter
H4	Take-off helicopter and approach to hover
H5	Control helicopter in normal flight
H6	Control helicopter during advanced manoeuvres
H7	Manage abnormal situations and emergencies – helicopter

Appendix L.3 Single-engine gyroplane class rating

Practical flight standards

Unit code	Unit of competency
GSE	Gyroplane single engine
NTS1	Non-technical skills 1

Unit code	Unit of competency
NTS2	Non-technical skills 2

Appendix L.4 Multi-engine aeroplane class rating

Practical flight standards

Unit code	Unit of competency
C2	Perform pre- and post-flight actions and procedures
NTS1	Non-technical skills 1
NTS2	Non-technical skills 2
A1	Control aeroplane on the ground
A2	Take off
A3	Control aeroplane in normal flight
A4	Land aeroplane
A5	Aeroplane advanced manoeuvres
IFF	Instrument flight full panel
AME	Operate multi-engine aeroplane

Design feature endorsements

Appendix L.5 Tailwheel undercarriage endorsement

Practical flight standards

Unit code	Unit of competency
DFE1	Tailwheel aeroplane

Appendix L.6 Retractable undercarriage endorsement

Practical flight standards

Unit code	Unit of competency
DFE2	Retractable undercarriage

Appendix L.7 Manual propeller pitch control endorsement

Practical flight standards

Unit code	Unit of competency
DFE3	Manual propeller pitch control

Appendix L.8 Gas turbine engine endorsement

Practical flight standards

Unit code	Unit of competency
DFE4	Gas turbine engine

Appendix L.9 Multi-engine Centreline thrust endorsement

Practical flight standards

Unit code	Unit of competency
DFE5	Multi-engine centreline thrust aeroplane

Appendix L.10 Pressurisation system endorsement

Practical flight standards

Unit code	Unit of competency
DFE6	Pressurisation system

Appendix L.11 Floating hull endorsement

Practical flight standards

Unit code	Unit of competency
DFE7	Floating hull

Appendix L.12 Floatplane endorsement

Practical flight standards

Unit code	Unit of competency
DFE8	Floatplane and amphibious aircraft

Appendix L.13 Float alighting gear endorsement

Practical flight standards

Unit code	Unit of competency
DFE9	Helicopter float alighting gear

Pilot type ratings

Appendix L.14 Single-engine aeroplane type rating

Aeronautical knowledge standards

Unit code	Unit of knowledge
TYPA	Type rating – single-engine aeroplane

Practical flight standards

Unit code	Unit of competency
TR-SEA	Type rating – single-engine aeroplane
NTS1	Non-technical skills 1
NTS2	Non-technical skills 2

Appendix L.15 Single-engine helicopter type rating

Aeronautical knowledge standards

Unit code	Unit of knowledge
TYPH	Type rating – helicopter

Practical flight standards

Unit code	Unit of competency
TR-SEH	Type rating single-engine helicopter
NTS1	Non-technical skills 1
NTS2	Non-technical skills 2

Appendix L.16 Multi-engine aeroplane type rating

Aeronautical knowledge standards

Unit code	Unit of knowledge
TYPA	Type rating – aeroplane

Practical flight standards

Unit code	Unit of competency
AME	Operate multi-engine aeroplane
TR-MEA	Type rating – multi-engine aeroplane
NTS1	Non-technical skills 1
NTS2	Non-technical skills 2

Appendix L.17 Multi-engine helicopter type rating

Aeronautical knowledge standards

Unit code	Unit of knowledge
TYPH	Type rating – helicopter

Practical flight standards

Unit code	Unit of competency
TR-MEH	Type rating multi-engine helicopter
NTS1	Non-technical skills 1
NTS2	Non-technical skills 2

Appendix L.18 Cruise relief aeroplane type rating

Aeronautical knowledge standards

Unit code	Unit of knowledge
TYPA	Type rating – aircraft

Practical flight standards

Unit code	Unit of competency
CRT	Cruise relief type rating
NTS1	Non-technical skills 1
NTS2	Non-technical skills 2

Section M Instrument rating and endorsements

Appendix M.1 Instrument rating

Aeronautical knowledge standards

Unit code	Unit of knowledge
IREX	Instrument rating
GNSS	Basic GNSS and en route GNSS navigation principles

Appendix M.2 Single-engine aeroplane instrument endorsement

Practical flight standards

Unit code	Unit of competency
NTS1	Non-technical skills 1
NTS2	Non-technical skills 2
IFF	Full instrument panel manoeuvres
IFL	Limited instrument panel manoeuvres
CIR	Conduct an IFR flight
NVR1	Conduct a traffic pattern at night
NVR2	Night VFR – single-engine aircraft
IAP2	Conduct an instrument approach 2D

Appendix M.3 Multi-engine aeroplane instrument endorsement

Practical flight standards

Unit code	Unit of competency
NTS1	Non-technical skills 1
NTS2	Non-technical skills 2
IFF	Full instrument panel manoeuvres
IFL	Limited instrument panel manoeuvres
CIR	Conduct an IFR flight
NVR1	Conduct a traffic pattern at night
NVR3	Night VFR – multi-engine aircraft
IAP2	Conduct an instrument approach 2D

Appendix M.4 Single-engine helicopter instrument endorsement

Practical flight standards

Unit code	Unit of competency
NTS1	Non-technical skills 1
NTS2	Non-technical skills 2

IFF	Full instrument panel manoeuvres
IFL	Limited instrument panel manoeuvres
CIR	Conduct an IFR flight
NVR1	Conduct a traffic pattern at night
NVR2	Night VFR – single-engine aircraft
IAP2	Conduct an instrument approach 2D

Appendix M.5 Multi-engine helicopter instrument endorsement

Practical flight standards

Unit code	Unit of competency
NTS1	Non-technical skills 1
NTS2	Non-technical skills 2
IFF	Full instrument panel manoeuvres
IFL	Limited instrument panel manoeuvres
CIR	Conduct an IFR flight
NVR1	Conduct a traffic pattern at night
NVR3	Night VFR – multi-engine aircraft
IAP2	Conduct an instrument approach 2D

Appendix M.6 Powered-lift aircraft instrument endorsement – *Reserved*

Appendix M.7 Gyroplane instrument endorsement – *Reserved*

Appendix M.8 Airship instrument endorsement – *Reserved*

Appendix M.9 IAP 2D instrument endorsement

Practical flight standards

Unit code	Unit of competency
IAP2	Conduct an instrument approach 2D

Appendix M.10IAP 3D instrument endorsement

Practical flight standards

Unit code	Unit of competency
IAP3	Conduct an instrument approach 3D

Section N Private instrument ratings and endorsements

Appendix N.1 Private instrument ratings (PIFR)

Aeronautical knowledge standards

Unit code	Unit of knowledge
PIFR	Private IFR rating
GNSS	Basic GNSS and en route GNSS navigation principles

Appendix N.2 Single-engine aeroplane private instrument endorsement

Practical flight standards

Unit code	Unit of competency
NTS1	Non-technical skills 1
NTS2	Non-technical skills 2
IFF	Full instrument panel manoeuvres
IFL	Limited instrument panel manoeuvres
PIF	Conduct a private IFR flight

Appendix N.3 Multi-engine aeroplane private instrument endorsement

Practical flight standards

Unit code	Unit of competency
NTS1	Non-technical skills 1
NTS2	Non-technical skills 2
IFF	Full instrument panel manoeuvres
IFL	Limited instrument panel manoeuvres
PIF	Conduct a private IFR flight

Appendix N.4 Single-engine helicopter private instrument endorsement

Practical flight standards

Unit code	Unit of competency
NTS1	Non-technical skills 1
NTS2	Non-technical skills 2
IFF	Full instrument panel manoeuvres
IFL	Limited instrument panel manoeuvres
PIF	Conduct a private IFR flight

Appendix N.5 Multi-engine helicopter private instrument endorsement

Practical flight standards

Unit code	Unit of competency

NTS1	Non-technical skills 1
NTS2	Non-technical skills 2
IFF	Full instrument panel manoeuvres
IFL	Limited instrument panel manoeuvres
PIF	Conduct a private IFR flight

Appendix N.6 Navigation – NDB private instrument endorsement

Practical flight standards

Unit code	Unit of competency
PIF	Conduct a private IFR flight

Appendix N.7 Navigation – VOR/LLZ private instrument endorsement

Practical flight standards

Unit code	Unit of competency
PIF	Conduct a private IFR flight

Appendix N.8 Navigation – GNSS private instrument endorsement

Practical flight standards

Unit code	Unit of competency
PIF	Conduct a private IFR flight

Appendix N.9 Departure – Single-engine aircraft private instrument endorsement

Practical flight standards

Unit code	Unit of competency
PIF	Conduct a private IFR flight

Appendix N.10 Departure – Multi-engine aeroplane private instrument endorsement

Practical flight standards

Unit code	Unit of competency
PIF	Conduct a private IFR flight

Appendix N.11 Departure – Multi-engine helicopter private instrument endorsement

Practical flight standards

Unit code	Unit of competency
PIF	Conduct a private IFR flight

Appendix N.12 Standard instrument departure private instrument endorsement

Practical flight standards

Unit code	Unit of competency
PIF	Conduct a private IFR flight

Appendix N.13 STAR private instrument endorsement

Practical flight standards

Unit code	Unit of competency
PIF	Conduct a private IFR flight

Appendix N.14 Approach – NDB private instrument endorsement

Practical flight standards

Unit code	Unit of competency
IAP2	Conduct an instrument approach 2D

Appendix N.15 Approach – VOR/LLZ private instrument endorsement

Practical flight standards

Unit code	Unit of competency
IAP2	Conduct an instrument approach 2D

Appendix N.16 Approach – DME or GNSS Arrival private instrument endorsement

Practical flight standards

Unit code	Unit of competency
IAP2	Conduct an instrument approach 2D

Appendix N.17 Approach – RNP APCH 2D private instrument endorsement

Practical flight standards

Unit code	Unit of competency
IAP2	Conduct an instrument approach 2D

Appendix N.18 Approach – RNP APCH 3D private instrument endorsement

Practical flight standards

Unit code	Unit of competency
IAP3	Conduct an instrument approach 3D

Appendix N.19 Approach – ILS private instrument endorsement

Practical flight standards

Unit code	Unit of competency
IAP3	Conduct an instrument approach 3D

Appendix N.20 Approach and landing – multi-engine aeroplane private instrument endorsement

Practical flight standards

Unit code	Unit of competency
PIF	Conduct a private IFR Flight

Appendix N.21 Approach and landing – multi-engine helicopter private instrument endorsement

Practical flight standards

Unit code	Unit of competency
PIF	Conduct a private IFR flight

Appendix N.22 Night private instrument endorsement

Practical flight standards

Unit code	Unit of competency
PIF	Conduct a private IFR flight
NVR1	Conduct a traffic pattern at night
NVR2	Night VFR — single-engine aircraft
NVR3	Night VFR — multi-engine aircraft

Section O Night VFR (NVFR) rating and endorsements

Appendix O.1 NVFR rating

Aeronautical knowledge standards – *Reserved*

Appendix O.2 Single-engine aeroplane NVFR endorsement

Practical flight standards

Unit code	Unit of competency
NTS1	Non-technical skills 1
NTS2	Non-technical skills 2
IFF	Full instrument panel manoeuvres
IFL	Limited instrument panel manoeuvres
NVR1	Conduct a traffic pattern at night
NVR2	Night VFR — single-engine aircraft

Appendix O.3 Multi-engine aeroplane NVFR endorsement

Practical flight standards

Unit code	Unit of competency
NTS1	Non-technical skills 1
NTS2	Non-technical skills 2
IFF	Full instrument panel manoeuvres
IFL	Limited instrument panel manoeuvres
NVR1	Conduct a traffic pattern at night
NVR3	Night VFR — multi-engine aircraft

Appendix O.4 Helicopter NVFR endorsement

Practical flight standards

Unit code	Unit of competency
NTS1	Non-technical skills 1
NTS2	Non-technical skills 2
IFF	Full instrument panel manoeuvres
IFL	Limited instrument panel manoeuvres
NVR1	Conduct a traffic pattern at night
NVR2	Night VFR – single-engine aircraft

Appendix O.5 Powered-lift aircraft NVFR endorsement – *Reserved*

Appendix O.6 Gyroplane NVFR endorsement

Practical flight standards

Unit code	Unit of competency
NTS1	Non-technical skills 1
NTS2	Non-technical skills 2
IFF	Full instrument panel manoeuvres
IFL	Limited instrument panel manoeuvres
NVR1	Conduct a traffic pattern at night
NVR2	Night VFR — single-engine aircraft

Appendix O.7 Airship NVFR endorsement – *Reserved*

Section P Night vision imaging system (NVIS) rating and endorsements

Appendix P.1 NVIS rating

Aeronautical knowledge standards

Unit code	Unit of knowledge
NVIS	NVIS rating

Appendix P.2 Grade 1 NVIS endorsement

Practical flight standards

Unit code	Unit of competency
NTS1	Non-technical skills 1
NTS2	Non-technical skills 2
NVI	NVIS operation

Appendix P.3 Grade 2 NVIS endorsement

Practical flight standards

Unit code	Unit of competency
NTS1	Non-technical skills 1
NTS2	Non-technical skills 2
NVI	NVIS operation

Section Q Low-level rating and endorsements

Appendix Q.0 Low-level rating

Aeronautical knowledge standards

Unit code	Unit of knowledge
LLLR	Low-level rating

Appendix Q.1 Aeroplane low-level endorsement

Practical flight standards

Unit code	Unit of competency
NTS1	Non-technical skills 1
NTS2	Non-technical skills 2
LL-A	Aeroplane low-level operations

Appendix Q.2 Helicopter low-level endorsement

Practical flight standards

Unit code	Unit of competency
NTS1	Non-technical skills 1
NTS2	Non-technical skills 2
LL-H	Helicopter low-level operations

Appendix Q.3 Powered-lift aircraft low-level endorsement – *Reserved*

Appendix Q.4 Gyroplane low-level endorsement

Practical flight standards

Unit code	Unit of competency
NTS1	Non-technical skills 1
NTS2	Non-technical skills 2
LL-G	Gyroplane low-level operations

Appendix Q.5 Aerial mustering – aeroplane endorsement

Practical flight standards

Unit code	Unit of competency
NTS1	Non-technical skills 1
NTS2	Non-technical skills 2
LL-A	Aeroplane low-level operations
LL-M	Aerial mustering operations

Appendix Q.6 Aerial mustering – helicopter endorsement

Practical flight standards

Unit code	Unit of competency
NTS1	Non-technical skills 1
NTS2	Non-technical skills 2
LL-H	Helicopter low-level operations
LL-M	Aerial mustering operations

Appendix Q.7 Aerial mustering – gyroplane endorsement – *Reserved*

Appendix Q.8 Sling operations endorsement

Practical flight standards

Unit code	Unit of competency
NTS1	Non-technical skills 1
NTS2	Non-technical skills 2
LL-H	Helicopter low-level operations
LL-SO	Sling operations

Appendix Q.9 Winch and rappelling operations endorsement

Practical flight standards

Unit code	Unit of competency
NTS1	Non-technical skills 1
NTS2	Non-technical skills 2
LL-H	Helicopter low-level operations
LL-WR	Winch and rappelling operations

Section R Aerial application rating and endorsements

Appendix R.0 Aerial application rating

Aeronautical knowledge standards

Unit code	Unit of knowledge
AAGR	Aerial application rating

Appendix R.1 Aeroplane aerial application endorsement

Aeronautical knowledge standards

Unit code	Unit of knowledge
AAGA	Aerial application rating — aeroplane

Practical flight standards

Unit code	Unit of competency
NTS1	Non-technical skills 1
NTS2	Non-technical skills 2
LL-A	Aeroplane low-level operations
AA1	Aeroplane aerial application operation

Appendix R.2 Helicopter aerial application endorsement

Aeronautical knowledge standards

Unit code	Unit of knowledge
AAGH	Aerial application rating — helicopter

Practical flight standards

Unit code	Unit of competency
NTS1	Non-technical skills 1
NTS2	Non-technical skills 2
LL-H	Helicopter low-level operations
AA2	Helicopter aerial application operation

Appendix R.3 Gyroplane aerial application endorsement

Practical flight standards

Unit code	Unit of competency
NTS1	Non-technical skills 1
NTS2	Non-technical skills 2
AA3	Gyroplane aerial application operation

Appendix R.4 Aeroplane firefighting endorsement

Practical flight standards

Unit code	Unit of competency
NTS1	Non-technical skills 1
NTS2	Non-technical skills 2
LL-A	Aeroplane low-level operations
AA4	Aeroplane firefighting operation

Appendix R.5 Helicopter firefighting endorsement

Practical flight standards

Unit code	Unit of competency
NTS1	Non-technical skills 1
NTS2	Non-technical skills 2
LL-H	Helicopter low-level operations
AA5	Helicopter firefighting operation

Appendix R.6 Night aeroplane aerial application endorsement

Practical flight standards

Unit code	Unit of competency
NTS1	Non-technical skills 1
NTS2	Non-technical skills 2
NVR2	Night VFR – single-engine aircraft
AA6	Night aerial application operation

Appendix R.7 Night helicopter aerial application endorsement

Practical flight standards

Unit code	Unit of competency
NTS1	Non-technical skills 1
NTS2	Non-technical skills 2
NVR2	Night VFR – single-engine aircraft
AA6	Night aerial application operation

Appendix R.8 Night gyroplane aerial application endorsement

Practical flight standards

Unit code	Unit of competency
NTS1	Non-technical skills 1
NTS2	Non-technical skills 2
NVR2	Night VFR — single-engine aircraft
AA6	Night aerial application operation

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Section S Flight activity endorsements

Appendix S.1 Aerobatics flight activity endorsement

Practical flight standards

Unit code	Unit of competency
FAE-2	Aerobatics — 3,000 ft AGL
FAE-8	Spinning

Appendix S.2 Aerobatics (1,500) flight activity endorsement

Practical flight standards

Unit code	Unit of competency
FAE-2	Aerobatics — 3,000 ft AGL
FAE-3	Aerobatics — 1,500 ft AGL
FAE-8	Spinning

Appendix S.3 Aerobatics (1,000) flight activity endorsement

Practical flight standards

Unit code	Unit of competency
FAE-2	Aerobatics — 3,000 ft AGL
FAE-3	Aerobatics — 1,500 ft AGL
FAE-4	Aerobatics — 500 ft AGL
FAE-8	Spinning

Appendix S.4 Aerobatics (500) flight activity endorsement

Practical flight standards

Unit code	Unit of competency
FAE-2	Aerobatics — 3,000 ft AGL
FAE-3	Aerobatics — 1,500 ft AGL
FAE-4	Aerobatics — 500 ft AGL
FAE-8	Spinning

Appendix S.5 Aerobatics (unlimited) flight activity endorsement

Practical flight standards

FAE-2	Aerobatics — 3,000 ft AGL
FAE-3	Aerobatics — 1,500 ft AGL
FAE-4	Aerobatics — 500 ft AGL
FAE-5	Aerobatics – Unlimited

FAE-8	Spinning

Appendix S.6 Formation flying (aeroplane) flight activity endorsement

Practical flight standards

Unit code	Unit of competency
FAE-6	Formation flying aeroplane

Appendix S.7 Formation aerobatics flight activity endorsement

Practical flight standards

Unit code	Unit of competency
FAE-2	Aerobatics — 3,000 ft AGL
FAE-6	Formation flying aeroplane
FAE-7	Aerobatics (formation)
FAE-8	Spinning

Appendix S.8 Spinning flight activity endorsement

Practical flight standards

Unit code	Unit of competency
FAE-8	Spinning

Appendix S.9 Formation flying (helicopter) flight activity endorsement

Practical flight standards

Unit code	Unit of competency
FAE-9	Formation flying helicopter

Section T Pilot instructor rating and endorsements

Flight instructor rating

Appendix T.01 Flight instructor ratings

Aeronautical knowledge standards

Unit code	Unit of knowledge
FIRC	Instructor rating — common

Simulator instructor rating

Appendix T.02 Simulator instructor rating

Aeronautical knowledge standards

Unit code	Unit of knowledge
FIRC	Instructor rating — common

Practical flight standards

Unit code	Unit of competency
SIR	Conduct training in a synthetic training device
FIR7	Conduct flight review

Training endorsements

Appendix T.1 Grade 1 training endorsement

Practical flight standards

Unit code	Unit of competency
NTS1	Non-technical skills 1
NTS2	Non-technical skills 2
FIR1	Conduct aeronautical knowledge training
FIR2	Assess competence
FIR3	Conduct flight training
FIR7	Conduct flight review

Appendix T.2 Grade 2 training endorsement

Practical flight standards

Unit code	Unit of competency
NTS1	Non-technical skills 1
NTS2	Non-technical skills 2
FIR1	Conduct aeronautical knowledge training
FIR2	Assess competence

FIR3	Conduct flight training
FIR7	Conduct a flight review

Appendix T.3 Grade 3 training endorsement

Practical flight standards

Unit code	Unit of competency
NTS1	Non-technical skills 1
NTS2	Non-technical skills 2
FIR1	Conduct aeronautical knowledge training
FIR2	Assess competence
FIR3	Conduct flight training

Appendix T.3A Grade 3 training endorsement (aeroplane)

Practical flight standards

Unit code	Unit of competency
NTS1	Non-technical skills 1
NTS2	Non-technical skills 2
FIR1	Conduct aeronautical knowledge training
FIR2	Assess competence
FIR3	Conduct flight training

Appendix T.4 Multi-crew pilot training endorsement

Practical flight standards

Unit code	Unit of competency
NTS1	Non-technical skills 1
NTS2	Non-technical skills 2
FIR1	Conduct aeronautical knowledge training
FIR2	Assess competence
FIR9	Multi-crew training endorsement

Appendix T.5 Type rating training endorsement (type specific)

Practical flight standards

Unit code	Unit of competency
NTS1	Non-technical skills 1
NTS2	Non-technical skills 2
FIR1	Conduct aeronautical knowledge training
FIR2	Assess competence

Unit code	Unit of competency
FIR3	Conduct flight training
FIR9	Multi-crew training endorsement

Appendix T.6 Multi-engine aeroplane training endorsement

Practical flight standards

Unit code	Unit of competency
NTS1	Non-technical skills 1
NTS2	Non-technical skills 2
FIR1	Conduct aeronautical knowledge training
FIR2	Assess competence
FIR3	Conduct flight training
FIR7	Conduct flight review

Appendix T.7 Design feature endorsement training endorsement

Practical flight standards

Unit code	Unit of competency
NTS1	Non-technical skills 1
NTS2	Non-technical skills 2
FIR1	Conduct aeronautical knowledge training
FIR2	Assess competence
FIR3	Conduct flight training

Appendix T.8 Instrument rating training endorsement

Practical flight standards

Unit code	Unit of competency
NTS1	Non-technical skills 1
NTS2	Non-technical skills 2
FIR1	Conduct aeronautical knowledge training
FIR2	Assess competence
FIR3	Conduct flight training

Appendix T.9 Night VFR rating training endorsement

Practical flight standards

Unit code	Unit of competency
NTS1	Non-technical skills 1
NTS2	Non-technical skills 2

Unit code	Unit of competency
FIR1	Conduct aeronautical knowledge training
FIR2	Assess competence
FIR3	Conduct flight training
FIR7	Conduct flight review

Appendix T.10 NVIS rating training endorsement

Practical flight standards

Unit code	Unit of competency
NTS1	Non-technical skills 1
NTS2	Non-technical skills 2
FIR1	Conduct aeronautical knowledge training
FIR2	Assess competence
FIR3	Conduct flight training

Appendix T.11 Low-level rating training endorsement

Practical flight standards

Unit code	Unit of competency
NTS1	Non-technical skills 1
NTS2	Non-technical skills 2
FIR1	Conduct aeronautical knowledge training
FIR2	Assess competence
FIR3	Conduct flight training
FIR7	Conduct flight review

Appendix T.12 Aerial application rating (day) training endorsement

Practical flight standards

Unit code	Unit of competency
NTS1	Non-technical skills 1
NTS2	Non-technical skills 2
FIR1	Conduct aeronautical knowledge training
FIR2	Assess competence
FIR3	Conduct flight training

Appendix T.13 Aerial application rating (night) training endorsement

Practical flight standards

Unit code	Unit of competency
NTS1	Non-technical skills 1
NTS2	Non-technical skills 2
FIR1	Conduct aeronautical knowledge training
FIR2	Assess competence
FIR3	Conduct flight training

Appendix T.14 Instructor rating training endorsement

Practical flight standards

Unit code	Unit of competency
NTS1	Non-technical skills 1
NTS2	Non-technical skills 2
FIR1	Conduct aeronautical knowledge training
FIR2	Assess competence
FIR3	Conduct flight training

Appendix T.15 Multi-engine aeroplane class rating instructor training endorsement

Practical flight standards

Unit code	Unit of competency
NTS1	Non-technical skills 1
NTS2	Non-technical skills 2
FIR1	Conduct aeronautical knowledge training
FIR2	Assess competence
FIR3	Conduct flight training
FIR7	Conduct flight review

Appendix T.16 Sling operations training endorsement

Practical flight standards

Unit code	Unit of competency
NTS1	Non-technical skills
NTS2	Non-technical skills 2
FIR1	Conduct aeronautical knowledge training
FIR2	Assess competence
FIR3	Conduct flight training

Unit code	Unit of competency
FIR7	Conduct flight review

Appendix T.17 Winch and rappelling operations training endorsement

Practical flight standards

Unit code	Unit of competency
NTS1	Non-technical skills 1
NTS2	Non-technical skills 2
FIR1	Conduct aeronautical knowledge training
FIR2	Assess competence
FIR3	Conduct flight training
FIR7	Conduct flight review

Appendix T.18 Spinning training endorsement

Practical flight standards

Unit code	Unit of competency
NTS1	Non-technical skills 1
NTS2	Non-technical skills 2
FIR1	Conduct aeronautical knowledge training
FIR2	Assess competence
FIR3	Conduct flight training

Appendix T.19 Aerobatics training endorsement

Practical flight standards

Unit code	Unit of competency
NTS1	Non-technical skills 1
NTS2	Non-technical skills 2
FIR1	Conduct aeronautical knowledge training
FIR2	Assess competence
FIR3	Conduct flight training

Appendix T.20 Formation (aeroplane) training endorsement

Practical flight standards

Unit code	Unit of competency
NTS1	Non-technical skills 1
NTS2	Non-technical skills 2
FIR1	Conduct aeronautical knowledge training

Unit code	Unit of competency
FIR2	Assess competence
FIR3	Conduct flight training

Appendix T.21 Formation (helicopter) training endorsement

Practical flight standards

Unit code	Unit of competency
NTS1	Non-technical skills 1
NTS2	Non-technical skills 2
FIR1	Conduct aeronautical knowledge training
FIR2	Assess competence
FIR3	Conduct flight training

Appendix T.22 Formation aerobatics training endorsement

Practical flight standards

Unit code	Unit of competency
NTS1	Non-technical skills 1
NTS2	Non-technical skills 2
FIR1	Conduct aeronautical knowledge training
FIR2	Assess competence
FIR3	Conduct flight training

Appendix T.23 Glider towing training endorsement

Practical flight standards

Unit code	Unit of competency
NTS1	Non-technical skills 1
NTS2	Non-technical skills 2
FIR1	Conduct aeronautical knowledge training
FIR2	Assess competence
FIR3	Conduct flight training

Section U Flight examiner rating and endorsements

Appendix U.0 Flight Examiner Rating

Aeronautical knowledge standards

Unit code	Unit of knowledge
FERC	Flight examiner rating – common

Appendix U.1 Private pilot licence flight test endorsement (category-specific)

Practical flight standards

Unit code	Unit of competency
NTS1	Non-technical skills 1
NTS2	Non-technical skills 2
FER	Conduct a flight test

Appendix U.2 Commercial pilot licence flight test endorsement (category-specific)

Practical flight standards

Unit code	Unit of competency
NTS1	Non-technical skills 1
NTS2	Non-technical skills 2
FER	Conduct a flight test

Appendix U.3 Air transport pilot flight test endorsement (category-specific)

Practical flight standards

Unit code	Unit of competency
NTS1	Non-technical skills 1
NTS2	Non-technical skills 2
FER	Conduct a flight test

Appendix U.4 Multi-engine aeroplane class rating flight test endorsement

Practical flight standards

Unit code	Unit of competency
NTS1	Non-technical skills 1
NTS2	Non-technical skills 2
FER	Conduct a flight test

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Appendix U.5 Type rating flight test endorsement (type-specific)

Practical flight standards

Unit code	Unit of competency
NTS1	Non-technical skills 1
NTS2	Non-technical skills 2
FER	Conduct a flight test

Appendix U.6 Instrument rating flight test endorsement (category-specific)

Practical flight standards

Unit code	Unit of competency
NTS1	Non-technical skills 1
NTS2	Non-technical skills 2
FER	Conduct a flight test

Appendix U.7 Night VFR rating flight test endorsement (category-specific)

Practical flight standards

Unit code	Unit of competency
NTS1	Non-technical skills 1
NTS2	Non-technical skills 2
FER	Conduct a flight test

Appendix U.8 NVIS flight test endorsement

Practical flight standards

Unit code	Unit of competency
NTS1	Non-technical skills 1
NTS2	Non-technical skills 2
FER	Conduct a flight test

Appendix U.9 Low-level rating flight test endorsement (category-specific)

Practical flight standards

Unit code	Unit of competency
NTS1	Non-technical skills 1
NTS2	Non-technical skills 2
FER	Conduct a flight test

Appendix U.10 Aerial application rating flight test endorsement (category-specific)

Practical flight standards

Unit code	Unit of competency
NTS1	Non-technical skills 1
NTS2	Non-technical skills 2
FER	Conduct a flight test

Appendix U.11 Flight instructor rating flight test endorsement (category-specific)

Practical flight standards

Unit code	Unit of competency
NTS1	Non-technical skills 1
NTS2	Non-technical skills 2
FER	Conduct a flight test

Appendix U.12 English language assessment endorsement — Reserved

Section V Flight engineer licence, ratings and endorsements

Appendix V.1 Flight engineer licence

Aeronautical knowledge standards

Unit code	Unit of competency
FFRC	FE Flight rules and air law — all aircraft categories
FAGC	FE Aircraft general knowledge — all aircraft categories
AHFC	ATPL Human factors
RARO	RPL Aeronautical radio operator
CAKA	CPL Aeronautical knowledge — aeroplane
CMTC	CPL Meteorology — all aircraft categories

Practical flight standards

Unit code	Unit of competency
AEL	Aviation English language proficiency
NTS1	Non-technical skills 1
NTS2	Non-technical skills 2
C2	Perform pre- and post-flight actions and procedures
C3	Operate aeronautical radio

Section W Flight engineer type rating

Appendix V.2 Flight engineer type rating

Aeronautical knowledge standards

Unit code	Unit of competency
TYPA	Type rating

Practical flight standards

Unit code	Unit of competency
NTS1	Non-technical skills 1
NTS2	Non-technical skills 2
FTM	Flight engineer type rating — all categories

Section X Flight engineer instructor rating

Appendix X.0 Flight engineer instructor rating

Aeronautical knowledge standards

Unit code	Unit of knowledge
FIRC	Instructor rating — common

Appendix X.1 Flight engineer type rating training endorsement

Practical flight standards

Unit code	Unit of competency
NTS1	Non-technical skills 1
NTS2	Non-technical skills 2
FIR1	Conduct aeronautical knowledge training
FIR2	Assess competence
FIR3	Conduct flight training
SIR	Conduct training in a synthetic training device

Appendix X.2 Flight engineer instructor rating training endorsement

Practical flight standards

Unit code	Unit of competency
NTS1	Non-technical skills 1
NTS2	Non-technical skills 2
FIR1	Conduct aeronautical knowledge training
FIR2	Assess competence
FIR3	Conduct flight training
SIR	Conduct training in a synthetic training device

Section Y Flight engineer examiner rating and endorsements

Appendix Y.0 Flight engineer examiner rating

Aeronautical knowledge standards

Unit code	Unit of knowledge
FERC	Flight examiner rating — common

Appendix Y.1 Flight engineer type rating flight test endorsement

Practical flight standards

Unit code	Unit of competency
NTS1	Non-technical skills 1
NTS2	Non-technical skills 2
FIR1	Conduct aeronautical knowledge training
FIR2	Assess competence
FIR3	Conduct flight training
FER	Conduct a flight test
SIR	Conduct training in a synthetic training device

Appendix Y.2 Flight engineer instructor rating flight test endorsement

Practical flight standards

Unit code	Unit of competency
NTS1	Non-technical skills 1
NTS2	Non-technical skills 2
FIR1	Conduct aeronautical knowledge training
FIR2	Assess competence
FIR3	Conduct flight training
FER	Conduct a flight test
SIR	Conduct training in a synthetic training device

Appendix Y.3 Flight engineer examiner rating flight test endorsement

Practical flight standards

Unit code	Unit of competency
NTS1	Non-technical skills 1
NTS2	Non-technical skills 2
FIR1	Conduct aeronautical knowledge training
FIR2	Assess competence
FIR3	Conduct flight training

Unit code	Unit of competency
FER	Conduct a flight test
SIR	Conduct training in a synthetic training device

Appendix Y.4 English language assessment endorsement — *Reserved*

Section Z Glider pilot licence

Appendix Z.1 Glider pilot licence

Practical flight standards

Unit code	Unit of competency
G1	Control glider on the ground
G2	Take-off glider
G3	Control glider in normal flight
G4	Land glider
G5	Glider advanced manoeuvres
G6	Manage abnormal situations and emergencies — gliders
G7	Navigation — gliders
NTS1	Non-technical skills 1
NTS2	Non-technical skills 2
PPF-G	Perform pre- and post-flight actions and procedures — gliders

Schedule 2 Competency standards

The following Table of Contents is for guidance only and is not part of the Schedule.

TABLE OF CONTENTS

SECTION 1: ENGLISH LANGUAGE PROFICIENCY

GEL General English language proficiency

1 Unit description

This unit describes the general English language proficiency standard that applies to student pilots and recreational pilot licence (RPL) holders.

2 Elements and performance criteria

2.1 **GEL.1 – General communication**

2.1.1 The person is able to demonstrate her or his ability to do the following:

(a) pronounce words clearly, using an accent that does not cause difficulties in understanding;

(b) convey information in clearly structured sentences without confusion or ambiguity;

(c) use an extensive vocabulary to accurately communicate on general and technical topics, without excessive use of jargon, slang or colloquial language;

(d) speak fluently without long pauses, repetition or excessive false starts;

(e) respond to communications with actions that demonstrate that the information has been received and understood;

(f) exchange information clearly in a variety of situations with both expert and non-expert English speakers while giving and receiving timely and appropriate responses;

(g) use appropriate techniques such as questioning, non-verbal communication and paraphrasing to validate communications.

3 Range of variables

(a) oral and written communications;

(b) aviation technical learning environment and context;

(c) face-to-face situations.

4 Underpinning knowledge

No applicable areas.

5 Evidence required

5.1 **A person meets the standard for this unit if they provide the following evidence**

5.1.1 An assessment report, completed by a person authorised under Part 61 of CASR 1998 to perform general English language assessments, that states the candidate satisfies the general English language proficiency elements prescribed above.

5.1.2 One of the following:

(a) completed a course of secondary education conducted in an Australian or New Zealand educational institution;

(b) completed a course that is at least the equivalent of an Australian secondary education in an educational institution in a country where 1 of the principal mediums of instruction was English;

(c) is currently receiving secondary education in an Australian or New Zealand educational institution in which the principle language of instruction is English;

(d) has worked in Australia or New Zealand for at least 3 of the 5 years immediately before conducting a solo flight as a student pilot;

(e) has worked in 1 or more of the following countries for at least 3 of the 5 years immediately before conducting a flight as a student pilot:

(i) United Kingdom;

(ii) Republic of Ireland;

(iii) United States of America;

(iv) New Zealand;

(v) Canada – providing that evidence of use of English language in the workplace is available;

(f) completed at least 1 of the following general English proficiency tests with the minimum grade specified for the test:

(i) the International English Language Testing System (IELTS) General or academic training module overall grade of 5.5, with no individual grade in a paper lower than 5;

(ii) the Test of English for International Communication (TOEIC-Secure Program Public Testing Centre) with grades not less than the following:

(A) 350 for listening;

(B) 300 for reading;

(C) 160 for speaking;

(D) 140 for writing;

(iii) the Test of English as a Foreign Language internet-based test (TOEFL IBT) with a grade of not less than 71;

(iv) the Test of English as a Foreign Language computer-based test (TOEFL CBT) with a Grade of not less than 197;

(v) the Test of English as a Foreign Language paper based test (TOEFL PB) with a grade of not less than 530.

AEL Aviation English language proficiency

1 Unit description

This unit describes the minimum aviation English language proficiency required for the following:

(a) obtaining a flight crew licence, other than a recreational pilot licence;

(b) authorising a person to operate an aeronautical radio under CASR Part 64;

(c) obtaining recreational pilot licence endorsements.

A person may be assessed within a range of operational levels according to the standards in Section 2 of Schedule 8.

2 Elements and performance criteria

2.1 AEL.1 – Communicate effectively using English language

2.1.1 The person is able to communicate effectively in the following areas:

(a) pronunciation, stress, rhythm and intonation;

(b) grammatical structures and sentence patterns;

(c) vocabulary range and accuracy;

(d) paraphrasing;

(e) fluency;

(f) comprehension;

(g) interactions.

3 Range of variables

(a) oral and written communication in English;

(b) in flight or on the ground;

(c) in situations which include disruptions to communication normally encountered in the flight environment, including background noise levels equipment malfunctions and distractions;

(d) pre-recorded or actual aeronautical radio transmissions in more than 1 accent used to assess comprehension of basic aviation phraseology.

4 Underpinning knowledge of the following:

(a) standard phraseology used in aviation communications;

(b) the structure of the English language sufficient to comprehend written text and be able to maintain general conversation.

5 Evidence required

A report issued by a person authorised to conduct an assessment of aviation English language proficiency that states a minimum ICAO English language proficiency Level 4.

SECTION 2: COMMON STANDARDS

C1 Communicating in the aviation environment

1 Unit description

This unit describes the standards for communicating effectively that apply to flight crew using aeronautical radios for the purposes of safely conducting flight operations.

2 Elements and performance criteria

2.1 **C1.1 – Communicating face-to-face**

2.1.1 The person is able to communicate effectively in general English as follows:

(a) pronounces words clearly, using an accent that does not cause difficulties in understanding;

(b) conveys information in clearly structured sentences without confusion or ambiguity;

(c) uses an extensive vocabulary to accurately communicate on general and technical topics, without excessive use of jargon, slang or colloquial language;

(d) speaks fluently without long pauses, repetition or excessive false starts;

(e) responds to communications with actions that demonstrate that the information has been received and understood;

(f) exchanges information clearly in a variety of situations with both expert and non-expert English speakers while giving and receiving timely and appropriate responses;

(g) uses appropriate techniques to validate communications.

2.2 **C1.2 – Operational communication using an aeronautical radio**

2.2.1 The person must be able to demonstrate her or his ability to communicate adequately for the purpose of conducting flying operations safely as follows:

(a) maintain effective communication with others on operational matters;

(b) communicate effectively in unfamiliar, stressful or non-standard situations;

(c) apply the phonetic alphabet;

(d) transmit numbers;

(e) make appropriate transmissions using standard aviation phraseology;

(f) use plain English effectively when standard phraseology is inadequate;

(g) receive appropriate responses to transmissions;

(h) respond to transmissions and take appropriate action;

(i) recognise and manage communication errors and misunderstandings effectively;

(j) seek clarification in the time available if a message is unclear or uncertainty exists;

(k) react appropriately to a variety of regional accents;

(l) communicate effectively in unexpected, stressful or non-standard situations using standard phraseology or plan English.

3 Range of variables

(a) limited background noise associated with a typical work environment;

(b) aircraft environment in a routine operational setting;

(c) simulated conditions can be used;

(d) disruptions to normal communication patterns that might be encountered in an operational situation, including background noise, equipment malfunctions and other distractions.

4 Underpinning knowledge of the following:

(a) basic radiotelephony phraseology specified in the aeronautical information package (AIP) for visual flight rules (VFR) operations;

(b) common aviation terminology.

C2 Perform pre- and post-flight actions and procedures

1 Unit description

This unit describes the skills and knowledge required for a person to conduct pre- and post-flight actions and procedures for an aircraft of the applicable category, class or type.

2 Elements and performance criteria

2.1 C2.1 – Pre-flight actions and procedures

(a) complete all required pre-flight administration documentation;

(b) obtain, interpret and apply information contained in the required pre-flight operational documentation, including to the following:

  (i) minimum equipment list (MEL);

  (ii) maintenance release;

  (iii) weather forecasts;

  (iv) local observations;

  (v) Notice to Airmen (NOTAM);

  (vi) global navigation satellite system (GNSS) receiver autonomous integrity monitoring (RAIM) information;

  (vii) En Route Supplement Australia (ERSA);

  (viii) Aeronautical Information Package (AIP);

(c) identify special aerodrome procedures;

(d) identify all relevant radio and navigation aid facilities to be used during the flight (if applicable);

(e) determine the suitability of the current and forecast weather conditions for the proposed flight;

(f) using the aircraft documents, calculate the following for a given set of environmental and operational conditions:

  (i) weight and balance;

  (ii) in-ground and out-of-ground effect hover performance (rotorcraft only);

  (iii) take-off and landing performance;

  (iv) fuel requirements;

(g) determine whether the aircraft is serviceable for the proposed flight.

2.2 C2.2 – Perform pre-fight inspection

This element is not applicable when the training or assessment activity is being conducted in an FSTD that is approved for the training or assessment purpose.

(a) identify and secure equipment and documentation that is required for the flight;

(b) complete an internal and external check of the aircraft;

(c) identify all defects or damage to the aircraft;

(d) report to, and seek advice from, qualified personnel to determine the action required in relation to any identified defects or damage;

(e) ensure all aircraft locking and securing devices, covers and bungs are removed and stowed securely;

(f) certify the aircraft flight technical log entering any defects or endorsements to permissible unserviceabilities as appropriate;

(g) complete and certify the daily inspection (if authorised to do so).

2.3 C2.3 – Post-flight actions and procedures

(a) shut down aircraft;

(b) conduct post-flight inspection and secure the aircraft (if applicable);

(c) complete all required post-flight administration documentation.

3 Range of variables

(a) an aircraft of the specified aircraft category;

(b) any class or type of aircraft within that aircraft category;

(c) activities are performed in accordance with published procedures

(d) alternatively, competency is demonstrated in an FSTD that is approved for the purpose.

4 Underpinning knowledge of the following:

(a) standard operating procedures for the category, and class or type of aircraft and the operator;

(b) fuel requirements for day VFR flight operation;

(c) MEL;

(d) airworthiness requirements applicable to the aircraft category, and class or type;

(e) local weather patterns;

(f) local aerodrome requirements.

C3 Operate aeronautical radio

1 Unit description

This unit describes the skills and knowledge required for a person to operate radiotelephone and intercom equipment under normal and emergency conditions.

2 Elements and performance criteria

2.1 **C3.1 – Operate radio equipment**

(a) confirm serviceability of radio equipment;

(b) conduct transmission and receipt of radio communications using appropriate procedures and phraseology;

(c) maintain a listening watch and respond appropriately to applicable transmissions;

(d) conduct appropriate emergency and urgency transmissions.

2.2 **C3.2 – Manage R/T equipment malfunctions**

(a) perform radio failure procedures;

(b) use fault finding procedures and perform corrective actions.

2.3 **C3.3 – Operate transponder**

(a) operate a transponder during normal, abnormal and emergency operations;

(b) recall transponder emergency codes.

3 Range of variables

(a) activities are performed in accordance with published procedures;

(b) aircraft fitted with a common radio system and transponder;

(c) VFR procedures.

4 Underpinning knowledge of the following:

(a) the phonetic alphabet;

(b) documented radio procedures relevant to the VFR;

(c) the components of an aeronautical radio system:

- (i) power source or battery switch, radio master, microphone;
- (ii) transmitter;
- (iii) receiver;
- (iv) antenna;
- (v) location of aerial antennas in buildings (except aircrew);
- (vi) headphones and speaker;
- (vii) the procedures for using an aeronautical radio system;
- (viii) setting up an aeronautical radio (except aircrew);
- (ix) use of radio transmit and receive selector switches (VHF, HF, I/C, PA);
- (x) turning a radio on and off;
- (xi) selecting correct frequencies;
- (xii) use of squelch control;
- (xiii) correct use of a microphone;

(d) characteristics of radio waves, wave propagation, transmission and reception (except aircrew):

- (i) radio frequency band ranges (MF, HF, VHF, UHF);
- (ii) properties of radio waves;

(iii) propagation of paths of radio waves:
   (A) ground waves;
   (B) sky waves;
(iv) factors affecting the propagation of radio waves:
   (A) terrain;
   (B) Ionosphere;
   (C) sun spot activity;
   (D) interference from electrical equipment;
   (E) thunderstorms;
   (F) power attenuation;
(v) radio antennas:
   (A) characteristics of antennas;
   (B) use of antennas;

(e) the responsibilities of an aeronautical radio operator (except aircrew) for the following:
   (i) secrecy of communications;
   (ii) unauthorised transmissions;

(f) light signals, including interpretation and actions required.

C4 Manage fuel

1 Unit description

This unit describes the skills and knowledge required to effectively manage fuel for an aircraft operation.

2 Elements and performance criteria

2.1 C4.1 – Plan fuel requirements

(a) determine the required fuel reserves;

(b) determine the quantity of fuel required taking into account operational requirements and relevant abnormal or emergency conditions and contingencies;

(c) determine the total fuel required for the flight.

2.2 C4.2 – Manage fuel system

(a) verify fuel quantity on-board aircraft prior to flight using 2 independent methods;

(b) ensure the fuel caps are secured;

(c) perform fuel quality check prior to flight;

(d) ensure fuel drain cocks are closed;

(e) monitor fuel usage during the flight;

(f) accurately maintain fuel log;

(g) calculate and state endurance at any point during flight;

(h) perform fuel tank changes correctly;

(i) maintain fuel load within aircraft limits;

(j) operate the fuel cross-feed system correctly (if fitted);

(k) operate fuel pumps and engine controls correctly;

(l) except for RPL and PPL, configure the aircraft correctly to achieve best range performance and correctly calculate the revised range of operation;

(m) configure the aircraft correctly to achieve best endurance performance and correctly calculate the revised operational endurance.

2.3 C4.3 – Refuel aircraft

(a) identify the correct type of fuel to be used;

(b) ensure aircraft is earthed prior to refuelling and defueling operations;

(c) correctly load and unload fuel;

(d) ensure required fuel quantity is loaded;

(e) ensure fuel caps are closed and secured after fuelling operations;

(f) perform fuel quality checks.

3 Range of variables

(a) activities are performed in accordance with published procedures;

(b) aircraft of the applicable category;

(c) VFR.

4 Underpinning knowledge of the following:

(a) minimum fuel requirements for day VFR operations;

(b) fuel sources and fuel grades, including methods for identifying difference grades;

(c) methods of verifying the quantity of fuel on board an aircraft;

(d) fire extinguishers that can be used for fuel-related fires, including requirements and how to use them in the event of a fire;

(e) location of refuelling places;

(f) limitations on using drum stock fuel;

(g) health and safety requirements applicable to fuelling operations;

(h) variations to planned fuel consumption.

C5 Manage passengers and cargo

1 Unit description

This unit describes the skills and knowledge required to ensure the following:

(a) passengers are safe, informed and controlled;

(b) provision is made for passenger comfort and wellbeing;

(c) cargo is managed.

2 Elements and performance criteria

2.1 **C5.1 – Manage passengers**

(a) supervise passenger safety;

(b) encourage passengers to participate in and contribute to the safe outcome of the flight;

(c) conduct pre-flight passenger safety briefing;

(d) ensure passengers are aware of, and avoid interference with, flight and systems controls;

(e) ensure passengers are aware of, and comply with, the use of seat harnesses;

(f) ensure passengers are aware of the use of escape hatches, exits and emergency equipment on board the aircraft;

(g) manage passenger safety in the event of abnormal or in-flight emergency situations.

2.2 **C5.2 – Aid and assist passengers**

(a) establish and maintain clear communications with passengers;

(b) assist with passenger comfort both when airside and in flight.

2.3 **C5.3 – Manage cargo**

(a) manage loading, unloading and security of cargo during flight operations;

(b) identify dangerous goods and apply procedures to ensure safety and security.

3 Range of variables

(a) activities are performed in accordance with published procedures;

(b) single or multi-engine aircraft;

(c) propeller wash, rotor wash and jet blast (may be simulated);

(d) simulated abnormal or emergency situations;

(e) real or simulated passengers and cargo.

4 Underpinning knowledge of the following:

(a) managing passengers during abnormal or emergency situations;

(b) local procedures for movement of passengers;

(c) security requirements;

(d) dangerous goods awareness;

(e) health and safety regulations and best practice.

NTS1 Non-technical skills 1

1 Unit description

This unit describes the knowledge and skills required to manage a safe flight.

2 Elements and performance criteria

2.1 NTS1.1 – Maintain effective lookout

(a) maintain traffic separation using a systematic visual scan technique at a rate determined by traffic density, visibility and terrain;

(b) maintain radio listening watch and interpret transmissions to determine traffic location and intentions;

(c) perform airspace-cleared procedure before commencing any manoeuvre.

2.2 NTS1.2 – Maintain situational awareness

(a) monitor all aircraft systems using a systematic scan technique;

(b) collect information to facilitate ongoing system management;

(c) monitor flight environment for deviations from planned operations;

(d) collect flight environment information to update planned operations.

2.3 NTS1.3 – Assess situations and make decisions

(a) identify problems;

(b) analyse problems;

(c) identify solutions;

(d) assess solutions and risks;

(e) decide on a course of action;

(f) communicate plans of action (if appropriate);

(g) allocate tasks for action (if appropriate);

(h) take actions to achieve optimum outcomes for the operation;

(i) monitor progress against plan;

(j) re-evaluate plan to achieve optimum outcomes.

2.4 NTS1.4 – Set priorities and manage tasks

(a) organise workload and priorities to ensure optimum outcome of the flight;

(b) plan events and tasks to occur sequentially;

(c) anticipate events and tasks to ensure sufficient opportunity for completion;

(d) use technology to reduce workload and improve cognitive and manipulative activities.

2.5 NTS1.5 – Maintain effective communications and interpersonal relationships

(a) establish and maintain effective and efficient communications and interpersonal relationships with all stakeholders to ensure the optimum outcome of the flight;

(b) define and explain objectives to stakeholders;

(c) demonstrate a level of assertiveness that ensures the optimum completion of the flight.

3 Range of variables

(a) simulated conditions may be used where appropriate.

4 Underpinning knowledge of the following:

(a) effective communication under normal and non-normal circumstances;

(b) task management.

NTS2 Non-technical skills 2

1 Unit description

This unit describes the knowledge and skills required to recognise, direct and manage threats and errors during flight operations.

2 Elements and performance criteria

2.1 NTS2.1 – Recognise and manage threats

(a) identify relevant environmental or operational threats that are likely to affect the safety of the flight;

(b) identify when competing priorities and demands may represent a threat to the safety of the flight;

(c) develop and implement countermeasures to manage threats;

(d) monitor and assess flight progress to ensure a safe outcome, or modify actions when a safe outcome is not assured.

2.2 NTS2.2 – Recognise and manage errors

(a) apply checklists and standard operating procedures to prevent aircraft handling, procedural or communication errors;

(b) identify committed errors before safety is affected or the aircraft enters an undesired state;

(c) monitor the following to collect and analyse information to identify potential or actual errors:

- (i) aircraft systems using a systematic scan technique;
- (ii) the flight environment;
- (iii) other crew;

(d) implement countermeasures to prevent errors or take action in the time available to correct errors before the aircraft enters an undesired state.

2.3 NTS2.3 – Recognise and manage undesired aircraft state

(a) recognise an undesired aircraft state;

(b) prioritise tasks to ensure an undesired aircraft state is managed effectively;

(c) apply corrective actions to recover an undesired aircraft state in a safe and timely manner.

3 Range of variables

(a) Reserved;

(b) simulated conditions may be used where appropriate.

4 Underpinning knowledge of the following:

(a) effective communication under normal and non-normal circumstances;

(b) threat and error management detailing processes that can be used to identify and mitigate or control threats and errors;

(c) the application of situational awareness to identifying real or potential environmental or operational threats to flight safety;

(d) developing and implementing plans of action for the following:

- (i) removing and mitigating threats;
- (ii) removing and mitigating errors;

(e) undesired aircraft states, including prevention, identifying and controlling;

(f) how an undesired aircraft state can develop from an unmanaged threat or error;

(g) what aspects of multi-crew operations (if applicable) can prevent an undesired aircraft state;

(h) use of checklists and standard operating procedures to prevent errors.

(i) task management, including:
  (i) workload organisation and priority setting to ensure optimum safe outcome of the flight;
  (ii) event planning to occur in a logical and sequential manner;
  (iii) anticipating events to ensure sufficient opportunity is available for completion;
  (iv) using technology to reduce workload and improve cognitive and manipulative activities;
  (v) task prioritisation and protection whilst filtering and managing real time information.

MCO Manage flight during multi-crew operations

1 Unit description

This unit describes the skills, knowledge and behaviours required to plan, direct and control all aspects of a flight in a multi-crew environment as pilot in command or crew member.

2 Elements and performance criteria

2.1 MCO.1 – Operate effectively as a crew member

(a) utilise standard operating procedures (SOP) and phraseology to conduct and manage flight;

(b) ensure crew members are aware of changes when operating aircraft systems;

(c) ensure changes to responsibility for flying aircraft are clearly stated;

(d) listen critically and request clarification when necessary;

(e) apply assertive strategies when working with others;

(f) present ideas in a way that shows respect for others;

(g) verbalise observations in a calm and concise manner;

(h) consider the condition (ability) of other crew members to perform crew duties;

(i) monitor and appraise crew members' performance;

(j) interact with crew members in a supportive and constructive way;

(k) assist other crew members to manage workload;

(l) motivate and support other crew members;

(m) identify the signs, stages and possible causes of stress and conflict;

(n) apply strategies to manage stress and conflict;

(o) ensure pilot flying manages and monitors flight path;

(p) manage distractions and interruptions to cockpit activities.

2.2 MCO.2 – Demonstrate effective leadership and authority

(a) conduct briefings to share common plan and set priorities;

(b) ensure crew members are aware of their role and responsibilities throughout a flight;

(c) establish an atmosphere to encourage open communications;

(d) manage flight deck gradient relative to task;

(e) identify and manage threats and errors;

(f) maintain crew member motivation and commitment to task;

(g) monitor the effectiveness of crew performance;

(h) correct crew member deviations from standards;

(i) set realistic performance standards;

(j) monitor outcomes, and evaluate performance;

(k) collect information and identify key issues and relationships relative to achieving determined roles;

(l) break down tasks and establish courses of action to accomplish specified goals;

(m) encourage monitoring of performance by other crew members;

(n) allocate sufficient resources and time to complete workload;

(o) maintain patience and focus when processing large amounts of data or multiple tasks;

(p) identify when crew members become ineffective or incapacitated;

(q) manage time and resources to ensure that work is completed safely and effectively;

(r) ensure responsibility for flight path management is always assigned;

(s) take action to resolve crew member confusion.

2.3 **MCO.3 – Maintain situational awareness**

(a) actively monitor flight path, aircraft configuration and systems to achieve desired performance using a systematic scan technique;

(b) advise pilot flying of deviations from planned operations;

(c) utilise available resources to collect flight environment information and modify planned operations when required;

(d) analyse aircraft systems and flight environment information to identify actual and potential threats or errors;

(e) cross-check the actions of other crew members.

2.4 **MCO.4 – Make effective decisions**

(a) identify problems and their associated causal factors and review them with other crew members;

(b) break down systematically and logically problems or processes into component parts;

(c) employ analytical techniques to identify solutions and consider the value and implications of each;

(d) generate, in the time available, solutions with crew members;

(e) assess alternative solutions and risks with other crew members;

(f) decide on a course of action and address crew member concerns;

(g) communicate plans of action and direct crew members to complete specified tasks;

(h) take actions to achieve optimum outcomes for the operation;

(i) monitor progress against agreed plan;

(j) evaluate decisions in line with changing circumstances;

(k) decision making is improvement-focused and directed towards achieving optimum outcomes.

3 Range of variables

(a) activities are performed in accordance with published procedures;

(b) operations may be VFR or IFR;

(c) approved flight simulation training device or aircraft;

(d) normal and simulated non-normal flight and ground operations;

(e) simulated hazardous weather conditions;

(f) simulated interaction involving ground and ATC personnel relevant to aviation activities.

4 Underpinning knowledge of the following:

(a) the topics mentioned in Unit 1.6.3, ATPL human factors in Schedule 3 of this MOS;

(b) threat and error management (TEM) principles, with particular emphasis on multi-crew operations.

SECTION 3 NAVIGATION AND INSTRUMENT FLYING STANDARDS

NAV Navigate aircraft

1 Unit description

This unit describes the knowledge and skills required to plan and conduct a flight from a departure aerodrome to a destination aerodrome, or an alternate aerodrome, and navigating the aircraft under the applicable flight rules. This includes pre-flight planning, compliance with airspace, departure and arrival procedures, and navigation under normal and abnormal conditions.

2 Elements and performance criteria

2.1 **NAV.1 – Prepare documents and flight plan**

(a) select and prepare appropriate navigation charts for the intended flight;

(b) select a suitable route and altitude considering weather, terrain, airspace, NOTAMs and alternate landing areas;

(c) obtain and interpret meteorological forecasts, NOTAMs and operational information applicable to the planned flight;

(d) determine whether the planned flight can be conducted under the applicable flight rules and taking account of the beginning and end of daylight times;

(e) except for the RPL navigation endorsement and the PPL, calculate and document critical point (CP) and point of no return (PNR) locations;

(f) complete a flight plan to the planned destination and alternates;

(g) lodge suitable flight notification for search and rescue (SAR) purposes.

2.2 **NAV.2 – Comply with airspace procedures while navigating**

(a) identify airspace restrictions and dimensions applicable to the flight;

(b) obtain and comply with air traffic clearances, if applicable;

(c) comply with airspace procedures applicable to the airspace classification throughout the flight.

2.3 **NAV.3 – Conduct departure procedures**

(a) organise cockpit to ensure charts, documentation and navigational calculator are accessible from the control seat;

(b) comply with all departure procedures, clearances and noise abatement requirements;

(c) establish planned track on departure within 5 nm of airfield or apply alternative procedure if required;

(d) calculate estimated time of arrival (ETA) for first waypoint.

2.4 **NAV.4 – Navigate aircraft en route**

(a) maintain a navigation cycle that ensures accurate tracking, and apply track correctional techniques to re-establish track prior to waypoint or destination;

(b) maintain heading to achieve a nominated track;

(c) maintain and revise ETAs (±2 minutes) for waypoint or destination;

(d) maintain track in accordance with published flight path tolerances in controlled airspace;

(e) navigate using accepted map-reading techniques;

(f) maintain navigation and fuel log to monitor tracking, ETAs and fuel status;

(g) use appropriate techniques to obtain a positive fix at suitable intervals;

(h) maintain awareness of route, en route terrain, en route and destination weather, and react appropriately to changing weather conditions;

(i) perform pre-descent and turning point checks;

(j) maintain appropriate radio communication and listening watch with ATS and other aircraft if radio is fitted and used;

(k) configure the aircraft as required for the following environmental and operational conditions:

  (i) turbulence;

  (ii) holding;

  (iii) maximum range;

(l) maintain awareness of search and rescue times (SARTIME) and revise as required;

(m) monitor aircraft systems, manage fuel and engine to ensure aircraft is operated to achieve flight plan objectives.

2.5 **NAV.5 – Navigate at low level and in reduced visibility**

(a) configure the aircraft as required for the following environmental and operational conditions:

  (i) reduced visibility;

  (ii) low cloud base;

(b) navigate aeroplane at minimum heights (not below 500 ft AGL, clear of built-up areas) and remain in VMC;

(c) maintain separation from terrain, obstacles, allowing for wind and turbulence at low level;

(d) avoid noise sensitive areas;

(e) operate appropriately in the vicinity of aerodromes and landing areas.

2.6 **NAV.6 – Perform lost procedure**

(a) acknowledge positional uncertainty in a timely manner;

(b) configure aircraft for range and endurance as required;

(c) apply recognised method to re-establish aircraft position;

(d) fix position;

(e) use radio to request assistance, if applicable;

(f) plan a timely precautionary search and landing if unable to complete flight safely to suitable aerodrome.

2.7 **NAV.7 – Perform diversion procedure**

(a) make timely decision to divert;

(b) identify an acceptable alternate aerodrome;

(c) select a suitable route and cruising level;

(d) revise flight plan considering weather, terrain, airspace and fuel available;

(e) advise ATS of an intention to divert.

2.8 **NAV.8 – Use instrument navigation systems**

(a) initialise navigation system (as applicable);

(b) conduct navigation system validity check (as applicable);

(c) conduct RAIM check if required;

(d) select, load, check and activate the flight plan (as applicable);

(e) navigate on departure, en route and on arrival using GNSS;

(f) operate instrument navigation systems correctly;

(g) use instrument navigation systems to assist with navigation;

(h) confirm waypoints and fixes using instrument navigation systems.

2.9 **NAV.9 – Execute arrival procedures**

(a) obtain updated relevant aerodrome information;

(b) determine landing direction and aerodrome suitability;

(c) conduct arrival;

(d) identify and avoid all traffic;

(e) observe local and published noise abatement requirements and curfews;

(f) cancel SARWATCH.

3 Range of variables

(a) activities are performed in accordance with published procedures;

(b) different terrain;

(c) applicable airspace procedures;

(d) simulated weather conditions.

4 Underpinning knowledge of the following:

(a) basic GNSS principles;

(b) en route GNSS navigation principles;

(c) dead-reckoning navigation;

(d) navigate in featureless terrain and extended over-water flights;

(e) diversion considerations and procedures;

(f) maximum payload and minimum fuel operations.

RNE Radio navigation – en route

1 Unit description

This unit describes the skills and knowledge required to navigate an aircraft using radio navigation aids and systems.

2 Elements and performance criteria

2.1 RNE.1 – Operate and monitor radio navigation aids and systems

(a) select and operate navigation aids and systems;

(b) monitor and take appropriate action in relation to the integrity of navigation aid systems information.

2.2 RNE.2 – Navigate the aircraft using navigation aids and systems

(a) determine aircraft position fix solely with reference to navigation aids and systems;

(b) intercept tracks to and from navigation aids and systems;

(c) maintain tracks within specified tolerances;

(d) record, assess and revise timings as required;

(e) recognise station passage.

3 Range of variables

(a) activities are performed in accordance with published procedures;

(b) in an aircraft or an approved flight simulation training device;

(c) azimuth and course deviation indicator display systems.

4 Underpinning knowledge of the following:

(a) tracking tolerances for radio navigation and GNSS aids;

(b) for non-directional beacon (NDB):

- (i) effects of coastal refraction, night error, thunderstorms, mountainous areas, types of terrain and altitude of aircraft on NDB indications or range;
- (ii) methods of selecting and using the most appropriate NDB for tracking during navigation;
- (iii) NDB tracking techniques, procedures and limitations;
- (iv) procedures for sector entry and holding using the NDB;

(c) for VOR:

- (i) VOR instrument settings required to provide command indications when flying on given tracks both to and from the VOR;
- (ii) VOR tracking techniques, procedures and limitations;
- (iii) procedures for sector entry and holding using the VOR;

(d) for global navigation satellite system (GNSS):

- (i) principles of operation, performance limitations and errors of a GNSS system;
- (ii) methods of position fixing using a GNSS system;
- (iii) GNSS operating procedures which provide safeguards against navigational error and loss of situational awareness;
- (iv) GNSS operating procedures for typical navigational tasks using a specific type of aircraft equipment;
- (v) indications of waypoint passage;
- (vi) GNSS operational and serviceability checks;
- (vii) human factors limitations associated with the use of GNSS equipment;
- (viii) requirements applicable to pilots and equipment for GNSS operations;

(e) PBN specifications and requirements:
  (i) applicable navigation specifications for various airspace operations;
  (ii) RNP tracking tolerances;
  (iii) APV Baro – NAV;
  (iv) radius to fix path terminators on RF legs;
  (v) equipment requirements;
  (vi) system performance, monitoring and alert requirements;
  (vii) circumstances in which a GNSS sensor is a primary RNP requirement.

IFF Full instrument panel manoeuvres

1 Unit description

This unit describes the skills and knowledge required to perform normal flight manoeuvres using the full instrument panel.

2 Elements and performance criteria

2.1 IFF.1 – Determine and monitor the serviceability of flight instruments and instrument power sources

(a) determine serviceability of flight and navigational instruments;

(b) perform functional checks of flight and navigational instruments where applicable prior to take-off;

(c) monitor flight instrument and instrument power sources and react to any warnings, unserviceability or erroneous indications.

2.2 IFF.2 – Perform manoeuvres using full instrument panel

(a) interpret flight instrument indications and apply procedures and techniques to achieve and maintain a specified flight path using the aircraft's full instrument panel;

(b) except for RPL, set and maintain power and attitude by reference to the full instrument panel to achieve the following:

- (i) straight and level performance during normal cruise within the flight tolerances;
- (ii) nominated climb performance within the flight tolerances;
- (iii) descent performance within the flight tolerances;

(c) set and maintain power and attitude by reference to the full instrument panel to establish a rate 1 turn onto a nominated heading within the flight tolerances.

2.3 IFF.3 – Recover from upset situations and unusual attitudes

(a) correctly identify upset situations and unusual attitudes under simulated IMC;

(b) recover to controlled flight from upset situations and unusual attitudes under simulated IMC from any combination of the following aircraft states:

- (i) high and low-nose attitudes;
- (ii) varying angles of bank;
- (iii) various power settings;
- (iv) various aircraft configurations;
- (v) unbalanced flight.

3 Range of variables

(a) activities are performed in accordance with published procedures;

(b) day VFR in variable weather conditions;

(c) for RPL, PPL, CPL licence and multi-engine aeroplane class rating training and assessment, day VFR simulated inadvertent entry into IMC with a level 180° turn to re-establish visual flight;

(d) VMC with simulated IMC;

(e) IMC if conducted in a synthetic flight simulator device;

(f) fitted flight instruments that are suitable for full panel instrument flight.

4 Underpinning knowledge of the following:

(a) scan technique appropriate to fitted flight instruments and phase of flight;

(b) attitude and power requirements to achieve specified flight profiles;

(c) instrument failure and warning systems fitted to the aeroplane.

IFL Limited instrument panel manoeuvres

1 Unit description

This unit describes the skills and knowledge required to perform normal flight manoeuvres and recover from unusual attitudes in each of the following non-normal situations:

(a) without reference to the primary attitude indicator or display;

(b) without reference to the primary heading indicator or display;

(c) without reference to reliable airspeed indications.

2 Elements and performance criteria

2.1 IFL.1 – Recognise failure of attitude indicator and stabilised heading indicator

(a) monitor flight instruments and instrument power sources and recognise warning indicators or erroneous instrument indications;

(b) transition from a full instrument panel to a limited instrument panel.

2.2 IFL.2 – Perform manoeuvres – limited panel

(a) interpret and respond appropriately to instrument indications;

(b) apply power and attitude settings to achieve straight and level performance during:
- (i) normal cruise;
- (ii) in an aeroplane-approach configuration with flaps (when fitted) and undercarriage down;
- (iii) in a helicopter at minimum power for level flight speed;

(c) apply power and attitude settings to achieve:
- (i) nominated climb performance;
- (ii) nominated descent performance;
- (iii) during climb, descent and straight and level flight, rate 1 turns onto a nominated heading;

(d) trim (as applicable) and balance aircraft;

(e) establish level flight at a nominated altitude, from a climb or descent during straight or turning flight.

2.3 IFL.3 – Recover from upset situations and unusual attitudes – limited panel

(a) correctly identify upset situations and unusual attitudes under simulated IMC;

(b) recover to stabilised straight and level flight using approved techniques from upset situations and unusual attitudes under simulated IMC from any combination of the following aircraft states:
- (i) high and low-nose attitudes;
- (ii) varying angles of bank;
- (iii) various power settings;
- (iv) various aircraft configurations;
- (v) unbalanced flight.

2.4 IFL.4 – Re-establish visual flight

(a) transition from visual flight conditions to instrument flight conditions while maintaining control of the aircraft;

(b) perform a manoeuvre to re-establish visual flight;

(c) implement a plan that ensures the flight continues in VMC.

3 Range of variables

(a) activities are performed in accordance with published procedures;

(b) single-engine or multi-engine aircraft or approved flight simulation training device;

(c) manually flown in single-pilot or multi-crew operations;

(d) simulated IMC conditions;

(e) up to and including light turbulence.

4 Underpinning knowledge of the following:

(a) scan technique appropriate to fitted flight instruments and phase of flight (without attitude or stabilised heading indicators);

(b) performance instrument indications and power requirements to achieve specified flight profiles;

(c) anti-icing and de-icing controls and switches fitted to the aircraft type, and when these systems should be operated;

(d) instrument failure and warning systems fitted to the aircraft;

(e) the safety risks associated with application of large or rapid control inputs in more than 1 axis simultaneously.

CAS Operate airborne collision avoidance systems (ACAS)

1 Unit description

This unit prescribes the standards required to operate an ACAS while conducting a flight operation.

2 Elements and performance criteria

2.1 CAS.1 – ACAS pre-flight check

(a) complete a pre-flight check of ACAS equipment;

(b) determine the serviceability status of the equipment.

2.2 CAS.2 – ACAS operating mode

(a) select the correct operating mode of an ACAS;

(b) determine when the ACAS is operating normally.

2.3 CAS.3 – Respond to Traffic Advisory (TA)

(a) recognise a TA;

(b) interpret TA information correctly to determine bearing and range and vertical displacement of displayed traffic;

(c) make no change to flight path based solely on information displayed by ACAS;

(d) apply right of way rules with visual acquisition of traffic or maintain safe separation.

2.4 CAS.4 – Respond to Resolution Advisory (RA)

(a) recognise an RA, at typical cruise altitudes and below 10,000 ft;

(b) apply positive control inputs as required within 5 seconds of RA notification;

(c) notify ATC when vertical speed established;

(d) apply correct control inputs within 2.5 seconds to modify vertical speed with changes in RA guidance;

(e) recognise altitude crossing encounters where applicable;

(f) manage aircraft performance to avoid aircraft upset condition;

(g) notify ATC when clear of conflict once aircraft safety is assured and flight path resumed.

3 Range of variables

(a) in an FSTD or interactive computer-based training (CBT) with ACAS display and controls similar to those used to operate an aircraft;

(b) activities are performed in accordance with published procedures.

4 Underpinning knowledge of the following:

(a) principles of the TCAS system and operation;

(b) the ATPL general knowledge standards in Schedule 3 of the Part 61 Manual of Standards relevant to this unit.

CTR Operate at a controlled aerodrome

1 Unit description

This unit describes the skills and knowledge required to operate an aircraft to and from a controlled aerodrome.

2 Elements and performance criteria

2.1 CTR.1 – Controlled aerodrome pre-flight preparation

(a) using a current ERSA and NOTAM, for the controlled aerodrome, extract all the relevant operational information;

(b) interpret the extracted information;

(c) identify all special aerodrome procedures;

(d) check current weather forecast and local observations;

(e) identify all relevant radio and navigation aid frequencies.

2.2 CTR.2 – Taxi aircraft at a controlled aerodrome

(a) obtain and comply with ATC clearances;

(b) manoeuvre aircraft to holding point as instructed and take appropriate action to avoid other aircraft and obstructions;

(c) recognise ground markings during taxi and take appropriate action;

(d) recognise lighting signals and take appropriate action;

(e) identify airport runway incursion hotspots;

(f) manoeuvre aircraft to avoid jet blast hazard;

(g) request taxi guidance if unsure of position;

(h) use strobes when crossing any runway.

2.3 CTR.3 – Perform departure from controlled aerodrome

(a) receive and correctly read back an airways clearance;

(b) check and ensure runway approach is clear prior to entering a runway;

(c) correctly set transponder code and mode prior to entering runway for take-off;

(d) comply with ATC departure instructions;

(e) advise ATC as soon as possible if unable to comply with clearance;

(f) contact approach with airborne report or give departure call to tower;

(g) maintain lookout;

(h) avoid wake turbulence;

(i) comply with airways clearances within tracking and altitude tolerances and maintain traffic lookout until clear of the aerodrome control zone.

2.4 CTR.4 – Perform arrival and landing at controlled aerodrome

(a) check ERSA and NOTAM prior to entering control area and extract required operational information;

(b) receive ATIS and correctly set the appropriate QNH;

(c) request and receive ATC clearance and set correct transponder code prior to entering control area;

(d) advise ATC as soon as possible if unable to comply with clearance;

(e) maintain lookout at all times;

(f) update QNH as required;

(g) maintain tracking tolerances;

(h) establish aircraft on the correct leg of the circuit in preparation for landing and maintain separation from traffic;

(i) confirm clearance to land;

(j) vacate runway and obtain taxi clearance.

3 Range of variables

(a) activities are performed in accordance with published procedures;

(b) Class C or D aerodromes;

(c) day VFR conditions.

4 Underpinning knowledge of the following:

(a) NOTAM decoding;

(b) aerodrome ground markings and lighting;

(c) standard RT phraseology;

(d) radio failure procedures in ERSA;

(e) transponder codes for radio failure and emergency.

ONTA Operate at non-towered aerodromes

1 Unit description

This unit describes the skills and knowledge required to operate an aircraft to and from a non-towered aerodrome or landing area.

2 Elements and performance criteria

2.1 ONTA.1 – Non-towered aerodrome – pre-flight preparation

(a) using a current ERSA and NOTAM, for the non-towered aerodrome or landing area, extract all of the relevant operational information;

(b) interpret the extracted information;

(c) identify all special aerodrome procedures;

(d) check current weather forecast and local observations;

(e) identify all relevant radio and navigation aid frequencies.

2.2 ONTA.2 – Taxi aircraft at a non-towered aerodrome or landing area

(a) refer to aerodrome or landing area chart (if available);

(b) set local QNH or area QNH;

(c) broadcast intentions on appropriate frequency;

(d) obtain and interpret traffic information;

(e) maintain lookout for, and separation from, other aircraft, wildlife and other obstructions;

(f) recognise ground markings during taxi and take appropriate action;

(g) Reserved;

(h) taxi aircraft to holding point;

(i) use strobes when crossing any runway.

2.3 ONTA.3 – Perform departure at a non-towered aerodrome or landing area

(a) check and ensure runway approach is clear prior to entering a runway;

(b) correctly set transponder code and mode prior to entering runway for take-off;

(c) confirm runway approaches clear in all directions prior to entering runway;

(d) broadcast line up details;

(e) Reserved;

(f) transmit appropriate radio calls and maintain separation with other aircraft;

(g) advise air service provider of departure details, if required;

(h) conduct departure.

2.4 ONTA.4 – Perform arrival and landing at a non-towered aerodrome or landing area

(a) check ERSA and NOTAM prior to entering circuit area;

(b) set correct area or local QNH;

(c) use correct radio frequency to transmit inbound calls as required;

(d) maintain effective lookout;

(e) maintain aircraft separation and avoid other traffic;

(f) maintain tracking tolerances;

(g) determine wind velocity;

(h) determine landing direction;

(i) confirm runway is serviceable for the operation;

(j) determine circuit direction;

(k) conduct landing area inspection (if applicable);

(l) position aircraft in the circuit in preparation for landing and maintain separation from traffic;

(m) make all necessary circuit radio calls;

(n) verify runway is clear of other traffic, wildlife and other obstructions;

(o) land the aircraft;

(p) vacate runway;

(q) cancel SARWATCH, if applicable.

3 Range of variables

(a) activities are performed in accordance with published procedures;

(b) non-towered aerodromes;

(c) landing areas;

(d) Class G airspace;

(e) CTAF;

(f) day VFR conditions.

4 Underpinning knowledge of the following:

(a) decode NOTAM;

(b) aerodrome ground markings and lighting;

(c) standard RT phraseology for operations at non-towered aerodromes and landing areas;

(d) radio failure procedures in ERSA;

(e) transponder codes for G airspace.

CTA Operate in controlled airspace

1 Unit description

This unit describes the skills and knowledge required to operate an aircraft in controlled airspace.

2 Elements and performance criteria

2.1 CTA.1 – Operate aircraft in controlled airspace

2.1.1 The person must be able to demonstrate her or his ability to do the following:

(a) comply with airways clearance requirements for operating in all classes of airspace, including lead time required for flight plan submission, contents, 'clearance void time', and 'readback' requirement;

(b) apply airways clearance requirements for entering, operating in and departing from CTA and CTR, including details that need to be provided to ATC, and what details to expect from ATC;

(c) maintain control area protection tolerances;

(d) maintain tracking and altitude tolerances when operating on an airways clearance;

(e) reconfirm any clearance items when doubt exists;

(f) advise ATC as soon as possible if unable to maintain clearance due to adverse weather conditions;

(g) follow ATC requirements for a change of level in CTA, including in an emergency situation;

(h) comply with departure, climb, transition to cruise (levelling out), cruise, change of levels, descent and visual approach procedures in CTA and CTR instructions;

(i) apply separation standards between IFR flights, and IFR and VFR flights in the various classes of CTA;

(j) perform appropriate actions in the event of the loss of radio communication in CTA and CTR;

(k) perform appropriate actions in the event of abnormal operations and emergency procedures in CTA and CTR;

(l) operate under radar vectoring procedures, including radio procedures and phraseologies;

(m) maximum permissible time interval between ATC transmissions during radar vectoring are not exceeded;

(n) perform appropriate actions in the event of abnormal operations and emergencies;

(o) recall transponder emergency code and communication failure code.

3 Range of variables

(a) activities are performed in accordance with published procedures;

(b) day VFR conditions;

(c) any category of aircraft;

(d) Class C, D, or G airspace.

4 Underpinning knowledge of the following:

(a) decode NOTAMS;

(b) aerodrome ground markings and lighting;

(c) standard RT phraseology for operations at controlled aerodromes;

(d) radio failure procedures that are published in the ERSA;

(e) transponder codes.

OGA Operate in Class G airspace

1 Unit description

This unit describes the skills and knowledge required to operate an aircraft in Class G (uncontrolled) airspace.

2 Elements and performance criteria

2.1 OGA – Operate aircraft in Class G airspace

(a) maintain tracking and altitude tolerances to remain outside controlled airspace;

(b) apply separation tolerances between IFR flights, and IFR and VFR flights;

(c) when using an aircraft radio:

- (i) monitor appropriate radio frequency;
- (ii) make appropriate radio calls;
- (iii) obtain operational information from air services provider and other aircraft;
- (iv) use information to ensure aircraft separation is maintained;
- (v) apply loss of radio communication procedures;

(d) using a suitable chart:

- (i) operate clear of active aerodromes and landing areas in the vicinity of the aircraft;
- (ii) identify and remain clear of controlled and restricted airspace;
- (iii) take appropriate action when operating in the vicinity of a danger area;

(e) perform actions in the event of abnormal operations and emergencies;

(f) recall transponder emergency code and communication failure code.

3 Range of variables

(a) activities are performed in accordance with published procedures;

(b) day VFR conditions;

(c) Class G airspace;

(d) simulated or actual abnormal, emergency situations and radio failure.

4 Underpinning knowledge of the following:

Class G airspace.

SECTION 4: AIRCRAFT RATING STANDARDS

AEROPLANE CATEGORY

A1 Control aeroplane on the ground

1 Unit description

This unit describes the skills and knowledge required to operate an aeroplane on the ground.

2 Elements and performance criteria

2.1 **A1.1 – Start and stop engine**

(a) perform engine start and after start actions;

(b) perform engine shutdown and after shutdown actions;

(c) manage engine start and shutdown malfunctions and emergencies;

(d) considers ground surface in relation to contamination and propeller care during engine start and stop activities.

2.2 **A1.2 – Taxi aeroplane**

(a) use aerodrome or landing area charts to taxi aircraft;

(b) comply with taxiway and other aerodrome markings, right-of-way rules and ATC or marshalling instructions when applicable;

(c) perform applicable taxi checks, including the following:

  (i) brakes and steering function normally and take appropriate action in the event of a malfunction;

  (ii) instruments for correct readings;

  (iii) altimeter setting;

(d) maintain safe taxi speed and control of the aircraft;

(e) maintain safe spacing from other aircraft, obstructions, and persons;

(f) maintain the aircraft on the taxiway centreline;

(g) avoid causing a hazard to other aircraft, objects or persons;

(h) correct handling techniques are applied to take into account wind from all 4 quadrants;

(i) correctly manage the engine during taxi manoeuvres.

3 Range of variables

(a) activities are performed in accordance with published procedures;

(b) single-engine aeroplane with propeller;

(c) aircraft with undercarriage and flaps;

(d) windsock located on the aerodrome;

(e) sufficient wind that requires control adjustment (may be simulated);

(f) hazardous weather (may be simulated);

(g) day VFR conditions;

(h) local area operational limitations such as noise abatement and aerodrome curfews (may be simulated).

4 Underpinning knowledge of the following:

(a) typical single-engine aeroplane aircraft systems;

(b) differences between normally aspirated and fuel-injected systems;

(c) carburettor icing;

(d) the cause and effect of fuel vaporisation;

(e) typical aircraft performance characteristics of single-engine aeroplanes and the effects of local weather conditions on performance;

(f) aircraft weight and balance and the how to calculate aircraft centre of gravity;

(g) the contents of the flight manual and POH for the aircraft being flown;

(h) the environmental conditions that represent VMC;

(i) propeller wash, rotor wash and jet blast and how they affect other aircraft;

(j) the day VFR flight rules;

(k) the meaning of:

  (i) light and marshalling signals;

  (ii) aerodrome markings, signals and local procedures;

(l) care of propellers;

(m) the actions to be taken in the event of a brake or tyre or steering failure;

(n) the relevant sections of the AIP.

A2 Take-off aeroplane

1 Unit description

This unit describes the skills and knowledge required to complete pre-take-off checks, take-off aeroplane into wind and in cross-wind conditions and perform after take-off checks in an aeroplane.

2 Elements and performance criteria

2.1 **A2.1 – Carry out pre-take-off procedures**

(a) correctly identify critical airspeeds, configurations, and emergency and abnormal procedures for normal and cross-wind take-offs;

(b) work out a plan of action, in advance, to ensure the safest outcome in the event of abnormal operations;

(c) verify and correctly apply correction for the existing wind component to the take-off performance;

(d) perform all pre-take-off and line-up checks required by the aircraft checklist;

(e) ensure approach path is clear of conflicting traffic and other hazards before lining up for take-off;

(f) align the aeroplane on the runway centreline.

2.2 **A2.2 – Take off aeroplane**

(a) apply the controls correctly to maintain longitudinal alignment on the centreline of the runway, if appropriate, prior to initiating and during the take-off;

(b) adjust the power controls taking into account the existing conditions;

(c) monitor power controls, settings, and instruments during take-off to ensure all predetermined parameters are achieved and maintained;

(d) adjust the controls to attain the desired pitch attitude at the predetermined airspeed to attain the desired performance;

(e) perform the take-off applying the required pitch, roll and yaw inputs as appropriate in a smooth, coordinated manner;

(f) trim the aeroplane accurately;

(g) perform gear and flap retractions, power adjustments (as applicable) and other required pilot-related activities;

(h) maintain flight path along the runway extended centreline;

(i) apply the applicable noise abatement and wake turbulence avoidance procedures;

(j) recognise take-off abnormalities and take appropriate action to reject take-off (can be simulated).

2.3 **A2.3 – Take off aeroplane in a cross-wind**

(a) perform a take-off in an aeroplane making appropriate adjustments for cross-wind conditions;

(b) maintain the runway centreline and extended centreline.

2.4 **A2.4 – Carryout after take-off procedures**

(a) perform after take-off checklist;

(b) maintain the appropriate climb segment at the nominated heading and airspeed;

(c) manoeuvre according to local and standard procedures;

(d) maintain traffic separation.

2.5 **A2.5 – Take-off aeroplane from ‘short field’**

(a) calculate take-off and landing performance in accordance with the aeroplane’s performance charts;

(b) perform take-off aeroplane to achieve the minimum length take-off performance;

(c) perform take-off aeroplane to achieve the obstacle clearance parameters.

3 Range of variables

(a) activities are performed in accordance with published procedures;

(b) aeroplane with piston or turbine powerplant and propeller;

(c) aircraft with nose wheel or tail wheel;

(d) aircraft with fixed or retractable undercarriage;

(e) aircraft with or without flaps;

(f) sealed, gravel or grass runways and taxiways;

(g) windsock located on aerodrome;

(h) engine start and shutdown malfunctions and emergencies covered by the aircraft flight manual;

(i) simulated hazardous weather;

(j) day VFR conditions;

(k) for take-off in cross-wind, the cross-wind component must be:

  (i) for RPL, not more than 10 kts;

  (ii) otherwise, 70% of the maximum permitted for the type of aeroplane being flown;

(l) local area operational limitations such as noise abatement and aerodrome curfews.

4 Underpinning knowledge of the following:

(a) obtaining or calculating the cross-wind and down or up wind components;

(b) the factors affecting take-off and initial climb performance;

(c) interpreting windsock indications and determining wind direction and speed;

(d) take-off distance required calculation;

(e) aerodrome charts and an ability to interpret them;

(f) local topographical charts to identify safe areas for engine-failure purposes and noise-abatement considerations.

A3 Control aeroplane in normal flight

1 Unit description

This unit describes the skills and knowledge required to control an aeroplane while performing normal flight manoeuvres.

2 Elements and performance criteria

2.1 A3.1 – Climb aeroplane

(a) operate and monitor all aircraft systems when commencing, during, and completing a climbing flight manoeuvre;

(b) adjust altimeter subscale according to applicable settings;

(c) identify and avoid terrain and traffic;

(d) for the following climbing manoeuvres select power, attitude and configuration as required for the flight path, balance and trim the aeroplane accurately, and apply smooth, coordinated control inputs to achieve the required flight tolerances that apply to the manoeuvre:

  (i) cruise climb;

  (ii) best angle climb;

  (iii) best rate climb;

(e) anticipate level-off altitude and achieve straight and level flight.

2.2 A3.2 – Maintain straight and level flight

(a) operate and monitor all aircraft systems during straight and level flight manoeuvres;

(b) adjust altimeter subscale according to applicable settings;

(c) identify and avoid terrain and traffic;

(d) for the following straight and level manoeuvres select power, attitude and configuration as required for the flight path, balance and trim the aeroplane accurately, and apply smooth, coordinated control inputs to achieve the required flight tolerances that apply to the manoeuvre:

  (i) at slow speed;

  (ii) at normal cruise;

  (iii) at high-speed cruise;

  (iv) during acceleration and deceleration;

  (v) except for the RPL, at maximum range;

  (vi) except for the RPL, at maximum endurance;

  (vii) with flaps selected.

2.3 A3.3 – Descend aeroplane

(a) operate and monitor all aircraft systems during descending flight manoeuvres;

(b) for the following descending manoeuvres select power, attitude and configuration as required for the flight path, balance and trim the aeroplane accurately, and apply smooth, coordinated control inputs to achieve the required flight tolerances that apply to the manoeuvre:

  (i) glide;

  (ii) powered;

  (iii) approach configuration descent (flap and undercarriage);

(c) anticipate level-off altitude and achieve straight and level flight.

2.4 A3.4 – Turn aeroplane

(a) operate and monitor all aircraft systems during turning flight manoeuvres;

(b) for the following turning manoeuvres select power, attitude and configuration as required for the flight path, balance and trim the aeroplane accurately, and apply smooth, coordinated control inputs to achieve the required flight tolerances that apply to the manoeuvre:
   (i) level turns;
   (ii) climbing turn;
   (iii) powered descending;
   (iv) gliding descending turn;

(c) complete turn manoeuvre on a nominated heading or geographical feature;

(d) turn aeroplane at varying rates to achieve specified tracks;

(e) manoeuvre aeroplane over specified tracks or geographical features.

2.5 **A3.5 – Control aeroplane at slow speeds**

(a) complete pre-manoeuvre checks;

(b) operate and monitor all aircraft systems when operating the aeroplane at slow speed in straight and level, climbing, descending and turning flight;

(c) except for multi-engine aeroplane operations, select power, attitude and configuration as required for the flight path, balance and trim the aeroplane accurately, and apply smooth, coordinated control inputs to achieve stable flight at the required flight tolerances that apply to the following:
   (i) minimum approach speed with flaps retracted;
   (ii) minimum approach speed in approach configuration;
   (iii) flight at speeds just above stall warning activation or at the initial symptoms of stall;

(d) except for multi-engine aeroplane operations, observe audible and visible stall warnings and recover aeroplane to controlled flight;

(e) recognise and respond positively to reduced effectiveness of controls during slow flight manoeuvres;

(f) recognise the need to increase power while manoeuvring in slow flight to maintain nominated altitude and a margin of speed above the stall;

(g) transition from slow speed configuration, using take-off power to achieve nominated speed in excess of 1.5 Vs without loss of height.

2.6 **A3.6 – Perform circuits and approaches**

(a) operate and monitor all aircraft systems when operating the aeroplane in the circuit;

(b) in accordance with specific local procedures, safely perform a full circuit pattern (5 legs) by balancing and trimming the aeroplane accurately while applying smooth, coordinated control inputs to achieve the required flight tolerances specified for the flight path flown during traffic pattern manoeuvres as follows:
   (i) track upwind along extended centreline to 500 ft;
   (ii) establish and maintain cross-wind leg tracking 90° to the runway;
   (iii) establish and maintain downwind leg tracking parallel to, and at a specified distance from, the runway at circuit height;
   (iv) establish base leg tracking 90° to the runway at a specified distance from the runway threshold;

(c) perform checks as required throughout circuit;

(d) establish the approach and landing configuration appropriate for the runway and meteorological conditions, and adjust the power plant controls as required for the following:
   (i) commence and control approach descent path;
   (ii) adjust descent commencement point to take account of extended downwind leg or traffic adjustments;
   (iii) align and maintain aircraft on final approach flight path with specified or appropriate runway;
   (iv) set and maintain approach configuration not below 500 ft AGL;

(v) identify and maintain the nominated aiming point;

(vi) maintain a stabilised approach angle at the nominated airspeed not less than $1.3V_S$ to the round-out height;

(vii) verify existing wind conditions, make proper correction for drift, and maintain a precise ground track;

(viii) apply speed allowances for wind gusts;

(ix) configure aeroplane for landing;

(e) maintain aircraft separation and position in the circuit with reference to other aircraft traffic in the circuit area.

2.7 **A3.7 – Local area airspace**

(a) using an appropriate chart, for the local area and circuit area:

(i) identify geographical features;

(ii) identify geographical limits;

(iii) identify restricted, controlled and uncontrolled airspace areas;

(iv) state local airspace limits;

(v) identify the transit route between the departure aerodrome and training area;

(vi) identify the geographical limits of the training area;

(vii) identify aerodromes and landing areas within the local area;

(b) maintain orientation and pinpoint location by using geographical features and a local area chart;

(c) transit from the circuit area and transit to the designated training area;

(d) operate safely within a transit lane (if applicable);

(e) remain clear of restricted, controlled and other appropriately designated airspace;

(f) operate safely in the vicinity of local aerodromes and landing areas;

(g) transit from the designated training area to the circuit area;

(h) set QNH appropriately;

(i) correctly determine which runway is to be used for landing;

(j) ensure runway is serviceable and available;

(k) position aircraft for arrival into the circuit.

3 Range of variables

(a) activities are performed in accordance with published procedures;

(b) aeroplane with piston or turbine powerplant and propeller;

(c) aircraft with fixed or retractable undercarriage;

(d) aircraft with or without flaps;

(e) simulated hazardous weather;

(f) approach and landing configurations:

(i) normal;

(ii) flapless;

(iii) glide;

(g) circuit patterns:

(i) normal 1,000 ft AGL circuit;

(ii) low-level 500 ft AGL circuit;

(iii) full circuit pattern, including 5 legs;

(iv) shortened circuit pattern;

(h) day VFR conditions;

(i) local area airspace limitations.

4 Underpinning knowledge of the following:

(a) the primary effects of controls;

(b) the secondary effects of controls;

(c) the stall warning devices;

(d) aircraft systems;

(e) aircraft performance;

(f) aircraft weight and balance;

(g) hazards when performing performance manoeuvres;

(h) turning using a magnetic compass;

(i) relationship between angle of bank, load factor and stall speed;

(j) relationship between induced drag and operating at slow speed;

(k) dangers associated with mechanical and wake turbulence;

(l) engine considerations during prolonged climbing and descending;

(m) contents of the aircraft flight manual and pilot's operating handbook;

(n) environmental conditions that represent VMC;

(o) day VFR flight rules;

(p) local area operating procedures;

(q) relevant sections of the AIP.

A4 Land aeroplane

1 Unit description

This unit describes the skills and knowledge required to conduct a landing in an aeroplane.

2 Elements and performance criteria

2.1 A4.1 – Land aeroplane

(a) maintain a constant landing position aim point;

(b) achieve a smooth, positively-controlled transition from final approach to touchdown, including the following;

  (i) control ballooning during flare;

  (ii) touchdown at a controlled rate of descent, in the specified touchdown zone within tolerances

  (iii) control bouncing after touchdown;

  (iv) touchdown aligned with the centreline within tolerances;

(c) ensure separation is maintained;

(d) maintain positive directional control and cross-wind correction during the after-landing roll;

(e) use drag and braking devices, as applicable, in such a manner to bring the airplane to a safe stop;

(f) complete the applicable after-landing checklist items in a timely manner.

2.2 A4.2 – Land aeroplane in a cross-wind

(a) verify existing wind conditions, make proper correction for drift, and maintain a precise ground track;

(b) configure the aeroplane for the cross-wind conditions;

(c) control the aeroplane during the transition from final approach to touchdown and during after-landing roll to compensate for the cross-wind conditions.

2.3 A4.3 – Conduct a missed approach

(a) recognise the conditions when a missed approach should be executed;

(b) make the decision to execute a missed approach when it is safe to do so;

(c) make a smooth, positively-controlled transition from approach to missed approach, including the following:

  (i) select power, attitude and configuration to safely control aeroplane;

  (ii) manoeuvre aeroplane clear of the ground and conduct after take-off procedures;

  (iii) make allowance for wind velocity during go-around;

  (iv) avoid wake turbulence.

2.4 A4.4 – Perform recovery from missed landing

(a) recognise when a missed landing is occurring and when it is appropriate to take recovery action;

(b) make the decision to execute recovery from a missed landing only when it is safe to do so;

(c) make a smooth, positively-controlled transition from missed landing to missed approach, including the following:

  (i) select power, attitude and configuration to safely control aeroplane;

  (ii) manoeuvre aeroplane clear of the ground and conduct after take-off procedures;

  (iii) make allowance for wind velocity during go-around;

  (iv) avoid wake turbulence.

2.5 **A4.5 – Short landing**

(a) land aeroplane at nominated touchdown point at minimum speed;

(b) control ballooning during flare;

(c) control bouncing after touchdown;

(d) maintain direction after touchdown;

(e) apply maximum braking without locking up wheels;

(f) stops aircraft within landing distance available.

3 Range of variables

(a) activities are performed in accordance with published procedures;

(b) aeroplane with piston or turbine powerplant and propeller;

(c) aircraft with nose wheel or tail wheel;

(d) aircraft with fixed or retractable undercarriage;

(e) aircraft with or without flaps;

(f) sealed, gravel or grass runways and taxiways;

(g) windsock located on aerodrome;

(h) simulated hazardous weather;

(i) day VFR conditions;

(j) for landing an aeroplane in cross-wind, the cross-wind component must be:

   (i) for RPL, not more than 10 kts;

   (ii) otherwise, 70% of the maximum permitted for the type of aeroplane being flown;

(k) local area operational limitations such as noise abatement and aerodrome curfews.

4 Underpinning knowledge of the following:

(a) typical single-engine aeroplane aircraft systems;

(b) aeroplane performance;

(c) aeroplane limitations;

(d) aeroplane weight and balance;

(e) options when local conditions are not suitable for landing;

(f) causes of loss of control of aeroplane on landing;

(g) contents of the aircraft flight manual and pilot's operating handbook;

(h) environmental conditions that represent VMC;

(i) day VFR flight rules;

(j) propeller wash, rotor wash and jet blast;

(k) relevant sections of the AIP.

A5 Aeroplane advanced manoeuvres

1 Unit description

This unit describes the skills and knowledge required to perform advanced manoeuvres in an aeroplane.

2 Elements and performance criteria

2.1 A5.1 – Enter and recover from stall

(a) perform stalling pre-manoeuvre checks;

(b) recognise symptoms of a stall;

(c) control the aeroplane by trimming and balancing accurately for slow flight and then applying the required pitch, roll and yaw inputs to enter and recover from the following:

- (i) slow flight where initial symptoms of a stall become evident;
- (ii) stall, recovering without application of power;
- (iii) stall, recovering with full power applied (not required for multi-engine aeroplanes);
- (iv) stall under the following conditions:
  - (A) straight and level flight;
  - (B) climbing flight (not required for multi-engine aeroplanes);
  - (C) descending flight (not required for multi-engine aeroplanes);
  - (D) approach to land configuration;
  - (E) turning flight (not required for multi-engine aeroplanes);

(d) perform stall recovery including the following:

- (i) reduce angle of attack;
- (ii) prevent yaw;
- (iii) use available power and height to increase the aircraft energy state;
- (iv) avoid secondary stall;
- (v) re-establish desired flight path and aircraft control with balanced control application;

(e) perform stall recovery in simulated partial and complete engine failure conditions;

(f) perform stall recovery at simulated low altitude.

2.2 A5.2 – Avoid spin

This element only applies to a single-engine aeroplane:

(a) perform stalling pre-manoeuvre checks;

(b) recognise wing drop at the stall;

(c) from balanced flight, recover from stall in the attitudes and configurations most likely to cause a wing drop;

(d) perform recovery where the aeroplane exhibits a tendency to drop a wing at the stall, in accordance with paragraph (d) of subclause 2.1 (5.1 – Enter and recover from stall);

(e) perform stall recovery at simulated low altitude.

2.3 A5.3 – Turn aeroplane steeply

(a) pre-manoeuvre checks for steep turning;

(b) steep level turn using a nominated bank angle, ending on a nominated heading or geographical feature, without altitude change;

(c) steep descending turn using a nominated bank angle, ending on a nominated heading or geographical feature ending on a nominated altitude;

(d) aeroplane operating limits are not exceeded.

2.4 **A5.4 – Sideslip aeroplane (where flight manual permits)**

(a) straight sideslip:

(i) induce slip to achieve increased rate of descent while maintaining track and airspeed; and

(ii) adjust rate of descent by coordinating angle of bank and applied rudder;

(b) sideslipping turn by adjusting the bank angle to turn through minimum heading change of 90° at constant airspeed using sideslip, and exiting the turn on a specified heading or geographical feature, within tolerance;

(c) recover from a sideslip and return the aeroplane to balanced flight.

3 Range of variables

(a) activities are performed in accordance with published procedures;

(b) manoeuvres are performed within operating limits of aeroplane;

(c) aeroplane with piston or turbine powerplant and propeller;

(d) aircraft with nose wheel or tail wheel;

(e) aircraft with fixed or retractable undercarriage;

(f) aircraft with or without flaps;

(g) sealed, gravel or grass runways and taxiways;

(h) windsock located on aerodrome;

(i) simulated hazardous weather;

(j) day VFR conditions;

(k) local area operational limitations such as noise abatement and aerodrome curfews.

4 Underpinning knowledge of the following:

(a) operational circumstances where steep turns are required;

(b) aerodynamic and aeroplane operational considerations related to slow flight, sideslipping, stalling, spinning, steep turns, upset aeroplane states, including but not limited to the following:

(i) symptoms of approach to stall and throughout the stall manoeuvre until recovery;

(ii) relationship between angle of attack and stall;

(iii) effects of weight, centre of gravity position, ‘g’ force and angle of attack;

(iv) dangers of unbalanced flight;

(v) principle of stick and control and the point of stall;

(vi) priority given to reduce angle of attack during stall manoeuvres;

(vii) loss of height is considered in relation to available height and energy state;

(viii) the technique of converting excess speed to height;

(ix) the technique of converting excess height to speed;

(x) symmetrical and rolling ‘g’ force limitations;

(xi) higher stall speeds when aeroplane is turning;

(xii) effects on fuel, pitot and flap systems;

(c) contents of the flight manual and POH;

(d) environmental conditions that represent VMC;

(e) day VFR flight rules;

(f) relevant sections of the AIP.

A6 Manage abnormal situations – single-engine aeroplanes

1 Unit description

This unit describes the skills and knowledge required to accurately assess an abnormal situation, reconfigure the aeroplane, control the aeroplane and execute appropriate manoeuvres to achieve a safe outcome with no injury to personnel or damage to the aeroplane or property.

2 Elements and performance criteria

2.1 A6.1 – Manage engine failure – take-off (simulated)

(a) correctly identify an engine failure after take-off;

(b) apply the highest priority to taking action to control the aeroplane;

(c) maintain control of aeroplane;

(d) perform recall actions;

(e) perform emergency actions as far as time permits;

(f) manoeuvre the aeroplane to achieve the safest possible outcome;

(g) ensure passengers adopt brace position;

(h) advise others such as ATS and other aircraft of intentions if time permits.

2.2 A6.2 – Manage engine failure in the circuit area (simulated)

(a) correctly identify an engine failure during flight;

(b) apply the highest priority to taking action to control the aeroplane;

(c) perform recall actions;

(d) select a suitable landing area within gliding distance, on the aerodrome or elsewhere;

(e) perform emergency procedures and land the aeroplane if the engine cannot be restarted as time permits;

(f) advise ATS or other agencies capable of providing assistance of situation and intentions;

(g) re-brief passengers about flight situation, brace position and harness security;

(h) land the aeroplane ensuring safest outcome if an engine restart is not achieved.

2.3 A6.3 – Perform forced landing (simulated)

(a) after a simulated complete engine failure has occurred, without prior indications, carryout the following:

- (i) identify complete power failure condition and control aeroplane;
- (ii) perform immediate actions;
- (iii) formulate and describe a recovery plan, including selecting the most suitable landing area;
- (iv) establish optimal gliding flight path to position the aeroplane for a landing on the selected landing area;
- (v) perform emergency procedures and land the aeroplane if the engine cannot be restarted as time permits;
- (vi) advise ATS or other agencies capable of providing assistance of situation and intentions;
- (vii) re-brief passengers about flight situation, brace position and harness security;
- (viii) land the aeroplane ensuring safest outcome if an engine restart is not achieved;

(b) after a simulated partial engine failure has occurred, without prior indications, carryout the following:

- (i) identify partial power failure condition;
- (ii) perform recall actions;

(iii) adjust flight controls to re-establish flight path that maximises performance for partial power condition and maintain a safe airspeed margin above stall speed;

(iv) establish radio communications where possible;

(v) perform partial engine failure actions;

(vi) formulate a plan to recover aeroplane to a safe landing area or aerodrome, taking into account that partial failure might lead to a full power failure at any time;

(vii) manoeuvre the aeroplane to a selected landing area or aerodrome using the remaining power to establish an optimal aircraft position for a safe landing;

(viii) advise ATS, or other agencies capable of providing assistance of situation and intentions;

(ix) re-brief passengers about flight situation, brace position and harness security;

(x) maintain a contingency plan for coping with a full power failure throughout the manoeuvre;

(xi) when a safe landing position is established, shut down and secure engine and aeroplane.

2.4 **A6.4 – Conduct precautionary search and landing (simulated condition)**

(a) assess flight circumstances and make an appropriate decision when to perform precautionary landing;

(b) configure aeroplane for conditions;

(c) perform precautionary search procedure;

(d) select landing area, carryout an inspection and assess its suitability for landing, taking into account:

(i) unobstructed approach and overshoot paths;

(ii) landing area length adequate for landing;

(iii) landing area surface is suitable for aeroplane type and clear of hazards;

(e) maintain orientation and visual contact with the landing area;

(f) advise ATS or other agencies capable of providing assistance of situation and intentions;

(g) re-brief passengers about flight situation, brace position and harness security;

(h) land and secure aircraft and manage passengers.

2.5 **A6.5 – Manage other abnormal situations (simulated)**

(a) correctly identify the situation and maintain safe control of the aeroplane at all times;

(b) manage abnormal and emergency situations in accordance with relevant emergency procedures and regulatory requirements;

(c) follow appropriate emergency procedures while maintaining control of the aeroplane;

(d) identify and conduct flight with an unreliable airspeed indication;

(e) correctly identify when an emergency evacuation of an aeroplane is required;

(f) execute a simulated emergency evacuation of an aeroplane;

(g) advise ATS or other agencies capable of providing assistance of situation and intentions.

2.6 **A6.6 – Recover from unusual flight attitudes**

(a) identify nose-high or nose-low unusual attitude flight condition;

(b) recover from nose-low or nose-high unusual attitudes by adjusting pitch, bank and power to resume controlled and balanced flight;

(c) apply controlled corrective action while maintaining aircraft performance within limits.

3 Range of variables

(a) activities are performed in accordance with published procedures;

(b) single-engine aeroplane with piston or turbine powerplant and propeller;

(c) discontinue simulated manoeuvres that would be terminated by a forced landing when the assessor is satisfied that the landing standard would be achieved;

(d) day VFR conditions.

4 Underpinning knowledge of the following:

(a) engine failure scenarios and procedures for partial and complete power loss;

(b) forced landing scenarios and procedures;

(c) causes leading to precautionary landings;

(d) judging descent profiles in various configurations;

(e) prioritising activities during emergencies and non-normal situations;

(f) ditching;

(g) suitable fields for forced landings and precautionary landings;

(h) considerations when practicing emergencies and non-normal operations;

(i) aircraft performance in a glide (straight and turning);

(j) hazard of sideslip at low altitude;

(k) effects of partial engine power on performance, flight profile, range and landing options;

(l) contents of the flight manual and pilot's operating handbook;

(m) passenger control and briefing;

(n) VMC;

(o) low-flying hazards.

AME Operate multi-engine aeroplane

1 Unit description

This unit describes the skills and knowledge required to operate a multi-engine class-rated aeroplane in non-normal and emergency operations.

2 Elements and performance criteria

2.1 AME.1 – Operate multi-engine aeroplane

(a) start multi-engine aeroplane;

(b) use asymmetric thrust to assist with taxi manoeuvring;

(c) check multi-engine specific systems and instrumentation.

2.2 AME.2 – Manage failures and malfunctions – general

(a) operate and manage aircraft systems;

(b) asymmetric operations for all phases of flight are anticipated and contingencies are planned;

(c) a plan of action is self-briefed or briefed that will ensure the safest outcome in the event of asymmetric operations.

2.3 AME.3 – Manage engine failure and malfunction after take-off (simulated)

(a) manage simulated engine failures and malfunctions effectively whilst maintaining control of the aircraft flight path within specified tolerances;

(b) configure and fly aeroplane to achieve best performance;

(c) replan flight and take action to return to land or divert to alternate.

2.4 AME.4 – Manage engine failure and malfunction en route (simulated)

(a) maintain or regain control of the aeroplane flight path within specified tolerances;

(b) manage failed or malfunctioning engine effectively;

(c) replan flight and take action to continue or divert to alternate.

2.5 AME.5 – Perform rejected take-off – multi-engine aeroplane

(a) abort take-off at or before decision point during the take-off where the abort procedure can be initiated and the aeroplane stopped on the remaining runway or stopway;

(b) reduce power smoothly and promptly;

(c) activate spoilers, prop fine, reverse, thrust reverse, wheel brakes and other drag and braking devices (as applicable);

(d) maintain positive control to bring the aeroplane to a safe stop;

(e) initiate and complete engine failure procedures and checklists.

2.6 AME.6 – Manage engine failure and malfunction during approach and landing (simulated)

(a) maintain control of aeroplane flight path;

(b) nominate decision height for landing;

(c) make decision to continue or abort approach and landing in a safe and timely way;

(d) advise ATS or other agencies capable of providing assistance of situation and intentions;

(e) establish the approach and landing configuration appropriate for the runway or landing area, and meteorological conditions, and adjust the power plant controls as required;

(f) maintain a stabilised approach and nominated airspeed within tolerances;

(g) achieve a smooth, positively-controlled transition from final approach to touchdown in the touchdown zone within tolerances;

(h) maintain positive directional control and cross-wind corrections during the after-landing roll maintaining the centreline within tolerances;

(i) use spoilers, prop reverse, thrust reversers, wheel brakes, and other drag or braking devices, as appropriate, in such a manner to bring the airplane to a safe stop after landing (as applicable).

2.7 **AME.7 – Conduct go-around or missed approach with engine failure (simulated)**

(a) identify and confirm engine failure in a multi-engine aeroplane during a go-around or missed approach;

(b) maintain control of aeroplane;

(c) perform engine inoperative go-around safely not below the decision height.

3 Range of variables

(a) activities are performed in accordance with published procedures;

(b) day VFR or IFR;

(c) class-rated multi-engine aeroplane with dual controls, electronic intercom and dual control brakes;

(d) aerodromes;

(e) appropriate surfaces;

(f) simulated emergencies;

(g) simulated hazardous weather.

4 Underpinning knowledge of the following:

(a) airspeed limitations, including: V_{NO}, V_A, V_X and V_Y, V_{NE}, V_{FE}, V_{LO}, V_{LE}, V_{LO2} (landing gear operations down), maximum cross-wind, turbulence penetration speed and maximum load factor;

(b) emergency airspeeds, including: V_{MCA}, V_{SSE}, engine(s) inoperative climb, approach and final speed, emergency descent and best glide range speeds;

(c) emergency procedures for: engine failure after take-off, engine fire on the ground and airborne, engine failure in the cruise, waste gate failure (if applicable) and propeller or turbine over-speed;

(d) safety implications of asymmetric flight below V_{MCA};

(e) power, flight and configuration requirements that apply to V_{MCA};

(f) methods of regaining control of an aeroplane with a failed engine that is flying at a speed less than V_{MCA};

(g) conditions that would increase V_1 (if stated in AFM and POH);

(h) performance the aeroplane can achieve after reaching V_Y or V_2 during asymmetric flight;

(i) markings on the airspeed indicator that apply to failed engine operations;

(j) normal and cross-wind take-off and landing procedures: climb, cruise, descent procedures, including airspeeds, configurations, method of drift allowance, setting of flight instruments and non-normal and emergency procedures;

(k) technique and procedures used during engine failure on take-off, the appropriate reference airspeeds, and the specific pilot actions required;

(l) technique and procedure for carrying out a rejected take-off after an engine or system(s) failure or warnings, including related safety factors;

(m) technique and procedures used to conduct an asymmetric go-around or missed approach, the appropriate reference airspeeds, and the specific pilot actions required;

(n) other abnormal or emergency items as contained in the flight manual or pilot operating handbook.

TR-CR Type rating – cruise relief aeroplane

1 Unit description

This unit describes the skills and knowledge required for the issue of a cruise-relief type rating.

2 Elements and performance criteria

2.1 TR-CR.1 – Conduct pre-flight inspection

(a) complete pre-flight inspections;

(b) communicate with ground support crew;

(c) ensure all aircraft locking devices and bungs are removed;

(d) prepare and operate aircraft systems correctly.

2.2 TR-CR.2 – Extract pre-flight performance data

(a) extract correct aircraft loading and performance data;

(b) set instrumentation and systems;

(c) obtain and interpret the take-off and departure clearance issued by ATC.

2.3 TR-CR.3 – Request ATC clearance

Obtain, interpret and brief ATC clearance.

2.4 TR-CR.4 – Start engines

(a) start engine correctly;

(b) manage occurrences where specific instructions or checklist items are not published.

2.5 TR-CR.5 – Taxi aircraft

(a) request ATC clearances or make mandatory air traffic broadcast;

(b) push back or power back aircraft safely;

(c) maintain control of aircraft during taxi;

(d) divide attention appropriately between inside and outside the flight deck, to ensure maintenance of control while taxiing and completion of cockpit procedures and checklists;

(e) check instruments in a suitable area clear of traffic and other hazards;

(f) interpret and comply with taxiway, lighting, other aerodrome markings and marshalling instructions;

(g) adjust taxi speed to suit aircraft type, surface conditions, congestion, and maintenance of control, and avoid collision with personnel, obstacles or other aircraft;

(h) apply flying controls, power and brakes to maintain the aircraft on the taxiway centreline while compensating for wind and surface conditions.

2.6 TR-CR.6 – Conduct pre-take-off checks

(a) perform pre-take-off checklist and confirm all systems are within normal operating range;

(b) perform pre-take-off briefing;

(c) confirm, prior to entering runway, that aircraft is positioned on specified or appropriate taxiway;

(d) ensure final approach path is clear of conflicting traffic on specified or appropriate runway.

2.7 TR-CR.7 – Conduct take-off

(a) demonstrate knowledge of airspeeds, configurations, and emergency and abnormal procedures for normal and cross-wind take-offs;

(b) brief a plan of action to ensure the safest outcome in the event of abnormal operations;

(c) verify and correctly apply correction for the existing wind component to the take-off performance;

(d) ensure all pre-take-off checks required by the appropriate checklist items are completed in a timely manner;

(e) align the aircraft on the runway centreline;

(f) apply the controls correctly to maintain longitudinal alignment on the centreline of the runway, if appropriate, prior to initiating and during the take-off;

(g) adjust the power plant controls;

(h) monitor power plant controls, settings, and instruments during take-off to ensure all predetermined parameters are maintained;

(i) adjust the controls to attain the desired pitch attitude at the predetermined airspeed to attain the desired performance;

(j) perform the required pitch changes and, as appropriate, perform and verify the completion of, gear and flap retractions, power adjustments (as applicable) and other required pilot-related activities at the required airspeed within the published tolerances;

(k) use the applicable noise abatement and wake turbulence avoidance procedures;

(l) verify the completion of the appropriate after take-off checklist items in a timely manner;

(m) manage any incident, malfunction or failure during take-off to achieve the safest possible outcome.

2.8 **TR-CR.8 – Operate aircraft in flight**

(a) operate aircraft in normal flight profiles;

(b) operate aircraft systems for normal, non-normal and emergency conditions;

(c) demonstrate the following manoeuvres:

(i) approach to stall and full stall recovery;

(ii) maximum performance turning;

(iii) unusual attitude and upset recovery;

(iv) flight with unreliable airspeed;

(v) emergency descent.

2.9 **TR-CR.9 – Manage engine failure in flight**

(a) maintain control of aircraft flight path;

(b) correctly identify and verify malfunction;

(c) manage failure effectively.

2.10 **TR-CR.10 – Conduct a descent, arrival and landing**

(a) plan and conduct a descent, arrival and landing;

(b) obtain, interpret and brief ATC clearance for descent and arrival;

(c) manage non-normal or emergency conditions;

(d) demonstrate missed approach manoeuvre.

2.11 **TR-CR.11 – Conduct taxi to stand, park and shutdown**

Follow published procedures, taxi, park and shutdown aircraft at the designated parking bay.

3 Range of variables

(a) activities are performed in accordance with published procedures;

(b) day and night VMC or IMC;

(c) approved aircraft or approved flight simulation training device;

(d) simulated abnormal or emergency situations;

(e) flight crew incapacitation (multi-crew operations);

(f) simulated hazardous weather;

(g) sealed, gravel or grass surfaces.

4 Underpinning knowledge of the following:

(a) normal and cross-wind take-off;

(b) instrument take-off;

(c) engine failure during take-off;

(d) the procedures used during engine failure on take-off, the appropriate reference airspeeds, and the specific pilot actions required;

(e) rejected take-off;

(f) departure procedures;

(g) steep turns;

(h) approaches to stalls;

(i) engine failure;

(j) any specific flight characteristics;

(k) recovery from unusual attitudes;

(l) normal and cross-wind approaches and landings;

(m) approach and landing with a (simulated) engine failure;

(n) baulked approach and missed-landing;

(o) no flap or a non-standard flap approach and landing;

(p) critical airspeeds, V-speeds (including tyre rotation limits);

(q) how to calculate landing distance required;

(r) the normal system operating procedures of the aircraft systems;

(s) emergency procedures;

(t) how potential, kinetic and chemical energy relate to an aircraft in flight;

(u) how energy states are manipulated to generate aerodynamic forces that allow an aircraft to be manoeuvred;

(v) the unintended flight conditions of pitch, bank and airspeed that describe upset aircraft state;

(w) the physical symptoms that may or may not be evident in a stall;

(x) stall recovery technique during any nominated phase of flight applicable to the aircraft type being flown;

(y) the upset recovery techniques applicable to the aircraft type being flown at low altitude, and high altitude where the aircraft is pressurised;

(z) Structural integrity of an aeroplane is not ensured when operating at or below maximum manoeuvring speed, if multiple control inputs in one axis, or full control inputs in more than one axis, are initiated at the same time.

TR-SEA Type rating – single-engine aeroplane

1 Unit description

This unit describes the skills and knowledge required for a person to operate a type-rated single-engine aeroplane.

2 Elements and performance criteria

2.1 TR-SEA.1 – Conduct pre-flight inspection

(a) complete pre-flight inspection correctly;

(b) communicate effectively with ground support crew;

(c) ensure all aircraft locking devices, covers and bungs are removed;

(d) prepare and operate aircraft systems.

2.2 TR-SEA.2 – Extract pre-flight performance data

(a) extract correct aircraft loading and performance data;

(b) set instrumentation and systems;

(c) obtain and interpret the take-off and departure clearance issued by ATC.

2.3 TR-SEA.3 – Request ATC clearance

Obtain, interpret and brief ATC clearance.

2.4 TR-SEA.4 – Start engine

(a) start engine;

(b) manage occurrences where specific instructions or checklist items are not published.

2.5 TR-SEA.5 – Taxi aircraft

(a) request ATC clearances or make mandatory air traffic broadcast appropriate to the local airspace and aerodrome;

(b) maintain control of aircraft during taxi;

(c) divide attention appropriately between inside and outside the flight deck, to ensure aircraft control is maintained while taxiing and complete cockpit procedures and checklists;

(d) check instruments in a suitable area clear of traffic and other hazards;

(e) interpret and comply with taxiway, lighting, other aerodrome markings and marshalling instructions;

(f) adjust taxi speed to suit aircraft type, surface conditions, congestion, and maintenance of control; and avoid collision with personnel, obstacles or other aircraft;

(g) apply flying controls, power and brakes to maintain the aircraft on the taxiway centreline while compensating for wind and surface conditions.

2.6 TR-SEA.6 – Conduct pre-take-off checks

(a) perform pre-take-off checklist and confirm all systems are within normal operating range;

(b) perform pre-take-off briefing effectively;

(c) confirm prior to entering runway, that aircraft is positioned on specified or appropriate taxiway;

(d) ensure final approach path is clear of conflicting traffic on specified or appropriate runway.

2.7 TR-SEA.7 – Conduct take-off

(a) apply correct airspeeds, configurations, and emergency and abnormal procedures for normal and cross-wind take-offs;

(b) conduct a briefing covering the plan of action that will ensure the safest outcome in the event of abnormal operations;

(c) verify and correctly apply correction for the existing wind component to the take-off performance;

(d) perform and ensure all pre-take-off checks required by the appropriate checklist items are completed in a timely manner;

(e) align the aircraft on the runway centreline;

(f) apply the controls correctly to maintain longitudinal alignment on the centreline of the runway, if appropriate, prior to initiating and during the take-off;

(g) adjust the powerplant controls correctly;

(h) monitor powerplant controls, settings, and instruments during take-off to ensure all predetermined parameters are maintained;

(i) adjust the controls to attain the desired pitch attitude to attain the desired performance;

(j) perform the required pitch changes and, as appropriate, perform and verify the completion of, gear and flap retractions, power adjustments (as applicable) and other required pilot-related activities at the required airspeed within the published tolerances;

(k) use the applicable noise abatement and wake turbulence avoidance procedures, as applicable;

(l) verify the completion of the appropriate after take-off checklist items in a timely manner.

2.8 **TR-SEA.8 – Incident, malfunction or failure during take-off**

Appropriately manage incident, malfunction or failure during take-off.

2.9 **TR-SEA.9 – Operate aircraft in flight**

(a) operate aircraft in normal flight profiles;

(b) operate aircraft systems for normal, non-normal and emergency conditions;

(c) identify aeroplane upset conditions and take appropriate action to return aeroplane to normal flight;

(d) demonstrate approach to the stall and stall recovery as follows:

(i) recognises approaching stall symptoms;

(ii) reduce AOA at the stall;

(iii) prevents yaw with rudder;

(iv) apply recommended power;

(v) when the wings are unstalled, level them using balanced aileron control;

(vi) recover height loss;

(e) demonstrate maximum performance turning under the following conditions:

(i) maximum rate;

(ii) minimum radius;

(f) demonstrate flight with unreliable airspeed;

(g) demonstrate ability to recover from unusual attitude and upset situations;

(h) demonstrate an emergency descent.

2.10 **TR-SEA.10 – Manage partial and complete engine failure situations in flight**

(a) maintain control of aircraft;

(b) correctly identify and verify failure;

(c) manage failure to achieve safest possible outcome;

(d) perform forced landing;

(e) perform precautionary landing (simulated).

2.11 **TR-SEA.11 – Conduct engine relight and restart in flight**

Maintain control while performing relight and restart.

2.12 **TR-SEA.12 – Conduct a descent, arrival and landing**

(a) plan and conduct a descent, arrival and landing;

(b) obtain, interpret and brief ATC clearance for descent and arrival;

(c) manage non-normal or emergency conditions;

(d) demonstrate missed approach manoeuvre.

2.13 **TR-SEA.13 – Conduct taxi to stand, park and shutdown**

(a) taxi, park and shut down aircraft at the designated parking bay as cleared;

(b) secure aircraft.

3 Range of variables

(a) activities are performed in accordance with published procedures;

(b) day and night VMC or IMC;

(c) upset conditions include the following:

  (i) pitch attitude more than 25° nose up;

  (ii) pitch attitude more than 10° nose down;

  (iii) bank angle more than 45°;

  (iv) flying at airspeeds inappropriate to the conditions;

(d) aircraft of the type to which the rating applies;

(e) approved flight simulator.

4 Underpinning knowledge of the following:

(a) normal and cross-wind take-off;

(b) instrument take-off (IFR pilots only);

(c) engine failure during take-off;

(d) rejected take-off;

(e) departure procedures;

(f) steep turns;

(g) approaches to stalls;

(h) engine failure;

(i) any specific flight characteristics (e.g. Dutch roll);

(j) recovery from unusual attitudes;

(k) normal and cross-wind approaches and landings;

(l) approach and landing with a (simulated) engine failure – multi-engine aeroplane;

(m) baulked approach and missed landing;

(n) no flap and non-standard flap approach and landing:

(o) factors that affect an aircraft when full or partial flaps, leading edge flaps, and any other similar devices become inoperative, including aircraft handling;

(p) extract critical airspeeds, V-speeds (including tyre rotation limits);

(q) calculate landing distance required;

(r) normal systems operating procedures;

(s) emergency procedures;

(t) how potential and kinetic energy relate to an aircraft in flight;

(u) how energy states are manipulated to generate aerodynamic forces that allow an aircraft to be manoeuvred;

(v) the unintended flight conditions of pitch, bank and airspeed that describe upset aircraft state;

(w) the physical symptoms that may or may not be evident in a stall;

(x) stall recovery technique during any nominated phase of flight applicable to the aircraft type being flown;

(y) upset recovery techniques applicable to the aircraft type being flown at low altitude, and high altitude where the aircraft is pressurised;

(z) Structural integrity of an aeroplane is not ensured when operating at or below maximum manoeuvring speed, if multiple control inputs in one axis, or full control inputs in more than one axis, are initiated at the same time.

TR-MEA Type rating – multi-engine aeroplane

1 Unit description

This unit describes the skills and knowledge required for a person to operate a type-rated multi-engine aeroplane.

2 Elements and performance criteria

2.1 TR-MEA.1 – Conduct pre-flight inspection

(a) complete pre-flight inspection correctly;

(b) communicate effectively with ground support crew;

(c) ensure all aircraft locking devices, covers and bungs are removed;

(d) prepare and operate aircraft systems.

2.2 TR-MEA.2 – Extract pre-flight performance data

(a) extract correct aircraft loading and performance data;

(b) set instrumentation and systems;

(c) obtain and interpret the take-off and departure clearance issued by ATC.

2.3 TR-MEA.3 – Request ATC clearance

Obtain, interpret and brief ATC clearance.

2.4 TR-MEA.4 – Start engines

(a) start engines;

(b) manage occurrences where specific instructions or checklist items are not published.

2.5 TR-MEA.5 – Taxi aircraft

(a) request ATC clearances or make mandatory air traffic broadcast appropriate to the local airspace and aerodrome;

(b) push back or power back aircraft safely;

(c) maintain control of aircraft during taxi;

(d) divide attention appropriately between inside and outside the flight deck, to ensure aircraft control is maintained while taxiing and cockpit procedures and checklists are completed;

(e) check instruments in a suitable area clear of traffic and other hazards;

(f) interpret and comply with taxiway, lighting, other aerodrome markings and marshalling instructions;

(g) adjust taxi speed to suit aircraft type, surface conditions, congestion, and maintenance of control, and avoid collision with personnel, obstacles or other aircraft;

(h) apply flying controls, power and brakes to maintain the aircraft on the taxiway centreline while compensating for wind and surface conditions.

2.6 TR-MEA.6 – Conduct pre-take-off checks

(a) perform pre-take-off checklist and confirm all systems are within normal operating range;

(b) perform pre-take-off briefing;

(c) confirm, prior to entering runway, that aircraft is positioned on specified or appropriate taxiway;

(d) ensure final approach path is clear of conflicting traffic on specified or appropriate runway.

2.7 TR-MEA.7 – Conduct take-off

(a) demonstrate knowledge of airspeeds, configurations, and emergency and abnormal procedures for normal and cross-wind take-offs;

(b) conduct a briefing covering the plan of action that will ensure the safest outcome in the event of abnormal operations;

(c) verify and correctly apply correction for the existing wind component to the take-off performance;

(d) perform and ensure all pre-take-off checks required by the appropriate checklist items are completed in a timely manner;

(e) align the airplane on the runway centreline;

(f) apply the controls correctly to maintain longitudinal alignment on the centreline of the runway, if appropriate, prior to initiating and during the take-off;

(g) adjust the power plant controls correctly;

(h) monitor power plant controls, settings, and instruments during take-off to ensure all predetermined parameters are maintained;

(i) adjust the controls to attain the desired pitch attitude to attain the desired performance;

(j) perform the required pitch changes and, as appropriate, perform and verify the completion of, gear and flap retractions, power adjustments (as applicable) and other required pilot-related activities at the required airspeed within the published tolerances;

(k) use the applicable noise abatement and wake turbulence avoidance procedures;

(l) verify the completion of the appropriate after take-off checklist items in a timely manner.

2.8 **TR-MEA.8 – Incident, malfunction or failure during take-off**

Manage incidents, malfunctions and failures during take-off as described in the AFM.

2.9 **TR-MEA.9 – Operate aircraft in flight**

(a) operate aircraft in normal flight profiles;

(b) operate aircraft systems for normal, non-normal and emergency conditions;

(c) identify aeroplane upset conditions and take appropriate action to return aeroplane to normal flight;

(d) demonstrate approach to the stall and stall recovery as follows:

(i) recognise approaching stall symptoms;

(ii) at the stall, reduce AOA;

(iii) prevent further yaw with rudder;

(iv) apply recommended power;

(v) when the wings are unstalled, level the wings using aileron control;

(vi) recover height loss;

(e) demonstrate maximum performance turning under the following conditions:

(i) maximum rate;

(ii) minimum radius;

(f) demonstrate flight with unreliable airspeed;

(g) demonstrate her or his ability to recover from unusual attitude and upset situations;

(h) demonstrate an emergency descent.

2.10 **TR-MEA.10 – Manage engine failure in flight**

(a) maintain control of aircraft flight path;

(b) correctly identify and verify failed engine;

(c) manage failure to achieve the safest outcome.

2.11 **TR-MEA.11 – Conducts engine relight and restart in flight**

Relight and restart an engine in flight.

2.12 **TR-MEA.12 – Conduct a descent, arrival and landing**

(a) plan and conduct a descent, arrival and landing;

(b) obtain, interpret and brief ATC clearance for descent and arrival;

(c) manage non-normal or emergency conditions;

(d) demonstrate missed approach manoeuvre.

2.13 **TR-MEA.13 – Conduct taxi to stand, park and shut down**

Follow published procedures taxi, park and shut down aircraft at the designated parking bay.

3 Range of variables

(a) activities are performed in accordance with published procedures;

(b) day and night VMC or IMC;

(c) aircraft of the type which the rating applies to;

(d) approved flight simulation training device if available;

(e) upset conditions include the following:

(i) pitch attitude more than 25° nose up;

(ii) pitch attitude more than 10° nose down;

(iii) bank angle more than 45°;

(iv) flying at airspeeds inappropriate to the conditions;

(f) in the absence of markings, the aircraft is maintained in the centre of the taxiway and at a safe distance from obstacles;

(g) simulated abnormal or emergency situations;

(h) flight crew incapacitation (multi-crew operations);

(i) simulated hazardous weather;

(j) sealed, gravel or grass surfaces.

4 Underpinning knowledge of the following:

(a) normal and cross-wind take-off;

(b) instrument take-off (IFR pilots only);

(c) engine failure during take-off;

(d) rejected take-off;

(e) departure procedures;

(f) steep turns;

(g) approaches to stalls;

(h) engine failure;

(i) any specific flight characteristics (e.g. Dutch roll);

(j) recovery from unusual attitudes;

(k) normal and cross-wind approaches and landings;

(l) approach and landing with a (simulated) engine failure – multi-engine aeroplane;

(m) baulked approach and missed landing;

(n) no flap or a non-standard flap approach and landing;

(o) the factors that affect the characteristics of an aircraft when full or partial flaps, leading edge flaps, and any other similar devices become inoperative, including on aircraft handling;

(p) extract critical airspeeds, V-speeds (including tyre rotation limits);

(q) calculate landing distance required;

(r) normal systems operating procedures;

(s) emergency procedures;

(t) how potential and kinetic energy relate to an aircraft in flight;

(u) how energy states are manipulated to generate aerodynamic forces that allow an aircraft to be manoeuvred;

(v) knows the unintended flight conditions of pitch, bank and airspeed that describe upset aircraft state;

(w) knows the physical symptoms that may or may not be evident in a stall;

(x) stall recovery technique during any nominated phase of flight applicable to the aircraft type being flown;

(y) upset recovery techniques applicable to the aircraft type being flown at low altitude, and high altitude where the aircraft is pressurised.

(z) Structural integrity of an aeroplane is not ensured when operating at or below maximum manoeuvring speed, if multiple control inputs in one axis, or full control inputs in more than one axis, are initiated at the same time.

FR-SEAC SINGLE-ENGINE AEROPLANE CLASS RATING FLIGHT REVIEW

1 Unit description

This unit describes the standards required for a single-engine aeroplane class rating flight review.

2 Elements and performance criteria

2.1 FR-SEAC.1 – Conduct flight

(a) start and taxi aircraft ready for take-off;

(b) perform a normal take-off simulating minimum take-off distance available;

(c) perform departure from circuit area;

(d) perform general handling manoeuvres, including the following:

- (i) initiate stall and recover where initial symptoms of a stall become evident;
- (ii) perform a full stall and recovery;
- (iii) perform steep level and descending turns through at least 360°;
- (iv) conduct low flying at 500 ft AGL and perform a reversal turn;

(e) perform circuit rejoin and at least 1 full circuit pattern;

(f) perform a missed approach;

(g) perform a flapless approach and landing;

(h) perform cross-wind take-off and landing if conditions permit;

(i) perform a normal landing simulating minimum landing distance available.

2.2 FR-SEAC.2 – Manage aircraft systems

(a) ensure sufficient fuel is loaded and fuel consumption is monitored and managed throughout the flight;

(b) manage the aircraft fuel system;

(c) manage all other aircraft systems.

2.3 FR-SEAC.3 – Navigation (optional)

(a) plan flight of at least 3 legs and submit flight plan in accordance with AIP;

(b) conduct a departure;

(c) navigate en route using visual and instrument navigation systems;

(d) perform diversion procedure;

(e) conduct arrival.

2.4 FR-SEAC.4 – Airspace

(a) comply with airspace procedures and requirements;

(b) operate aircraft radio and conform to standard radio procedures.

2.5 FR-SEAC.5 – Instrument flying

(a) perform basic flight manoeuvres using full instrument panel;

(b) recover from upset situations and unusual aircraft attitudes to straight and level flight;

(c) perform checks and monitor system for serviceability.

2.6 FR-SEAC.6 – Manage non-normal and emergency conditions

(a) manage a simulated engine failure in the take-off segment (optional);

(b) manage a simulated partial engine failure (optional);

(c) manage a simulated complete engine failure and execute a forced landing;

(d) manage aircraft system malfunctions other than engine failure.

2.7 **FR-SEAC.7 – Non-technical skills**

(a) recognise and manage threats and errors during pre-flight planning and in-flight;

(b) maintain effective lookout and situational awareness;

(c) assess situations and make appropriate decisions;

(d) set priorities and manage tasks;

(e) maintain effective communication with stakeholders;

(f) communicate effectively using aeronautical radio.

2.8 **FR-SEAC.8 – Manage passengers and cargo**

(a) conduct pre-flight and in-flight safety briefings to ensure passengers are familiar with safety procedures, emergency equipment, exits and operational requirements;

(b) manage cargo.

3 Range of variables

(a) activities are performed in accordance with published procedures;

(b) simulated conditions can be used;

(c) for FR-SEAC.5 – instrument flying, simulated or actual instrument conditions.

4 Underpinning knowledge of the following:

(a) privileges, limitations and responsibilities of the licences, ratings and endorsements the applicant holds;

(b) flight review requirements;

(c) obtaining, interpreting and applying meteorological and aeronautical information;

(d) navigation and flight planning for day VFR operations;

(e) weight and balance and aircraft performance;

(f) operation of systems fitted to the aircraft that is used in the flight review;

(g) extracting and applying aircraft performance data, including take-off and landing performance data for the aircraft that is used in the flight review;

(h) airspace requirements and procedures;

(i) manage cargo and passengers;

(j) hazard identification and risk management;

(k) non-normal and emergency procedures, including full and partial failures;

(l) local operating procedures;

(m) hazardous weather;

(n) airworthiness requirements;

(o) reporting requirements;

(p) ERSA normal and emergency procedures;

(q) current and recently changed legislation and procedures that are relevant to the applicant's licences, ratings and endorsements.

FR-MEAC Multi-engine aeroplane class rating flight review

1 Unit description

This unit describes the standards required for a multi-engine aeroplane class rating flight review.

2 Elements and performance criteria

2.1 FR-MEAC.1 – Conduct flight

(a) start and taxi aircraft ready for take-off;

(b) perform a normal take-off simulating minimal take-off distance available;

(c) perform departure from circuit area;

(d) perform general handling manoeuvres, including the following:

- (i) initiate stall and recover where initial symptoms of a stall become evident;
- (ii) perform a full stall and recovery;
- (iii) perform steep level and descending turns through at least 360°;
- (iv) conduct low flying at 500 ft AGL and perform a reversal turn;

(e) perform circuit rejoin and at least 1 full circuit pattern;

(f) perform a missed approach;

(g) perform a normal landing simulating minimum landing distance available.

2.2 FR-MEAC.2 – Manage aircraft systems

(a) ensure sufficient fuel is loaded and fuel consumption is monitored and managed throughout the flight;

(b) manage the aircraft fuel system;

(c) manage all other aircraft systems.

2.3 FR-MEAC.3 – Navigation (optional)

(a) plan flight of at least 3 legs and submit flight plan in accordance with AIP;

(b) conduct a departure;

(c) navigate en route using visual and instrument navigation systems;

(d) perform diversion procedure;

(e) conduct arrival.

2.4 FR-MEAC.4 – Airspace

(a) comply with airspace procedures and requirements;

(b) operate aircraft radio and conform to standard radio procedures.

2.5 FR-MEAC.5 – Instrument flying

(a) perform basic flight manoeuvres using full instrument panel;

(b) recover from upset situations and unusual aircraft attitudes to straight and level flight;

(c) perform checks and monitor system for serviceability.

2.6 FR-MEAC.6 – Manage non-normal and emergency conditions

(a) manage a simulated engine failure in the take-off segment;

(b) manage a simulated partial engine failure;

(c) manage a simulated complete engine failure and execute a simulated asymmetric approach and landing;

(d) manage aircraft system malfunctions.

2.7 **FR-MEAC.7 – Non-technical skills**

(a) recognise and manage threats and errors during pre-flight planning and in-flight;

(b) maintain effective lookout and situational awareness;

(c) assess situations and make appropriate decisions;

(d) set priorities and manage tasks;

(e) maintain effective communication with stakeholders;

(f) communicate effectively using aeronautical radio.

2.8 **FR-MEAC.8 – Manage passengers and cargo.**

(a) conduct pre-flight and in-flight safety briefings to ensure passengers are familiar with safety procedures, emergency equipment, exits and operational requirements;

(b) manage cargo.

3 Range of variables

(a) activities are performed in accordance with published procedures;

(b) simulated conditions can be used;

(c) for FR-MEAC.5 – instrument flying, simulated or actual instrument conditions.

4 Underpinning knowledge of the following:

(a) privileges, limitations and responsibilities of the licences, ratings and endorsements the applicant holds;

(b) flight review requirements;

(c) obtaining, interpreting and applying meteorological and aeronautical information;

(d) navigation and flight planning for day VFR operations;

(e) weight and balance and aircraft performance;

(f) operation of systems fitted to the aircraft that is used in the flight review;

(g) extracting and applying aircraft performance data, including take-off and landing performance date for the aircraft that is used in the flight review;

(h) airspace requirements and procedures;

(i) manage cargo and passengers;

(j) hazard identification and risk management;

(k) non-normal and emergency procedures, including full and partial failures;

(l) local operating procedures;

(m) hazardous weather;

(n) airworthiness requirements;

(o) reporting requirements;

(p) ERSA normal and emergency procedures;

(q) current and recently changed legislation and procedures that are relevant to the applicant's licences, ratings and endorsements.

FR-MEAT Multi-engine aeroplane type rating flight review

1 Unit description

This unit describes the standards required for a multi-engine aeroplane type rating flight review.

2 Elements and performance criteria

2.1 FR-MEAT.1 – Conduct flight

(a) start and taxi aircraft ready for take-off;

(b) perform a normal take-off simulating minimal take-off distance available;

(c) perform departure from circuit area;

(d) perform general handling manoeuvres, including the following:

- (i) initiate stall and recover where initial symptoms of a stall become evident;
- (ii) perform a full stall and recovery;
- (iii) perform steep level and descending turns through at least 360°;
- (iv) conduct low flying at 500 ft AGL and perform a reversal turn;

(e) perform circuit rejoin and at least 1 full circuit pattern;

(f) perform a missed approach;

(g) perform a normal landing simulating minimum landing distance available.

2.2 FR- MEAT.2 – Manage aircraft systems

(a) ensure sufficient fuel is loaded and fuel consumption is monitored and managed throughout the flight;

(b) manage the aircraft fuel system;

(c) manage all other aircraft systems.

2.3 FR- MEAT.3 – Navigation (optional)

(a) plan flight of at least 3 legs and submit flight plan in accordance with AIP;

(b) conduct a departure;

(c) navigate en route using visual and instrument navigation systems;

(d) perform diversion procedure;

(e) conduct arrival.

2.4 FR- MEAT.4 – Airspace

(a) comply with airspace procedures and requirements;

(b) operate aircraft radio and conform to standard radio procedures.

2.5 FR- MEAT.5 – Instrument flying

(a) perform basic flight manoeuvres using full instrument panel;

(b) recover from upset situations and unusual aircraft attitudes to straight and level flight;

(c) perform checks and monitor system for serviceability.

2.6 FR- MEAT.6 – Manage non-normal and emergency conditions

(a) manage a simulated engine failure in the take-off segment;

(b) manage a simulated partial engine failure;

(c) manage a simulated complete engine failure and execute a simulated asymmetric approach and landing;

(d) manage aircraft system malfunctions.

2.7 **FR- MEAT.7 – Non-technical skills**

(a) recognise and manage threats and errors during pre-flight planning and in-flight;

(b) maintain effective lookout and situational awareness;

(c) assess situations and make appropriate decisions;

(d) set priorities and manage tasks;

(e) maintain effective communication with stakeholders;

(f) communicate effectively using aeronautical radio.

2.8 **FR- MEAT.8 – Manage passengers and cargo.**

(a) conduct pre-flight and in-flight safety briefings to ensure passengers are familiar with safety procedures, emergency equipment, exits and operational requirements;

(b) manage cargo.

3 Range of variables

(a) activities are performed in accordance with published procedures;

(b) simulated conditions can be used;

(c) for FR-MEAT.5 – instrument flying, simulated or actual instrument conditions.

4 Underpinning knowledge of the following:

(a) privileges, limitations and responsibilities of the licences, ratings and endorsements the applicant holds;

(b) flight review requirements;

(c) obtaining, interpreting and applying meteorological and aeronautical information;

(d) navigation and flight planning for day VFR operations;

(e) weight and balance and aircraft performance;

(f) operation of systems fitted to the aircraft that is used in the flight review;

(g) extracting and applying aircraft performance data, including take-off and landing performance date for the aircraft that is used in the flight review;

(h) airspace requirements and procedures;

(i) manage cargo and passengers;

(j) hazard identification and risk management;

(k) non-normal and emergency procedures, including full and partial failures;

(l) local operating procedures;

(m) hazardous weather;

(n) airworthiness requirements;

(o) reporting requirements;

(p) ERSA normal and emergency procedures;

(q) current and recently changed legislation and procedures that are relevant to the applicant’s licences, ratings and endorsements.

TR-FE Type rating – flight engineer

1 Unit description

This unit describes the skills and knowledge required by a flight engineer to operate a type-rated aircraft.

2 Elements and performance criteria

2.1 FTM.1 – Conduct pre-flight inspection

(a) complete pre-flight inspection correctly;

(b) communicate effectively with ground support crew;

(c) ensure removal of appropriate aircraft engine protective devices;

(d) prepare and operate aircraft systems.

2.2 FTM.2 – Manage engines

(a) manage engine systems correctly;

(b) manage and monitor aircraft systems as appropriate;

(c) manage occurrences where specific instructions or checklist items are not published.

2.3 FTM.3 – Conduct pre-take-off checks

(a) complete the pre-take-off checklist and confirm all applicable systems are within normal operating range.

2.4 FTM.4 – Conduct take-off

(a) operate flight engineer controls correctly;

(b) adjust the power plant controls correctly;

(c) monitor power plant controls, settings, and instruments during take-off to ensure all predetermined parameters are maintained;

(d) inform the pilot in command of abnormal or emergency situations in a timely manner.

2.5 FTM.5 – Operate aircraft in flight

(a) operate flight engineer systems for normal, non-normal and emergency conditions;

(b) identify an aeroplane upset condition and immediately informs the pilot in command.

2.6 FTM.6 – Manage engine failure in flight

(a) inform pilot in command;

(b) correctly identify and verify failed engine;

(c) manage failure appropriately.

2.7 FTM.7 – Conducts engine relight and restart in flight

2.8 FTM.8 – Conducts shutdown

2.8.1 The person must be able to demonstrate her or his ability to correctly shutdown the aircraft.

3 Range of variables

(a) activities are performed in accordance with published procedures;

(b) day and night VMC or IMC;

(c) upset conditions include the following:

   (i) pitch attitude more than 25° nose up;

   (ii) pitch attitude more than 10° nose down;

   (iii) bank angle more than 45°;

   (iv) flying at airspeeds inappropriate to the conditions.

(d) approved multi-engine multi-crew aircraft;

(e) approved flight simulator;

(f) simulated abnormal or emergency situations;

(g) flight crew incapacitation (multi-crew operations);

(h) simulated hazardous weather.

4 Underpinning knowledge of the following:

(a) engine failure during take-off;

(b) rejected take-off;

(c) departure procedures;

(d) aircraft systems failures;

(e) any specific flight characteristics (e.g. Dutch roll);

(f) recognition of unusual attitudes;

(g) recognition of aeroplane upset conditions (aeroplane only);

(h) normal systems operating procedures;

(i) emergency procedures;

(j) approach and landing with a (simulated) engine failure – multi-engine aircraft.

HELICOPTER CATEGORY

H1 Control helicopter on the ground – stationary

1 Unit description

This unit describes the skills and knowledge required to operate a stationary helicopter on the ground.

2 Elements and performance criteria

2.1 **H1.1 – Start and stop engine**

(a) ensure the helicopter is in a suitable location for starting the engine and rotors;

(b) perform pre-start and start actions;

(c) perform shutdown and after-shutdown actions;

(d) control blade sailing during start and shut down by appropriate positioning of helicopter and use of cyclic pitch;

(e) comply with manufacturer’s limitations and report deviations when appropriate;

(f) manage emergencies appropriately (simulated).

2.2 **H1.2 – Engage rotor**

(a) set engine RPM within limits before rotor engagement (if applicable – this is only relevant to the few rotorcraft, including the R22 and R44 which are the most common basic trainers);

(b) engage rotor correctly (if applicable);

(c) maintain engine RPM within limits during rotor engagement;

(d) maintain disc position within operating limits as Rotor RPM (RRPM) increases;

(e) operate rotor brake correctly (if applicable – this is only relevant to the very few rotocraft that can run 1 engine at idle before rotor engagement);

(f) monitor and react appropriately to transmission, hydraulic system and engine indications (if applicable).

2.3 **H1.3 – Control main rotor disc and anti-torque system**

(a) maintain the correct main rotor disc attitude during all RRPM operations;

(b) set correct engine idle RPM;

(c) set correct anti-torque pedal position to compensate for main rotor torque;

(d) maintain correct rotor disc attitude and RRPM while performing other tasks or actions.

3 Range of variables

(a) activities are performed in accordance with published procedures;

(b) helicopter with dual controls and electronic intercom, if fitted;

(c) engine start and shutdown emergencies covered by the aircraft flight manual;

(d) malfunctions and emergency procedures described in the flight manual;

(e) day VFR;

(f) aerodromes and helicopter landing sites;

(g) obstructions and personnel (simulated);

(h) various wind conditions (may be simulated).

4 Underpinning knowledge of the following:

(a) regulations and procedures relating to the ground operation of rotorcraft;

(b) operational and start limitations of typical helicopters;

(c) applicable helicopter systems;

(d) operating on different surfaces, including sealed and unsealed surfaces;

(e) effect of wind on rotor blade control (blade sailing);

(f) use of the fire extinguisher system fitted to the helicopter;

(g) ground resonance;

(h) dynamic rollover;

(i) local noise abatement procedures and curfews.

H2 Control helicopter in lift-off, hover and landing

1 Unit description

This unit describes the skills and knowledge required to complete pre-take-off checks, lift-off helicopter to the hover, complete hover checks, perform hover, perform aborted lift-off, perform hovering turns and land from the hover.

2 Elements and performance criteria

2.1 H2.1 – Lift-off and hover helicopter, perform hover checks and abort take-off

(a) calculate aircraft performance for the flight;

(b) complete pre-take-off checks;

(c) lift-off helicopter:

(i) set flight controls correctly to prepare for lift-off to the hover at the location;

(ii) use correct flight and power controls to lift helicopter off the surface to a stable hover at the appropriate hover height for the helicopter while controlling heading;

(iii) anticipate and take account of wind effect with appropriate control inputs to maintain position over hover point;

(iv) demonstrate awareness of rotor downwash on surrounding aircraft, people, objects and environment;

(v) confirm the proper functioning of the flight controls and the centre of gravity and power required to hover are within limits;

(d) at a constant and safe hover height, commence, maintain and stop a hover taxi manoeuvre while maintaining power and RRPM within the limits;

(e) remain clear of the manufacturer’s ‘height-velocity diagram avoid area’ when applicable;

(f) perform aborted take-off from the hover.

2.2 H2.2 – Hover helicopter in cross-wind and tailwind

(a) maintain helicopter in flight over a nominated hover point at a nominated height and heading in cross-wind and tailwind;

(b) apply controlled corrective action to maintain a constant rate of turn and counter the effects of wind.

2.3 H2.3 – Perform turn around a mast

(a) turn helicopter around a mast while maintaining a constant height at a constant rate of turn using anti-torque pedals;

(b) stop the turn on a nominated heading;

(c) maintain RPM within limits during the turn.

2.4 H2.4 – Perform turns around nose and tail

(a) turn helicopter around a nominated point on or forward of the nose while maintaining a constant height and specified rate of movement around the point;

(b) turn helicopter around a nominated point on or aft of the tail while maintaining a constant height and specified rate of movement around the point;

(c) commence turns in a specified direction and stop them at a specified heading;

(d) maintain RPM within limits during the turn;

(e) maintain ground track at a constant distance from the nominated point;

(f) use the anti-torque pedals to ensure helicopter is pointed at the nominated turning point.

2.5 H2.5 – Perform sideways and backwards flight

(a) transition from static hover to forward, sideways and backwards flight and terminate this movement over a nominated hover point at a nominated height;

(b) ensure direction of travel is clear of obstructions;

(c) conduct backward movement only after visually checking behind helicopter and adjusting height as required;

(d) maintain sideways and backwards directional control;

(e) maintain RPM within limits during the turn;

(f) maintain rate of movement of helicopter at a safe speed;

(g) maintain lookout in direction of travel;

(h) terminate sideways or backwards movement at desired hover point.

2.6 **H2.6 – Land from the hover**

(a) complete pre-landing checks (if applicable);

(b) nominate touchdown point;

(c) from a stable hover, establish a controlled rate of descent, maintain heading and remain over the nominated hover point;

(d) land helicopter at a suitable rate and maintain a constant heading without lateral or longitudinal drift while maintaining the requisite RRPM during the landing sequence;

(e) ensure helicopter is stable on its undercarriage prior to fully lowering collective;

(f) perform after-landing checks;

(g) for mishandled landing:

  (i) recognise when a safe landing cannot be achieved;

  (ii) discontinue the landing and return to the hover safely;

  (iii) re-establish a stabilised hover;

  (iv) land from the stabilised hover.

3 Range of variables

(a) activities are performed in accordance with published procedures;

(b) helicopter with dual controls and electronic intercom day VFR;

(c) aerodromes and helicopter landing sites;

(d) obstructions and personnel (simulated);

(e) various wind conditions (may be simulated).

4 Underpinning knowledge of the following:

(a) calculates aircraft performance for the flight;

(b) operational and start limitations of typical helicopters;

(c) operating on different surfaces, including sealed and unsealed surfaces;

(d) effect of wind on rotor blade control (blade sailing);

(e) use of the fire extinguisher system fitted to the helicopter being used;

(f) ground resonance;

(g) recirculation;

(h) dynamic rollover;

(i) local noise abatement procedures and curfews.

H3 Taxi helicopter

1 Unit description

This unit describes the skills and knowledge required to taxi a helicopter.

2 Elements and performance criteria

2.1 H.3.1 – Ground taxi helicopter

(a) use correct flight and power control techniques to initiate forward movement of the helicopter on the surface;

(b) check and confirm the proper functioning of the wheel brake system;

(c) use correct flight and power control techniques to ground taxi and manoeuvre the helicopter on appropriate surfaces (wet and dry) at a safe speed in headwind, cross-wind and tailwind conditions;

(d) perform flight instrument checks while taxiing (if applicable);

(e) avoids adverse effects of rotor wash on personnel, aircraft, structures and loose objects;

(f) apply smooth control while ground taxiing and manoeuvring the helicopter with turns at a constant and safe rate of turn while maintaining power and RRPM within the limits;

(g) adjusts taxi speed to suit helicopter type, surface conditions, congestion while maintaining control and desired track and avoiding collision with obstacles and other aircraft;

(h) maintain landing gear in contact with the ground;

(i) apply smooth and controlled actions to terminate at a nominated holding or parking point under different wind and surface conditions;

(j) maintain RRPM within normal operating limits;

(k) observe mast operating limits, if applicable;

(l) ensure final approach path is clear of conflicting traffic.

2.2 H3.2 – Air taxi helicopter

(a) manoeuvre the helicopter while allowing for prevailing conditions, over a prescribed track at a constant height;

(b) maintain alignment of the landing gear with the direction of travel;

(c) remain clear of manufacturer’s ‘height-velocity diagram avoid area’;

(d) maintain RPM within operating limits;

(e) adjust air taxi speed to suit helicopter type, traffic conditions, congestion, and maintenance of control and to avoid collision with obstacles or other aircraft;

(f) ensure final approach path is clear of conflicting traffic.

2.3 H3.3 – Air transit helicopter

(a) obtain transit clearance and complies with ATC instructions (if applicable);

(b) manoeuvre the helicopter, while allowing for prevailing conditions, over a prescribed track at a height not above 100 ft AGL at airspeeds greater than speeds used for air taxiing;

(c) limits movement within the aerodrome boundaries, without incident;

(d) remain clear of manufacturer’s ‘height-velocity diagram avoid area’;

(e) maintain height;

(f) manipulate instruments, switches or devices, when safe to do so, including when the release of the collective pitch level is required, while maintaining height, heading, speed, and attitude and not exceeding RPM or power limits;

(g) avoid conditions that could lead to loss of tail rotor or anti-torque effectiveness;

(h) aligns helicopter with track, or balances, as applicable;

(i) adjust air transit ground speed to suit helicopter type, traffic conditions, congestion, and maintenance of control and to avoid collision with obstacles or other aircraft;

(j) maintain RRPM within normal operating limits;

(k) avoid adverse effect of rotor wash on other aircraft, facilities, loose objects and personnel;

(l) ensure final approach path is clear of conflicting traffic.

3 Range of variables

(a) activities are performed in accordance with published procedures;

(b) helicopter with dual controls and electronic intercom;

(c) day VFR;

(d) aerodromes and helicopter landing sites;

(e) obstructions and personnel (simulated);

(f) various wind conditions (may be simulated).

4 Underpinning knowledge of the following:

(a) height-velocity diagram;

(b) adverse effects of rotor wash;

(c) ground resonance and action to be taken when it occurs;

(d) taxiway and runway markings;

(e) loss of tail rotor effectiveness and action to be taken when it occurs;

(f) hazards and risks associated with conducting air taxi and air transit manoeuvres.

H4 Take-off helicopter and approach to hover

1 Unit description

This unit describes the skills and knowledge required to prepare a helicopter for take-off, perform take-off and perform an approach to termination at hover.

2 Elements and performance criteria

2.1 H4.1 – Carryout pre-take-off checks

(a) complete pre-take-off checks correctly and clearing turn (if applicable);

(b) assess situation and select safe take-off path;

(c) conduct a take-off safety briefing (this may be carried out prior to take off lift-off to the hover if necessitated by location);

(d) clear the area, taxi into the take-off position, perform line-up checks.

2.2 H4.2 – Take-off helicopter

(a) transition to forward flight and maintain take-off path;

(b) recognise and control translational lift effect;

(c) accelerate to and maintain the recommended or nominated climb speed;

(d) control the helicopter to remain outside of the Height-Velocity (H-V) avoid curve, balanced and trimmed (if applicable);

(e) ensure obstacle clearance;

(f) correct power and attitude are maintained for the profile and IAS to be flown;

(g) landing gear is retracted after a positive rate of climb is established (if applicable);

(h) comply with noise abatement procedures, where applicable;

(i) complete after take-off checks.

2.3 H4.3 – Approach to hover

(a) select a suitable termination point;

(b) complete checklists as applicable for manoeuvre;

(c) intercept and maintain appropriate approach angle and track;

(d) adjust power and attitude to achieve a controlled decreasing closure rate to the termination point;

(e) align the landing gear to the planned approach direction;

(f) recognise and control loss of translational lift;

(g) controls RPM within limits;

(h) terminates approach to the hover over the termination point.

2.4 H4.4 – Perform go-round procedure

(a) recognise adverse conditions that require the execution of a go-round;

(b) initiate go-round safely in the time available;

(c) set power and attitude to achieve safe climb at appropriate IAS;

(d) maintain control throughout go-round procedure;

(e) align landing gear with the planned take-off direction until the point at which balanced flight is required;

(f) perform after-take-off checks.

3 Range of variables

(a) activities are performed in accordance with published procedures;

(b) helicopter with dual controls and electronic intercom;

(c) day VFR;

(d) aerodromes and helicopter landing sites;

(e) obstructions and personnel (simulated);

(f) various wind conditions (may be simulated).

4 Underpinning knowledge of the following:

(a) vortex ring state;

(b) loss of tail rotor effectiveness (LTE);

(c) low ‘g’ and mast bumping;

(d) overpitching or low RRPM – rotor stall;

(e) recirculation;

(f) contributing operational situations and environmental conditions;

(g) avoidance and recognition of and recovery techniques appropriate to helicopter type;

(h) aircraft systems;

(i) aircraft performance;

(j) aircraft weight and balance;

(k) AFM and POH;

(l) day VFR flight rules.

H5 Control helicopter in normal flight

1 Unit description

This unit describes the skills and knowledge required to control a helicopter in normal flight, whilst flying straight and level, climbing, descending and turning.

2 Elements and performance criteria

2.1 **H5.1 – Climb helicopter**

(a) set and maintain power and attitude to establish and maintain climb flight on a constant heading for the following profiles:
 (i) maintain IAS for cruise climb;
 (ii) maintain IAS for best angle of climb (V_X);
 (iii) maintain IAS for best rate of climb (V_Y);

(b) set appropriate altimeter settings;

(c) ensure helicopter is balanced and trimmed (if applicable);

(d) maintain power as altitude increases.

2.2 **H5.2 – Maintain straight and level flight**

(a) set and maintain power and attitude to achieve straight and level flight at nominated airspeeds, altitudes and headings;

(b) ensure helicopter is balanced and trimmed (if applicable).

2.3 **H5.3 – Descend helicopter**

(a) set and maintain power and attitude to achieve cruise descending flight on a constant heading at a nominated rate of descent;

(b) set appropriate altimeter settings;

(c) identify and avoid terrain and aircraft traffic;

(d) ensure helicopter is balanced and trimmed (if applicable).

2.4 **H5.4 – Turn helicopter**

(a) perform airspace cleared procedure;

(b) set and maintain power, attitude and bank to achieve specified turn performance to the left and to the right, onto specific headings or geographical features for the following:
 (i) level turns;
 (ii) climbing turn, rate 1 or with 20° bank angle;
 (iii) powered descending turn with 30° bank angle;

(c) turn helicopter onto specified headings using the magnetic compass;

(d) manoeuvre the helicopter over specified ground tracks;

(e) ensure helicopter is balanced and trimmed (if applicable).

2.5 **H5.5 – Perform circuits and approaches**

(a) plan and conduct descent;

(b) join traffic pattern;

(c) maintain a safe separation from other traffic joining, departing or in the traffic pattern;

(d) track upwind on extended centreline to 500 ft;

(e) adjust circuit to ensure spacing with preceding traffic;

(f) establish the helicopter on cross-wind tracking 90° to the runway;

(g) establish the helicopter on downwind at circuit height tracking parallel to the runway at a specified distance from the runway;

(h) perform pre-landing checks;

(i) establish aircraft on base leg a specified distance from helicopter landing site;

(j) commence and control rate of descent to maintain approach path;

(k) ensure helicopter is aligned with specified or appropriate runway when applicable;

(l) establish helicopter on final approach in approach configuration not below 500 ft AGL;

(m) select termination point;

(n) maintain closure rate to the termination point;

(o) maintain helicopter on extended centreline, approach slope and approach speed;

(p) adjust speed to compensate for wind gusts;

(q) complete final approach checks;

(r) ensure helicopter is balanced and trimmed (as applicable);

(s) complete approach at the termination point.

2.6 **H5.6 – Comply with airspace requirements**

(a) use a chart and identify the geographical limits of the designated area;

(b) with reference to a suitable chart, identify prominent geographical features;

(c) describe the position of controlled airspace using a suitable chart and geographical features;

(d) identify and avoid restricted areas and controlled airspace using a chart and geographical features when applicable;

(e) complete departure from the circuit area and transits to the designated area without incident;

(f) complete departure from the designated area and transits to the circuit area without incident;

(g) maintain orientation by geographical features with the aid of a suitable map.

3 Range of variables

(a) activities are performed in accordance with published procedures;

(b) helicopter with dual controls and electronic intercom;

(c) day VFR;

(d) aerodromes and helicopter landing sites;

(e) obstructions and personnel (simulated);

(f) various wind conditions (may be simulated).

4 Underpinning knowledge of the following:

(a) primary and secondary effects of helicopter controls;

(b) vortex ring state;

(c) circuit operations;

(d) managing non-normal and emergencies in the circuit area;

(e) wind shear, turbulence and wake turbulence;

(f) helicopter instruments and monitoring helicopter performance.

H6 Control helicopter during advanced manoeuvres

1 Unit description

This unit describes the skills and knowledge required to control a helicopter during advanced manoeuvres and procedures.

2 Elements and performance criteria

2.1 H6.1 – Turn helicopter steeply

(a) complete airspace cleared procedure;

(b) perform steep turns (45º) onto a nominated heading or geographical feature as follows:

  (i) maintaining altitude;

  (ii) descending through a minimum descent of 500 ft;

  (iii) in balance.

2.2 H6.2 – Perform autorotative flight

(a) enter and maintain autorotative flight at a nominated speed in balanced flight for the following profiles:

  (i) straight descent at nominated heading and manufacturer's recommended speed;

  (ii) turning descent through 180˚ and 360˚ using up to 45˚ angle of bank;

  (iii) best range speed and minimum descent rate speed;

(b) maintain RRPM within limitations during autorotative flight;

(c) perform power recovery as follows:

  (i) anticipate and comply with nominated minimum descent altitude;

  (ii) ensure engine RPM and RRPM 'needles' are rejoined prior to the setting of climb power;

  (iii) set climb power;

  (iv) control yaw;

  (v) set climb speed;

(d) perform power termination as follows:

  (i) maintain RRPM within limitations;

  (ii) ensure throttle(s) is at 100% (or the equivalent terminology) prior to the commencement of the flare;

  (iii) commence flare at appropriate height for the prevailing conditions and reduce ground speed and rate of descent;

  (iv) controls attitude to achieve a decreasing closure rate and reducing rate of descent;

  (v) control yaw, engine and RRPM;

  (vi) terminate the helicopter to a hover or hover taxi within tolerances of termination point without lateral or rearward movement;

(e) perform autorotative landing as follows:

  (i) commence flare at appropriate height for the prevailing conditions and reduce ground speed and rate of descent;

  (ii) control RRPM;

  (iii) select and maintain helicopter at the hover attitude without lateral or rearward movement;

  (iv) control touchdown rate;

  (v) control yaw;

  (vi) land helicopter with zero or minimum run-on speed within tolerances of nominated touchdown point without lateral or rearward movement.

2.3 **H6.3 – Land on, and lift off from, sloping ground**

2.3.1 Land on sloping ground:

(a) plan and conduct a slope landing in accordance with the wind and slope limits specified for the helicopter (if stated);

(b) use the appropriate slope landing technique relevant to the helicopter as follows:

(i) make adjustments using the controls in response to wind, surface and applicable limitations;

(ii) maintain RRPM within limits;

(iii) apply an appropriate rate of descent whilst maintaining a constant heading and preventing all drift during all the phases of land on;

(iv) control the roll rate of the helicopter following first contact;

(v) maintain the helicopter's position on the slope while lowering collective and centralising the cyclic;

(c) ensure security of the helicopter on the sloping surface prior to reducing rotor RPM.

2.3.2 Lift off from sloping ground:

(a) plan and conduct a lift-off from sloping ground in accordance with the wind and slope limits of the helicopter;

(b) use the appropriate slope lift-off technique for the helicopter as follows:

(i) make adjustments using the controls in response to wind, surface and applicable limitations;

(ii) maintain RRPM within limits;

(iii) apply an appropriate rate of climb while maintaining a constant heading and preventing all drift during all the phases of lift-off;

(iv) control the roll rate of the rotorcraft during lift-off;

(c) establish a stable hover above the lift off position clear of all obstacles.

2.4 **H6.4 – Land, take off and manoeuvre in a confined area**

2.4.1 Land in confined area:

(a) plan and conduct a confined area landing in accordance with the limitations for the helicopter;

(b) confirm helicopter performance, which includes power checks as applicable;

(c) inspect confined area and determine a plan, including an appropriate approach and departure path;

(d) intercept and maintain approach path to the termination point;

(e) operate the helicopter within its limitations;

(f) land at a suitable landing and lift-off area.

2.4.2 Take off from confined area:

(a) plan a take-off from a confined area in accordance with the limitations for the helicopter;

(b) calculate and confirm the helicopter's take-off performance is adequate for the confined area;

(c) determine an appropriate abort point;

(d) identify all obstacles on the departure patch and a possible abort path in the confined area;

(e) conduct take-off and departure from the confined area and remain clear of obstacles with a margin that is applicable to the operation;

(f) operate the helicopter within its limitations.

2.4.3 Manoeuvre in a confined area:

(a) plan for manoeuvring in a confined area in accordance with the limitations for the helicopter;

(b) confirm the helicopter's performance, which includes power checks as applicable;

(c) identify all obstacles in the confined area;

(d) manoeuvre the helicopter in the confined area while remaining clear of obstacles;

(e) operate the helicopter within its limitations.

2.5 H6.5 – Execute limited power take-off, approach and landing

2.5.1 Limited power take-off:

(a) confirm the helicopter's performance using its performance charts;

(b) apply maximum, or nominated, power, while maintaining optimum RRPM;

(c) accelerate helicopter at an appropriate rate;

(d) recognise and control translational lift effect;

(e) maintain direction of departure path then balance when appropriate;

(f) establish and maintain climb;

(g) identify and avoid obstacles.

2.5.2 Limited power approach and landing:

(a) confirm the helicopter's performance using its performance charts;

(b) confirm the landing area available is sufficient for a safe limited power approach and landing;

(c) determine an appropriate plan for approach, which includes the nomination of a suitable touchdown point;

(d) intercept the planned approach path appropriate for the performance of the helicopter in the prevailing conditions;

(e) manage the helicopter's airspeed with the optimum RRPM appropriate to the power available and landing environment;

(f) identify and avoid obstacles;

(g) maintain effective translational lift until touchdown is assured;

(h) maintain balance and direction of approach path;

(i) touchdown on the nominated touchdown point;

(j) control the helicopter on the ground.

2.6 H6.6 – Land on, and take-off, from a pinnacle or ridgeline (CPL only)

2.6.1 Land on pinnacle or ridgeline:

(a) plan a pinnacle or ridgeline landing in accordance with the limitations of the helicopter;

(b) confirm the helicopter's performance, which includes power checks as applicable;

(c) inspect the ridgeline or pinnacle as applicable, and determine a plan including an appropriate approach and departure path;

(d) assess the local environment conditions for effects of the terrain on wind and turbulence;

(e) intercept and maintain the approach path to the termination point;

(f) operate the helicopter within its limitations and set optimum RPM;

(g) maintain effective translational lift until touchdown is assured;

(h) terminate to a hover over the selected landing and lift-off area;

(i) touchdown on nominated touchdown point;

(j) control the helicopter on the ground.

2.6.2 Take off from pinnacle or ridgeline:

(a) plan a take-off from in a pinnacle or ridgeline in accordance with the limitations of the helicopter;

(b) calculate and confirm the helicopter's take-off performance is adequate for the departure;

(c) determine an appropriate abort point (if applicable);

(d) identify all obstacles on the departure patch and proposed abort path for the pinnacle or ridgeline (if applicable);

(e) conduct take-off and departure from the pinnacle or ridgeline remaining clear of obstacles with a margin that is applicable to the operation;

(f) operate the helicopter within its limitations.

3 Range of variables

(a) activities are performed in accordance with published procedures;

(b) day VFR;

(c) where applicable:

(i) confined helicopter landing site;

(ii) terrain with sloping ground;

(iii) terrain with a pinnacle or ridgeline;

(d) simulated abnormal and emergency situations;

(e) simulated hazardous or marginal weather;

(f) for PPL, autorotative landings may be replaced by a power termination.

4 Underpinning knowledge of the following:

(a) cross-wind and rotor control limits for the helicopter;

(b) helicopter performance limitations;

(c) local weather conditions;

(d) typical hazards and risks associated with conducting advanced manoeuvres and identify precautions and procedures to control the risks;

(e) instructions, procedures and information that is relevant to executing advanced manoeuvres and procedures.

H7 Manage abnormal situations and emergencies – helicopter

1 Unit description

This unit describes the skills and knowledge required to manage abnormal and emergency situations in helicopters.

2 Elements and performance criteria

2.1 H7.1 – Manage forced landing from level flight

(a) identify engine failure correctly and maintain control of helicopter;

(b) establish and maintain helicopter in autorotative flight;

(c) maintain balance;

(d) control RRPM within limitations;

(e) select suitable landing area;

(f) position helicopter to land in selected area;

(g) make appropriate radio transmissions (if time permits);

(h) perform emergency checks;

(i) brief passengers as appropriate;

(j) perform autorotative landing and secure helicopter.

2.2 H7.2 – Manage engine failure during take-off and on final approach

(a) identify engine failure correctly and maintain control of helicopter;

(b) establish and maintain helicopter in autorotative flight;

(c) maintain skids parallel to direction of travel;

(d) perform autorotative landing or power termination and secure helicopter.

2.3 H7.3 – Manage engine failure during hover or hover taxi

2.3.1 During hover:

(a) correctly identify engine failure;

(b) control yaw and drift;

(c) perform controlled touchdown.

2.3.2 During hover taxi:

(a) correctly identify engine failure;

(b) control yaw and drift;

(c) maintain skids parallel to direction of travel;

(d) perform controlled touchdown;

(e) control ground-slide.

2.4 H7.4 – Manage tail rotor malfunctions

2.4.1 During flight:

(a) correctly identify tail rotor malfunction;

(b) maintain control of the helicopter;

(c) select a suitable landing area;

(d) manoeuvre helicopter to a position where the safest landing is assured;

(e) land the helicopter.

2.4.2 During hover:

(a) correctly identify tail rotor malfunction;

(b) maintain control of the helicopter;

(c) select a suitable landing area;

(d) land the helicopter.

2.5 **H7.5 – Manage jammed flight control systems**

(a) correctly identify when controls are jammed;

(b) locate and remove any objects that are causing the jam;

(c) maintain control of the helicopter and rectify the malfunction, if appropriate;

(d) manoeuvre the helicopter to the safest landing area available.

2.6 **H7.6 – Manage helicopter systems malfunctions**

(a) maintain control of the helicopter;

(b) identify and confirm the system malfunction;

(c) manage the malfunction appropriately;

(d) where appropriate, isolate the system;

(e) perform emergency procedures.

3 Range of variables

(a) activities are performed in accordance with published procedures;

(b) helicopter with dual controls and electronic intercom;

(c) day VFR;

(d) aerodromes and helicopter landing sites;

(e) obstructions and personnel (simulated);

(f) various wind conditions (can be simulated).

4 Underpinning knowledge of the following:

(a) emergency procedures;

(b) applicable system malfunctions;

(c) managing system malfunctions;

(d) prioritising tasks when managing malfunctions;

(e) the following key hazards including, for each, the typical causal factors and contributing operational situations, avoidance and recognition of symptoms and recovery techniques:

(i) vortex ring state;

(ii) ground resonance;

(iii) loss of tail rotor effectiveness (LTE);

(iv) low ‘g’ and mast bumping;

(v) overpitching or low RRPM – rotor stall;

(vi) retreating blade stall;

(vii) recirculation;

(viii) dynamic rollover;

(f) the impact of high gross weight and high density altitude on key hazards;

(g) threat and error management as follows:

(i) flight planning to avoid hazardous flight regimes;

(ii) techniques for how to avoid a potentially hazardous situation developing whilst in flight.

TR-SEH Type rating – single-engine helicopter

1 Unit description

This unit describes the skills and knowledge required to operate a type-rated single-engine helicopter.

2 Elements and performance criteria

2.1 **TR-SEH.1 – Control helicopter on the ground**

2.1.1 For all helicopters:

(a) prepare for start as follows:

(i) using an orderly procedure with checklists, inspect and prepare the helicopter, including those items recommended by the manufacturer, for a flight;

(ii) identify and verify switches, circuit breakers, fuses, and spare fuses pertinent to day and night operations;

(iii) confirm that there is sufficient fuel and oil for the intended flight;

(iv) identify and verify the required equipment for the flight is on-board and serviceable;

(v) ensure security of baggage and required equipment;

(vi) organise and arrange documents and equipment that will need to be accessed in flight in a manner that makes the items readily available;

(vii) perform an effective passenger safety briefing (if type capable of carrying passengers);

(b) conduct engine start and rotor engagement as follows:

(i) ensure helicopter is located in a suitable location for starting engine and rotors;

(ii) use the appropriate checklist provided by the helicopter manufacturer or owner or operator;

(iii) calculate and confirm sufficient power margin available for the proposed flight;

(iv) demonstrate knowledge of recommended starting procedures;

(v) take appropriate action with respect to unsatisfactory start conditions;

(vi) complete the appropriate engine and helicopter systems checks;

(c) taxiing and hover manoeuvring as follows:

(i) carry out pre-take-off checks;

(ii) set flight controls correctly to prepare for the lift-off transition to the hover at the location;

(iii) use correct flight and power control techniques to lift helicopter off the surface to a stable hover at the appropriate hover height for the helicopter;

(iv) confirm the proper functioning of the flight controls and confirm centre of gravity and power required to hover are within limits;

(v) trim helicopter where applicable;

(vi) demonstrate smooth control at a constant safe hover height while hover manoeuvring and maintaining power and RRPM within the limits;

(vii) maintain helicopter in flight over a nominated hover point at a nominated height and heading in cross-wind and tailwind;

(viii) transition from static hover to forward, sideways and backwards flight and terminate this movement over a nominated hover point;

(ix) turn helicopter around a the mast while maintaining a constant height at a constant rate of turn using anti-torque pedals;

(x) turn helicopter around a nominated point on or forward of the nose or on or aft of the tail while maintaining a constant height and specified rate of movement around the point;

(xi) apply controlled corrective action to maintain a constant rate of turn and to counter the effects of wind;

(xii) adjust air transit ground speed to suit helicopter type, traffic conditions, congestion, and maintenance of control and to avoid collision with obstacles or other aircraft.

2.1.2 For a helicopter with wheel landing gear, be able to do the following:

(a) select and maintain correct disk attitude and power required to initiate forwards movement of the helicopter on the surface;

(b) check and confirm the proper functioning of the wheel brake system;

(c) select and maintain correct disk attitude and power required to ground taxi and manoeuvre the helicopter on appropriate surfaces (wet and dry) at a safe speed in headwind, cross-wind and tailwind conditions;

(d) control the helicopter smoothly while ground taxiing and manoeuvring the helicopter with turns at a constant and safe rate of turn while maintaining an appropriate disk attitude and power setting;

(e) apply smooth and controlled actions to terminate at a nominated holding or parking point under different wind and surface conditions.

2.2 **TR-SEH.2 – Conduct take-off to departure**

2.2.1 Manage normal take-off to departure as follows:

(a) using approved technique and documented procedures perform a take-off, either from the ground or hover, and transition to forward flight and:

(i) complete appropriate checklists;

(ii) perform a take-off safety briefing (this may be carried out prior to lift off to the hover if necessitated by location);

(iii) ensure operating RPM within limits;

(iv) clear the area, taxi into the take-off position;

(v) transition to forward flight and through translational lift using correct techniques;

(b) accelerate to and maintain the recommended or nominated climb speed using the correct profile:

(i) outside of the Height-Velocity (H-V) avoid curve;

(ii) ensure obstacle avoidance;

(iii) retract the landing gear after a positive rate of climb is established (if applicable);

(iv) maintain correct power and attitude for the profile and IAS to be flown;

(v) comply with noise abatement procedures, where applicable;

(vi) complete appropriate checks.

2.2.2 Manage engine failure during take-off to departure as follows:

(a) self-brief, or brief crew members, stating a plan of action that will ensure the safest outcome in the event of an engine failure;

(b) maintain RRPM within the prescribed limits and control of the helicopter;

(c) perform autorotation to power termination or touchdown, as applicable;

(d) at the appropriate time, complete the engine failure shutdown checklist.

2.3 **TR-SEH.3 – Control helicopter in normal flight**

Set power and maintain attitude to establish and maintain the following manoeuvres with the helicopter in balanced flight and trimmed (as applicable) within prescribed tolerances as follows:

(a) straight and level:

(i) straight and level flight at normal cruise;

(ii) maintains heading;

(iii) maintains nominated altitude;

(b) straight climbs and descents:

(i) maintain IAS for best angle of climb (V_X);

(ii) maintain IAS for best rate of climb (V_Y);

(iii) maintain IAS for cruise climb;

(iv) maintain IAS for cruise descent;

(v) maintain correct power setting as applicable to the rotorcraft;

(vi) maintain heading;

(c) turn onto specific headings (using magnetic compass) or geographical feature within the flight tolerances for the following:

(i) level turn;

(ii) climbing turn, rate 1 or 20° bank;

(iii) powered descending turn, 30° bank.

2.4 **TR-SEH.4 – Control helicopter during advanced manoeuvres**

(a) perform steep turns (45º) within the flight tolerances as follows:

(i) level turn altitude;

(ii) exit on specified heading or geographical feature;

(b) perform autorotative flight:

(i) enter and maintain autorotative flight at nominated speed in balanced flight for the following profiles:

(A) descend at nominated heading and manufacturer's recommended speed;

(B) conduct 180˚ autorotations using up to 45˚ angle of bank;

(C) autorotative flight at best range speed and minimum descent rate speed;

(D) maintain RRPM within limitations;

(c) perform landing or power termination as applicable;

(d) perform power termination:

(i) maintain RRPM within limitations;

(ii) commence flare at appropriate height for the prevailing conditions and reduce ground speed and rate of descent;

(iii) control attitude to achieve a decreasing closure rate and reducing rate of descent;

(iv) control yaw, engine and RRPM;

(v) terminate the helicopter to a hover or hover taxi within tolerances of termination point without lateral or rearward drift;

(e) perform autorotative landing:

(i) commence flare at appropriate height for the prevailing conditions and reduces ground speed and rate of descent;

(ii) control RRPM;

(iii) select and maintain helicopter at the hover attitude without lateral or backward movement;

(iv) control touchdown rate;

(v) control yaw;

(vi) land helicopter with zero or minimum run-on speed within tolerances of nominated touchdown point without lateral or backward drift.

2.5 **TR-SEH.5 – Manage abnormal and emergency conditions**

(a) manage engine failure using the correct technique and applying the applicable checklists, procedures and planning during the following:

(i) hover and hover taxi;

(ii) take-off and departure;

(iii) cruise flight;

(iv) approach and landing;

(b) manage control malfunction as follows:

(i) identify tail rotor malfunction during flight and take appropriate action following required checklists and procedures;

(ii) select and manoeuvre helicopter to the safest landing area within area of regard;

(iii) identify jammed primary controls, carry out manoeuvres to safely remediate the problem, and land at a suitable location for the following:

(A) jammed pedals;

(B) jammed or limited cyclic or collective;

(c) manage system malfunctions by identifying critical system malfunction during flight and take appropriate action following required checklists and procedures for:

(i) hydraulic system emergencies (if applicable);

(ii) electrical system emergencies;

(iii) clutch system emergencies (if applicable);

(iv) engine governing system emergencies;

(d) perform recovery from the following (if applicable):

(i) vortex ring condition;

(ii) loss of tail rotor effectiveness;

(iii) low ‘g’ and mast bumping;

(e) control helicopter throughout, and manoeuvre the helicopter to the safest landing area available.

2.6 **TR-SEH.6 – Conduct a descent and arrival to an aerodrome**

(a) plan and conduct descent;

(b) join traffic pattern;

(c) maintain a safe separation from other traffic joining, departing or in the traffic pattern.

2.7 **TR-SEH.7 – Fly a full circuit pattern**

(a) perform a full circuit pattern (5 legs) within the tolerances specified for the relevant flight path;

(b) manage engine failure in the circuit:

(i) maintain control of the aircraft;

(ii) perform recall actions correctly;

(iii) select a suitable landing area within gliding distance, on the aerodrome or elsewhere;

(iv) perform emergency procedures correctly and land the aircraft if the engine cannot be restarted;

(v) advise ATS or other agencies capable of providing assistance of situation and intentions;

(vi) brief passengers about flight situation, brace position and harness security;

(vii) land aircraft ensuring safest outcome if an engine restart is not achieved.

2.8 **TR-SEH.8 – Conduct a landing**

Perform the following while operating within the limitations prescribed in the RFM:

(i) land on, and lift off from, sloping ground;

(ii) land, take off and manoeuvre in a confined area;

(iii) limited power approach and landing and take-off;

(iv) land and take-off from a pinnacle or ridgeline.

3 Range of variables

(a) activities are performed in accordance with published procedures;

(b) day VFR;

(c) single-engine helicopter with dual controls, electronic intercom and dual control brakes, if fitted;

(d) aerodromes or HLS;

(e) sealed, gravel or grass surfaces;

(f) limitations, such as those imposed by local noise abatement procedures and curfews;

(g) operational hazards, which may include variable surfaces, loose objects, personnel, birds and propeller wash, rotor wash and jet blast;

(h) simulated abnormal and emergency situations;

(i) simulated hazardous weather.

4 Underpinning knowledge of the following:

(a) general aircraft data;

(b) make, type and model of helicopter, designation of engines, take-off and rated power;

(c) stated airspeed limitations including, but not limited to: V_{NE} (at varying AUW and density altitudes) V_H, configuration airspeed limits V_{LO}, V_{TURB}, maximum cross-wind;

(d) low speed wind limits;

(e) RRPM limits (Power ON and Power OFF);

(f) engine, transmission and any other stated limits in the RFM;

(g) slope landing limitations (if available);

(h) emergency procedures for the following:

(i) engine failure in the hover;

(ii) taxiing;

(iii) during transitions before and after take-off;

(iv) in the cruise;

(v) on final approach before and after landing;

(vi) engine fire on the ground and airborne;

(vii) electrical fire on the ground and airborne;

(viii) cabin fire in flight;

(i) N1, torque split indications;

(j) identify malfunctioning governor in flight and manage the related engine;

(k) corrective action to be taken when engine run-up or run-down has been diagnosed;

(l) the following weight and balance topics:

(i) weight, balance and performance;

(ii) permissible take-off weight;

(iii) maximum gross weight, landing weight, ramp weight and zero fuel weight;

(iv) centre of gravity position for any specified conditions;

(v) centre of gravity limitations;

(vi) appropriate charts to determine centre of gravity;

(vii) calculated centre of gravity position and confirm it is within limits;

(m) the following take-off and landing topics:

(i) continuing and rejected take-off distances;

(ii) take-off decision point;

(iii) landing decision point;

(n) climb performance, hover out of ground effect and height–velocity diagram charts;

(o) failed engine operations;

(p) the following aircraft systems:

(i) fuel system;

(ii) hydraulic system;

(iii) electrical system;

(iv) oil system;
(v) stability augmentation, AFCS and FDS (as applicable);
(vi) anti-icing and de-icing systems (as applicable);
(vii) heating and ventilation systems;
(viii) pitot and static system;
(ix) fire extinguisher system (as applicable);
(x) engine systems;
(xi) transmission and rotor systems;
(xii) display systems (as applicable);
(xiii) undercarriage system (fixed or retractable as applicable);

(q) the following key hazards including, for each, the typical causal factors and contributing operational situations, avoidance and recognition of symptoms and recovery techniques:
(i) vortex ring state;
(ii) ground resonance;
(iii) loss of tail rotor effectiveness (LTE);
(iv) low 'g' and mast bumping;
(v) overpitching or low RRPM – rotor stall;
(vi) retreating blade stall;
(vii) recirculation;
(viii) dynamic rollover.

TR-MEH Type rating – multi-engine helicopter

1 Unit description

This unit describes the skills and knowledge required to operate a multi-engine helicopter.

2 Elements and performance criteria

2.1 TR-MEH.1 – Control helicopter on the ground

2.1.1 For all helicopters:

(a) prepare for start as follows:

(i) using an orderly procedure with checklists, inspect and prepare the helicopter, including those items recommended by the manufacturer, for a flight;

(ii) identify and verify switches, circuit breakers, fuses, and spare fuses pertinent to day and night operations;

(iii) confirm that there is sufficient fuel and oil for the intended flight;

(iv) identify and verify the required equipment for the flight is on-board and serviceable;

(v) ensure security of baggage and required equipment;

(vi) organise and arrange documents and equipment that will need to be accessed in flight in a manner that makes the items readily available;

(vii) perform an effective passenger safety briefing (if type capable of carrying passengers);

(b) conduct engine start and rotor engagement as follows:

(i) ensure helicopter is located in a suitable location for starting engine and rotors;

(ii) use the appropriate checklist provided by the helicopter manufacturer or owner or operator;

(iii) calculate and confirm sufficient power margin available for the proposed flight;

(iv) demonstrate knowledge of recommended starting procedures;

(v) take appropriate action with respect to unsatisfactory start conditions;

(vi) complete the appropriate engine and helicopter systems checks;

(c) taxiing and hover manoeuvring as follows:

(i) carry out pre-take-off checks;

(ii) set flight controls correctly to prepare for the lift-off transition to the hover at the location;

(iii) use correct flight and power control techniques to lift helicopter off the surface to a stable hover at the appropriate hover height for the helicopter;

(iv) confirm the proper functioning of the flight controls and confirm centre of gravity and power required to hover are within limits;

(v) trim helicopter where applicable;

(vi) demonstrate smooth control at a constant safe hover height while hover manoeuvring and maintaining power and RRPM within the limits;

(vii) maintain helicopter in flight over a nominated hover point at a nominated height and heading in cross-wind and tailwind;

(viii) transition from static hover to forward, sideways and backwards flight and terminate this movement over a nominated hover point;

(ix) turn helicopter around a the mast while maintaining a constant height at a constant rate of turn using anti-torque pedals;

(x) turn helicopter around a nominated point on or forward of the nose or on or aft of the tail while maintaining a constant height and specified rate of movement around the point;

(xi) apply controlled corrective action to maintain a constant rate of turn and to counter the effects of wind;

(xii) adjust air transit ground speed to suit helicopter type, traffic conditions, congestion, and maintenance of control and to avoid collision with obstacles or other aircraft.

2.1.2 For a helicopter with wheel landing gear, be able to do the following:

(a) select and maintain correct disk attitude and power required to initiate forwards movement of the helicopter on the surface;

(b) check and confirm the proper functioning of the wheel brake system;

(c) select and maintain correct disk attitude and power required to ground taxi and manoeuvre the helicopter on appropriate surfaces (wet and dry) at a safe speed in headwind, cross-wind and tailwind conditions;

(d) control the helicopter smoothly while ground taxiing and manoeuvring the helicopter with turns at a constant and safe rate of turn while maintaining an appropriate disk attitude and power setting;

(e) apply smooth and controlled actions to terminate at a nominated holding or parking point under different wind and surface conditions.

2.2 **TR-MEH.2 – Conduct take-off to departure**

2.2.1 Manage normal take-off to departure as follows:

(a) using approved technique and documented procedures perform a take-off, either from the ground or hover, and transition to forward flight and:

(i) complete appropriate checklists;

(ii) perform a take-off safety briefing (this may be carried out prior to lift off to the hover if necessitated by location);

(iii) ensure operating RPM within limits;

(iv) clear the area, taxi into the take-off position;

(v) transition to forward flight and through translational lift using correct techniques;

(b) accelerate to and maintain the recommended or nominated climb using the correct profile:

(i) outside of the Height-Velocity (H-V) avoid curve;

(ii) ensure obstacle avoidance;

(iii) retract the landing gear after a positive rate of climb is established (if applicable);

(iv) maintain correct power and attitude for the profile and IAS to be flown;

(v) comply with noise abatement procedures, where applicable;

(vi) complete appropriate checks.

2.2.2 Manage engine failure during take-off to departure as follows:

(a) self-brief, or brief crew members, stating a plan of action that will ensure the safest outcome in the event of an engine failure;

(b) maintain RRPM within the prescribed limits and control of the helicopter;

(c) correctly identify and confirm the failed engine(s) and at the appropriate time, complete the engine failure shutdown checklist for the following situations:

(i) engine failure prior to reaching take-off decision point:

(A) conduct the rejected take-off procedure in accordance with AFM and POH;

(B) apply the appropriate power within the AFM limits for the configuration being flown;

(C) perform a controlled landing in the rejected take-off distance available;

(ii) engine failure after take-off:

(A) maintain control of the helicopter;

(B) set maximum contingency power on serviceable engine;

(C) accelerate to V_{TOSS} (if applicable);

(D) identify and confirm failed engine;

(E) at the appropriate time, complete the engine failure shutdown checklist;

(F) climb multi-engine helicopter not below V_{YSE};

(G) land helicopter at nearest appropriate landing area.

2.3 **TR-MEH.3 – Control helicopter in normal flight**

Set power and maintain attitude to establish and maintain the following manoeuvres with the helicopter in balanced flight and trimmed (as applicable) within prescribed tolerances as follows:

(a) straight and level:
   (i) straight and level flight at normal cruise;
   (ii) maintains heading;
   (iii) maintains nominated altitude;

(b) straight climbs and descents:
   (i) maintain IAS for best angle of climb (V_X);
   (ii) maintain IAS for best rate of climb (V_Y);
   (iii) maintain IAS for cruise climb;
   (iv) maintain IAS for cruise descent;
   (v) maintain correct power setting as applicable to the rotorcraft;
   (vi) maintain heading;

(c) turn onto specific headings (using magnetic compass) or geographical feature within the flight tolerances for the following:
   (i) level turn
   (ii) climbing turn, rate 1 or 20° bank;
   (iii) powered descending turn, 30° bank.

2.4 **TR-MEH.4 – Control helicopter during advanced manoeuvres**

(a) perform steep turns (45º) within the flight tolerances as follows:
   (i) level turn altitude;
   (ii) exits on specified heading or geographical feature;

(b) perform autorotative flight:
   (i) enters and maintains autorotative flight at nominated speed in balanced flight for the following profiles:
      (A) descend at nominated heading and manufacturer's recommended speed;
      (B) conduct 180º autorotations using up to 45º angle of bank;
      (C) autorotative flight at best range speed and minimum descent rate speed;
      (D) maintains RRPM within limitations;

(c) perform power termination:
   (i) maintain RRPM within limitations;
   (ii) ensure throttle(s) is at 100% (or the equivalent terminology) prior to the commencement of the flare;
   (iii) commence flare at appropriate height for the prevailing conditions and reduce ground speed and rate of descent;
   (iv) control attitude to achieve a decreasing closure rate and reducing rate of descent;
   (v) control yaw, engine and RRPM;
   (vi) terminate the helicopter to a hover or hover taxi within tolerances of termination point without lateral or rearward drift.

2.5 **TR-MEH.5 – Manage abnormal and emergency conditions**

(a) manage engine failure, using the correct technique and applying the applicable checklists, procedures and planning manages engine failure during the following:
   (i) hover and hover taxi;
   (ii) take-off and departure;
   (iii) cruise flight;
   (iv) approach and landing;

(b) manage control malfunction as follows:
   (i) identify tail rotor malfunction during flight and take appropriate action following required checklists and procedures;
   (ii) select and manoeuvre helicopter to the safest landing area within area of regard;
   (iii) identify jammed primary controls, carry out manoeuvres to safely remediate the problem, and land at a suitable location for the following:
      (A) jammed pedals;
      (B) jammed or limited cyclic or collective;

(c) manage system malfunctions by identifying critical system malfunction during flight and take appropriate action following required checklists and procedures for the following:
   (i) hydraulic system emergencies (if applicable);
   (ii) electrical system emergencies;
   (iii) clutch system emergencies (if applicable);
   (iv) engine governing system emergencies;

(d) perform recovery from the following (if applicable):
   (i) vortex ring condition;
   (ii) loss of tail rotor effectiveness;
   (iii) low ‘g’ and mast bumping;

(e) control helicopter throughout and manoeuvres helicopter to the safest landing area available.

2.6 **TR-MEH.6 – Conduct a descent and arrival to an aerodrome**

(a) plan and conduct descent;

(b) join traffic pattern;

(c) maintain a safe separation from other traffic joining, departing or in the traffic pattern.

2.7 **TR-MEH.7 – Fly a full circuit pattern**

(a) perform a full circuit pattern (5 legs) within the tolerances specified for the relevant flight path;

(b) manage engine failure in the circuit:
   (i) maintain control of the aircraft;
   (ii) perform recall actions correctly;
   (iii) select a suitable landing area within gliding distance, on the aerodrome or elsewhere;
   (iv) perform emergency procedures correctly and land the aircraft if the engine cannot be restarted;
   (v) advise ATS or other agencies capable of providing assistance of situation and intentions;
   (vi) brief passengers about flight situation, brace position and harness security;
   (vii) land aircraft ensuring safest outcome if an engine restart is not achieved.

2.8 **TR-MEH.8 – Conduct a landing**

Perform the following while operating within the limitations prescribed in the RFM:
   (i) land on, and lift off from, sloping ground;
   (ii) land, take off and manoeuvre in a confined area;
   (iii) limited power approach and landing and take-off;
   (iv) land and take-off from a pinnacle or ridgeline (CPL).

3 Range of variables

(a) activities are performed in accordance with published procedures;

(b) day VFR;

(c) approved multi-engine helicopter with dual controls, electronic intercom and dual control brakes, if fitted;

(d) aerodromes or HLS;

(e) sealed, gravel or grass surfaces;

(f) limitations, such as those imposed by local noise abatement procedures and curfews;

(g) operational hazards, which may include variable surfaces, loose objects, personnel, birds and propeller wash, rotor wash and jet blast;

(h) simulated abnormal and emergency situations;

(i) flight crew incapacitation (multi-crew operations);

(j) simulated hazardous weather.

4 Underpinning knowledge of the following:

(a) general aircraft data;

(b) make, type and model of helicopter, designation of engines, take-off and rated power;

(c) stated airspeed limitations including, but not limited to, V_{NE} (at varying AUW and density altitudes) V_H, configuration airspeed limits V_{LO}, V_{TURB}, maximum cross-wind;

(d) low speed wind limits;

(e) RRPM limits (Power ON and Power OFF);

(f) engine, transmission and any other stated limits in the RFM;

(g) slope landing limitations (if available);

(h) emergency procedures for the following:

(i) engine failure in the hover;

(ii) taxiing;

(iii) during transitions before and after take-off;

(iv) in the cruise;

(v) on final approach before and after landing;

(vi) engine fire on the ground and airborne;

(vii) electrical fire on the ground and airborne;

(viii) cabin fire in flight;

(i) N1, torque split indications;

(j) identify malfunctioning governor in flight and manage the related engine;

(k) corrective action to be taken when engine run-up or run-down has been diagnosed;

(l) the following weight and balance topics:

(i) weight, balance and performance;

(ii) permissible take-off weight;

(iii) maximum gross weight, landing weight, ramp weight and zero fuel weight;

(iv) centre of gravity position for any specified conditions;

(v) centre of gravity limitations;

(vi) appropriate charts to determine centre of gravity;

(vii) calculated centre of gravity position and confirm it is within limits;

(m) the following take-off and landing topics:

(i) continuing and rejected take-off distances;

(ii) take-off decision point;

(iii) landing decision point;

(n) climb performance, hover out of ground effect and height-velocity diagram charts;

(o) failed engine operations;

(p) initial rate of climb and climb gradient for 1 engine inoperative for specified conditions;

(q) range of the aircraft increases or decreases following an engine failure;

(r) PNR for 1 engine inoperative (CPL and ATPL);

(s) ETP for 1 engine inoperative (CPL and ATPL);

(t) the following aircraft systems:
   (i) fuel system;
   (ii) hydraulic system;
   (iii) electrical system;
   (iv) oil system;
   (v) stability augmentation, AFCS and FDS (as applicable);
   (vi) anti-icing and de-icing systems (as applicable);
   (vii) heating and ventilation systems;
   (viii) pitot and static system;
   (ix) fire extinguisher system (as applicable);
   (x) engine systems;
   (xi) transmission and rotor systems;
   (xii) display systems (as applicable);
   (xiii) undercarriage system (fixed or retractable as applicable);

(u) the following key hazards including, for each, the typical causal factors and contributing operational situations, avoidance and recognition of symptoms and recovery techniques:
   (i) vortex ring state;
   (ii) ground resonance;
   (iii) loss of tail rotor effectiveness (LTE);
   (iv) low ‘g’ and mast bumping;
   (v) overpitching or low RRPM – rotor stall;
   (vi) retreating blade stall;
   (vii) recirculation;
   (viii) dynamic rollover.

FR-SEH Single-engine helicopter flight review

1 Unit description

This unit describes the standards required for a single-engine helicopter class rating and a single-engine helicopter type rating flight review.

2 Elements and performance criteria

2.1 FR-SEHC.1 – Conduct flight

(a) start, lift-off, hover and taxi helicopter ready for take-off;

(b) perform a normal take-off and departure;

(c) perform general handling manoeuvres, including the following:

  (i) perform steep turns through at least 360°;

  (ii) conduct low flying at 500 ft AGL and perform a reversal turn;

(d) perform circuit rejoin and at least 1 full circuit pattern;

(e) perform a missed approach;

(f) perform hover, taxi, take-off, approach and landing in a cross-wind if conditions permit;

(g) conduct operations on sloping ground and in confined areas (where possible).

2.2 FR-SEAHC.2 – Manage aircraft systems

(a) ensure sufficient fuel is loaded and fuel consumption is monitored and managed throughout the flight;

(b) manage the aircraft fuel system;

(c) manage all other aircraft systems.

2.3 FR-SEHC.3 – Navigation (optional)

(a) plan flight of at least 3 legs and submit flight plan in accordance with AIP;

(b) conduct a departure;

(c) navigate en route using visual and instrument navigation systems;

(d) perform diversion procedure;

(e) demonstrate lost procedure;

(f) conduct arrival.

2.4 FR-SEHC.4 – Airspace

(a) comply with airspace procedures and requirements;

(b) operate aircraft radio and conform to standard radio procedures.

2.5 FR-SEHC.5 – Instrument flying (optional)

(a) perform basic flight manoeuvres using full instrument panel;

(b) recover from upset situations and unusual aircraft attitudes to straight and level flight;

(c) perform checks and monitor system for serviceability.

2.6 FR-SEHC.6 – Manage non-normal and emergency conditions

(a) perform autorotation to touchdown or power termination;

(b) manage simulated engine failure during hover or hover taxi;

(c) manage aircraft system malfunctions other than engine failure;

(d) manage hydraulic system failure;

(e) perform recovery from the following (if applicable):

  (i) vortex ring condition;

(ii) loss of tail rotor effectiveness;

(iii) low 'g' and mast bumping;

(f) manage loss of tail rotor control for the following:

(i) forward flight;

(ii) hover.

2.7 **FR-SEHC.7 – Non-technical skills**

(a) recognise and manage threats and errors during pre-flight planning and in-flight;

(b) maintain effective lookout and situational awareness;

(c) assess situations and make appropriate decisions;

(d) set priorities and manage tasks;

(e) maintain effective communication with stakeholders;

(f) communicate effectively using aeronautical radio.

2.8 **FR-SEHC.8 – Manage passengers and cargo**

(a) conduct pre-flight and in-flight safety briefings to ensure passengers are familiar with safety procedures, emergency equipment, exits and operational requirements;

(b) manage cargo.

3 Range of variables

(a) activities are performed in accordance with published procedures;

(b) simulated conditions can be used;

(c) for FR-SEH.5 – *instrument flying*, simulated or actual instrument conditions;

(d) for FR-SEH.6 – *manage non-normal and emergency conditions*, performance criteria are limited according to the type of aircraft being used.

4 Underpinning knowledge of the following:

(a) privileges, limitations and responsibilities of the licences, ratings and endorsements the applicant holds;

(b) flight review requirements;

(c) obtaining, interpreting and applying meteorological and aeronautical information;

(d) navigation and flight planning for day VFR operations;

(e) diversion and lost procedures;

(f) weight and balance and aircraft performance;

(g) operation of systems fitted to the aircraft that is used in the flight review;

(h) extracting and applying aircraft performance data for the aircraft that is used in the flight review;

(i) limitations applicable to the rotorcraft being flown for the flight review;

(j) airspace requirements and procedures;

(k) helicopter landing sites;

(l) manage cargo and passengers;

(m) hazard identification and risk management;

(n) low inertia characteristics;

(o) for each of the following, the typical causal factors and contributing operational situations, avoidance and recognition of symptoms and recovery techniques:

(i) vortex ring generation;

(ii) ground resonance;

(iii) loss of tail rotor effectiveness;
(iv) low ‘g’ and mast bumping;
(v) overpitching/low RRPM – rotor stall;
(vi) retreating blade stall;
(vii) recirculation;
(viii) dynamic rollover;

(p) non-normal and emergency procedures, including full and partial failures;

(q) local operating procedures;

(r) hazardous weather;

(s) airworthiness requirements;

(t) reporting requirements;

(u) ERSA normal and emergency procedures;

(v) current and recently changed legislation and procedures that are relevant to the applicant’s licences, ratings and endorsements.

FR-MEHT Multi-engine helicopter type rating flight review

1 Unit description

This unit describes the standards required for a multi-engine helicopter type rating flight review.

2 Elements and performance criteria

2.1 **FR-MEHT.1 – Conduct flight**

(a) start, lift-off, hover and taxi helicopter ready for take-off;

(b) perform a normal take-off and departure;

(c) perform general handling manoeuvres, including the following:

(i) perform steep turns through at least 360°;

(ii) conduct low flying at 500 ft AGL and perform a reversal turn;

(d) perform circuit rejoin and at least 1 full circuit pattern;

(e) perform hover, taxi, take-off, approach and landing in a cross-wind if conditions permit;

(f) conduct operations on sloping ground and in confined areas (if possible).

2.2 **FR-MEHT.2 – Manage aircraft systems**

(a) ensure sufficient fuel is loaded and fuel consumption is monitored and managed throughout the flight;

(b) manage the aircraft fuel system;

(c) manage all other aircraft systems.

2.3 **FR-MEHT.3 – Navigation (optional)**

(a) plan flight of at least 3 legs and submit flight plan in accordance with AIP;

(b) conduct a departure;

(c) navigate en route using visual and instrument navigation systems;

(d) perform diversion procedure;

(e) conduct arrival.

2.4 **FR-MEHT.4 – Airspace**

(a) comply with airspace procedures and requirements;

(b) operate aircraft radio and conform to standard radio procedures.

2.5 **FR-MEHT.5 – Instrument flying**

(a) perform basic flight manoeuvres using full instrument panel;

(b) recover from upset situations and unusual aircraft attitudes to straight and level flight;

(c) perform checks and monitor system for serviceability.

2.6 **FR-MEHT.6 – Manage non-normal and emergency conditions**

(a) perform autorotation to power termination;

(b) manage simulated engine failures during departure and approach manoeuvres, to the applicable rotorcraft category standard;

(c) perform a single-engine missed approach;

(d) manage aircraft system malfunctions other than engine failure;

(e) perform recovery from the following (if applicable):

(i) vortex ring condition;

(ii) loss of tail rotor effectiveness;

(iii) low ‘g’ and mast bumping;

(f) manage loss of tail rotor control for the following:
  (i) forward flight;
  (ii) hover.

2.7 **FR-MEHT.7 – Non-technical skills**

(a) recognise and manage threats and errors during pre-flight planning and in-flight;

(b) maintain effective lookout and situational awareness;

(c) assess situations and make appropriate decisions;

(d) set priorities and manage tasks;

(e) maintain effective communication with stakeholders;

(f) communicate effectively using aeronautical radio.

2.8 **FR-MEHT.8 – Manage passengers and cargo**

(a) conduct pre-flight and in-flight safety briefings to ensure passengers are familiar with safety procedures, emergency equipment, exits and operational requirements;

(b) manage cargo.

3 Range of variables

(a) activities are performed in accordance with published procedures;

(b) simulated conditions can be used;

(c) for FR- MEHT.5 – *instrument flying*, simulated or actual instrument conditions.

4 Underpinning knowledge of the following:

(a) privileges, limitations and responsibilities of the licences, ratings and endorsements the applicant holds;

(b) flight review requirements;

(c) obtaining, interpreting and applying meteorological and aeronautical information;

(d) navigation and flight planning for day VFR operations;

(e) weight and balance and aircraft performance;

(f) operation of systems fitted to the aircraft that is used in the flight review;

(g) extracting and applying aircraft performance data for the aircraft that is used in the flight review;

(h) limitations applicable to the rotorcraft being flown for the flight review;

(i) airspace requirements and procedures;

(j) helicopter landing sites;

(k) manage cargo and passengers;

(l) hazard identification and risk management;

(m) low inertia characteristics;

(n) for each of the following, the typical causal factors and contributing operational situations, avoidance and recognition of symptoms and recovery techniques:
  (i) vortex ring generation;
  (ii) ground resonance;
  (iii) loss of tail rotor effectiveness;
  (iv) low ‘g’ and mast bumping;
  (v) overpitching/low RRPM – rotor stall;
  (vi) retreating blade stall;
  (vii) recirculation;

(viii) dynamic rollover;

(o) non-normal and emergency procedures, including full and partial failures;

(p) local operating procedures;

(q) hazardous weather;

(r) airworthiness requirements;

(s) reporting requirements;

(t) ERSA normal and emergency procedures;

(u) current and recently changed legislation and procedures that are relevant to the applicant's licences, ratings and endorsements.

GYROPLANE CATEGORY

GSE Single-engine gyroplane

1 Unit description

This unit describes the skills and knowledge required to operate a single-engine gyroplane aircraft.

2 Elements and performance criteria

2.1 GSE.1 – Control gyroplane on the ground

(a) prepare for start:
- (i) determine take-off distance and obstacle clearance;
- (ii) using an orderly procedure with checklists, inspect and prepare the gyroplane, including those items recommended by the manufacturer, for flight;
- (iii) identify and verify switches, circuit breakers, fuses, and spare fuses pertinent to day and night operations;
- (iv) confirm that there is sufficient fuel and oil for the intended flight;
- (v) identify and verify the required equipment for the flight is on board and serviceable;
- (vi) ensure baggage and required equipment are secured;
- (vii) organise, stow and arrange documents and equipment that will need to be accessed during the flight to make them readily available;
- (viii) perform an effective passenger safety briefing;

(b) conduct engine start:
- (i) ensure gyroplane is located in a suitable location clear of obstructions and building for starting engine;
- (ii) use the appropriate checklist provided by the gyroplane manufacturer to perform pre-start checks;
- (iii) ensure propeller area clear prior to start;
- (iv) demonstrate knowledge of recommended starting procedures;
- (v) demonstrates hot and cold engine starts in accordance with appropriate checklists;
- (vi) manage emergencies in accordance with appropriate checklists;
- (vii) complete engine and gyroplane systems after-start checks;
- (viii) engine warm-up conducted in accordance with appropriate checklist (if applicable);
- (ix) control gyroplane movement during and after engine start;

(c) conduct pre-rotation:
- (i) position gyroplane with safe rotor clearance from obstructions;
- (ii) operate rotor brake (if fitted) in accordance with appropriate checklist;
- (iii) spin up rotor in accordance with appropriate checklist;
- (iv) prevent blade flap;
- (v) understand the correct action in the event of blade flap;
- (vi) maintain rotor disc position within published limits during pre-rotation and ground manoeuvring;

(d) taxi gyroplane:
- (i) obtain taxi clearance (if required);
- (ii) check and confirm proper functioning of the wheel brake system;
- (iii) taxi gyroplane in accordance with prevailing aerodrome conditions;
- (iv) comply with taxiway and other aerodrome markings, right-of-way rules and other as appropriate;
- (v) follow marshalling instructions where applicable;

(vi) anticipate and allow for effects of prevailing weather conditions;

(vii) operate engine on ground and exercise rotor care;

(viii) maintain safe rotor clearance from obstructions;

(ix) adjust taxi speed to suit gyroplane type, surface conditions, and avoid collision with obstacles, other aircraft or persons;

(x) coordinate taxi speed and rotor disc position to control RRPM and prevent blade flap;

(xi) use correct action in the event of blade flap;

(e) take-off gyroplane:

(i) carry out pre-take-off procedures:

(ii) perform run up and pre-take-off checks in accordance using the aircraft checklist;

(iii) self-brief after take-off emergency actions;

(iv) perform pre-rotation in accordance with approved procedure;

(v) line up gyroplane on runway centreline in take-off direction;

(vi) perform line-up checks in accordance with aircraft checklist;

(vii) apply throttle to accelerate gyroplane and achieve flying RRPM;

(viii) maintain runway direction;

(ix) prevent rotor flap;

(x) compensate for engine torque roll;

(xi) achieve desired RRPM for flight not later than minimum power speed;

(xii) use throttle and controls to balance gyroplane on main gear at recommended speed;

(xiii) apply take off power after rotation;

(xiv) maintain climb speed at best angle or best rate;

(xv) maintain flight path on runway extended centreline as required;

(xvi) use applicable noise abatement and wake turbulence procedures as applicable;

(xvii) reduce take-off power to climb power;

(xviii) balance gyroplane;

(xix) carry out after take-off procedures;

(xx) perform after take-off checks by memory recall;

(xxi) conduct short-field take-off;

(xxii) conduct soft-field take-off;

(xxiii) conduct normal take-off;

(f) take off gyroplane in a cross-wind:

(i) apply competencies for take-off gyroplane;

(ii) ensure cross-wind component within manufacturer’s limitations;

(iii) configure gyroplane for cross-wind take-off;

(iv) initial lift-off on downwind wheel.

2.2 **GSE.2 – Control gyroplane in normal flight**

(a) climb gyroplane:

(i) clear airspace above;

(ii) set and maintain climb power and attitude (cyclic pitch);

(iii) demonstrate best angle of climb (V_x);

(iv) demonstrate best rate of climb (V_y);

(v) demonstrate normal climb;

(vi) balance gyroplane;

(vii) trim gyroplane, if applicable;

(viii) maintain power as altitude is increased;

(ix) demonstrates straight climb;

(b) straight and level flight:
  (i) perform normal cruise in straight and level flight;
  (ii) perform high speed cruise in straight and level flight;
  (iii) perform maximum range cruise in straight and level;
  (iv) perform maximum endurance cruise in straight and level flight;
  (v) maintain altitude;
  (vi) maintain desired speed;
  (vii) balance gyroplane;
  (viii) trim gyroplane, if applicable;

(c) descend gyroplane:
  (i) set and maintain power and attitude to achieve normal descent performance during straight flight;
  (ii) set and idle power and attitude to achieve descent at glide speed;
  (iii) set and maintain power and attitude to achieve powered descent at nominated approach configuration and speed;
  (iv) balance gyroplane;
  (v) trim gyroplane, if applicable;
  (vi) monitor and control engine temperature;
  (vii) apply carburettor heat when applicable;
  (viii) maintain traffic clearance ahead and below.

(d) turn gyroplane:
  (i) perform airspace cleared procedure;
  (ii) set and maintain power, attitude and angle of bank to achieve specified turn performance;
  (iii) turn gyroplane at varying rates to achieve specified tracks;
  (iv) turn gyroplane onto specified headings or geographical feature;
  (v) balance gyroplane;
  (vi) trim gyroplane, if applicable;
  (vii) monitor and control engine temperature;
  (viii) turn gyroplane at various airspeeds;
  (ix) perform climbing turns at normal climb speed;
  (x) perform climbing turns at best angle speed;
  (xi) perform climbing turn at best rate speed;
  (xii) perform descending turn at normal descent speed
  (xiii) perform descending turn at glide speed and configuration;
  (xiv) perform descending turn in approach and landing configuration;

(e) recover gyroplane from flight behind the power curve:
  (i) perform airspace cleared procedure;
  (ii) maintain minimum altitude 1,000 ft AGL when manoeuvring below minimum level flight speed;
  (iii) maintain forward speed not less than 20 kts below minimum level flight speed;
  (iv) avoid rapid application of cyclic pitch;
  (v) maintain nominated heading;
  (vi) avoid loss of directional control;
  (vii) balance gyroplane;
  (viii) recover gyroplane from flight below minimal flight speed;
  (ix) coordinate use of throttle and cyclic to increase airspeed above minimum level flight speed;

- (x) regain level flight by nominated altitude;
- (f) turn gyroplane steeply:
  - (i) visually clear air space;
  - (ii) performs level steep turn at nominated bank angle without altitude change;
  - (iii) maintains airspeed;
  - (iv) perform descending steep turn at nominated bank angle and speed to a nominated heading or geographical feature through a minimum of 500 ft;
  - (v) exit on specified heading or geographical feature;
  - (vi) balance gyroplane;
- (g) sideslip gyroplane:
  - (i) perform pre-manoeuvre checks;
  - (ii) perform side slip while maintaining speed and track;
  - (iii) perform side slip in a turn while maintaining speed;
  - (iv) recover from sideslip and balanced flight re-established;
- (h) conduct circuits:
  - (i) maintain lookout and traffic separation;
  - (ii) conduct normal circuit:
    - (A) maintain extended centreline on upwind leg;
    - (B) allow for wind effect on all legs of the circuit;
    - (C) adjust downwind spacing;
    - (D) perform pre-landing checks;
    - (E) maintain desired speed;
    - (F) adjust base turning point according to prevailing wind conditions;
    - (G) adjust base turning point according to traffic conditions or overshoots from base;
    - (H) adjust height on base to be established on final approach not below 500 ft AGL;
    - (I) identify and maintain aiming point on final approach;
    - (J) perform final approach checklist actions;
    - (K) control airspeed;
    - (L) land gyroplane;
- (i) land gyroplane:
  - (i) conduct normal landing;
  - (ii) conduct short-field landing;
  - (iii) conduct soft-field landing;
  - (iv) identify and select aiming point;
  - (v) control power requirements;
  - (vi) control the effect of cross-wind;
  - (vii) flare gyroplane at appropriate height;
  - (viii) take appropriate action to control ballooning;
  - (ix) take appropriate action to control any bouncing after touchdown;
  - (x) touchdown within flight tolerances;
  - (xi) perform after landing checklist actions;
- (j) perform missed landing:
  - (i) recognise when the landing standard cannot be achieved;
  - (ii) makes a timely decision to perform missed landing;
  - (iii) apply take-off power and controls pitch attitude;
  - (iv) lift off at lift-off speed or establish climb attitude if airborne;
  - (v) avoid wake turbulence;

(vi) complete after take-off checks.

2.3 **GSE.3 – Manage abnormal situations**

(a) manage engine failure after take-off:

(i) control gyroplane;

(ii) establish and maintain best gliding speed;

(iii) select suitable landing area;

(iv) perform recall actions as time permits;

(v) brief passengers on pilot's intentions, brace position and harness security, as time permits;

(vi) land gyroplane to achieve safest outcome;

(b) perform forced landing (complete or partial power failure):

(i) maintain control of gyroplane;

(ii) perform recall actions;

(iii) select landing area within gliding distance;

(iv) formulate plan;

(v) perform all emergency checks;

(vi) brief passengers on pilot's intentions, brace position and harness security;

(vii) declare a Mayday advising ATC, or any agency capable of providing assistance, of your situation and intentions;

(viii) land gyroplane ensuring safest outcome if engine restart not achieved;

(c) conduct precautionary search and landing:

(i) assess flight circumstances and decide to perform precautionary landing in the time available;

(ii) declare a PAN and communicates intentions;

(iii) configure gyroplane for reduced visibility manoeuvring, if applicable;

(iv) select landing area and inspect suitability for landing ensuring;

(A) unobstructed approach and overshoot paths;

(B) landing area length adequate for landing;

(C) landing area surface clear of hazards and suitable for gyroplane type;

(d) manage adverse aerodynamic situations:

(i) explain causes and effect of, and avoidance and recovery actions of pilot induced oscillation (PIO);

(ii) explain causes and effect of Gust Induced Oscillation (GIO);

(iii) explain the causes and effects of power pushover and negative 'g';

(iv) explain causes and avoidance of loss of directional control;

(v) explain causes and effects of and recall actions in the event of ground resonance;

(vi) identify presence of dynamic rollover conditions and maintain control of gyroplane.

3 **Range of variables**

(a) activities are performed in accordance with published procedures;

(b) day VFR;

(c) approved gyroplane with dual controls, electronic intercom and dual control brakes, if fitted;

(d) aerodromes or landing areas;

(e) sealed, gravel or grass surfaces;

(f) wake, orographic or mechanical turbulence;

(g) classes of airspace designated by the regulator;

(h) limitations, such as those imposed by local noise abatement procedures and curfews;

(i) operational hazards, which may include variable surfaces, loose objects, personnel, birds and propeller wash, rotor wash and jet blast;

(j) simulated abnormal and emergency situations;

(k) simulated hazardous weather.

4 Underpinning knowledge of the following:

(a) the fuel system and causes and effects of fuel vaporisation;

(b) rotor spin-up procedures;

(c) the effects of wind on rotor blades;

(d) performing weight and balance calculations;

(e) loading within specified limitations;

(f) dynamic rollover and ground resonance;

(g) gyroplane operational and starter motor limitations;

(h) all gyroplane limitations;

(i) aerodrome markings;

(j) light and marshalling signals;

(k) calculating take-off performance;

(l) calculating cross-wind components;

(m) factors affecting take-off performance;

(n) factors affecting initial climb performance;

(o) principles of aerodynamics;

(p) function and primary and secondary effects of controls;

(q) theory and application of best rate and angle of climb;

(r) forces and moments in straight and level and climbing flight;

(s) relationship of attitude and power to trim;

(t) use of trim controls;

(u) forces acting on a gyroplane during descent;

(v) effects of excessive cooling on engine performance during descent and methods to counter these effects;

(w) use of carburettor heat (if fitted to the gyroplane);

(x) hazards during maximum-rate descents;

(y) forces acting on a gyroplane in a turn;

(z) effects of turn on magnetic compass performance;

(za) effect of angle of bank on load factor and stall speed;

(zb) dangers of turbulence and wake turbulence when flying at slow speed;

(zc) circuit patterns and procedures;

(zd) dangers of wind shear, turbulence and wake turbulence;

(ze) aerodrome light signals;

(zf) aircraft systems;

(zg) aircraft performance;

(zh) aircraft weight and balance;

(zi) contents of the flight manual or POH;

(zj) day VFR flight rules;

(zk) relevant sections of the AIP;

(zl) effects of ‘g forces’ during turns;

(zm) effects of induced drag;

(zn) effects of a sideslip on gyroplane performance;

(zo) effects of sideslipping on gyroplane fuel and pitot systems;

(zp) calculating take-off and landing performance;

(zq) ground hazards associated with minimum ground roll and soft-surface operations;

(zr) principles of maximum rate and minimum radius turns;

(zs) precautionary search procedures;

(zt) causes of and corrective actions to manage adverse aerodynamic situations.

POWERED LIFT CATEGORY (RESERVED)

AIRSHIP CATEGORY (RESERVED)

GLIDER CATEGORY

PPF-G Perform pre- and post-flight actions and procedures gliders

1 Unit description

This unit describes the skills and knowledge required for a person to conduct pre- and post-flight actions and procedures for a glider.

2 Elements and performance criteria

2.1 **PPF.1 – Pre-flight actions and procedures**

(a) complete all required pre-flight administration documentation;

(b) obtain, interpret and apply information contained in the required pre-flight operational documentation, including but not limited to:

- (i) maintenance release;
- (ii) weather forecasts;
- (iii) local observations;
- (iv) NOTAMs;
- (v) ERSA;
- (vi) AIP;

(c) identify special aerodrome procedures;

(d) identify all relevant radio and navigation aid facilities to be used during the flight (if applicable);

(e) determine the suitability of the current and forecast weather conditions for the proposed flight;

(f) using the aircraft documents, calculate the following for a given set of environmental and operational conditions:

- (i) weight and balance;

(g) determine whether the aircraft is serviceable for the proposed flight.

2.2 **PPF.2 – Perform pre-fight inspection**

(a) identify and secure equipment and documentation that is required for the flight;

(b) complete an internal and external check of the aircraft;

(c) identify all defects or damage to the aircraft;

(d) report to and seek advice from qualified personnel to determine the action required in relation to any identified defects or damage;

(e) ensure all aircraft locking and securing devices, covers and bungs are removed and stowed securely;

(f) certify the aircraft flight technical log entering any defects or endorsements to permissible unserviceabilities, as appropriate;

(g) complete and certify the daily inspection (if authorised to do so).

2.3 **PPF.3 – Post-flight actions and procedures**

(a) conduct post-flight inspection and secure the aircraft (if applicable);

(b) complete all required post-flight administration documentation.

3 Range of variables

Activities are performed in accordance with published procedures.

4 Underpinning knowledge of the following:

(a) standard operating procedures for the glider;

(b) airworthiness requirements applicable to the glider;

(c) local weather patterns;

(d) local aerodrome requirements.

G1 Control glider on the ground

1 Unit description

This unit describes the skills and knowledge required to operate a glider on the ground.

2 Elements and performance criteria

2.1 G1.1 – Before flight actions

(a) assess weather conditions as being suitable for flight;

(b) determine glider weight and balance is within limits;

(c) demonstrate an ability to assemble glider;

(d) determine ballast requirements;

(e) perform external pre-flight actions;

(f) perform internal pre-flight actions;

(g) determine launch mechanism is correctly connected.

3 Range of variables

(a) activities are performed in accordance with published procedures;

(b) windsock located on aerodrome;

(c) sufficient wind that requires control adjustment (can be simulated);

(d) hazardous weather (can be simulated);

(e) day VFR conditions;

(f) local area operational limitations such as aerodrome curfews (can be simulated).

4 Underpinning knowledge of the following:

(a) published regulations and published procedures relating to the ground operation of aircraft;

(b) typical glider aircraft systems;

(c) typical glider launch systems;

(d) typical aircraft performance characteristics of gliders and the effects of local weather conditions on performance;

(e) aircraft weight and balance and the how to calculate aircraft centre of gravity;

(f) the contents of the flight manual and pilot operating handbook for the aircraft being flown;

(g) the environmental conditions that represent VMC;

(h) propeller wash, rotor wash and jet blast and how they affect gliders;

(i) the day VFR flight rules;

(j) the meaning of aerodrome markings, signals and local procedures;

(k) the actions to be taken in the event of a brake or tyre or steering failure;

(l) the relevant sections of the AIP.

G2 Take-off glider

1 Unit description

This unit describes the skills and knowledge required to perform a take-off in a glider.

2 Elements and performance criteria

2.1 **G2.1 – Carry out pre-take-off procedures**

(a) identify and apply airspeeds, configurations, and emergency and abnormal procedures for normal and cross-wind take-offs;

(b) work out in advance a plan of action to ensure the safest outcome in the event of abnormal operations;

(c) verify and correctly apply correction for the existing wind component to the take-off performance;

(d) perform and ensure all pre-take-off and line-up checks required by the aircraft checklist items are completed in a timely manner;

(e) align the airplane on the runway centreline.

2.2 **G2.2 – Take-off glider**

(a) apply the controls correctly to maintain longitudinal alignment on the centreline of the runway, if appropriate, prior to initiating and during the take-off;

(b) monitor settings, and instruments during take-off to ensure all predetermined parameters are maintained;

(c) adjust the controls to attain the desired pitch attitude at the predetermined airspeed to attain the desired performance;

(d) perform the take-off using winch and towed glider equipment applying the required control inputs as appropriate in a smooth, coordinated manner;

(e) trim the glider accurately maintaining balanced flight;

(f) perform and verify the completion of, gear and flap retractions (as applicable) and other required pilot-related activities at the required airspeed within tolerances;

(g) maintain desired flight path as required.

2.3 **G2.3 – Take-off glider in a cross-wind**

(a) perform a take-off in a glider allowing for cross-wind;

(b) maintain runway centreline and extended centreline.

2.4 **G2.4 – Carryout after take-off procedures**

2.4.1 The person must be able to demonstrate the following:

(a) verify the completion of the appropriate after take-off checklist items in a timely manner;

(b) maintain the appropriate climb segment at the nominated heading and airspeed.

3 Range of variables

(a) activities are performed in accordance with published procedures;

(b) towed take-off;

(c) winch launch;

(d) aircraft with or without flaps;

(e) sealed, gravel or grass runways and taxiways;

(f) windsock located on aerodrome;

(g) simulated hazardous weather;

(h) day VFR conditions;

(i) for take-off in cross-wind, the cross-wind component must be at least 70% of the maximum permitted for the type of aeroplane being flown;

(j) local area operational limitations such as noise abatement and aerodrome curfews.

4 Underpinning knowledge of the following:

(a) hand signals;

(b) tow aircraft signals;

(c) obtaining or calculating the cross-wind and down or up wind components;

(d) the factors affecting take-off and initial climb performance;

(e) interpreting windsock indications and determining wind direction and speed;

(f) take-off distance required calculation;

(g) aerodrome charts and an ability to interpret them;

(h) local topographical chart to identify safe areas for engine-failure purposes and noise-abatement considerations.

G3 Control glider in normal flight

1 Unit description

This unit describes the skills and knowledge required to control a glider while performing normal flight manoeuvres.

2 Elements and performance criteria

2.1 **G3.1 – Climb glider**

(a) operate and monitor all aircraft systems when commencing, during, and completing a climbing flight manoeuvre;

(b) for the following climbing manoeuvres select attitude and configuration as required for the flight path, balance and trim the aeroplane accurately, apply smooth, coordinated control inputs to achieve the required flight tolerances as applicable to the normal climb manoeuvre.

2.2 **G3.2 – Maintain straight flight**

(a) operate and monitor all aircraft systems during straight flight manoeuvres;

(b) for the following straight manoeuvres selects attitude and configuration as required for the flight path, balance and trim the glider accurately, apply smooth, coordinated control inputs to achieve the required flight tolerances as applicable to the manoeuvre:

(i) at slow speed;

(ii) at normal cruise;

(iii) at high-speed;

(iv) at maximum range;

(v) at maximum endurance;

(vi) with flap selected.

2.3 **G3.3 – Descend glider**

(a) operate and monitor all aircraft systems during descending flight manoeuvres;

(b) for the following descending manoeuvres select attitude and configuration as required for the flight path, balance and trim the glider accurately, apply smooth, coordinated control inputs to achieve the required flight tolerances as applicable to the manoeuvre:

(i) glide;

(ii) approach configuration descent (flap and gear).

2.4 **G3.4 – Turn glider**

2.4.1 The person must be able to demonstrate her or his ability to do the following:

(a) operate and monitor all aircraft systems during turning flight manoeuvres;

(b) for the following turning manoeuvres select attitude and configuration as required for the flight path, balance and trim the aeroplane accurately, apply smooth, coordinated control inputs to achieve the required flight tolerances as applicable to the manoeuvre:

(i) level turns;

(ii) climbing turn;

(iii) descending turn.

2.5 **G3.5 – Control glider at slow speeds**

(a) operate and monitor all aircraft systems when operating the glider at slow speed;

(b) for the following climbing manoeuvres select, attitude and configuration as required for the flight path, balance and trim the glider accurately, apply smooth, coordinated control inputs to achieve the required flight tolerances as applicable to the manoeuvre:

(i) minimum approach speed with flaps retracted;

(ii) minimum approach speed in approach configuration;

(iii) observe visual stall warnings and recover aeroplane to controlled flight;

(iv) recognise and respond positively to reduced effectiveness of controls during slow flight manoeuvres;

(v) transition from slow speed configuration to achieve nominated speed in excess of 1.5 V_S.

2.6 **G3.6 – Perform circuits and approaches**

(a) operate and monitor all aircraft systems when operating the glider in the circuit;

(b) perform a circuit pattern (4 legs) by balancing, trimming the aeroplane accurately while applying smooth, coordinated control inputs to achieve the required flight tolerances specified for the relevant flight path flown during traffic pattern manoeuvres as follows:

(i) establish and maintain cross-wind leg tracking 90° to the runway;

(ii) establish and maintain downwind leg tracking parallel to and at a specified distance from the runway at circuit height;

(iii) establish base leg tracking 90° to the runway at a specified distance from the runway threshold;

(c) establish the approach and landing configuration appropriate for the runway and meteorological conditions as required for the following:

(i) commence and control approach descent path;

(ii) adjust descent commencement point to take account of extended downwind leg or traffic adjustments;

(iii) align and maintain aircraft on final approach flight path with specified or appropriate runway;

(iv) set and maintain approach configuration;

(v) identify and maintain aiming point;

(vi) maintain a stabilised approach angle at the nominated airspeed to the round-out height;

(vii) verify existing wind conditions, make proper correction for drift, and maintain a precise ground track;

(viii) apply speed allowances for wind gusts;

(ix) configure glider for landing;

(d) maintain separation and position in the circuit with reference to other aircraft traffic in the circuit area.

3 Range of variables

(a) activities are performed in accordance with published procedures;

(b) aircraft with fixed or retractable undercarriage;

(c) aircraft with or without flaps;

(d) simulated hazardous weather;

(e) day VFR conditions;

(f) local area airspace limitations.

4 Underpinning knowledge of the following:

(a) the primary effects of controls;

(b) the secondary effects of controls;

(c) the stall warning devices;

(d) aircraft systems;

(e) aircraft performance;

(f) aircraft weight and balance;

(g) contents of the flight manual and POH;

(h) environmental conditions that represent VMC;

(i) day VFR flight rules;

(j) relevant sections of the AIP.

G4 Land glider

1 Unit description

This unit describes the skills and knowledge required to conduct a landing in a glider.

2 Elements and performance criteria

2.1 G4.1 – Land glider

(a) maintain a constant landing position aim point;

(b) achieve a smooth, positively-controlled transition from final approach to touchdown, including the following;

   (i) control ballooning during flare and bouncing;

   (ii) touchdown at a controlled rate of descent, in specified touchdown zone within tolerances;

   (iii) touchdown aligned with the centreline within tolerances;

(c) maintain positive directional control and cross-wind correction during the after-landing roll;

(d) use drag or braking devices, as applicable, in such a manner to bring the airplane to a safe stop;

(e) complete the applicable after-landing checklist items in a timely manner.

2.2 G4.2 – Land glider in a cross-wind

(a) verify existing wind conditions, make proper correction for drift, and maintain a precise ground track;

(b) configure the glider for the cross-wind conditions;

(c) control the glider during the transition from final approach to touchdown and during after-landing roll to compensate for the cross-wind conditions.

2.3 G4.3 – Conduct an ‘outlanding’

(a) recognise the conditions when an outlanding must be executed;

(b) the decision to execute an outlanding is made and executed when it is safe to do so;

(c) obstacles are identified and avoided;

(d) suitable field is identified and inspected from a safe height;

(e) wind direction is established;

(f) glider is manoeuvred for a safe landing.

3 Range of variables

(a) activities are performed in accordance with published procedures;

(b) aircraft with fixed or retractable undercarriage;

(c) aircraft with or without flaps;

(d) sealed, gravel or grass runways and taxiways;

(e) windsock located on aerodrome;

(f) simulated hazardous weather;

(g) day VFR conditions;

(h) for land aeroplane in cross-wind, the cross-wind component must be at least 70% of the maximum permitted for the type of aeroplane being flown;

(i) local area operational limitations such aerodrome curfews.

4 Underpinning knowledge of the following:

(a) typical glider systems;

(b) glider performance;

(c) glider limitations;

(d) glider weight and balance;

(e) contents of the flight manual and POH;

(f) environmental conditions that represent VMC;

(g) day VFR flight rules;

(h) propeller wash, rotor wash and jet blast;

(i) relevant sections of the AIP.

G5 Glider advanced manoeuvres

1 Unit description

This unit describes the skills and knowledge required to perform advanced manoeuvres in a glider.

2 Elements and performance criteria

2.1 **G5.1 – Enter and recover from stall**

(a) perform pre-manoeuvre checks for stalling;

(b) recognise stall signs and symptoms;

(c) control the glider by applying the required pitch, roll and yaw inputs as appropriate in a smooth, coordinated manner, trims aeroplane accurately to enter and recover from the following manoeuvres:

(i) where initial symptoms of a stall become evident;

(ii) stall under the following conditions:

(A) straight and level flight;

(B) climbing;

(C) descending;

(D) approach to land configuration;

(E) turning;

(d) when executing the recovery for each of the stall manoeuvres mentioned in paragraph (c), adjust the aeroplane's attitude to resume normal balanced flight on advent of stall, applicable to glider type;

(e) during stall recovery:

(i) reduce angle of attack to unstall the wings;

(ii) achieve height loss that is appropriate for the type of glider and commensurate with available altitude (simulated ground-base height may be set).

2.2 **G5.2 – Recover from spin at the incipient phase**

(a) perform spin pre-manoeuvre checks;

(b) recognise symptoms of spin at the incipient phase;

(c) use the glider's attitude controls to enter a spin and recover at the incipient phase from the following flight conditions:

(i) straight and level flight;

(ii) climbing;

(iii) turning;

(d) use correct recovery technique to regain straight and level flight with height loss commensurate with the available altitude (simulated ground-base height may be set).

2.3 **G5.3 – Recover from spiral dive**

(a) perform spiral dive pre-manoeuvre checks;

(b) recognise a spiral dive and symptoms;

(c) use the glider's attitude controls to execute a spiral dive manoeuvre from the following flight conditions and, using correct recovery technique, regain straight and level flight with height loss commensurate available altitude (simulated ground-base height may be simulated).

2.4 **G5.4 – Turn glider steeply**

(a) pre-manoeuvre checks for steep turning;

(b) steep level turn using a nominated bank angle, ending on a nominated heading or geographical feature, without altitude change;

(c) steep descending turn using a nominated bank angle, ending on a nominated heading or geographical feature ending on a nominated altitude;

(d) awareness of higher stall speed in turns is demonstrated;

(e) glider operating limits are not exceeded.

2.5 **G5.5 – Maximum performance turning**

(a) perform maximum rate turn as following:

(i) maximum bank angle attained;

(ii) maximum speed attained;

(iii) maximum allowable G limit attained;

(iv) maintain lookout during turn;

(b) perform minimum radius turn as following:

(i) maximum bank angle attained;

(ii) maximum allowable G limit attained;

(iii) maintain look-out during the turn.

2.6 **G5.6 – Sideslip glider (where flight manual permits)**

(a) straight sideslip:

(i) induce slip to achieve increased rate of descent while maintaining track and airspeed;

(ii) adjust rate of descent by coordinating angle of bank and applied rudder;

(b) sideslipping turn:

(i) adjust bank angle to turn through minimum heading change of 90° at constant airspeed using sideslip;

(ii) exit on specified heading or geographical feature within tolerance;

(c) recover from sideslip and returns glider to balanced flight.

3 Range of variables

(a) activities are performed in accordance with published procedures;

(b) glider with fixed or retractable undercarriage;

(c) aircraft with or without flaps;

(d) sealed, gravel or grass runways and taxiways;

(e) windsock located on aerodrome;

(f) simulated hazardous weather;

(g) day VFR conditions;

(h) local area operational limitations such as aerodrome curfews.

4 Underpinning knowledge of the following:

(a) typical glider aircraft systems;

(b) aircraft performance;

(c) aircraft weight and balance;

(d) contents of the flight manual and POH;

(e) environmental conditions that represent VMC;

(f) day VFR flight rules;

(g) relevant sections of the AIP;

(h) hazards of unbalanced flight.

G6 Manage abnormal situations – gliders

1 Unit description

This unit describes the skills and knowledge required to accurately assess an abnormal situation, reconfigure the glider, control the glider and execute appropriate manoeuvres to achieve a safe outcome with no injury to personnel or damage to the glider or property.

2 Elements and performance criteria

2.1 G6.1 – Manage winch launch equipment failure – take-off (simulated)

(a) correctly identify a winch and towed take-off emergencies during and after take-off;

(b) apply the highest priority to taking action to control the glider;

(c) perform recall actions in accordance with AFM;

(d) perform emergency actions as far as time permits;

(e) manoeuvre the glider to achieve the safest possible outcome.

2.2 G6.2 – Perform forced landing (simulated)

(a) after a simulated emergency has occurred, without prior indications, carry out the following:
   (i) perform immediate actions;
   (ii) select most suitable landing area within gliding distance;
   (iii) formulate a plan;
   (iv) perform all emergency procedures;
   (v) establish optimal gliding flight path to a landing on the selected landing area.

2.3 G6.5 – Manage other abnormal situations (simulated)

(a) correctly identify the situation and maintain safe control of the aeroplane at all times;

(b) abnormal and emergency situations are managed in accordance with relevant emergency procedures and regulatory requirements;

(c) appropriate emergency procedures are followed while maintaining control of the aeroplane;

(d) identify and conduct flight with an unreliable airspeed indication.

2.4 G6.6 – Recover from unusual flight attitudes

(a) identify nose-high or nose-low unusual attitude flight condition;

(b) recover from nose-low or nose-high unusual attitudes by adjusting pitch and bank to resume controlled and balanced flight;

(c) apply controlled corrective action while maintaining aircraft performance within limits.

3 Range of variables

(a) activities are performed in accordance with published procedures.

(b) day VFR conditions.

4 Underpinning knowledge of the following:

(a) collision avoidance precautions and procedures;

(b) forced landing procedure;

(c) aircraft performance in a glide (straight and turning);

(d) hazard of slideslip at low altitude;

(e) contents of the flight manual and POH;

(f) passenger control;

(g) VMC;

(h) low flying hazards.

G7 Navigation – gliders

1 Unit description

This unit describes the skills and knowledge required to conduct a cross-country flight in a glider using visual references and dead reckoning.

2 Elements and performance criteria

2.1 G7.1 – Conduct cross-country flight

(a) prepare for a cross-country flight that terminates at the departure aerodrome;

(b) maintain a navigation cycle that ensures accurate tracking and apply track correctional technique to re-establish track prior to waypoint or destination;

(c) maintain heading to achieve a nominated track;

(d) maintain and revises ETAs (±2 minutes) for waypoint or destination;

(e) navigate en route using dead reckining;

(f) navigate using accepted map reading techniques;

(g) maintain navigation log to monitor tracking and ETAs;

(h) use appropriate technique obtains a positive fix at suitable intervals;

(i) maintain awareness of route and destination weather and reacts appropriately to changing weather conditions;

(j) configure glider as required for environmental and operational conditions, including the following:

  (i) turbulence;

  (ii) reduced visibility;

  (iii) low cloud base;

  (iv) maximum range.

2.2 G7.2 – Perform diversion procedure

(a) make timely decision to divert;

(b) identify an acceptable alternate landing site;

(c) revises plan considering weather, terrain, airspace and available height.

2.3 G7.3 – Execute arrival procedures

(a) determine landing site;

(b) conduct arrival;

(c) cancel SARWATCH.

3 Range of variables

(a) activities are performed in accordance with published procedures;

(b) visual flight rules;

(c) different terrain;

(d) simulated weather conditions;

(e) carriage of dangerous goods.

4 Underpinning knowledge of the following:

(a) 1:60 rule;

(b) basic navigation map reading;

(c) aeronautical charts.

DESIGN FEATURE ENDORSEMENT

DFE1 Tail wheel aeroplane

1 Unit description

This unit describes the skills and knowledge required to safely operate an aeroplane fitted with tail wheel undercarriage.

2 Elements and performance criteria

2.1 **DFE1.1 – Taxi tail-wheel aeroplane**

(a) taxi a tail-wheel aeroplane in the prevailing aerodrome and surface conditions and weather;

(b) operate engine on the ground and exercise propeller care;

(c) perform brake checks;

(d) perform flight instrument checks while taxiing;

(e) maintain forward visibility;

(f) maintain aeroplane within the taxiway limits;

(g) anticipate and manage ground slope;

(h) use minimum power to achieve desired performance and exercise propeller care;

(i) adjust taxi speed to suit aeroplane type, surface conditions, congestion, maintain control and avoid collision with obstacles, and other aircraft;

(j) interpret and comply with taxiway and other aerodrome markings or, in the absence of markings, the aircraft is maintained in the centre of the taxiway and at a safe distance from obstacles;

(k) compensate for effects of wind velocity and high engine power using aircraft controls.

2.2 **DFE1.2 – Take-off tail wheel aeroplane**

(a) perform pre-take-off checks correctly;

(b) line up aircraft in the centre of the runway in take-off direction and completes line-up checks in accordance with approved checklist;

(c) apply take-off power fully, maintain aircraft aligned with centre of runway and maintain wings level;

(d) raise tail to achieve minimum drag, ensuring the propeller is clear of the surface;

(e) control yaw;

(f) rotate at manufacturer's recommended speed to achieve planned climb performance;

(g) adjust heading to maintain track along extended runway centreline;

(h) configure aircraft for nominated climb profile and track on runway centreline;

(i) perform after take-off checks from memory;

(j) perform take-off into wind and cross-wind take-off.

2.3 **DFE1.3 – Land tail wheel aeroplane**

(a) select and identify aiming point;

(b) land aeroplane at a controlled rate of descent, aligned with and above the runway centreline, within a specified area beyond a nominated touchdown point, without drift, maintaining directional control, and stop within the available runway length;

(c) minimise and control ballooning and bouncing;

(d) land aeroplane in the following profiles:

  (i) main wheels and tail wheel simultaneously (3-point landing);

  (ii) wheel landing (main wheels only on touchdown);

(iii) flapless landing;

(e) perform after-landing checks correctly.

2.4 **DFE1.4 – Short take-off and landing**

(a) for short take-off, demonstrate the following:

(i) calculate take-off performance;

(ii) perform pre- and after-take-off, line-up and after-landing checks;

(iii) line up aeroplane to use maximum runway length;

(iv) apply take-off power fully before brakes (where fitted) are released and rotate aeroplane at manufacturer's recommended speed;

(v) set nominated climb speed appropriate to obstacle clearance requirements;

(b) for short landing, demonstrate the following;

(i) calculate landing performance;

(ii) land the aeroplane at the nominated touchdown point at minimum speed and apply maximum braking;

(iii) touchdown simultaneously on main wheels and tail wheel;

(iv) control the direction of the aeroplane on the ground;

(v) stop aeroplane within calculated landing distance;

(vi) perform after-landing checks correctly.

3 Range of variables

(a) activities are performed in accordance with published procedures;

(b) day VFR;

(c) approved aircraft fitted with tail wheel undercarriage;

(d) aircraft with fixed or retractable undercarriage;

(e) cross-wind, headwind or tailwind to the limits of the aircraft type;

(f) sealed, gravel or grass runways;

(g) simulated abnormal and emergency situations.

4 Underpinning knowledge of the following:

(a) cross-wind limits for the aircraft type flown;

(b) ability to calculate cross-wind components;

(c) windsock indication interpretation;

(d) take-off and landing performance;

(e) take-off weight and centre of gravity calculation;

(f) centre of gravity limitations;

(g) gyroscopic effect during take-off;

(h) slipstream effect during take-off;

(i) direction of induced yaw when aircraft tail is raised;

(j) causes of loss of control of a tail wheel aeroplane on landing.

DFE2 Retractable undercarriage

1 Unit description

This unit describes the skills and knowledge required to operate an aircraft fitted with retractable undercarriage in normal and abnormal or emergency conditions.

2 Elements and performance criteria

2.1 **DF2.1 – Retractable undercarriage in normal flight**

(a) retract undercarriage;

(b) establish a positive rate of climb before selecting undercarriage up;

(c) identify undercarriage selector and select undercarriage up;

(d) confirm undercarriage is in transit;

(e) confirm undercarriage is in the retracted and locked position by reference to undercarriage position indicators;

(f) comply with undercarriage speed limitations (V_{LO});

(g) lower undercarriage;

(h) comply with undercarriage lowering speed limits (V_{LE});

(i) identify undercarriage selector and select undercarriage down;

(j) confirm undercarriage is in transit;

(k) confirm undercarriage is in the lowered and locked position by reference to undercarriage position indicators.

2.2 **DFE2.2 – Manage abnormal and emergency procedures applicable to retractable undercarriage**

(a) identify abnormal operation of undercarriage;

(b) control aircraft;

(c) manage abnormal or emergency operation of undercarriage to achieve a safe flight outcome.

3 Range of variables

(a) activities are performed in accordance with published procedures;

(b) day VFR;

(c) approved aircraft fitted with tail wheel or conventional undercarriage;

(d) aircraft with or without flaps;

(e) aircraft with retractable undercarriage;

(f) cross-wind, headwind or tailwind to the limits of the aircraft type;

(g) sealed, gravel or grass runways;

(h) simulated abnormal and emergency situations;

4 Underpinning knowledge of the following:

(a) source of power that operates the undercarriage;

(b) cockpit indications for undercarriage down and locked;

(c) cockpit indications for undercarriage retracted;

(d) cockpit indications when undercarriage is in transit;

(e) conditions that will cause the undercarriage warning horn to sound;

(f) how the landing gear doors are opened and closed;

(g) method of preventing retraction of the undercarriage on the ground;

(h) maximum undercarriage extension speed (V_{LE});

(i) maximum undercarriage operating speed (V_{LO});

(j) how long the undercarriage takes to extend and retract;

(k) emergency procedures to extend and lock the undercarriage down.

DFE3 Manual propeller pitch control

1 Unit description

This unit describes the skills and knowledge required to control an aircraft and operate a propeller fitted with a manual propeller pitch control on the ground and in flight during normal and abnormal and emergency situations.

2 Elements and performance criteria

2.1 DFE3.1 – Perform pre-flight and pre-take-off checks for manual propeller pitch control

(a) perform propeller pre-flight checks ensuring the serviceability of the following:
   (i) propeller;
   (ii) spinner (when fitted);
   (iii) backing plate;

(b) CSU control rods and cables are checked to confirm they are intact and secure (when visible);

(c) perform propeller pre-take-off checks, including the following:
   (i) oil temperature and pressure within limits;
   (ii) function of propeller pitch control at specified RPM;
   (iii) function of propeller feather system when applicable.

2.2 DFE3.2 – Operate manual propeller pitch control during ground and flight operations

(a) operates manual propeller pitch control on the ground within the limitations and conditions specified in AFM and POH, ensuring:
   (i) idle RPM within limits;
   (ii) propeller RPM responds appropriately to throttle;
   (iii) engine RPM is within limitations when take-off power is set;

(b) operates manual propeller pitch control in flight within the limitations and conditions specified in AFM and POH and:
   (i) sets RPM is set as required;
   (ii) monitors RPM remains within specified limits;
   (iii) synchronises engine RPM using propeller control on multi-engine aircraft;
   (iv) avoids oil congelation in cold weather operations by cycling engine RPM.

2.3 DFE3.3 – Manage abnormal and emergency procedures for a manual propeller pitch control

(a) identifies abnormal or emergency operations of manual propeller pitch control or CSU;

(b) maintains control of engine RPM;

(c) performs appropriate abnormal or emergency procedures;

(d) feathers and unfeathers propeller.

3 Range of variables

(a) activities are performed in accordance with published procedures;

(b) day VFR in variable weather conditions;

(c) approved aircraft fitted with tail wheel or conventional undercarriage;

(d) single- and multi-engine aircraft;

(e) piston or diesel engine;

(f) featherable or non-featherable propeller;

(g) CSU with or without counterweights;

(h) simulated abnormal and emergency situations;

(i) simulated hazardous weather.

4 Underpinning knowledge of the following:

(a) effects of loss of oil pressure to the CSU;

(b) effects of loss of oil pressure on the pitch of the propeller (if applicable);

(c) effects of counterweights on engine RPM (when applicable);

(d) the function of oil pressure on the CSU fitted to the aircraft;

(e) the function of the fine and coarse pitch stops;

(f) the effect that failure of the fine pitch stops may cause in the aircraft type flown;

(g) the effects of the use of carburettor heat on an aircraft fitted with a CSU;

(h) propeller over-speed in an aircraft fitted with a CSU;

(i) indications of engine ice in an engine fitted with a CSU;

(j) indications that carburettor ice has been cleared in an engine fitted with a CSU;

(k) effects on manifold pressure of reducing engine RPM in a normally aspirated engine below full throttle height.

DFE4 Gas turbine engine

1 Unit description

This unit describes the skills and knowledge required to operate a gas turbine powered aircraft on the ground and in the air during normal and abnormal operations.

2 Elements and performance criteria

2.1 DFE4.1 – Start and stop gas turbine engine

Perform pre-start and after-start checks.

2.2 DFE4.2 – Starts and stops engine

Comply with manufacturer's limitations and report deviations when appropriate.

2.3 DFE4.3 – Operate gas turbine engine on the ground and in the air

(a) extract, interpret and apply engine performance and limitations information;

(b) manage gas turbine engine on the ground and in the air.

2.4 DFE4.4 – Manage abnormal and emergency actions applicable to gas turbine engine

(a) identify and confirm abnormal or emergency situation affecting a gas turbine engine;

(b) control aircraft;

(c) perform abnormal or emergency rectification or shutdown action.

3 Range of variables

(a) activities are performed in accordance with published procedures;

(b) day VFR in variable weather conditions;

(c) approved aircraft fitted with gas turbine engine(s);

(d) variable temperatures and environmental conditions.

4 Underpinning knowledge of the following:

(a) the make and model of the engine applicable to the aircraft flown;

(b) where the make and model of the engine are found;

(c) major characteristics of the engine;

(d) purpose of the engine air intake system;

(e) purpose of inlet guide vanes in a gas turbine engine;

(f) method of measuring thrust (power) of the engine being used;

(g) main components of all gas turbine engines;

(h) principles of operation of a centrifugal compressor;

(i) principles of operation of an axial flow compressor;

(j) principles of operation of a bypass fan engine;

(k) primary method of preventing air leakage between a compressor and engine internal compartments in a gas turbine engine;

(l) purpose of the stator blades in an axial flow compressor;

(m) specific purpose of the stator blade at the last stage of a gas turbine engine;

(n) uses of bleed air on the engine being operating;

(o) the section of a gas turbine engine bleed air is normally taken;

(p) consequences of a bleed air valve being stuck open;

(q) the detrimental effects that may occur when starting a turbine engine using a battery with voltage below the minimum specified in AFM or POH;

(r) what damage could be caused by a slow or hung start;

(s) instrument indications and physical symptoms of a hung start;

(t) hung start procedure;

(u) hot start procedure;

(v) likely cause and damage caused by a ‘hot start’;

(w) engine instrument indications and physical symptoms of a compressor stall;

(x) the automatic devices in a gas turbine engine designed to control compressor stalls;

(y) likely cause of a compressor stall;

(z) clearing a compressor stall and re-establishing normal engine operations;

(za) engine instrument indications and physical symptoms of a compressor surge;

(zb) location of the sensor for engine temperature measurement in the engine that is being operated;

(zc) the advantages and disadvantages of single shaft turbine engines;

(zd) for single shaft turbo-prop engines:

(i) the cause of shaft bowing and prevention procedure;

(ii) calculated single red line EGT indications;

(iii) compensated EGT indications;

(ze) the turbine stage that N1 RPM is measured from;

(zf) the turbine stage that N2 RPM is measured from;

(zg) causes of a low N1 reading;

(zh) actions in the event of a low N1 reading;

(zi) possible causes of a low N2 reading;

(zj) actions in the event of a low N2 reading;

(zk) how the power from the N1 turbine is transferred to thrust or SHP;

(zl) possible effects on the performance of a gas turbine engine if:

(i) the compressor is damaged;

(ii) the intake is partially blocked;

(iii) the intake is damaged;

(iv) the turbine has overheated;

(zm) the duty cycle of the start system;

(zn) the maximum transient TOT or EGT and time limit on start for the applicable engine;

(zo) the engine oil type and capacity;

(zp) indications that would be expected when engine anti-icing or de-icing system is operated;

(zq) location of fire warning sensors (as applicable);

(zr) operation of cockpit fire alert systems (as applicable);

(zs) method of arming or selecting and firing contents of the fire extinguisher(s) (as applicable).

DFE5 Multi-engine centreline thrust aeroplane

1 Unit description

This unit describes the skills and knowledge required to operate a multi-engine centreline thrust aeroplane.

2 Elements and performance criteria

2.1 DFE5.1 – Extract, interpret, calculate and apply normal and abnormal flight performance information

(a) extract approved flight performance information from AFM or POH, interpret information and apply to:
   (i) calculate aircraft take-off and landing weight, centre of gravity and take-off and landing performance; and
   (ii) the phase of flight and calculate aircraft performance during normal flight operations; and
   (iii) failed engine(s) operations during any phase of flight and calculate aircraft performance; and

(b) apply performance information to calculate fuel requirements; and

(c) apply performance information to calculate range and endurance at any stage of a flight following a failure of 1 or more of the following:
   (i) forward engine;
   (ii) rear engine.

2.2 DFE5.2 – Operate multi-engine centreline thrust aeroplane in normal flight

(a) control aeroplane in all phases of normal flight;

(b) operate all aircraft systems, equipment and engines.

2.3 DFE5.3 – Manage abnormal or emergency flight operations in multi-engine centreline thrust aeroplane

(a) identify and confirm abnormal or emergency situation;

(b) control aeroplane;

(c) perform appropriate abnormal or emergency procedures;

(d) advise ATS or other agencies capable of assistance of situation and intentions.

2.4 DFE5.4 – Manage engine failure(s) in multi-engine centreline thrust aeroplane

(a) self-brief or brief crew members stating a plan of action that will ensure the safest outcome in the event of an engine failure;

(b) maintain control of aeroplane, identify and confirm failed engine and shut down failed engine following engine failure during any phase of flight;

(c) operate aircraft during flight with failed engine for the following:
   (i) engine failure in flight (sequence of actions may be varied);
      (A) set power on serviceable engine(s) to ensure desired aircraft performance;
      (B) configure aircraft to achieve minimum drag;
      (C) climb aircraft at V_{YSE} if applicable;
      (D) land aircraft at nearest appropriate landing area;
   (ii) engine failure after take-off:
      (A) control aircraft;
      (B) ensure maximum take-off power applied to serviceable engine;
      (C) identify failed engine and confirms failure;
      (D) feather propeller (as applicable) and shut down failed engine;
      (E) configure aircraft to achieve minimum drag;

(F) climb aircraft at V_{YSE};

(G) land aircraft at nearest appropriate landing area;

(iii) manage engine failure after take-off below V_{TOSS} – aircraft will not accelerate or climb:

(A) set power as required to manoeuvre aircraft to most suitable area to land;

(B) perform overshoot from visual committal height;

(C) determine visual committal height;

(D) initiate go-around at or above visual committal height;

(E) control aircraft;

(F) apply take-off power;

(G) configure aircraft to achieve minimum drag;

(H) maintain V_{YSE} or greater;

(I) climb to circuit height;

(J) re-assess situation for landing;

(iv) below visual committal height:

(A) control aircraft;

(B) land aircraft.

3 Range of variables

(a) activities are performed in accordance with published procedures;

(b) day VFR;

(c) approved multi-engine centreline thrust aeroplane with dual controls, electronic intercom and dual control brakes;

(d) aerodromes;

(e) sealed, gravel or grass surfaces;

(f) simulated abnormal and emergency situations;

(g) simulated hazardous weather.

4 Underpinning knowledge of the following:

(a) general aircraft data;

(b) airspeed and load limitations;

(c) normal and emergency procedures;

(d) fuel system;

(e) hydraulic system;

(f) electrical system;

(g) oil system;

(h) autopilot;

(i) anti-icing and de-icing systems;

(j) heating, ventilation and pressurisation systems;

(k) pitot and static system;

(l) suction system;

(m) oxygen system;

(n) fire extinguisher system;

(o) engines;

(p) weight, balance and performance;

(q) abnormal and emergency operations.

DFE6 Pressurisation system

1 Unit description

This unit describes the skills and knowledge required to operate an aircraft that is fitted with a pressurisation system during normal, abnormal and emergency flight.

2 Elements and performance criteria

2.1 DFE6.1 – Operate and monitor aircraft pressurisation system

(a) conduct pre-flight serviceability check of flight crew supplementary oxygen system, confirming normal contents, flow and operation of oxygen system;

(b) activate and operate pressurisation system, ensuring appropriate selection of switches and circuit breakers;

(c) confirm pressurisation system is operating normally before reaching 10,000 ft;

(d) confirm the integrity of the pressurisation system when passing 10,000 ft, and identify an appropriate pressure differential between cabin and outside air pressure;

(e) confirm cabin altitude and cabin differential pressure are appropriate and constant during cruise;

(f) monitor and react appropriately to instrument indications, physiological symptoms and crew member's advice during multi-crew operations to ensure normal operation of the pressurisation system;

(g) ensure the aircraft is de-pressurised before opening doors on the ground.

2.2 DFE6.2 – Manage pressurisation system during abnormal and emergency situations

(a) identify abnormal or emergency situation involving aircraft pressurisation system, including rapid and slow decompression;

(b) perform abnormal or emergency procedures;

(c) monitor cabin altitude and differential pressure, identify any discrepancies and manually control the aircraft pressurisation system when appropriate;

(d) monitor physiological condition of self, crew members and passengers to identify signs of hypoxia, barotrauma or other physiological hazards associated with pressurisation failure;

(e) ensure the use of emergency oxygen by crew members and passengers when cabin altitude is greater than 10,000 ft;

(f) advise ATC of flight situation, action taken by pilot in command and any requirements.

3 Range of variables

(a) activities are performed in accordance with published procedures;

(b) VFR or IFR in variable weather conditions;

(c) approved aircraft fitted with pressurisation system;

(d) variable temperatures and environmental conditions;

(e) simulated abnormal and emergency situations.

4 Underpinning knowledge of the following:

(a) pressurisation failure warning indications fitted to the aircraft type flown;

(b) the cabin pressure at which the cabin pressurisation warning light illuminates;

(c) conditions that will cause a pressurisation failure indicator to activate;

(d) functions of bleed air with respect to an aircraft pressurisation system;

(e) how bleed air pressure and temperature are controlled (modified) to meet cabin pressurisation and temperature requirements;

(f) procedure for manual control of cabin pressurisation applicable to the aircraft type flown;

(g) what a pressure differential gauge indicates to a pilot with respect to a pressurisation system;

(h) maximum pressure differential for the aircraft type flown;

(i) symptoms that may indicate an outflow valve failure;

(j) power source that operates (controls) the outflow valve;

(k) the effect of an outflow valve that is stuck open on an aircraft climbing above 10,000 ft and explain the hazards associated with this situation;

(l) minimum and maximum rates of change of cabin air pressure;

(m) indications that would be expected in a pressurised aircraft if the outflow valve were stuck closed during descent;

(n) how the automatic depressurisation system operates after landing;

(o) times of useful consciousness without oxygen at:

  (i) 10,000 ft;

  (ii) 20,000 ft;

  (iii) 25,000 ft;

  (iv) 30,000 ft;

(p) physiological symptoms of hypoxia;

(q) physical hazards that could occur during a rapid decompression;

(r) physiological hazards that could occur following a rapid decompression;

(s) the cabin altitude above which supplementary oxygen must be used by crew and passengers.

DFE7 Floating hull

1 Unit description

This unit describes the skills and knowledge required to operate an aircraft that has a floating hull on the water and in the air during normal and abnormal operations.

2 Elements and performance criteria

2.1 DFE7.1 – Extract, interpret, calculate and apply flight performance information

(a) extract approved flight performance information from AFM or POH, interpret the information and apply the information to:

(i) calculate aircraft take-off and landing weight and take-off and landing performance; and

(ii) calculate aircraft performance during normal flight operations; and

(iii) determine meteorological conditions, tide state, current flow and water state; and

(b) use the information to plan water operations.

2.2 DFE7.2 – Conduct pre-flight inspection of floating hull aircraft

(a) conduct pre-flight inspection in accordance with AFM or POH, and identifies and determines availability and serviceability of equipment required for marine operations ensuring:

(i) serviceability of aircraft;

(ii) suitability and serviceability of equipment carried for amphibious aircraft type and flight circumstances;

(b) ensure hull and floats do not contain excessive water;

(c) ensure removal of all aircraft locking devices;

(d) inspect mooring lines, bumpers, anchors, life jackets and rafts for condition and stowage when appropriate.

2.3 DFE7.3 – Operate floating hull aircraft on water

(a) conduct pre-flight passenger briefing, including fitment and use of personal flotation devices, evacuation procedures and water survival procedures;

(b) start and stop engines on the water and maintains control of the aircraft;

(c) disconnect and manoeuvre aircraft from a mooring without assistance, while maintaining control of the aircraft and passengers;

(d) obtain taxi clearance when required, and taxis (manoeuvres) aircraft on the water to a nominated position, anticipating and allowing for prevailing conditions and traffic while maintaining control of the aircraft;

(e) conduct displacement and step taxiing and ploughing turns to a nominated position, avoiding traffic and obstacles while maintaining control of the aircraft within the sea state and wind limitations of the aircraft;

(f) sail aircraft, using engine power, flight controls, keel surfaces and wind velocity to manoeuvre the aircraft fore and aft and laterally to a nominated position;

(g) ensure suitability of area and safely moors, dock and beach aircraft with and without assistance.

2.4 DFE7.4 – Ensure suitability of take-off area and take-off floating hull aircraft from water

(a) select a take-off path into wind, adequate to comply with take-off distance requirements, clear of traffic and obstructions, and ensure a climb-out path clear of obstacles;

(b) self-brief or brief crew about departure procedures and action in the event of engine failure after take-off;

(c) perform pre-take-off, engine run-up, line-up and after-take-off checks;

(d) retract water rudder, apply take-off power, maintain aircraft aligned with take-off direction, maintain wings level, position elevator to maintain the nose in the planing attitude until the step position is achieved, and adjust nose attitude to maintain the aircraft on the step until lift-off occurs;

(e) avoid porpoising;

(f) accelerate aircraft to climb speed and establishes climb;

(g) perform after take-off checks.

2.5 **DFE7.5 – Operate floating hull aircraft during all phases of flight**

(a) control aircraft in all phases of normal and abnormal flight to the appropriate standards specified for a private or commercial aeroplane pilot in this MOS;

(b) manoeuvre aircraft safely below 500 ft AGL over specified tracks after take-off and during approach for landing;

(c) operate all aircraft systems, equipment and engines correctly;

(d) operate all aircraft systems, equipment and engines correctly;

(e) assess landing area and weather conditions and formulates a plan to ensure a safe landing on water;

(f) land aircraft at a controlled rate of descent, aligned with and above the landing direction, within a specified area, without drift, maintaining directional control and wings level and stopping within the available landing area;

(g) minimise and controls ballooning and bouncing;

(h) perform after-landing checks correctly.

2.6 **DFE7.6 – Ensure suitability of landing area, plan landing and land floating hull aircraft on water**

(a) assess landing area and weather conditions and formulate a plan to ensure a safe landing on water;

(b) land aircraft at a controlled rate of descent, aligned with and above the landing direction, within a specified area, without drift, maintaining directional control and wings level and stopping within the available landing area;

(c) minimise and control ballooning and bouncing;

(d) perform after-landing checks correctly.

2.7 **DFE7.7 – Manage abnormal or emergency situations in floating hull aircraft**

(a) identify and confirm abnormal or emergency situation;

(b) control aircraft;

(c) perform abnormal or emergency procedures correctly.

3 Range of variables

(a) activities are performed in accordance with published procedures;

(b) day VFR;

(c) cross-wind, headwind and tailwind to the limits of the aircraft;

(d) approved floating hull aircraft;

(e) salt and fresh waterways;

(f) variable sea states;

(g) confined waterways;

(h) variable marine traffic;

(i) maritime regulations and procedures;

(j) limitations, such as those imposed by local noise abatement procedures or curfews;

(k) simulated abnormal and emergency situations;

(l) simulated hazardous weather.

4 Underpinning knowledge of the following:

(a) differences between a seaplane, floatplane, flying boat (floating hull) and amphibious aircraft;

(b) aircraft performance with respect to:

(i) design features for seaplanes, floatplanes and floating hulls; and

(ii) the differences between an aircraft that is fitted with the feature and the same type of aircraft that doesn't have the feature;

(c) how to interpret Beaufort scale readings and ascertain wind velocity;

(d) how movement of the centre of buoyancy affects aircraft manoeuvrability on the water;

(e) how the centre of resistance to lateral motion affects the operation of a seaplane;

(f) why water rudders are not used for take-off;

(g) how to extract information from maritime tide chart and determine the tide height and state at any specified place or time;

(h) how the centre of buoyancy can be varied when an aircraft is on the water;

(i) how movement of the centre of resistance affects aircraft manoeuvrability on the water;

(j) function of a ventral fin on a seaplane;

(k) function of float struts and bracing wires;

(l) the requirements that apply to floats with regard to minimum number of water-tight compartments and capability of supporting the aircraft weight when compartments are flooded;

(m) the method of detecting water inside a hull or float and how to remove the water;

(n) the function of the 'step' at the bottom of a float or hull;

(o) the position of the nose attitude and the 'feel' that indicates the aircraft is planning on the step;

(p) hazards associated with excessive swells.

DFE8 Floatplane and amphibious aircraft

1 Unit description

This unit describes the skills and knowledge required to operate an amphibious aircraft on the water and land during normal and abnormal operations.

2 Elements and performance criteria

2.1 DFE8.1 – Extract, interpret, calculate and apply flight performance information

(a) extract approved flight performance information from AFM or POH, interpret the information and apply the information to:

   (i) calculate amphibious aircraft take-off and landing weight, and take-off and landing performance; and

   (ii) the phase of flight and calculate amphibious aircraft performance during normal flight operations;

(b) determine meteorological conditions, tide state, current flow and water state;

(c) use the information described in subparagraphs (a) and (b) to plan water operations using an amphibious aircraft;

2.2 DFE8.2 – Conduct pre-flight inspection of amphibious aircraft

(a) conduct pre-flight inspection in accordance with AFM or POH, identify and determine availability and serviceability of equipment required for marine operations ensuring:

   (i) serviceability of aircraft;

   (ii) suitability and serviceability of equipment carried for amphibious aircraft type and flight circumstances;

(b) ensure hull and floats do not contain excessive water;

(c) ensure removal of all aircraft locking devices;

(d) inspect mooring lines, bumpers, anchors, life jackets and rafts for condition and stowage when appropriate.

2.3 DFE8.3 – Operate amphibious aircraft during all phases of flight

(a) operate single- or multi-engine floatplane or floating hull amphibious aircraft during all phases of normal and abnormal flight, on the water and the land, to the standards specified for a private or commercial pilot in this MOS for aeroplane class ratings;

(b) land amphibious aircraft on water with undercarriage retracted;

(c) land amphibious aircraft on land with undercarriage extended;

(d) extend undercarriage in water when transiting to land (beaching);

(e) retract undercarriage in water after taxiing from land to water;

(f) operate all amphibious aircraft systems, equipment and engines.

2.4 DFE8.4 – Manage abnormal or emergency situations in amphibious aircraft

(a) identify and confirm abnormal or emergency situation;

(b) maintain control of aircraft;

(c) manage or rectify abnormal or emergency situation;

(d) perform abnormal and emergency actions when applicable;

(e) perform failed engine procedures in accordance with standards specified in class or type rating requirements.

3 Range of variables

(a) activities are performed in accordance with published procedures;

(b) day VFR;

(c) cross-wind, headwind and tailwind to the limits of the aircraft;

(d) approved floating hull aircraft;

(e) salt and fresh waterways;

(f) variable sea states;

(g) confined waterways;

(h) variable marine traffic;

(i) maritime regulations and procedures;

(j) limitations, such as those imposed by local noise abatement procedures or curfews;

(k) simulated abnormal and emergency situations;

(l) simulated hazardous weather.

4 Underpinning knowledge of the following:

(a) differences between a seaplane, floatplane, flying boat (floating hull) and amphibious aircraft;

(b) aircraft performance with respect to:

  (i) design features for seaplanes, floatplanes and floating hulls; and

  (ii) the differences between an aircraft that is fitted with the feature and the same type of aircraft that doesn’t have the feature;

(c) how to interpret Beaufort scale readings and ascertain wind velocity;

(d) how movement of the centre of buoyancy affects amphibious aircraft manoeuvrability on the water;

(e) how the centre of resistance to lateral motion affects the operation of an amphibious aircraft;

(f) why water rudders are not used for take-off;

(g) the type of undercarriage position indicators fitted to the aircraft, and the method of indicating undercarriage retracted;

(h) the method of emergency lowering of the undercarriage;

(i) how to extract information from maritime tide chart and determine the tide height and state at any specified place or time;

(j) how the centre of buoyancy can be varied when an amphibious aircraft is on the water;

(k) how movement of the centre of resistance affects amphibious aircraft manoeuvrability on the water;

(l) functions of a ventral fin on an amphibious aircraft;

(m) the function of float struts, spreader bars and bracing wires;

(n) requirements that apply to floats with regard to minimum number of water-tight compartments and capability of supporting the amphibious aircraft weight when compartments are flooded;

(o) method of detecting water inside a float and how to remove the water;

(p) function of the ‘step’ at the bottom of a float or hull;

(q) hazards associated with excessive swells.

DFE9 Helicopter float alighting gear

1 Unit description

This unit describes the skills and knowledge required to operate a helicopter fitted with float alighting gear on land and water.

2 Elements and performance criteria

2.1 DFE9.1 – Conduct pre-flight inspection of float alighting gear

(a) conduct pre-flight inspection of helicopter and float alighting gear;

(b) confirm fitment, inflation, condition and security of float alighting gear;

(c) ensure removal of all aircraft locking devices.

2.2 DFE9.2 – Start and stop engine on water

(a) perform all checklists and emergency procedures associated with starting and stopping an engine and rotors;

(b) perform free-floating start-up (as permitted by AFM or POH) and moored start-up and shutdown;

(c) start and stop engine and rotors correctly;

(d) identify abnormal or emergency situations on start or shutdown and manages correctly.

2.3 DFE9.3 – Taxi helicopter on water

(a) manoeuvre helicopter without incident on water over a prescribed track while allowing for prevailing conditions;

(b) comply with approved marshalling signals.

2.4 DFE9.4 – Take-off helicopter from a solid surface and from water

(a) perform pre-take-off checks and after-take-off checks correctly;

(b) perform take-off, transition and climb from a solid surface;

(c) perform take-off, transition and climb from water.

2.5 DFE9.5 – Operate helicopter fitted with float alighting gear in normal flight

(a) operate helicopter fitted with float alighting gear in normal flight in accordance with standards for helicopter specified in this MOS;

(b) manage reduced aircraft performance in float configuration.

2.6 DFE9.6 – Land on float alighting gear on land and on water

(a) identify aiming point, touchdown point and any alignment features;

(b) land helicopter without harshness onto a nominated touchdown point from hovering flight without longitudinal, lateral, yawing or rolling movements;

(c) ensure no aft movement when landing on water;

(d) ensure landing area on a solid surface is clear of protuberances and sharp objects;

(e) ensure helicopter is securely on the surface prior to fully lowering collective;

(f) perform after-landing checks;

(g) for a mishandled landing – implement a decision in the time available to initiate a mishandled landing to the hover when the landing standard cannot be achieved.

2.7 DFE9.7 – Manage abnormal or emergency actions in helicopter fitted with float alighting gear

(a) identify abnormal or emergency situation;

(b) control helicopter;

(c) perform abnormal or emergency procedures correctly.

3 Range of variables

(a) activities are performed in accordance with published procedures;

(b) day VFR in variable weather conditions;

(c) cross-wind, headwind and tailwind to the limits of the aircraft;

(d) approved helicopter fitted with float alighting gear;

(e) helicopter landing sites;

(f) salt and fresh waterways;

(g) variable sea states;

(h) confined waterways;

(i) variable marine traffic;

(j) maritime regulations and procedures;

(k) limitations, such as those imposed by local noise abatement procedures or curfews;

(l) simulated abnormal and emergency situations;

(m) simulated hazardous weather.

4 Underpinning knowledge of the following:

(a) maximum inflation pressure of the float alighting gear;

(b) maximum operating altitude permitted with float alighting gear fitted;

(c) maxim wave height permitted for float alighting gear operations in the helicopter type flown;

(d) how to calculate the maximum inflation pressure for the flotation devices;

(e) take-off distance required with the float configuration;

(f) the maximum wind speed for 360° pivot turns;

(g) hazards associated with a landing that is performed with a partially deflated float;

(h) avoidance measures for dynamic rollover;

(i) avoidance measures for ground resonance.

SECTION 5 OPERATIONAL RATING AND ENDORSEMENT STANDARDS

INSTRUMENT RATING

CIR Conduct an IFR flight

1 Unit description

This unit describes the skills and knowledge required to conduct a flight in an aircraft under the IFR.

2 Elements and performance criteria

2.1 **CIR.1 – Plan a flight under the IFR**

(a) determine aircraft is properly equipped and serviceable for IFR flight;

(b) possess and use all the required documentation that is current to plan an IFR flight;

(c) prepare an accurate flight plan that ensures all applicable operational requirements are met;

(d) make flight notification;

(e) check navigation system database is current;

(f) initialise navigation system (as applicable);

(g) conduct navigation system validity check (as applicable);

(h) conduct RAIM check if required;

(i) select, load, check and activate the flight plan (as applicable).

2.2 **CIR.2 – Perform an instrument departure**

(a) prepare aircraft and aircraft systems for departure;

(b) demonstrate consideration of and planning for non-normal and emergencies during departure;

(c) demonstrate adequate knowledge of both of published and cleared and non-published and non-cleared instrument departures;

(d) establish lowest take-off minima required considering aircraft performance, aerodrome, available instrument approaches and environmental conditions;

(e) conduct instrument departure to comply with obstacle clearance requirements.

2.3 **CIR.3 – Conduct a published instrument departure (all engines)**

(a) perform a SID or other published departure;

(b) maintain assigned SID, including all tracks, headings, altitudes and speeds;

(c) perform a cleared departure safely and maintain tracks, headings, altitudes and speeds within specified tolerances.

2.4 **CIR.4 – Conduct an instrument departure (1 engine inoperative) – simulated IMC**

(a) for single-engine aircraft instrument endorsements:

  (i) following engine failure establish optimum flight path and manoeuvres aircraft towards most suitable terrain considering conditions;

  (ii) time permitting conduct checklists and radio calls.

(b) for multi-engine aircraft instrument endorsements:

  (i) during departure manages aircraft following a simulated 1 engine inoperative event;

  (ii) maintain aircraft flight path within published tolerances;

  (iii) conduct checklists and radio calls;

  (iv) maintain terrain clearance;

  (v) assess condition and decide to continue or return to aerodrome.

2.5 **CIR.5 – Navigate aircraft under the IFR using ground-based and satellite-based navigational systems**

(a) demonstrate adequate knowledge of the published procedures associated with navigating an aircraft under the IFR using ground-based and satellite-based navigational systems;

(b) navigate aircraft under the IFR in accordance with published procedure using ground-based and satellite-based navigational systems;

(c) position fix is determined with reference to navigation aid and systems using ground-based and/or satellite-based navigational systems;

(d) tracks are intercepted to and from stations and way points with reference to navigation aids/systems using ground-based and satellite-based navigational systems;

(e) perform ground-based and satellite-based navigational systems confidence and integrity checks;

(f) requirement for an unplanned diversion is recognised and confirmed;

(g) route to alternate aerodrome, navigation aid and revised track is determined;

(h) planned route maintains height above the LSALT;

(i) flight planned route is diverted to track to alternate aerodrome, navigation aid or aerodrome;

(j) operational information for alternate aerodrome(s) is reviewed and applied according to published procedures;

(k) fuel plan is reviewed and amended according to published procedures;

(l) hazardous weather conditions are identified and avoided;

(m) procedures for penetration of hazardous weather are demonstrated and explained;

(n) aircraft systems are employed to mitigate the effects of hazardous weather;

(o) aircraft is configured to comply with turbulence penetration procedures;

(p) passenger and crew are restrained;

(q) procedures for penetrating turbulence are explained and demonstrated;

(r) identify and manage non-normal and emergency events.

2.6 **CIR.6 – Perform a descent and arrival under the IFR**

(a) demonstrate adequate knowledge of the published procedures for the conduct of a descent and arrival to an aerodrome;

(b) perform a descent and published arrival procedure to an aerodrome.

2.7 **CIR.7 – Perform a published holding procedure**

(a) demonstrate adequate knowledge of a published holding procedure;

(b) track aircraft to the holding fix and performs holding procedure (entry, full holding pattern and exit) safely.

2.8 **CIR.8 – Perform an instrument approach 2D or 3D**

(a) demonstrate adequate knowledge of published procedures associated with an instrument approach;

(b) perform an instrument approach unique to the instrument approach type;

(c) maintain a stabilised flight path within specified tolerances during the approach procedure.

2.9 **CIR.9 – Perform an instrument approach 1 engine inoperative (multi-engine aircraft only) – simulated IMC**

(a) at or before the FAF, identify, control and establish aircraft flight path within specified tolerances following an engine failure;

(b) complete checklists and radio calls;

(c) from the missed approach point conducts a missed approach whilst maintaining flight path within specified tolerances.

2.10 **CIR.10 – Perform visual approach operations (includes visual circling where applicable)**

(a) demonstrate adequate knowledge of published procedures for the conduct of a visual approach;

(b) conduct a visual circling approach requiring at least a 90° change of heading to establish the aircraft onto the final approach leg to the specified runway whilst maintaining a stabilised flight path.

3 Range of variables

(a) element CIR.9 only applies to the multi-engine aeroplane, multi-engine helicopter and powered-lift aircraft instrument endorsements;

(b) for the single-engine aeroplane instrument endorsement, the aircraft must be a single-engine aeroplane;

(c) for the multi-engine aeroplane instrument endorsement, the aircraft must be a multi-engine aeroplane;

(d) for the single-engine helicopter instrument endorsement, the aircraft must be a single-engine helicopter;

(e) for the multi-engine helicopter instrument endorsement, the aircraft must be a multi-engine helicopter;

(f) for the powered-lift aircraft instrument endorsement, the aircraft must be a powered-lift aircraft;

(g) for the gyroplane instrument endorsement, the aircraft must be a gyroplane;

(h) for the airship instrument endorsement, the aircraft must be an airship;

(i) activities are performed in accordance with published procedures;

(j) IMC or Simulated IMC conditions;

(k) aircraft or approved synthetic training device;

(l) turbine or piston power plants;

(m) day and night;

(n) analogue or digital flight decks;

(o) autopilots and flight management systems;

(p) CTA and OCTA airspace;

(q) RVSM or non-RVSM airspace;

(r) AIP, Jeppesen or other approved IAL plates;

(s) approved checklists;

(t) FMS.

4 Underpinning knowledge of the following:

(a) full panel instrument manoeuvres;

(b) limited and partial panel instrument manoeuvres;

(c) AIP and published regulations;

(d) PBN procedures;

(e) approved aircraft flight manual;

(f) relevant sections of published regulations;

(g) airspace requirements and procedures under IFR conditions;

(h) IFR route planning requirements;

(i) use of the navigational computer;

(j) aircraft fuel planning, including holding, alternate, fixed reserve and usage rates;

(k) visual and instrument flight rules and procedures;

(l) factors affecting en route performance, range and endurance;

(m) critical point and point of no return;

(n) meteorological considerations for an IFR flight;

(o) icing conditions and hazards;

(p) requirements for an alternate aerodrome;

(q) determine take-off minima for single and twin engine aircraft at aerodromes with and without suitable departure or instrument approach procedures;

(r) conditions for take-off if a forecast cannot be obtained;

(s) departure procedures;

(t) transponder codes;

(u) when departure track must be established;

(v) contents of airborne and departure reports, and when these must be made;

(w) pilot's responsibility in an IFR visual departure;

(x) procedures for loss of radio communication;

(y) procedures for abnormal operations and emergencies;

(z) aerodrome and en route holding procedures;

(za) IFR cruising levels, selection and hazards;

(zb) operations, functions, modes, limitations and errors of navigations aids and systems;

(zc) instrument approach procedure chart;

(zd) instrument approach procedures and limitations, including the minimum system components required to conduct an approach;

(ze) correct sector entry join for entering the holding pattern of the approach procedure;

(zf) tracking tolerance and altitude limitations for flying a published arc of the approach procedure;

(zg) approach procedure applicable minima for aircraft;

(zh) conditions under which a circling approach must be discontinued and a missed approach initiated;

(zi) circling area applicable to the aircraft performance category being flown;

(zj) when an aircraft may descend below the MDA (day and night);

(zk) procedure to conduct a missed approach from any nominated point within a circling area on a specified approach;

(zl) read and interpret a STAR chart;

(zm) STAR procedures and limitations;

(zn) pilot's responsibilities when STAR clearance is given or cancelled;

(zo) applicable instrument approach procedure or visual approach at end of STAR;

(zp) knowledge of STAR radio procedures;

(zq) procedures for loss of radio communication during STAR;

(zr) procedures for abnormal operations and emergencies during STAR, including navigation aid failure;

(zs) conditions permitting descent below minima;

(zt) procedure for joining the circuit from an approach procedure;

(zu) approach procedure missed approach procedure;

(zv) minimum obstacle clearance criteria during an approach procedure missed approach procedure;

(zw) knowledge of approach procedure radio procedures;

(zx) procedures for loss of radio communication during an approach procedure;

(zy) procedures for abnormal operations and emergencies during an approach procedure, including navigation aid failure, loss of signal integrity and disparity between aids.

IAP2 Conduct an instrument approach 2D

1 Unit description

This unit describes the skills and knowledge required to perform a 2D instrument approach operation.

2 Elements and performance criteria

2.1 IAP2.1 – Prepares for approach

(a) review latest available information for destination;

(b) conduct navigation system validity check (as applicable);

(c) conduct RAIM check if required;

(d) select, load, check and activate the flight plan (as applicable);

(e) select and brief current approach chart for the approach to be flown;

(f) check and confirm navigation aid required for the approach is serviceable.

2.2 IAP2.2 – Conducts initial approach

(a) set altimeter QNH correctly;

(b) manoeuvre aircraft to the holding fix.

2.3 IAP2.3 – Conducts a holding pattern

(a) from the holding fix enter and perform a holding pattern;

(b) fly aircraft in accordance with procedure.

2.4 IAP2.4 – Conducts an approach

(a) update and set Altimeter QNH;

(b) use automation appropriately;

(c) approach performed correctly and within published tolerances;

(d) navigation aid signal integrity monitored during approach;

(e) from the final approach fix to minima aircraft is flown to a stabilised descent profile;

(f) after establishing visual reference, a visual circling or runway approach is conducted for a landing on the selected runway.

2.5 IAP2.5 – Conducts a missed approach

(a) conditions requiring a missed approach are recognised and missed approach is initiated;

(b) aircraft is manoeuvred to MAPt;

(c) missed approach procedure is conducted in accordance with the IAL chart;

(d) obstacle clearance in IMC or simulated IMC is maintained.

3 Range of variables

(a) activities are performed in accordance with published procedures;

(b) tasks may be undertaken in:
   (i) IMC;
   (ii) VMC with simulated IMC conditions;

(c) performance may be demonstrated in:
   (i) single-engine aircraft;
   (ii) multi-engine aircraft;
   (iii) approved flight simulation training device;
   (iv) variable air traffic conditions;

   - (v) variable weather conditions;
   - (vi) variable flight situations;
   - (vii) abnormal situations;
   - (viii) differing classes of airspace;
- (d) aircraft may include:
   - (i) fixed wing;
   - (ii) helicopter;
   - (iii) other commercial or military aircraft;
- (e) crew may include:
   - (i) single pilot;
   - (ii) multi-crew;
- (f) instruments may be:
   - (i) fitted flight instruments suitable for instrument flight;
   - (ii) head up display suitable for instrument flight;
- (g) performance must be demonstrated using azimuth guidance and CDI guidance in the following:
   - (i) tracking;
   - (ii) holding pattern;
   - (iii) approach operations;
   - (iv) missed approach operations;
- (h) limitations may be imposed by:
   - (i) local noise abatement requirements and curfews;
   - (ii) airspace endorsements;
- (i) conditions may include:
   - (i) a method of simulating IMC;
   - (ii) simulated icing conditions;
   - (iii) moderate turbulence;
   - (iv) simulated hazardous weather;
   - (v) autopilot and flight director;
   - (vi) FMS and other NAV system;
   - (vii) simulation of emergency and abnormal procedures;
- (j) one of the following kinds of 2D instrument approach procedures:
   - (i) NDB;
   - (ii) VOR and LOC;
   - (iii) DGA (DME/GNSS Arrival);
   - (iv) RNP-LNAV (RNAV/GNSS) and RNP-LP (WAAS required)
- (k) approaches may include:
   - (i) NDB;
   - (ii) VOR;
   - (iii) DME or GNSS arrival procedure;
   - (iv) RNP APCH LNAV and RNP APCH LP [charted as RNAV-(GNSS)];
   - (v) LLZ;
- (l) for an approach — NDB private instrument endorsement, competency must be demonstrated using a non-directional beacon navigation system;
- (m) for an approach — VOR/LLZ private instrument endorsement, competency must be demonstrated using a VHF omni-range/localiser navigation system;

(n) for an approach — DME or GNSS private instrument endorsement, competency must be demonstrated using distance measuring equipment or a global navigation satellite system;

(o) for an approach — Approach – RNP APCH-2D private instrument endorsement, competency must be demonstrated using:

(i) a global navigation satellite system; or

(ii) another kind of area navigation-based system.

4 Underpinning knowledge of the following:

(a) instrument approach procedures and limitations;

(b) sector entry join procedures for entering a holding pattern;

(c) tracking tolerance and altitude limitations for flying the published approach procedure;

(d) procedure for joining the circuit from an approach procedure;

(e) minimum obstacle clearance criteria during a approach procedure and missed approach procedure;

(f) missed approach procedure for an approach;

(g) radio procedures during an approach;

(h) loss of radio communication during an approach procedure;

(i) abnormal operations and emergencies procedures during an approach, including navigation aid failure;

(j) GNSS system fundamentals and principles of operations;

(k) requirements applicable to pilots and equipment for GNSS operations;

(l) cause and magnitude of typical GNSS errors;

(m) human factors limitations associated with the use of GNSS equipment;

(n) operating procedures which provide safeguards against GNSS navigational errors;

(o) GNSS operating procedures for navigation tasks;

(p) GNSS operational and serviceability checks;

(q) GNSS warnings and messages;

(r) tracking tolerances, automatic Way-point sequencing, CDI sensitivity and RAIM availability parameters for entry, RAIM availability and approach segments;

(s) mode of operation required during each segment of a GNSS/NPA;

(t) conditions required to transition to and operate in that mode of operation for the GNSS/NPA, and the associated CDI sensitivity and RAIM protection provided;

(u) parameters applicable to RAIM warnings in the en route, terminal and approach modes;

(v) effects of availability or otherwise of barometric altimeter-aiding on RAIM availability and prediction;

(w) effects of satellite unserviceability on the reliability of each type of prediction;

(x) effect of each type of RAIM prediction on operational requirements;

(y) prediction limitations that apply to availability of approach RAIM at the destination or alternate aerodrome;

(z) operational requirements which apply to planning a flight on the basis of conducting a RNAV (GNSS) procedure at the destination;

(za) factors that adversely affect the conduct of a GNSS/NPA, and suitable pilot procedures to minimise such effects;

(zb) operating procedures for GNSS equipment which reduce or eliminate errors.

IAP3 Conduct an instrument approach 3D

1 Unit description

This unit describes the skills and knowledge required to perform a 3D instrument approach procedure.

2 Elements and performance criteria

2.1 IAP3.1 – Prepares for approach

(a) review latest available information for destination;

(b) conduct navigation system validity check (as applicable);

(c) conduct RAIM/SBAS check if required;

(d) select, load, check and activate the flight plan (as applicable);

(e) select and brief current approach chart for the approach to be flown;

(f) check and confirm navigation aid required for the approach is serviceable.

2.2 IAP3.2 – Conducts initial approach

(a) set altimeter QNH;

(b) manoeuvre aircraft to the holding fix.

2.3 IAP3.3 – Conducts a holding pattern

(a) from the holding fix enter and perform a holding pattern;

(b) fly aircraft in accordance with procedure.

2.4 IAP3.4 – Conducts an approach

(a) update and set altimeter QNH;

(b) uses automation appropriately;

(c) navigation aid signal integrity monitored during approach;

(d) vertical and lateral path flown within published tolerances;

(e) specified altitude check on glide slope is performed;

(f) from the final approach fix to minima aircraft is flown to a stabilised descent profile;

(g) after establishing visual reference, a visual circling or runway approach is conducted for a landing on the selected runway.

2.5 IAP3.5 – Conducts a missed approach

(a) conditions requiring a missed approach are recognised and missed approach is initiated;

(b) aircraft is manoeuvred to MAPt;

(c) missed approach procedure is conducted in accordance with the IAL chart;

(d) obstacle clearance in IMC or simulated IMC is maintained.

3 Range of variables

(a) activities are performed in accordance with published procedures;

(b) tasks may be undertaken in:

   (i) IMC;

   (ii) VMC with simulated IMC conditions;

(c) performance may be demonstrated in:

   (i) single-engine aircraft;

   (ii) multi-engine aircraft;

   (iii) synthetic training device approved by the relevant authority;

(iv) variable air traffic conditions;
(v) variable weather conditions;
(vi) variable flight situations;
(vii) abnormal situations;
(viii) differing classes of airspace;

(d) aircraft may include:
(i) fixed wing;
(ii) helicopter;
(iii) other commercial or military aircraft;

(e) crew may include:
(i) single pilot;
(ii) multi-crew;

(f) instruments may be:
(i) fitted flight instruments suitable for instrument flight;
(ii) head up display suitable for instrument flight;

(g) limitations may be imposed by:
(i) local noise abatement requirements and curfews;
(ii) airspace endorsements;

(h) conditions may include:
(i) a method of simulating IMC;
(ii) simulated icing conditions;
(iii) moderate turbulence;
(iv) simulated hazardous weather;
(v) autopilot and flight director;
(vi) FMS other NAV system;
(vii) simulation of emergency and abnormal procedures;

(i) one of the following kinds of 3D instrument approach procedures:
(i) ILS and MLS and GLS;
(ii) RNP-LNAV/VNAV (Baro) and RNP-LPV (WAAS required);

(j) Reserved

(k) for an approach — Approach – RNP APCH-3D private instrument endorsement, competency must be demonstrated using barometric-aided vertical guidance;

(l) for an approach — ILS private instrument endorsement, competency must be demonstrated using:
(i) an instrument landing system; or
(ii) a microwave landing system; or
(iii) a global navigation satellite system with ground-based augmentation.

4 Underpinning knowledge of the following:

(a) types of approach lighting systems;

(b) use of and precautions with approach slope indicators;

(c) low-visibility operations and environmental limitations (where applicable);

(d) contaminated runway operations;

(e) runway markings and lighting;

(f) temperature effects on altimeter;

(g) adjustment to Baro determined minima for temperature effect;

(h) automation and FMS management for low-visibility operations (where applicable);

(i) equipment redundancy during low-visibility operations (where applicable);

(j) RVR versus SVR.

PRIVATE IFR RATING

PIF Conduct a private instrument flight rules flight

1 Unit description

This unit describes the skills and knowledge required to conduct of a Private IFR flight.

2 Elements and performance criteria

2.1 PIF.1 – Plan a flight under the IFR

(a) determine aircraft is properly equipped and serviceable for IFR flight;

(b) initialise navigation system (as applicable);

(c) conduct navigation system validity check (as applicable);

(d) conduct RAIM/SBAS check if required;

(e) select, load, check and activate the flight plan (as applicable);

(f) use all the required documentation that is current to plan an IFR flight;

(g) prepare an accurate flight plan that ensures all applicable operational requirements are met;

(h) make flight notification;

(i) check navigation system database is current.

2.2 PIF.2 – Conduct a visual departure

(a) conduct a visual departure until reaching the LSALT;

(b) ensure terrain clearance is maintained visually at all times during departure until reaching LSALT;

(c) for the night endorsement, comply with requirements for conducting a circling approach at night.

2.3 PIF.3 – En route IFR operation

(a) use navigation systems to maintain en route navigation;

(b) perform en route procedures;

(c) comply with en route procedures in applicable types of airspace;

(d) ensures aircraft separation standards are maintained;

(e) recognise and confirm requirement for an unplanned diversion;

(f) determine route to alternate aerodrome, navigation aid and revised track;

(g) maintain height above the LSALT;

(h) divert from flight planned route to track to an alternate aerodrome, navigation aid or aerodrome;

(i) review and apply operational information for alternate aerodrome(s);

(j) review and amend fuel plan;

(k) identify and avoid hazardous weather conditions;

(l) demonstrate awareness of and take appropriate action in relation to penetration of hazardous weather;

(m) use aircraft systems effectively to mitigate the effects of hazardous weather;

(n) configure aircraft to comply with turbulence penetration procedures;

(o) identify and manage non-normal and emergency events.

2.4 PIF.4 – Navigating and holding using navigation system

(a) operate navigation system;

(b) perform system confidence and integrity checks;

(c) use ground-based and satellite-based navigation systems to navigate aircraft under the IFR, including the following:

(i) fix position;

(ii) intercept and maintain tracks to and from stations and way points;

(d) track aircraft to the holding fix and enter holding pattern;

(e) perform holding procedure (entry, full holding pattern and exit).

2.5 **PIF.5 – Conduct instrument departure (if applicable)**

(a) conduct an instrument departure procedure to comply with obstacle clearance requirements;

(b) if applicable, perform SID or other published departure;

(c) maintain assigned SID, including tracks, headings, altitudes and speeds;

(d) comply with a departure clearance by maintaining tracks, headings, altitudes and speeds within specified tolerances;

(e) for single-engine aircraft instrument endorsements:

(i) following a simulated engine failure, establish optimum flight path and manoeuvre aircraft towards most suitable terrain considering conditions;

(ii) time permitting, conduct checklists and radio calls;

(f) for multi-engine aircraft instrument endorsements:

(i) during departure manage aircraft following a simulated 1 engine inoperative event;

(ii) maintain aircraft flight path;

(iii) conduct checklists and radio calls;

(iv) maintain terrain clearance;

(v) assess conditions and decide and then execute plan to continue or return to aerodrome.

2.6 **PIF.6 – Perform an instrument approach operation (if applicable)**

(a) perform an instrument approach in accordance with procedures unique to the instrument approach type;

(b) maintain a stabilised flight path within specified tolerances during the approach operation;

(c) conduct a visual circling approach requiring at least a 90° change of heading to establish the aircraft onto the final approach leg to the specified runway whilst maintaining a stabilised flight path;

(d) for the night endorsement, comply with requirements for conducting a circling approach at night.

2.7 **PIF.7 – Perform an instrument approach 1 engine inoperative (multi-engine aircraft only), if applicable**

(a) at or before the FAF identify, control and establish aircraft flight path within specified tolerances following an engine failure;

(b) complete checklists and radio calls;

(c) from the missed approach point conduct a missed approach whilst maintaining flight path within specified tolerances.

2.8 **PIF.8 – Perform a descent, visual approach and landing**

(a) plan descent to establish VMC above or at the LSALT or MSA;

(b) maintain VMC during decent and arrival to the destination aerodrome;

(c) conduct visual approach and landing;

(d) for the night endorsement, comply with requirements for descending below LSALT at night.

3 Range of variables

(a) for the single-engine aeroplane private instrument endorsement, the aircraft must be a single-engine aeroplane;

(b) for the multi-engine aeroplane private instrument endorsement and the departure — multi-engine aeroplane private instrument endorsement, the aircraft must be a multi-engine aeroplane;

(c) for the single-engine helicopter private instrument endorsement, the aircraft must be a single-engine helicopter;

(d) for the multi-engine helicopter private instrument endorsement and the departure — multi-engine helicopter private instrument endorsement, the aircraft must be a multi-engine helicopter;

(e) for the powered-lift aircraft private instrument endorsement and the departure — powered-lift aircraft private instrument endorsement, the aircraft must be a powered-lift aircraft;

(f) for the gyroplane private instrument endorsement, the aircraft must be a gyroplane;

(g) for the airship private instrument endorsement and the departure — airship private instrument endorsement, the aircraft must be an airship;

(h) for the departure — single-engine aircraft private instrument endorsement, the aircraft must be a single-engine aircraft;

(i) for the standard instrument departure private instrument endorsement, the candidate must complete a published standard instrument departure procedure;

(j) for the navigation — NDB private instrument endorsement, competency must be demonstrated using an NDB where applicable;

(k) for the navigation — VOR/LLZ private instrument endorsement, competency must be demonstrated using a VOR or LLZ where applicable;

(l) for the navigation — GNSS private instrument endorsement, competency must be demonstrated using a GNSS, where applicable;

(m) for the STAR private instrument endorsement, competency must be demonstrated using an NDB where applicable;

(n) for the approach and landing — multi-engine aeroplane private instrument endorsement, the aircraft must be a multi-engine aeroplane;

(o) for the approach and landing — multi-engine helicopter private instrument endorsement, the aircraft must be a multi-engine helicopter;

(p) for the night private instrument endorsement, competency must be demonstrated at night;

(q) activities are performed in accordance with published procedures;

(r) IMC or simulated IMC conditions;

(s) aircraft or approved synthetic training device;

(t) single-pilot or multi-crew aircraft;

(u) single-engine or multi-engine aircraft;

(v) turbine or piston power plants;

(w) day or night;

(x) analogue or digital flight decks;

(y) autopilots and flight management systems;

(z) CTA and OCTA airspace;

(za) RVSM or non-RVSM airspace;

(zb) AIP, Jeppensen or other approved IAL plates;

(zc) NDB, VOR, DME, RNAV/GNSS navigation aids.

4 Underpinning knowledge of the following:

(a) environmental conditions of VMC;

(b) AIP and published regulations;

(c) approved aircraft flight manual;

(d) determining the currency of operational documents;

(e) relevant sections of Civil Aviation Safety Regulations and Civil Aviation Orders;

(f) airspace requirements and procedures under IFR conditions;

(g) IFR route planning requirements and procedures;

(h) IFR approach procedures;

(i) use of the navigational computer;

(j) aircraft fuel planning, including holding, alternate, fixed reserve and usage rates;

(k) visual and instrument flight rules and procedures;

(l) factors affecting en route performance, range and endurance;

(m) critical point and point of no return;

(n) meteorological considerations for an IFR flight;

(o) icing conditions, hazards and avoidance;

(p) turbulence conditions, hazards and avoidance;

(q) requirements for an alternate aerodrome;

(r) take-off minima;

(s) IFR and visual;

(t) ability to read and interpret an instrument approach procedure chart;

(u) instrument approach procedures and limitations;

(v) tracking tolerance and altitude limitations for DME/GNSS arc approach procedure;

(w) when an aircraft may descend below the MDA (day and night);

(x) interpret a STAR chart;

(y) interpret a SID chart;

(z) conditions permitting descent below minima;

(za) radio procedures;

(zb) procedures for abnormal operations and emergencies during an approach procedure, including navigation aid failure, loss of signal integrity and disparity between aids.

NIGHT VFR RATING

NVR1 Conduct a traffic pattern at night

1 Unit description

This unit describes the skills and knowledge required to take off, land and operate an aircraft safely in the traffic pattern at night.

2 Elements and performance criteria

2.1 **NVR1.1 – Control aircraft on the ground at night**

(a) instrument and cockpit lighting are adjusted to an appropriate level for taxiing;

(b) ATC instructions and manoeuvres of the aircraft on the ground at night within the approved movement area as defined by aerodrome ground lighting are complied with;

(c) aircraft lighting to identify obstructions, other aircraft and taxiway and runway limits is used as required;

(d) aircraft is taxied at a speed which allows for an adequate lookout to be maintained to avoid obstructions.

2.2 **NVR1.2 – Activate pilot activated lighting (PAL)**

(a) appropriate radiotelephone frequency is utilised to activate PAL system when within radio range;

(b) transmit sequence is utilised to activate PAL system;

(c) wind indicator lighting is monitored to determine end of activation period.

2.3 **NVR1.3 – Take-off aircraft at night**

2.3.1 For aircraft in the aeroplane category, as follows:

(a) aircraft is lined up correctly in centre of runway in take-off direction;

(b) line-up checks appropriate to night take-off are completed;

(c) take-off by reference to flare path and runway lighting and aircraft instruments is executed;

(d) aircraft is rotated at manufacturer’s recommended speed;

(e) climb attitude and control aircraft in climb, after take-off solely by reference to instruments is completed;

(f) alignment with runway by visual reference and lookout is established and maintained;

(g) after take-off, checks are performed at a safe height.

2.3.2 For aircraft in the helicopter category, as follows:

(a) accelerates helicopter in take-off direction on a prescribed track;

(b) recognises and controls translational lift;

(c) executes take-off by reference to flare path and runway lighting or HLS lighting and aircraft instruments;

(d) applies climb power and adjusts attitude to maintain climb speed appropriate to obstacle clearance requirements;

(e) aligns helicopter landing gear with the planned take-off direction until the point at which balanced flight is required;

(f) maintains helicopter outside the height-velocity chart avoid area;

(g) retracts undercarriage at a safe height and airspeed, if applicable;

(h) trims helicopter, if applicable;

(i) balances helicopter;

(j) performs after-take-off checks in accordance with approved checklist.

2.4 **NVR1.4 – Fly a circuit pattern at night**

Performs a circuit pattern safely and in accordance with the specified procedures and approved techniques.

2.5 **NVR1.5 – Manage emergency situations at night**

(a) (in simulated conditions) aircraft control is maintained;

(b) emergency situation is managed in accordance published procedures;

(c) electrical lighting and power sources are monitored;

(d) electrical lighting and power source emergency procedures are conducted as appropriate.

2.6 **NVR1.6 – Perform a go-around**

(a) the need to conduct a go-around is recognised;

(b) go-around is performed from any point on base and final approach legs.

2.7 **NVR1.7 – Land at night, with and without the use of aircraft landing lights**

(a) circuit entry and pattern are performed with reference to runway environment;

(b) safe altitude is maintained by reference to aircraft instruments and runway lighting;

(c) aircraft is safely landed at night with and without landing lights;

(d) after landing checks are performed.

3 Range of variables

(a) activities are performed in accordance with published procedures;

(b) for the single-engine aeroplane night VFR endorsement, the aircraft must be a single-engine aeroplane;

(c) for the multi-engine aeroplane night VFR endorsement, the aircraft must be a multi-engine aeroplane;

(d) for the helicopter night VFR endorsement, the aircraft must be a helicopter;

(e) for the powered-lift aircraft night VFR endorsement, the aircraft must be a powered-lift aircraft;

(f) for the gyroplane night VFR endorsement, the aircraft must be a gyroplane;

(g) for the airship night VFR endorsement, the aircraft must be a airship;

(h) night or simulated night conditions;

(i) aircraft or approved synthetic training device;

(j) analogue or digital flight decks;

(k) autopilots and flight management systems.

4 Underpinning knowledge of the following:

(a) the topics mentioned in Section 2.7 of this MOS, night VFR rating;

(b) colour and pattern of the following:

- (i) permanent threshold light;
- (ii) runway threshold identifications lights;
- (iii) displaced threshold lighting;
- (iv) runway edge lighting;
- (v) runway end lighting;
- (vi) runway centreline lighting;
- (vii) obstacle lighting;

(c) method of activating PAL;

(d) method of activating Aerodrome Frequency Response Unit (AFRU) with PAL options;

(e) time that PAL remains illuminated;

(f) PAL warning for users that the lights are about to extinguish;

(g) operation and use of a VASI system;

(h) operation and use of a PAP) system;

(i) vestibular systems, namely the semicircular canals and otoliths, in helping the pilot maintain orientation;

(j) circumstances aggravate vestibular disorientation, and how to overcome this problem;

(k) causes that may aggravate, vestibular disorientation such as somatogravic illusions, somatogyral illusions and ‘graveyard spiral’, coriolis effect, and ‘leans’;

(l) conditions and causes under which visual illusions, such as ‘false horizons’, visual-cue illusions, relative motion illusions, ‘flicker effect’, ‘black hole’ illusion, and autokinesis may occur.

NVR2 Night VFR – single-engine aircraft

1 Unit description

This unit describes the skills and knowledge required to conduct a NVFR operation in a single-engine aircraft.

2 Elements and performance criteria

2.1 **NVR2.1 – Determine aircraft meets requirements for NVFR flight**

(a) aircraft requirements for NVFR flight are determined;

(b) flight and navigation instruments, minimum electrical lighting and navigation equipment and any other requirements which are fitted to the aircraft are checked to ensure they are suitable and serviceable for NVFR flight.

2.2 **NVR2.2 – Obtain and use current operational documents**

(a) operational documents applicable to the flight are obtained and checked for currency;

(b) applicable information contained in documents for flight planning and management is interpreted and applied;

(c) documents required for the flight are stowed and accessibility for the pilot during flight is ensured.

2.3 **NVR2.3 – Prepare flight plan for NVFR flight**

(a) charts suitable for intended NVFR flight are selected and prepared;

(b) applicable information to prepare a flight plan which details tracks, distances, times, altitudes to be flown and fuel requirements to reach destination are obtained, analysed and applied;

(c) meteorological, airways facilities, aerodrome and NOTAM information applicable to planning and conducting a flight is obtained, interpreted and applied;

(d) routes to optimise options in the event of an engine failure are planned.

2.4 **NVR2.4 – Determine operational requirements**

(a) suitability of the aerodrome lighting for night operations is determined;

(b) curfew requirements are complied with;

(c) duration of flight is determined;

(d) holding, alternate and reserve fuel requirements due to weather, navigation aid availability and aerodrome lighting are determined in accordance with operational requirements;

(e) total fuel requirements are calculated.

2.5 **NVR2.5 – Make flight notification**

(a) flight notification is prepared for planned NVFR flight;

(b) completed flight notification is submitted;

(c) flight notification acceptance is confirmed.

2.6 **NVR2.6 – Program navigation system**

(a) prepare data for transfer to approved airborne navigation system;

(b) navigation data is loaded and checked.

2.7 **NVR2.7 – Select, operate and monitor navigation aids and systems**

(a) appropriate navigation aids and systems for the planned NVFR flight are selected and operated in accordance navigation aid and system requirements;

(b) integrity of navigation aid and systems information is monitored and maintained.

2.8 **NVR2.8 – Make visual departure at night**

(a) obstacle clearance is ensured until reaching LSALT;

(b) departure track is intercepted within 5 nm of aerodrome

(c) conduct take-off and departure from an aerodrome which is remote from ground lighting as follows:

(i) climb out after take-off, using instruments as the primary reference;

(ii) after take-off checks are performed at a safe height.

2.9 **NVR2.9 – Navigate the aircraft under NVFR**

(a) cockpit and instrument lighting are adjusted to allow reference to documentation, instruments and lookout;

(b) manages and interprets outputs of on-board navigation systems;

(c) aircraft position fix is determined visually or with reference to navigation aid and system;

(d) updates navigation log;

(e) maintains fuel log;

(f) uses a recognised navigation work cycle;

(g) tracks are intercepted to and from visually or with reference to navigation aids and systems;

(h) track is maintained within tolerances specified in published procedures;

(i) timings are recorded, assessed and revised as required;

(j) station passage is recognised;

(k) planned route above LSALT is maintained;

(l) route and destination weather conditions are monitored and appropriate actions are executed;

(m) descent point is calculated and amended.

2.10 **NVR2.10 – Comply with air traffic control rules and procedures for NVFR flights**

(a) separation from other air traffic maintained;

(b) airspace requirements are complied with;

(c) two-way communication is maintained with ATS and other aircraft;

(d) ATC clearances and radar vectoring instructions are complied with.

2.11 **NVR2.11 – Manage hazardous weather conditions**

(a) hazardous weather conditions are identified and avoided;

(b) procedures for avoidance of hazardous weather are demonstrated and explained;

(c) aircraft systems are employed to mitigate the effects of hazardous weather.

2.12 **NVR2.12 – Manage emergency situations at night**

(a) (in simulated conditions) aircraft control is maintained;

(b) emergency situation is managed in accordance published procedures;

(c) electrical lighting and power sources are monitored;

(d) electrical lighting and power source emergency procedures are conducted as appropriate.

2.13 **NVR2.13 – Conduct a diversion to revised route or alternate aerodrome at night**

(a) requirement for an unplanned diversion is recognised and confirmed;

(b) route to alternate aerodrome, navigation aid and revised track is determined;

(c) planned route maintains height above LSALT in accordance with regulations while flying under NVFR;

(d) flight planned route is diverted to track to an alternate aerodrome, navigation aid or aerodrome;

(e) operational information for alternate aerodrome(s) is reviewed and applied according to published procedures;

(f) fuel plan is reviewed and amended according to published procedures.

2.14 **NVR2.14 – Make visual approach at night**

(a) descent below LSALT is conducted in accordance with published procedures;

(b) track is maintained to destination aerodrome;

(c) conduct an approach and landing at an aerodrome that is remote from extensive ground lighting.

2.15 **NVR2.15 – Perform a go-around**

(a) the need to conduct a go-around is recognised;

(b) go-around is performed from any point on base and final approach legs.

3 Range of variables

(a) activities are performed in accordance with published procedures;

(b) tasks may be undertaken in NVFR conditions;

(c) performance may be demonstrated in the following as applicable:
   (i) single-engine aircraft;
   (ii) synthetic training device approved by the appropriate authority;

(d) aircraft may include:
   (i) fixed wing;
   (ii) helicopter;

(e) instruments may be:
   (i) fitted flight instruments suitable for NVFR flight;
   (ii) head up display suitable for NVFR flight;

(f) limitations may be imposed by:
   (i) local noise abatement requirements and curfews;
   (ii) airspace endorsements;

(g) Aircraft requirements may include:
   (i) instruments;
   (ii) communication;
   (iii) navigation system;
   (iv) lighting;

(h) for the single-engine aeroplane night VFR endorsement, the aircraft must be a single-engine aeroplane;

(i) for the helicopter night VFR endorsement, the aircraft must be a helicopter;

(j) for the powered-lift aircraft night VFR endorsement, the aircraft must be a powered-lift aircraft;

(k) for the gyroplane night VFR endorsement, the aircraft must be a gyroplane;

(l) for the airship night VFR endorsement, the aircraft must be a airship.

4 Underpinning knowledge of the following:

(a) the topics mentioned in Section 2.7 of this MOS, night VFR rating;

(b) navigation requirements for the following:
   (i) a night visual flight using radio navigation systems;
   (ii) a night visual flight using self-contained or long-range navigation systems;
   (iii) a night visual flight using visual reference to ground and water;

(c) navigation tolerance for a night visual flight avoiding CTA;

(d) requirements for the following:

  (i) positive radio fixing;

  (ii) the most precise track guidance;

(e) navigation requirements for night visual flight with respect to time interval between fixes, accuracy of time reference, and accuracy and procedures in track-keeping;

(f) procedures for night visual flight in all classes of airspace when diverting from track due to navigation or weather;

(g) route for night visual flight with respect to forecast weather, controlled airspace, prohibited, restricted and danger areas, engine out performance for multi-engine aircraft, specified route limitations, airways operational requirements, and availability of published routes, en route alternate aerodromes, navigation aids, rated coverage and radio communication;

(h) compulsory reporting points;

(i) route, aircraft equipment and navigation requirements for NVFR;

(j) LSALT for a night visual flight for a route published on a chart;

(k) dimensions of the significant safety sector when calculating LSALT for a route not published on a chart;

(l) methods of calculating LSALT for a route not published on a chart;

(m) calculation of LSALT when uncertain of position;

(n) conditions for descent below LSALT;

(o) pre-flight altimeter accuracy check for a night visual flight;

(p) altimetry procedures to all stages of a night visual flight

(q) operating at aerodromes where surrounding light is limited.

NVR3 Night VFR – multi-engine aircraft

1 Unit description

This unit describes the skills and knowledge required to conduct a flight at night under the NVFR in a multi-engine aircraft.

2 Elements and performance criteria

2.1 NVR3.1 – Determine aircraft meets requirements for NVFR flight

(a) aircraft requirements for NVFR flight are determined;

(b) flight and navigation instruments, minimum electrical lighting and navigation equipment and any other requirements which are fitted to the aircraft are checked to ensure they are suitable and serviceable for NVFR flight.

2.2 NVR3.2 – Obtain and use current operational documents

(a) operational documents applicable to the flight are obtained and checked for currency;

(b) applicable information contained in documents for flight planning and management is interpreted and applied;

(c) documents required for the flight are stowed and accessibility for the pilot during flight is ensured.

2.3 NVR3.3 – Prepare flight plan for NVFR flight

(a) charts suitable for intended NVFR flight are selected and prepared;

(b) calculates LSALT for planned flight using WAC;

(c) applicable information to prepare a flight plan which details tracks, distances, times, altitudes to be flown and fuel requirements to reach destination are obtained, analysed and applied;

(d) meteorological, airways facilities, aerodrome and NOTAM information applicable to planning and conducting a flight is obtained, interpreted and applied;

(e) routes to optimise options in the event of an engine failure are planned.

2.4 NVR3.4 – Determine operational requirements

(a) suitability of the aerodrome lighting for night operations is determined;

(b) curfew requirements are complied with;

(c) duration of flight is determined;

(d) holding, alternate and reserve fuel requirements due to weather, navigation aid availability and aerodrome lighting are determined in accordance with operational requirements;

(e) total fuel requirements are calculated;

(f) calculates performance available and plans actions in the event of engine failure after take-off;

(g) calculates performance available in the event of engine failure during cruise and determines if aircraft can maintain at least the LSALT for planned route until established within 3 nm of destination aerodrome with the runway in sight;

(h) replans if OEI performance indicates inability to maintain LSALT on planned route.

2.5 NVR3.5 – Make flight notifications

(a) flight notification is prepared for planned NVFR flight;

(b) completed flight notification is submitted;

(c) flight notification acceptance is confirmed.

2.6 NVR3.6 – Program navigation system

(a) prepare data for transfer to approved airborne navigation system;

(b) navigation data is loaded and checked.

2.7 **NVR3.7 – Select, operate and monitor navigation aids and systems**

(a) appropriate navigation aids/systems for the planned NVFR flight are selected and operated in accordance navigation aid/system requirements;

(b) integrity of navigation aid/systems information is monitored and maintained.

2.8 **NVR3.8 – Take-off at night at other than departure aerodrome which is remote from ground lighting**

(a) aircraft is lined up correctly in centre of runway in take-off direction;

(b) line-up checks appropriate to night take-off are completed;

(c) take-off by reference to flare path/runway lighting and aircraft instruments is executed;

(d) aircraft is rotated at manufacturer's recommended speed;

(e) climb attitude and control aircraft in climb, after take-off solely by reference to instruments is completed;

(f) alignment with runway by visual reference and lookout is established and maintained;

(g) after take-off, checks are performed at a safe height.

2.9 **NVR3.9 – Engine failure after take-off (performed in day VFR conditions)**

Under simulated IMC at a height not below 400 ft AGL controls aircraft following a simulated engine failure after take-off from the point of failure, carries out published engine failure procedures and establishes the aircraft at circuit height within prescribed tolerances for altitude and heading.

2.10 **NVR3.10 – Make a visual departure at night**

(a) obstacle clearance is ensured until reaching LSALT;

(b) departure track is intercepted within 5 nm of aerodrome.

2.11 **NVR3.11 – Navigate the aircraft in NVFR**

(a) cockpit and instrument lighting are adjusted to allow reference to documentation, instruments and lookout;

(b) manages and interprets outputs of on-board navigation systems;

(c) aircraft position fix is determined visually or with reference to navigation aid and system;

(d) updates navigation log;

(e) maintains fuel log;

(f) uses a recognised navigation work cycle;

(g) tracks are intercepted to and from visually or with reference to navigation aids and systems;

(h) track is maintained within tolerances specified in published procedures;

(i) timings are recorded, assessed and revised as required;

(j) station passage is recognised;

(k) planned route above LSALT is maintained;

(l) route and destination weather conditions are monitored and appropriate actions are executed;

(m) descent point is calculated and amended.

2.12 **NVR3.12 – Engine failure during cruise (not below LSALT at night)**

(a) following a simulated engine failure during cruise, carries out published engine failure-procedures and establishes aircraft at a nominated altitude above LSALT for route within prescribed tolerances for altitude, track and heading;

(b) using a structured method develops and decides on a course of action to minimise threats for continuation of flight with 1 engine inoperative.

2.13 **NVR3.13 – Comply with air traffic control rules and procedures for NVFR flights**

(a) separation from other air traffic maintained;

(b) airspace requirements are complied with;

(c) two-way communication is maintained with ATS and other aircraft;

(d) ATC clearances and radar vectoring instructions are complied with.

2.14 **NVR3.14 – Manage hazardous weather conditions**

(a) hazardous weather conditions are identified and avoided;

(b) procedures for avoidance of hazardous weather are demonstrated and explained;

(c) aircraft systems are employed to mitigate the effects of hazardous weather.

2.15 **NVR3.15 – Manage emergency situations at night**

(a) (in simulated conditions) aircraft control is maintained;

(b) emergency situation is managed in accordance published procedures;

(c) electrical lighting and power sources are monitored;

(d) electrical lighting and power source emergency procedures are conducted as appropriate.

2.16 **NVR3.16 – Conduct a diversion to revised route or alternate aerodrome at night**

(a) requirement for an unplanned diversion is recognised and confirmed;

(b) route to alternate aerodrome, navigation aid and revised track is determined;

(c) planned route maintains height above LSALT in accordance with regulations while flying under NVFR;

(d) flight planned route is diverted to track to an alternate aerodrome, navigation aid or aerodrome;

(e) operational information for alternate aerodrome(s) is reviewed and applied according to published procedures;

(f) fuel plan is reviewed and amended according to published procedures.

2.17 **NVR3.17 – Make visual approach at night**

(a) descent below LSALT is conducted in accordance published procedures;

(b) track is maintained to destination aerodrome;

(c) with 1 engine inoperative, under day VFR conditions conducts a descent, circuit join, approach and landing from 3 nm at or above a simulated LSALT with 1 engine inoperative whilst maintaining prescribed flight tolerances.

2.18 **NVR3.18 – Land at night, with and without the use of aircraft landing lights at other than departure aerodrome which is remote from ground lighting**

(a) circuit entry and pattern are performed with reference to runway environment;

(b) safe altitude is maintain by reference to aircraft instruments and runway lighting;

(c) aircraft is safely landed at night with and without landing lights;

(d) after landing checks are performed.

3 Range of variables

(a) activities are performed in accordance with published procedures;

(b) tasks may be undertaken in NVFR conditions;

(c) performance may be demonstrated in a:

  (i) multi-engine aircraft;

  (ii) synthetic training device approved by the appropriate authority;

(d) aircraft may include:

- (i) fixed wing;
- (ii) helicopter;

(e) crew may include:
- (i) single pilot;
- (ii) multi-crew;

(f) instruments may be:
- (i) fitted flight instruments suitable for NVFR flight;
- (ii) head up display suitable for NVFR flight;

(g) limitations may be imposed by:
- (i) local noise abatement requirements and curfews;
- (ii) airspace endorsements;

(h) aircraft requirements may include:
- (i) instruments;
- (ii) communication;
- (iii) navigation system;
- (iv) lighting;

(i) for the multi-engine aeroplane night VFR endorsement, the aircraft must be a multi-engine aeroplane.

4 Underpinning knowledge of the following:

(a) the topics mentioned in Section 2.7, Night VFR rating in Schedule 3 of this MOS;

(b) navigation requirements for the following:
- (i) a night visual flight using radio navigation systems;
- (ii) a night visual flight using self-contained or long-range navigation systems;
- (iii) a night visual flight using visual reference to ground and water;

(c) navigation tolerance for a night visual flight avoiding CTA;

(d) requirements for the following:
- (i) positive radio fixing;
- (ii) the most precise track guidance;

(e) navigation requirements for night visual flight with respect to time interval between fixes, accuracy of time reference, and accuracy and procedures in track-keeping;

(f) procedures of night visual flight in all classes of airspace when diverting from track due to navigation or weather;

(g) route for night visual flight with respect to forecast weather, controlled airspace, prohibited, restricted and danger areas, engine out performance for multi-engine aircraft, specified route limitations, airways operational requirements, and availability of published routes, en route alternate aerodromes, navigation aids, rated coverage and radio communication;

(h) compulsory reporting points;

(i) route, aircraft equipment and navigation requirements for NVFR;

(j) LSALT for a night visual flight for a route published on a chart;

(k) dimensions of the significant safety sector when calculating LSALT for a route not published on a chart;

(l) methods of calculating LSALT for a route not published on a chart;

(m) calculation of LSALT when uncertain of position;

(n) conditions for descent below LSALT;

(o) pre-flight altimeter accuracy check for a night visual flight;

(p) altimetry procedures to all stages of a night visual flight;

NIGHT VISION IMAGING SYSTEM RATING

NVI Night vision imaging system operation

1 Unit description

This unit describes the skills and knowledge required to plan and conduct helicopter operations using night vision imaging systems (NVIS) at night.

2 Elements and performance criteria

2.1 **NV1.1 – Plan NVIS operations**

(a) identifies task requirements and any hazards or risks;

(b) plans navigation and operational requirements;

(c) manual, including:

(i) NVFR or IFR operations;

(ii) operational requirements and procedures;

(iii) risk and hazard mitigation;

(iv) contingency procedures;

(d) determine serviceability of NVG equipment and aircraft:

(i) determines helicopter certification MEL requirements for conducting an NVIS operation;

(ii) inspects and ensures serviceability of NVG equipment;

(iii) inspects and ensures serviceability and suitability of aircraft and aircraft lighting system for NVG operations;

(e) brief and de-brief NVG operations:

(i) pre-flight brief;

(f) briefs all stakeholders, including:

(i) a plan for recovery from inadvertent IMC entry and loss of visual cues, when appropriate;

(ii) the transit flight, let-down and approach procedures;

(iii) landing and take-off procedures;

(iv) role functions and procedures;

(v) contingency management;

(vi) post-flight brief;

(vii) analyses objectives and outcomes of the flight and reviews operating procedures;

(viii) analyses effectiveness and efficiency in the use and performance of role equipment;

(ix) identifies achievements and any faults or errors that occurred during the NVG flight and provides guidance and feedback to crew members;

(x) ensures inspection, servicing and stowage arrangements for NVG equipment.

2.2 **NV1.2 – Perform circuit procedures using NVG**

(a) performs hover, taxi, take-off, circuits and landing using NVG to the standards for night visual flight specified in this MOS;

(b) performs baulked landing procedures using NVG;

(c) performs cockpit procedures and checks during goggled and de-goggled flight;

(d) take off and transit to and from area of operation using NVG;

(e) performs hover, taxi, take-off and transit to and from area of operations using NVG in accordance with NVFR standards specified in this MOS;

(f) descends aircraft to unlit HLS while avoiding terrain and obstructions using NVG;

(g) maintains control of aircraft during transition to and from goggled and de-goggled flight;

(h) identifies the unlit HLS and any obstructions or terrain using NVG;

(i) approach, land on, take-off from and climb out from an unlit HLS using NVG;

(j) approach and landing
  (i) manoeuvres aircraft using instrument scan and visual cues;
  (ii) intercepts and maintains glide slope;
  (iii) identifies and confirms touchdown point and reference markers;
  (iv) approaches at a constant angle;
  (v) terminates approach and establishes stable hover over HLS;
  (vi) lands helicopter on HLS using NVG, including:
    (A) sloping ground landing;
    (B) pinnacle and ridgeline landing;

(k) take-off and climb-out
  (i) identifies obstructions and hazards using NVG;
  (ii) establishes stable hover;
  (iii) takes off helicopter, including:
    (A) sloping ground take-off;
    (B) pinnacle and ridgeline take-off;
  (iv) climbs helicopter steeply after take-off;
  (v) avoids obstacles and terrain;
  (vi) establishes climb to LSALT.

2.3 **NV1.3 – Manage abnormal and emergency situations using NVG**

(a) controls helicopter;

(b) identifies and confirms abnormal or emergency situations during aided flight;

(c) manages abnormal or emergency situation;

(d) manages inadvertent entry into IMC and re-establishment of VMC:
  (i) manages loss of visual cues on take-off and landing during operations devoid of surrounding cultural lighting.

2.4 **NV1.4 – Conduct NVIS operation**

(a) perform role functions;

(b) manage flight during multi-crew NVG operations:
  (i) ensures that all crew members have role clarity and relevant information to achieve goals;
  (ii) ensures clear communications using standard operating procedures in accordance with Company Operations Manual;
  (iii) manages changing priorities and, if necessary, re-focuses crew members to accommodate the changed priorities;
  (iv) corrects individual or crew member deviations from standards;

(c) threat and error management:
  (i) identifies environmental or operational threats that could affect the safety of the flight;
  (ii) develops options to mitigate or control threats;
  (iii) applies checklists and standard operating procedures to prevent aircraft handling, procedural or communication errors, and identifies committed errors before safety is affected or aircraft enters an undesired aircraft state;
  (iv) recognises undesired aircraft state;
  (v) manipulates aircraft controls or systems, or modifies actions or procedures, to correct undesired aircraft state in the time available.

3 Range of variables

(a) activities are performed in accordance with published procedures;

(b) for the class 1 endorsement, IFR where applicable;

(c) for the class 2 endorsement, NVFR conditions;

(d) goggled and de-goggled flight;

(e) approved aircraft fitted with flight instruments, including attitude and stabilised heading indicators with lighting adapted to NVG standards;

(f) operations without visible horizon;

(g) simulated hazardous weather;

(h) simulated abnormal and emergency situations;

(i) lit and unlit HLS.

4 Underpinning knowledge of the following:

(a) the topics mentioned in Section 2.6, Night vision imaging system (NVIS) rating of Schedule 3 of this MOS;

(b) NVG equipment;

(c) human and aeromedical factors;

(d) NVG environment;

(e) terrain interpretation and navigation;

(f) NVG regulations;

(g) NVG flight planning;

(h) crew coordination;

(i) dangers of non-NVG-trained personnel and non-compatible lighting at landing sites.

LOW LEVEL RATING

LL-A Aeroplane low-level operations

1 Unit description

This unit describes the skills and knowledge required to safely conduct low-level operations in aeroplanes.

2 Elements and performance criteria

2.1 **LL-A.1 – Plan low-level operations**

(a) identify hazards, evaluate and manage risks at low level;

(b) complete consultation with all stake holders involved in the low-level operation to confirm task requirements;

(c) ensure aeroplane type and performance capability is appropriate for the task;

(d) assess and allow for the effects of fatigue and physical health on pilot performance;

(e) analyse and apply actual and forecast weather conditions to low-level operations;

(f) identify area of operations using chart and geographical features;

(g) assess geographical characteristics of the area of flying operations to ensure safe completion of the task;

(h) confirm location of ground support personnel when available;

(i) conduct appropriate reconnaissance and pre-manoeuvre or other relevant checks prior to descending below 500 ft AGL.

2.2 **LL-A.2 – Flight component**

(a) correctly performs pre-flight inspection and determine aircraft serviceability for intended flight;

(b) initialises and checks data validity of area navigation system (if fitted);

(c) correctly operates aircraft;

(d) correctly performs take-off.

2.3 **LL-A.3 – Aircraft handling**

2.3.1 For this element, manoeuvres are performed at an altitude above 3,000 ft AGL for training purposes:

(a) perform level flight, climbing and descending turns up to 60° angle of bank (45° for multi-engine aircraft):

(i) visual references utilised;

(ii) speed monitored;

(iii) bank attitude maintained;

(iv) pitch attitude adjusted for bank angle;

(v) desired altitude maintained;

(vi) rollout and level off anticipated;

(b) perform approach and recovery to the stall in level flight:

(i) recognise approach to stall conditions;

(ii) maintain references by visual cues;

(iii) identify the approach to stall;

(iv) recover by AOA reduction and power application to minimise height loss;

(v) reconfigure aeroplane;

(c) perform approach to the stall in turning flight and recovers:

(i) recognise approach to stall conditions;

(ii) maintain references by visual cues;

(iii) identify the approach to stall;

(iv) recover by AOA reduction and power application to minimise height loss;

(v) reconfigures aeroplane;

(d) recover from wing drop at the stall to straight and level in various configurations (limited to single-engine aeroplanes):

(i) identify the approach to stall;

(ii) recognise wing drop at the stall;

(iii) reduce angle of attack to unstall the wing;

(iv) prevent yaw;

(v) use available power and height to increase the aircraft energy state;

(vi) avoid secondary stall;

(vii) re-establish desired flight path and aircraft control with balanced control application;

(viii) reconfigure aeroplane as required;

(e) perform maximum rate turning:

(i) apply maximum performance turning criteria;

(ii) maximum power applied;

(iii) maximum bank applied for turning performance commensurate with speed;

(iv) maximum permitted ‘g’ applied commensurate with speed;

(v) achieve turning at maximum AOA;

(vi) ensure aeroplane does not stall or exceed permitted G limits;

(vii) release ‘g’ force during roll out of turn;

(f) perform minimum radius turning:

(i) apply minimum radius turning criteria;

(ii) maximum power applied;

(iii) height as low as safely practical;

(iv) recognise stall warning indications (at the approach to the stall);

(v) ensure aeroplane does not stall;

(vi) release ‘g’ force immediately prior to rolling out of the turn;

(g) manage the energy state of the aircraft:

(i) identify high kinetic energy situations;

(ii) identify low kinetic energy situations;

(iii) identify high potential energy situations;

(iv) identify low potential energy situations;

(h) perform a forced landing following a simulated engine failure (single-engine aircraft only).

2.4 LL-A.4 – Low-level handling

2.4.1 For this element, manoeuvres are performed, manoeuvres are performed at an altitude of below 500 ft AGL but not below 100 ft AGL:

(a) manage the aircraft energy state;

(b) identify wind velocity;

(c) perform straight flight:

(i) adjust height according to terrain to maintain assigned height above ground level;

(ii) recognise and manage the effect of rising and descending terrain on aircraft performance;

(iii) compensate for drift;

(d) perform turning at various bank angles up to 60° angle of bank at normal cruise speed:
   (i) perform lookout;
   (ii) adjust power as required;
   (iii) manage the effects of flying over featureless terrain or water;
   (iv) recognise and manages the effect of rising and descending terrain on aircraft performance;
   (v) compensate for the effect of gradient wind;
   (vi) anticipate rollout;

(e) conduct procedure turns from a fixed ground reference point and compensate for the effect of gradient wind;

(f) demonstrate knowledge of the effect of false horizons;

(g) recognise and manage impact of sun glare on increased risk of collision with obstacles;

(h) demonstrate use of escape routes and rising ground;

(i) demonstrate flight at various speed and configurations not below the calculated stall speed +15 KIAS or safe single-engine speed +15 KIAS (for multi-engine aeroplanes);

(j) identify and maintain safe distance from pole stay wires;

(k) operate adjacent to powerlines and wires;

(l) identify the requirement to operate in the vicinity of powerlines and wires and assess risk;

(m) demonstrate awareness of wind effect in the vicinity of obstructions, mountainous terrain and illusions;

(n) identify poles, cross trees, wires and insulators to assist powerline and wire location;

(o) recognise and control the illusion of slipping and skidding during turns close to the ground;

(p) recognise the effect of rising and descending terrain on aircraft performance;

(q) comply with airspace requirements and procedures;

(r) demonstrate correct navigation techniques and procedures at low level;

(s) navigate to a predetermined destination at a height below 500 ft AGL;

(t) correctly performs low level circuit and landing.

2.5 **LL-A.6 – Execute forced landing (simulated) from below 500 ft AGL (single-engine aeroplane only)**

(a) identify potential forced-landing areas prior to and during low-level operations;

(b) recognise engine failure or any other emergency requiring a forced landing and conduct recall actions;

(c) maintain control of the aircraft – select the most appropriate landing area within gliding distance while avoiding any powerlines or obstructions;

(d) manoeuvre the aircraft to a landing area that achieves the safest outcome;

(e) explain plan of action and the landing techniques that would ensure the safest outcome when committed to a forced landing on unfavourable terrain or water.

2.6 **LL-A.7 – Execute engine failure (simulated) from below 500 ft AGL (multi-engine aeroplane only)**

(a) identify potential escape routes prior to and during low-level operations;

(b) recognise engine failure or any other emergency and conduct recall actions;

(c) maintain control of the aeroplane;

(d) initiate climb to safe altitude;

(e) manoeuvre the aeroplane via escape route to a safe altitude;

(f) complete check system items;

(g) explain plan of action.

2.7 **LL-A.8 – Operate at low level in hilly terrain**

(a) safely manipulate the aeroplane at low level in hilly terrain;

(b) establish and maintain safe height relevant to application type;

(c) demonstrate safe contour flying;

(d) identify and select appropriate natural markers to aid situational awareness;

(e) demonstrate safe approaches to higher ground, including identification of escape routes;

(f) demonstrate safe turns in hilly terrain;

(g) demonstrate awareness and management of the effects of wind and turbulence in hilly terrain, including lee effects;

(h) demonstrate awareness of illusions in hilly terrain, including false horizon effect and shadows.

3 Range of variables

(a) activities are performed in accordance with published procedures;

(b) day VFR in variable weather conditions;

(c) alternate landing areas;

(d) obstructions and vertical terrain;

(e) up to and including light turbulence;

(f) simulated emergency and abnormal situations;

(g) simulated hazardous weather;

(h) multi-engine and single-engine aeroplanes;

(i) winds in excess of 10 kts.

4 Underpinning knowledge of the following:

(a) the topics mentioned in Section 2.5, Low-level rating in Schedule 3 of this MOS;

(b) minimum height for flight by an aircraft over a city, town or populous area;

(c) legislative restrictions applicable to low flying;

(d) minimum lateral and vertical distances that an aircraft must avoid persons, vessels, vehicles, structures or livestock over a sparsely populated area;

(e) dangers associated with ‘out of balance’ flight manoeuvres when flying at low level;

(f) maximum rate turns and minimum radius turn criteria;

(g) aeroplane limitations;

(h) how unintended spinning may be induced.

LL-H Helicopter low-level operations

1 Unit description

This unit describes the skills and knowledge required to safely conduct low-level operations in helicopters.

2 Elements and performance criteria

2.1 LL-H.1 – Plan low-level operations

(a) identify, evaluate and manage risks at low level;

(b) complete consultation with all stake holders involved in the low-level operation to confirm task requirements;

(c) ensure aircraft type and performance is appropriate for the task;

(d) assess and allow for the effects of fatigue and physical health on pilot performance;

(e) analyse and apply actual and forecast weather conditions to low-level operations;

(f) identify area of operations using chart and geographical features;

(g) assess geographical characteristics of the area of flying operations to ensure safe completion of the task;

(h) identify and avoid all obstructions;

(i) identify and avoid buildings, personnel, vehicles, animals, vegetation and nuisance areas.

2.2 LL-H.2 – Flight component

(a) correctly perform pre-flight inspection and determine aircraft serviceability for intended flight;

(b) initialise and check data validity of area navigation system (if fitted);

(c) correctly operate aircraft;

(d) correctly perform take-off.

2.3 LL-H.3 – Aircraft handling (at an altitude above 1,500 ft AGL)

(a) conduct pre-manoeuvre checks for each manoeuvre;

(b) demonstrate level flight, climbing and descending turns up to 60° angle of bank as follows:

- (i) visual references utilised;
- (ii) speed monitored;
- (iii) bank attitude maintained;
- (iv) pitch attitude adjusted for bank angle;
- (v) desired altitude maintained;
- (vi) rollout and level off anticipated;

(c) recognise the approach and demonstrate the recovery to retreating blade stall in level flight as follows:

- (i) configure aircraft appropriately;
- (ii) recognise approach to retreating blade stall conditions;
- (iii) maintain references by visual cues;
- (iv) recover by reduction of collective (AOA) (consistent with available height and power application);

(d) recognise the approach and demonstrate the recovery to retreating blade stall in turning flight as follows:

- (i) configure aircraft appropriately;
- (ii) recognise approach to retreating blade stall conditions;
- (iii) maintain references by visual cues;
- (iv) recover by AOA reduction (consistent with available height and power application);

(e) apply correct techniques for upset recovery in various configurations as follows:
  (i) configure aircraft appropriately;
  (ii) recognise upset condition;
  (iii) maintain references by visual cues;
  (iv) recover to level flight condition;

(f) Reserved

(g) Reserved

(h) manage the energy state of the aircraft for the following:
  (i) identify high kinetic energy situations;
  (ii) identify low kinetic energy situations;
  (iii) identify high potential energy situations;
  (iv) identify low potential energy situations.

2.4 **LL-H.4 – Low-level handling (at an altitude of 200 ft AGL but not below 5 ft AGL)**

(a) manage the aircraft energy state;

(b) perform straight flight as follows:
  (i) adjust height according to terrain to maintain assigned height above ground level;
  (ii) recognise and manage the effect of rising and descending terrain on aircraft performance;
  (iii) compensate for drift;

(c) perform turning at various bank angles up to 60° angle of bank at normal cruise speed as follows:
  (i) adjust power as required;
  (ii) recognise and manage the effect of rising and descending terrain on aircraft performance;
  (iii) compensate for the effect of gradient wind;
  (iv) anticipate rollout;

(d) demonstrate use of escape routes and rising ground;

(e) demonstrate flight at various speed and configurations not below (safe single-engine speed +15 KIAS for multi-engine aircraft);

(f) operate adjacent to powerlines and wires;

(g) demonstrate awareness of wind effect in the vicinity of obstructions, mountainous terrain and illusions;

(h) recognise and control the illusion of slipping and skidding during turns close to the ground;

(i) recognise the effect of rising and descending terrain on aircraft performance;

(j) maintain a constant altitude over featureless terrain or water;

(k) conduct procedure turns from a fixed ground reference point;

(l) demonstrate knowledge of the effect of false horizons;

(m) recognise and manage impact of sun glare on increased risk of collision with obstacles;

(n) identify escape routes and rising ground;

(o) identify the requirement to operate in the vicinity of powerlines and wires and assesses risk;

(p) identify and avoid powerlines (wires) by a minimum of 15 ft when crossing overhead;

(q) identify and avoid all powerlines and wires;

(r) identify poles, cross trees, wires and insulators to assist powerline and wire location;

(s) identify and avoid pole stay wires;

(t) perform quick stop manoeuvres; into wind and downwind entry as follows:

(i) identify termination point;
(ii) decelerate helicopter;
(iii) balance helicopter and maintain direction and altitude;
(iv) maintain helicopter outside height velocity diagram requirements;
(v) hover over the termination point;
(vi) perform quick stop manoeuvres, downwind entry;
(vii) identify termination point;
(viii) turn 180° by controlled corrective action (downwind entry);
(ix) turn helicopter into wind and initiate deceleration;
(x) balance helicopter and maintain direction and altitude;

(u) perform flight at various speed and configurations;
(i) identify and maintain safe distance from pole stay wires;
(ii) navigate to a predetermined destination at altitude below 500 ft AGL;
(iii) comply with airspace requirements and procedures;
(iv) demonstrate correct navigation techniques and procedures at low level;
(v) correctly perform low level circuit and landing;
(vi) correctly perform after landing and shutdown checks.

2.5 LL-H.5 – Execute autorotative forced landing (simulated) from below 500 ft AGL (single-engine helicopter only)

(a) identify potential forced-landing areas prior to and during low-level operations;

(b) recognise engine failure or any other emergency requiring a forced landing and conduct recall actions;

(c) maintain control of the aircraft – select the most appropriate landing area within gliding distance while avoiding any powerlines or obstructions;

(d) manoeuvre the aircraft to a landing area that achieves the safest outcome;

(e) explain plan of action and the landing techniques that would ensure the safest outcome when committed to a forced landing on unfavourable terrain or water.

2.6 LL-H.6 – Execute engine failure (simulated) from below 500 ft AGL (multi-engine helicopter only)

(a) identify potential escape routes prior to and during low-level operations;

(b) recognise engine failure or any other emergency and conduct recall actions;

(c) maintain control of the aircraft – initiate climb to safe altitude;

(d) manoeuvre the aircraft via escape route to a safe altitude;

(e) complete check system items;

(f) explain plan of action.

2.7 LL-H.7 – Operate at low level in hilly terrain

(a) safely manipulate the aeroplane at low level in hilly terrain;

(b) establish and maintain safe height relevant to application type;

(c) demonstrate safe contour flying;

(d) identify and select appropriate natural markers to aid situational awareness;

(e) demonstrate safe approaches to higher ground, including identification of escape routes;

(f) demonstrate safe turns in hilly terrain;

(g) demonstrate awareness and management of the effects of wind and turbulence in hilly terrain, including lee effects;

(h) demonstrate awareness of illusions in hilly terrain, including false horizon effect and shadows.

3 Range of variables

(a) activities are performed in accordance with published procedures;

(b) day VFR;

(c) approved helicopter with dual controls, electronic intercom and dual control brakes if fitted;

(d) aerodromes or HLS;

(e) hazards may include variable terrain and weather, surface conditions, other aircraft, lose objects, personnel, animals, birds propeller wash, rotor wash, jet blast and negative ‘g’ in teetering rotor systems;

(f) limitations may be imposed by local noise abatement procedures and curfews.

4 Underpinning knowledge of the following:

(a) the topics mentioned in Section 2.5, Low-level rating in Schedule 3 of this MOS;

(b) maximum rate and minimum rate turn criteria;

(c) the effect of wind velocity in low-level operations;

(d) the effect of aircraft inertia at low level;

(e) effects of illusions;

(f) obstruction avoidance techniques;

(g) critical operational conditions, including retreating blade stall, vortex ring, over pitching loss of anti-torque effectiveness and negative ‘g’ effects;

(h) meteorological factors affecting helicopter performance at low level;

(i) terrain following techniques;

(j) safety hazards and risks of low-level operations and methods of control.

LL-PL Powered-light low-level operations – *Reserved*

LL-G Gyroplane low-level operations

1 Unit description

This unit describes the skills and knowledge required to manoeuvre a helicopter safely and effectively at low level, in accordance with the following provisions.

2 Elements and performance criteria

2.1 LL-G.1 – Plan low-level operations

(a) identifies, evaluates and manages risks at low level;

(b) complete consultation with all stake holders involved in the low-level operation to confirm task requirements;

(c) ensures aircraft type and performance is appropriate for the task;

(d) assesses and allows for the effects of fatigue and physical health on pilot performance;

(e) analyses and applies actual and forecast weather conditions to low-level operations;

(f) identifies area of operations using chart and geographical features;

(g) assesses geographical characteristics of the area of flying operations to ensure safe completion of the task;

(h) identifies and avoid all significant obstructions;

(i) identifies and avoids buildings, personnel, vehicles, animals, vegetation and nuisance areas

2.2 LL-G.2 – Flight component

(a) correctly performs pre-flight inspection and determine aircraft serviceability for intended flight;

(b) initialises and checks data validity of area navigation system (if fitted);

(c) correctly operates aircraft;

(d) correctly performs take-off.

2.3 LL-G.3 – Aircraft handling

(a) at an altitude above 1,500 ft AGL:
  - (i) conducts pre-manoeuvre checks;
  - (ii) performs an effective lookout;
  - (iii) demonstrates level flight, climbing and descending turns up to 60° angle of bank;
    - (A) visual references utilised;
    - (B) speed monitored;
    - (C) bank attitude maintained;
    - (D) pitch attitude adjusted for bank angle;
    - (E) desired altitude maintained;
    - (F) lookout performed;
    - (G) rollout and level off anticipated;
  - (iv) demonstrates approach and recovery to stall in level flight;
    - (A) clearing turns;
    - (B) configures aircraft;
    - (C) recognises approach to stall conditions;
    - (D) maintains references by visual cues;
    - (E) recovers by AOA reduction (consistent with available height) and power application;

(v) demonstrates approach and recovery to stall in turning flight;
  (A) clearing turns;
  (B) configures aircraft;
  (C) recognises approach to stall conditions;
  (D) maintains references by visual cues;
  (E) recovers by AOA reduction (consistent with available height) and power application;
(vi) applies correct techniques for upset recovery in various configurations;
  (A) clearing turns;
  (B) configures aircraft;
  (C) recognises approach to stall conditions;
  (D) maintains references by visual cues;
  (E) identifies the approach to stall;
  (F) recovers by AOA reduction (consistent with available height);
(vii) demonstrates maximum rate turning;
  (A) knows maximum performance turning criteria;
  (B) area cleared;
  (C) maximum power applied;
  (D) maximum bank applied for turning performance commensurate with speed;
  (E) maximum permitted ‘g’ applied commensurate with speed;
  (F) achieves turning at maximum AOA;
  (G) aircraft does not stall or exceed permitted ‘g’ limits;
  (H) performs lookout;
  (I) anticipates rollout;
  (J) releases ‘g’ force during roll out of turn;
(viii) demonstrates minimum radius turning;
  (A) knows minimum radius turning criteria;
  (B) area cleared;
  (C) maximum power applied;
  (D) height as low as practical (1,500 ft AGL);
  (E) maximum AOA maintained;
  (F) aircraft does not stall;
  (G) performs lookout;
  (H) anticipates rollout;
  (I) releases ‘g’ forces while rolling out of the turn;
(ix) demonstrates methods of losing height in a turn and straight flight;
(x) manages the energy state of the aircraft;
  (A) identifies high kinetic energy situations;
  (B) identifies low kinetic energy situations;
  (C) identifies high potential energy situations;
  (D) identifies low potential energy situations.

2.4 **LL-G.4 – Low level handling**

(a) at an altitude of 200 ft AGL but not below 50 ft AGL:
  (i) manage the aircraft energy state;
  (ii) perform straight flight:
    (A) adjust height according to terrain to maintain assigned height above ground level;

(B) recognise and manage the effect of rising and descending terrain on aircraft performance;

(C) compensate for drift;

(iii) perform turning at various bank angles up to 60° angle of bank at normal cruise speed;

(A) adjust power as required;

(B) recognise and manage the effect of rising and descending terrain on aircraft performance;

(C) compensate for the effect of gradient wind;

(D) anticipate rollout;

(iv) demonstrate use of escape routes and rising ground;

(v) demonstrate flight at various speed and configurations not below minimum safe speed + 15 KIAS;

(vi) operate adjacent to powerlines and wires;

(vii) demonstrate awareness of wind effect in the vicinity of obstructions, mountainous terrain and illusions;

(viii) recognise and control the illusion of slipping and skidding during turns in windy conditions;

(ix) recognise the effect of rising and descending terrain on aircraft performance;

(x) maintain a constant altitude over featureless terrain or water;

(xi) conduct procedure turns from a fixed ground reference point;

(xii) demonstrate knowledge of the effect of false horizons;

(xiii) recognise and manage impact of sun glare on increased risk of collision with obstacles;

(xiv) identify the requirement to operate in the vicinity of powerlines and wires and assesses risk;

(xv) identify and avoid powerlines (wires) by a minimum of 15 ft (-0 ft) when crossed overhead by an aircraft;

(xvi) identify and avoid all powerlines and wires;

(xvii) identify poles, cross trees, wires and insulators to assist powerline and wire location;

(xviii) identify and avoid pole stay wires;

(xix) navigate to a predetermined destination at altitude below 500 ft AGL;

(xx) maintain a constant altitude over featureless terrain or water;

(xxi) conduct procedure turns from a fixed ground reference point;

(xxii) comply with airspace requirements and procedures;

(xxiii) demonstrate correct navigation techniques and procedures at low level;

(xxiv) correctly perform low-level circuit and landing;

(xxv) correctly perform after landing and shutdown checks.

2.5 **LL-G.5 – Execute autorotative forced landing (simulated) from below 500 ft AGL (single-engine gyrocopter only)**

(a) identify potential forced-landing areas prior to and during low-level operations;

(b) recognise engine failure or any other emergency requiring a forced landing and conduct recall actions;

(c) maintain control of the aircraft – select the most appropriate landing area within gliding distance while avoiding any powerlines or obstructions;

(d) manoeuvre the aircraft to a landing area that achieves the safest outcome;

(e) explain plan of action and the landing techniques that would ensure the safest outcome when committed to a forced landing on unfavourable terrain or water.

2.6 **LL-G.6 – Operate at low level in hilly terrain**

(a) safely manipulate the aeroplane at low level in hilly terrain;

(b) establish and maintain safe height relevant to application type;

(c) demonstrate safe contour flying;

(d) identify and select appropriate natural markers to aid situational awareness;

(e) demonstrate safe approaches to higher ground, including identification of escape routes;

(f) demonstrate safe turns in hilly terrain;

(g) demonstrate awareness and management of the effects of wind and turbulence in hilly terrain, including lee effects;

(h) demonstrate awareness of illusions in hilly terrain, including false horizon effect and shadows.

3 Range of variables

(a) activities are performed in accordance with published procedures;

(b) day VFR;

(c) approved gyroplane dual controls, electronic intercom and dual control brakes if fitted;

(d) aerodromes or landing areas;

(e) hazards may include variable terrain and weather, surface conditions, other aircraft, lose objects, personnel, animals, birds propeller wash, rotor wash, jet blast and negative ‘g’ in teetering rotor systems;

(f) limitations may be imposed by local noise abatement procedures and curfews.

4 Underpinning knowledge of the following:

(a) the topics mentioned in Section 2.5, Low-level rating in Schedule 3 of this MOS;

(b) maximum rate and minimum rate turn criteria;

(c) the effect of wind velocity in low-level operations;

(d) the effect of aircraft inertia at low level;

(e) effects of illusions;

(f) obstruction avoidance techniques;

(g) critical operational conditions, including retreating blade stall, blade flap, and negative ‘g’ effects;

(h) meteorological factors affecting performance at low level;

(i) terrain following techniques;

(j) safety hazards and risks of low-level operations and methods of control.

LL-M Aerial mustering operations

1 Unit description

This unit describes the skills and knowledge required to conduct aerial mustering operations.

2 Elements and performance criteria

2.1 LL-M.1 – Plan a stock mustering operation

Formulate a stock mustering operation plan, including:

(a) determination of location and boundaries of the area of operation, terrain features;

(b) suitability and serviceability of aircraft, starting point, positioning of support personnel, final destination of stock, location and suitability of landing areas;

(c) present and forecast weather;

(d) methods of communication and signals;

(e) hazards and obstructions;

(f) emergency procedures to ensure the safe and effective operation.

2.2 LL-M.2 – Manoeuvre aircraft to the limits of the flight-manoeuvring envelope

(a) manoeuvre aircraft in all planes below 500 ft AGL, up to and not beyond the limits of the flight-manoeuvring envelope, without exceeding the operating limitations of the aircraft;

(b) in addition to the performance criterion in paragraph (a), for helicopters, perform reversal turns, decelerations, steep turns, climb and descent manoeuvres, low and high speed manoeuvres within the following standards:

  (i) ensure power available exceeds power required;

  (ii) conduct hovering only when OGE power is available for the gross weight, density altitude and relative wind conditions;

  (iii) avoid conditions conducive to loss of tail rotor effectiveness;

  (iv) avoid negative ‘g’ and reduced disc loading flight manoeuvres in teetering main rotor head systems;

  (v) avoid vortex ring conditions during quick stop/deceleration manoeuvres and recovery from low airspeed descending manoeuvres;

  (vi) remain below V_{MAX} and V_{NE} limits;

  (vii) comply with weight/velocity avoid combinations;

(c) in addition to the performance criterion in paragraph (a), for gyroplanes, perform reversal turns, decelerations, steep turns, climb and descent manoeuvres, low and high speed manoeuvres within the following standards:

  (i) manoeuvre the gyroplane at speeds above the speed that ensures the gyroplane is not ‘behind the power curve’ (power available is greater than power required);

  (ii) avoid negative ‘g’ manoeuvres;

  (iii) V_{MAX} and V_{NE} limits are not exceeded;

  (iv) balances gyroplane.

2.3 LL-M.3 – General manoeuvring

(a) achieves desired ground tracks;

(b) maintains visual contact with the ground;

(c) manages the effect of wind and turbulence.

2.4 LL-M.4 – Conduct a stock mustering operation using an aircraft

(a) coordinates and conducts the assembly and movement of stock to predetermined destination in the time available, safely and effectively, using an aircraft;

(b) establishes and maintains an effective communication system with stock mustering people on the ground.

3 Range of variables

(a) activities are performed in accordance with published procedures;

(b) day VFR;

(c) for the aerial mustering – aeroplane endorsement, the aircraft must be an aeroplane;

(d) for the aerial mustering – helicopter endorsement, the aircraft must be an helicopter;

(e) for the aerial mustering – gyroplane endorsement, the aircraft must be an gyroplane;

(f) obstructions and vertical terrain;

(g) up to and including light turbulence;

(h) simulated emergency or abnormal situations;

(i) simulated hazardous weather;

(j) stock.

4 Underpinning knowledge of the following:

(a) the topics mentioned in Section 2.5, Low-level rating in Schedule 3 of this MOS;

(b) maximum rate and minimum rate turn criteria;

(c) the effect of wind velocity in low-level operations;

(d) the effect of aircraft inertia at low level;

(e) effects of illusions;

(f) obstruction avoidance techniques;

(g) critical operational conditions, including, aerodynamic stall, retreating blade stall, blade flap, and negative ‘g’ effects;

(h) meteorological factors affecting performance at low level;

(i) terrain following techniques;

(j) safety hazards and risks of low-level operations and methods of control.

LL-SO Sling operations

1 Unit description

This unit describes the skills and knowledge required to conduct sling operations.

2 Elements and performance criteria

2.1 LL-SO.1 – Prepare and rig a sling load

(a) tasking requirements are identified;

(b) external load is secured, stabilised and rigged in accordance with workplace procedures and AFM or POH.

2.2 LL-SO.2 – Plan external load operations

(a) external load procedure, equipment and personnel required for task are determined;

(b) helicopter performance data is interpreted and calculated to ensure suitability of aircraft for external load operations;

(c) outbound and return flight routes are planned;

(d) secure and stable load preparations are arranged;

(e) load lifting equipment strength and suitability are assessed.

2.3 LL-SO.3 – Conduct pre-flight briefings for external load operations

(a) requirements of the load task are explained and confirmed;

(b) personnel responsible for inspecting the load lifting equipment for serviceability and security are identified;

(c) communication and hook-up procedure is explained;

(d) hook-up person and hook-up procedure is specified;

(e) departure, transit, approach, termination and load release procedures are explained;

(f) emergency procedures are explained and confirmed;

(g) pilot vertical reference (long line) procedure is explained if applicable;

(h) crew and ground loadmaster are briefed on all aspects of the load lifting task;

(i) seating is adjusted to ensure full exercise of the flight controls and the ability to scan the instrument panel;

(j) helicopter performance data is interpreted and calculated to ensure suitability of aircraft for operations;

(k) the removal of doors and the security of internal equipment is arranged as required.

2.4 LL-SO.4 – Operate the aircraft during external load operations

(a) functional and safety checks on role equipment are performed, and defects are reported;

(b) fuel and cargo load combinations to achieve task are calculated;

(c) adequacy of power margin and directional control are determined;

(d) stable hover over the load during hook-up/delivery procedures is maintained;

(e) external load is lifted and transported to a separate location and placed at a specified position;

(f) load is monitored and appropriate actions are taken to ensure load security and stability during flight;

(g) excessive load swing during transit is avoided.

2.5 LL-SO.5 – Manage abnormal and emergency situations during external load operations

(a) helicopter control is maintained;

(b) abnormal or emergency situations are identified and managed in accordance with workplace procedures and AFM or POH;

(c) load is jettisoned when appropriate.

2.6 **LL-SO.6 – Conduct post-flight activities for external load operations**

(a) operating procedures and outcomes of the flight are reviewed and analysed;

(b) effectiveness, efficiency and performance of equipment is analysed and reported.

3 Range of variables

(a) activities are performed in accordance with published procedures;

(b) tasks that may be undertaken in variable weather in day VFR and NVFR conditions;

(c) performance must be demonstrated in:

  (i) an aircraft capable of hovering;

  (ii) variable air traffic conditions;

  (iii) variable flight situations;

  (iv) abnormal situations;

(d) performance must be demonstrated on aircraft with:

  (i) fully functioning dual controls;

  (ii) an electronic intercom system;

  (iii) dual control brakes;

  (iv) wheeled or skidded undercarriages;

  (v) NVFR environment may include:

    (A) unaided;

    (B) aided utilising night vision devices;

(e) crew may include:

  (i) single pilot;

  (ii) multi-crew;

(f) load lifting may be carried out:

  (i) with crewman;

  (ii) without crewman.

4 Underpinning knowledge of the following:

(a) the topics mentioned in Section 2.5, Low-level rating in Schedule 3 of this MOS;

(b) relevant sections of Civil Aviation Safety Regulations and Civil Aviation Orders;

(c) engine performance checks for the helicopter type to be flown;

(d) aircraft performance calculations (for all phases of flight);

(e) internal and external load limitations for the aircraft type to be flown;

(f) aerial delivery equipment operation, safe working loads and limitations;

(g) cargo hook limitations, problems and hazards;

(h) load rigging and preparation for flight;

(i) principles of aerodynamics;

(j) control effectiveness in all phases of flight;

(k) hazards that exist and problems that can occur when operating an aircraft during external load operations;

(l) procedures to address problems associated with a helicopter during external load operations;

(m) aircraft dimensions;

(n) vertical reference (long line) operation procedures if applicable;
(o) external load lifting equipment inspection procedures;
(p) communication procedure and terminology applicable to external load operations.

LL-WR Winch and rappelling operations

1 Unit description

This unit describes the skills and knowledge required to conduct winch and rappelling operations.

2 Elements and performance criteria

2.1 LL-WR.1 – Plan roping operations

(a) tasking requirements are identified;

(b) crew roping personnel and equipment required to ensure safe achievement of task are determined;

(c) aircraft performance is interpreted and calculated to ensure suitability of aircraft for roping operations;

(d) transit, roping operation communications and recovery is planned in accordance with workplace procedures;

(e) roping personnel qualifications are confirmed;

(f) roping operations abnormal and emergency situation actions are planned.

2.2 LL-WR.2 – Conduct pre-flight briefings for roping operations

(a) requirements of the roping operation are explained and confirmed;

(b) location, terrain features (sea state as applicable) and forecast weather conditions are obtained and confirmed;

(c) timings, route(s), airspeeds and altitudes are confirmed;

(d) pilot, crew and roping personnel responsibilities and communication procedures are explained;

(e) roping operation emergency procedures are explained.

2.3 LL-WR.3 – Operate the helicopter during roping operations

(a) site inspection, approach and hover heading are determined in accordance with operational requirements;

(b) descent and approach is controlled to terminate over the roping site;

(c) adequacy of hover power margin and control limits to perform roping operations is checked and maintained;

(d) control is applied to the aircraft to maintain position over roping site;

(e) obstacle clearances are maintained during roping operations;

(f) crew member is directed/cleared to deploy ropes;

(g) roping team is directed when clear to perform roping operation in accordance with workplace procedures;

(h) ropes are recovered/detached and site vacated in accordance with workplace procedures.

2.4 LL-WR.4 – Manage abnormal and emergency situations during roping operations

(a) aircraft control is maintained;

(b) abnormal or emergency situations are identified and managed in accordance with workplace procedure and AFMAFM or POH.

2.5 LL-WR.5 – Conduct post-flight briefings for roping operations

(a) operating procedures and outcomes of the flight are reviewed and analysed;

(b) effectiveness, efficiency and performance of equipment is analysed and reported.

3 Range of variables

(a) activities are performed in accordance with published procedures;

(b) tasks may be undertaken in variable weather conditions in accordance with day VFR and NVFR;

(c) performance may be demonstrated in:
   (i) an aircraft capable of hovering;
   (ii) variable air traffic conditions;
   (iii) variable flight situations;
   (iv) abnormal situations;

(d) performance must be demonstrated on a helicopter or tilt rotor aircraft with:
   (i) fully functioning dual controls;
   (ii) an electronic intercom system;
   (iii) dual control brakes;
   (iv) wheeled or skidded undercarriages;
   (v) night aided vision devices;

(e) NVFR environment may include:
   (i) unaided;
   (ii) aided utilising night vision devices;

(f) operational environments may include:
   (i) unprepared landing sites;
   (ii) confined areas;
   (iii) unknown landing sites;
   (iv) pinnacles;
   (v) embarked/sea platforms;
   (vi) marine environments;

(g) crew may include:
   (i) single pilot;
   (ii) multi-crew;

(h) limitations may be imposed by local noise abatement requirements and curfews;

(i) roping may include:
   (i) rappelling;
   (ii) fast rope;

(j) checklists may include:
   (i) AFM or POH approach and landing;
   (ii) hover;
   (iii) pre-roping;

(k) class of airspace are:
   (i) those designated by CASA;
   (ii) restricted and danger areas;
   (iii) military control zones;
   (iv) Air Defence identification zones;

(l) operational hazards during low-level operations may include:
   (i) structures;
   (ii) other aircraft;
   (iii) loose objects;
   (iv) birds;
   (v) engine salt ingestion;
   (vi) trees;

(vii) dust;
(viii) low visibility;
(ix) turbulence;
(x) wind strength;
(xi) sea state;

(m) guidance during low-level operations may be provided by:
(i) air traffic control instructions;
(ii) light signals;
(iii) aerodrome markings;

(n) procedures for maintaining compliance with airspace requirements are:
(i) geographical limits of the flight area are demonstrated on a chart;
(ii) prominent geographical features are identified using a chart;
(iii) the limits of the flight area are identified on the ground;
(iv) the position of controlled airspace is determined using a chart and geographical features;
(v) restricted areas are identified using a chart and geographical features;
(vi) departure from the circuit (roping) area and transition to the flight area is completed without incident;
(vii) departure from the flight area and transition to the circuit (roping) area is completed without incident;

(o) dependent on the type of organisation concerned and the local terminology used, workplace procedures may include:
(i) company procedures;
(ii) enterprise procedures;
(iii) organisational procedures;
(iv) established procedures;
(v) standard operating procedures;

(p) information/documents may include:
(i) relevant sections of CASR 1998 and CAOs, including day VFR;
(ii) in Defence context, relevant Defence Orders and Instructions;
(iii) AFM or POH;
(iv) this MOS;
(v) AIP;
(vi) ERSA;
(vii) charts;
(viii) operations manuals;
(ix) approved checklists;
(x) workplace procedures and instructions and job specification;
(xi) induction and training materials;
(xii) conditions of service, legislation and industrial agreements, including workplace agreements and awards;

(q) applicable regulations and legislation may include:
(i) relevant CASR 1998 and CAOs;
(ii) in Defence context, relevant Defence Orders and Instructions;
(iii) relevant state/territory OH&S legislation;
(iv) relevant state/territory environmental protection legislation;
(v) relevant Australian Standards;

(r) performance includes tolerances specified in either of:

(i) relevant licence and aircraft rating requirements of as this MOS:

(ii) relevant Defence documentation such as:

(A) Defence Orders and Instructions;

(B) approved curricula and training documentation.

4 Underpinning knowledge of the following:

(a) the topics mentioned in Section 2.5, Low-level rating in Schedule 3 of this MOS;

(b) relevant sections of CASR 1998 and CAOs;

(c) relevant OH&S and environmental procedures and regulations;

(d) in Defence context, relevant Defence Orders and Instructions;

(e) communication procedure and terminology applicable to roping operations;

(f) engine performance checks for the helicopter type to be flown;

(g) aircraft performance calculations (for all phases of flight);

(h) internal and external load limitations for the helicopter type to be flown, including weight and balance consideration;

(i) functions and effects of all aircraft controls and instruments;

(j) principles of aerodynamics:

(i) control effectiveness in all phases of flight;

(ii) hazards, limitations and problems that can occur when operating an aircraft during roping operations;

(iii) rope and attaching point limitations;

(iv) helicopter dimensions.

AERIAL APPLICATION RATING

AA1 Aeroplane aerial application operation

1 Unit description

This unit describes the skills and knowledge required to conduct aerial application operations other than firefighting operations in aeroplanes.

2 Elements and performance criteria

2.1 **AA1.1 – Pre-flight actions**

(a) conduct self-assessment fit for flight and planned operation;

(b) determine suitability of aircraft for type of operation;

(c) conduct a thorough pre-flight of aircraft and role equipment to determine serviceability for planned operations;

(d) check and correctly complete required maintenance documentation as applicable;

(e) confirm minimum equipment and minimum crew and instrumentation requirements for planned operations are met;

(f) check safe operation of role equipment, including the serviceability of the jettison (dump) door;

(g) check and adjust role equipment calibration;

(h) planning and risk management;

(i) determine the requirement to operate at low level;

(j) identifies hazards, analyses the risks and implement a decision to safely conduct low-level operations – ensures aeroplane type and performance is appropriate for the task;

(k) assesses and allows for the effects of fatigue and physical health on pilot performance;

(l) analyses and applies actual and forecast weather conditions to low-level operations;

(m) develop an Application Management Plan;

(n) correctly interpret treatment area map;

(o) understands that all aircraft limitations, except those exempted by CASA (maximum take-off weight), are applicable to the operation;

(p) adequately identify potential hazards and operational requirements, assess risks and apply appropriate risk controls, including powerlines, houses, susceptible crops and environmentally sensitive areas;

(q) demonstrate an ability to make a command decision on the safety or otherwise of the proposed application, including refusing to undertake an application where the risks are considered to be too high;

(r) make appropriate selection of application pattern and direction of treatment taking into consideration safety, efficiency, hazards and terrain;

(s) carefully plans fuel requirements;

(t) confirms acceptable aircraft performance for conditions;

(u) confirms location of ground support personnel when available;

(v) confirms normal and abnormal ops communications and signals;

(w) confirms appropriate logistical considerations, including local airstrip condition, fuel, products, ground support and access to strip, SARWATCH, water, and personal supplies, including adequate water and food.

2.2 **AA1.2 – Fly to, assess, land and take-off from an operational airstrip**

(a) performs low-level navigation to an operational airstrip at an appropriate height;

(b) performs appropriate assessment of an operational airstrip, including strip length, conditions, direction, identification of hazards, meteorological conditions;

(c) selects the most suitable loading area;

(d) correctly performs pre-landing and pre-take-off checks;

(e) selects a ‘no go, go around, commitment’ point for landings;

(f) selects a touchdown point for landings;

(g) identifies and manages issues relating to aircraft weight, performance, strip length, slope, surface, direction, load, surrounds, hazards and meteorological conditions;

(h) demonstrates appropriate short-field landing and take-off techniques, including having her or his hand on the dump door handle for take-offs and being prepared to dump if required;

(i) identifies an appropriate dumping point for each take-off, including adequate safety buffers;

(j) demonstrates safe operations from a 1-way airstrip.

2.3 **AA1.3 – Fly between operational airstrip and application area**

(a) performs low-level navigation from an operational airstrip to an application area;

(b) selects the most appropriate route and height between the operational strip and application area with considerations to terrain, stock, populated areas, housing and hazards.

2.4 **AA1.4 – Conduct operations at a certified or registered aerodrome**

Performs operations in accordance with the requirements published regulations.

2.5 **AA1.5 – Conduct an aerial survey of a treatment area**

(a) develops an appropriate and safe plan for conduct of an aerial survey;

(b) accurately identifies the treatment area boundaries;

(c) confirms the map;

(d) identifies susceptible crops and environmentally sensitive areas;

(e) identifies hazards on the map;

(f) identifies potential emergency landing area(s);

(g) checks and identifies any hazards not on the map, including sun glare and shadows from hills;

(h) accurately assesses wind speed and direction;

(i) identifies clean-up runs required;

(j) confirms or appropriately amends the Application Management Plan, including pattern type and direction of treatment and possible suspension of application if conditions are not appropriate.

2.6 **AA1.6 – Fly aircraft at low level**

Identifies and avoids buildings, personnel, vehicles, animals, vegetation and nuisance areas.

2.7 **AA1.7 – Perform steep turns and procedure turns at or below 500 ft AGL**

(a) performs airspace cleared procedure;

(b) conducts a balanced steep turn level (± 100 ft) climbing and descending turn at a nominated speed;

(c) conducts procedure turns with varying flap and power settings.

2.8 **AA1.8 – Manoeuvre and navigate at low level**

(a) manoeuvres aeroplane at a height below 500 ft AGL;

(b) navigates an aeroplane to a predetermined destination at altitudes at or below 500 ft AGL;

(c) awareness of wind effect in the vicinity obstructions, mountainous terrain and illusions;

(d) identifies wind velocity;

(e) recognises and controls the illusions of slipping and skidding during turns in windy conditions;

(f) recognises and manages impact of sun glare on increased risk of collision with obstacles;

(g) operate adjacent to powerlines and wires;

(h) identifies the requirement to operate in the vicinity of powerlines and wires and assesses risk;

(i) identifies poles, cross trees, wires and insulators to assist powerline and wire location;

(j) recognises and manages the effect of rising and descending terrain on aircraft performance;

(k) demonstrate safe operation from non-certified or registered landing areas;

(l) accurately re-enters treatment area with aircraft aligned for treatment run;

(m) accurately identifies and monitors wind speed and direction;

(n) recognises and manages the adverse effects of wind caused by terrain and obstructions;

(o) recognises and manages false horizon illusions;

(p) maintains a constant altitude over featureless terrain or water;

(q) establishes and maintains an appropriate height and speed over treatment area.

2.9 **AA1.9 – Recognise and avoid the stall and recover from a simulated low altitude stall**

(a) recognises the approach to the stall during any phase of flight and resumes normal balanced flight before stall entry;

(b) recovers from a developed stall at a simulated altitude of 500 ft AGL by a simulated altitude of 300 ft AGL. Minimum actual attitude is to be not below 3,000 ft.

2.10 **AA1.10 – Execute forced landing from below 500 ft AGL**

(a) identifies potential forced-landing areas prior to and during low-level operations;

(b) recognises engine failure or any other emergency requiring a forced landing and conducts recall actions;

(c) maintains control of the aircraft – selects the most appropriate landing area within gliding distance while avoiding any powerlines or obstructions;

(d) manoeuvres the aircraft to a landing area that achieves the safest outcome;

(e) explains plan of action and the landing techniques that would ensure the safest outcome when committed to a forced landing on unfavourable terrain or water.

2.11 **AA1.11 – Conduct operations over and under powerlines**

(a) identifies powerlines both in and outside the treatment area during an aerial survey;

(b) demonstrates an ability to interpret powerline infrastructure cues so as to aid wire run identification;

(c) demonstrates safe technique for accurately assessing wire height, including safe flying parallel to wires;

(d) identifies and manages other hazards relevant to operations near powerlines, such as pole stays, crop height, fences or machinery that may pose a risk;

(e) demonstrates safe command decisions whether to fly over or under a wire;

(f) conducts safe treatment over wires, including adequate safety buffers for pull-up and let-down and accurate cut-off and on of application equipment;

(g) conducts safe treatment under wires, including safe clearance;

(h) terminates approaches towards powerlines when passage beneath is unachievable;

(i) can explain the relevant human factors that may affect operations near powerlines, particularly distraction, short-term memory limitations and in attentional blindness.

2.12 **AA1.12 – Apply substances**

(a) safely applies substances in accordance with application management plan;

(b) establishes and maintains correct application height relevant to terrain, application type and meteorological conditions;

(c) controls airspeed and flight profile appropriately on entry/re-entry to treatment area;

(d) engages and shuts off application equipment at appropriate points;

(e) manoeuvers around and over hazards in the treatment area with adequate safety buffers;

(f) regularly uses aircraft smoker to identify and monitor wind direction;

(g) monitors application flow rate, pressure and product remaining;

(h) conducts clean-up runs, including extra safety check for hazards;

(i) demonstrates safe command decisions to continue with, amend or suspend operations due to changing conditions.

2.13 **AA1.13 – Operate aircraft safely and effectively using GNSS swath guidance equipment**

(a) demonstrates basic familiarity with at least 1 GNSS system;

(b) demonstrates sound judgement in selecting the correct pattern relevant to the treatment area and terrain;

(c) selects correct swath relevant to the aircraft, aircraft configuration and the substance to be applied;

(d) accurately places an AB line and C point if required;

(e) manoeuvres the aircraft accurately on the correct swath line with reference to the light bar and natural features;

(f) operate aircraft at maximum permissible weights for aerial application operations;

(g) determines take-off weight within legal requirements and relevant to strip length and conditions;

(h) operates safely and effectively at maximum weights during:

(i) taxi;

(ii) take off and climb;

(iii) approach and landing (including safe command decisions on dumping and strip selection);

(iv) application;

(v) turns;

(vi) obstacle avoidance.

2.14 **AA1.14 – Operate at low level in hilly terrain**

(a) safely manipulate the aircraft at low level in hilly terrain;

(b) establish and maintain safe height relevant to application type;

(c) demonstrate safe contour flying;

(d) identify and select appropriate natural markers to aid situational awareness;

(e) demonstrate safe approaches to higher ground, including identification of escape routes;

(f) demonstrate safe turns in hilly terrain;

(g) demonstrate awareness and management of the effects of wind and turbulence in hilly terrain, including lee effects;

(h) demonstrate awareness of illusions in hilly terrain, including false horizon effect and shadows.

2.15 **AA1.15 – Manage abnormal and emergency situations during low-level operations**

(a) identifies potential forced-landing areas prior to and during aerial application operations;

(b) identifies abnormal or emergency situation;

(c) conducts appropriate abnormal or emergency procedures during application operations;

(d) maintains control of the aircraft, jettisons load if required, and avoids any powerlines or hazards;

(e) successfully conducts a practice forced landing from 500 ft.

2.16 **AA1.16 – Jettison load**

(a) jettisons a full liquid load during take-off prior to lift off, and maintains control of the aircraft;

(b) jettison a full liquid load immediately after take-off and maintains control of the aircraft;

(c) jettisons a full liquid load during flight and controls pitch changes to ensure maintenance of altitude (+100/-0 ft) by adjustments of elevator and power.

3 Range of variables

(a) activities are performed in accordance with published procedures;

(b) day VFR in variable weather conditions;

(c) approved aircraft;

(d) approved low-flying areas;

(e) operational airstrips;

(f) man-made or natural obstacles;

(g) undulating, hilly or mountainous terrain;

(h) emergency and abnormal situations;

(i) hazardous weather conditions;

(j) mental and physical fatigue;

(k) heat stress and dehydration;

(l) maintaining situational awareness;

(m) in-flight distractions.

4 Underpinning knowledge of the following:

(a) CASA exemptions with regards to maximum take-off weight and applicability of other aircraft limitations;

(b) applicable regulations that relate to the conduct of a safe operation;

(c) low level meteorology;

(d) relevant aerodynamics and aircraft performance;

(e) aircraft flight manual, performance, engine and systems;

(f) human factors;

(g) safety hazards and risks of flight at low level;

(h) role equipment;

(i) factors to be considered when determining the payload weight for each application;

(j) aircraft configuration for the aircraft being flown, when jettisoning a full load;

(k) characteristics of the aircraft being flown when jettisoning a full load;

(l) flight control and throttle actions required to maintain control of the aircraft being flown when jettisoning a full load.

AA2 Helicopter aerial application operation

1 Unit description

This unit describes the skills and knowledge required to conduct aerial application operations other than firefighting operations in helicopters.

2 Elements and performance criteria

2.1 AA2.1 – Pre-flight actions

(a) conduct self-assessment fit for flight and planned operation;

(b) determine suitability of helicopter for type of operation;

(c) conduct a thorough pre-flight of helicopter and role equipment to determine serviceability for planned operations;

(d) check and correctly complete required maintenance documentation as applicable;

(e) confirm minimum equipment and minimum crew and instrumentation requirements for planned operations are met;

(f) check safe operation of role equipment, including the serviceability of the jettison (dump) door if applicable or the sling jettison;

(g) check and adjust role equipment calibration.

2.2 AA2.2 – Planning and risk management

(a) determine the requirement to operate at low level, analyses the risk and implement a decision to safely conduct low-level operations;

(b) develop an Application Management Plan;

(c) correctly interpret treatment area map;

(d) adequately identify potential hazards and operational requirements, assess risks and apply appropriate risk controls, including powerlines, houses, susceptible crops and environmentally sensitive areas;

(e) demonstrate an ability to make a command decision on the safety or otherwise of the proposed application, including refusing to undertake an application where the risks are considered to be too high;

(f) determine the suitability of the current and forecast weather;

(g) make appropriate selection of application pattern and direction of treatment taking into consideration safety, efficiency, hazards and terrain;

(h) carefully plans fuel requirements;

(i) confirms acceptable helicopter performance for conditions;

(j) confirms location of ground support personnel when available;

(k) confirms normal and abnormal ops communications and signals;

(l) confirms appropriate logistical considerations, including local HLS condition, fuel, products, ground support and access to HLS, SARWACH, water, and personal supplies, including adequate water and food.

2.3 AA2.3 – Fly to, assess, land and take-off from an operational HLS

(a) performs low-level navigation to an operational HLS at an appropriate height;

(b) performs appropriate assessment of an operational HLS, including dimensions, conditions, direction, identification of hazards, meteorological conditions;

(c) identifies and manages issues relating to helicopter weight, performance, dimensions, load and meteorological conditions;

(d) consistently performs pre-landing and pre-take-off checks;

(e) demonstrates appropriate landing and take-off techniques;

(f) identifies an appropriate dumping point for each take-off, including adequate safety buffers;

(g) demonstrates safe operations from a marginal HLS.

2.4 **AA2.4 – Fly between operational HLS and application area**

(a) performs low-level navigation from an operational HLS to an application area;

(b) selects the most appropriate route and height between the operational HLS and application area with considerations to terrain, stock, populated areas, housing and hazards;

(c) conduct operations at a certified or registered aerodrome;

(d) performs operations in accordance with the requirements of published regulations.

2.5 **AA2.5 – Conduct an aerial survey of a treatment area**

(a) develops an appropriate and safe plan for conduct of an aerial survey;

(b) accurately identifies the treatment area boundaries;

(c) confirms the map;

(d) identifies susceptible crops and environmentally sensitive areas;

(e) identifies hazards on the map;

(f) identifies potential emergency landing area(s);

(g) checks and identifies any hazards not on the map, including sun glare and shadows from hills;

(h) accurately assesses wind speed and direction;

(i) identifies clean-up runs required;

(j) confirms or appropriately amends the Application Management Plan, including pattern type and direction of treatment and possible suspension of application if conditions are not appropriate.

2.6 **AA2.6 – Manipulate helicopter at low level**

(a) manoeuvres helicopter at all speeds below 500 ft AGL, up to and not beyond the limits of the flight-manoeuvring envelope, without exceeding the operating limitations of the helicopter;

(b) conducts coordinated, smooth procedure (P) turns with varying power settings;

(c) accurately re-enters treatment area with helicopter aligned for treatment run;

(d) accurately identifies and monitors wind speed and direction;

(e) recognises and manages the adverse effects of wind caused by terrain and obstructions;

(f) recognises and controls the illusions caused by turning in windy conditions;

(g) manages the effects of gradient wind;

(h) recognises and manages the effect of rising and descending terrain on helicopter performance;

(i) recognises and manages false horizon illusions;

(j) maintains a constant altitude over featureless terrain or water;

(k) establishes and maintains an appropriate height and speed over treatment area.

2.7 **AA2.7 – Conduct operations over and under powerlines**

(a) identifies powerlines both in and outside the treatment area during an aerial survey;

(b) demonstrates an ability to interpret powerline infrastructure cues so as to aid wire run identification;

(c) demonstrates safe technique for accurately assessing wire height, including safe flying parallel to wires;

(d) identifies and manages other hazards relevant to operations near powerlines, such as pole stays, crop height, fences or machinery that may pose a risk;

(e) demonstrates safe command decisions whether to fly over or under a wire;

(f) conducts safe treatment over wires, including adequate safety buffers for pull-up and let-down and accurate cut-off and on of application equipment;

(g) conducts safe treatment under wires, including safe clearance;

(h) terminates approaches towards powerlines when passage beneath is unachievable;

(i) can explain the relevant human factors that may affect operations near powerlines, particularly distraction, short-term memory limitations and inattentional (perceptual) blindness.

2.8 **AA2.8 – Apply substances**

(a) safely applies substances in accordance with application management plan;

(b) establishes and maintains correct application height relevant to terrain, application type and meteorological conditions;

(c) controls airspeed and flight profile appropriately on entry and re-entry to treatment area;

(d) engages and shuts off application equipment at appropriate points;

(e) manoeuvers around and over hazards in the treatment area with adequate safety buffers;

(f) regularly uses aircraft smoker to identify and monitor wind direction;

(g) monitors application flow rate, pressure and product remaining;

(h) conducts clean-up runs, including extra safety check for hazards;

(i) demonstrates safe command decisions to continue with, amend or suspend operations due to changing conditions.

2.9 **AA2.9 – Operate helicopter safely and effectively using GNSS swath guidance equipment**

(a) demonstrates basic familiarity with at least 1 GNSS system;

(b) demonstrates sound judgement in selecting the correct pattern relevant to the treatment area and terrain;

(c) selects correct swath relevant to the helicopter, helicopter configuration and the substance to be applied;

(d) accurately places an AB line and C point if required;

(e) manoeuvres the helicopter accurately on the correct swath line with reference to the light bar and natural features;

(f) operate helicopter at maximum permissible weights for aerial application operations;

(g) determines take-off weight within legal requirements and relevant to HLS dimensions and conditions;

(h) operates safely and effectively at maximum weights during:

(i) hover and taxi;

(ii) take off and climb;

(iii) approach and landing (including command decision on dumping and HLS selection);

(iv) application;

(v) turns;

(vi) obstacle avoidance.

2.10 **AA2.10 – Manage known helicopter risks during application operations**

(a) demonstrate sound decision making in assessing likely hover performance considering load, density altitude, ground surface and relative wind;

(b) demonstrates awareness of, and sound behaviours in, managing rotor disc behaviour under reduced or negative ‘g’;

(c) demonstrates awareness of, and sound behaviour in, avoiding dynamic rollover;

(d) demonstrates awareness of, and sound behaviour in, avoiding loss of tail rotor effectiveness (LTE).

2.11 **AA2.11 – Operate at low level in hilly terrain**

(a) safely manipulate the helicopter at low level in hilly terrain;

(b) establish and maintain safe height relevant to application type;

(c) demonstrate safe contour flying;

(d) identify and select appropriate natural markers to aid situational awareness;

(e) demonstrate safe approaches to higher ground, including identification of escape routes;

(f) demonstrate safe turns in hilly terrain;

(g) demonstrate awareness and management of the effects of wind and turbulence in hilly terrain, including lee effects;

(h) demonstrate awareness of illusions in hilly terrain, including false horizon effect and shadows;

(i) manage abnormal and emergency situations during low-level operations;

(j) identifies potential forced-landing areas prior to and during aerial application operations;

(k) identifies abnormal or emergency situation;

(l) conducts appropriate abnormal or emergency procedures during application operations;

(m) maintains control of helicopter, including adequate coordination of collective, jettisons load if required, and avoids any powerlines or hazards;

(n) successfully conducts a practice forced landing from 500 ft.

2.12 **AA2.12 – Jettison load**

(a) jettisons a full liquid load during take-off and maintains control of the helicopter;

(b) jettisons a full liquid load during flight and controls pitch changes.

3 Range of variables

(a) activities are performed in accordance with published procedures;

(b) day VFR in variable weather conditions;

(c) approved helicopter;

(d) approved low-flying areas;

(e) operational HLSs;

(f) man-made or natural obstacles;

(g) undulating, hilly or mountainous terrain;

(h) emergency and abnormal situations;

(i) hazardous weather conditions;

(j) mental and physical fatigue;

(k) heat stress and dehydration;

(l) maintaining situational awareness;

(m) in-flight distractions.

4 Underpinning knowledge of the following:

(a) applicable regulations that relate to the conduct of a safe operation;

(b) low level meteorology;

(c) relevant aerodynamics and helicopter performance;

(d) helicopter flight manual, performance, engine and systems;

(e) relevant human factors;

(f) safety hazards and risks of flight at low level;

(g) role equipment;

(h) factors to be considered when determining the payload weight for each application;

(i) helicopter configuration for the helicopter being flown, when jettisoning a full load;

(j) flight characteristics of the helicopter being flown when jettisoning a full load;

(k) flight control and throttle actions required to maintain control of the helicopter being flown when jettisoning a full load.

AA3 Gyroplane aerial application operation – *Reserved*

AA4 Aeroplane firefighting operation

1 Unit description

This unit describes the skills and knowledge required to conduct firefighting operations in aeroplanes.

2 Elements and performance criteria

2.1 AA4.1 – Applies human factors

(a) demonstrates knowledge of and employs appropriate management strategies in response to human factors particularly relevant to fire operations, including:

(i) high workload;

(ii) distraction and radios;

(iii) dehydration;

(iv) fatigue;

(v) CRM;

(vi) time critical operational requirements;

(vii) external factors.

2.2 AA4.2 – Pre-flight actions

(a) conduct self-assessment fit for flight and planned operation;

(b) determine suitability of aircraft for type of operation;

(c) conduct a thorough pre-flight of aircraft and role equipment to determine serviceability for planned operations;

(d) check and correctly complete required maintenance documentation as applicable;

(e) confirm minimum equipment and minimum crew and instrumentation requirements for planned operations are met;

(f) apply TEM and risk management considerations, including human error;

(g) check safe operation of role equipment;

(h) confirm communication plan with fire agency and serviceability of communication equipment.

2.3 AA4.3 – Demonstrate understanding of generic fire agency procedures

(a) demonstrate awareness of fire agency briefing processes;

(b) demonstrate awareness of fire agency incident control systems;

(c) able to explain the role and responsibilities of Air Attack Supervisor.

2.4 AA4.4 – Fire traffic management and other aircraft separation

(a) demonstrate strong situational awareness of other aircraft and remotely piloted vehicles;

(b) demonstrate awareness of correct radio procedures and fire agency traffic management procedures;

(c) manage correct frequencies dependant on operational requirements.

(d) uses appropriate techniques and communication procedures when arriving at and departing from fire ground, refuelling site or replenishment points.

2.5 AA4.5 – Planning and risk management

(a) determine the requirement to operate at low level, analyse the risk and implement a decision to safely conduct low-level operations;

(b) adequately identify potential hazards and operational requirements, assess risks and apply appropriate risk controls;

(c) demonstrate an ability to make a command decision on the safety or otherwise of the proposed application, including refusing to undertake an application where the risks are considered to be too high;

(d) demonstrates consideration of avoidance and escape techniques;

(e) determine the suitability of the current and forecast weather;

(f) make appropriate selection of application pattern and direction of treatment taking into consideration safety, efficiency, hazards and terrain;

(g) carefully plans fuel requirements;

(h) confirms acceptable aircraft performance for conditions;

(i) confirms location of ground support and firefighting personnel;

(j) confirms normal and abnormal ops communications and signals;

(k) confirms appropriate logistical considerations, including local airstrip condition, fuel, products, ground support and access to strip, SARWATCH, water, and personal supplies, including adequate water and food.

2.6 **AA4.6 – Fly to, assess, land and take off from an operational airstrip**

(a) performs low-level navigation to an operational airstrip at an appropriate height;

(b) performs appropriate assessment of an operational airstrip, including strip length, conditions, direction, identification of hazards, meteorological conditions;

(c) selects the most suitable loading area, taking into account factors such as the safety of ground personnel and directions from the fire agency;

(d) consistently performs pre-landing and pre-take-off checks;

(e) selects a ‘no go, go around, commitment’ point for landings;

(f) selects a touchdown point for landings;

(g) identifies and manages issues relating to aircraft weight, performance, strip length, slope, surface, direction, load and meteorological conditions;

(h) demonstrates appropriate short-field landing and take-off techniques, including having her or his hand on the dump door handle for take-offs and being prepared to dump if required;

(i) identifies an appropriate dumping point for each take-off, including adequate safety buffers;

(j) demonstrates safe operations from a 1-way airstrip.

2.7 **AA4.7 – Fly between operational airstrip and drop zone**

(a) performs low-level navigation from an operational airstrip to a drop zone;

(b) selects the most appropriate route and height between the operational strip and drop zone with considerations to terrain, stock, populated areas, housing and hazards.

2.8 **AA4.8 – Conduct operations at a certified or registered aerodrome**

(a) performs operations in accordance with the requirements of published regulations.

2.9 **AA4.9 – Conduct an aerial survey of a fire area**

(a) develops an appropriate and safe plan for conduct of an aerial survey;

(b) accurately identifies the fire area boundaries;

(c) confirms the map;

(d) identifies environmentally sensitive areas;

(e) identifies hazards on the map;

(f) checks and identifies any hazards not on the map, including fire specific hazards, sun glare and shadows from hills;

(g) accurately assesses wind speed and direction;

(h) confirms or appropriately amends the Application Management Plan, including pattern type and direction of treatment and possible suspension of application if conditions are not appropriate.

2.10 **AA4.10 – Apply substances**

(a) safely and accurately apply substances in accordance with application management plan by doing the following:

(i) select the correct tank or door configuration and airspeed;

(ii) make appropriate allowance for wind conditions;

(iii) link application drops to create a continuous line of treatment;

(b) establish and maintain correct application height relevant to terrain, application type and meteorological conditions;

(c) control airspeed and flight profile appropriately on entry and re-entry to treatment area;

(d) engage and shut off application equipment at appropriate points;

(e) manoeuver around and over hazards in the treatment area with adequate safety buffers;

(f) demonstrate safe command decisions to continue with, amend or suspend operations due to changing conditions.

2.11 **AA4.11 – Operate aircraft at maximum permissible weights for fire operations**

(a) determine take-off weight within legal requirements and relevant to strip length and conditions;

(b) operate safely and effectively at maximum weights during:

(i) taxi;

(ii) take off and climb;

(iii) approach and landing (including safe command decisions on dumping and strip selection);

(iv) application;

(v) turns;

(vi) obstacle avoidance.

2.12 **AA4.12 – Operate at low level in hilly terrain**

(a) safely manipulate the aircraft at low level in hilly terrain;

(b) establish and maintain safe height relevant to application type;

(c) demonstrate safe contour flying;

(d) identify and select appropriate natural markers to aid situational awareness;

(e) demonstrate safe approaches to higher ground, including identification of escape routes;

(f) demonstrate safe turns in hilly terrain;

(g) demonstrate awareness and management of the effects of wind and turbulence in hilly terrain, including lee effects;

(h) demonstrate awareness of illusions in hilly terrain, including false horizon effect and shadows.

2.13 **AA4.13 – Operate in high winds, high density altitude and high turbulence**

(a) demonstrate awareness of the principles of operating at low level in high winds, high density altitude and high turbulence;

(b) demonstrate sound judgement in assessing take-off conditions as being within the limitations of the aircraft.

2.14 **AA4.14 – Low-visibility operations**

Able to explain low-visibility risks, including illusions such as false horizons and operating in smoke conditions.

2.15 **AA4.15 – Manage abnormal and emergency situations during low-level operations on a fire ground**

(a) identify potential forced-landing areas prior to and during firebombing operations;

(b) identify abnormal or emergency situation;

(c) conduct appropriate abnormal or emergency procedures;

(d) maintain control of aircraft, jettison load if required, and avoid any powerlines or hazards;

(e) successfully conduct a practice forced landing from 500 ft.

2.16 **AA4.16 – Jettison load from fire gate**

(a) jettison a full liquid load during take-off prior to lift off, and maintain control of the aircraft;

(b) jettison a full liquid load during flight and controls pitch changes to ensure maintenance of altitude by adjustments of elevator and power.

3 Range of variables

(a) activities are performed in accordance with published procedures;

(b) day VFR in variable weather conditions;

(c) approved aircraft;

(d) approved low-flying areas;

(e) airstrips;

(f) man-made or natural obstacles;

(g) undulating, hilly or mountainous terrain;

(h) emergency and abnormal situations;

(i) hazardous weather conditions and simulated fire conditions;

(j) mental and physical fatigue;

(k) heat stress and dehydration;

(l) maintaining situational awareness;

(m) in-flight distractions.

4 Underpinning knowledge of the following:

(a) applicable regulations that relate to the conduct of a safe operation;

(b) low level and localised meteorology including the following:

(i) local meteorological conditions relevant to fire conditions;

(ii) wind conditions likely to be found in fire conditions;

(iii) wind conditions in hilly terrain, include lee winds;

(c) relevant aerodynamics and aircraft performance;

(d) aircraft flight manual, performance, engine and systems;

(e) relevant human factors;

(f) safety hazards and risks of flight at low level;

(g) pre-flight serviceability checks that are conducted on firefighting equipment that is fitted to the aircraft type being flown;

(h) conditions would indicate unserviceable firefighting equipment;

(i) role and authority of the Air Attack Supervisor and common fire agency procedures;

(j) radio frequencies being used by ground crews are obtained;

(k) factors that will determine the design and conduct of drop patterns;

(l) function and use of various fire suppressants and retardants;

(m) Reserved;

(n) the drop characteristics of suppressants and retardants with respect to drift;

(o) aircraft configuration for the aircraft being flown, when jettisoning a full load;

(p) flight characteristics of the aircraft being flown when jettisoning a full load;

(q) flight control and throttle actions required to maintain control of the aircraft being flown when jettisoning a full load;

(r) terminology used during fire-bombing operations including the following:

    (i) head end of load;

    (ii) lead-in;

    (iii) roll up;

    (iv) tag-on;

    (v) tail end of load;

(s) operational conditions under which fire-bombing could be suspended by an Air Attack Supervisor;

(t) environmental conditions under which an Air Attack Supervisor could suspend fire-firefighting operations;

(u) symptoms that could indicate aircrew fatigue;

(v) symptoms of dehydration and explain effects of dehydration on a pilot’s performance;

(w) container markings of fire retardant and suppression chemicals;

(x) toxicity conditions that apply to firefighting chemicals and the methods of avoiding any adverse effects;

(y) dispensing system, drop patters and emergency procedures;

(z) basic wildfires.

AA5 Helicopter firefighting operation

1 Unit description

This unit describes the skills and knowledge required to conduct firefighting operations in helicopters.

2 Elements and performance criteria

2.1 AA5.1 – Applies human factors

(a) demonstrate knowledge of and employ appropriate management strategies in response to human factors particularly relevant to fire operations, including:

(i) high workload;

(ii) distraction and radios;

(iii) dehydration;

(iv) fatigue;

(v) CRM

(vi) time critical operational requirements;

(vii) external factors..

2.2 AA5.2 – Pre-flight actions

(a) conduct self-assessment fit for flight and planned operation;

(b) determine suitability of helicopter for type of operation;

(c) conduct a thorough pre-flight of helicopter and role equipment to determine serviceability for planned operations;

(d) check and correctly complete required maintenance documentation as applicable;

(e) confirm minimum equipment and minimum crew and instrumentation requirements for planned operations are met;

(f) apply TEM and risk management considerations, including human error;

(g) check safe operation of role equipment, including the serviceability of the jettison (dump) door if applicable or the sling jettison;

(h) confirm communication plan with fire agency and serviceability of communication equipment.

2.3 AA5.3 – Demonstrates understanding of generic fire agency procedures

(a) demonstrates awareness of fire agency briefing processes;

(b) demonstrates awareness of fire agency incident control systems;

(c) able to explain the role and responsibilities of Air Attack Supervisor.

2.4 AA5.4 – Fire traffic management and other aircraft separation

(a) demonstrates strong situational awareness of other aircraft and remotely piloted vehicles;

(b) demonstrates awareness of correct radio procedures and fire agency traffic management procedures;

(c) able to manage correct frequencies dependant on operational requirements;

(d) can explain appropriate techniques and communication procedures when arriving at and departing from fire ground, refuelling site or replenishment points.

2.5 AA5.5 – Planning and risk management

(a) determine the requirement to operate at low level, analyse the risk and implement a decision to safely conduct low-level operations;

(b) adequately identify potential hazards and operational requirements, assess risks and apply appropriate risk controls;

(c) demonstrates consideration of avoidance and escape techniques;

(d) demonstrate an ability to make a command decision on the safety or otherwise of the proposed application, including refusing to undertake an application where the risks are considered to be too high;

(e) determine the suitability of the current and forecast weather;

(f) make appropriate selection of application pattern and direction of treatment taking into consideration safety, efficiency, hazards and terrain;

(g) carefully plans fuel requirements;

(h) confirms acceptable helicopter performance for conditions;

(i) confirms location of ground support and firefighting personnel;

(j) confirms normal and abnormal ops communications and signals;

(k) confirms appropriate logistical considerations, including local airstrip condition, fuel, products, ground support and access to strip, SARwatch, water, and personal supplies, including adequate water and food.

2.6 **AA5.6 – Fly to, assess, land and take-off from an operational HLS or pick-up point**

(a) perform low-level navigation to an operational HLS or pick-up point at an appropriate safe height;

(b) perform appropriate assessment of an operational HLS or pick-up point, including dimensions, conditions, direction, identification of hazards, meteorological conditions;

(c) identify and manage issues relating to helicopter weight, performance, dimensions, load and meteorological conditions;

(d) consistently perform pre-landing and pre-take-off checks;

(e) demonstrate appropriate landing and take-off techniques;

(f) identify an appropriate dumping point for each take-off, including adequate safety buffers;

(g) demonstrate safe operations from a marginal HLS or pick-up point.

2.7 **AA5.7 – Fly between operational HLS and drop zone**

(a) perform low-level navigation from an operational airstrip to a drop zone;

(b) selects the most appropriate route and height between the HLS or pick-up point and the drop zone with consideration to terrain, stock, populated areas, housing and hazards.

2.8 **AA5.8 – Conduct operations at a certified or registered aerodrome**

Perform operations in accordance with the requirements of published regulations.

2.9 **AA5.9 – Conduct an aerial survey of a fire area**

(a) develops an appropriate and safe plan for conduct of an aerial survey;

(b) accurately identifies the fire area boundaries;

(c) confirms the map;

(d) identifies environmentally sensitive areas;

(e) identifies hazards on the map;

(f) identifies potential emergency landing area(s);

(g) checks and identifies any hazards not on the map, including fire specific hazards, sun glare and shadows from hills;

(h) accurately assesses wind speed and direction;

(i) confirms or appropriately amends the Application Management Plan, including pattern type and direction of treatment and possible suspension of application if conditions are not appropriate.

2.10 **AA5.10 – Apply substances**

(a) safely and accurately applies substances in accordance with application management plan by doing the following;

(i) select the correct tank or door configuration and airspeed;

(ii) make appropriate allowance for wind conditions;

(iii) link application drops to create a continuous line of treatment;

(b) perform a spot drops to achieve an accuracy of 80% of the substance falling vertically within a predetermined area;

(c) establishes and maintains correct application height relevant to terrain, application type and meteorological conditions;

(d) controls airspeed and flight profile appropriately on entry and re-entry to treatment area;

(e) engages and shuts off application equipment at appropriate points;

(f) manoeuvers around and over hazards in the treatment area with adequate safety buffers;

(g) demonstrates safe command decisions to continue with, amend or suspend operations due to changing conditions.

2.11 **AA5.11 – Reserved**

2.12 **AA5.12 – Replenish helicopter load with snorkel or bucket**

(a) demonstrates safe identification and assessment of replenishment site, including consideration of entry and exit direction, hazards, surrounding terrain, emergency actions, wind conditions and impact of heavier load on exit performance;

(b) demonstrates safe speed control and height loss on approach to target replenishment spot (e.g. dam);

(c) accurately places bucket or snorkel into water;

(d) maintains safe hover while taking on load, smoothly adjusting for increasing weight;

(e) demonstrates safe technique in lifting bucket or snorkel smoothly and maintaining safe hover and exit under new load;

(f) maintains safe control of the helicopter and demonstrates safe command decisions to jettison or replace bucket into water if helicopter is unable to safely lift load.

2.13 **AA5.13 – Operate helicopter at maximum permissible weights for fire operations**

(a) determines take-off weight within legal requirements and relevant to HLS dimensions and conditions;

(b) operates safely and effectively at maximum weights during:

(i) taxi;

(ii) take off and climb;

(iii) approach and landing, including safe command decisions on dumping and HLS selection;

(iv) application;

(v) turns;

(vi) obstacle avoidance.

2.14 **AA5.14 – Manage known helicopter risks during firefighting operations**

(a) demonstrate sound decision making in assessing likely hover performance considering load, density altitude, ground surface and relative wind;

(b) demonstrates awareness of and correct techniques in managing rotor disc behaviour under reduced or negative ‘g ‘;

(c) demonstrate awareness of and correct techniques in avoiding dynamic rollover;

(d) demonstrate awareness of and correct techniques in avoiding loss of tail rotor effectiveness (LTE) and vortex ring state.

2.15 **AA5.15 – Low-visibility operations**

Able to explain low-visibility risks, including illusions such as false horizons and operating in smoke conditions.

2.16 **AA5.16 – Operate at low level in hilly terrain**

(a) safely manipulate the helicopter at low level in hilly terrain;

(b) establish and maintain safe height relevant to application type;

(c) demonstrate safe contour flying;

(d) identify and select appropriate natural markers to aid situational awareness;

(e) demonstrate safe approaches to higher ground, including identification of escape routes;

(f) demonstrate safe turns in hilly terrain;

(g) demonstrate awareness and management of the effects of wind and turbulence in hilly terrain, including lee effects;

(h) demonstrate awareness of illusions in hilly terrain, including false horizon effect and shadows.

2.17 **AA5.17 – Operate in high winds, high density altitude and high turbulence**

(a) demonstrate awareness of the principles of operating at low level in high winds, high density altitude and high turbulence;

(b) demonstrate sound judgement in assessing take-off conditions as being within the limitations of the helicopter.;

2.18 **AA5.18 – Manage abnormal and emergency situations during low-level operations on a fire ground**

(a) identify potential forced-landing areas prior to and during firebombing operations;

(b) identify abnormal or emergency situation;

(c) conduct appropriate abnormal or emergency procedures;

(d) maintain control of helicopter including adequate coordination of collective, jettison load if required, and avoid any powerlines or hazards;

(e) successfully conduct a practice forced landing from 500 ft.

2.19 **AA5.19 – Jettison load from fire gate**

(a) jettison a full liquid load at take-off, and maintains control of the helicopter;

(b) jettison a full liquid load during flight and ensures maintenance of altitude (+100 -0 ft).

3 Range of variables

(a) activities are performed in accordance with published procedures;

(b) day VFR in variable weather conditions;

(c) approved helicopter;

(d) approved low-flying areas;

(e) operational HLSs and pick-up points;

(f) man-made or natural obstacles;

(g) undulating, hilly or mountainous terrain;

(h) emergency and abnormal situations;

(i) hazardous weather conditions and simulated fire conditions;

(j) mental and physical fatigue;

(k) heat stress and dehydration;

(l) maintaining situational awareness;

(m) in-flight distractions.

4 Underpinning knowledge of the following:

(a) applicable regulations that relate to the conduct of a safe operation;

(b) low level and localised meteorology:

(i) local meteorological conditions relevant to fire conditions;

(ii) wind conditions likely to be found in fire conditions;

(iii) wind conditions in hilly terrain, including lee winds;

(c) relevant aerodynamics and helicopter performance;

(d) helicopter flight manual, performance, engine and systems;

(e) human factors;

(f) safety hazards and risks of flight at low level;

(g) pre-flight serviceability checks that are conducted on fire-firefighting equipment that is fitted to the helicopter type being flown;

(h) conditions would indicate unserviceable fire-firefighting equipment;

(i) role and authority of the Air Attack Supervisor and common fire agency procedures;

(j) radio frequencies being used by ground crews are obtained;

(k) factors that will determine the design and conduct of drop patterns;

(l) function and use of various fire suppressants and retardants;

(m) Reserved;

(n) drop characteristics of suppressants and retardants with respect to drift;

(o) helicopter configuration for the helicopter being flown, when jettisoning a full load;

(p) flight characteristics of the helicopter being flown when jettisoning a full load;

(q) flight control and throttle actions required to maintain control of the helicopter being flown when jettisoning a full load;

(r) terminology used during fire-bombing operations:

(i) head end of load;

(ii) lead-in;

(iii) roll up;

(iv) tag-on;

(v) tail end of load;

(s) operational conditions under which fire-bombing could be suspended by an Air Attack Supervisor;

(t) environmental conditions under which an Air Attack Supervisor could suspend fire-bombing operations;

(u) symptoms that could indicate aircrew fatigue;

(v) symptoms of dehydration and explain effects of dehydration on a pilot’s performance;

(w) markings of fire retardant and suppression chemicals;

(x) toxicity conditions that apply to firefighting chemicals and the methods of avoiding any adverse effects;

(y) dispensing system, drop patters and emergency procedures;

(z) basic wildfires.

AA6 Night aerial application operation

1 Unit description

This unit describes the skills and knowledge required to conduct an aerial application operation other than a firefighting operation at night.

2 Elements and performance criteria

2.1 **AA6.1 – Aircraft and equipment serviceability**

(a) confirm all required aircraft lighting is installed and serviceable;

(b) confirm additional instrumentation required for night flying is installed and serviceable.

2.2 **AA6.2 – Conduct risk assessment of operation**

Demonstrate an ability to assess forecast meteorological conditions for night operations, including moon state and to make a command decision (i.e. go-no go) based on her or his safety assessment.

2.3 **AA6.3 – Pre-flight actions**

(a) thorough risk assessment of planned treatment are conducted during daylight;

(b) conduct self-assessment fit for night flying.

2.4 **AA6.4 – Determine whether an airstrip or HLS is suitable for night operations**

(a) determine whether airstrip or /HLS dimensions and lighting is suitable and available for night operations;

(b) identify potential obstacles surrounding the airstrip or HLS and in the runway end splays.

2.5 **AA6.5 – Take-off and land at night at an airstrip or HLS remote from ground lighting**

(a) conducts take-off, circuit procedures and lands aircraft at night at an aerodrome remote from significant ground lighting that could assist the pilot in maintaining control of the aircraft;

(b) uses runway lights for positioning aircraft in circuit;

(c) confirms aircraft performance and attitude by reference to flight instruments;

(d) conducts a circuit and approach, controlling the aircraft and maintaining a safe altitude by reference to altimeter and positioning aircraft by reference to runway lighting;

(e) conducts a final approach and landing maintaining correct final approach angle and touchdown within specified touchdown zone.

2.6 **AA6.6 – Conducts safe transit from airstrip to treatment area**

(a) maintains a visible horizon;

(b) maintains a safe altitude over unsurveyed terrain during transit to and from treatment area;

(c) maintains vigilance and awareness of obstacles during descent into and departure from treatment area;

(d) conducts check of instruments and lighting prior to descent.

2.7 **AA6.7 – Operates work lights to illuminate treatment area**

(a) actions to be followed when 1 or more work lights become inoperative;

(b) extinguish work lights at the end of each spray run;

(c) illuminate work lights at the correct height when on a straight or turning descent to spray level.

3 Range of variables

(a) activities are performed in accordance with published procedures;

(b) for the night aeroplane aerial application endorsement, the aircraft must be an aeroplane;

(c) for the night helicopter aerial application endorsement, the aircraft must be an helicopter;

(d) for the night gyroplane aerial application endorsement, the aircraft must be an gyroplane;

(e) NVFR approved aeroplane;

(f) agricultural airstrips suitable for night operations;

(g) man-made or natural obstacles;

(h) noise sensitive areas and curfews;

(i) emergency and abnormal situations;

(j) mental and physical fatigue;

(k) maintaining situational awareness;

(l) in-flight distractions;

(m) human factors in the context of night operations.

4 Underpinning knowledge of the following:

(a) LSALT;

(b) NVFR requirements;

(c) aerodrome lighting requirements;

(d) limitations of human ocular system at night;

(e) visual illusions;

(f) aircraft instrument and lighting requirements.

FLIGHT INSTRUCTOR RATING

FIR1 Conduct aeronautical knowledge training

1 Unit description

This unit describes the skills and knowledge required to competently plan, conduct and review aeronautical knowledge training for Part 61 authorisations.

2 Elements and performance criteria

2.1 **FIR1.1 – Plan aeronautical knowledge training**

(a) assess and confirm the trainee's readiness for training;

(b) ensure the training plan includes training objectives, including threat and error management training;

(c) identify appropriate training resources;

(d) plan the lesson and delivery method appropriate to the training objectives;

(e) specify the assessment procedures;

(f) schedule and integrate the theory training with flight training lessons where appropriate;

(g) confirm the availability of the required facilities, equipment, training aids and reference materials.

2.2 **FIR1.2 – Conduct aeronautical knowledge training**

(a) establish a learning environment and motivation that suits the trainee’s needs;

(b) present the training materials;

(c) state the training objectives;

(d) lesson plan is followed and modified where applicable to achieve training objectives and transfer of knowledge;

(e) new knowledge to previous knowledge is linked and presented within a meaningful and logical framework;

(f) training aids are used to illustrate and enhance explanations;

(g) accurate technical knowledge is presented clearly and to the required standard;

(h) opportunities for trainee participation and practice are provided;

(i) applicable threat and error management issues are discussed;

(j) trainees ability to apply threat and error management principles to the material presented is confirmed;

(k) achievement of training objectives is confirmed by questioning, review and other suitable methods;

(l) feedback on trainee performance is provided;

(m) trainee self-assessment skills are developed;

(n) training objectives are completed in the time available;

(o) training is conducted effectively and safely.

2.3 **FIR1.3 – Review aeronautical knowledge training**

(a) training objectives and transfer of knowledge are achieved;

(b) training delivery and effectiveness using self-assessment, peers and supervisors is reviewed;

(c) records of assessment and progress of trainee are maintained and reviewed in accordance with established workplace procedures.

3 Range of variables

(a) activities are performed in accordance with published procedures;

(b) delivering aeronautical knowledge training to trainees that is for a flight crew licence, rating or endorsement;

(c) the training covers the units and elements of competency that applies to the licence rating or endorsement;

(d) the training environment includes suitable classroom or briefing facilities and training aids;

(e) the training is delivered in accordance with appropriate and documented lesson plans;

(f) suitable learning resources may be used to assist the presentation, including audio visual aids, aircraft models, synthetic training devices, regulatory publications and aircraft and operations manuals;

(g) training outcomes are reviewed as applicable to the needs of the trainee and against the standards specified for the issue of the licence, rating or endorsement.

4 Underpinning knowledge of the following:

(a) principles of learning:
- (i) learning as a behavioural change;
- (ii) sensory perception;
- (iii) factors affecting perception;
- (iv) motivation, positive and negative;
- (v) attitudes, discipline and responsibility;
- (vi) the following levels of learning:
  - (A) rote;
  - (B) understanding;
  - (C) application;
  - (D) correlation;
- (vii) factors which aid the learning process;
- (viii) transfer, habit formation;
- (ix) reinforcement;
- (x) memory and retention;

(b) role of psychology in flying instruction:
- (i) satisfaction of human needs;
- (ii) defence mechanisms;
- (iii) dealing with stress, abnormal reactions to airborne stress situations;
- (iv) psychological problems of both student and experienced pilots;

(c) teaching methods:
- (i) lecture, theory and skill lessons, guided discussion, briefing;
- (ii) behavioural objectives, their importance and formulation;

(d) lesson planning and development;

(e) effective communication;

(f) questioning techniques;

(g) use and abuse of teaching aids;

(h) application of instructional principles to airborne instruction.

FIR2 Assess competence

1 Unit description

This unit describes the skills and knowledge required to effectively assess a trainee's competence.

2 Elements and performance criteria

2.1 FIR2.1 – Prepare for assessment

(a) interpret an assessment plan and confirm organisational, legal and ethical requirements for conducting an effective competency assessment;

(b) access and interpret relevant benchmarks for assessment and nominated assessment tools to confirm the requirements for evidence to be collected;

(c) arrange identified material and physical resource requirements according to assessment system policies and procedures;

(d) organise specialist support required for assessment;

(e) explain, discuss and agree details of the assessment plan with candidate.

2.2 FIR2.2 – Gather quality evidence

(a) use agreed assessment methods and instruments to gather, organise and document evidence in a format suitable for determining competence;

(b) apply the principles of assessment and rules of evidence in gathering quality evidence;

(c) determine opportunities for evidence gathering in actual or simulated activities through consultation with the candidate and relevant personnel;

(d) determine opportunities for integrated assessment activities and document any changes to assessment instruments where required.

2.3 FIR2.3 – Support the candidate

(a) guide candidates in gathering their own evidence to support recognition of prior learning (RPL);

(b) use appropriate communication and interpersonal skills to develop a professional relationship with the candidate that reflects sensitivity to individual differences and enables two-way feedback;

(c) make decisions on reasonable adjustments with the candidate, based on candidate's needs and characteristics;

(d) access required specialist support in accordance with the assessment plan;

(e) address any OHS risk to person or equipment immediately.

2.4 FIR2.4 – Make the assessment decision

(a) examine collected evidence and evaluate it to ensure that it reflects the evidence required to demonstrate competence;

(b) use judgement to infer whether competence has been demonstrated, based on the available evidence;

(c) make assessment decision in line with agreed assessment procedures and according to agreed assessment plan;

(d) provide clear and constructive feedback to candidate regarding the assessment decision and develop any follow-up action plan required.

2.5 FIR2.5 – Record and report the assessment decisions as follow:

(a) record assessment outcomes promptly and accurately;

(b) complete and process an assessment report according to agreed assessment procedures;

(c) inform other relevant parties of the assessment decision according to confidentiality conventions.

2.6 **FIR2.6 – Review the assessment process**

(a) review the assessment process in consultation with relevant people to improve own future practice;

(b) document and record the review according to relevant assessment system policies and procedures.

3 Range of variables

(a) activities are performed in accordance with published procedures;

(b) assessment plan may include:

(i) overall planning, describing:

(A) what is to be assessed;

(B) when assessment is to take place;

(C) where assessment is to take place;

(D) how assessment is to take place;

(c) benchmarks for assessment:

(i) refer to a criterion against which the candidate is assessed;

(ii) may be a competency standard, unit of competency, assessment criteria of course curricula, performance specifications, or product specifications;

(d) assessment tools include:

(i) the learning or competency unit(s) to be assessed;

(ii) the target group, context and conditions for the assessment;

(iii) the tasks to be administered to the candidate;

(iv) an outline of the evidence to be gathered from the candidate;

(v) the evidence criteria used to judge the quality of performance (i.e. the assessment decision-making rules);

(vi) the administration, recording and reporting requirements;

(vii) the evidence of how validity and reliability have been tested and built into the design and use of the tool;

(e) specialist support may include:

(i) assistance by third party, such as carer or interpreter;

(ii) support from specialist educator;

(iii) provision of developed online assessment activities;

(iv) support for remote or isolated candidates and assessors;

(v) support from subject matter or safety experts;

(vi) advice from regulatory authorities;

(vii) assessment teams and panels;

(viii) support from lead assessors;

(ix) advice from policy development experts;

(f) assessment methods include:

(i) particular techniques used to gather different types of evidence, such as:

(A) direct observation;

(B) structured activities;

(C) oral or written questioning;

(D) portfolios of evidence;

(E) review of products;

(F) third-party feedback;

(g) feedback may include:

(i) ensuring assessment for RPL process is understood;

(ii) ensuring candidate concerns are addressed;
(iii) enabling questions and answers;
(iv) confirming outcomes;
(v) identifying further evidence to be provided;
(vi) discussing action plans;
(vii) confirming gap training needed;
(viii) providing information regarding available appeal processes;
(ix) suggesting improvements in evidence gathering and presentation;

(h) consultation may involve:
(i) moderation with other assessors, or training and assessment coordinators;
(ii) discussions with client, team leaders, managers, RPL coordinators, supervisors, coaches and mentors;
(iii) technical and subject experts;
(iv) English language, literacy and numeracy experts.

4 Underpinning knowledge of the following:

(a) competency-based assessment, including:
(i) vocational education and training as a competency-based system;
(ii) criterion-referenced assessment as distinct from norm-referenced assessment;
(iii) competency standards as the basis of qualifications;
(iv) structure and application of competency standards;
(v) principles of assessment and how they are applied;
(vi) rules of evidence and how they are applied;
(vii) range of assessment purposes and assessment contexts, including RPL;
(viii) different assessment methods, including suitability for gathering various types of evidence, suitability for content of units, and resource requirements and associated costs;
(ix) reasonable adjustments and when they are applicable;
(x) types and forms of evidence, including assessment instruments that are relevant to gathering different types of evidence used in competency-based assessment, including RPL;
(xi) potential barriers and processes relating to assessment tools and methods;
(xii) assessment system, including policies and procedures established by the industry, organisation or training authority;

(b) recognition of prior learning policies and procedures established by the organisation.

FIR3 Conduct flight training

1 Unit description

This unit describes the skills and knowledge required to effectively conduct and review flight training in an aircraft.

2 Elements and performance criteria

2.1 FIR3.1 – Plan flight training

(a) review a trainee's performance records, identify the appropriate units and elements of training to be delivered and develop an appropriate lesson plan, including remedial training if required;

(b) identify training outcomes based on prescribed performance criteria, the operator's training plans and consultation with supervisors;

(c) identify underpinning knowledge for the units and elements and confirm that the trainee has received the appropriate training;

(d) plan flight training exercise to ensure an effective, efficient and safe outcome;

(e) identify potential threats and errors, including those associated with simulation of abnormal or emergency procedures or aircraft mishandling by trainee, and apply suitable mitigators;

(f) consider availability and program suitable training aircraft and briefing facilities;

(g) establish airworthiness and fuel state of the training aircraft;

(h) determine that environmental conditions are suitable for the training exercise.

2.2 FIR3.2 – Conduct pre-flight briefing

(a) confirm the trainee is mentally and physically prepared for flight training and she or he can recall the underpinning knowledge required for the flight exercise;

(b) brief the trainee on the training outcomes, the associated performance criteria and the actions required of the trainee during the flight;

(c) link previous training to the current exercise;

(d) brief the trainee on how the flight will be conducted to meet the training outcomes;

(e) confirm the trainee's ability to recall the training outcomes, underpinning knowledge, handling technique and planned flight scenario;

(f) discuss threat and error management issues applicable to the proposed flight and confirm the trainee understands her or his responsibility for managing those issues (airmanship).

2.3 FIR3.3 – Conduct airborne training

(a) demonstrate elements:

(i) introduce tasks in manageable portions without trainee overload;

(ii) make clear, concise and systematic explanations;

(iii) coordinate demonstration with explanation of manoeuvre;

(iv) make coordinated control inputs without abrupt manoeuvring, using accepted techniques;

(v) demonstrate the manoeuvre to the competency standards specified in this manual for a commercial pilot.

(b) directs task performance:

(i) implements handover and takeover procedures for control of aircraft;

(ii) provides direction appropriate to trainee's progress;

(iii) provides instructions in a clear, concise and timely manner;

(iv) provides sufficient practice for the trainee to achieve the task;

(v) intervenes only to the extent necessary to assist the trainee's progress or to maintain safety.

(c) monitors trainee performance (unassisted practice):
   (i) identify the trainee's deficiencies and provide feedback to assist the trainee in achieving the standard;
   (ii) provide additional instruction and demonstration as necessary to assist trainee;
   (iii) encourage the trainee to develop self-assessment skills;
   (iv) note training events for debriefing and assessment.

2.4 **FIR3.4 – Manage threats and errors**

(a) manage responsibilities as pilot in command for the safe operation of the aircraft and maintain situation awareness while providing instruction;

(b) identify and manage threats and errors;

(c) intervene to recover the aircraft if trainee does not manage an undesired aircraft state;

(d) develop the trainee's responsibility through the application of human factors principles for threat and error management.

2.5 **FIR3.5 – Conduct post-flight briefing**

(a) ask the trainee to self-assess performance against the performance criteria;

(b) describe, clearly and accurately, significant details of the trainee's performance and assess the trainee's achievement against the training outcomes for the lesson and associated performance criteria;

(c) identify any deficiencies in performance and suggest remedial actions and training;

(d) discuss threat and error management issues encountered during the flight;

(e) brief the trainee on the details of the next training exercise;

(f) record achievement, or otherwise, of competency, any remedial training required and identify content of the next training exercise.

2.6 **FIR3.6 – Complete post-training administration**

(a) relevant staff are informed of trainee's performance and results;

(b) administration procedures required for issue of an endorsement or military equivalent are completed.

2.7 **FIR3.7 – Review training**

(a) evaluate training effectiveness with trainees and other appropriate stakeholders;

(b) evaluate final session outcomes against desired session outcomes;

(c) identify and incorporate adjustments to delivery, presentation and content of training when appropriate.

3 Range of variables

(a) activities are performed in accordance with published procedures;

(b) flight training includes training for the issue of a flight crew licence, rating or endorsement using a suitable training aircraft or approved synthetic flight trainer;

(c) flight training includes the units and elements authorised by the flight training endorsement(s) held by the instructor;

(d) aeronautical knowledge training, including pre- and post-flight briefings, is provided to support the flight training units and elements;

(e) flight training and aircraft operation is conducted in accordance with regulatory requirements and safe operational practices and includes administrative procedures associated with authorising and recording flight training and maintaining training records;

(f) flight training for licences and ratings is conducted under a Part 141 or Part 142 operator certificate with the relevant training specification in accordance with holder's operations manual.

4 Underpinning knowledge of the following:

(a) relevant sections of Civil Aviation Safety Regulations and Civil Aviation Orders;

(b) performing and learning complex skills, including cognitive and developmental issues and observational learning;

(c) cognitive basis of airmanship, situational awareness, captaincy, prioritisation, load shedding and decision making;

(d) rate of learning, enforced automaticity and the foundations of expertise;

(e) instructor professionalism, including interpersonal skills, implications of being a role-model, self-reflection and self-managed professional development;

(f) effective use of a course of training, curricula and syllabus and lesson plans;

(g) training and assessment standards;

(h) debriefing and feedback techniques;

(i) transfer of control (handover and takeover or follow-through) drills and procedures;

(j) principles of flight;

(k) crew resource management (CRM) principles;

(l) techniques for introducing tasks in manageable segments to avoid overloading a trainee and principles for integrating task segments;

(m) appropriate use of scenario-based training in flight instruction;

(n) application of risk management principles to emergency procedure simulations in flight;

(o) checklists for single-pilot or multi-crew operations as applicable;

(p) common student errors and suggested suitable remedial instruction;

(q) operational concept of threat and error management in relation to flight training in terms of:

(i) managing threats;

(ii) managing errors;

(iii) managing undesired aircraft state;

(r) procedures and strategies for developing trainee threat and error management skills;

(s) task prioritisation system to assist the development of trainee task management skills in terms of:

(i) aircraft control;

(ii) navigation;

(iii) communication;

(t) suitable procedures for making decisions in-flight and for developing trainee decision-making skills;

(u) goal fixation effects on good decision making;

(v) 3 types of stress likely to affect trainee performance and methods of assisting trainees to cope with stress:

(i) physical;

(ii) physiological;

(iii) psychological;

(w) requirements for completing relevant documentation;

(x) principles, purpose and location of controls, monitoring devices, and systems;

(y) procedures to be followed in the event of an emergency.

FIR4 *Reserved*

FIR5 *Reserved*

FIR6 *Reserved*

FIR7 Conduct flight review

1 Unit description

This unit describes the skills and knowledge required to conduct a flight review and assess competency of a pilot to continue to use a flight crew licence or rating.

2 Elements and performance criteria

2.1 **FIR7.1 – Conduct pre-flight discussion**

(a) pre-flight discussion plan is prepared that covers the topics required for the rating being reviewed;

(b) pre-flight discussion plan is delivered;

(c) opportunities to actively participate in the discussion are provided to the applicant;

(d) discussion is reviewed to determine whether the aims of the discussion were achieved.

2.2 **FIR7.2 – Conduct review**

(a) flight review is conducted in accordance with flight review standards as specified in applicable regulations;

(b) assess the pilot's performance against the standards specified in applicable regulations;

(c) remedial training for those elements performed below the specified standard is determined;

(d) remedial training is conducted where applicable.

2.3 **FIR7.3 – Complete post-review briefing and administration**

(a) post-review briefing is conducted that includes assessment of the pilot's competence against the standards specified in published procedures;

(b) post-review administration is completed.

3 Range of variables

(a) activities are performed in accordance with published procedures;

(b) suitable flight review resources may include:

- (i) aircraft;
- (ii) facilities;

(c) environmental conditions may include:

- (i) weather;
- (ii) hazards and threats such as powerlines and masts;
- (iii) terrain;

(d) assessment of applicant's competence may include:

- (i) strengths;
- (ii) deficiencies;
- (iii) remedial actions;
- (iv) self-awareness and insight;
- (v) self-management.

4 Underpinning knowledge of the following:

(a) principles of instructions (see FIR 1, 2 and 3);

(b) relevant sections of Civil Aviation legislation;

(c) common risks that exist when conducting flight reviews;

(d) common problems that may occur when conducting flight reviews and appropriate action that should be taken in each case;

(e) assessment and workplace training competency standards;

(f) principles of adult teaching and learning;

(g) human performance and limitations factors relevant to the training tasks;

(h) psychological factors affecting satisfaction of human needs, defence mechanisms and stress management;

(i) relevant workplace policies and procedures;

(j) appropriate methods of analysis and training planning;

(k) lesson planning and development;

(l) preparation of training resources;

(m) principles of assessment;

(n) assessment of behaviour;

(o) self-assessment and evaluation;

(p) questioning techniques;

(q) requirements for completing relevant documentation.

FIR8 *Reserved*

FIR9 Multi-crew training endorsement

1 Unit description

This unit describes the skills and knowledge required to plan and conduct Multi-Crew Cooperation training courses.

2 Elements and performance criteria

2.1 **FIR9.1 – Demonstrate knowledge of competency-based training as applied to multi-crew operations**

(a) understands core philosophy of competency-based training;

(b) conducts training and assessment that is characterised by an emphasis on performance measured against identified competencies;

(c) assesses trainee on the basis meeting prescribed competency standards;

(d) states key competencies required by crew to operate effectively in a multi-crew operation.

2.2 **FIR9.2 – Prepares to deliver training**

(a) completes administrative tasks as per the training organisation's requirements and ensures;

(i) a training plan is prepared or provided, which identifies each performance criteria required to achieve the standard specified for the issue of an endorsement;

(ii) a trainee performance record is prepared or provided for recording trainee performance against all performance criteria;

(iii) an assessment guide is prepared or provided to assist the instructor in assessing trainee performance;

(iv) an achievement record is prepared or provided to record the date a trainee is signed off as competent in an particular competency element;

(b) completes personal preparation to deliver training session as scheduled;

(c) checks all training material supplied is complete and up-to-date and all equipment/classroom/simulator used to deliver training session is available and serviceable;

(d) reviews trainees records prior to training session to understand their experience level and competency level.

2.3 **FIR9.3 – Prepares trainees for training session**

(a) ensures trainees are not fatigued prior to commencing the training session;

(b) sets trainees tasks to prepare for training session;

(c) clearly communicates session objectives and required elements and performance criteria to meet the required level of competency for the session.

2.4 **FIR9.4 – Conducts a multi-crew training session**

(a) understands and applies the learning process;

(b) assesses trainee's performance against the performance criteria;

(c) uses role plays by trainees to gain insight to the roles of PF, and PM;

(d) structures training sessions that have outcomes that emphasises the importance of working as a highly coordinated team and applying problem solving to real world scenarios;

(e) ensures trainees are using all information available from a range of sources to assist with problem solving;

(f) emphasises non-technical skills rather than manipulative skills during exercises;

(g) uses scenarios to discuss how a breakdown in crew coordination may lead to an undesired aircraft state;

(h) strictly applies correct use of checklists and following SOP`s at all times and a high level of cockpit discipline;

(i) emphasises situational awareness and the importance of application of the TEM model;

(j) highlights effects of automation induced complacency;

(k) ensures trainees are continually aware of automation mode and its correct use and limitations;

(l) identifies to trainees the development of a compromised cockpit authority gradient;

(m) emphasises during periods of high workload and distraction that 1 trainee must be flying the plane at all times and not have attention diverted from this task;

(n) monitors trainees during session for signs of overload and breakdown in learning environment;

(o) ensures session is structured and paced to match differing trainees skill levels.

2.5 **FIR9.5 – Conducts post-session assessment**

(a) analyses trainee performance against the performance criteria performed in the session;

(b) debriefs trainees as a crew and then individually as required;

(c) debriefs trainee from a macro to micro perspective i.e. gives a general overview of performance then drills down to specific areas requiring attention to improve competency;

(d) provides a post-session plan of action for trainee to address areas requiring attention;

(e) completes debrief on a positive note highlighting areas of good performance.

2.6 **FIR9.6 – Post-session administration**

(a) completes trainee performance record in a comprehensive and legible manner;

(b) completes training performance record as soon as practicable after session and definitely before conducting another training session;

(c) determines if the trainee is competent in a particular competency element;

(d) achievement record is completed (when competency in a particular competency element has been achieved).

3 Range of variables

(a) activities are performed in accordance with published procedures;

(b) single trainee or small groups of trainees;

(c) cassroom or approved flight simulator;

(d) various SOPs and aircraft types;

(e) trainees from different cultures;

(f) sessions covering normal, abnormal and emergency operations.

4 Underpinning knowledge of the following:

(a) principles and methods of instruction;

(b) principles of competency based training in aviation;

(c) principles of effective interpersonal communication;

(d) cultural factors related to multi-crew operations.

SIMULATOR INSTRUCTOR RATING

SIR Conduct training in an approved flight simulation training device

1 Unit description

This unit describes the skills and knowledge required to plan and conduct practical flight training in an approved flight simulation training device (FSTD).

2 Elements and performance criteria

2.1 **SIR.1 – Plan a learning activity**

(a) the learning strategy and learning program are accessed, read and interpreted to determine learning outcomes or objectives to be met and relevant delivery requirements;

(b) limitations of the flight simulation training device are identified;

(c) completes administrative tasks according to the training organisation's requirements and ensures:

(i) a training plan is prepared or provided that identifies each performance criteria required to achieve the standard specified for an endorsement, rating or proficiency check;

(ii) a trainee performance record is prepared or provided for recording trainee performance against all performance criteria;

(iii) an assessment guide is prepared or provided to assist the instructor in assessing trainee performance;

(d) an achievement record is prepared or provided to record the date a trainee is signed off as competent in a particular competency element;

(e) technical and human factors requirements for the training environment, including safety and emergency procedures are confirmed.

2.2 **SIR.2 – Prepare trainee for training activities**

(a) availability of suitable resources is confirmed;

(b) ensures trainees are not fatigued prior to commencing the training session;

(c) an introduction to the training environment is provided, including training objectives and relevant workplace procedures;

(d) instructional relationships are established between trainer/facilitator and trainees using appropriate communication tools and skills;

(e) trainee is briefed on how the synthetic training activity will be conducted to meet the training objectives;

(f) risk management issues applicable to the training activity are discussed and the trainee's responsibility for managing relevant risks is confirmed;

(g) trainee's ability to comprehend and recall the training objectives, underpinning knowledge, handling techniques and planned training activity or scenario are confirmed.

2.3 **SIR3 – Guide and facilitate learning in a synthetic environment**

(a) liaison with relevant personnel is conducted to determine simulation activity requirements;

(b) learning is facilitated in accordance with the delivery plan using relevant flight simulation training device and facilitation skills;

(c) good practice in facilitating learning in a simulation training environment is demonstrated to ensure an effective and safe transfer of learning to the real world;

(d) technical issues are addressed where required using relevant technical support mechanisms and personnel;

(e) opportunities for authentic learning, practice and formative assessment are built into the learning experience;

(f) pre-loaded automatic demonstrations are employed where appropriate;

(g) abnormal and unusual conditions are monitored and addressed;

(h) variations to activity conditions are implemented where applicable;

(i) handover and takeover procedures for control of the synthetic device are implemented in accordance with workplace procedures;

(j) trainee performance is assessed against the performance criteria.

2.4 **SIR.4 – Monitor learning in a flight simulation training device environment**

(a) trainee progress is monitored and documented in accordance with workplace procedures;

(b) trainee's cognitive load is assessed, monitored and managed;

(c) support and guidance are provided as appropriate;

(d) trainee is encouraged to develop self-assessment skills;

(e) trainee interaction with others, and participation in training activities, are continuously monitored and interventions are made where appropriate;

(f) opportunities are provided for trainees to reflect on their learning progress;

(g) demonstrates the ability to:

  (i) operate the functional controls of the instructor station;

  (ii) operate the functional controls of the pilot station;

  (iii) freeze the simulator;

  (iv) reposition the simulator to a designated position in space.

2.5 **SIR.5 – Demonstrate a flight sequence**

  (i) narrative coordinated with demonstration;

  (ii) demonstrates smooth and accurate flying;

  (iii) correct handover and takeover techniques are used;

  (iv) demonstrate accurate fault analysis;

  (v) correct instructional and testing techniques are used throughout exercise.

2.6 **SIR.6 – Conduct post-training activities**

(a) significant details of trainee's performance are clearly and accurately debriefed;

(b) completes trainee performance record in a comprehensive and legible manner;

(c) completes training performance record as soon as practicable after session and definitely before conducting another training session;

(d) determines if the trainee is competent in a particular competency element;

(e) achievement record is completed (when competency in a particular competency element has been achieved);

(f) playback devices are employed during debriefing to illustrate key learning points when appropriate;

(g) trainee is briefed on the details of the next training event as appropriate;

(h) trainee records are maintained in accordance with workplace procedures;

(i) relevant stakeholders are kept informed about trainee learning progress;

(j) synthetic device faults are recorded and rectified in accordance with workplace procedures;

(k) support and guidance are provided post-synthetic environment activities as appropriate.

2.7 **SIR.7 – Review synthetic environment facilitation processes**

(a) training session outcomes are evaluated against desired session outcomes;

(b) a review is undertaken post-completion of the learning program, course or qualification;

(c) time is taken to reflect on own performance as a trainer or facilitator, and ways to improve performance are explored;

(d) recommendations for improvements in facilitating training and appropriateness of synthetic systems, tools and resources are identified and documented, and discussed with relevant personnel for future action.

3 Range of variables

(a) activities are performed in accordance with published procedures;

(b) number of trainees;

(c) limitations of the approved flight simulation training device can include:

(i) fidelity;

(ii) movement;

(iii) instrumentation;

(iv) resolution;

(d) flight simulation training devices can include:

(i) full motion simulator;

(ii) flight training device;

(iii) synthetic training device;

(iv) virtual reality training system;

(v) single, multiple or team operator simulator;

(vi) simulator;

(vii) part-task simulator;

(viii) desktop simulator;

(ix) operating system;

(x) associated simulator computer hardware and software;

(e) risk management issues can include:

(i) threat and error management;

(ii) simulation motion sickness;

(iii) equipment malfunction and failure;

(iv) smoke or overheat warnings;

(v) simulator access and egress;

(vi) emergency communication;

(vii) loading stops;

(viii) motion stops;

(ix) negative learning;

(x) fidelity and resolution constraints/limitations;

(f) abnormal/unusual conditions can include:

(i) hardware malfunction/failure;

(ii) software malfunction/failure;

(iii) simulation sickness;

(iv) poor/unusual participant performance;

(v) personnel equipment malfunction and failure;

(g) simulation sickness can include:

(i) visuomotor dysfunctions;

(ii) mental disorientation;

(iii) nausea, including vomiting;

(iv) other symptoms such as drowsiness, fatigue and headache.

4 Underpinning knowledge of the following:

(a) fundamentals of instructing, questioning, engaging and motivating trainees;

(b) IFR and VFR operations and procedures;

(c) effective use of a course of training, curricula/syllabus and lesson plans;

(d) training and assessment standards;

(e) debriefing and feedback techniques;

(f) techniques for introducing tasks in manageable segments to avoid overloading a trainee;

(g) common trainee errors and suggested suitable remedial instruction;

(h) intervention strategies, principles and implications for the synthetic environment;

(i) sequencing and developing synthetic training activities and their relationship with real-world training activities;

(j) the application of simulation and synthetic activities, including live, virtual and constructive (LVC) simulations;

(k) advantages and limitations of synthetic training environments in facilitating learning;

(l) information communication technology within the simulation and synthetic environment;

(m) established procedures applicable to simulation operations;

(n) abnormal conditions, including hardware, software and equipment malfunction and failure and poor or unusual trainee performance;

(o) human factors implication and risks in the synthetic training environment;

(p) the effects of simulation sickness;

(q) functions of single-user, multi-user and distributed user operating systems;

(r) documentation production and safe storage;

(s) technical knowledge sufficient to distinguish between a technical problem and a content problem and to respond accordingly;

(t) relevant learning management systems;

(u) structure and content of relevant training resources;

(v) handover and takeover procedures for the control of synthetic device(s).

FLIGHT EXAMINER RATING

FER Conduct a flight test

1 Unit description

This unit describes the skills and knowledge required to plan, conduct and administer a flight test in accordance with CASA requirements in an aircraft or flight simulator.

The content of this unit also applies to the skills and knowledge required to conduct and administer a proficiency check.

2 Elements and performance criteria

2.1 **FER.1 – Plan a flight test**

(a) identify the flight test to be conducted and extract the flight test standards from the applicable section of Schedule 5 of the Part 61 Manual of Standards;

(b) confirm the applicant is eligible to sit the flight test;

(c) identify competency standards that must be assessed and plan methods of gathering evidence;

(d) plan evidence gathering activities to provide sufficient, reliable, valid and fair evidence of competency;

(e) ensure the flight test applicant’s knowledge deficiency report has been completed and certified by the flight training operator;

(f) plan the KDR assessment when applicable.

2.2 **FER.2 – Prepare applicant for flight test**

(a) confirm the identity of the applicant and ensure a recommendation for the flight test has been issued by the flight training operator;

(b) confirm that the applicant meets all the requirements for the issue of the licence and ratings being assessed;

(c) confirm underpinning knowledge specified for the unit of competency being assessed;

(d) conduct KDR assessment when applicable;

(e) explain and confirm the context, purpose and content of the flight test;

(f) explain and confirm the assessment procedure and expected performance requirements;

(g) explain and confirm the function of the flight examiner, including role-playing, simulation and procedures in the event of an actual emergency;

(h) identify and provide any special needs of the applicant, and any allowable adjustments are made to the assessment procedure;

(i) explain and confirm action to be taken by the flight examiner in the event of failure to achieve competency;

(j) convey information using language and interactive strategies and techniques to communicate effectively with the person being assessed.

2.3 **FER.3 – Conduct flight test**

(a) correctly apply the flight test process in accordance with the relevant sections of the flight examiner manual;

(b) use clear, logical, systematic and unambiguous explanations to convey information to the applicant to ensure the effective conduct of the flight test;

(c) limit flight examiner intervention to ensuring effective conduct of the flight test and management of contingencies and abnormal or emergency situations;

(d) monitor and assess the applicant’s performance and maintain a comprehensive record of events;

(e) ensure the safe completion of the flight test and maintain situational awareness.

2.4 **FER.4 – Make assessment decision**

(a) evaluate the evidence of the applicant’s performance in terms of validity, authenticity, sufficiency, currency and consistent achievement of the specified standards;

(b) evaluate the evidence of the applicant’s performance using a holistic procedure that ensures competency when conducting tasks, managing tasks and contingencies, operating in a flight environment and transferring skills and knowledge to new situations and contexts;

(c) make the assessment decision based on objective evaluation of the evidence against the specified standards.

2.5 **FER.5 – Conduct post-flight test briefing**

(a) advise the applicant of the achievement of competency, or failure to achieve competency;

(b) provide clear and constructive feedback about performance to the applicant using appropriate language and strategies, including guidance on further training if appropriate;

(c) explore opportunities for overcoming any gaps in competency as revealed by the assessment with the applicant;

(d) advise the applicant of the reassessment procedures and the appeals mechanism if the assessment decision is challenged.

2.6 **FER.6 – Conduct post-flight test briefing with training organisation**

Advise the trainer and training operator of the flight test result and the reasons for the outcome, including both positive and negative aspects of the applicant’s performance and any information that could assist in improved training outcomes.

2.7 **FER.7 – Complete administrative requirements**

(a) complete the flight test application and appropriate flight test forms;

(b) complete the applicant’s records;

(c) forward the flight test report, licence application form and notification of any ratings and endorsements that have been issued to CASA.

3 Range of variables

(a) activities are performed in accordance with published procedures;

(b) in an aircraft or an FSTD approved for the purpose;

(c) the aircraft or flight simulation training device must be appropriate for the purposes of the flight test endorsement;

(d) the conditions must be appropriate for the purposes of the licence rating or endorsement to which the flight test endorsement applies.

4 Underpinning knowledge of the following:

(a) Flight Examiners Handbook;

(b) assessment and workplace training competency standards;

(c) principles of adult teaching and learning;

(d) human performance and limitations factors relevant to the training tasks;

(e) psychological factors affecting satisfaction of human needs, defence mechanisms and stress management;

(f) relevant workplace policies and procedures;

(g) appropriate methods of analysis and training planning;

(h) principles of equity and occupational health and safety;

(i) lesson planning and development;

(j) preparation of training resources;

(k) principles of assessment;

(l) assessment of behaviour;

(m) questioning techniques;

(n) applicable subject matter;

(o) self-assessment and evaluation.

FER-AEL Conduct a language proficiency assessment – *Reserved*

SECTION 6 FLIGHT ACTIVITY ENDORSEMENT STANDARDS

FAE-1 Aerobatics — 3,000 ft AGL

1 Unit description

This unit describes the skills and knowledge required to perform aerobatic manoeuvres not below 3,000 ft AGL.

2 Elements and performance criteria

2.1 **FAE-1.1 – Prepare for aerobatic flight**

(a) select suitable airspace that allows the completion of all aerobatic manoeuvres above the authorised minimum altitude;

(b) perform pre-manoeuvre checks and select appropriate aircraft configuration;

(c) maintain lookout using a systematic scan technique at a rate determined by traffic density, visibility or terrain.

2.2 **FAE-1.2 – Perform looping manoeuvre**

(a) pitch the aircraft vertically at a continuous rate through 360º in balanced flight, maintaining wings parallel to the Earth's horizon, positive 'g', without stalling and maintaining alignment with a nominated line feature from a nominated airspeed that will ensure completion of a loop;

(b) comply with engine, airframe and physiological limitations;

(c) observe entry and recovery heights.

2.3 **FAE-1.3 – Perform rolling manoeuvre**

(a) roll the aircraft from a nominated airspeed around the fore and aft axis through 360º while maintaining direction and altitude, or a height loss appropriate to the aircraft type;

(b) observe entry and recovery height.

2.4 **FAE-1.4 – Perform stall turn-hammerhead (vertical yaw reversal)**

(a) pitch aircraft from a nominated airspeed to the vertical in balanced flight with the wings parallel to the horizon and terminate the pitch at the vertical;

(b) maintain the aircraft vertical and yaw through 180º, descending vertically in balanced flight and recover the aircraft from the dive to straight and level flight, aligned with a nominated line feature 180º to the original heading;

(c) observe entry and recovery height.

2.5 **FAE-1.5 – Recover from unusual attitudes**

(a) recover aircraft to controlled flight, in the height available, from any attitude, bank angle or speed within the limitations of the aircraft;

(b) recover aircraft to controlled flight, in the height available from any inverted negative 'g' attitude, bank angle or speed within the limitations of the aircraft.

2.6 **FAE-1.6 – Recover from spin**

(a) perform pre-manoeuvre checks;

(b) enter and establish an upright spin;

(c) identify upright spin and direction of yaw;

(d) close throttle;

(e) stop yaw;

(f) unstall wing by reducing AOA (aeroplane);

(g) recover to controlled flight;

(h) recover within the number of turns normally required for upright spin recovery in the aircraft type, within the aircraft and height limitations.

3 Range of variables

(a) activities are performed in accordance with published procedures;

(b) day VFR;

(c) aeroplanes approved to conduct aerobatic flight.

4 Underpinning knowledge of the following:

(a) meaning of the terms positive and negative ‘g’;

(b) symmetrical positive and negative ‘g’ limits for the aircraft flown;

(c) meaning of the term rolling ‘g’;

(d) rolling ‘g’ limits for the aircraft flown;

(e) how to calculate the rolling ‘g’ limitation of an aircraft;

(f) relationship during rolling manoeuvres between pitch angle required on commencement of a roll and rate of roll;

(g) engine RPM limitations for the aircraft flown;

(h) physiological effects of positive and negative ‘g’;

(i) the ‘g’ figure that a normal person may experience ‘g’ induced loss of consciousness (G-LOC);

(j) differences between grey out, black out, and G-LOC;

(k) conditions under which G-LOC is likely to occur;

(l) time period that disorientation may occur for after recovery from G-LOC;

(m) factors that can reduce G-LOC tolerances;

(n) physiological effects of sustained and rapid changes of ‘g’ loading;

(o) relationship between tunnel vision and loss of consciousness;

(p) hazards and consequences of performing aerobatics with blocked eustachian tubes;

(q) physiological factors that can reduce ‘g’ tolerance;

(r) physical actions that may increase ‘g’ tolerance;

(s) minimum altitude to perform aerobatic manoeuvres;

(t) relationship between pre-stall buffet and rate of turn or rate of pitch;

(u) effect of increasing airspeed on stick force;

(v) structural irregularities that indicate an aircraft has been overstressed;

(w) effect of increased ‘g’ loading on stall speed;

(x) airspeed limitations;

(y) V_A, V_{NE} and V_{NO};

(z) effect of aircraft weight on VA and what precautions must be taken;

(za) recovery from manoeuvre-induced disorientation;

(zb) how to assess personal fitness for aerobatic flight;

(zc) maximum rate turn criteria;

(zd) minimum radius criteria.

FAE-2 Aerobatics — 1,500 ft AGL

1 Unit description

This unit describes the skills and knowledge required to design and plan an aerobatic routine and conduct aerobatics safely not below 1,500 ft AGL.

2 Elements and performance criteria

2.1 FAE-2.1 – Design an aerobatic routine

(a) design a sequence of aerobatic manoeuvres that meet a specified requirement, involve practical transitions between manoeuvres, and identify performance parameters that will ensure safe completion of all manoeuvres not below 1,500 ft AGL;

(b) identify performance parameters based on a combination of aircraft attitude, power setting, altitude and speed that provide go-no go guidance for safe completion of all manoeuvres not below 1,500 ft AGL within the physical limitations of the pilot and structural limitations of the aircraft.

2.2 FAE-2.2 – Plan an aerobatic performance

(a) identify the stakeholder requirements for the aerobatic sequence and formulate a plan to safely present the sequence, meeting the specified requirements;

(b) ensure any required aerobatic approvals are appropriate, valid and current;

(c) analyse prevailing and forecast weather and apply wind velocity, visibility and cloud base to ensure safe and accurate aerobatic performance;

(d) identify the 'aerobatic box' when appropriate, and plan manoeuvres to remain within the box;

(e) modify aerobatic performance if weather conditions cause (or controlling authority imposes) limitations, when appropriate;

(f) recall and apply the identified go-no go performance criteria to plan break-off manoeuvres at any point of the aerobatic sequence where performance criteria are not achievable;

(g) recall escape manoeuvres that could be required during the aerobatic sequence stating the go-no go criteria and detail the escape manoeuvres that will result in (return to) controlled flight not below 1,500 ft AGL.

2.3 FAE-2.3 – Conduct aerobatics not below 1,500 ft AGL

(a) complete a specified sequence of aerobatic manoeuvres in accordance with display plan in the specified time;

(b) ensure performance parameters required for safe completion of the manoeuvre are achieved prior to commencement of each manoeuvre;

(c) maintain orientation with display axis;

(d) manage the energy potential of the aircraft to ensure completion of manoeuvres and sequences of manoeuvres within aircraft structure and minimum height limits;

(e) recognise the failure to achieve performance parameters (energy requirement) to complete a manoeuvre and manage the aircraft to regain the manoeuvre energy potential;

(f) maintain height at or above a specified altitude not below 1,500 ft AGL.

3 Range of variables

(a) activities are performed in accordance with published procedures;

(b) day VFR;

(c) aerobatic aircraft;

(d) lateral and vertical limitations imposed on manoeuvring airspace.

4 Underpinning knowledge of the following:

(a) energy management as applied to aerobatic routines;

(b) the minimum height required to complete a pull through manoeuvre, remaining within the structural limits of the aircraft, from inverted flight at 80 kts in the aircraft type being flown;

(c) the minimum height required to recover from a spin in the aircraft type being flown;

(d) the recovery technique to regain physiological and aircraft control when disorientation is experienced;

(e) the ‘g’ limitations for the aircraft being flown;

(f) the rolling ‘g’ limitations for the aircraft being flown;

(g) maximum rate turn criteria;

(h) minimum radius turn criteria;

(i) the precautions that should be taken with regard to radius of turn when operating at a high-density altitude;

(j) factors that lead to increased density altitude.

FAE-3 Aerobatics — 1,000 ft AGL

1 Unit description

This unit describes the skills and knowledge required to design and plan an aerobatic routine and conduct aerobatics safely not below 1,000 ft AGL.

2 Elements and performance criteria

2.1 FAE-3.1 – Design an aerobatic routine

(a) design a sequence of aerobatic manoeuvres that meet a specified requirement, involve practical transitions between manoeuvres, and identify performance parameters that will ensure safe completion of all manoeuvres not below 1,000 ft AGL;

(b) identify performance parameters based on a combination of aircraft attitude, power setting, altitude and speed that provide go-no go guidance for safe completion of all manoeuvres not below 1,000 ft AGL within the physical limitations of the pilot and structural limitations of the aircraft.

2.2 FAE-3.2 – Plan an aerobatic performance

(a) identify the stakeholder requirements for the aerobatic sequence and formulate a plan to safely present the sequence, meeting the specified requirements;

(b) ensure any required aerobatic approvals are appropriate, valid and current;

(c) analyse prevailing and forecast weather and apply wind velocity, visibility and cloud base to ensure safe and accurate aerobatic performance;

(d) identify the ‘aerobatic box’ when appropriate, and plan manoeuvres to remain within the box;

(e) modify aerobatic performance if weather conditions cause (or controlling authority imposes) limitations, when appropriate;

(f) recall and apply the identified go-no go performance criteria to plan break-off manoeuvres at any point of the aerobatic sequence where performance criteria are not achievable;

(g) recall escape manoeuvres that could be required during the aerobatic sequence stating the go-no go criteria and detail the escape manoeuvres that will result in (return to) controlled flight not below 1,000 ft AGL.

2.3 FAE-3.3 – Conduct aerobatics above 1,000 ft AGL

(a) complete a specified sequence of aerobatic manoeuvres in accordance with display plan in the specified time;

(b) ensure performance parameters required for safe completion of the manoeuvre are achieved prior to commencement of each manoeuvre;

(c) maintain orientation with display axis;

(d) manage the energy potential of the aircraft to ensure completion of manoeuvres and sequences of manoeuvres within aircraft structure and minimum height limits;

(e) recognise the failure to achieve performance parameters (energy requirement) to complete a manoeuvre and manage the aircraft to regain the manoeuvre energy potential;

(f) maintain height at or above a specified altitude not below 1,000 ft AGL.

3 Range of variables

(a) activities are performed in accordance with published procedures;

(b) day VFR;

(c) aerobatic aircraft;

(d) lateral and vertical limitations imposed on manoeuvring airspace.

4 Underpinning knowledge of the following:

(a) energy management as applied to aerobatic routines;

(b) the minimum height required to complete a pull through manoeuvre, remaining within the structural limits of the aircraft, from inverted flight at 80 kts in the aircraft type being flown;

(c) the minimum height required to recover from a spin in the aircraft type being flown;

(d) the recovery technique to regain physiological and aircraft control when disorientation is experienced;

(e) the ‘g’ limitations for the aircraft being flown;

(f) the rolling ‘g’ limitations for the aircraft being flown;

(g) maximum rate turn criteria;

(h) minimum radius turn criteria;

(i) the precautions that should be taken with regard to radius of turn when operating at a high-density altitude;

(j) factors that lead to increased density altitude.

FAE-4 Aerobatics — 500 ft AGL

1 Unit description

This unit describes the skills and knowledge required to design an aerobatic sequence, plan an aerobatic performance and conduct aerobatics safely not below 500 ft AGL.

2 Elements and performance criteria

2.1 FAE-4.1 – Design an aerobatic routine

(a) design a sequence of aerobatic manoeuvres that meet a specified requirement, involve practical transitions between manoeuvres and identify performance parameters that will ensure safe completion of all manoeuvres not below 500 ft AGL;

(b) identify performance parameters based on a combination of aircraft attitude, power setting, altitude and speed that provide go-no go guidance for safe completion of all manoeuvres not below 500 ft AGL within the physical limitations of the pilot and structural limitations of the aircraft.

2.2 FAE-4.2 – Plan an aerobatic performance

(a) identify the stakeholder requirements for the aerobatic sequence and formulate a plan to safely present the sequence, meeting the specified requirements;

(b) ensure any required aerobatic approvals are appropriate, valid and current;

(c) analyse prevailing and forecast weather and apply wind velocity, visibility and cloud base to ensure safe and accurate aerobatic performance;

(d) demonstrate her or his ability to safely modify aerobatic performance if weather conditions cause, or controlling authority imposes, limitations (when appropriate);

(e) plan a safe aerobatic display using manoeuvres applicable to a prescribed or actual limited cloud base (plan a ‘flat’ or ‘low’ show);

(f) recall and apply the identified go-no go performance parameters to plan break-off manoeuvres at any point of the aerobatic sequence where performance criteria are not achieved;

(g) recall escape manoeuvres that could be required during the aerobatic sequence stating the go-no go criteria and detail the escape manoeuvres that will result in (return to) controlled flight not below 500 ft AGL.

2.3 FAE-4.3 – Conduct aerobatics not below 500 ft AGL

(a) complete a specified sequence of aerobatic manoeuvres in accordance with display plan in the specified time;

(b) ensure performance parameters required for safe completion of the manoeuvre are achieved prior to commencement of each manoeuvre;

(c) maintain orientation with display axis;

(d) manage the energy potential of the aircraft to ensure completion of manoeuvres and sequences of manoeuvres within aircraft structure and minimum height limits;

(e) recognise the failure to achieve performance parameters (energy requirement) to complete a manoeuvre and manage the aircraft to regain the manoeuvre energy potential;

(f) maintain height at or above a specified altitude not below 500 ft AGL;

(g) demonstrate safe behaviour.

3 Range of variables

(a) activities are performed in accordance with published procedures;

(b) day VFR.

4 Underpinning aeronautical knowledge of the following:

(a) energy management as applied to aerobatic routines;

(b) the minimum height required to complete a pull through manoeuvre, remaining within the structural limits of the aircraft, from inverted flight at 80 kts in the aircraft type being flown;

(c) minimum height required to recover from a spin in the aircraft type being flown;

(d) recovery technique to regain physiological and aircraft control when disorientation is experienced;

(e) ‘g’ limitations for the aircraft being flown;

(f) rolling ‘g’ limitations for the aircraft being flown;

(g) Beggs-Mueller emergency spin recovery technique;

(h) maximum rate turn criteria;

(i) minimum radius turn criteria;

(j) precautions that should be taken with regard to radius of turn when operating at a high-density altitude;

(k) factors that lead to increased density altitude;

(l) potential danger associated with conducting aerobatics at 500 ft AGL over unfamiliar terrain.

FAE-5 Aerobatics — unlimited

1 Unit description

This unit describes the skills and knowledge required to design an aerobatic sequence, plan an aerobatic performance and conduct aerobatics at any height.

2 Elements and performance criteria

2.1 FAE-5.1 – Design an aerobatic routine

(a) design a sequence of aerobatic manoeuvres that meet a specified requirement, involve practical transitions between manoeuvres and identify performance parameters that will ensure safe completion of all manoeuvres below 500 ft AGL;

(b) identify performance parameters based on a combination of aircraft attitude, power setting, altitude and speed that provide go-no go guidance for safe completion of all manoeuvres below 500 ft AGL within the physical limitations of the pilot and structural limitations of the aircraft.

2.2 FAE-5.2 – Plan an aerobatic performance

(a) identify the stakeholder requirements for the aerobatic sequence and formulates a plan to safely present the sequence, meeting the specified requirements;

(b) ensure any required aerobatic approvals are appropriate, valid and current;

(c) analyse prevailing and forecast weather and apply wind velocity, visibility and cloud base to ensure safe and accurate aerobatic performance;

(d) identify the ‘aerobatic box’ when appropriate, and plan manoeuvres to remain within the box;

(e) demonstrate the ability to safely modify aerobatic performance if weather conditions cause or controlling authority imposes limitations, when appropriate;

(f) plan a safe aerobatic display using manoeuvres applicable to a prescribed or actual limited cloud base (plan a ‘flat’ or ‘low’ show);

(g) recall and apply the identified go-no go performance parameters to plan break-off manoeuvres at any point of the aerobatic sequence where performance criteria are not achieved;

(h) recall escape manoeuvres that could be required during the aerobatic sequence stating the go-no go criteria and detail the escape manoeuvres that will result in (return to) controlled flight below 500 ft AGL.

2.3 FAE-5.3 – Conduct aerobatics below 500 ft AGL

(a) complete a specified sequence of aerobatic manoeuvres in accordance with display plan in the specified time;

(b) ensure performance parameters required for safe completion of the manoeuvre are achieved prior to commencement of each manoeuvre;

(c) maintain orientation with display axis;

(d) manage the energy potential of the aircraft to ensure completion of manoeuvres and sequences of manoeuvres within aircraft structure and minimum height limits;

(e) recognise the failure to achieve performance parameters (energy requirement) to complete a manoeuvre and manage the aircraft to regain the manoeuvre energy potential.

3 Range of variables

(a) activities are performed in accordance with published procedures;

(b) day VFR;

(c) aerobatic aircraft;

(d) lateral and vertical limitations imposed on manoeuvring airspace.

4 Underpinning knowledge of the following:

(a) energy management as applied to aerobatic routines;

(b) minimum height required to complete a pull through manoeuvre, remaining within the structural limits of the aircraft, from inverted flight at 80 kts in the aircraft type being flown;

(c) maximum rate turn criteria;

(d) minimum radius turn criteria;

(e) minimum height required to recover from a spin in the aircraft type being flown;

(f) recovery technique to regain physiological and aircraft control when disorientation is experienced;

(g) ‘g’ limitations for the aircraft being flown;

(h) rolling ‘g’ limitations for the aircraft being flown;

(i) Mueller-Beggs emergency spin recovery technique;

(j) precautions that should be taken with regard to radius of turn when operating at a high-density altitude;

(k) factors that lead to increased density altitude;

(l) the potential danger associated with conducting aerobatics below 500 ft AGL over unfamiliar terrain.

FAE-6 Formation flying — aeroplane

1 Unit description

This unit describes the skills and knowledge required to safely fly an aeroplane in formation, plan a formation flight, brief all participants and lead a formation.

2 Elements and performance criteria

2.1 **FAE-6.1 – Fly echelon formation**

(a) maintain the specified echelon right and left formation stations while remaining in the lateral plane of the lead aircraft during all manoeuvres and phases of flight;

(b) balance aircraft;

(c) apply standard clear and concise radiotelephony phraseology to ensure precise advice to formation lead and other formation aircraft;

(d) perform pairs take-off;

(e) perform pairs stream take-off and join up;

(f) apply specified procedures and hand signals (non-verbal) for take-off;

(g) maintain the specified echelon position during take-off.

2.2 **FAE-6.2 – Fly line astern formation**

(a) maintain the specified line astern formation station while remaining stepped down parallel to the lateral plane of the lead aircraft during all manoeuvres and phases of flight;

(b) maintain wings parallel to lead aircraft;

(c) balance aircraft.

2.3 **FAE-6.3 – Perform station changes**

Manoeuvre the aeroplane safely to specified alternative formation stations during all phases of flight in the briefed sequence, while remaining clear of all other formation aircraft.

2.4 **FAE-6.4 – Perform manoeuvres in echelon and line astern**

(a) straight and level at various airspeeds

(b) level turns at various airspeeds

(c) climbing:
   (i) straight;
   (ii) turning;

(d) descending at various speeds:
   (i) straight;
   (ii) turning;

(e) flight in various aircraft configurations:
   (i) straight and level;
   (ii) turning and level;
   (iii) descending in straight flight;
   (iv) descending and turning;

(f) perform break and rejoin:
   (i) recognise loss of contact with formation or any other requirement to break away and implement a decision to break away from the formation;
   (ii) break away from formation lead by creating positive track and height separation with the remaining formation aircraft;
   (iii) notify formation leader of break away;

(iv) maintain track and height separation until cleared by formation leader to rejoin the formation;

(v) regain visual contact with leader;

(vi) transmit rejoin intentions;

(vii) maintain vertical separation with the remaining formation aircraft;

(viii) establish and manage overtaking speed while maintaining vertical separation;

(g) establish a flight path that will ensure the aircraft will pass behind and below the formation in the event of a join-up overshoot:

(i) position the aircraft into the recognised formation position;

(h) perform circuit and stream landing:

(i) conduct formation break into the circuit;

(ii) maintain separation with other formation aircraft;

(iii) manage wake turbulence;

(iv) land in turn;

(i) perform formation landing:

(i) maintain formation position and

(A) carry out pre-landing checks;

(B) configure aircraft on leader's call;

(C) land aircraft;

(ii) after landing, ensure horizontal and lateral separation is established;

(iii) after clearing runway establish formation taxiing position;

(iv) conduct after-landing checks;

(j) perform formation overshoot:

(i) maintain formation position;

(ii) configure aircraft on instructions from leader;

(iii) complete after take-off checks.

2.5 **FAE-6.5 – Plan a formation flight**

(a) identify the task requirements for the flight;

(b) arrange crews, briefing venue and time, and coordinate aircraft availability;

(c) analyse the tasks to be achieved and determine the manoeuvres and formations that ensure safe achievement of the task;

(d) plan flight route to allow task achievement in the time available and within performance capabilities of the flight, while complying with all air traffic, area limitations and navigation requirements;

(e) plan actions in the event of abnormal or emergency situations involving the formation.

2.6 **FAE-6.6 – Brief and de-brief formation pilots**

(a) explain and confirm the ground and flight manoeuvres to be conducted;

(b) explain and confirm timings, route(s), speeds and altitudes to be flown;

(c) identify and nominate deputy leader and explain and confirm responsibilities;

(d) explain and confirm communication procedures, in-flight minimum fuel, abnormal and emergency procedures and method of return for landing;

(e) identify achievements and any faults or errors that occurred during the formation flight and provides guidance and feedback to other formation members during the post-flight de-brief.

2.7 **FAE-6.7 – Lead a formation flight**

(a) manoeuvre lead aircraft using controlled corrective action to ensure a stable platform for pilots flying in formation stations;

(b) manoeuvre the formation safely anticipating and allowing for formation size, proximity to obstructions, terrain, airspace limitations, weather conditions and air traffic, while ensuring compliance with regulatory requirements;

(c) direct and control the formation using precise standard radio phraseology, hand and other signal procedures;

(d) manage lost contact procedures in accordance with standard operating procedures;

(e) monitor formation member's flight performances and reacts appropriately to any problems.

2.8 **FAE-6.8 – Manage abnormal and emergency situations during formation flight**

(a) control aircraft and formation when leading;

(b) manage abnormal or emergency situations in accordance with standard operating procedures or AFM and POH, both as flight leader and as pilot in command of a non-lead aircraft.

3 Range of variables

(a) activities are performed in accordance with published procedures;

(b) day VFR;

(c) two or more aircraft.

4 Underpinning knowledge of the following:

(a) left and right echelon positions for the aeroplane being flown;

(b) the reference points that are used to achieve a specified formation position;

(c) line astern position for the aeroplane being flown;

(d) how to manoeuvre from echelon to line astern;

(e) how to manoeuvre from echelon right to echelon left;

(f) how to manoeuvre from line astern to echelon;

(g) the verbal and non-verbal signals for:

  (i) commence take off roll;

  (ii) position changes;

  (iii) radio receiver failure;

  (iv) radio transmitter failure;

(h) lost contact procedure;

(i) formation rejoin procedures.

FAE-7 Aerobatics — formation

1 Unit description

This unit describes the skills and knowledge required to safely plan, direct and control a formation of aircraft during the performance of aerobatic manoeuvres.

2 Elements and performance criteria

2.1 FAE-7.1 – Identify the role, requirements and principles of operation of the formation aerobatic team

Identify and explain the role of the aerobatic team with respect to types of displays and aircraft used, requirements of the team and team members and the principles that will be applied to ensure safe and effective formation displays.

2.2 FAE-7.2 – Select a formation aerobatic team

(a) identify appropriately qualified and willing pilots to be selected for the aerobatic team;

(b) explain and confirm the requirements of each pilot with respect to personal performance, expected behaviour and commitment;

(c) develop a method of assessment to determine the suitability of pilots to conduct formation aerobatics;

(d) conduct airborne assessment of formation team pilots to ensure suitability and competence to conduct formation aerobatics.

2.3 FAE-7.3 – Develop a formation aerobatic training plan

(a) produce a training plan that will ensure the development of competency of a pilot to safely conduct formation aerobatic flight;

(b) direct and control the training and practice of the formation team until specified flying standards are consistently achieved.

2.4 FAE-7.4 – Develop and plan a formation aerobatic routine

Develop and plan a formation aerobatic routine that is safe, achievable, practical and fulfils the identified role of the formation team.

2.5 FAE-7.5 – Brief and de-brief formation pilots

(a) explain and confirm the ground and flight manoeuvres to be conducted;

(b) explain and confirm timings, route(s), speeds and altitudes to be flown;

(c) describe the venue of the formation aerobatic display, display axis, minimum distance from crowd, elevation of the venue, minimum altitude and any hazards or obstructions;

(d) identify and nominate deputy leader and explain and confirm responsibilities;

(e) explain and confirm communication procedures, in flight minimum fuel, abnormal and emergency procedures and method of return for landing;

(f) identify achievements and any faults or errors that occurred during the formation flight and provide guidance and feedback to other formation team members during the post-flight de-brief.

2.6 FAE-7.6 – Lead a formation aerobatic team during an aerobatic sequence

(a) identify the task requirements for the flight;

(b) arrange crews, briefing venue and time, and coordinate aircraft availability;

(c) analyse the tasks to be achieved and determine the manoeuvres and formations that ensure safe achievement of the task;

(d) plan flight route to allow task achievement in the time available and with performance capabilities of the flight, while complying with all air traffic, area limitations and navigation requirements;

(e) plan actions in the event of abnormal or emergency situations involving the formation;

(f) manoeuvre lead aircraft using controlled corrective action to ensure a stable platform for pilots flying in formation stations;

(g) manoeuvre the formation safely during aerobatic flight anticipating and allowing for formation size, proximity to obstructions, terrain, airspace limitations, weather conditions and air traffic, while ensuring compliance with regulatory requirements;

(h) direct and control the formation using precise standard radio phraseology, hand and other signal procedures;

(i) manage lost contact procedures in accordance with standard operating procedures;

(j) monitor formation member's flight performances and react appropriately to any problems.

2.7 **FAE-7.7 – Manage abnormal and emergency situations during formation aerobatic flight**

(a) control aircraft and formation;

(b) manage abnormal or emergency situations in accordance with standard operating procedures or AFM and POH, both as flight leader and as pilot in command of a non-lead aircraft.

3 Range of variables

(a) activities are performed in accordance with published procedures;

(b) day VFR;

(c) approved aerobatic aircraft;

(d) a team of pilots;

(e) lateral and vertical limitations imposed on manoeuvring airspace.

4 Underpinning knowledge

(a) left and right echelon positions for the aeroplane being flown;

(b) the line astern position for the aeroplane being flown;

(c) how to manoeuvre from echelon to line astern;

(d) how to manoeuvre from echelon right to echelon left, how to manoeuvre from line astern to echelon;

(e) the verbal and non-verbal signals for:

  (i) commence take off roll;

  (ii) change position;

  (iii) radio receiver failure;

  (iv) radio transmitter failure;

(f) the procedure that a pilot flying a wing position would follow when visual contact is lost with the lead aircraft;

(g) how to rejoin the flight leader.

FAE-8 Spinning

1 Unit description

This unit describes the skills and knowledge required to execute and recover from an upright spin manoeuvre.

2 Elements and performance criteria

2.1 FAE-8.1 – Recover from spin

(a) perform pre-manoeuvre checks;

(b) enter and establish an upright spin;

(c) identify upright spin and direction of yaw;

(d) close throttle;

(e) stop yaw;

(f) unstall wing by reducing AOA;

(g) recover to controlled flight;

(h) recover within the number of turns normally required for upright spin recovery in the aircraft type, within the aircraft and height limitations.

3 Range of variables

(a) activities are performed in accordance with published procedures;

(b) day VFR flight in VMC;

(c) within the lateral and vertical limitations of the planned manoeuvring airspace using an approved aerobatic aeroplane.

4 Underpinning knowledge of the following:

(a) actions required to recover from wing drop at the stall;

(b) what control inputs, with an aeroplane in any attitude, at the point of stall, are likely to cause a spin;

(c) blanketing effects the elevator can have on the rudder during spin recovery;

(d) significance of stick and control wheel position with respect to spin recovery;

(e) aerodynamic causes of a spin;

(f) what aerodynamic factor determines the direction of a spin;

(g) how to recognise a stable spin;

(h) difference between a stable spin and an unstable spin;

(i) effects of C of G position on spin performance and acceleration;

(j) difference between a spin and spiral dive;

(k) factors which may lead to a flat spin;

(l) difference between an upright and an inverted spin;

(m) visual indications used to determine the direction of a spin;

(n) instrument indications used confirm the direction of a spin;

(o) standard spin entry and recovery techniques for the aircraft being flown;

(p) number of turns normally required for spin recovery in the aeroplane type;

(q) height normally required entering and recovering from a stable spin;

(r) Mueller-Beggs spin recovery action and limitations on its application;

(s) ‘g’ and any other limitations applicable to spinning for the aeroplane type.

FAE-9 Formation flying — helicopter

1 Unit description

This unit describes the skills and knowledge required to safely fly a helicopter in formation.

2 Elements and performance criteria

2.1 **FAE-9.1 – Fly echelon formation**

(a) maintain the specified echelon right and left formation stations during take-off, climb, cruise, descent and turning manoeuvres;

(b) advise formation lead and other formation aircraft using standard clear and concise radiotelephony phraseology to ensure precise information.

2.2 **FAE-9.2 – Fly line astern formation**

(a) maintain the specified line astern formation station during take-off, climb, cruise, descent and turning manoeuvres;

(b) advise formation lead and other formation aircraft using standard clear and concise radiotelephony phraseology to ensure precise information.

2.3 **FAE-9.3 – Perform station changes**

(a) manoeuvre the helicopter safely to specified alternative formation stations during climb, cruise, descending and turning manoeuvres, while remaining clear of all other formation aircraft.

2.4 **FAE-9.4 – Perform breakaway and rejoin procedures**

(a) recognise loss of contact situations and implement a decision to break away from the formation;

(b) break away from formation lead aircraft and rejoin at specified formation stations.

2.5 **FAE-9.5 – Plan a formation flight**

(a) identify the task requirements for the flight;

(b) analyse the tasks to be achieved and determine the manoeuvres and formations that ensure safe achievement of the task;

(c) plan flight route to allow task achievement in the time available and within the performance capabilities of the flight, while complying with all air traffic, area limitations and navigation requirements;

(d) arrange crews, briefing venue and time, and coordinate helicopter availability;

(e) plan actions in the event of abnormal or emergency situations involving the formation.

2.6 **FAE-9.6 – Brief and de-brief formation pilots**

(a) explain and confirm the ground and flight manoeuvres to be conducted;

(b) explain and confirms timings, route(s), airspeeds and altitudes to be flown;

(c) identify and nominate deputy leader and explain and confirm responsibilities;

(d) explain communication procedures, standard calls, in flight minimum fuel, abnormal and emergency procedures and method of return for landing;

(e) identify achievements and any faults or errors that occurred during the formation flight and provide guidance and feedback to other formation members.

2.7 **FAE-9.7 – Lead a formation flight**

(a) manoeuvre lead aircraft without using harsh or rapid control input to ensure a stable platform for pilots flying in formation stations;

(b) manoeuvre the formation safely, anticipating and allowing for formation size, proximity to obstructions, terrain, airspace limitations, weather conditions and air traffic, while ensuring compliance with regulatory requirements;

(c) direct and control the formation using precise standard radio phraseology, hand and other signal procedures;

(d) manage lost contact in accordance with standard operating procedures;

(e) monitor formation member's flight performances and react appropriately to any problems.

2.8 **FAE-9.8 – Perform formation take-off approach and landings**

(a) maintain echelon left and right positions from a hover departure, throughout the climb to level off, acceleration and cruise speed;

(b) maintain echelon right, echelon left and line astern positions during an approach for landing;

(c) execute termination to the hover from a formation approach.

2.9 **FAE-9.9 – Manage abnormal and emergency situations during formation flight**

(a) control aircraft and formation when leading;

(b) manage abnormal or emergency situations in accordance with standard operating procedures or AFM and POH, both as flight leader and as pilot in command of a non-lead aircraft.

3 Range of variables

(a) activities are performed in accordance with published procedures;

(b) day VFR;

(c) more than 1 approved helicopter.

4 Underpinning knowledge of the following:

(a) left and right echelon positions for the aeroplane being flown;

(b) reference points used to achieve a specified formation position;

(c) line astern position for the aeroplane being flown;

(d) how to manoeuvre from echelon to line astern;

(e) how to manoeuvre from echelon right to echelon left;

(f) how to manoeuvre from line astern to echelon;

(g) the verbal and non-verbal signals for:

(i) commence take off roll;

(ii) position change;

(iii) radio receiver failure;

(iv) radio transmitter failure;

(h) lost contact procedure;

(i) formation rejoin procedures;

(j) explain reasons for lag between control input and attitude change;

(k) 'Control Power'.

Schedule 3 Aeronautical knowledge standards

The following Table of Contents and Index of Codes are for guidance only and are not part of the Schedule.

Table of Contents

INDEX to Unit Codes

APPENDIX 1. FLIGHT CREW LICENCES AND AIRCRAFT CATEGORY RATINGS

SECTION 1.1 BASIC AERONAUTICAL KNOWLEDGE (BAK)

Unit 1.1.1 BAKC: Basic aeronautical knowledge – all aircraft categories

1. Reserved

2. Terminology

2.1 Direction of flight

2.1.1 Describe direction using the following methods:
- (a) as a 3 figure group;
- (b) as a 2 figure group;
- (c) in the clock code.

2.1.2 Define the meaning of aircraft heading (HDG).

2.1.3 Describe the differences between the following terms when used to describe direction:
- (a) true (T);
- (b) magnetic (M);
- (c) compass (C).

2.2 Distance, speed and velocity

2.2.1 State the units used for lateral distance in respect of the following:
- (a) navigation;
- (b) visibility.

2.2.2 Define the meaning of knot (kt) when used to express aircraft speed.

2.2.3 Define wind velocity (W/V).

2.2.4 Differentiate between the following acronyms:
- (a) IAS;
- (b) CAS;
- (c) TAS;
- (d) GS.

2.3 Time

2.3.1 Express time as a 4 figure group (24 hour time).

2.3.2 Convert local standard time to UTC.

2.3.3 Convert UTC to local standard time.

2.4 Units of measurement

2.4.1 State the units used to describe vertical measurement and the differences between the following:
- (a) height;
- (b) altitude;
- (c) elevation.

2.4.2 State the unit of measurement used to express:
- (a) runway dimensions;
- (b) temperature;
- (c) atmospheric pressure;
- (d) weight;

(e) volume (liquids);

(f) visibility.

2.5 Basic physics

2.5.1 Describe the meaning of kinetic and potential energy and the relationship to basic aircraft operations.

2.5.2 Describe the meaning of 'aircraft energy state' with respect to kinetic and potential energy.

2.5.3 Describe the effects on 'aircraft energy state' of acceleration, deceleration, climb and descent.

3. Power plants and systems – basics

3.1 Piston engine aircraft

3.1.1 Describe the basic principle of operation of a 4 stroke cycle internal combustion engine and state the purpose and function of the following components:

(a) cylinders;

(b) pistons;

(c) piston rings;

(d) inlet/exhaust valves;

(e) crank shaft;

(f) cam shaft;

(g) spark plugs.

3.1.2 Describe the effect of increasing altitude and temperature on engine performance and how the following affect the power output of an engine:

(a) throttle lever position;

(b) RPM.

3.1.3 State the function of the following engine components and/or features:

(a) carburettor;

(b) throttle;

(c) magneto, dual ignition;

(d) alternator;

(e) battery, battery compartment vent;

(f) propeller;

(g) circuit breaker, fuse, bus bar;

(h) impulse start;

(i) oil cooler;

(j) fuel tank vents.

3.1.4 In relation to power plants and systems, state the purpose and importance of monitoring the following gauges:

(a) RPM (tachometer);

(b) CHT and EGT;

(c) voltmeter, ammeter, loadmeter;

(d) fuel pressure;

(e) oil temperature and pressure.

3.1.5 Describe the purpose and function of an engine lubrication system in relation to engine cooling.

3.1.6 State the purpose of mixture control and describe the effect of excessively rich and lean mixture strengths on engine operation.

3.1.7 Describe the advantages and disadvantages of a simple carburettor and a direct injection system.

3.1.8 List typical services provided by the following systems in a light aircraft and the actions a pilot would take to rectify or detect a malfunction:

(a) hydraulic system;

(b) electrical system;

(c) ignition system;

(d) vacuum system.

3.2 Fuels and oils

3.2.1 Describe the following in relation to fuels:

(a) the sources of fuel contamination;

(b) the advantages and disadvantages of fuelling prior to overnight parking;

(c) how to identify different grades of aviation fuel;

(d) the hazards/problems with:

(i) mixing different hydraulic fluids;

(ii) using incorrect grades of fuel.

3.3 Engine handling

3.3.1 State the causes and effects of detonation, limited to improper use of mixture control, MP/RPM, and use of incorrect fuel octane.

3.3.2 Describe the effect on an engine of the following:

(a) prolonged idling;

(b) using incorrect mixture settings in flight.

3.3.3 State reasons for the following limitations/actions:

(a) minimum oil pressure;

(b) minimum/maximum oil temperature;

(c) minimum/maximum CHT;

(d) maximum RPM;

(e) ignition checks: pre-take-off and shutdown;

(f) prolonged use of starter motor;

(g) use of pitot heat on the ground;

(h) engine warm up on prolonged descents.

3.3.4 Explain the significance of blue or black exhaust smoke produced by an aircraft piston engine.

3.4 Malfunctions

3.4.1 For paragraphs (a), (b) and (c), the components are listed in paragraph (d):

(a) describe the cockpit indications which may suggest a malfunction or failure of a component;

(b) state the actions (if any) a pilot should take to rectify a malfunction or failure of a component;

(c) describe the consequences if a malfunction or failure of a component listed above cannot be rectified;

(d) the following is a list of components that applies to paragraphs (a), (b) and (c):

(i) alternator;

(i) magneto;

(ii) battery;

(iii) ignition switch;

(iv) fuel vent (blockage), fuel/booster pump;

(v) oil cooler, cowl flaps;

(vi) vacuum pump;

(vii) hydraulic brakes.

3.4.2 For paragraphs (a) and (b), the piston-engine gauges are listed in paragraph (c):

(a) with reference to engine gauge indications, identify reasons for an abnormality and state pilot actions (if any) to rectify a problem;

(b) state the consequences if the problem cannot be rectified by the pilot;

(c) the following is a list of piston-engine gauges that applies to paragraphs (a) and (b):

(i) oil temperature and pressure;

(i) CHT;

(ii) fuel pressure;

(iii) tachometer;

(iv) ammeter/load meter;

(v) voltmeter;

(vi) engine icing.

3.4.3 Describe the method for checking the operation of carburettor heat prior to take-off.

3.4.4 State the atmospheric conditions of outside air temperature and relative humidity, engine control settings and power conditions which are conducive to the formation in a carburettor, including the severity of the icing, of the following:

(a) throttle ice;

(b) fuel evaporation ice;

(c) impact ice.

3.4.5 State the danger of progressive throttle increments if engine icing is not diagnosed.

3.4.6 Describe the use of carburettor heat for:

(a) anti-icing;

(b) de-icing;

(c) ground operation.

3.4.7 Describe the difference between the use of ‘alternate air’ and ‘carburettor heat’ controls.

3.4.8 State the effect of the application of carburettor heat on engine performance and engine instrument indications.

3.4.9 Describe the symptoms of fuel vaporisation and the method of rectification.

3.5 Flight instruments

3.5.1 Explain the colour code markings on an airspeed indicator (ASI).

3.5.2 Describe the basic operation of the primary flight instruments and associated systems.

3.5.3 State:

(a) the effect of a blockage of the pitot or static source on the indications displayed by each pressure instrument; and

(b) the effect of using an alternate static source located inside the cockpit, on the reliability of pressure instrument indications; and

(c) the effect of low suction and loss of electrical power on the reliability of the gyroscopic flight instruments; and

(d) the causes of toppling of gyroscopic instruments and identify conditions under which they would re-erect; and

(e) how, when and why a directional indicating gyro should be synchronised with the magnetic compass.

3.5.4 Describe the methods to determine the serviceability of the primary flight instruments and magnetic compass.

4. Aerodynamics

4.1 Basic aerodynamics

4.1.1 Basic physics – aircraft energy state in terms of the following:
- (a) kinetic energy;
- (b) potential energy;
- (c) inertia.

4.1.2 Explain the meaning of the following terms:
- (a) aerofoil, angle of attack, relative airflow;
- (b) centre of pressure, centre of gravity;
- (c) lift, weight, thrust, drag.

4.1.3 Describe the meaning of the following terms in respect of an aerofoil:
- (a) chord;
- (b) span;
- (c) camber;
- (d) aerodynamic stall.

4.2 Lift and drag

4.2.1 State whether lift and drag of an aerofoil will increase or decrease with changes in the following:
- (a) airspeed;
- (b) angle of attack.

4.2.2 Explain the following types of drag which affect a subsonic aircraft in flight:
- (a) parasite (zero lift) – form, interference, skin friction;
- (b) induced (lift dependent).

4.2.3 State how total drag varies with airspeed.

4.3 Climbing

4.3.1 Describe the difference between rate of climb and angle of climb.

4.4 Wake turbulence

4.4.1 List the factors that affect the strength of vortex flow with respect to the following:
- (a) aircraft weight;
- (b) speed;
- (c) wing shape.

4.4.2 State the primary control hazard that may result from a vortex encounter.

4.4.3 Describe the following:
- (a) approximate flow direction around each vortex; and
- (b) approximate location of vortices (in still air) generated by a preceding aeroplane during:
  - (i) cruise flight; and
  - (ii) take-off and landing; and
- (c) approximate take-off/touchdown points and flight profiles which should be used to avoid wake turbulence.

4.4.4 State the effect of wind and atmospheric turbulence on the following:
- (a) strength of vortices;
- (b) longevity of vortices;
- (c) location and direction of movement of vortices.

4.5 Thrust stream turbulence (jet blast or rotor downwash)

4.5.1 Describe how the hazard from thrust stream turbulence varies with changes in engine power and distance from the source.

5. Navigation

5.1 Charts

5.1.1 Identify the major features displayed on visual charts.

5.1.2 State the charts used to identify controlled airspace (CTA) and prohibited, restricted and danger (PRD) areas.

5.2 Documentation

5.2.1 Determine runway data from ERSA for a given airport.

5.2.2 Determine data pertaining to Prohibited, Restricted and Danger areas.

5.2.3 Use ERSA to determine the time a restricted area is active.

6. Operations, performance and planning

6.1 Airworthiness and aircraft equipment

6.1.1 State the documents required to determine the serviceability of an aircraft.

6.1.2 Describe how to certify the aircraft for flight.

6.1.3 Describe the process to record an aircraft defect on a release to service document (maintenance release).

6.2 Take-off and landing performance

6.2.1 Differentiate between pressure height and density height.

6.2.2 Describe how to use an altimeter to obtain:

(a) local QNH at an aerodrome;

(b) pressure height of an aerodrome;

(c) elevation of an aerodrome.

6.2.3 Calculate the following:

(a) density altitude given pressure altitude (or elevation and QNH) and temperature;

(b) pressure altitude given airfield elevation and QNH.

6.2.4 State the effect (increase/decrease) of the following factors on take-off, landing, and take-off climb performance:

(a) strength of headwind/tailwind component;

(b) air temperature;

(c) QNH;

(d) airfield elevation;

(e) ground effect and windshear;

(f) frost on an aircraft.

6.2.5 Explain the following terms:

(a) maximum structural take-off and landing weight;

(b) climb weight limit.

6.3 Speed limitations

6.3.1 Explain the following terms/abbreviations:

(a) normal operating speed (V_{NO});

(b) never exceed speed (V_{NE});

(c) maximum manoeuvre speed (V_A);

(d) turbulence penetration speed (V_B);

(e) limit and design load factors.

6.3.2 Describe situations which may result in an aircraft exceeding speed limits and load factor limits.

6.4 Weight and balance

6.4.1 Explain the meaning of the following terms used in the computation of weight and balance data:

(a) datum;

(b) arm;

(c) moment;

(d) station;

(e) centre of gravity and limits;

(f) empty weight;

(g) operating weight;

(h) MTOW;

(i) zero fuel weight (MZFW);

(j) MLW.

6.4.2 Calculate the following weight and balance information:

(a) MTOW;

(b) capacity and arm of the baggage lockers;

(c) capacity, arm, grade and specific gravity of the fuel;

(d) location and arms of the seating.

6.4.3 Determine if an aircraft is loaded within the prescribed CG for the aircraft.

6.4.4 State the likely results of exceeding aircraft weight limits.

Unit 1.1.2 RBKA: Basic aeronautical knowledge – aeroplane

1. Reserved

2. Power plants and systems

2.1 Piston engine

2.1.1 Describe the method of using a manual mixture control for an aircraft piston engine fitted with a fixed pitch propeller.

2.1.2 State what indications would signify the presence of engine icing in an aircraft fitted with a fixed pitch propeller.

3. Aerodynamics

3.1 Lift and drag

3.1.1 State whether lift and drag of an aerofoil will increase or decrease with changes in flap settings.

3.1.2 For the following, recall the typical angles of attack at which a basic low-speed aerofoil:
- (a) generates maximum lift (16°);
- (b) is most efficient (best L/D: 4°).

3.1.3 Describe how the angles of attack relate to the following:
- (a) stall speed;
- (b) best glide speed.

3.1.4 State the relationship between attitude, angle of attack and airspeed in level flight.

3.2 Flight controls

3.2.1 Describe the primary and further effects of the elevator, rudder and aileron on an aeroplane's movement about its longitudinal, lateral and normal (vertical) axes.

3.2.2 Describe the effect of changes in power and airspeed on pitch trim and on the effectiveness of the elevator, rudder and ailerons.

3.2.3 Describe the purpose of trim controls.

3.2.4 State the effect of lowering or raising flap on lift, drag and attitude.

3.3 Climbing

3.3.1 State the effect (increase/decrease) on climb rate and angle resulting from changes in the following:
- (a) weight;
- (b) power;
- (c) airspeed (changed from recommended);
- (d) flap deflection;
- (e) headwind/tailwind component, windshear;
- (f) bank angle;
- (g) altitude and density altitude.

3.4 Descents

3.4.1 State the effect on rate, angle of descent and attitude resulting from changes in the following:
- (a) power – constant IAS;
- (b) flap – constant IAS.

3.4.2 State the effect of headwind/tailwind on the glide path and glide distance (relevant to the earth's surface).

3.4.3 Explain why gliding at any indicated airspeed other than the recommended glide speed will reduce the distance that can be achieved in still air.

3.5 Turning

3.5.1 Describe what is meant by a balanced turn.

3.5.2 Describe the terms ‘g’ wing loading load factor.

3.5.3 During a level turn, state the effect (increase/decrease) of bank angle on the following:

(a) stall IAS, including the rate of increase of stall speed with increasing bank;

(b) the aircraft’s structure (load factor) and possible airframe damage if limits are exceeded.

3.5.4 List reasons for avoiding steep turns:

(a) shortly after take-off; and

(b) during a glide, particularly on approach to land.

3.5.5 Explain why an aeroplane executing balanced level turns at low level may appear to slip or skid when turning downwind or into wind.

3.5.6 Given level flight stall speed, determine the stall speed and load factor during turns at 45 and 60 degrees bank.

3.6 Stalling, spinning and spiral dives

3.6.1 Describe:

(a) the symptoms when approaching the stall; and

(b) the characteristics of a stall.

3.6.2 Explain:

(a) the effect of using ailerons when approaching and during the stall; and

(b) why an aeroplane may stall at different speeds.

3.6.3 State the effect (increase/decrease/nil) of the following variables on the level flight stall IAS:

(a) power;

(b) flap;

(c) wind shear vertical gusts;

(d) manoeuvres;

(e) weight;

(f) frost and ice;

(g) altitude.

3.6.4 Describe the aerodynamic principles of stall recovery.

3.6.5 Describe manoeuvres during which an aeroplane may stall at an angle which appears to be different to the true stalling angle.

3.6.6 Differentiate between a spin and a spiral dive in a light aeroplane and describe the standard recovery technique from each.

3.7 Taxi, take-off, landing

3.7.1 Describe situations which may cause an aeroplane to ‘wheel barrow’ and state the recommended pilot action in the event of such an occurrence.

3.7.2 Describe the effect of a cross-wind on high- and low-wing aeroplanes during taxi, take-off and landing.

3.7.3 List the advantages of taking-off and landing into wind.

3.7.4 Compare a flapless approach to an approach with flap in terms of:

(a) attitude during descent; and

(b) approach path angle; and

(c) threshold and touchdown speeds; and

(d) landing roll.

3.7.5 Describe the effect of wind shear (wind gradient) and ground effect on aerodynamic and flight characteristics and identify.

3.8 Structural damage

3.8.1 Describe the effect of structural damage, including bird strikes, with emphasis on:

(a) stall characteristics; and

(b) controllability.

4. Operations and performance

4.1 Take-off and landing performance

4.1.1 State the effect (increase/decrease) of the following factors on take-off, landing, and take-off climb performance:

(a) runway slope;

(b) wet runway surface;

(c) slushy runway surface.

4.2 Aircraft limitations

4.2.1 Explain the following terms/abbreviations:

(a) flap operating speed (V_{FO});

(b) flap extended speed (V_{FE}).

Unit 1.1.3 RBKH: RPL Basic aeronautical knowledge – helicopter

1. Reserved

2. Power plants and systems

2.1 Piston engine

2.1.1 Describe the method of setting the correct mixture in a helicopter fitted with a piston engine.

2.1.2 State what indications would signify the presence of carburettor or induction ice.

2.2 Helicopter engines and systems

2.2.1 Describe pilot actions that can be performed to rectify a malfunction related to the following:

(a) main and tail rotor systems:

(i) abnormal vibrations from main and tail rotor systems;

(ii) flight control systems;

(iii) trimming devices;

(iv) stabilisers;

(b) transmissions:

(i) clutches;

(ii) free-wheel units;

(iii) rotor brakes;

(c) oil systems:

(i) reservoirs;

(ii) pressure pumps and filters;

(iii) pressure gauges;

(iv) temperature gauges;

(v) scavenge pumps;

(vi) oil coolers;

(vii) pressure relief valves;

(viii) oil cooler by-pass valves;

(ix) dipsticks.

3. Aerodynamics – helicopter

3.1 Lift and drag

3.1.1 State the aerodynamic properties of a rotor blade in respect of the following:

(a) aerofoil shape;

(b) blade twist;

(c) blade taper.

3.1.2 Match each of the following terms with an appropriate definition:

(a) rotor thrust;

(b) rotor drag;

(c) total reaction;

(d) relative airflow;

(e) rotational airflow;

(f) induced airflow;

(g) centrifugal reaction;

(h) rotor disc;

(i) coning angle.

3.2 Hovering flight

3.2.1 Label a diagram showing the vectors acting on a rotor blade in hovering flight.

3.2.2 Define each of the following terms:

(a) ground effect;

(b) tail rotor drift;

(c) rotor shaft tilt effect;

(d) re-circulation.

3.2.3 Describe each of the following:

(a) vortex ring state (settling with power);

(b) loss of tail rotor effectiveness (LTE);

(c) the conditions leading to LTE;

(d) the appropriate recovery action.

3.3 Rotor blade freedom of movement

3.3.1 In regard to rotor blade freedom of movement describe each of the following terms:

(a) feathering;

(b) flapping;

(c) flapping to equality;

(d) dragging;

(e) advance angle;

(f) phase lag.

3.4 Forward flight

3.4.1 In regard to forward flight, define the following terms:

(a) dissymmetry of lift;

(b) flapback;

(c) cyclic limits;

(d) airflow reversal;

(e) retreating blade stall;

(f) compressibility;

(g) inflow roll;

(h) translational lift.

3.4.2 Describe the vectors acting on various sections of a rotor blade in forward flight.

3.5 Power requirements

3.5.1 Define each of the following terms:

(a) rotor profile drag;

(b) induced drag;

(c) parasite drag.

3.5.2 Describe the power available and power required curves and their relationship to the following:

(a) best speed for range;

(b) best speed for endurance;

(c) best rate of climb;

(d) best angle of climb.

3.5.3 Select from a list, the statement which best describes:

(a) overpitching;

(b) the conditions leading thereto;

(c) the appropriate recovery action.

3.6 Autorotative flight

3.6.1 Describe the following terms:

(a) autorotative force;

(b) autorotative section.

3.6.2 Describe the effect on autorotative flight from variations in the following:

(a) all-up-weight;

(b) density altitude;

(c) airspeed;

(d) rotor RPM.

3.6.3 Label a diagram showing the vectors acting on a rotor blade section during forward autorotative flight.

3.6.4 Label a diagram showing the vectors acting on a rotor blade section during an autorotative flare.

3.7 Other conditions

3.7.1 Select from a list the statement which best describes:

(a) ground resonance;

(b) mast bumping;

(c) dynamic roll-over;

(d) the conditions leading to:

(i) ground resonance;

(ii) mast bumping;

(iii) dynamic roll-over;

(e) the appropriate recovery action for each condition in paragraph (d).

4. Operations, performance and planning

4.1 Helicopter limitations

4.1.1 State the reasons for the following limitations:

(a) maximum rotor RPM – power on;

(b) maximum rotor RPM – power off;

(c) minimum rotor RPM – power on;

(d) minimum rotor RPM – power off;

(e) never exceed speed – power on;

(f) never exceed speed – power off;

(g) maximum sideways speed;

(h) maximum rearward speed;

(i) maximum take-off weight;

(j) maximum all up weight;

(k) minimum operating weight;

(l) maximum positive and negative flight load factors.

4.2 Helicopter landing sites

4.2.1 Recall the requirements for basic and secondary HLS in respect of the following:

(a) physical specifications;

(b) operational requirements;

(c) general conditions of use.

4.3 Take-off and landing weight

4.3.1 Describe the effect of the following variables on the take-off and/or landing performance of a helicopter:

(a) weight;

(b) power;

(c) ground effect.

4.3.2 Determine hover performance in and out of ground effect given the following:

(a) gross weight;

(b) pressure altitude;

(c) temperature;

(d) flight manual performance charts.

4.4 Weight and balance

4.4.1 Recall the meaning of the term ‘lateral centre of gravity range’ when it is used in the computation of weight and balance data.

Unit 1.1.4 RBKG: RPL Basic aeronautical knowledge – gyroplane – *Reserved*

Unit 1.1.5 RBKS: RPL Basic aeronautical knowledge – airship – *Reserved*

SECTION 1.2 General aeronautical knowledge (AK)

Unit 1.2.1 RARO: RPL aeronautical radio operator

1. Reserved

2. Aeronautical radio telephony

2.1 Operation of aeronautical radio systems

2.1.1 Meets the English language to Aviation English language standard (AEL).

2.1.2 Recall the phonetic alphabet and the method of transmitting numerals.

2.1.3 Recall the correct use of aircraft call-signs.

2.1.4 State standard radio procedures for outside controlled airspace (OCTA).

2.1.5 State how transmission of time is conducted.

2.1.6 State how to listening to the radio.

2.1.7 State how to establish and maintain communications.

2.1.8 State the hazards of clipped transmissions and the consequences.

2.1.9 Correct procedure for the conduct of a routine pre-flight test of an aircraft radio-telephone, including the following:

(a) use of radio transmit and receive selector switches;

(b) turning radio on;

(c) selecting correct frequencies;

(d) use of squelch control;

(e) selection of radio navigation equipment;

(f) correct use of a microphone;

(g) use of intercom and public address system;

(h) voice activated systems.

2.1.10 Describe the correct procedure for routine fault finding and correction.

2.1.11 State the standard phraseology to be used to report aircraft positions in the circuit and the required calls for local flights.

2.1.12 State the responsibilities of an aeronautical radio operator in relation to the following:

(a) secrecy of communications;

(b) unauthorised transmissions.

2.1.13 Describe the function of each of the following components of an aeronautical radio system:

(a) power source/battery switch;

(b) radio master;

(c) fuses and circuit breakers;

(d) microphone;

(e) transmitter;

(f) receiver;

(g) antenna;

(h) headphones and speaker.

2.1.14 Describe the difference between a distress and an emergency message and the standard phrases used in both cases.

2.1.15 Accurately extract radio failure procedures from ERSA.

2.1.16 In relation to the use of an aeronautical radiotelephone, describe the controls used to transmit and receive, including audio panel selections.

2.2 Radio waves

2.2.1 Describe the basic principles and characteristics of radio waves, wave propagation, transmission and reception for the following:

(a) radio frequency band ranges (MF, HF, VHF, UHF);

(b) properties of radio waves and the effective range of transmissions;

(c) propagation of paths of radio waves:

(i) ground waves;

(ii) sky waves;

(d) factors affecting the propagation of radio waves and reception:

(i) terrain;

(ii) ionosphere;

(iii) sun spot activity;

(iv) interference from electrical equipment;

(v) thunderstorms;

(vi) power attenuation;

(e) radio antennas:

(i) characteristics of antennas;

(ii) use of antennas.

2.2.2 Describe the limitations of VHF and HF signals and factors affecting quality of reception and range of signal.

Unit 1.2.2 PAKC: PPL aeronautical knowledge – all aircraft categories

1. Reserved

2. Power plants and systems

2.1 Piston engines

2.1.1 Describe the meaning of full throttle height.

2.1.2 Describe the effect of increasing altitude and temperature on engine performance.

2.1.3 Describe the effect of the following factors on engine performance:

(a) fuel/air mixture strength;

(b) density height and altitude for:

(i) normally aspirated engines; and

(ii) turbocharged/supercharged engines.

2.2 Supercharging

2.2.1 Describe the purpose of supercharging.

2.2.2 Describe the common methods used to achieve supercharging.

2.2.3 Describe the device(s) used to limit supercharging of the intake system.

2.2.4 Describe the actions a pilot should take if engine limits are exceeded due to supercharging.

2.3 Flight instruments

2.3.1 Explain the following terms:

(a) pitot-static system;

(b) pitot pressure static pressure;

(c) alternate static source;

(d) pressure error;

2.3.2 Describe the meaning of the following airspeeds:

(a) indicated (IAS);

(b) calibrated (CAS);

(c) true (TAS).

2.3.3 For the following pressure instruments, state the effect of the factors listed under each instrument on the accuracy of the indications for that instrument:

(a) ASI:

(i) blockage/leaks (pitot or static);

(ii) manoeuvre induced errors (for example, sharp pull out from a dive);

(b) VSI:

(i) blockage of the static source;

(ii) lag;

(iii) the benefits of a IVSI;

(c) Altimeter:

(i) blockage of the static source;

(ii) lag;

(iii) incorrect subscale settings;

(iv) errors due to changes in atmospheric temperature and pressure.

2.3.4 For a direct reading magnetic compass, describe the principles of construction in relation to the following:

(a) magnetic needles point to magnetic north;

(b) fluid decreases oscillations and friction;

(c) fluid in the compass should not contain bubbles;

(d) pendulosity of magnet systems causes errors.

2.3.5 State the effect of the following errors on compass indications in the southern hemisphere:

(a) turning errors;

(b) acceleration errors.

2.3.6 State the purpose and use of a compass correction card to determine magnetic heading.

2.3.7 Describe the methods used to determine the serviceability of the primary flight instruments before commencing a flight.

3. Aeronautical radio telephony

3.1 Operation of aeronautical radio systems

(a) recall the phonetic alphabet and the method of transmitting numerals;

(b) recall the correct use of aircraft call-signs;

(c) state standard radio procedures for OCTA;

(d) state how time is transmitted in a message;

(e) state how to effectively listen to the radio;

(f) state how to establish and maintain communications;

(g) state the hazards of clipped transmissions and the consequences.

3.2 Routine pre-flight test of an aircraft radio-telephone

(a) for the following, describe the correct technique and procedure for conducting a routine pre-flight test of an aircraft radio telephone:

(i) use of radio transmit and receive selector switches;

(ii) turning radio on;

(iii) selecting correct frequencies;

(iv) use of squelch control;

(v) selection of radio nav equipment;

(vi) correct use of a microphone;

(vii) use of intercom and public address system;

(viii) voice activated systems.

3.3 Fault finding and corrective action

3.3.1 State the correct procedure for routine fault finding and the corrective actions a pilot should take in relation to a fault.

3.4 Reporting position in circuit and for local flights

3.4.1 State the standard phraseology to be used to report the position of an aircraft in the circuit and required calls for local flights.

3.5 Responsibilities of an aeronautical radio operator

3.5.1 State the responsibility of an aeronautical radio operator for the following:

(a) secrecy of communications;

(b) unauthorised transmissions.

3.6 State the function of the following components of an aeronautical radio system

(a) power source/battery switch;

(b) radio master;

(c) fuses and circuit breakers;

(d) microphone;

(e) transmitter;

(f) receiver;

(g) antenna;

(h) headphones and speaker.

3.7 Distress and emergency messages

3.7.1 Describe the difference between a distress and emergency message and the standard phrases used.

3.8 Radio failure procedures

3.8.1 Extract and use the radio failure procedures from ERSA.

3.9 Radiotelephone controls

3.9.1 In relation to the use of an aeronautical radiotelephone, describe the controls used to transmit and receive, including audio panel selections.

3.10 Radio waves

3.10.1 Describe the basic principles and characteristics of radio waves, wave propagation, transmission and reception:

(a) radio frequency band ranges (MF, HF, VHF, UHF);

(b) properties of radio waves and the effective range of transmissions;

(c) propagation of paths of radio waves:

(i) ground waves;

(ii) sky waves.

(d) factors affecting the propagation of radio waves and reception:

(i) terrain;

(ii) ionosphere;

(iii) sun spot activity;

(iv) interference from electrical equipment;

(v) thunderstorms;

(vi) power attenuation;

(e) radio antennas:

(i) characteristics of antennas;

(ii) use of antennas.

3.10.2 Describe the limitations of VHF and HF signals and factors affecting quality of reception and range of signal.

Unit 1.2.3 GNSSC: Basic GNSS and en route GPS navigation principles – all categories

1. Reserved

2. Global navigation satellite system (GNSS)

2.1 GNSS operation

2.1.1 Describe the principles of operation, performance limitations and errors of a GNSS system, including the following:

(a) methods of position fixing using a GNSS system;

(b) the GNSS operating procedures which provide safeguards against navigational error and loss of situational awareness;

(c) GNSS operating procedures for typical navigational tasks using a specific type of aircraft equipment;

(d) indications of waypoint passage;

(e) GNSS operational and serviceability checks;

(f) the human factors limitations associated with the use of GNSS equipment;

(g) the requirements applicable to pilots and equipment for GNSS operations.

Unit 1.2.4 PAKA: PPL aeronautical knowledge – aeroplane

1. Reserved

2. Power plants and systems

2.1 Propellers

2.1.1 List reasons for propeller overspeed in aeroplanes fitted with a fixed pitch propeller and state the remedial action a pilot should take in the event of an overspeed.

2.2 Aircraft systems

2.2.1 Describe or state the function of the following typical components installed in aeroplanes, including the possibility of ‘overpowering the system and associated precautions a pilot should take:

(a) stall warning devices;

(b) auto-pilot components, including the following:

(i) roll attitude heading pitch controls;

(ii) trim indicator;

(iii) cut-out mechanisms.

3. Take-off and landing performance

Note: Use of take-off and landing charts is included in ‘Type’ training.

3.1.1 State the effect (increase/decrease) of the following factors on take-off, landing, and take-off climb performance:

(a) strength of headwind/tailwind component;

(b) air temperature;

(c) QNH;

(d) density height (non-standard conditions);

(e) airfield elevation;

(f) runway slope;

(g) surface conditions, including the following:

(i) wet runway;

(ii) dry runway;

(iii) slushy runway;

(h) ground effect and windshear;

(i) frost on an aircraft.

3.1.2 Differentiate between pressure height and density height.

3.1.3 Describe how to use an altimeter to obtain the following:

(a) local QNH at an aerodrome;

(b) pressure height of an aerodrome;

(c) elevation of an aerodrome.

3.1.4 Explain the following terms:

(a) maximum structural take-off and landing weight;

(b) climb weight limit.

3.1.5 State the likely results of exceeding aircraft weight limits.

Unit 1.2.5 PAKH: PPL aeronautical knowledge – helicopter

1. Reserved

2. Aircraft general knowledge

2.1 Engine and transmission systems

2.1.1 Describe the actions a pilot should take in the event of a malfunction of an exhaust driven supercharger or waste gate and the likely indication of the malfunction.

2.1.2 Reserved.

Unit 1.2.6 PAKG: PPL aeronautical knowledge – gyroplane

1. <u>Reserved</u>

2. <u>Power plants and systems</u>

2.1 Propellers

2.1.1 List reasons for propeller overspeed in gyroplanes fitted with a fixed pitch propeller and state the associated remedial pilot action.

2.2 Aircraft systems

2.2.1 Describe or state the function of the stall warning devices installed in gyroplanes.

3. <u>Take-off and landing performance</u>

3.1.1 State the effect (increase/decrease) of the following factors on take-off, landing, and take-off climb performance:

(a) strength of headwind/tailwind component;

(b) air temperature;

(c) QNH;

(d) density height (non-standard conditions);

(e) airfield elevation;

(f) runway slope and surface, including wet and slushy runways;

(g) ground effect and windshear;

(h) frost on an aircraft.

3.1.2 Differentiate between pressure height and density height.

3.1.3 Describe how to use an altimeter to obtain:

(a) local QNH at an aerodrome;

(b) pressure height of an aerodrome;

(c) elevation of an aerodrome.

3.1.4 Explain the following terms:

(a) maximum structural take-off and landing weight;

(b) climb weight limit.

3.1.5 State the likely results of exceeding aircraft weight limits.

Unit 1.2.7 PAKP: PPL aeronautical knowledge – powered-lift – *Reserved*

Unit 1.2.8 PAKS: PPL aeronautical knowledge – airship – *Reserved*

Unit 1.2.9 CAKC: CPL aeronautical knowledge – all aircraft categories

1. Reserved

2. Aircraft general knowledge

2.1 Power plants

2.1.1 Describe the purpose and principle of operation of a simple carburettor in terms of the following:

(a) idling jets;

(b) main jets;

(c) acceleration jets.

2.1.2 State the precautions to be observed to avoid detonation when operating a supercharged engine.

2.1.3 Supercharging

(a) state the purpose of supercharging;

(b) list the types of superchargers for the following:

(i) geared (mechanically driven:

(ii) turbo (exhaust driven);

(c) state the purpose and function of the following components:

(i) geared superchargers:

(ii) impeller;

(A) diffuser;

(iii) turbo-chargers

(A) compressor;

(B) waste gate (fixed, manual and automatic).

2.2 Aircraft systems

2.2.1 Explain the function of the following typical components mentioned in pilot operating handbooks:

(a) fuel system components, including the following:

(i) auxiliary/booster pump;

(ii) fuel drain;

(iii) fuel pressure gauge;

(iv) fuel flow gauge;

(v) check valves;

(b) lubrication system, including the following:

(i) by-pass valves;

(ii) oil cooler;

(iii) wet sump system;

(iv) dip stick;

(c) electrical and ignition systems, including the following:

(i) alternator generator;

(ii) voltage regulator overvoltage relay;

(iii) ammeter voltmeter;

(iv) circuit breaker fuse;

(v) battery ampere hours;

(vi) bus bar battery master switch;

(vii) starter motor starter relay;

(viii) dual ignition distributor ignition switch;
(ix) external power receptacle, ground/flight switch;
(d) hydraulic system components, including the following:
(i) accumulator;
(ii) actuators;
(iii) check valve restrictors;
(e) typical fire protection detectors, including the following:
(i) overheat – thermal switches;
(ii) rate of temperature rise – thermocouple;
(iii) flame;
(f) typical fire protection warning devices, including the following:
(i) lights;
(ii) audio;
(g) types of fire extinguisher and usage;
(h) engine cooling devices, including the following:
(i) fins;
(ii) baffles;
(iii) cowl flaps.

2.2.2 Describe or state the function of the typical retractable undercarriage system components mentioned in pilot operating handbooks, including the following:
(a) uplocks/downlocks;
(b) anti-retraction devices;
(c) aural/visual warning devices;
(d) emergency systems;
(e) free fall;
(f) electric, hydraulic, pneumatic.

2.2.3 Describe or state the function of the following typical components mentioned in pilot operating handbooks, including considering the possibility of overpowering the system and the associated precautions pilots should take when operating these system:
(a) fuel system components, including the following:
(i) auxiliary/booster pump;
(ii) fuel drain;
(iii) fuel pressure gauge;
(iv) fuel flow gauge;
(v) check valves.
(b) lubrication system, including the following:
(i) by-pass valves;
(ii) oil cooler;
(iii) wet sump system;
(iv) dip stick.
(c) stall warning devices;
(d) electrical and ignition systems, including the following:
(i) alternator generator;
(ii) voltage regulator overvoltage relay;
(iii) ammeter voltmeter;
(iv) circuit breaker fuse;
(v) battery ampere hours;
(vi) bus bar battery master switch;

(vii) starter motor starter relay;
(viii) dual ignition distributor ignition switch;
(ix) external power receptacle, ground/flight switch;

(e) hydraulic system, including the following:
(i) accumulator;
(ii) actuators;
(iii) brake master cylinder;
(iv) check valve restrictors.

(f) auto-pilot, including the following:
(i) roll attitude heading pitch controls;
(ii) trim indicator;
(iii) cut-out mechanisms.

(g) typical fire protection detectors, including the following:
(i) overheat – thermal switches;
(i) rate of temperature rise – thermocouple;
(ii) flame;

(h) typical fire protection warning devices, including the following:
(i) lights;
(ii) audio;

(i) types of fire extinguishers and usage;

(j) engine cooling devices, including the following:
(i) fins;
(ii) baffles;
(iii) cowl flaps.

2.3 Barometric flight instruments

2.3.1 Explain the relationship between the following airspeeds:
(a) indicated (IAS);
(b) calibrated (CAS);
(c) true (TAS);
(d) equivalent (EAS).

2.3.2 Explain the basic principle of operation and construction of the following instruments:
(a) ASI;
(b) VSI;
(c) altimeter;
(d) artificial horizon;
(e) direction indicator;
(f) rate of turn indicator;
(g) turn coordinator.

2.3.3 State the effect of the following factors on the accuracy of pressure instrument indications:
(a) ASI:
(i) blockage/leaks (pitot or static); and
(ii) manoeuvre induced errors (for example, sharp pull out from a dive);
(b) VSI:
(i) blockage of the static source; and
(ii) lag;

Note: Student should be aware that an IVSI compensates for lag errors.

(c) altimeter:
   (i) blockage of the static source; and
   (ii) lag; and
   (iii) incorrect subscale settings; and
   (iv) errors due to changes in atmospheric temperature and pressure.

2.4 Gyroscopic flight instruments

2.4.1 Explain the gyroscopic properties of rigidity and precession.

2.4.2 In relation to gyroscopic flight instruments:
(a) compare the advantages and disadvantages of air driven and electrically driven gyroscopes;
(b) state the effect on a directional indicator of the following:
   (i) apparent wander/drift;
   (ii) maximum at the poles, zero at the equator;
   (iii) transport wander;
(c) describe the advantages of a directional indicator fitted with a flux valve.

2.5 Direct reading magnetic compass

2.5.1 Describe the principle of construction of a magnetic compass.

2.5.2 Explain how needles point to magnetic north.

2.5.3 Describe how fluid decreases oscillations and friction and why the chamber should not contain air bubbles.

2.5.4 Explain how pendulosity of magnet systems causes errors.

2.6 Aeronautical radio telephony

2.6.1 Operation of aeronautical radio systems:
(a) recall the phonetic alphabet and the method of transmitting numerals;
(b) recall the correct use of aircraft call-signs;
(c) state standard radio procedures for OCTA;
(d) state how transmission of time is conducted;
(e) state how to listening to the radio;
(f) state how to establish and maintain communications;
(g) state the hazards of clipped transmissions and the consequences.

2.6.2 Correct procedure for the conduct of a routine pre-flight test of an aircraft radio-telephone in the following:
(a) use of radio transmit and receive selector switches;
(b) turning radio on;
(c) selecting correct frequencies;
(d) use of squelch control;
(e) selection of radio navigation equipment;
(f) correct use of a microphone;
(g) use of intercom and public address system;
(h) voice activated systems.

2.6.3 State procedure for routine fault finding and correction.

2.6.4 State the standard phraseology for positions in the circuit and required calls for local flights.

2.6.5 State the responsibilities of an aeronautical radio operator with respect to the following:
(a) secrecy of communications;
(b) unauthorised transmissions.

2.6.6 State the function of the following components of an aeronautical radio system:

(a) power source/battery switch, radio master, fuses and circuit breakers;

(b) microphone;

(c) transmitter;

(d) receiver;

(e) antenna;

(f) headphones and speaker.

2.6.7 Describe the difference between a distress and emergency message and the standard phrases used.

2.6.8 Extract radio failure procedures from ERSA.

2.6.9 In relation to the use of an aeronautical radiotelephone describe the controls used to transmit and receive, including audio panel selections.

2.7 Radio waves

2.7.1 Describe the basic principles and characteristics of radio waves, wave propagation, transmission and reception:

(a) radio frequency band ranges (MF, HF, VHF, UHF);

(b) properties of radio waves and the effective range of transmissions;

(c) propagation of paths of the following types of radio wave:

(i) ground waves;

(ii) sky waves;

(d) factors affecting the propagation of radio waves and reception with respect to the following:

(i) terrain;

(ii) ionosphere;

(iii) sun spot activity;

(iv) interference from electrical equipment;

(v) thunderstorms;

(vi) power attenuation;

(e) the following types of radio antennas:

(i) characteristics of antennas;

(ii) use of antennas.

2.7.2 Describe the limitations of VHF and HF signals and factors affecting quality of reception and range of signal.

Unit 1.2.10 CAKA: CPL aeronautical knowledge – aeroplane

1. Reserved

2. Engine and systems

2.1 Propellers

2.1.1 Compare the performance characteristics of various propeller and engine systems, including the following:
- (a) aeroplanes with fixed pitch propellers and those fitted with a variable pitch propeller;
- (b) engine operation (within limits) at high MP/low RPM and low MP/high RPM;
- (c) normally aspirated and turbocharged/supercharged engines.

2.1.2 Explain the following with regard to a variable pitch propeller adopting either a full fine or full coarse pitch when the propeller oil pressure is lost:
- (a) centrifugal twisting moment (CTM) tends to reduce (fine) pitch;
- (b) counter weights, when used, increase (coarsen) pitch;
- (c) oil pressure is used to decrease pitch if counterweights are fitted;
- (d) oil pressure is used to increase pitch if counterweights are not fitted.

2.1.3 Describe the following terms:
- (a) blade angle, helix angle/pitch;
- (b) propeller thrust and torque;
- (c) thrust horsepower (THP);
- (d) brake horsepower (BHP);
- (e) asymmetric blade effect.

2.1.4 Describe how a propeller converts engine power into thrust and explain what is meant by fine and course pitch stops.

2.2 Constant speed units (CSU)

2.2.1 Explain the principle of operation of a CSU.

2.2.2 Describe the effect of a CSU malfunction on engine operation.

2.2.3 Explain the method of using engine controls in the event of a malfunction of a CSU.

2.2.4 Describe the cockpit indications in an aeroplane fitted with a variable pitch propeller which could signify:
- (a) the presence of engine ice; and
- (b) when engine ice has been cleared after application of ‘carb heat’.

2.2.5 Explain the effect of using carburettor heat on aeroplanes fitted with a CSU.

2.2.6 Describe how power output is controlled when operating aeroplanes fitted with a variable pitch propeller and describe how engine instruments are used to monitor power.

2.2.7 List the precautions necessary if operating a variable pitch propeller when:
- (a) conducting ground checks; and
- (b) changing power (i.e. use of throttle/RPM levers).

2.3 Undercarriage system

- (a) describe the purpose and function of the following:
  - (i) oleos/shock struts;
  - (ii) shimmy dampers;
  - (iii) nose wheel steering/castering;
- (b) describe the purpose and function of the following retractable undercarriage components:
  - (i) uplocks/downlocks;
  - (ii) anti-retraction devices;

(iii) aural/visual warning devices;

(iv) emergency systems;

(v) free fall;

(vi) electric, hydraulic, pneumatic.

Unit 1.2.11 CAKH: CPL aeronautical knowledge – helicopter

1. Reserved

2. Helicopter general knowledge

2.1 Engine and transmission systems

2.1.1 For each of the following systems, explain its function and that of the major components listed below the system and state the indications that a pilot would observe if the system or one of the components malfunctioned:

(a) exhaust driven supercharger systems (turbochargers):
- (i) compressors;
- (ii) turbines;
- (iii) waste gates;

(b) main and tail rotor systems:
- (i) abnormal vibrations from main and tail rotor systems;
- (ii) flight control systems;
- (iii) trimming devices;
- (iv) stabilisers;

(c) transmissions:
- (i) clutches;
- (ii) free-wheel units;
- (iii) rotor brakes;

(d) oil systems:
- (i) reservoirs;
- (ii) pressure pumps and filters;
- (iii) pressure gauges;
- (iv) temperature gauges;
- (v) scavenge pumps;
- (vi) oil coolers;
- (vii) pressure relief valves;
- (viii) oil cooler by-pass valves;
- (ix) dipsticks.

Unit 1.2.12 CAKG: CPL aeronautical knowledge – gyroplane – *Reserved*

Unit 1.2.13 CAKP: CPL aeronautical knowledge – powered-lift – *Reserved*

Unit 1.2.14 CAKS: CPL aeronautical knowledge – airship – *Reserved*

SECTION 1.3 AERODYNAMICS (AD)

Unit 1.3.1 CADC: CPL aerodynamics – all aircraft categories

1. Reserved

2. Aerodynamics

2.1 Terminology

2.1.1 Explain the following terms and their effect on lift and drag production:

(a) aerofoil span, chord, camber, thickness/chord ratio;

(b) relative airflow and angle of attack;

(c) laminar and turbulent boundary layers.

2.1.2 Explain the different types of drag and state the effect on total drag resulting from changes in IAS, aircraft weight and height, if any.

2.2 Bernoulli's theorem and Coanda theory

2.2.1 Apply Bernoulli's theorem of constant energy flow to describe how an aerofoil produces lift, limited to the variation of kinetic energy (dynamic pressure) and potential energy (static pressure) as air flows through a venturi or over a aerofoil.

2.2.2 Explain Coanda theory and the effect on lift production.

2.3 Power requirements

2.3.1 Describe the power available and power required curves and best speeds for range and endurance, best rate of climb and best angle of climb.

2.4 Lift and drag

2.4.1 Explain the meaning of the following terms used in the lift and drag formulae viz:

(a) C_L and C_D – depend on shape and angle of attack of an aerofoil;

(b) $\frac{1}{2} \rho V^2$ – defines dynamic pressure (IAS);

(c) S – defines surface area.

2.5 Manoeuvres

2.5.1 Explain the forces of lift, weight, thrust and drag acting on an aircraft in the following cases:

(a) steady level flight;

(b) a steady climb;

(c) a steady descent;

(d) a balanced level turn.

2.6 Performance considerations

2.6.1 Give reasons for flying for maximum still air range and endurance.

2.6.2 Given that certain flight conditions remain constant, explain the effect of changes in headwind/tailwind component on level flight range and endurance.

2.6.3 List/identify aerodynamic and engine considerations which are required to achieve maximum still air range and endurance when operating an aircraft with the following types of engine:

(a) normally aspirated engine;

(b) turbocharged/supercharged engine.

2.6.4 From (theoretical) power required and power available graphs identify the following:

(a) best still air range speed;

(b) best endurance speed;

(c) maximum level flight speed.

Unit 1.3.2 CADA: CPL aerodynamics – aeroplane

1. Reserved

2. Aerodynamics

2.1 Changes in angle of attack

2.1.1 Explain the effect of changes in angle of attack up to the stalling angle on the following:
- (a) pressure changes above and below an aerofoil;
- (b) changes in airflow characteristics streamlined to turbulent;
- (c) lift and drag;
- (d) the boundary layer.

2.1.2 With reference to C_L, C_D, C_L/C_D graphs identify angles of attack associated with the following:
- (a) minimum drag – maximum level flight speed;
- (b) maximum lift – stalling angle;
- (c) best C_L/C_D – best glide range and still air range.

2.2 Aerodynamic design features

2.2.1 Explain the purpose of the following design features/controls:
- (a) anhedral dihedral aspect ratio sweepback wash-out;
- (b) wing spoilers flaps vortex generators;
- (c) trim tabs.

2.3 Lift and drag

2.3.1 With reference to C_L, C_D, C_L/C_D graphs, explain the angles of attack associated with the following:
- (a) minimum drag – maximum level flight speed;
- (b) maximum lift – stalling angle;
- (c) best C_L/C_D – best glide range and still air range.

2.3.2 State the effect on total drag resulting from changes in IAS, aircraft weight and height.

2.4 Manoeuvres

2.4.1 Explain the relationship between speed, bank angle, radius and rate of turn during a balanced level turn.

2.4.2 For a given IAS, determine the approximate angle of bank to achieve a rate 1 turn (360^{o} in 2 minutes).

2.4.3 Explain the following:
- (a) power must be applied to maintain speed in a level turn;
- (b) an aeroplane tends to overbank in level and climbing turns and not in descending turns.

2.4.4 Explain the following:
- (a) the effect of aileron drag on turn performance at low airspeed;
- (b) how the following design features offset this drag:
  - (i) frise ailerons;
  - (ii) differential ailerons.

2.5 Performance considerations

2.5.1 Using power required and power available graphs, identify the following:
- (a) stall speed (power on);
- (b) the region of reverse command (sometimes described as the ‘back of the power curve’).

2.5.2 Describe the following terms and cite situations that may result in an aeroplane exceeding load factor and wing loading limits:

(a) load factor;

(b) ‘g’;

(c) wing loading.

2.5.3 Given that certain flight conditions remain constant, explain the effect of the following:

(a) changes in weight and altitude (height) on:

(i) angle of attack and IAS in level flight;

(ii) level flight range and endurance;

(iii) turn rate and radius;

(iv) glide range and endurance;

(b) changes in headwind/tailwind component on:

(i) glide range;

(ii) endurance;

(c) changes in power on turn rate and radius.

2.5.4 Explain how the energy state of an aircraft changes with changes in altitude and airspeed.

2.6 Stability and control

2.6.1 Explain the effect of the factors listed below on the stability and control of an aeroplane in each of the following 3 planes of movement:

(a) longitudinal stability:

(i) position of CG;

(ii) movement of centre of pressure;

(iii) changes in thrust;

(iv) tailplane moment;

(b) lateral stability:

(i) high versus low set wings;

(ii) dihedral versus anhedral;

(iii) sweepback;

(c) directional stability:

(i) large fore/aft displacement of the CG;

(ii) large versus small fin and rudder moment.

2.6.2 Describe the relationship between directional and lateral stability (spiral instability) and state the effect of spiral instability on the control of an aeroplane.

2.6.3 Recognise statements/diagrams which describe static and dynamic stability.

2.6.4 Describe the controllability problems associated with flight in the region of reverse command.

2.6.5 Explain the purpose of the following:

(a) trim tabs (fixed and cockpit controlled);

(b) balance tabs;

(c) anti-balance tabs;

(d) aerodynamic balance;

(e) mass balance.

2.6.6 Explain the function of the items mentioned in 2.6.5 in relation to the movement of a main control surface.

2.7 Taxi, take-off and landing

2.7.1 Describe the stability and control characteristics of nose wheel aeroplanes during ground operation.

2.7.2 Describe the result of the following factors on the controllability of an aeroplane:

(a) propeller torque and slipstream effect;

(b) gyroscopic effect;

(c) asymmetric blade effect.

2.7.3 Describe the term ‘ground effect’ and its effect on aeroplane performance.

2.8 Stalling, spinning and spiral dives

2.8.1 Describe the following:

(a) symptoms of approaching stall;

(b) characteristics of a stall in the following circumstances:

(i) straight and level;

(ii) turning;

(iii) climbing and descending turns.

2.8.2 Explain the following:

(a) the effect of using ailerons when approaching and during the stall;

(b) why an aeroplane may stall at different speeds.

2.8.3 List the effect (increase/decrease/nil) of the following variables on the level flight stall IAS:

(a) power;

(b) flap;

(c) wind shear vertical gusts;

(d) manoeuvres;

(e) weight;

(f) frost and ice;

(g) altitude.

2.8.4 Describe the aerodynamic principles of stall recovery.

2.8.5 Describe manoeuvres during which an aeroplane may stall at an angle which appears to be different to the true stalling angle.

2.8.6 Differentiate between a wing-drop at the stall, spin and spiral dive in a light aeroplane and describe the standard recovery technique from each.

Unit 1.3.3 CADH: CPL aerodynamics – helicopter

1. Reserved

2. Aerodynamics

2.1 Rotorblade aerodynamics

2.1.1 Explain the aerodynamic properties of a rotor blade in respect to the following:
(a) aerofoil shape;
(b) blade twist;
(c) blade taper.

2.1.2 Explain the following terms:
(a) rotor thrust;
(b) rotor drag;
(c) total reaction;
(d) relative airflow;
(e) rotational airflow;
(f) induced airflow;
(g) centrifugal reaction;
(h) rotor disc;
(i) coning angle.

2.2 Hovering flight

2.2.1 Describe the vectors acting on a rotor blade in hovering flight.

2.2.2 Define each of the following items:
(a) ground effect;
(b) tail rotor drift;
(c) rotor shaft tilt effect;
(d) recirculation.

2.2.3 Explain the meaning the following, including the conditions leading thereto and appropriate recovery action:
(a) vortex ring state (settling with power);
(b) loss of tail rotor effectiveness (LTE).

2.3 Rotor blade freedom of movement

2.3.1 Describe the following terms:
(a) feathering;
(b) flapping;
(c) flapping to equality;
(d) dragging;
(e) advance angle;
(f) phase lag.

2.4 Forward flight

2.4.1 Explain the meaning of each of the following terms:
(a) dissymmetry of lift;
(b) flapback;
(c) cyclic limits;
(d) airflow reversal;
(e) retreating blade stall;

(f) compressibility;

(g) inflow roll;

(h) translational lift.

2.4.2 Describe the vectors acting on various sections of a rotor blade in forward flight.

2.5 Power requirements

2.5.1 Select from a list the statement which best describes:

(a) overpitching;

(b) the conditions leading thereto;

(c) the appropriate recovery action.

2.6 Autorotative flight

2.6.1 Explain the meaning of each of the following terms:

(a) autorotative force;

(b) autorotative section.

2.6.2 Describe the effect on autorotative flight of variations in:

(a) all-up-weight;

(b) density altitude;

(c) airspeed;

(d) rotor RPM.

2.6.3 Describe the vectors acting on a rotor blade section during forward autorotative flight.

2.6.4 Explain the vectors acting on a rotor blade section during an autorotative flare.

2.7 Other conditions

2.7.1 Explain the following phenomena and the conditions that can lead to them arising and the appropriate recovery actions to be taken when they arise:

(a) ground resonance;

(b) mast bumping;

(c) dynamic roll-over.

Unit 1.3.4 CADG: CPL aerodynamics – gyroplane – *Reserved*

Unit 1.3.5 CADP: CPL aerodynamics – powered-lift – *Reserved*

Unit 1.3.6 CADS: CPL aerodynamics – airship – *Reserved*

SECTION 1.4 ATPL AIRCRAFT GENERAL KNOWLEDGE (AG)

Unit 1.4.1 AAGC: ATPL aircraft general knowledge – all aircraft categories

1. Reserved

2. Advanced aerodynamics

2.1.1 Explain the following airspeeds;

(a) IAS;

(b) CAS;

(c) EAS;

(d) TAS.

2.1.2 Explain the aerodynamic forces acting on an aircraft in flight.

3. Airframe and systems

3.1 Actuating systems

3.1.1 With reference to the basic principles of hydromechanics, explain and compare the following:

(a) transmission of force by an incompressible fluid;

(b) transmission of force by a compressible fluid.

3.2 Hydraulic systems

3.2.1 For the following:

(a) describe the functioning of a typical hydraulic system comprising main, standby and emergency systems that have multiple pumps and services;

(b) describe the purpose and function of the major components of a hydraulic system comprising:

(i) pumps;

(ii) accumulators;

(iii) reservoirs;

(iv) selector valves;

(v) check (one-way) valves;

(c) recognise on a diagram the symbols for major components of a hydraulic system and be able to trace the functioning of a diagrammatic system (system detail at the level of typical operations manual diagram);

(d) describe the typical services operated by a hydraulic system and for a typical system, how priority is allocated to certain services.

3.3 Fuel system

3.3.1 Jet fuels

(a) Avtur (Jet A1) – difference from other fuel cuts:

(i) volatility;

(ii) additives (discussion only);

(b) specific gravity:

(i) meaning;

(ii) variation with temperature;

(iii) effect of variation.

3.3.2 Carriage of fuel on aircraft

(a) fuel tanks:

(i) individual tanks;

(b) CG balance during fuel usage;

(c) problems:

(i) algae, corrosion, water content;

(d) need for venting.

3.3.3 Operation of fuel system

(a) understand function of a typical multi-engine fuel system with multiple fuel tanks, tank-to-tank transfer;

(b) understand purpose/function of major components (for example, engine-driven pumps (HP/LP), fuel tank pumps, override/transfer pumps jettison pumps, fuel/oil heat exchange, vent lines, single-point refuelling;

(c) recognise on diagrams the symbols for major components and be able to trace the functioning off a diagrammatic system (system details at level of flight manual diagrams);

(d) understand suction feed/transfer as backup for pressure feed/transfer.

3.3.4 Operational considerations

(a) fuel temperature (max/min):

(i) need for fuel heating (oil, bleed air);

(b) cooling/lubrication of pumps;

(c) cooling of oil/hydraulic systems:

(i) effect of fuel flow rates;

(d) minimum fuel level:

(i) pick-up for delivery to engine;

(ii) maintain oil/hydraulic cooling;

(iii) effects of aircraft attitude;

(iv) fuel jettison.

3.3.5 Fuel system monitoring

(a) gauges:

(i) fuel contents, flow meters;

(ii) effect of check angle;

(iii) likely errors;

(b) warning systems;

(i) low fuel level, low pressure warning;

(c) measurement of tank contents:

(i) dipstick/dripstick/floatsticks;

(ii) importance of having aircraft level;

(iii) precautions in use.

3.4 Electrical systems

3.4.1 Selected components

(a) bus:

(i) concept of a bus;

(ii) common terminology:

hot bus, emergency bus, essential bus.

(b) circuit breaker:

(i) function, precautions if resetting;

(ii) multiple CB panels – need for identification;

(iii) grid system of nomenclature (for example, CB G22 on P3 panel);

(c) battery:

(i) types of high performance batteries in common use;

(ii) charge/discharge characteristics;

(iii) precautions needed;

(d) AC generation:

(i) advantages of AC versus DC;

(ii) types of generator:

(A) permanent magnet generator;

(B) field excitation generator;

(C) differences between them;

(iii) constant speed drive:

(A) purpose;

(B) disconnecting drive;

(e) TR unit:

(i) purpose;

(ii) function of diodes/RCRs;

(f) power distribution:

(i) connecting generator to a bus;

(ii) connecting multiple generators to bus system;

(A) split buses;

(B) paralleling generators;

(iii) priority supplies in event of partial failure.

3.4.2 Operation of electrical system

(a) functioning of a typical AC-based electrical system with multiple generators, multiple AC and DC buses, APU and GPU;

(b) recognise on a diagram the symbols for the major components, and be able to trace the functioning of the diagrammatic system. (system detail at the level of typical Operations Manager diagram).

3.4.3 The aircraft structure as an electrical conductor.

4. Power plants – turbine engine

4.1 Theory of thrust

4.1.1 Explain the thrust formula for turbine engines and for thrust, state the functional relationship between airspeed, air density, pressure and temperature, and RPM.

4.2 Principle of operation

4.2.1 Describe the basic principles of jet propulsion theory with reference to the following:

(a) working cycle:

(i) gas flow;

(ii) changes in velocity, pressure, temperature;

(iii) engine pressure ratio;

(b) the differences and advantages of the following types of engine:

(i) centrifugal flow;

(ii) axial flow.

5. Engine instruments

5.1 Displays

5.1.1 Describe the basic features of the following commonly available types of displays:

(a) pointer-and-dial;

(b) vertical strip;

(c) EICAS.

5.1.2 Explain the purpose of monitoring engine parameters in regards to the following:

(a) comparison of engine performance;

(b) trends;

(c) identification of malfunctions/failures.

5.1.3 In relation to identifying an engine gauge with its engine:

(a) explain the desirability of being able to rapidly identify the correct gauge engine combination; and

(b) give examples of good/bad instrumentation layouts; and

(c) describe the consequence of engine misidentification.

6. Flight instrumentation systems

6.1 Application of computers used in aircraft

6.1.1 Describe how the following computer-based systems and technologies are used in aircraft:

(a) flight management systems;

(b) performance management systems;

(c) fly-by-wire aircraft.

6.2 Electronic flight instrument system (EFIS)

6.2.1 In relation to EFIS:

(a) describe the advantages of EFIS compared to conventional system; and

(b) list typical inputs and outputs; and

(c) describe typical data inputs; and

(d) describe typical control panels and display units; and

(e) provide examples of typical aircraft installation.

6.3 Flight management system (FMS)

6.3.1 In relation to a typical FMS:

(a) describe the advantages of FMS compared to conventional system; and

(b) explain the general principles of operation; and

(c) list the typical inputs and outputs; and

(d) describe typical control panel and display units; and

(e) provide examples of typical aircraft installations.

6.4 Total air temperature (TAT) gauge

6.4.1 In relation to TAT:

(a) explain the purpose and operation of TAT gauges and the following terms:

(i) ram rise;

(ii) recovery factor; and

(b) describe typical indicators of a TAT gauge in relation to malfunctions.

7. Warning and recording equipment

7.1 Ground Proximity Warning Systems (GPWS)

7.1.1 In relation to typical GPWS:

(a) explain the purpose and operation of GPWS; and

(b) describe the modes of operation and operating envelopes; and

(c) describe hard and soft aural and visual warnings; and

(d) list the typical inputs and outputs; and

(e) describe the limitations and restrictions in function and use; and

(f) describe typical GPWS displays and control panels.

7.2 Airborne Collision Avoidance System (ACAS)

7.2.1 Explain the basic concepts of ACAS operation.

7.2.2 Describe the effect on ACAS operation for each mode of operation that an be selected on the TCAS/Transponder control panel selected by the flight crew.

7.2.3 Describe the limitation of ACAS for tracking aircraft fitted with Mode A/C transponders.

7.2.4 Describe the range of the altitude band in which traffic are displayed in normal operation.

7.2.5 Explain the traffic display visual symbology used to determine the possibility of conflict with other aircraft and associated aural warnings.

7.2.6 Describe how ‘proximate’ aircraft are displayed on the traffic display.

7.2.7 Describe the aural and visual alerts for the following:

(a) ‘intruder’ aircraft;

(b) ’threat’ aircraft.

7.2.8 Describe pilot actions in response to the following:

(a) ACAS Traffic Advisory (TA) alert;

(b) ACAS Resolution Advisory (RA) alerts.

7.2.9 State the standard phraseology pilots should use to communicate with ATC in the following cases:

(a) in response to an ACAS RA alert;

(b) on cessation of a RA alert.

7.2.10 Explain the requirements for complying with ACAS RA instructions as overriding Air traffic Control (ATC) directions.

7.2.11 Describe the reporting/notification obligations when ACAS alerts are generated.

7.3 Digital Flight Data Recorder (DFDR)

7.3.1 In relation to a typical DFDR system:

(a) explain the purpose and function of DFDR; and

(b) describe the typical data coverage available; and

(c) describe the physical appearance of a set of gauges of typical recorder and recorded data.

7.4 Health Usage Monitoring System (HUMS)

7.4.1 Explain the purpose and function of HUMS, including the following:

(a) actuation;

(b) down loading.

7.5 Cockpit Voice Recorder (CVR)

7.5.1 In relation to a typical CVR system:

(a) explain the purpose and function of a CVS; and

(b) describe a typical audio/radio channel coverage available in a multi-seat flight deck environment; and

(c) describe the physical appearance of a set of gauges of a typical recorder and control panel.

7.6 Master Warning Systems (MWS)

7.6.1 In relation to a typical MWS:

(a) explain the purpose and function of the system; and

(b) describe the typical warning systems incorporated or covered by a MWS; and

(c) describe the aural and visual outputs for the following:
  (i) warnings;
  (ii) cautions;
(d) describe the features of a typical displays;
(e) explain take-off inhibiting of MWS outputs.

7.7 Fire Detection, Warning, Extinguishing Systems

7.7.1 Describe the following in relation to fire detection, warning and extinguishing systems:
(a) types of systems commonly used in aircraft; and
(b) typical warnings; and
(c) system limitations; and
(d) actuation mechanisms; and
(e) effects.

8. Global Navigation Satellite Systems

8.1 GNSS operation

8.1.1 For the following, describe:
(a) the principles of operation, performance limitations and errors of a GNSS system, including:
  (i) methods of position fixing using a GNSS system;
  (ii) the GNSS operating procedures which provide safeguards against navigational error and loss of situational awareness;
  (iii) GNSS operating procedures for typical navigational tasks using a specific type of aircraft equipment;
  (iv) indications of waypoint passage;
  (v) GNSS operational and serviceability checks;
  (vi) the human factors limitations associated with the use of GNSS equipment;
  (vii) the requirements applicable to pilots and equipment for GNSS operations.

Unit 1.4.2 AAGA: ATPL aircraft general knowledge – aeroplane

1. Reserved

2. Advanced aerodynamics

2.1 Review of terminology

2.1.1 Definitions

(a) Mach No;

(b) reference speeds, including M_{CRIT}, V_{MO}, M_{MO}, $V_{S.}$

2.2 Aerodynamic forces

(a) review forces acting in flight;

(b) balance of forces in trimmed asymmetric flight;

(c) V_{MCA} and V_{MCG}.

2.3 Shock waves

(a) reasons for their formation at subsonic speeds;

(b) their effect on the handling and operation of the aircraft;

(c) high-speed buffet and its possible similarity to low-speed buffet and speedbrake buffet.

2.4 Performance and speed

(a) manoeuvring and gust envelope;

(b) changes to C_L and C_D with increasing speed at constant angle of attack;

(c) performance degradation, the effect of Mach drag on thrust required and fuel flow;

(d) aileron reversal;

(e) effects of wing sweep back;

(f) maximising low-speed performance (use windshear on take-off as discussion case).

2.5 Performance and altitude

(a) effect of high altitude on:

(i) buffet boundaries;

(ii) stall and stability;

(iii) manoeuvring capability (inertia effects);

(b) stall and V_{MCA} considerations with engine failure at high altitude.

3. Airframe and systems

3.1 Flight controls

3.1.1 Review flight controls

(a) primary flight controls:

(i) ailerons; and

(ii) elevators; and

(iii) rudder;

(b) secondary flight controls:

(i) spoilers/airbrakes;

(ii) trim systems:

(iii) flying tail, stabiliser trim.

3.1.2 Leading edge flaps

(a) review trailing edge flaps;

(b) leading edge flaps/devices:

(i) purpose/function of leading edge flaps;

(ii) types in common use;

(iii) typical interconnection with trailing edge flaps;

(c) common methods of operation:

(i) hydraulic;

(ii) electric;

(iii) pneumatic (outline knowledge only is required; actuating systems are at later section).

3.1.3 Powered controls

(a) methods of transmitting demand to control surfaces;

(b) feedback;

(c) feel, natural or artificial;

(d) possibility or availability of manual reversion.

3.2 Landing gear

3.2.1 Wheel systems

(a) arrangements:

(i) multi-wheel;

(ii) bogie wheel;

(iii) effects on PCN/ACN;

(b) main components;

(c) brief outline of typical retract/extend operation:

(i) normal, alternate, emergency operation;

(ii) landing gear doors may be disabled under some conditions.

3.2.2 Wheels and tyres

(a) wheels and brake energy limits, thermal plugs;

(b) cooling charts, minimum turn-around times.

3.2.3 Braking systems

(a) typical multi-wheel systems:

(i) typical sources of power for normal, alternate, emergency use;

(A) hydraulic supply and back-up;

(B) emergency air bottles.

(b) parking brake;

(c) principles of operations/limitations of:

(i) anti-skid system;

(ii) auto brake system.

3.2.4 Hydroplaning

(a) cause and effect;

(b) factors affecting hydroplaning, including speed formulae.

3.2.5 Steering systems

(a) types available:

(i) rudder pedal steering;

(ii) hand/wheel/tiller steering;

(iii) body-gear steering on some aircraft;

(b) degree of steering commonly available with each:

(i) understand that some steering systems are incompatible with asymmetric brake and/or power, while others are improved by them.

3.3 Actuating systems

3.3.1 Pneumatic systems

(a) basic system knowledge as for hydraulics;

(b) compare system differences with hydraulic system;

(c) compare operating differences with hydraulic system;

(i) speed of response;

(ii) force available;

(iii) supply of operating fluid;

(iv) weight of system.

3.4 Airconditioning and pressurisation

3.4.1 Typical air supply system

(a) power sources:

(i) engine driven compressors;

(ii) bleed air:

(A) gas turbine compressor;

(B) turbo charger compressor;

(b) typical services provided;

(c) availability of services:

(d) possibility of limitations under take-off or asymmetric power conditions, or during engine start.

3.4.2 Airconditioning system

(a) types of systems:

(i) freon;

(ii) air cycle machine;

(b) brief outline of operation of system;

(i) single zone cabin;

(ii) multiple zones;

(c) purpose of/necessity for humidifiers.

3.4.3 Pressurisation system

(a) terminology:

(i) cabin altitude, differential pressure;

(b) brief outline of operation of typical system:

(i) supply;

(ii) outflow valves;

(iii) overpressure and negative pressure relief;

(iv) control of cabin altitude and rate (no detail of internal mechanism of controller required);

(c) normal pressurised zones in the aircraft;

(d) rapid decompression, cabin altitude warning.

3.5 Ice and rain protection

3.5.1 Distinction between anti-ice and de-ice system.

3.5.2 Pneumatic systems (brief coverage only)

(a) where used:

(i) leading edges;

(b) limitations.

3.5.3 Thermal ice protection

(a) where used:

(i) propellers, flying surfaces, air intakes, pitot and other sensors, windshields;

(b) methods:

(i) electrical, air, oil;

(c) limitations.

3.5.4 Fluid ice protection

(a) where used:

(i) inflight leading edge of flying surfaces, propellers, windshield;

(ii) ground de-icing;

(b) limitations.

3.5.5 Rain removal from windscreen

(a) methods:

(i) wipers;

(ii) fluid dispersant;

(iii) air jets.

3.5.6 Effects on aeroplane performance (discussion only)

(a) ice accumulations;

(b) use of ice control systems.

3.6 Fuel system

3.6.1 Carriage of fuel on aircraft

(a) structural consequences:

(i) wing bending;

(ii) zero-fuel weight;

(iii) CG movement;

(b) understand suction feed and gravity feed/transfer as backup for pressure feed/transfer.

3.6.2 Operational considerations

(a) minimum fuel levels:

(i) pick-up for delivery to engine;

(ii) maintain oil/hydraulic cooling;

(iii) effect of aircraft attitude (for example, missed approach);

(b) fuel jettison:

(i) legislation;

(ii) precautions to be observed;

(iii) minimum fuel after jettison (stand-pipes).

4. Power plants – turbine engine

4.1 Principle of operation

(a) types of engine:

(i) differences and advantages:

(ii) bypass ratio;

(b) turboprop:

(i) advantages and limitations/problems.

4.2 Engine constructions

(a) intake (subsonic only):

(i) location on airframe relative to free-stream airflow;

(ii) location relative to engine (for example, B727 centre engine);

(iii) vulnerability to icing;

(b) compressor:
  (i) purpose/function of compressor;
  (ii) centrifugal;
    (A) single/multiple;
  (iii) axial;
    (A) single/twin;
  (iv) inlet guide vanes;
  (v) vulnerability to icing;
  (vi) bleed air provisions;
  (vii) compressor stalling:
    (A) causes, symptoms, avoidance;
    (B) unloading compressor during start;
(c) fan:
  (i) purpose and function of fan;
  (ii) relationship to compressor;
  (iii) inlet guide vanes;
  (iv) reverse thrust;
(d) combustion system:
  (i) purpose and function of combustion system;
  (ii) combustion chamber:
    (A) individual;
    (B) annular;
  (iii) fuel injectors;
  (iv) igniters;
  (v) air/fuel ratios;
(e) turbine:
  (i) purpose/function of turbine;
  (ii) single, twin, and triple turbines:
    (A) for example, driving two-stage compressor with fan;
  (iii) thermal and mechanical stress;
  (iv) effects of damage;
  (v) monitoring turbine temperature:
    (A) desired to monitor inlet temperature;
    (B) difficulties/compromise in monitoring;
    (C) terminology – EGT, TGT, TIT;
  (vi) reverse thrust mechanisms;
    (A) cascade, buckets;
    (B) safety interlocks;
(f) exhaust:
  (i) purpose and function of exhaust;
  (ii) sources of noise;
  (iii) hushkits.

4.3 Turbo-prop

(a) drive train from engine:
  (i) flight range; and
  (ii) ground range;
(b) control of propeller:

(i) variable speed engine;
(ii) constant speed engine;
(c) reverse thrust:
(i) concept of zero thrust;
(d) feathering;
(e) propeller brake.

4.4 Auxiliary power unit (APU)

(a) purpose/function of APU;
(b) types commonly available;
(c) outputs available;
(d) availability determined by AFM:
(i) use in flight;
(ii) start in flight;
(iii) outputs available in flight.

4.5 Operational considerations

(a) use of reverse thrust:
(i) effectiveness with decreasing speed;
(ii) instability of airflow in reverse at low ground speeds;
(iii) monitoring and precautions;
(iv) deliberate or inadvertent use in flight (where not permitted by AFM);
(b) use of bleed air:
(i) effect on thrust and performance;
(ii) engine indications:
(A) EGT;
(B) RPM;
(C) EPR.

4.6 Engine starting

(a) air-driven starters:
(i) characteristics;
(ii) sources of air;
(iii) failure to disconnect;
(b) critical engine RPM:
(i) initiating fuel flow/ignition;
(ii) self-sustaining RPM;
(iii) stable idle;
(c) typical engine start sequence;
(d) typical start malfunctions:
(i) cause and remedy for each of the following:
(A) fails to light off;
(B) hot start;
(C) hung start;
(D) fails to stabilise at idle;
(E) starter fails to disengage;
(F) torching/tailpipe fire.

5. Engine instruments

5.1 EPR gauge

(a) inputs;

(b) displays:

(i) analogue and digital readout;

(ii) setting target EPR:

(A) manual and auto settings;

(c) typical appearance of a set of gauges in a modern multi-engine aircraft.

5.2 Torque meter

(a) inputs and methods of functioning;

(b) types of indicators and units of torque;

(c) typical appearance of a set of gauges in a modern multi-engine aircraft.

5.3 RPM indicator

(a) types of display:

(i) RPM or percentage;

(ii) 100% not necessarily a limit and markings;

(b) multiple RPM displays – N1, N2, N3:

(i) conventional order of numbering;

(c) typical appearance of a set of gauges in a modern multi-engine aircraft.

5.4 Turbine temperature indicator

(a) types of display:

(i) analogue;

(ii) digital;

(b) overtemp warnings;

(c) typical appearance of a set of gauges in a modern multi-engine aircraft.

5.5 Fuel consumption

(a) flowmeters:

(i) analogue and digital indications;

(ii) importance on start-up and shutdown;

(b) fuel-used gauges:

(i) may be separate or incorporated with flowmeter;

(c) typical appearance of a set of gauges in a modern multi-engine aircraft.

6. Automatic flight control system (AFCS)

6.1 Autopilot (AP)

(a) purpose/function of AP;

(b) common types (different axes);

(c) components;

(d) typical heavy aircraft AP controller;

(e) command and manual modes, including typical submodes:

(i) ALT/HDG/IAS/MACH/VS hold;

(ii) VORLOC/ILS/INS tracking;

(iii) FMS coupling;

(iv) autoland and auto-go-around;

(f) typical limitations/restrictions.

6.2 Flight Director (FD)

(a) purpose/function of FD;

(b) common types of presentation:
   (i) V-bars;
   (ii) cross-bars;
(c) typical components;
(d) typical heavy aircraft FD controller;
(e) typical modes of operation; mode indicator.

6.3 Auto-throttle (AT)

(a) purpose/function of AT;
(b) typical modes of operation:
   (i) thrust hold;
   (ii) speed hold;
   (iii) VNAV coupling;
(c) auto-derate of take-off power;
(d) typical engage/disengage/go-around controls;
(e) typical limitations/restrictions.

6.4 Autoflight

(a) relationship between AT, FD and AP;
(b) relationship between FMS and AT/FD/AP;
(c) redundancy requirements for autoland.

6.5 Flight envelope protection in autoflight

(a) types for protection available:
   (i) high speed; low speed;
   (ii) alpha floor;
   (iii) flap/gear speed protection;
(b) functioning of typical system:
   (i) inputs; and
   (ii) outputs;
(c) modified functioning during flare and touchdown;
(d) alternate law, reversionary modes.

6.6 Associated autosystems

(a) yaw damper:
   (i) purpose and function of yaw damper:
      (A) typical low and high speed behaviour requiring installation of yaw damper;
   (ii) method of functioning:
      (A) input and output;
   (iii) series and parallel types;
      (A) advantages and disadvantages of each type;
   (iv) typical yaw damper controls;
(b) automatic pitch trim:
   (i) purpose and function of auto-trim;
   (ii) input and output;
   (iii) typical auto-trim controls;
(c) thrust computation:
   (i) purpose and function of thrust computation system;
   (ii) input and output;
   (iii) relationship to FMS.

7. Warning and recording equipment

7.1 Overspeed Warning System

(a) components:
  (i) inputs; and
  (ii) outputs;
(b) may be selectable according to weight/CG/fuel distribution;
(c) typical selectors and warning indicators:
  (i) aural warnings; and
  (ii) visual warnings.

7.2 Stall Warning

(a) purpose/function of system;
(b) components of a typical heavy aircraft system:
  (i) ADC inputs, including AOA;
  (ii) stick shaker and pusher;
  (iii) visual and aural warnings.

7.3 Take-off Warning System (TWS)

(a) Purpose and function of TWS;
(b) typical items monitored;
(c) aural/visual warnings.

Unit 1.4.3 AAGH: ATPL aircraft general knowledge – helicopter

1. Reserved

2. Advanced aerodynamics

2.1 Review of terminology

2.1.1 Definitions

(a) reference speeds, including V_{TOSS}, CDP, landing decision point (LDP);

(b) define; tip path, tip path plane, axis of rotation, shaft axis, disc area, chord line, pitch angle, angle of attack, coning angle, feathering, feathering axis, disc loading, blade loading, solidity, flapping, dragging, teetering rotor, articulated rotor, semi rigid rotor.

2.1.2 Aerodynamic forces

(a) Effect of RAF on angle of attack, induced airflow and effects, total reaction, rotor thrust, torque, torque reaction, rotor thrust/rotor drag ratio, forces opposing weight, factors influencing rotor thrust, Bernoulli's theorem, Hookes joint effect.

2.1.3 Stability

(a) static and dynamic stability;

(b) stability during hover;

(c) stability during forward flight;

(d) effect of off-set flapping hinges;

(e) effect of stabiliser bar;

(f) effect of centre of gravity (CG);

(g) effects of altitude and speed on stability;

(h) effect of horizontal stabilizer.

2.1.4 Forward flight

(a) arrangement of forces and effects of CG position;

(b) basic aspects-tilting the disc through cyclic;

(c) dissymmetry of lift, dissymmetry lift elimination through flapping;

(d) flapback, designs to reduce flapping amplitude, Delta-3 hinge, offset pitch horn;

(e) reverse flow, transitional lift, inflow roll.

2.1.5 Climbing and descending

(a) forces in a vertical climb;

(b) horse power available (HPAV) curve and factors affecting the HPAV: altitude, DA, collective setting;

(c) rate and angle of climb and relationship to HPAV and horse power required (HPREQ) curve;

(d) effect of wind, altitude, and sling loads on rate and angle of climb;

(e) forces in a vertical descent;

(f) over pitching;

(g) rate and angle of descent and relationship to HPAV and HPREQ curves;

(h) effect of wind, all up weight (AUW), altitude and sling loads on rate and angle of descent.

2.1.6 Hovering

(a) definition;

(b) hover in and out of ground effect (IGE, OGE);

(c) factors affecting ground effect, height, DA, AUW, nature of surface, slope, wind, recirculation.

2.1.7 Turning

(a) centripetal force and angle of bank;

(b) rate and radius of turn, relationship of angle of bank;
(c) steep turn, load factor, power requirement;
(d) forces in climbing and descending turns;
(e) effect of attitude and bank angle on rate and radius of turn;
(f) effect of AUW on rate/radius;
(g) effect of wind when turning around a ground feature;
(h) effects of slipping and skidding.

2.1.8 Autorotation
(a) definition;
(b) autorotative forces/drag;
(c) effects of airflow on vertical autorotation;
(d) effects of airflow on forward autorotation;
(e) rate of descent requirements for autorotation:
(i) minimum rate of descent, maximum air range;
(f) effect of weight, altitude, temperature.

2.1.9 Rotor blades
(a) feathering, taper, washout, lift distribution;
(b) flapping, flapping to equality;
(c) dragging;
(d) changing blade CG;
(e) limits of rotor RPM.

2.1.10 Tail rotor
(a) principles of operation – pitch control;
(b) primary and additional purpose;
(c) auto rotation;
(d) tail rotor drift;
(e) tail rotor roll;
(f) tail rotor flapping, shrouded rotors.

2.1.11 Ground resonance
(a) definition;
(b) causes of ground resonance;
(c) recovery action.

2.1.12 Vortex ring state
(a) how vortex rings develop;
(b) effect of ROD-flow and tip vortex action on rotor thrust;
(c) effects of power and airspeed on vortex ring state;
(d) flight conditions leading to vortex ring state;
(e) tail rotor vortex ring state;
(f) loss of tail rotor effectiveness (LTE).

2.1.13 Retreating blade stall
(a) conditions which could cause retreating blade stall;
(b) effect of reverse flow, effect of airspeed on stall angle;
(c) factors effecting the advancing blade;
(d) symptoms and recovery from retreating blade stall;
(e) methods to minimize retreating blade stall (swept tips);
(f) effect of altitude on VNE.

(g) forward speed limiting factors.

2.1.14 Blade sailing, dynamic roll-over, mast bumping

(a) definitions;

(b) cause of blade sailing and prevention;

(c) forces in dynamic roll-over;

(d) avoidance of dynamic roll-over;

(e) factors effecting mast bumping/flapping amplitude;

(f) avoidance of mast bumping.

3. Airframe and systems

3.1 Flight controls

3.1.1 Review flight controls:

(a) primary flight controls;

(i) pitch and roll (cyclic), yaw, collective;

(ii) trim systems;

(iii) canted tail rotor;

(iv) sweep back on tips;

(v) shrouded tail rotor.

3.1.2 Aerodynamic enhancements:

(a) canted tail rotor;

(b) sweep back on tips;

(c) shrouded tail rotor;

(d) tail surfaces, fins, end plates, stabilators.

3.1.3 Powered controls:

(a) methods of transmitting demand to control surfaces;

(b) feedback;

(c) natural and artificial feel;

(d) possibility/availability of manual reversion.

3.2 Airconditioning

3.2.1 Typical air supply system:

(a) power sources:

(i) engine, transmission, driven compressor;

(ii) bleed air;

(iii) gas turbine compressor;

(iv) turbo-charger compressor;

(b) typical services provided;

(c) availability of services:

(i) possibility of limitations during take-off and landing or during engine start.

3.2.2 Airconditioning system

(a) types of systems:

(i) freon;

(ii) air cycle machine;

(b) brief outline of operation of system:

(i) single zone; and

(ii) multi-zone;

(c) purpose and need for humidifier.

3.3 Ice and rain protection

3.3.1 Distinction between anti-ice and de-ice systems.

3.4 Landing gear

3.4.1 Wheel systems

(a) main components;

(b) brief outline of typical retract and extend operation:

(i) normal operation;

(ii) alternative operation;

(iii) emergency operation.

3.4.2 Wheels and tyres

(a) Wheel and brake energy limits.

3.4.3 Braking systems

(a) typical systems;

(b) typical sources of power for normal, alternate and emergency systems -hydraulic supply and backup emergency air bottles;

(c) parking brake.

3.4.4 Steering systems

(a) types available:

(i) tail rotor steering (pedals);

(ii) differential braking;

(b) degree of steering available with each-possibility of rollover.

3.5 Actuating systems

3.5.1 Basic principles of hydromechanics

(a) principle of transmission of force by an incompressible fluid;

(b) brief comparison with use of a compressible fluid.

3.5.2 Thermal ice protection

(a) where used:

(i) flying surfaces;

(ii) air intakes;

(iii) pitot and other sensors;

(iv) windshields;

(b) methods:

(i) electric;

(ii) air;

(iii) oil;

(c) limitations.

3.5.3 Fluid ice protection

(a) where used:

(i) ground de-icing;

(b) limitations.

3.5.4 Rain removal from windscreen

(a) wipers.

3.5.5 Effects on helicopter performance

(a) ice accumulation;

(b) use of engine air bleed ice control systems.

4. Power plants – turbine engine

4.1 Engine design

(a) types of engine:
  (i) differences and advantages;
  (ii) centrifugal flow;
  (iii) axial flow;
  (iv) bypass engine;
  (v) bypass ratio;
(b) power train:
  (i) fixed shaft – 'clutch';
  (ii) free power turbine;
  (iii) twin pack, combining gear box;
  (iv) torque sharing.

4.2 Engine construction

(a) intake:
  (i) purpose and /function of intake;
  (ii) location relative to engine;
  (iii) vulnerability to icing;
(b) compressor:
  (i) purpose and function of compressor;
  (ii) centrifugal, axial;
  (iii) single, twin, and multiple:
    (A) inlet guide vanes;
    (B) vulnerability to icing;
    (C) bleed air provisions;
    (D) compressor stalling;
  (iv) causes, symptoms, avoidance;
  (v) unloading compressor during start.
(c) combustion system:
  (i) purpose (function of combustion system);
  (ii) combustion chamber;
  (iii) individual/annular:
    (A) fuel injectors;
    (B) igniters;
    (C) air/fuel ratios.
(d) turbine:
  (i) purpose/function of turbine;
  (ii) thermal and mechanical stress;
  (iii) effects of damage;
  (iv) monitoring turbine temperature;
  (v) need to monitor inlet temperature;
  (vi) difficulties/compromise in monitoring;
  (vii) terminology – TIT, ITT, TGT, etc.
(e) exhaust:
  (i) purpose/function of exhaust;
  (ii) sources of noise;

(iii) EGT, JPT;

(f) torque measuring/torque sharing:

(i) governor inputs.

4.3 Auxiliary power unit (APU)

(a) purpose/function of APU;

(b) types commonly available;

(c) outputs available;

(d) availability determined by AFM:

(i) use in flight;

(ii) start in flight;

(iii) outputs available in flight.

4.4 Operational considerations

(a) use of bleed air;

(i) effect on performance;

(ii) engine indications;

(iii) EGT, RPM.

4.5 Engine starting

(a) electrical starters;

(i) source of power;

(ii) cross tie requirements;

(b) critical engine RPM:

(i) initiating fuel flow/ignition;

(ii) self-sustaining RPM;

(iii) stable idle;

(c) typical engine start sequences;

(d) typical start malfunctions:

(i) cause and remedy;

(ii) fails to light off;

(iii) hot start;

(iv) hung start;

(v) fails to stabilise at idle;

(vi) starter fails to disengage;

(vii) torching/tailpipe fire;

(e) starter/generator:

(i) principle of operation and function.

5. Engine instruments

5.1 Torque meter

(a) inputs and methods of functioning;

(b) types of indicators and units of torque;

(c) typical appearance of a set of gauges in a modern multi-engine helicopter.

5.2 RPM indicator

(a) types of display:

(i) RPM, percent;

(ii) 100% not necessarily a limit-biasing;

(b) multiple RPM displays – N1, N2, NR:

(i) conventional order of numbering;

(c) typical appearance of a set of gauges in a modern multi-engine helicopter.

5.3 Temperature indicator

(a) types of display:

(i) analogue/digital;

(b) over temperature warnings;

(c) typical appearance of a set of gauges in a modern multi-engine helicopter.

5.4 Fuel consumption

(a) flow meters:

(i) analogue/digital indications;

(ii) importance on start-up and shutdown;

(b) fuel-used gauges:

(i) may be separate or incorporated with flow meter;

(c) typical appearance of a set of gauges in a modern multi-engine helicopter.

5.5 Inflight tracking

5.5.1 Principles of operation.

5.6 Monitoring systems

(a) indicators, units;

(b) warning systems;

(c) mechanical and electrical remote signal transmission systems;

(d) HUMS operation and indication.

6. Stability augmenation and autoflight control, system (AFCS)

6.1 AFCS

(a) purpose/function of AP:

(i) common types (different axes)/inputs;

(ii) pitch;

(iii) collective;

(iv) other;

(b) components;

(c) typical AP controller;

(d) command and manual modes:

(i) typical submodes;

(ii) Stability Augmentation System (SAS);

(iii) attitude retention system (ARS/ATT);

(iv) ALT/HDG/IAS hold;

(v) VOR/LOC/ILS/INS/GNSSGNSS tracking;

(vi) FMS coupling;

(vii) auto hover;

(e) typical limitations/restrictions.

6.2 Flight director (FD)

(a) purpose/function of FD;

(b) common types of presentation:

(i) V-bars;

(ii) cross-bars;

(c) typical components;

(d) typical FD controller;

(e) typical modes of operation:

  (i) mode indicator.

6.3 Autoflight

(a) relationship between FD and AP;

(b) relationship between FMS and FD/AP;

(c) redundancy requirements.

7. Warning and recording equipment

7.1 Auto Voice Activated Decision System (AVADS)

(a) AVADS:

  (i) principles of operation;

  (ii) warnings;

  (iii) limitations.

7.2 Rotor overspeed and underspeed warning system components

(a) inputs;

(b) outputs.

7.3 Health Usage Monitoring System (HUMS)

(a) actuation;

(b) down loading.

Unit 1.4.4 AAGP: ATPL aircraft general knowledge – powered-lift – *Reserved*

Unit 1.4.5 FAGC: FE aircraft general knowledge – all categories

1. Reserved

2. Advanced aerodynamics

2.1 Terminology

2.1.1 Definitions

(a) Mach No;

(b) reference speeds, including MCRIT, VMO, MMO, Vs.

2.2 Aerodynamic forces

(a) forces acting in flight;

(b) V_{MCA} and V_{MCG}.

2.3 Shock waves

(a) reasons for their formation at subsonic speeds;

(b) their effect on the handling and operation of the aircraft;

(c) high-speed buffet and its possible similarity to low-speed buffet and speedbrake buffet.

2.4 Performance and speed

2.4.1 performance degradation, the effect of Mach drag on thrust required and fuel flow.

3. Airframe and systems

3.1 Flight Controls

3.1.1 Review flight controls:

(a) primary flight controls:

(i) ailerons, elevators, rudder;

(b) secondary flight controls:

(i) spoilers/airbrakes;

(ii) trim systems:

flying tail, stabiliser trim.

3.1.2 Leading edge flaps:

(a) review trailing edge flaps;

(b) leading edge flaps/devices:

(i) purpose/function of LE flaps;

(ii) types in common use;

(iii) typical interconnection with TE flaps;

(c) common methods of operation:

(i) hydraulic, electric, pneumatic (outline only; actuating systems are at later section).

3.1.3 Powered controls:

(a) methods of transmitting demand to control surfaces;

(b) feedback;

(c) feel, natural/artificial;

(d) possibility/availability of manual reversion.

3.2 Landing gear

3.2.1 Wheel systems;

(a) arrangements:

(i) multi-wheel;

(ii) bogie wheel;

(iii) effects on PCN/CAN;

(b) main components;

(c) brief outline of typical retract/extend operation:

(i) normal, alternate, emergency operation;

(ii) LG doors may be disabled under some conditions;

3.2.2 Wheels and tyres

(a) wheels and brake energy limits, thermal plugs;

(b) cooling charts, minimum turn-around times.

3.2.3 Braking systems

(a) typical multi-wheel systems:

(i) typical sources of power for normal, alternate, emergency use:

(A) hydraulic supply and back-up;

emergency air bottles.

(b) parking brake;

(c) principles of operations/limitations of:

(i) anti skid system;

(ii) auto brake system.

3.2.4 Steering systems

(a) types available:

(i) rudder pedal steering;

(ii) hand/wheel/tiller steering;

(iii) body-gear steering on some aircraft;

(b) degree of steering commonly available with each:

(i) understand that some steering systems are incompatible with asymmetric brake and/or power, while others are improved by them.

3.3 Actuating systems

3.3.1 Pneumatic systems

(a) basic system knowledge as for hydraulics;

(b) compare system differences with hydraulic system;

(c) compare operating differences with hydraulic system:

(i) speed of response;

(ii) force available;

(iii) supply of operating fluid;

(iv) weight of system.

(d) airconditioning and pressurisation.

3.3.2 Typical air supply system

(a) power sources:

(i) engine driven compressors;

(ii) bleed air:

(A) gas turbine compressor;

turbo charger compressor;

(b) typical services provided;

(c) availability of services:

(d) possibility of limitations under take-off or asymmetric power conditions, or during engine start.

3.3.3 Airconditioning system

(a) types of systems:

(i) freon;

(ii) air cycle machine;

(b) brief outline of operation of system;

(i) single zone cabin;

(ii) multiple zones;

(c) purpose of/necessity for humidifiers.

3.3.4 Pressurisation system

(a) terminology:

(i) cabin altitude, differential pressure;

(b) brief outline of operation of typical system:

(i) supply;

(ii) outflow valves;

(iii) overpressure and negative pressure relief;

(iv) control of cabin altitude and rate (no detail of internal mechanism of controller required);

(c) normal pressurised zones in the aircraft;

(d) rapid decompression, cabin altitude warning.

3.4 Ice and rain protection

3.4.1 Distinction between anti-ice and de-ice system.

3.4.2 Pneumatic systems (brief coverage only)

(a) where used:

(i) leading edges;

(b) limitations.

3.4.3 Thermal ice protection

(a) where used:

(i) propellers;

(ii) flying surfaces;

(iii) air intakes;

(iv) pitot and other sensors;

(v) windshields;

(b) methods:

(i) electrical;

(ii) air;

(iii) oil;

(c) limitations.

3.4.4 Fluid ice protection

(a) where used:

(i) inflight leading edge of flying surfaces, propellers, windshield;

(ii) ground de-icing;

(b) limitations.

3.4.5 Rain removal from windscreen

(a) methods:

(i) wipers;

(ii) fluid dispersant;

(iii) air jets.

3.4.6 Effects on aeroplane performance (discussion only)

(a) ice accumulations;

(b) use of ice control systems.

3.5 Fuel system

3.5.1 Carriage of fuel on aircraft

(a) structural consequences:

(i) wing bending;

(ii) zero-fuel weight;

(iii) CG movement;

(b) understand suction feed and gravity feed/transfer as backup for pressure feed/transfer.

3.5.2 Operational considerations

(a) minimum fuel levels:

(i) pick-up for delivery to engine;

(ii) maintain oil/hydraulic cooling;

(iii) effect of aircraft attitude (for example, missed approach);

(b) fuel jettison:

(i) legislation;

(ii) precautions to be observed;

(iii) minimum fuel after jettison (stand-pipes).

4. Power plants – turbine engine

4.1 Principle of operation

(a) types of engine:

(i) differences and advantages;

(ii) bypass ratio;

(b) turboprop:

(i) advantages; and

(ii) limitations; and

(iii) problems.

4.2 Engine constructions

(a) intake (subsonic only):

(i) location on airframe relative to free-stream airflow;

(ii) location relative to engine (for example, B727 centre engine);

(iii) vulnerability to icing;

(b) compressor:

(i) purpose/function of compressor;

(ii) centrifugal:

(A) single/multiple;

(iii) axial:

(A) single/twin;

(iv) inlet guide vanes;

(v) vulnerability to icing;

(vi) bleed air provisions;

(vii) compressor stalling:

(A) causes, symptoms, avoidance;

(B) unloading compressor during start;

(c) fan:

(i) purpose/function of fan;

(ii) relationship to compressor;

(iii) inlet guide vanes;

(iv) reverse thrust;

(d) combustion system:

(i) purpose/function of combustion system;

(ii) combustion chamber:

(A) individual/annular;

(iii) fuel injectors;

(iv) igniters;

(v) air/fuel ratios;

(e) turbine:

(i) purpose/function of turbine;

(ii) single/twin/triple turbines:

(A) for example, driving two-stage compressor with fan;

(iii) thermal and mechanical stress;

(iv) effects of damage;

(v) monitoring turbine temperature:

(A) desired to monitor inlet temperature;

(B) difficulties/compromise in monitoring;

(C) terminology – EGT, TGT, TIT;

(vi) reverse thrust mechanisms:

(A) cascade, buckets;

(B) safety interlocks;

(f) exhaust:

(i) purpose/function of exhaust;

(ii) sources of noise;

(iii) hushkits.

4.3 Turbo-prop

(a) drive train from engine:

(i) flight range; and

(ii) ground range;

(b) control of propeller:

(i) variable speed engine;

(ii) constant speed engine;

(c) reverse thrust:

(i) concept of zero thrust;

(d) feathering;

(e) propeller brake.

4.4 Auxiliary power unit (APU)

(a) purpose/function of APU;

(b) types commonly available;

(c) outputs available;

(d) availability determined by AFM:

(i) use in flight;
(ii) start in flight;
(iii) outputs available in flight.

4.5 Operational considerations

(a) use of reverse thrust:
(i) effectiveness with decreasing speed;
(ii) instability of airflow in reverse at low-ground speeds;
(iii) monitoring and precautions;
(iv) deliberate or inadvertent use in flight (where not permitted by AFM);
(b) use of bleed air:
(i) effect on thrust and performance;
(ii) engine indications:
(A) EGT;
(B) RPM;
(C) EPR.

4.6 Engine starting

(a) air-driven starters:
(i) characteristics;
(ii) sources of air;
(iii) failure to disconnect;
(b) critical engine RPM:
(i) initiating fuel flow/ignition;
(ii) self-sustaining RPM;
(iii) stable idle;
(c) typical engine start sequence;
(d) typical start malfunctions:
(i) cause and remedy for each of the following:
(A) fails to light off;
(B) hot start;
(C) hung start;
(D) fails to stabilise at idle;
(E) starter fails to disengage;
(F) torching/tailpipe fire.

5. Engine instruments

5.1 EPR gauge

(a) inputs;
(b) displays:
(i) analogue/digital readout;
(ii) setting target EPR:
(A) manual/auto settings;
(c) typical appearance of a set of gauges in a modern multi-engine aircraft.

5.2 Torque meter

(a) inputs and methods of functioning;
(b) types of indicators and units of torque;
(c) typical appearance of a set of gauges in a modern multi-engine aircraft.

5.3 RPM indicator

(a) types of display:
  (i) RPM or percentage;
  (ii) 100% not necessarily a limit and markings;
(b) multiple RPM displays – N1, N2, N3:
  (i) conventional order of numbering;
(c) typical appearance of a set of gauges in a modern multi-engine aircraft.

5.4 Turbine temperature indicator

(a) types of display:
  (i) analogue;
  (ii) digital;
(b) overtemp warnings;
(c) typical appearance of a set of gauges in a modern multi-engine aircraft.

5.5 Fuel consumption

(a) flowmeters:
  (i) analogue and digital indications;
  (ii) importance on start-up and shutdown;
(b) fuel-used gauges:
  (i) may be separate or incorporated with flowmeter;
(c) typical appearance of a set of gauges in a modern multi-engine aircraft.

6. Automatic flight control system (AFCS)

6.1 Autopilot (AP)

(a) purpose/function of AP;
(b) common types (different axes);
(c) components;
(d) typical heavy aircraft AP controller;
(e) command and manual modes, including typical submodes:
  (i) ALT/HDG/IAS/MACH/VS hold;
  (ii) VORLOC/ILS/INS tracking;
  (iii) FMS coupling;
  (iv) autoland and auto-go-around;
(f) typical limitations/restrictions.

6.2 Flight Director (FD)

(a) purpose/function of FD;
(b) common types of presentation:
  (i) V-bars;
  (ii) cross-bars;
(c) typical components;
(d) typical heavy aircraft FD controller;
(e) typical modes of operation:
  (i) mode indicator.

6.3 Auto-throttle (AT)

(a) purpose/function of AT;
(b) typical modes of operation:
  (i) thrust hold;

(ii) speed hold;
(iii) VNAV coupling;
(c) auto-derate of take-off power;
(d) typical engage/disengage/go-around controls;
(e) typical limitations/restrictions.

6.4 Autoflight

(a) relationship between AT, FD and AP;
(b) relationship between FMS and AT/FD/AP;
(c) redundancy requirements for autoland.

6.5 Flight envelope protection in autoflight

(a) types for protection available:
(i) high speed, low speed;
(ii) alpha floor;
(iii) flap/gear speed protection;
(b) functioning of typical system:
(i) inputs and outputs;
(c) modified functioning during flare and touchdown.
(d) alternate law, reversionary modes.

6.6 Associated autosystems

(a) yaw damper:
(i) purpose/function of yaw damper:
(A) typical low/high speed behaviour requiring installation of yaw damper;
(ii) method of functioning:
(A) input and output;
(iii) series and parallel types:
(A) advantages/disadvantages of each type;
(iv) typical yaw damper controls.

7. Automatic pitch trim

(a) purpose/function of auto-trim;
(b) input and output;
(c) typical auto-trim controls.

8. thrust computation

(a) purpose/function of thrust computation system;
(b) input and output;
(c) relationship to FMS.

9. Warning and recording equipment

9.1 Overspeed warning system

(a) components:
(i) inputs; and
(ii) outputs;
(b) may be selectable according to weight/CG/fuel distribution;
(c) typical selectors and warning indicators:
(i) aural warnings; and
(ii) visual warnings.

9.2 Stall warning

(a) purpose/function of system;

(b) components of a typical heavy aircraft system:

  (i) ADC inputs, including AOA;

  (ii) stick shaker and pusher;

  (iii) visual and aural warnings.

9.3 Take-off warning system (TWS)

(a) purpose/function of TWS;

(b) typical items monitored;

(c) aural/visual warnings.

SECTION 1.5 FLIGHT RULES AND AIR LAW (FR)

Unit 1.5.1 RFRC: RPL flight rules and air law – all aircraft categories

1. <u>Reserved</u>

2. <u>Elements</u>

2.1 Documentation

2.1.1 Explain the reason for recording flight time in a logbook and state what other information that must be recorded.

2.1.2 State the different documents that contain aviation legislation, aeronautical information and general operating rules.

2.1.3 Explain the purpose of the aircraft maintenance release and how it is used.

2.2 Licence privileges and limitations (RPL)

2.2.1 State the limitations of the RPL.

2.2.2 Describe the requirements for maintaining the privileges of the RPL.

2.2.3 State the medical standards and limitations for the holder of an RPL.

2.2.4 State the privileges of a licence holder with respect to the following:

(a) conducting daily inspections;

(b) signing a maintenance release;

(c) reporting defects.

2.3 Conditions of flight

2.3.1 Recall/apply the following rules/requirements:

(a) rules of the air;

(b) the requirements relating to the operation of aircraft on, and in the vicinity of, an aerodrome and the conditions relating to turns after take-off;

(c) separation minima between a/c for take-off and landing at a non-controlled aerodrome;

(d) rules relating to restrictions on smoking in aircraft during take-off, landing and refuelling;

(e) VFR and visual meteorology conditions (aeroplanes) for operations below 10,000 ft;

(f) altimetry procedures for flight below 10,000 ft.

2.3.2 State the rules relating to the following:

(a) the use of drugs and alcohol, and recall the minimum period between alcohol consumption and flight departure;

(b) temporary medical unfitness.

2.3.3 Recall the meaning of the following light signals directed at an aircraft:

(a) steady ‘green’ and steady ‘red’;

(b) ‘green’, ‘red’ and ‘white’ flashes.

2.3.4 Recall regulations relating to the minimum heights for flights over the following:

(a) populated areas;

(b) other areas.

2.3.5 State the limitations imposed on the following:

(a) acrobatic flight;

(b) flight over public gatherings.

2.3.6 Recall the requirements for landing prior to the end of daylight.

2.4 Air service operations

2.4.1 Extract from legislation references, the restrictions pertaining to the carriage of passengers on certain flights.

2.4.2 Apply the following regulations/rules/orders relating to the responsibilities of a pilot in command:

(a) before flight, requirements regarding the following:

(i) fuels and oils;

(ii) fuelling of aircraft;

(iii) starting and ground operation of engines;

(iv) appropriate passenger briefing;

(b) during flight, requirements and regulations regarding:

(i) the operation and safety of the aircraft and the authority of the pilot in command;

(ii) dropping of articles from an aircraft in flight.

2.4.3 Recall the legislation requirements that apply during the following phases of a flight:

(a) before flight:

(i) removal of locking devices;

(ii) security of doors, hatches;

(iii) tank caps;

(iv) testing of flight controls;

(v) removal of frost and ice;

(vi) instrument checks;

(vii) security of safety harness prior to solo flight in a dual control aircraft;

(viii) when and how a fuel system inspection is performed;

(ix) carriage of passengers in a control seat;

(x) carriage of infants and children;

(b) during flight:

(i) occupation of seats;

(ii) wearing of seat belts;

(iii) adjustment of seats;

(iv) manipulation of aircraft controls by pilots, and by unauthorised persons.

2.5 Aerodromes

2.5.1 With reference to a diagram of the aerodrome(s) used for training:

(a) identify movement areas; and

(b) explain the significance of the following markings:

(i) taxiway;

(ii) runway;

(iii) helipad.

2.5.2 With reference to a diagram, identify the following positions in a circuit:

(a) downwind leg;

(b) base leg;

(c) cross-wind leg;

(d) upwind leg;

(e) dead side of the circuit.

2.5.3 Explain the significance of a white cross on the movement area.

2.5.4 Identify and explain the purpose of the following aerodrome markings:

(a) runway markings;

(b) runway threshold markings;

(c) runway end markings;

(d) cone and gable markers;

(e) taxiway markings;

(f) holding points/bays;

(g) a double white cross adjacent to a primary wind indicator.

2.6 Airspace

2.6.1 Describe the difference between controlled airspace and non-controlled airspace.

2.6.2 State which documents are used to identify controlled airspace and explain if a prescribed airspace is active or inactive.

2.7 Emergencies and SAR

2.7.1 Describe what the intermittent use of navigation and landing lights by an aircraft are used to indicate.

2.7.2 State the difference between an incident and an accident.

2.7.3 Determine the reporting requirements following an incident or accident.

2.7.4 Explain the term SARTIME and how it might be used.

2.7.5 State the document that contains emergency procedures.

Unit 1.5.2 PFRC: PPL Flight rules and air law – All aircraft categories – *Reserved*

Unit 1.5.3 PFRA: PPL flight rules and air law – aeroplane

1. Reserved

2. Elements

2.1 Documentation

2.1.1 Describe the method of obtaining publications and know why it is important to update these documents.

2.1.2 Given an item of operational significance:

(a) select the appropriate reference document – CAR, CAO, AIP (Book), CAAP; and

(b) extract relevant and current information from these documents.

2.1.3 Decode information contained in ERSA, NOTAM and AIP supplements.

2.1.4 Understand the terms and abbreviations in AIP GEN that are relevant to flight in accordance with VFR.

2.2 Pilot licences, privileges and limitations (PPL)

2.2.1 For the PPL with aeroplane category rating, describe the following:

(a) privileges and limitations of the licence;

(b) recent experience requirements;

(c) classification of operations.

2.2.2 Apply the rules pertaining to flight and duty time limitations for PPL licence holders.

2.3 Flight rules and conditions of flight

2.3.1 Describe which documents must be carried on board an aircraft during flight in Australian airspace.

2.3.2 Apply the relevant rules that relate to the following:

(a) carriage and discharge of firearms;

(b) aerodromes where operations are not restricted to runways;

(c) the conditions relating to flight in PRD areas.

2.3.3 Give examples of situations which would require a ‘security’ prefix prior to a radio call.

2.4 Air service operations

2.4.1 Apply the relevant rules that relate to the following:

(a) a pilot’s responsibilities before flight;

(b) aerodrome meteorological minima;

(c) carriage of:

(i) cargo;

(ii) sick and handicapped persons;

(iii) parachutists;

(iv) flotation and survival equipment;

(v) animals and dangerous goods.

2.4.2 State the requirements to test radio equipment prior to taxi and maintain a listening watch.

2.5 Aerodromes

(a) identify and explain the purpose of the following aerodrome, LA and HLS markings:

(i) runway markings;

(ii) runway threshold markings;

(iii) runway end markings;

(iv) cone and gable markers;

(v) taxiway markings;
(vi) holding points/bays;
(vii) a double white cross adjacent to a primary wind indicator;
(viii) a horizontal white dumbbell;
(ix) movement areas;
(x) HLS markings.

2.5.2 Identify the following positions in a circuit:
(a) downwind leg;
(b) base leg;
(c) cross-wind leg;
(d) upwind leg;
(e) dead side of the circuit.

2.5.3 Explain the significance of a white cross on the movement area.

2.6 Airspace

2.6.1 Differentiate between the various classifications of airspace.

2.6.2 With respect to the following terms listed in (a) to (g), explain each term and, if applicable, identify airspace boundaries on appropriate charts, and extract vertical limits of designated airspace from charts or ERSA*:*
(a) flight information service FIR, FIA, OCTA;
(b) ATC service CTA, CTR;
(c) radio 'reports' and 'broadcasts';
(d) VFR route and lanes of entry;
(e) PRD areas;
(f) CTAF areas;
(g) controlled aerodromes.

2.6.3 Apply permitted tracking tolerances for VFR aircraft to avoid controlled airspace.

2.6.4 Know the requirements and procedures to be adopted when operating:
(a) in any class of airspace;
(b) from or into:
(i) any licensed aerodrome;
(ii) a CTAF(R).

2.6.5 Altimetry:
(a) recall the datum from which an altimeter indicates height when the following are set on the subscale:
(i) area QNH;
(ii) local QNH;
(iii) QFE;
(iv) standard pressure setting;
(b) recall the procedures that are carried out with the altimeter at the transition altitude and the transition layer on climb and descent;
(c) derive from AIP the transition layer for any given area QNH;
(d) recall the method of using an altimeter to derive Local QNH;
(e) calculate height error caused by setting the altimeter subscale incorrectly;
(f) recall the meaning of the following:
(i) height;
(ii) altitude;
(iii) flight level;

(g) recall the following parameters from the ICAO standard atmosphere:
   (i) MSL temperature;
   (ii) pressure lapse rate.

2.7 Emergencies, accidents, incidents

2.7.1 Extract emergency procedures from the ERSA.

2.7.2 State the conditions under which a pilot may declare a mercy flight and select occasions when a mercy flight must not be undertaken.

2.7.3 Extract from AIP the responsibilities of a pilot regarding the notification of accidents and incidents.

2.7.4 ***Reserved***

2.7.5 Describe examples of 'hazards to navigation' that must be reported by pilots.

2.8 Security

2.8.1 Explain the term ADIZ and extract:
(a) the general requirements for operations in this zone; and
(b) the action by the pilot of the intercepted aircraft.

2.8.2 State the powers vested in a pilot in command.

2.9 Emergencies and SAR

2.9.1 Describe what the intermittent use of navigation and landing lights by an aircraft are used to indicate.

2.9.2 State the difference between an incident and an accident.

2.9.3 Determine the reporting requirements following an incident or accident.

2.9.4 Explain the term SARTIME and how it might be used.

2.9.5 State the document that contains emergency procedures.

Unit 1.5.4 PFRH: PPL Flight rules and air law – Helicopter

1. Reserved

2. Elements

2.1 Documentation

2.1.1 Explain the reason for recording flight time in a logbook and state what other information that must be recorded.

2.1.2 Given an item of operational significance:

(a) select the appropriate reference document – CAR, CAO, AIP (Book), CAAP; and

(b) extract relevant and current information from these documents.

2.1.3 Decode information contained in ERSA, NOTAM and AIP supplements.

2.1.4 Understand the terms and abbreviations in AIP GEN that are relevant to flight in accordance with VFR.

2.2 Pilot licences, privileges and limitations (PPL)

2.2.1 For the PPL with helicopter category rating, describe the following:

(a) privileges and limitations of the licence;

(b) recent experience requirements.

2.2.2 Apply the rules pertaining to flight and duty time limitations for PPL licence holders.

2.3 Flight rules and conditions of flight

2.3.1 Describe which documents must be carried on board an aircraft during flight in Australian airspace.

2.3.2 Apply the relevant rules that relate to the following:

(a) carriage and discharge of firearms;

(b) aerodromes where operations are not restricted to runways;

(c) the conditions relating to flight in PRD areas.

2.3.3 *Reserved*

2.3.4 Describe the following:

(a) rules of the air that apply to helicopter operations;

(b) the requirements relating to the operation of aircraft on, and in the vicinity of, an aerodrome and the conditions relating to turns after take-off and their application to helicopters;

(c) separation minima between aircraft for take-off and landing at a controlled aerodromes;

(d) visual meteorology conditions for operations below 10,000 ft and below 700 ft in relation to helicopter operations;

(e) restrictions on smoking in aircraft during take-off, landing and refuelling;

(f) altimetry procedures for flight below 10,000 ft.

2.3.5 Apply the rules relating to the following:

(a) the use of drugs and alcohol and recall the minimum period between alcohol consumption and flight departure;

(b) temporary medical unfitness.

2.3.6 Recall the requirements relating to the minimum heights for flights over the following:

(a) populated areas;

(b) other areas.

2.3.7 Recall the meaning of the following light signals directed at an aircraft:

(a) steady ‘green’ and steady ‘red’;

(b) ‘green’, ‘red’, and ‘white’ flashes.

2.3.8 Apply the limitations imposed on the following:

(a) acrobatic flight;

(b) flights over public gatherings.

2.3.9 Recall the requirement to plan to and prior to the end of daylight.

2.4 Air service operations

2.4.1 Apply the relevant rules that relate to the following:

(a) a pilot’s responsibilities before flight;

(b) aerodrome meteorological minima;

(c) flights over water;

(d) carriage of:

(i) cargo;

(ii) sick and handicapped persons;

(iii) parachutists;

(iv) dangerous goods;

(v) animals;

(vi) flotation and survival equipment.

2.4.2 State the requirements to test radio equipment prior to taxi and maintain a listening watch.

2.4.3 Extract the restrictions pertaining to the carriage of passengers on certain flights.

2.4.4 Apply the following rules relating to the responsibility of a pilot in command:

(a) before flight:

(i) requirements of the following:

(A) fuel and oil;

(B) fuelling aircraft;

(C) starting and ground operations of engines;

(ii) appropriate passenger briefing;

(b) during flight, requirements regarding the operation and safety of the aircraft and the authority of the pilot in command.

2.4.5 Recall the following requirements:

(a) before flight:

(i) the conditions regarding the following:

(A) removal of locking devices;

(B) security doors, hatches, tank caps;

(C) testing of flight controls;

(D) removal of frost and ice;

(E) instrument checks;

(ii) fuel system inspections, including when inspections are required and how they are performed;

(iii) carriage of passengers in a control seat;

(iv) carriage of infants and children;

(b) during flight:

(i) seat occupation and seat belt requirements:

(A) occupation of seats;

(B) wearing of seat belts;

(C) adjustment of seat belts;

(ii) manipulation of aircraft controls:

(A) by pilots;

(B) not permitted by unauthorised persons.

2.4.6 Recall the precautions pertaining to the security of safety harnesses and other equipment prior to solo flight in dual control aircraft.

2.5 Aerodromes

2.5.1 State a pilot's responsibilities with regard to the use of aerodromes.

2.6 Airspace

2.6.1 Differentiate between the various classifications of airspace.

2.6.2 With respect to the following terms listed in (a) to (g), explain each term and, if applicable, identify airspace boundaries on appropriate charts, and extract vertical limits of designated airspace from charts or ERSA*:*

(a) flight information service FIR, FIA, OCTA;

(b) ATC service CTA, CTR,;

(c) radio 'reports' and 'broadcasts';

(d) VFR route and lanes of entry;

(e) PRD areas;

(f) CTAF areas;

(g) controlled aerodromes.

2.6.3 Apply permitted tracking tolerances for VFR aircraft to avoid controlled airspace.

2.6.4 Reserved

2.6.5 Altimetry:

(a) recall the datum from which an altimeter indicates height when the following are set on the subscale:

(i) area QNH;

(ii) local QNH;

(iii) QFE;

(iv) standard pressure setting;

(b) recall the procedures that are carried out with the altimeter at the transition altitude and the transition layer on climb and descent;

(c) derive from AIP the transition layer for any given area QNH;

(d) recall the method of using an altimeter to derive Local QNH;

(e) calculate height error caused by setting the altimeter subscale incorrectly;

(f) recall the meaning of the following:

(i) height;

(ii) altitude;

(iii) flight level;

(g) recall the following parameters from the ICAO standard atmosphere:

(i) MSL temperature;

(ii) pressure lapse rate.

2.7 Emergencies, accidents, incidents

2.7.1 State the conditions under which a pilot may declare a mercy flight and select occasions when a mercy flight must not be undertaken.

2.7.2 Extract from AIP the responsibilities of a pilot regarding the notification of accidents and incidents.

2.7.3 Reserved

2.7.4 Describe examples of 'hazards to navigation' that must be reported by pilots.

2.8 Security

2.8.1 Explain the term ADIZ and extract:

(a) the general requirements for operations in this zone; and

(b) the action by the pilot of the intercepted aircraft.

2.8.2 State the powers vested in a pilot in command.

2.9 Emergencies and SAR

2.9.1 Describe what the intermittent use of navigation and landing lights by an aircraft are used to indicate.

2.9.2 State the difference between an incident and an accident.

2.9.3 Determine the reporting requirements following an incident or accident.

2.9.4 Explain the term SARTIME and how it might be used.

Unit 1.5.5 PFRG: PPL flight rules and air law – gyroplane – *Reserved*

Unit 1.5.6 PFRP: PPL flight rules and air law – powered-lift – *Reserved*

Unit 1.5.7 PFRS: PPL flight rules and air law – airship – *Reserved*

Unit 1.5.8 CFRC: CPL flight rules and air law – all aircraft categories

1. Reserved

2. Elements

2.1 Documentation

2.1.1 Explain the reason for recording flight time in a logbook and state what other information that must be recorded.

2.1.2 Describe the method of obtaining publications and know why it is important to update these documents.

2.1.3 Given an item of operational significance:

(a) select the appropriate reference document – CASR, CAR, CAO, AIP (Book), CAAP; and

(b) extract relevant and current information from these documents.

2.1.4 Decode information contained in ERSA, NOTAM and AIP supplements.

2.1.5 Understand the terms and abbreviations in AIP GEN that are relevant to flight in accordance with VFR.

2.2 Pilot licences, privileges and limitations (CPL)

2.2.1 For the CPL, describe the following:

(a) privileges and limitations of the licence;

(b) recent experience requirements.

2.2.2 Apply the rules pertaining to flight and duty time limitations for CPL licence holders.

2.3 Flight rules and conditions of flight

2.3.1 Describe which documents must be carried on board an aircraft during flight in Australian airspace.

2.3.2 Apply the relevant rules that relate to the following:

(a) carriage and discharge of firearms;

(b) aerodromes where operations are not restricted to runways;

(c) the conditions relating to flight in PRD areas.

2.3.3 Describe the following:

(a) rules of the air;

(b) the requirements relating to the operation of aircraft on, and in the vicinity of, an aerodrome and the conditions relating to turns after take-off;

(c) separation minima between aircraft for take-off and landing at a controlled aerodromes;

(d) visual meteorology conditions for operations below 10,000 ft and below 700 ft;

(e) restrictions on smoking in aircraft during take-off, landing and refuelling;

(f) altimetry procedures for flight below 10,000 ft.

2.3.4 Apply the rules relating to the following:

(a) the use of drugs and alcohol and recall the minimum period between alcohol consumption and flight departure;

(b) temporary medical unfitness.

2.3.5 Recall the requirements relating to the minimum heights for flights over the following:

(a) populated areas;

(b) other areas.

2.3.6 Recall the meaning of the following light signals directed at an aircraft:

(a) steady ‘green’ and steady ‘red’;

(b) ‘green’, ‘red’, and ‘white’ flashes.

2.3.7 Apply the limitations imposed on the following:

(a) aerobaitc flight;

(b) flights over public gatherings.

2.3.8 Recall the requirement to plan to and prior to the end of daylight.

2.4 Air service operations

2.4.1 Apply the relevant rules that relate to the following:

(a) a pilot's responsibilities before flight;

(b) aerodrome meteorological minima;

(c) flights over water;

(d) carriage of:

(i) cargo;

(ii) sick and handicapped persons;

(iii) parachutists;

(iv) dangerous goods;

(v) animals;

(vi) flotation and survival equipment.

2.4.2 State the requirements to test radio equipment prior to taxi and maintain a listening watch.

2.4.3 Extract the restrictions pertaining to the carriage of passengers on certain flights.

2.4.4 Apply the following rules relating to the responsibility of a pilot in command:

(a) before flight:

(i) requirements of the following:

(A) fuel and oil;

(B) fuelling aircraft;

(C) starting and ground operations of engines;

(ii) appropriate passenger briefing;

(b) during flight, requirements regarding the operation and safety of the aircraft and the authority of the pilot in command.

2.4.5 Recall the following requirements:

(a) before flight:

(i) the conditions regarding the following:

(A) removal of locking devices;

(B) security doors, hatches, tank caps;

(C) testing of flight controls;

(D) removal of frost and ice;

(E) instrument checks;

(ii) fuel system inspections, including when inspections are required and how they are performed;

(iii) carriage of passengers in a control seat;

(iv) carriage of infants and children;

(b) during flight:

(i) seat occupation and seat belt requirements:

(A) occupation of seats;

(B) wearing of seat belts;

(C) adjustment of seat belts;

(ii) manipulation of aircraft controls:

(A) by pilots;

(B) not permitted by unauthorised persons.

2.4.6 Recall the precautions pertaining to the security of safety harnesses and other equipment prior to solo flight in dual control aircraft.

2.5 Aerodromes

2.5.1 State a pilot's responsibilities with regard to the use of aerodromes.

2.6 Airspace

2.6.1 Differentiate between the various classifications of airspace.

2.6.2 With respect to the following terms listed in (a) to (g), explain each term and, if applicable, identify airspace boundaries on appropriate charts, and extract vertical limits of designated airspace from charts or ERSA:

(a) flight information service FIR, FIA, OCTA;

(b) ATC service CTA, CTR, controlled airspace;

(c) radio 'reports' and 'broadcasts';

(d) VFR route and lanes of entry;

(e) PRD areas;

(f) CTAF areas;

(g) controlled aerodromes.

2.6.3 Apply permitted tracking tolerances for VFR aircraft to avoid controlled airspace.

2.6.4 Describe the requirements for obtaining clearances, making reports and broadcasts, and describe the procedures for requesting clearances, making reports and broadcasts, and the pilot actions to be taken on receiving an instruction from ATC to be adopted when operating in the following:

(a) in any class of airspace;

(b) from or into:

(i) a certified or registered aerodrome;

(ii) an uncertified aerodrome.

2.7 Altimetry

2.7.1 Recall the datum from which an altimeter indicates height when the following are set on the subscale:

(a) area QNH;

(b) local QNH;

(c) QFE;

(d) standard pressure setting.

2.7.2 Recall the procedures that are carried out with the altimeter at the transition altitude and the transition layer on climb and descent.

2.7.3 Derive from AIP the transition layer for any given area QNH.

2.7.4 Recall the method of using an altimeter to derive Local QNH.

2.7.5 Calculate height error caused by setting the altimeter subscale incorrectly.

2.7.6 Recall the meaning of the following:

(a) height;

(b) altitude;

(c) flight level.

2.7.7 Recall the following parameters from the ICAO standard atmosphere:

(a) MSL temperature;

(b) pressure lapse rate.

2.8 Emergencies, accidents, incidents

2.8.1 State the conditions under which a pilot may declare a mercy flight and select occasions when a mercy flight must not be undertaken.

2.8.2 Extract from AIP the responsibilities of a pilot regarding the notification of accidents and incidents.

2.8.3 Describe examples of 'hazards to navigation' that must be reported by pilots.

2.9 Security

2.9.1 Explain the term ADIZ and extract:

(a) the general requirements for operations in this zone; and

(b) the action by the pilot of the intercepted aircraft.

2.9.2 State the powers vested in a pilot in command.

2.10 Airworthiness and equipment

2.10.1 State the purpose of certificates of airworthiness and registration.

2.10.2 Given a typical scenario, extract from regulations, orders and instructions the communication and normal and emergency equipment required to be on board an aircraft.

2.10.3 State the responsibilities of a pilot in command with regard to:

(a) daily inspections; and

(b) recording and reporting aircraft defects.

2.10.4 Describe the types of maintenance that may be carried out by the holder of a CPL.

2.10.5 Given a copy of a maintenance release:

(a) determine its validity; and

(b) describe the types of operations authorised in the aircraft; and

(c) list outstanding defects/endorsements and decide whether these affect the airworthiness of the aircraft.

Unit 1.5.9 CFRA: CPL flight rules and air law – aeroplane

1. Reserved

2. Elements

2.1 Flight crew licensing

2.1.1 Describe the requirements for holding flight crew licences, ratings and endorsements that apply to aeroplane operations.

2.1.2 Describe the obligations aeroplane pilots must comply with in relation to general competency, flight reviews and proficiency checks.

2.2 Air operations

2.2.1 Describe circuit procedures for aeroplane operations.

2.2.2 Describe the requirements for operating in Class C and D airspace and special VFR clearance provisions.

2.2.3 State the minimum flight instruments required to operate an aeroplane under VFR.

2.2.4 State the rules for placarding unserviceable instruments.

Unit 1.5.10 CFRH: CPL flight rules and air law – helicopter

1. Reserved

2. Elements

2.1 Flight crew licensing

2.1.1 Describe the requirements for holding flight crew licences, ratings and endorsements that apply to helicopter operations.

2.1.2 Describe the obligations helicopter pilots must comply with in relation to general competency, flight reviews and proficiency checks.

2.2 Air operations

2.2.1 Describe circuit procedures for helicopter operations.

2.2.2 Describe the requirements for operating in Class C and D airspace and special VFR clearance provisions.

2.2.3 State the minimum flight instruments required to operate a helicopter under VFR.

2.2.4 Describe the minimum VMC requirements for operating in Class G airspace.

2.2.5 State the conditions under which hot refuelling may be conducted.

2.2.6 State the floatation system requirements for helicopters.

2.2.7 State the rules for placarding unserviceable instruments.

2.3 Helicopter landing sites (HLS)

2.3.1 Describe the requirements for operating to and from HLS.

Unit 1.5.11 CFRG: CPL flight rules and air law – gyroplane – *Reserved*

Unit 1.5.12 CFRP: CPL flight rules and air law – powered-lift – *Reserved*

Unit 1.5.13 CFRS: CPL flight rules and air law – airship – *Reserved*

Unit 1.5.14 AFRC: ATPL flight rules and air law – all aircraft categories

1. Reserved

2. Flight rules

2.1 Documentation

2.1.1 Airworthiness and equipment.

2.1.2 State the purpose of certificates of airworthiness and registration.

2.1.3 Given a typical scenario, extract from CASA regulations/orders/instructions the communication and normal and emergency equipment required to be on board an aircraft. State the responsibilities of a pilot in command with regard to:

(a) daily inspections; and

(b) recording/reporting aircraft defects.

2.1.4 As applicable, determine the types of maintenance that may be carried out by licence holder.

2.1.5 Given a copy of a maintenance release:

(a) determine its validity; and

(b) list the class(es) of operation applicable to the aircraft; and

(c) list outstanding defects/endorsements and decide whether these affect the airworthiness of the aircraft.

2.2 Aircraft nationality and registration

2.2.1 ICAO provisions (Annex).

2.2.2 General applicability – brief reference only.

2.2.3 Australian national legislation:

(a) requirement to register aircraft;

(b) registration of aircraft in Australia;

(c) transfer of interest and cancellation of registration.

2.3 Airworthiness of aircraft

2.3.1 ICAO Provisions (Annex 8):

(a) general applicability – brief reference only.

2.3.2 Australian national legislation:

(a) requirements for Certificates of Airworthiness;

(b) conditions relating to Certificates of Airworthiness;

(c) suspension or cancellation of Certificates of Airworthiness;

(d) permissible unserviceability:

(i) use of PUS;

(ii) MEL as an alternative to PUS;

(iii) use of an MEL;

(e) requirements for maintenance;

(f) pilot's responsibilities with respect to maintenance within Australia;

(g) pilot's responsibilities with respect to maintenance outside Australia;

(h) maintenance release requirements;

(i) suspension, cancellation of a maintenance release;

(j) cessation or recommencement of a maintenance release;

(k) pilot's responsibilities with respect to defects or damage;

(l) compliance and certification of Airworthiness Directives;

(m) classes of controlled airspace.

2.4 Personnel licensing

2.4.1 ICAO Provisions (Annex 1):

(a) general applicability.

2.4.2 Australian national legislation:

(a) general provisions:

(i) licences;

(ii) ratings;

(b) ATPL:

(i) privileges;

(ii) limitations;

(iii) recency requirements;

(c) classification of operations;

(d) multi-crew aircraft:

(i) composition of crew;

(ii) flight and duty time limitations.

2.5 Rules of the air

2.5.1 ICAO Annex 2:

(a) general applicability.

2.5.2 Australian national legislation.

2.5.3 Rules of the Air Review (CAR Part XII).

2.5.4 Conditions of flight (CAR PART XI):

(a) flight manuals;

(b) documents required for flight;

(c) carriage and discharge of firearms;

(d) drunkenness and violence on board an aircraft;

(e) dropping of articles;

(f) flight over public gatherings;

(g) low flying.

2.6 Procedures for air navigation

2.6.1 ICAO Doc 8168 – OPS/611:

(a) general provisions – brief reference only.

2.6.2 Australian national legislation Review AIP (DAP):

(a) general requirements;

(b) alternate planning requirements.

2.7 Air traffic services

2.7.1 ICAO Annex II and Doc 4444:

(a) general provisions – brief reference only.

2.7.2 Australian national legislation.

2.7.3 General provisions:

(a) objectives of ATS;

(b) division of ATS;

(c) designation of the portions of the airspace and controlled aerodromes where ATS will be provided;

(d) establishment and designation of the units providing ATS;

(e) specifications:
  (i) flight information regions;
  (ii) control areas;
  (iii) control zones;
(f) minimum flight attitudes;
(g) priority for aircraft in emergency;
(h) inflight contingencies in ATS.

2.7.4 ATC service:
(a) function and purpose of ATC;
(b) provision of ATC service;
(c) operation of ATC service;
(d) separation minima;
(e) contents of clearances;
(f) coordination of clearances;
(g) control of persons and vehicles at aerodromes.

2.7.5 Flight information service:
(a) application and scope of flight information service:
  (i) VFR traffic;
(b) operational flight information service broadcasts.

2.7.6 Alerting service:
(a) function/purpose;
(b) phases of alert: INCERFA, ALERFA, DISTRESFA;
(c) notification of rescue coordination centre;
(d) information to aircraft in a state of emergency.

2.7.7 Principles governing the identification of ATS routes other than standard departure and arrival routes.

2.8 Rules of the air and air traffic services

2.8.1 ICAO Doc 444 and RAC501/11:
(a) general provisions – brief reference only.

2.8.2 Australian national legislation.

2.8.3 General provisions:
(a) general air traffic services operating practices:
  (i) submission of a flight plan;
  (ii) flight clearances and information;
  (iii) control of air traffic flow;
  (iv) altimeter setting procedures;
  (v) position reporting requirements;
  (vi) requirements and format for AIREP.

2.8.4 Area control service:
(a) vertical separation:
  (i) requirements;
  (ii) vertical separation minima;
  (iii) minimum cruising level;
  (iv) assignment of cruising level;
  (v) vertical separation during climb or descent;

(b) horizontal separation (subsonic aircraft only):
  (i) requirements;
  (ii) geographical separation;
  (iii) track separation for aircraft using the same navaid;
  (iv) longitudinal separation;
(c) reduction in separation minima;
(d) ATC clearances:
  (i) requirement for clearance;
  (ii) function of clearance;
  (iii) contents of clearance;
  (iv) maintaining own separation while in VMC;
  (v) essential traffic information while in VMC;
  (vi) essential traffic information;
  (vii) clearance of a requested change in flight plan;
(e) emergency:
  (i) general, priority, emergency descent only (action by pilot in command only);
(f) communication failure:
  (i) air-ground communication failure (actions by pilot in command only);
(g) interception of civil aircraft.

2.8.5 Approach control service
(a) departing aircraft:
  (i) general procedures for departing aircraft;
  (ii) information for departing aircraft;
  (iii) clearances to climb maintaining own separation while in VMC;
  (iv) wake turbulence separation;
(b) arriving aircraft:
  (i) general procedures for arriving aircraft;
  (ii) clearance to descend maintaining own separation while in VMC;
  (iii) visual approach;
  (iv) instrument approach;
  (v) holding;
  (vi) approach sequence;
  (vii) expected approach;
  (viii) time information for arriving aircraft.

2.8.6 Aerodrome control service:
(a) functions of aerodrome control towers:
  (i) general functions;
  (ii) alerting service;
  (iii) suspension of VFR operations;
(b) control of traffic:
  (i) traffic circuit(s);
  (ii) start-up;
  (iii) taxiing traffic;
  (iv) vehicular traffic;
  (v) coordination of take-off and landings;
  (vi) order of priority for arriving and departing aircraft;
  (vii) control of departing and arriving aircraft;

(c) information provided to aircraft:
  (i) operation of the aircraft;
  (ii) aerodrome conditions.

2.8.7 Flight Information service and alerting service
(a) air traffic advisory service;
(b) alerting service.

2.8.8 Use of radar in air traffic services:
(a) limitations in the use of radar;
(b) functions of radar service:
  (i) identification procedure (establishment of radar identity only);
  (ii) position information;
  (iii) radar vectoring;
  (iv) speed control;
(c) use of radar in the ATC service;
(d) descent below MSA under radar control.

2.9 Aeronautical information service

2.9.1 ICAO Annex 15:
(a) general provisions – brief reference only.

2.9.2 Australian documentation:
(a) availability and procurement of AIP, NOTAM, AIC.

2.10 Aerodromes

2.10.1 ICAO Annex 14:
(a) general provisions – brief reference only.

2.10.2 Australian national legislation:
(a) AIP AD requirements:
  (i) aerodrome markers and markings;
  (ii) aerodrome lighting;
  (iii) visual aids;
  (iv) domestic aerodrome directory (ERSA);
  (v) pavement strength limitations.

2.11 Facilitation

2.11.1 ICAO Annex 9:
(a) general provisions – brief reference only.

2.11.2 Australian national legislation.

2.11.3 AIP GEN requirements:
(a) responsibility of DIT;
(b) differences to international standards and practices: 9 Annex 9;
(c) entry and departure of international aircraft:
  (i) documents required;
  (ii) description, purpose and use;
(d) entry and departure of persons and baggage:
  (i) normal requirements;
  (ii) procedures for flight crew and similar personnel;
(e) identification of designated international airports.

2.12 Search and Rescue

2.12.1 ICAO Annex 12:

(a) general provisions – brief reference only.

2.12.2 Australian national legislation

(a) SAR organisation:

(i) establishment of SAR regions;

(ii) establishment and designation of SAR services units;

(b) operating procedures:

(i) SAR phases;

(ii) distress and urgency signals;

(iii) use of SSR transponder;

(iv) procedures for pilots in command at the scene of an accident;

(v) procedures for pilots in command intercepting;

(vi) distress transmissions;

(vii) participation in searches.

2.13 Security

2.13.1 ICAO Annex 17:

(a) general provisions – brief reference only.

2.13.2 Air Defence identification zones (ADIZ):

(a) Pilot's responsibilities for flight within the zone;

(b) exemptions;

(c) non-compliance;

(d) action in the event of interception;

(e) interpretation of visual signals;

(f) powers of pilot in command.

2.14 Aircraft accidents and incidents

2.14.1 Terminology:

(a) definition of accident;

(b) definition of incident.

2.14.2 Responsibilities of pilot in command regarding notification.

2.15 Air service operations

(a) route qualifications;

(b) admission to crew compartment;

(c) carriage of approved persons:

(i) in crew compartment;

(ii) in cabin;

(d) operational procedures in relation to computers;

(e) fuel quantity measurement: (requirements for aircraft above 5,700 kg);

(f) hand signals;

(g) oxygen and protective breathing equipment;

(h) engine failure in multi-engine aircraft;

(i) carriage and use of radio;

(j) precautions in refuelling, engine and radar ground operations;

(k) emergency equipment;

(l) loading general;

(m) carriage of cargo;

(n) carriage of persons;

(o) aircraft equipment:

  (i) basic operational requirements;

(p) dangerous goods handling.

Unit 1.5.15 AFRA: ATPL flight rules and air law – aeroplane

1. Reserved

2. Flight rules

2.1 Air traffic services

2.1.1 Flight information service:

(a) application and scope of flight information service:

(i) IFR traffic.

3. Procedures for air navigation

3.1 Australian national legislation

3.1.1 Review AIP (DAP):

(a) approach procedures:

(i) altimeter checks;

(b) entry and holding procedures;

(c) instrument landing system:

(i) failures;

(d) meteorological minima:

(i) take-off;

(ii) landing;

(iii) alternate;

(e) category 1 and 2 minima;

(f) SIDs, STARs and NAPs;

(g) DME and GNSSGNSS arrival procedures;

(h) GNSSGNSS as a route navigation and approach aid;

(i) RNP and PBN:

(i) aircraft requirements;

(ii) application.

4. Rules of the air and air traffic services

4.1 Australian national legislation

4.1.1 General provisions:

(a) general air traffic services operating practices:

(i) change from IFR to VFR.

5. Air service operations

(a) fuel jettison:

(i) legislation;

(b) ferry flights with 1 engine inoperative.

Unit 1.5.16 AFRH: ATPL flight rules and air law – helicopter

1. Reserved

2. Flight rules

2.1 AERODROMES

2.1.1 ICAO Annex 14:

(a) helicopter landing sites and off shore HLS.

Unit 1.5.17 AFRP: ATPL Flight rules and air law – powered-lift – *Reserved*

Unit 1.5.18 FFRC: FE flight rules and air law – all aircraft categories

1. Reserved

2. Flight rules

2.1 Documentation

2.1.1 Airworthiness and equipment.

2.1.2 State the purpose of certificates of airworthiness and registration.

2.1.3 Given a typical scenario, extract from CASA regulations/orders/instructions the communication and normal and emergency equipment required to be on board an aircraft. State the responsibilities of a pilot in command with regard to:

(a) daily inspections; and

(b) recording/reporting aircraft defects.

2.1.4 As applicable, determine the types of maintenance that may be carried out by licence holder.

2.1.5 Given a copy of a maintenance release:

(a) determine its validity; and

(b) list the class(es) of operation applicable to the aircraft; and

(c) list outstanding defects/endorsements and decide whether these affect the airworthiness of the aircraft.

2.2 Aircraft nationality and registration

2.2.1 ICAO provisions (Annex).

2.2.2 General applicability – brief reference only.

2.2.3 Australian national legislation:

(a) requirement to register aircraft;

(b) registration of aircraft in Australia;

(c) transfer of interest and cancellation of registration.

2.3 Airworthiness of aircraft

2.3.1 ICAO Provisions (Annex 8):

(a) General applicability – brief reference only.

2.3.2 Australian national legislation:

(a) requirements for Certificates of Airworthiness;

(b) conditions relating to Certificates of Airworthiness;

(c) suspension or cancellation of Certificates of Airworthiness;

(d) permissible unserviceability:

(i) use of PUS;

(ii) MEL as an alternative to PUS;

(iii) use of an MEL;

(e) requirements for maintenance;

(f) flight engineer’s responsibilities with respect to maintenance within Australia;

(g) flight engineer’s responsibilities with respect to maintenance outside Australia;

(h) maintenance release requirements;

(i) suspension, cancellation of a maintenance release;

(j) cessation or re-commencement of a maintenance release;

(k) flight engineer’s responsibilities with respect to defects or damage;

(l) compliance and certification of Airworthiness Directives;

2.4 Personnel licensing

2.4.1 ICAO provisions (Annex 1):

(a) general applicability.

2.4.2 Australian national legislation:

(a) general provisions:

(i) licences;

(ii) ratings;

(b) flight engineer licence:

(i) privileges;

(ii) limitations;

(iii) recency requirements;

(c) multi-crew aircraft:

(i) composition of crew;

(ii) flight and duty time limitations.

2.5 Rules of the air

2.5.1 ICAO Annex 2:

(a) general applicability.

2.5.2 Australian national legislation.

2.5.3 Rules of the air review (CAR Part XI).

2.5.4 Conditions of flight (CAR PART X):

(a) flight manuals;

(b) documents required for flight;

(c) drunkenness and violence on board an aircraft;

2.6 Procedures for air navigation

2.6.1 ICAO Doc 8168 – OPS/611:

(a) general provisions – brief reference only.

2.7 Air traffic services

2.7.1 ICAO Annex I I and Doc 4444:

(a) general provisions – brief reference only.

2.7.2 Australian national legislation.

2.7.3 General provisions

(a) objectives of ATS;

(b) specifications:

(i) flight information regions;

(ii) control areas;

(iii) control zones;

(c) priority for aircraft in emergency;

(d) inflight contingencies in ATS.

2.7.4 ATC service:

(a) function and purpose of ATC.

2.7.5 Flight information service:

(a) application and scope of flight information service:

(i) VFR traffic;

(b) operational flight information service broadcasts.

2.7.6 Alerting service:

(a) function/purpose;

(b) phases of alert: INCERFA, ALERFA, DISTRESFA;

(c) notification of rescue coordination centre;

(d) information to aircraft in a state of emergency.

2.7.7 Flight information service and alerting service

(a) air traffic advisory service;

(b) alerting service.

2.7.8 Use of radar in air traffic services

(a) limitations in the use of radar;

(b) functions of radar service:

(i) identification procedure (establishment of radar identity only);

(ii) position information;

(iii) radar vectoring;

(iv) speed control;

(c) use of radar in the ATC service;

(d) descent below MSA under radar control.

2.8 Aeronautical information service

2.8.1 ICAO Annex 15:

(a) general provisions – brief reference only.

2.8.2 Australian documentation:

(a) availability and procurement of AIP, NOTAM, AIC.

2.9 Aerodromes

2.9.1 ICAO Annex 14:

(a) general provisions – brief reference only.

2.9.2 Australian national legislation:

(a) AIP AD requirements:

(i) aerodrome markers and markings;

(ii) aerodrome lighting;

(iii) visual aids;

(iv) domestic aerodrome directory (ERSA);

(v) pavement strength limitations.

2.10 Facilitation

2.10.1 ICAO Annex 9:

(a) general provisions – brief reference only.

2.10.2 Australian national legislation.

2.10.3 AIP GEN requirements:

(a) responsibility of DIT;

(b) differences to international standards and practices: 9 Annex 9;

(c) entry and departure of international aircraft:

(i) documents required;

(ii) description, purpose and use;

(d) entry and departure of persons and baggage:

(i) normal requirements;

(ii) procedures for flight crew and similar personnel;

(e) identification of designated international airports.

2.11 Search and rescue

2.11.1 ICAO Annex 12:

(a) general provisions – brief reference only.

2.11.2 Australian national legislation:

(a) SAR organisation;

(b) operating procedures:

(i) SAR phases;

(ii) distress and urgency signals;

(iii) use of SSR transponder;

(iv) distress transmissions;

(v) participation in searches.

2.12 Security

2.12.1 ICAO Annex 17:

(a) general provisions – brief reference only.

2.12.2 Air Defence identification zones (ADIZ)

(a) action in the event of interception;

(b) interpretation of visual signals.

2.13 Aircraft accidents and incidents

2.13.1 Terminology:

(a) definition of accident;

(b) definition of incident.

2.14 Air service operations

(a) admission to crew compartment;

(b) carriage of approved persons:

(i) in crew compartment;

(ii) in cabin;

(c) operational procedures in relation to computers;

(d) fuel quantity measurement (requirements for aircraft above 5,700 kg);

(e) hand signals;

(f) oxygen and protective breathing equipment;

(g) engine failure in multi-engine aircraft;

(h) carriage and use of radio;

(i) precautions in refuelling, engine and radar ground operations;

(j) emergency equipment;

(k) aircraft equipment:

(i) basic operational requirements.

SECTION 1.6 HUMAN FACTORS PRINCIPES (HF)

Unit 1.6.1 PHFC: PPL human factors – all categories

1. Reserved

2. Fitness for flight

2.1 Basic health

2.1.1 Relate the effect on pilot performance of the following factors:

(a) diet, exercise;

(b) coronary risk factors – smoking, cholesterol, obesity, hereditary factors;

(c) upper respiratory tract infection, for example, colds, hay fever, congestion of air passages and sinuses;

(d) food poisoning and other digestive problems;

(e) headaches and migraines;

(f) pregnancy:

(i) when to stop flying;

(ii) impact on cockpit ergonomics;

(g) injuries;

(h) ageing;

(i) alcohol and smoking;

(j) blood donations;

(k) dehydration;

(l) emotional:

(i) anxiety;

(ii) depression;

(iii) fears.

2.1.2 Recall pilot obligations for a medical clearance from a DME when on any medication.

2.1.3 Enumerate the responsibilities of pilots with regard to being medically fit for flight.

2.2 Health and fitness

2.2.1 Medical standards

(a) state the reasons for and frequency of physical examinations and how to locate DAMEs;

(b) describe the process of obtaining a medical examination;

(c) state the role of the CASA with regard to medical fitness and that only those conditions which present a flight safety hazard are disqualifying.

2.2.2 Alcohol:

(a) recall how alcohol is absorbed and excreted;

(b) outline what a ‘hangover’ is;

(c) explain the effect a ‘hangover’ may have on flying performance;

(d) explain the relationship between a ‘hangover’ and level of blood alcohol in a person;

(e) recall the relationship between the level of blood alcohol and the recovery period from a ‘hangover’;

(f) state the factors that affect the elimination of alcohol from the body and describe the effects of illicit drugs and alcohol on judgment, comprehension, attention to detail the senses, coordination and reaction times;

(g) describe the symptoms of dehydration;

(h) list fluids suitable for rehydration, and explain why.

2.2.3 Drugs:

(a) describe why drug abuse is a behavioural problem and is independent of:

(i) dependence (addiction);

(ii) frequent use;

(b) define illicit or non-illicit psychoactive substances;

(c) state the adverse effects of illicit or non-illicit psychoactive substances;

(d) recall the effects and duration of such effects on human performance related to perception, speed of processing information, and reaction time of such drugs as:

(i) cannabis-based substances, for example, marijuana, ganja;

(ii) amphetamine-based substances, for example, ecstasy;

(iii) opium-based substances, for example, codeine, heroin;

(e) state the undesirable effects of over-the-counter and prescription drugs. In particular, the side effects of:

(i) aspirin, antihistamines, nasal decongestants;

(ii) amphetamines, tranquillisers, sedatives, antibiotics.

2.2.4 Blood donations:

(a) state the effect on flying after giving a blood donation;

(b) state the recommended period between giving blood and the next flight and how this period can vary between individuals.

2.3 Hyperventilation

2.3.1 Recognise and state how to combat hyperventilation.

2.3.2 Define hyperventilation and recall its causes.

2.4 Atmospheric pressure changes

2.4.1 Trapped gases:

(a) recall the effect of changes in pressure on gases trapped in the body cavities;

(b) state the effect on normal bodily function;

(c) list measures for prevention and treatment.

2.4.2 Recall the effects of flying after a period of underwater diving and state the precautions to be taken if intending to fly after underwater diving.

2.5 Basic knowledge of the anatomy of the ear

2.5.1 Outline the basic operation.

2.5.2 Explain the purpose of the eustachian tube and effects of atmospheric/cabin pressure changes.

2.5.3 State the effects of noise exposure on:

(a) hearing loss: long- and short-term;

(b) speech intelligibility;

(c) fatigue.

2.6 State recommended methods of hearing protection

2.7 Vision, spatial disorientation, illusions

2.7.1 Outline the anatomy of the eye and its functioning during the day and at night.

2.7.2 State the factors that affect night vision and identify methods of ‘dark adaptation’.

2.7.3 Recall the limitations of the eye in discerning objects at night and the ‘off-centre’ method of identifying objects at night.

2.7.4 Recall the limitations of the eye with respect to:

(a) the ability to discern objects during flight, for example, other aircraft, transmission lines etc.;

(b) empty field myopia;

(c) glare;

(d) colour vision in aviation;

(e) common visual problems, viz:

(i) myopia, hyperopia, astigmatism, presbyopia;

(f) flicker vertigo.

2.7.5 Outline the importance of:

(a) updating spectacle prescriptions;

(b) selecting suitable sunglasses.

2.7.6 Recall the factors which are conducive to mid-air collisions and describe techniques for visual ‘scanning’.

2.7.7 Define the term ‘disorientation’.

2.7.8 Recall the sensory systems involved in maintaining body equilibrium i.e. equilibrium is normally maintained by use of the eyes, inner ear and proprioceptive system (‘seat of pants’).

2.7.9 Recall that these mechanisms do not provide reliable information under all conditions of flight.

2.7.10 Describe illusion(s) that may be associated with the factors listed below:

(a) ‘leans’;

(b) linear and angular accelerations;

(c) unperceived changes in the pitch; roll; yaw;

(d) autokinetic illusions;

(e) ‘graveyard spin’ illusion.

(f) somatogravic illusion.

2.7.11 Explain:

(a) the conditions under which illusions may occur;

(b) the conflict in perception of an artificial reference system and a pilot's senses when illusions are experienced;

(c) the factors that may make a person more susceptible to disorientation;

(d) how to overcome sensory illusions.

2.7.12 Recall the illusions that may result from the following:

(a) false horizontal clues, for example, sloping cloud formations and sloping terrain;

(b) depth perception, for example, flying over water, snow, desert and other featureless terrain effect of fog; haze; dust;

(c) optical characteristics of windscreens;

(d) landing illusions:

(i) approach angles – steep; shallow;

(ii) width and slope of runway;

(iii) slope of (approach);

(iv) terrain approaches over water;

(e) relative motion between objects.

2.8 Motion sickness

2.8.1 State the basic cause of motion sickness.

2.8.2 List factors that may aggravate motion sickness.

2.8.3 List methods of combating motion sickness in flight.

2.9 Acceleration ‘g’ effects

2.9.1 Describe the effects of positive and negative accelerations on:

(a) the cardiovascular systems; and

(b) vision; and

(c) consciousness.

2.10 Toxic hazards

2.10.1 State the sources, symptoms, effects and treatment of carbon monoxide poisoning.

2.10.2 Recall the effect of breathing air contaminated by fuel and other noxious or toxic aviation products.

2.11 The atmosphere and associated problems

2.11.1 State the chemical composition of the atmosphere and recall the variation of temperature and pressure with altitude.

2.11.2 Outline how the circulatory and respiratory systems distribute oxygen and excrete carbon dioxide.

2.11.3 State what is meant by the partial pressure of oxygen.

2.12 Hypoxia

2.12.1 List the causes of hypoxia and describe:

(a) its effect on night vision;

(b) the dangers of behavioural changes, for example, lack of self-criticism, over-confidence and a false sense of security;

(c) state the symptoms and their development as altitude is increased;

(d) list factors which may increase a person's susceptibility to hypoxia;

(e) list methods of combating various forms of hypoxia.

2.13 Human factors considerations

2.13.1 List the basic concepts of information processing and decision making, including:

(a) how sensory information is used to form mental images;

(b) the influence of the following factors on the decision-making process:

(i) personality traits, for example, introvert/extrovert;

(ii) pride, peer pressure;

(iii) the desire to get the flight flown;

(iv) anxiety, overconfidence, boredom, complacency;

(v) types of memory – long- and short-term;

(vi) memory limitations;

(vii) aides memoire, rules of thumb;

(viii) work load/overload;

(ix) skill, experience, currency.

2.13.2 Recall the general concepts behind decision-making and list the methods of enhancing decision-making skills.

2.13.3 Concepts of stress:

(a) recall the interaction between stress and arousal and the effects of short- and long-term stress on pilot performance and health;

(b) recall the symptoms, causes and effects of environmental stress:

(i) working in an excessively hot, cold, vibrating or noisy environment;

(c) state the effects of stress on performance;

(d) describe the effect of stress on human performance;

(e) apply the basic principles of stress management.

2.13.4 Concepts of fatigue:

(a) identify causes of fatigue and describe its effects on pilot performance;

(b) relate coping strategies, for example:

(i) sleep management;

(ii) relaxation;

(iii) fitness and diet;

(c) describe the differences between acute and chronic fatigue.

2.14 Principles of first aid and survival

2.14.1 Recall first aid and survival information contained in ERSA.

2.15 Threat and error management

2.15.1 Describe the basic principles of TEM.

2.15.2 Explain the principles of TEM and detail a process to identify and manage threats and errors during single-pilot operations.

2.15.3 Define ‘threat’ and give examples of threats.

2.15.4 Give an example of a committed error and how action could be taken to ensure safe flight.

2.15.5 Explain how the use of checklists and standard operating procedures can prevent errors.

2.15.6 Give examples of how an undesired aircraft state can develop from an unmanaged threat or error.

2.15.7 Explain what resources a pilot could identify and use to avoid or manage an undesired aircraft, state such as being lost or entering adverse weather.

2.15.8 Explain the importance of ensuring that tasks are prioritised to manage an undesired aircraft state.

2.15.9 Give examples of how establishing and maintaining interpersonal relationships can promote safe flight.

Unit 1.6.2 CHFC: CPL Human factors

1. Reserved

2. Fitness for flight

2.1 Basic health

2.1.1 Explain the effect and importance on pilot performance of the following factors:

(a) diet, exercise;

(b) coronary risk factors – smoking, cholesterol, obesity, hereditary factors;

(c) upper respiratory tract infection, for example, colds, hay fever, congestion of air passages and sinuses;

(d) food poisoning and other digestive problems;

(e) headaches and migraines;

(f) pregnancy:

(i) when to stop flying; and

(ii) impact on cockpit ergonomics;

(g) injuries;

(h) ageing;

(i) alcohol and smoking;

(j) blood donations;

(k) dehydration;

(l) emotional – anxiety, depression, fear.

2.1.2 Explain why a pilot is not to fly when on any medication unless a medical clearance from a DAME has been obtained.

2.2 Health and fitness

2.2.1 Explain the reasons for, and frequency of, physical examinations and that a CASA network of DAMEs exists.

2.2.2 Explain the role of the CASA with regard to medical fitness and that only those conditions which present a flight safety hazard are disqualifying.

2.3 Alcohol

(a) explain how alcohol is absorbed and excreted;

(b) state and explain what a 'hangover' is;

(c) explain the effect a 'hangover' may have on flying performance;

(d) explain the relationship between a 'hangover' and level of blood alcohol in a person;

(e) explain the relationship between the level of blood alcohol and the recovery period from a 'hangover';

(f) state the factors that affect the elimination of alcohol from the body and describe the effects of illicit drugs and alcohol on proficiency, for example:

(i) judgment, comprehension, attention to detail; and

(ii) the senses, coordination and reaction times.

2.4 Drugs

2.4.1 Explain that drug abuse is a behavioural problem and is independent of:

(a) dependence (addiction); and

(b) frequent use.

2.4.2 Define illicit or non-illicit psychoactive substances.

2.4.3 Explain the adverse effects of illicit or non-illicit psychoactive substances.

2.4.4 Explain the effects and duration of such effects on human performance related to perception, speed of processing information, and reaction time of such drugs as:

(a) cannabis-based substances, for example, marijuana, ganja; and

(b) amphetamine-based substances, for example, ecstasy; and

(c) opium-based substances, for example, codeine, heroin.

2.5 Blood donations

2.5.1 Explain the effect on flying after giving a blood donation.

2.6 Hyperventilation

2.6.1 Describe the effects of hyperventilation on the human body.

2.7 Atmospheric pressure changes

2.7.1 Trapped gases

(a) describe the effect of changes in pressure on gases trapped in the body cavities; and

(b) describe the effect on normal bodily function; and

(c) state/list measures for prevention/treatment.

2.8 Vision, spatial disorientation, illusions

2.8.1 Describe the limitations of the eye in discerning objects at night and the ‘off-centre’ method of identifying objects at night.

2.8.2 Explain the limitations of the eye with respect to:

(a) the ability to discern objects during flight, for example, other aircraft, transmission lines etc; and

(b) empty field myopia; and

(c) glare; and

(d) colour vision in aviation; and

(e) common visual problems, viz myopia, hyperopia, astigmatism, presbyopia; and

(f) rotor flicker and its effects (helicopters only).

2.8.3 Know of the factors which are conducive to mid-air collisions and describe/practice techniques for visual ‘scanning’.

2.8.4 Describe the sensory systems involved in maintaining body equilibrium i.e. that equilibrium is normally maintained by use of the eyes, inner ear and proprioceptive system (‘seat of pants’).

2.8.5 Describe illusion(s) that may be associated with the factors listed below:

(a) ‘leans’; and

(b) linear and angular accelerations; and

(c) unperceived changes in the pitch roll yaw; and

(d) autokinetic illusions; and

(e) ‘graveyard spin’ illusion; and

(f) somatogravic illusion.

2.8.6 Explain:

(a) that sensory illusions usually occur when external visual clues are poor or ambiguous and that they are predictable; and

(b) the importance of an artificial visual reference system and a pilot’s ability to use the system; and

(c) the factors that may make a person more susceptible to disorientation; and

(d) how to overcome sensory illusions.

2.9 Motion sickness

2.9.1 Describe the cause of motion sickness.

2.9.2 Explain the factors which may aggravate motion sickness.

2.10 Acceleration ‘g’ effects

2.10.1 Describe the effects of positive and negative accelerations on the human body, include:

(a) on the cardiovascular systems; and

(b) vision; and

(c) consciousness.

2.11 Toxic hazards

2.11.1 Describe the sources, symptoms, effects and treatment of carbon monoxide poisoning.

2.11.2 Explain the effect of breathing air contaminated by fuel and other noxious or toxic aviation products.

2.12 The atmosphere and associated problems

2.12.1 Describe the chemical composition of the atmosphere and recall the variation of temperature and pressure with altitude.

2.12.2 Describe the circumstances where there is a risk of a pilot suffering symptoms associated with the ‘bends’ (release of nitrogen in the bloodstream), for example, rapid rate of climb in unpressurised aircraft to altitudes in excess of FL180 or continued flight at altitude following failure of the aircraft pressurisation system.

2.12.3 Describe what is meant by the partial pressure of oxygen.

2.13 Hypoxia

2.13.1 Describe the causes of hypoxia and recognise the symptoms of hypoxia particularly:

(a) its effect on night vision; and

(b) the dangers of behavioural changes, for example, lack of self-criticism, overconfidence and a false sense of security; and

(c) know that symptoms are difficult to detect in healthy individuals and can develop much faster at higher altitudes, for example, 14,000 ft; and

(d) list factors which may increase a person’s susceptibility to hypoxia; and

(e) state the approximate time of useful consciousness (effective performance time: EPT) at 20,000, 25,000 and 30,000 ft and list factors which affect EPT; and

(f) list methods of combating various forms of hypoxia.

2.14 Human factors considerations

2.14.1 Know the basic concepts of information processing and decision making, including:

(a) how sensory information is used to form mental images; and

(b) the influence of the following factors on the decision-making process:

(i) personality traits, for example, introvert/extrovert;

(ii) pride, peer pressure, employer pressure;

(iii) the desire to get the task done;

(iv) anxiety, overconfidence, boredom, complacency;

(v) types of memory – long- and short-term;

(vi) memory limitations;

(vii) aides memoire, rules of thumb;

(viii) work load/overload;

(ix) skill, experience, currency.

2.14.2 Discuss the general concepts behind decision making and the methods of enhancing decision-making skills.

2.14.3 Concepts of stress:

(a) know the interaction between stress and arousal and the effects of short- and long-term stress on pilot performance and health; and

(b) know the symptoms, causes and effects of environmental stress working in an excessively hot, cold, vibrating or noisy environment; and

(c) know the symptoms and effects of domestic and work-related stress; and

(d) know the effects of stress on performance; and

(e) know the principles of stress management, for example:

(i) cognitive and behavioural techniques; and

(ii) relaxation; and

(iii) time management.

2.14.4 Concepts of fatigue:

(a) identify causes of fatigue and describe its effects on pilot performance; and

(b) differentiate between acute and chronic fatigue; and

(c) discuss coping strategies, for example:

(i) sleep management; and

(ii) relaxation; and

(iii) fitness and diet.

2.14.5 Basic ergonomics:

(a) discuss principles of control design and the design features of conventional and modern displays; and

(b) discuss problems associated with:

(i) poorly designed controls/positioning of controls; and

(ii) interpreting instrument presentations; and

(c) know the following information regarding safety harnesses:

(i) types, how to assess their maintenance; and

(ii) inertia reels, how to assess their maintenance.

2.15 Threat and error management (TEM)

2.15.1 Explain the principles of TEM and detail a process to identify and manage threats and errors during single-pilot operations.

2.15.2 Explain the meaning of ‘threat’ and give examples of threats:

(a) give an example of a committed error and how action could be taken to ensure safe flight;

(b) explain how the use of checklists and standard operating procedures can prevent errors;

(c) describe how an undesired aircraft state can develop from an unmanaged threat or error;

(d) explain what resources a pilot could identify and use to avoid or manage an undesired aircraft, state such as being lost or entering adverse weather;

(e) explain the importance of ensuring that tasks are prioritised to manage an undesired aircraft state;

(f) describe how establishing and maintaining interpersonal relationships can promote safe flight.

2.16 Crew coordination

2.16.1 Explain the basic principles of crew coordination and discuss factors which:

(a) influence verbal and non-verbal communication between flight deck crews;

(b) barriers to communication;

(c) listening skills;

(d) assertion skills.

2.16.2 Discuss factors which affect the decision-making process:

(a) communication – attitude;

(b) personality;

(c) judgment;

(d) leadership style.

2.16.3 Discuss ideal leadership qualities.

2.16.4 Review aircraft accidents which resulted from poor crew coordination.

Unit 1.6.3 AHFC: ATPL human factors

1. Reserved

2. Aviation medicine

2.1 Basic concepts

2.1.1 Metabolism.

2.1.2 Oxygen requirement of tissues.

2.1.3 Composition of the atmosphere.

2.1.4 The gas laws.

2.2 The respiratory system and circulation of the blood

2.2.1 Interrelationship of respiration and circulation.

2.2.2 Composition and function of the blood.

2.2.3 Blood pressure:

(a) control of blood pressure;

(b) hypotension and hypertension;

(c) hemodynamic effects of acceleration.

2.2.4 Functional anatomy of the respiratory system.

2.2.5 Ventilation of the alveolar space, respiratory control.

2.2.6 Hypoxia:

(a) definition and causes of hypoxia;

(b) symptoms of oxygen deficiency and treatment;

(c) time of useful consciousness.

2.2.7 Hyperventilation:

(a) definition and causes of hyperventilation;

(b) symptoms and treatment.

2.3 The pressure cabin

2.3.1 Rapid decompression, effects and counter measures.

2.3.2 Entrapped gases, barotrauma.

3. Human information processing

3.1 The general system

3.1.1 Central and peripheral nervous system.

3.1.2 Sensory threshold, sensitivity, adaptation, habituation.

3.1.3 Reflexes and biological control systems.

3.1.4 Information processing by the central nervous system:

(a) mental set, attention (selective, divided, failure);

(b) channel capacity, filtering;

(c) mechanisms of perception, constancies, selective perception.

3.2 The senses

3.2.1 Vision:

(a) functional anatomy of the eye;

(b) physiology of the visual system;

(c) visual acuity, refraction and refractive errors, presbyopia;

(d) the visual field, scanning of the environment;
(e) binocular vision;
(f) the intraocular pressure, glaucoma;
(g) hypoxia and vision;
(h) night vision (dark adaptation);
(i) defective colour vision.

3.2.2 Hearing:
(a) functional anatomy of the ear;
(b) physiology of hearing;
(c) hearing loss (perceptive, conductive);
(d) flight-related hazards to hearing: noise-related hearing loss, barotrauma.

3.2.3 Equilibrium:
(a) functional anatomy and physiology;
(b) detection of rotary and linear acceleration;
(c) the subjective vertical;
(d) motion sickness.

3.3 Integration of sensory inputs: spatial disorientation and illusions

3.3.1 Basic concepts and definitions.

3.3.2 Categories of disorientation:
(a) flight circumstances;
(b) vertigo coriolis effect, pressure, vertigo, flicker vertigo;
(c) visual illusions (the leans, approach and landing problems);
(d) prevention and handling of disorientation.

3.4 Memory

3.4.1 Functional description.

3.4.2 Information storage and recall:
(a) short-term memory;
(b) long-term memory;
(c) motor memory;
(d) effects of stress and time of day.

4. <u>Human behaviour</u>

4.1 General Concepts

4.1.1 Personality:
(a) characteristics;
(b) individual differences in personality;
(c) self concept;
(d) attitude development;
(e) cognitive dissonance.

4.1.2 Behaviour and skills:
(a) drives;
(b) learning;
(c) motivation and performance.

4.1.3 Human error and reliability:
(a) human error model;

(b) types of errors;
(c) prevention and counter measures;
(d) reliability of human behaviour;
(e) errors induced by external factors (ergonomics, organisations).

4.1.4 Working in an automated cockpit:
(a) advantages;
(b) disadvantages;
(c) coping behaviour.

4.2 Cockpit management

4.2.1 Crew coordination:
(a) distribution of responsibilities;
(b) working with a crew concept.

4.2.2 Crew cooperation:
(a) small group dynamics (norms, atmosphere, pressure, communication, structure);
(b) conflict management.

4.2.3 Leadership, style of management:
(a) concern for performance;
(b) concern for people;
(c) democratic vs autocratic style;
(d) encouraging inputs and feedback;
(e) optimising of crew performance in flight;
(f) correcting crew coordination deficiencies.

4.2.4 Communication:
(a) verbal and non-verbal communication;
(b) one and two-way communication;
(c) effects of different communication styles;
(d) miscommunication (including cultural differences).

4.3 Judgment and decision-making

4.3.1 Pilot judgment concepts:
(a) types of judgment;
(b) motor skills and human factors.

4.3.2 Aeronautical decision-making:
(a) decision-making concepts;
(b) pilot responsibilities;
(c) behavioural aspects.

4.3.3 Identification of hazardous attitudes:
(a) physical factors;
(b) psychological factors;
(c) social influences and interface between people.

4.3.4 Pilot judgment awareness:
(a) risk assessment;
(b) cockpit stress management.

4.3.5 Applying decision-making concepts:
(a) practical application;
(b) managing resources;

(c) safety awareness.

5. Flying and health

5.1 The high-altitude environment (ozone, radiation, humidity)

5.2 Physiological and mental fitness

5.3 Incapacitation

5.3.1 Causes and symptoms:

(a) gastro intestinal;

(b) cardiovascular;

(c) side effects of drug and medication;

(d) migraine;

(e) epilepsy;

(f) brain disorders.

5.3.2 Recognition: insidious and sudden incapacitation.

5.3.3 Procedures for dealing with incapacitation.

5.4 Intoxication

5.4.1 Tobacco.

5.4.2 Alcohol.

5.4.3 Drugs and self-medication.

5.4.4 Various toxic materials.

5.5 Body rhythm disturbances

5.5.1 The biological clock.

5.5.2 Disturbances of circadian rhythms:

(a) causes (shift work, time-zone crossing);

(b) symptoms;

(c) treatment.

5.5.3 Sleep

(a) functions;

(b) patterns;

(c) effects of disturbances and treatment.

5.6 Fatigue

5.6.1 Definition.

5.6.2 Causes.

5.6.3 Types and symptoms.

5.6.4 Prevention and treatment.

5.7 Stress and anxiety

5.7.1 Definition of stress.

5.7.2 Stress components.

5.7.3 Causes, stressors.

5.7.4 Coping behaviour:

(a) identifying and reducing stress;

(b) life stress management.

5.7.5 Effects on performance.

5.7.6 Anxiety.

5.7.7 Defence mechanisms.

5.7.8 Effects of anxiety and defence mechanism.

5.8 General health aspects

5.8.1 Common minor ailments (colds, influenza, gastro-intestinal upsets).

5.8.2 Tropical climates: risk, regulatory aspects.

5.8.3 Personal hygiene: oral, external, internal hygiene.

5.8.4 Diabetes.

5.8.5 Hypotension and hypertension.

5.8.6 Obesitas, lack of exercise.

5.8.7 Epidermic diseases.

6. Threat and error management

6.1 Threat and error management model (TEM)

6.1.1 Explain what is TEM.

6.2 Basic principles of TEM

6.2.1 Explain the principles of TEM.

6.2.2 Explain the components of TEM.

6.3 Threat

6.3.1 Define and explain 'threat'.

6.3.2 Explain types of 'threats' such as 'expected', 'unexpected' and 'latent' threats – recognise and give examples.

6.3.3 Explain categories of 'threats' such as 'environmental' and 'organisational' threats – give examples of these 'threat(s) and recognise the 'threat(s)' in a given scenario.

6.4 Error

6.4.1 Define and explain 'error'.

6.4.2 Explain types of 'errors', such as those independent of 'threat(s)', induced by 'threat(s)' and with the potential to escalate other 'errors' (chain of errors) – recognise and give examples.

6.4.3 Explain categories of 'errors' such as those due to aircraft handling, flight management, procedures and communication – give examples of these 'error(s) and recognise the 'error(s)' in a given scenario.

6.4.4 Describe some measures or practices (for example, use of checklist, SOPs) to prevent occurrence of 'errors'.

6.4.5 Analyse scenarios of crew facing 'error(s)', and how crew may recognise and prevent 'errors' to ensure safe flight.

6.5 Undesired aircraft states (UAS)

6.5.1 Define and explain UAS.

6.5.2 Explain categories of UAS such as those arising from ineffective 'threat' and/or 'error' management, and those spontaneously and directly from a 'threat' – recognise and give examples.

6.5.3 Explain categories of UAS such as those due to aircraft handling, ground navigation and incorrect aircraft configuration – give examples of these UAS and recognise the UAS in a given scenario.

6.5.4 Explain the primacy of UAS management over 'error' or 'threat' management – recognise and give examples of the importance of ensuring that tasks are prioritised to manage a UAS.

6.5.5 Explain what resources an aircraft cockpit crew could identify and use to avoid or manage a UAS.

6.5.6 Analyse scenarios of crew facing UAS, and what should be the recovery action, and what would be the end states (outcomes) if recovery action is not taken.

6.6 Countermeasures

6.6.1 Define and explain 'countermeasures'.

6.6.2 Describe and give examples of types of 'countermeasures' such as systemic-based, individual and team 'countermeasures'.

6.6.3 Describe and give examples of 'countermeasures'.

6.7 TEM in multi-crew operations

6.7.1 Detail a process to identify and manage threats and errors during multi-crew operations, such as data gathering, threat analysis, decision making.

6.7.2 Analyse scenarios of multi-crew operations with regards to TEM.

6.7.3 Give examples of how establishing and maintaining interpersonal relationships in multi-crew operations can promote safe flight.

SECTION 1.7 NAVIGATION (NV)

Unit 1.7.1 PNVC: PPL navigation – all aircraft categories

1. Reserved

2. General navigation

2.1 Form of the earth

2.1.1 Describe:

(a) the shape and rotation of the earth;

(b) latitude, longitude;

(c) the difference between true and magnetic north;

(d) how distance and direction are measured and applied to navigation;

(e) magnetic variation and compass deviation;

(f) the relationship between magnetic heading, relative heading and magnetic bearing.

2.2 Time

2.2.1 Explain the terms UTC, local mean time, local (standard) time, local summer time.

2.2.2 Determine within +/- 5 min the beginning and end of civil twilight from AIP daylight and darkness graphs.

2.2.3 Complete conversions between LMT, UTC, local (standard) times, including local summer time.

2.2.4 List factors which may cause daylight to end earlier than the time extracted from AIP darkness graphs.

2.3 Basics – Extract information from documents

2.3.1 On a WAC and AIP 'visual' charts (if applicable) which cover the local area of operation:

(a) identify, without reference to the chart legend:

(i) major features to assist in map reading, for example, roads, rivers, lakes;

(ii) obstacles and spot heights, including elevation or height above terrain;

(iii) CTA, PRDs, and aerodrome data on VTC/ERC (if applicable);

(b) decode other symbols with reference to the chart legend;

(c) assess the general height of the terrain from hypsometric tints and contours;

(d) estimate track and distance;

(e) demonstrate and explain the reason for chart orientation in flight.

2.3.2 On visual AIP charts identify airspace boundaries and symbols with reference to the chart legend.

2.3.3 Use ERSA to extract:

(a) runway data;

(b) data pertaining to prohibited, restricted and danger areas.

2.4 Computation techniques

2.4.1 Use mental rules of thumb to estimate:

(a) time interval using estimated GS and distance, for example, 120 kt = 2 nm/min;

(b) endurance given fuel flow and fuel available (excluding reserve fuel).

2.4.2 Apply magnetic variation to obtain magnetic direction.

2.4.3 Carry out conversions between:

(a) feet/metres;

(b) nm/km;

(c) lbs/kg;

(d) US gal/litres/kg of avgas.

2.4.4 Calculate headwind, tailwind and cross-wind components given W/V and HDG using:

(a) a navigation computer; and

(b) conversion and wind component tables in ERSA.

2.4.5 Calculate the following:

(a) CAS and TAS given air temperature and pressure height;

(b) HDG, GS and drift given TAS, W/V, TR;

(c) TR given HDG, TAS, W/V;

(d) climb and decent rates and gradients;

(e) TOPC and TOPD positions using average airspeed, W/V and rates of climb and descent.

2.5 Pilot navigation

2.5.1 Principles of map reading:

(a) describe the method of chart orientation; and

(b) list situations when a pilot should read:

(i) from map to ground; and

(ii) from ground to map; and

(c) select appropriate position lines to establish:

(i) ground speed; and

(ii) track error; and

(iii) a fix; and

(d) select appropriate ground features to establish position when flying:

(i) at low level (500 ft AGL); and

(ii) between (approximately) 2,000 and 10,000 ft; and

(iii) over mountainous terrain, coastal areas, densely populated and sparsely populated areas.

2.5.2 Chart preparation and selection (practice):

(a) draw tracks, track error lines, time/distance markings; and

(b) given a route – select WAC(s) and appropriate AIP ‘visual charts’.

2.5.3 With reference to a planned or given track and given appropriate data:

(a) determine track made good (TMG); and

(b) calculate drift; and

(c) determine alteration of heading or HDG(M) to:

(i) parallel track; and

(ii) intercept track at a nominated point; and

(iii) maintain track once track is intercepted; and

(d) revise/confirm estimates or ETA using latest ground speed or time/distance proportion; and

(e) establish a DR position using latest TR and GS; and

(f) using a map plotter, employ mental dead reckoning and proportional techniques to solve inflight navigational problems, including:

(i) mentally apply the 1 in 60 rule; and

(ii) mentally revise estimates/ETA’s; and

(iii) estimate TR and ETI to a selected diversion point.

2.6 Radio navigation aids

2.6.1 Extract NDB and VOR information from ERSA or ERC and state the rated coverage of a VOR up to 10,000 ft.

2.7 Area navigation systems

2.7.1 Types of systems:

(a) external sensor systems:

(i) VOR/DME;

(ii) GNSS.

2.7.2 General principles:

(a) inputs required:

(i) air data inputs;

(ii) other inputs;

(b) outputs generated:

(i) types of outputs;

(ii) uses.

2.7.3 RNAV systems:

(a) principle of VOR/DME area navigation (RNAV);

(b) advantages and disadvantages;

(c) limitations and restrictions:

(i) errors, accuracy, reliability;

(ii) coverage;

(iii) range.

(d) typical control panel.

2.7.4 Reserved:

2.7.5 Satellite navigation systems:

(a) principle of GNSS navigation:

(i) elements of GNSS (for example, GPS, GLONASS);

(b) advantages and disadvantages;

(c) limitations and restrictions:

(i) errors, accuracy, reliability;

(ii) coverage;

(iii) range;

(d) typical control panel;

(e) approvals for IFR Navigation;

(f) GNSS system enhancements (for example, DGNSS, GLS, WAAS).

2.7.6 Updating area navigation systems:

(a) need for updating position;

(b) requirements for updating:

(i) manual inserting;

(ii) automatic updating;

(iii) inhibiting updating;

(c) common indications when system updates position.

Unit 1.7.2 CNVC: CPL navigation – all aircraft categories

1. Reserved

2. Navigation

2.1 Form of the earth

2.1.1 Explain the following terms listed in (a) to (g):

(a) the shape and rotation of the earth; and

(b) latitude, longitude; and

(c) equator, Greenwich meridian; and

(d) great circles, small circles, rhumb lines; and

(e) difference between true and magnetic north; and

(f) terrestrial magnetism, magnetic variation and the change in variation with time; and

(g) distance on the earth i.e. relationship between a minute of latitude and a nautical mile; and, if applicable, their effect on:

(i) position on the earth; and

(ii) time differences; and

(iii) distance and direction.

2.2 Time

2.2.1 Explain the terms UTC, local mean time, local (standard) time, local summer time.

2.2.2 Determine within +/- 5 min the beginning and end of civil twilight from AIP daylight and darkness graphs.

2.2.3 Complete conversions between:

(a) LMT, UTC, local (standard) times, including local summer time.

2.2.4 List factors which may cause daylight to end earlier than the time extracted from AIP darkness graphs.

2.2.5 Describe the effect of the earth's rotation and revolution around the sun on the:

(a) beginning and end of daylight;

(b) period of daylight.

2.2.6 Describe the effect of changes in longitude on Local Mean Time.

2.3 Charts and publications

2.3.1 From:

(a) AIP visual charts, that is ERC, VTC and AUS PCA, including any subsequent changes to charts required for flight under VFR; and

(b) ERSA;

select the chart(s) or document(s) which contain information about a given item of operational significance.

2.3.2 Decode symbols and apply information displayed on AIP visual charts.

2.3.3 Interpret topographic detail and decode symbols displayed on a WAC and VTC.

2.3.4 On WAC and AIP visual charts using chart and latitude scale:

(a) estimate tracks and distances; and

(b) measure rhumb line track; and

(c) measure distance; and

(d) plot a position given:

(i) latitude and longitude; and

(ii) bearing and distance.

2.3.5 Describe the different kinds of map projections used in aviation and:

(a) identify the following properties of a Lamberts Conformal:

(i) appearance of rhumb lines, great circles, meridians and the graticule;

(ii) distortion of shapes and areas;

(iii) scale variation;

(b) describe the methods of representing scale.

2.4 Computations

2.4.1 Review computations and conversions and:

(a) solve GS, distance, fuel used, fuel required, fuel remaining and fuel consumption problems, given appropriate combinations of these factors; and

(b) solve CAS/TAS problems given air temperature and pressure height; and

(c) determine HDG, GS and drift given TAS, W/V, TR; and

(d) determine TR given HDG, TAS, W/V; and

(e) solve problems relating to rates/gradients of climb and descent; and

(f) determine TOPC and TOPD position using average airspeed, W/V, and rates of climb/descent.

2.5 Pilot navigation

2.5.1 Principles of map reading:

(a) describe the method of chart orientation; and

(b) list situations when a pilot should read:

(i) from map to ground; and

(ii) from ground to map; and

(c) select appropriate position lines to establish:

(i) ground speed; and

(ii) track error; and

(iii) a fix; and

(d) select appropriate ground features to establish position when flying:

(i) at low level (500 ft AGL); and

(ii) between (approximately) 2,000 and 10,000 ft; and

(iii) over mountainous terrain, coastal areas, densely populated and sparsely populated areas.

2.5.2 Chart preparation and selection (practice):

(a) draw tracks, track error lines, time/distance markings; and

(b) given a route – select WAC(s) and appropriate AIP ‘visual charts’.

2.5.3 With reference to a planned or given track and given appropriate data:

(a) determine track made good (TMG); and

(b) calculate drift; and

(c) determine alteration of heading or HDG(M) to:

(i) parallel track; and

(ii) intercept track at a nominated point; and

(iii) maintain track once track is intercepted; and

(d) revise/confirm estimates or ETA using latest ground speed or time/distance proportion; and

(e) establish a DR position using latest TR and GS; and

(f) using a map plotter, employ mental dead reckoning and proportional techniques to solve inflight navigational problems, including:

(i) mentally apply the 1 in 60 rule; and

(ii) mentally revise estimates/ETA’s; and

(iii) estimate TR and ETI to a selected diversion point.

2.6 Radio navigation aids

2.6.1 Describe how to identify an aid and state the frequency of a nominated NDB or VOR.

2.6.2 Extract NDB and VOR information from ERSA or ERC and state the rated coverage of a VOR up to 10,000 ft.

2.6.3 State the effect (in Australia) of the following errors on the reliability of ADF cockpit indications:

(a) co-channel interference;

(b) mountain effect;

(c) effect of thunderstorms;

(d) coastal refraction.

2.6.4 Explain why information pertaining to broadcasting stations is included in ERSA.

2.6.5 Recall the ‘aggregate’ error of a VOR and explain what is meant by ‘scalloping’.

2.6.6 Establish a position line given:

(a) HDG and ADF data; and

(b) VOR indications.

2.6.7 Describe how to use the VOR to determine TR to or from a station.

2.6.8 Describe how to use an ADF or VOR to home to a station, and recognise instrument indications that signify station passage.

2.6.9 Establish fixes and use these fixes to make off-track corrections using a DME distance and the following:

(a) HDG and ADF data; or

(b) VOR indications.

Unit 1.7.3 ANVC: ATPL navigation – all aircraft categories

1. Reserved

2. Advanced navigation

2.1 Navigation charts

2.1.1 Lambert Conformal Conic Projection:

(a) review properties:

(i) great circles, rhumb lines, rules lines;

(ii) scales, chart convergence;

(b) brief comparison with properties of other projections:

(i) Mercator;

(ii) Polar sterographic.

2.1.2 Use of AIP (MAP) charts.

2.2 Time zones

(a) brief review:

(i) time zones, date line;

(ii) LMT, LST, UTC;

(iii) conversion from LMT/LST to UTC and vice versa;

(b) practical examples of LST arrival/departure calculations for flights across time zones:

(i) with and without date line involvement.

2.3 Flight instruments

2.3.1 Air data instruments:

(a) review of altimeter, ASI, VSI, IVSI and Machmeter:

(i) principles of operation;

(ii) errors;

(iii) relationship between IAS, CAS, EAS, TAS and TMN;

(b) modern instrumentation:

(i) integrated displays;

(ii) EFIS;

(iii) standby instruments.

2.3.2 Air data computer (ADC):

(a) principles of operation;

(b) input and output data;

(c) uses of output data.

2.3.3 Gyroscopic principles:

(a) rigidity, precession:

(i) real and apparent precession;

(ii) correcting for precession;

(b) types of gyros in common use:

(i) mechanical;

(ii) laser gyros;

(c) gyro platforms:

(i) two- and three-dimensional stability;

(d) introduce concept of self-contained instruments versus gyro-platform output displays.

2.4 Compasses

2.4.1 Direct reading compass:

(a) principle of operation and errors;

(b) advantages and disadvantages.

2.4.2 Slaved gyro-stabilised compass:

(a) principles of operation;

(b) errors;

(c) advantages and disadvantages;

(d) uses of output data.

2.4.3 Inertial heading:

(a) use of a gyro platform to compute true heading:

(i) principles;

(ii) significance of initial positions insert;

(b) magnetic heading as a modification of true heading.

2.5 Radiowave propagation

2.5.1 Terminology:

(a) understand general principles of radio propagation;

(b) understand and be able to use in correct sense:

(i) wavelength;

(ii) amplitude;

(iii) frequency;

(iv) phase angle;

(v) frequency bands;

(vi) the following sidebands:

(A) SSB;

(B) LSB;

(C) USB;

(vii) carrier;

(viii) modulation, including the following:

(A) amplitude;

(B) frequency;

(C) pulse;

(D) multiplex;

(ix) demodulation.

2.5.2 Wave propagation:

(a) groundwaves, space (direct) waves, skywaves;

(b) propagation within the frequency bands;

(c) factors affecting reception:

(i) fading;

(ii) static;

(d) use of HF for communications:

(i) frequency prognosis;

(ii) SELCAL.

2.5.3 Antennas:

(a) function/purpose of antennas;

(b) types of antennas in common use for aircraft:
  (i) uses;
  (ii) characteristics (outline only):
    (A) directionality;
    (B) polarisation.

2.6 Radio NavAids

2.6.1 ADF (including NDBs and use of RMI):
(a) application for navigation;
(b) principles;
(c) presentation and interpretation;
(d) coverage;
(e) range;
(f) errors and accuracy;
(g) factors affecting range and accuracy.

2.6.2 VOR and Doppler-VOR (including use of RMI):
(a) application for navigation;
(b) principles;
(c) presentation and interpretation;
(d) coverage;
(e) range;
(f) errors and accuracy;
(g) factors affecting range and accuracy.

2.6.3 DME (distance measurement equipment):
(a) application for navigation;
(b) principles;
(c) presentation and interpretation;
(d) range;
(e) errors and accuracy;
(f) factors affecting range and accuracy.

2.6.4 ILS (instrument landing system):
(a) application for navigation;
(b) principles;
(c) presentation and interpretation;
(d) coverage;
(e) range;
(f) errors and accuracy;
(g) factors affecting range and accuracy.

2.6.5 MLS (microwave landing system):
(a) application for navigation;
(b) principles;
(c) presentation and interpretation;
(d) coverage;
(e) range;
(f) errors and accuracy;
(g) factors affecting range and accuracy.

2.7 Route navigation

2.7.1 Route selection:
(a) great circle tracks;
(b) choice of speed and flight level;
(c) ETOPS considerations.

2.7.2 Navigation on climb and descent:
(a) wind and temperature variations:
(i) desirability of allowing for variations;
(ii) availability of data in actual situations.
(b) weather/traffic avoidance:
(i) concept of track miles.
(c) allowance for use of anti-ice equipment:
(i) reduced rate of climb;
(ii) reduced rate of descent.

2.7.3 Use of radio NavAids:
(a) requirement for regular position fixing;
(b) use of navaid position lines to establish position:
(i) along track;
(ii) across track;
(iii) desired/preferred form of P/L intersections;
(c) computer-controlled navaid receivers:
(i) auto-tuning;
(ii) manual selection;
(iii) precautions.

2.7.4 Calculation of track and groundspeed:
(a) review basic track and groundspeed calculations:
(i) plotted positions, IAS/TAS/GS, HDG/TRK;
(ii) determination of wind velocity (track and groundspeed methods only);
(iii) calculation of ETAs, EETs;
(b) review ETP and PNR calculations;
(c) inflight diversion to fixed point:
(i) last PSD;
(ii) time and fuel required.

2.8 Basic radar principles

2.8.1 Pulse techniques and associated terminology.

2.8.2 Ground radar:
(a) coverage of ATC radars, factors affecting range and accuracy;
(b) facilities provided by Met radars for storm warning and avoidance.

2.8.3 Airborne weather radar:
(a) principles;
(b) types;
(c) presentation and interpretation;
(d) factors affecting range and accuracy.

2.8.4 SSR (secondary surveillance radar) and transponder:
(a) principles;
(b) application for traffic control;

(c) presentation and interpretation;
(d) advantages compared to primary radar for traffic control.

2.8.5 Radio altimeter:
(a) principle of operation;
(b) display;
(c) accuracy, errors.

2.9 Area navigation systems

2.9.1 Type of systems
(a) Self-contained on-board systems including the following;
(i) INS;
(ii) DOPPLER;
(b) External sensor systems including the following:
(i) VOR and DME;
(ii) GNSS.

2.9.2 General principles:
(a) inputs required:
(i) air data inputs;
(ii) other inputs;
(b) outputs generated:
(i) types of outputs;
(ii) uses.

2.9.3 RNAV systems:
(a) principle of VOR/DME area navigation (RNAV);
(b) advantages and disadvantages;
(c) limitations and restrictions:
(i) errors, accuracy, reliability;
(ii) coverage;
(iii) range.
(d) typical control panel.

2.9.4 Reserved:

2.9.5 Satellite navigation systems:
(a) principle of GNSS navigation:
(i) elements of GNSS (for example, GPS, GLONASS);
(b) advantages and disadvantages;
(c) limitations and restrictions:
(i) errors, accuracy, reliability;
(ii) coverage;
(iii) range;
(d) typical control panel;
(e) approvals for IFR Navigation;
(f) GNSS system enhancements (for example, DGNSS, GLS, WAAS).

2.9.6 Updating area navigation systems:
(a) need for updating position;
(b) requirements for updating:
(i) manual inserting;
(ii) automatic updating;

(iii) inhibiting updating;

(a) common indications when system updates position.

Unit 1.7.4 ANVA: ATPL navigation – aeroplane – *Reserved*

Unit 1.7.5 ANVH: ATPL navigation – helicopter – *Reserved*

SECTION 1.8 METEOROLOGY (MT)

Unit 1.8.1 RMTC: RPL meteorology – all aircraft categories

1. Reserved

2. Basic meteorology

2.1 Knowledge of local weather

2.1.1 Demonstrate a basic knowledge of local weather, in particular the likely occurrence of the following phenomena and how they may affect the safety of a flight:

(a) thunderstorms;

(b) low cloud;

(c) poor visibility;

(d) turbulence.

2.2 Knowledge of forecasts and reports

2.2.1 Demonstrate an understanding of weather forecasts, reports and broadcasts that are pertinent to the area of operation.

2.3 Understand significance of observations

2.3.1 Recognise signs, including forecast condition and pilot observations, which may indicate the presence of:

(a) turbulence, thermals, dust devils; and

(b) wind gradient, wind shear and describe the effect of these phenomena on flight characteristics.

Unit 1.8.2 PMTC: PPL meteorology – all aircraft categories

1. Reserved

2. General meteorology

2.1 Composition of the atmosphere

2.1.1 Describe the International Standard Atmosphere (ISA) sea level temperature and pressure.

2.1.2 State the ISA temperature and pressure lapse rates in the troposphere.

2.1.3 Describe the vertical division of the atmosphere:

(a) troposphere;

(b) tropopause;

(c) stratosphere.

2.1.4 Explain why most weather effects occur below the stratosphere.

2.2 Heat, temperature pressure and humidity

2.2.1 State the method of measuring surface air temperature, and relate that to actual temperatures above the runway.

2.2.2 Explain the meaning of the following terms:

(a) temperature inversion;

(b) saturated air, relative humidity, dew point;

(c) evaporation, condensation, freezing.

2.2.3 List the effect of changes in temperature, pressure and humidity on air density.

2.2.4 Calculate ISA temperature and pressure height.

2.2.5 Explain the meaning of the following terms:

(a) height;

(b) elevation;

(c) altitude;

(d) QNH;

(e) QFE.

2.3 Clouds and precipitation

2.3.1 Identify and classify clouds according to height and the 10 genera forms.

2.3.2 Recall the standard abbreviation for each cloud type, and the method used to report cloud amount.

2.3.3 Describe the weather associated with each cloud type.

2.4 Visibility

2.4.1 Determine visibility from either visual sighting or met forecast.

2.4.2 List meteorological factors that will reduce inflight visibility.

2.5 Winds – general

2.5.1 Describe the relationship between pressure and wind and apply Buys Ballot’s law to assess the approximate location of high and low pressure systems.

2.5.2 Differentiate between:

(a) squalls and gusts; and

(b) backing and veering.

2.5.3 Compare surface and gradient winds in terms of direction and strength.

2.5.4 List the ‘factors’ that effect the diurnal variation of wind and describe typical ‘variations’ in surface wind strength during a 24-hour period.

2.6 Air masses and fronts

2.6.1 Describe typical ‘flying weather’ associated with the following using the factors described in subclause 2.6.2:

(a) cold fronts;

(b) warm fronts;

(c) wave depressions;

(d) occluded fronts;

(e) tropical cyclones;

(f) the equatorial trough.

2.6.2 For subclause 2.6.1, ‘flying weather’ embraces the following:

(a) temperature (warmer/colder);

(b) wind changes (back/veer, stronger/weaker);

(c) stability and turbulence;

(d) cloud type and approximate amount, precipitation.

2.7 Flight considerations

2.7.1 With respect to the phenomena listed below (i) – (vi):

(a) state the conditions favourable to their development and, where applicable, their dispersal;

(b) recognise signs which may indicate their presence;

(c) describe their effect on flight characteristics where applicable, state the pilot actions required to minimise their effect on an aircraft in flight:

(i) turbulence;

(ii) windshear;

(iii) mountain waves;

(iv) land and sea breezes;

(v) thunderstorms;

(vi) downdrafts associated with terrain and cloud.

2.7.2 State/select the conditions under which it is mandatory to obtain a forecast.

2.7.3 For information contained in an ARFOR, TAF, TTF, METAR, SPECI, AIRMET or SIGMET, do the following:

(a) explain the coded information in plain language;

(b) decide whether a particular forecast is valid for a flight;

(c) apply the information to planning and conducting a flight.

2.7.4 List the conditions that require a pilot to submit a short AIREP.

Unit 1.8.3 CMTC: CPL meteorology – all aircraft categories

1. Reserved

2. Meteorology

2.1 Composition of the atmosphere

2.1.1 Describe the process of incoming solar radiation and outgoing terrestrial radiation and the factors that affect them.

2.1.2 Explain the processes by which the sun's energy is redistributed within the atmosphere and explain:

(a) conduction;

(b) advection;

(c) convection;

(d) latent heat;

(e) radiation.

2.2 Heat, temperature, pressure and humidity

2.2.1 A student should:

(a) describe the method of measuring surface air temperature and know that actual temperatures may be much higher, for example, above a runway; and

(b) know the meaning of the following terms:

(i) isotherm;

(ii) radiation, advection, convection, conduction;

(iii) isobar, horizontal pressure gradient;

(iv) saturated air, relative humidity, dew point;

(v) evaporation, condensation, freezing.

2.2.2 List the effect of changes in temperature, pressure and humidity on air density.

2.2.3 List factors that influence the diurnal variation of surface air temperature and explain the temperature gradient between land and sea surfaces.

2.3 Atmospheric stability

2.3.1 Differentiate between stable, unstable and conditionally atmospheric conditions.

2.3.2 Understanding of adiabatic process and the parcel method of assessing stability.

2.4 Clouds and precipitation

2.4.1 Identify and classify cloud 'types':

(a) classifications required are:

(i) high, medium, low; and

(ii) cumuliform, stratiform:

(A) examples of 'type' are Cu, Ci etc.

2.4.2 State the standard abbreviation for each cloud type, and the method used to report cloud amount.

2.4.3 Describe the weather associated with each cloud type.

2.4.4 Differentiate between drizzle, rain, showers and virga.

2.4.5 Select statements that describe the conditions necessary for the formation/dispersal of various types of cloud.

2.5 Visibility

2.5.1 Know the method used in meteorological forecasts and reports to determine visibility.

2.5.2 Describe the term 'runway visual range'.

2.5.3 Give reasons for differences between 'inflight' and 'reported' visibility.

2.5.4 List meteorological factors that will reduce inflight visibility.

2.6 Winds – general

2.6.1 Describe the relationship between pressure and wind and apply Buys Ballot's law to assess the approximate location of high and low pressure systems.

2.6.2 Differentiate between:

(a) squalls and gusts; and

(b) backing and veering.

2.6.3 Compare surface and gradient winds in terms of direction and strength.

2.6.4 List the 'factors' that effect the diurnal variation of wind and describe typical 'variations' in surface wind strength during a 24-hour period.

2.7 Air masses and fronts

2.7.1 Describe typical 'flying weather' associated with the following:

(a) cold fronts;

(b) warm fronts;

(c) wave depressions;

(d) occluded fronts;

(e) tropical cyclones;

(f) the equatorial trough.

2.7.2 For subsection 2.7.1 above, 'flying weather' embraces the following:

(a) temperature (warmer/colder);

(b) wind changes (back/veer, stronger/weaker);

(c) stability and turbulence;

(d) cloud type and approximate amount, precipitation.

2.8 Flight considerations

2.8.1 With respect to the phenomena listed below in subclause 2.8.2, do the following:

(a) state the conditions that are favourable to the development of the phenomenon and, where applicable, its dispersal;

(b) recognise signs which may indicate the presence of each phenomenon;

(c) describe the effect of the phenomenon on flight characteristics;

(d) where applicable, state the pilot actions required to minimise the effect of the phenomenon on an aircraft in flight.

2.8.2 The following is a list of meteorological phenomena that is for the purposes of subclause 2.8.1:

(i) thermals, turbulence;

(ii) dust devils and dust storms;

(iii) wind gradient, wind shear and low-level jetstreams;

(iv) anabatic and katabatic winds;

(v) mountain waves and fohn winds;

(vi) land and sea breezes;

(vii) inversions and fog;

(viii) thunderstorms and microbursts;

(ix) downdrafts associated with terrain/cloud;

(x) atmospheric stability and instability;

(xi) hoar frost, rime, and clear airframe ice;

(xii) tropical cyclones, tornadoes.

2.9 Synoptic meteorology

2.9.1 Given a MSL analysis chart, identify:

(a) high and low pressure systems; and

(b) a trough, a ridge, a col; and

(c) warm, cold and occluded fronts; and

(d) a tropical cyclone; and

(e) approximate wind direction.

2.9.2 Describe typical weather characteristics associated with the items listed in 2.9.1 (a) and (b) above in the following terms:

(a) approximate wind direction;

(b) moisture content (dry or humid);

(c) cloud: stratiform and cumuliform;

(d) clear skies;

(e) turbulent or smooth air;

(f) good or poor visibility.

2.10 Weather services

2.10.1 For given locations, determine from CASA documents the availability of aviation forecasts, meteorological reports and weather briefing and state the method of obtaining this information.

2.10.2 State/select the conditions under which it is mandatory to obtain a forecast.

2.10.3 For information contained in an ARFOR, TAF, TTF, METAR, SPECI, AIRMET or SIGMET, do the following:

(a) explain the coded information in plain language;

(b) decide whether a particular forecast is valid for a flight;

(c) apply the information to planning and conducting a flight.

2.10.4 Given a typical weather briefing, evaluate weather information applicable to a flight, and:

(a) assess likely changes (both improving and deteriorating) in weather during the flight; and

(b) list phenomena which may adversely affect the flight.

2.10.5 List the conditions that require a pilot to submit a short AIREP.

2.10.6 State the purpose of VOLMET and ATIS broadcasts indicate how this information is obtained and apply this information to practical scenarios.

2.10.7 State what is meant by a Hazard Alert service.

2.11 Climatology

2.11.1 Describe typical seasonal weather conditions in different regions of Australia with reference to:

(a) visibility (good/poor); and

(b) prevailing winds; and

(c) typical cloud patterns and precipitation; and

(d) seasonal pressure and frontal systems, including the ITCZ and equatorial trough; and

(e) tropical cyclones.

Unit 1.8.4 AMTC: ATPL meteorology – all aircraft categories

1. Reserved

2. Advanced meteorology

2.1 Composition of the atmosphere

2.1.1 Student should know the following vertical divisions in the atmosphere:

(a) troposphere, tropopause, stratosphere;

(b) that most weather effects occur below the stratosphere.

2.2 Heat, temperature, pressure and humidity

2.2.1 Describe the method of measuring surface air temperature, and explain how the actual temperatures may be much higher, for example, above a runway.

2.2.2 Describe the meaning of the following terms:

(a) isotherm, temperature inversion;

(b) radiation, advection, convection, conduction;

(c) isobar, horizontal pressure gradient;

(d) saturated air, relative humidity, dew point;

(e) evaporation, condensation, freezing.

2.2.3 Describe the effect of changes in temperature, pressure and humidity on air density.

2.2.4 Explain the factors that influence the diurnal variation of surface air temperature and explain the temperature gradient between land and sea surfaces.

2.3 Atmospheric stability

2.3.1 Differentiate between stable, unstable and conditionally atmospheric conditions.

2.3.2 Describe the adiabatic process and the parcel method of assessing stability.

2.4 Clouds and precipitation

2.4.1 Identify and classify cloud ‘types’ as cumuliform or stratform for the following:

(a) high level;

(b) medium level;

(c) low level.

2.4.2 State the standard abbreviation for each cloud type, and the method used to report cloud amount.

2.4.3 Describe the weather associated with each cloud type.

2.4.4 Differentiate between drizzle, rain, showers and virga, however, actual droplet size is NOT required.

2.4.5 Select statements that describe the conditions necessary for the formation/dispersal of various types of cloud.

2.5 Visibility

2.5.1 Know the method used in meteorological forecasts and reports to determine visibility.

2.5.2 Describe the term ‘runway visual range’.

2.5.3 Give reasons for differences between ‘inflight’ and ‘reported’ visibility.

2.5.4 List meteorological factors that will reduce inflight visibility.

2.6 Winds – general

2.6.1 Describe the relationship between pressure and wind and apply Buys Ballot’s law to assess the approximate location of high and low pressure systems.

2.6.2 Differentiate between:

(a) squalls and gusts; and

(b) backing and veering.

2.6.3 Compare surface and gradient winds in terms of direction and strength.

2.6.4 List the ‘factors’ that effect the diurnal variation of wind and describe typical ‘variations’ in surface wind strength during a 24-hour period.

2.7 Air masses and fronts

2.7.1 Describe typical ‘flying weather’ associated with the following, with reference to the parameters mentioned in subsection 2.7.2:

(a) cold fronts; and

(b) warm fronts; and

(c) wave depressions; and

(d) occluded fronts; and

(e) tropical cyclones; and

(f) the equatorial trough.

2.7.2 For subsection 2.7.1, the following are the parameters:

(a) temperature (warmer/colder);

(b) wind changes (back/veer, stronger/weaker);

(c) stability and turbulence;

(d) cloud type and approximate amount, precipitation.

2.8 Flight considerations

2.8.1 With respect to the phenomena listed below from (i) to (xii)

(a) state the conditions favourable to their development and, where applicable, their dispersal;

(b) recognise signs which may indicate their presence;

(c) describe their effect on flight characteristics;

(d) where applicable, state the pilot actions required to minimise their effect on an aircraft in flight:

(i) thermals, turbulence; and

(ii) dust devils and dust storms; and

(iii) wind gradient, wind shear and low-level jetstreams; and

(iv) anabatic and katabatic winds; and

(v) mountain waves and fohn winds; and

(vi) land and sea breezes; and

(vii) inversions and fog; and

(viii) thunderstorms and microbursts; and

(ix) downdrafts associated with terrain/cloud; and

(x) atmospheric stability and instability; and

(xi) hoar frost, rime, and clear airframe ice; and

(xii) tropical cyclones, tornadoes.

2.9 Synoptic meteorology

2.9.1 Given a MSL analysis chart, identify:

(a) high and low pressure systems; and

(b) a trough, a ridge, a col; and

(c) warm, cold and occluded fronts; and

(d) a tropical cyclone; and

(e) approximate wind direction.

2.9.2 Describe typical weather characteristics associated with the items listed in 2.9.1 (a) and (b) above.

2.9.3 For subclause 2.9.2, weather characteristics means the following:

(a) approx wind direction;

(b) moisture content (dry/humid);

(c) cloud: stratiform and cumuliform;

(d) clear skies;

(e) turbulent or smooth air;

(f) good or poor visibility.

2.10 Weather services

2.10.1 For given locations, determine from CASA documents the availability of aviation forecasts, meteorological reports and weather briefing and state the method of obtaining this information.

2.10.2 State/select the conditions under which it is mandatory to obtain a forecast.

2.10.3 For information contained in an ARFOR, TAF, TTF, METAR, SPECI, AIRMET or SIGMET, do the following:

(a) explain the coded information in plain language;

(b) decide whether a particular forecast is valid for a flight;

(c) apply the information to planning for and conducting a flight.

2.10.4 Given typical weather briefing, evaluate weather information applicable to a flight, and:

(a) assess likely changes in weather during the flight (both improving and deteriorating); and

(b) list phenomena which may adversely affect the flight.

2.10.5 List the conditions that require a pilot to submit a short AIREP.

2.10.6 State the purpose of VOLMET and ATIS broadcasts indicate how this information is obtained and apply this information to practical scenarios.

2.10.7 State what is meant by a Hazard Alert service.

2.11 Climatology

2.11.1 Explain typical seasonal weather conditions in different regions of Australia with reference to:

(a) visibility (good/poor); and

(b) prevailing winds; and

(c) typical cloud patterns and precipitation; and

(d) seasonal pressure and frontal systems, including the ITCZ and equatorial trough; and

(e) tropical cyclones.

2.12 Met observations

2.12.1 Standard observation methods:

(a) knowledge of the standard methods of measuring the following (however, knowledge of the mechanics of the various instruments used is not required):

(i) visibility;

(ii) cloud height;

(iii) pressure;

(iv) temperature;

(v) humidity;

(vi) surface wind;

(vii) upper winds.

2.12.2 Q codes:

(a) understand the code groups QFE and QNH, and understand the meaning of area QNH.

2.12.3 Inflight observations:

(a) requirement for inflight observations by crew members;

(b) reporting criteria;

(c) form and circumstances in which observations are made and reported:

(i) refer AIP for full position report format.

2.12.4 Satellite observations:

(a) use of satellite photographs (visual and infra-red) to recognise and describe weather systems and air masses.

2.12.5 Australian flight weather documentation:

(a) comprehension and interpretation of all weather forecasts or reports in common use in Australia for aviation purposes;

(b) decoding of TAF, METAR and SIGMET messages;

(c) understand the function of TREND type forecasts and the criteria for their use.

Unit 1.8.5 AMTA: ATPL meteorology – aeroplane

1. Reserved

2. Advanced meteorology

2.1 The atmosphere

2.1.1 Structure of the atmosphere:
- (a) composition and extent;
- (b) vertical division (to lower stratosphere only).

2.1.2 Pressure, temperature and density:
- (a) interrelationship of pressure, temperature and density;
- (b) barometric pressure, isobars;
- (c) pressure, temperature and density variation with height;
- (d) temperature near earth's surface:
  - (i) lapse rate;
  - (ii) surface effects;
  - (iii) diurnal variation;
  - (iv) effect of clouds;
- (e) adiabatic processes:
  - (i) meaning of adiabatic;
  - (ii) dry air;
  - (iii) evaporation;
  - (iv) condensation;
  - (v) latent heat;
  - (vi) saturated air;
- (f) temperature inversions:
  - (i) development;
  - (ii) types;
  - (iii) influence on the weather;
- (g) stability and instability:
  - (i) DALR, SALR, ELR;
  - (ii) stable and unstable conditions;
  - (iii) conditional instability;
  - (iv) stability changes caused by:
    - (A) radiation;
    - (B) turbulence;
    - (C) convection;
    - (D) advection;
    - (E) subsidence;
    - (F) convergence;
    - (G) divergence;
    - (H) precipitation.

2.1.3 Humidity:
- (a) water vapour in the atmosphere;
- (b) vapour pressure, effect on density;
- (c) dry/wet bulb temperature:
  - (i) dewpoint;

(ii) relative humidity.

2.2 Clouds and precipitation

2.2.1 Cloud:

(a) types of cloud and level at which found:
- (i) stratus;
- (ii) cumulus;
- (iii) cirrus;

(b) variations of basic types:
- (i) strato-;
- (ii) cumulo-;
- (iii) nimbo-;
- (iv) alto-;

(c) hazards (if any) presented by different types.

2.2.2 Formation of cloud:

(a) methods/mechanisms by which clouds form;

(b) conditions favourable to formation:
- (i) atmospheric;
- (ii) topographic.

2.2.3 Precipitation:

(a) cause of precipitation;

(b) types:
- (i) drizzle, rain, snow, hail;
- (ii) distinction between showers and rain;

(c) characteristics of precipitation:
- (i) orographic;
- (ii) frontal;
- (iii) showers;

(d) hazards presented by precipitation:
- (i) reduced visibility (for example, landing);
- (ii) icing;
- (iii) radar masking (water layer on radome);
- (iv) weight and impact (severe rain on large aircraft).

2.2.4 Thunderstorms:

(a) development of a single cell:
- (i) prerequisite conditions;
- (ii) stages of development;
- (iii) structure of mature cell;

(b) hazards presented by a thunderstorm:
- (i) down-draught (near ground);
- (ii) turbulence;
- (iii) icing;
- (iv) lightning;

(c) flight in or near thunderstorms:
- (i) hazards in flight close to thunderstorms:
- (ii) optimum flight paths/flight levels if penetration of a thunderstorm is necessary.

2.3 Motion of the atmosphere

2.3.1 Wind and pressure:

(a) relationship between isobars and wind:

(i) Buys Ballot's Law;

(b) primary cause of wind:

(i) pressure gradient;

(ii) coriolis force;

(iii) gradient wind;

(iv) convergence and divergence;

(c) diurnal variation of wind;

(d) turbulence and gustiness:

(i) factors affecting turbulence;

(ii) effect of turbulence on lapse rate.

2.3.2 Local winds:

(a) land and sea breezes;

(b) anabatic, katabatic and fohn winds;

(c) low-level jet.

2.3.3 Mountain effects:

(a) standing waves, rotors;

(b) conditions favourable to development;

(c) hazards presented by mountain effects.

2.3.4 Microbursts:

(a) structure of a microburst;

(b) meteorological conditions conducive to microburst formation;

(c) visual identifying features;

(d) hazards presented by microbursts:

(i) windshear;

(ii) effect on IAS and groundspeed;

(iii) sink rate;

(iv) turbulence;

(e) windshear reporting procedures.

2.3.5 Variation of wind with height:

(a) general/common characteristics:

(i) loss of mechanical turbulence;

(ii) tends to increase speed;

(iii) tends westerly;

(b) elementary knowledge of contour charts.

2.4 Visibility

2.4.1 Measurement of visibility:

(a) brief outline of difficulties:

(i) practical measurement of visibility;

(ii) visibility versus RVR;

(iii) visibility at night;

(b) reduced visibility:

(i) distinction between fog, mist and haze;

(c) hazards presented by reduced visibility:

(i) in flight;
(ii) on take-off or landing;
(iii) unseen obstacles on runway;
(iv) directional control, especially asymmetric roll control;
(v) obstacle avoidance if direction deviates;

(d) difference between horizontal and vertical visibility;
(e) effects of vertical visibility being greater than horizontal visibility on final approach:
(i) impression of greater visibility below aircraft's present height;
(ii) tendency to duck under glide path;
(iii) tendency to allow sink rate to increase;
(iv) reduction of visibility after flaring.

2.4.2 Fog:
(a) formation of fog:
(i) mechanism;
(ii) prerequisite conditions;
(b) synoptic conditions favourable to the formation and clearing of:
(i) radiation fog;
(ii) advection fog;
(iii) steam fog;
(iv) frontal fog.

2.4.3 Other causes of reduced visibility:
(a) effects of mist, smoke, dust, sand and sea spray;
(b) conditions favourable for such effects to develop.

2.5 Ice accretion

2.5.1 Airframe icing
(a) mechanism by which airframe ice is formed:
(b) types of icing:
(i) atmospheric conditions associated with each type;
(c) airframe areas most susceptible to icing:
(i) factors affecting type, rate and severity of icing;
(d) hazards presented by airframe icing;
(e) environmental conditions presenting an icing hazard:
(i) concept of visible moisture;
(ii) maximum and minimum air temperatures.

2.5.2 Engine icing (turbine engines only):
(a) conditions conducive to engine icing:
(i) atmospheric conditions;
(ii) aircraft conditions;
(b) sections of engine most susceptible to icing:
(i) factors affecting type, rate and severity of icing;
(c) hazards presented by engine icing.

2.5.3 Reports of icing:
(a) requirement to report;
(b) classification of degree of icing.

2.6 Air masses and fronts

2.6.1 Properties of an air mass:

(a) concept of an air mass;

(b) factors affecting the properties of an air mass:

(i) description of an air mass.

2.6.2 Classification of air masses:

(a) classification on basis of area of origin;

(b) modifications due to advection.

2.6.3 Basic synoptic analysis:

(a) high and low pressure areas:

(i) relationship with air masses;

(b) boundaries between air masses:

(i) non-frontal boundaries;

(ii) general/common situations;

(iii) ridges;

(iv) cols.

2.6.4 Fronts:

(a) warm fronts:

(i) formation/mechanism of warm front;

(ii) associated clouds and weather;

(iii) hazards presented by warm fronts;

(b) cold fronts:

(i) formation/mechanism of cold front;

(ii) associated clouds and weather;

(iii) hazards presented by cold fronts;

(c) occluded fronts:

(i) formation/mechanism of occluded front;

(ii) associated clouds and weather;

(iii) hazards presented by occluded fronts;

(d) quasi-stationary fronts:

(i) formation/mechanism of quasi-stationary front;

(ii) associated clouds and weather;

(iii) hazards presented by quasi-stationary fronts.

2.7 Air masses and frontal analysis

2.7.1 Frontal depressions:

(a) formation of frontal depressions;

(b) warm and cold fronts:

(i) occlusion process;

(c) distribution of weather;

(d) depression families and troughs;

(e) flight conditions in and over depressions.

2.7.2 Non-frontal depressions:

(a) associated weather and flying conditions;

(b) thermal, orographic and secondary depressions.

2.7.3 Anticyclones:

(a) general properties of anticyclones;

(b) cold and warm anticyclones.

2.7.4 Stream weather:

(a) general properties of streams;

(b) weather to be expected in typical stream situations.

2.8 Synoptic charts

2.8.1 Presentation of synoptic charts:

(a) common symbology and presentation of data;

(b) interpretation of data.

2.8.2 Basic analysis and prognostic rules:

(a) movement of pressure systems and development of pressure systems in the Australian region;

(b) movement of fronts and development of fronts;

(c) general prognosis of situations represented on synoptic charts:

(i) in the next 1 to 2 hours;

(ii) in the next 24 hours.

2.8.3 Aviation significance of synoptic chart:

(a) apply data from a synoptic chart to the selection of a route and destination/alternate;

(b) interpret data from a synoptic chart to estimate the surface weather expected at a selected point, at the time represented by the chart or at a time shortly later:

(i) surface wind;

(ii) type, amount and base of lowest cloud;

(iii) probability of rain;

(iv) probability of other features significant to aviation (for example, dust, fog, etc.).

2.9 Upper level weather

2.9.1 The tropopause:

(a) atmospheric division represented by the tropopause:

(i) temperature profile below and above the tropopause;

(b) variation in height of tropopause:

(i) at different latitudes;

(ii) in different seasons;

(c) variation in wind in the vicinity of the tropopause;

(d) temperature profile above the tropical and polar tropopause.

2.9.2 Upper level jet streams and CAT:

(a) recognise statements which define a jet stream;

(b) compare the strengths of typical tropical and polar jets;

(c) state conditions which may affect the strength and location of jet streams;

(d) recall that wind shear is usually greater on the polar side of the jet than on the equatorial side;

(e) list/identify signs which would suggest the presence of a jet stream and/or CAT;

(f) state pilot actions which would minimise the effect of CAT whilst flying:

(i) in the vicinity of a jet core;

(ii) in CAT not associated with a jet stream.

2.9.3 Flight conditions associated with:

(a) dense jet stream cirrus and cirrus haze;

(b) flight at high level in the vicinity of well-developed thunderstorm tops.

2.10 Upper level weather charts

2.10.1 Presentation of charts:

(a) types of charts:

(i) upper level prognostic charts (brief general discussion only);

(ii) SIGWX charts;

(iii) gridpoint wind and temperature forecasts;

(b) presentation of data and symbology used in the different charts;

(c) altitudes/mb levels commonly charted.

2.10.2 Application of upper level charts:

(a) apply data from an upper level chart to the selection of a route and destination/alternate;

(b) interpret data from an upper level chart in terms of its aviation significance;

2.11 Climatology

2.11.1 Global pressure distribution:

(a) average surface pressure and temperature distribution over the world;

(b) global circulation:

(i) average circulation patterns in the troposphere and low stratosphere and their seasonal variation;

(ii) upper winds, stream lines and seasonal variation;

(c) ITCZ and its associated weather in different areas.

2.11.2 Monsoonal weather:

(a) wet and dry seasons;

(b) typical wet and dry weather conditions;

(c) hazards presented by monsoonal weather;

(d) application of monsoonal conditions to Australia and near neighbours.

2.11.3 Tropical storms:

(a) prerequisites for development:

(i) climatic;

(ii) equatorial latitudes;

(b) global breeding grounds:

(i) understand that different areas have different local names for the same phenomenon;

(c) typical life history of storm;

(d) hazards presented by tropical storms:

(i) location of severest weather in relation to storm centre;

(e) application of tropical storms to Australia and near neighbours.

2.12 Met observations

2.12.1 Standard observation methods:

(a) knowledge of standard methods of measuring, not including knowledge of the mechanics of the various instruments:

(i) visibility;

(ii) cloud height;

(iii) pressure;

(iv) temperature;

(v) humidity;

(vi) surface wind;

(vii) upper winds.

2.12.2 Q Codes:

(a) understand the code groups QFE and QNH and understand the meaning of ‘area QNH’;:

2.12.3 Inflight observations:

(a) requirement for inflight observations by crew members;

(b) reporting criteria;

(c) form and circumstances in which observations are made and reported:

(i) AIP format for full position report.

2.12.4 Satellite observations:

(a) use of satellite photographs (visual and infra-red) to recognise and describe weather systems and air masses.

SECTION 1.9 OPERATIONS, PERFORMANCE AND PLANNING (OP)

Unit 1.9.1 POPC: PPL operations, performance and planning – all aircraft categories

1. Reserved

2. General flight planning and performance

2.1 Loading

2.1.1 Describe the following terms:

(a) arm, moment, datum, station, index unit;

(b) centre of gravity (CG) and CG limits;

(c) empty weight, zero fuel weight (ZFW), ramp weight;

(d) maximum take-off and maximum landing weights;

(e) floor loading limits.

2.2 Speed limitations

2.2.1 Explain the following terms/abbreviations:

(a) normal operating speed (V_{no});

(b) never exceed speed (V_{NE});

(c) maximum manoeuvre speed (V_A);

(d) turbulence penetration speed (V_B);

(e) limit and design load factors;

(f) flap operating speed (V_{FO}) and flap extended speed (V_{FE}).

2.2.2 Describe situations which may result in an aircraft exceeding speed limits and load factor limits.

2.3 ERSA

2.3.1 Apply all items of information contained in ERSA which are relevant to VFR (day) operations.

2.4 Flight plan preparation

2.4.1 Apply the responsibilities of a pilot in command with regard to weather and operational briefing prior to planning a VFR flight.

2.4.2 Given a route:

(a) select appropriate visual charts for the flight;

(b) list the operations for which it is mandatory to obtain meteorological and operational briefing;

(c) list the weather services available, and nominate the sources and methods of obtaining this information;

(d) apply CASA requirements/instructions for flight notification of VFR flights and state the preferred methods of submitting this notification;

2.4.3 Given an aerodrome forecast, determine whether holding or alternate requirements apply and if so:

(a) nominate an appropriate alternate aerodrome;

(b) determine the quantity of additional fuel required for holding or flight to the alternate.

2.5 PPL – completion standard

2.5.1 Given:

(a) a departure place and 2 landing points;

(b) weather and operational briefing;

(c) passenger and/or baggage requirements;

(d) appropriate performance data.

2.5.2 Complete a flight plan form after considering the following aspects:

(a) selection of safe route(s) and cruise levels to comply with VFR;

(b) selection of cruise levels in accordance with the table of cruising levels;

(c) fuel for the flight, holding fuel, fuel to an alternate aerodrome, and specified reserves;

(d) weight limitation and aeroplane balance requirements;

(e) latest departure time.

2.6 Equi-time point (ETP), point of no return (PNR), diversions

2.6.1 Describe/recognise situations that may require the calculations of an ETP or PNR.

2.6.2 Assuming a constant cruise altitude and TAS, indicate the position of an ETP between 2 points in still air.

2.6.3 Given fuel on board, use planned/given ground speed to decide which of the following courses of action would require the least fuel (including reserves):

(a) proceed to destination;

(b) return to the departure aerodrome;

(c) proceed to a suitable alternate.

2.7 Airworthiness and equipment

2.7.1 State the purpose of certificates of airworthiness and registration.

2.7.2 Given a typical scenario, extract the communication and normal and emergency equipment required to be on board an aircraft.

2.7.3 State the responsibilities of a pilot in command with regard to:

(a) daily inspections;

(b) recording/reporting aircraft defects;

(c) know the types of maintenance that may be carried out by a PPL or CPL holder, as appropriate;

(d) given a copy of a maintenance release:

(i) determine its validity;

(ii) list the class(es) of operation applicable to the aircraft;

(iii) list outstanding defects/endorsements and decide whether these affect the airworthiness of the aircraft.

Unit 1.9.2 POPA: PPL operations, performance and planning – aeroplane

1. Reserved

2. General flight planning and performance

2.1 Aerodromes and aeroplane landing areas (ALAs)

2.1.1 Explain/apply the following terms used in CASA publications and documents:

(a) take-off safety speed;

(b) take-off distance available (TODA);

(c) take-off distance required (TODR);

(d) landing distance available (LDA);

(e) landing distance required (LDR).

2.1.2 Determine whether a given ALA is suitable for an aeroplane to take-off and land safety in accordance with guidelines contained in CAAP 92.1.

2.2 Take-off and landing performance

2.2.1 State the effect (increase/decrease) of the following factors on take-off, landing, and take-off climb performance:

(a) strength of headwind/tailwind component;

(b) air temperature;

(c) QNH;

(d) density height (non-standard conditions);

(e) airfield elevation;

(f) runway slope and surface, including wet and slushy runways;

(g) ground effect and windshear;

(h) frost on an aircraft.

2.2.2 Differentiate between pressure height and density height.

2.2.3 Describe how to use an altimeter to obtain:

(a) local QNH at an aerodrome; and

(b) pressure height of an aerodrome; and

(c) elevation of an aerodrome.

2.2.4 Explain the terms:

(a) maximum structural take-off and landing weight; and

(b) climb weight limit.

2.2.5 State the likely results of exceeding aircraft weight limits.

2.3 Density height

2.3.1 Using the methods under subsection 2.3.2, determine density height, given the following:

(a) OAT and pressure height;

(b) using cockpit temperature and an altimeter setting of 1013.2 hPa.

2.3.2 For subsection 2.3.1, the methods are the following:

(a) density altitude charts;

(b) manual computer;

(c) flight manual charts;

(d) mathematics.

2.4 Take-off and landing performance

2.4.1 Use the flight manual to extract maximum structural take-off and landing weights.

2.4.2 Given a typical flight scenario, use performance charts to extract:

(a) maximum take-off weight A;

(b) maximum landing weight A;

(c) take-off distance required (TODR) B;

(d) landing distance required (LDR) B;

(e) climb weight limit;

(f) take-off parameters:

(i) power;

(ii) flap setting;

(iii) take-off safety speed;

(g) landing parameters:

(i) flap;

(ii) threshold speed;

(h) State the conditions on which the parameters listed in paragraphs (f) and (g) are based.

2.5 Climb, cruise and descent performance

2.5.1 From typical charts or tables extract/determine the following data for climb, cruise and descent:

(a) time, speed, distance, fuel flow/quantity;

(b) appropriate engine settings;

(c) rates of climb/descent;

(d) the conditions under which an aeroplane will achieve maximum range and endurance.

Unit 1.9.3 POPH: PPL operations, performance and planning – helicopter

1. Reserved

2. General flight planning and performance

2.1 Helicopter limitations

2.1.1 Describe the reason for the following limitations on helicopter performance:
(a) maximum rotor RPM – power on;
(b) maximum rotor RPM – power off;
(c) minimum rotor RPM – power on;
(d) minimum rotor RPM – power off;
(e) never exceed speed – power on;
(f) never exceed speed – power off;
(g) maximum sideways speed;
(h) maximum rearward speed;
(i) maximum take-off weight;
(j) maximum all up weight;
(k) minimum operating weight;
(l) maximum positive and negative flight load factors.

2.2 Flight manual

2.2.1 Select from a list, the information which may be obtained from a flight manual.

2.3 Density altitude

2.3.1 Match each of the following terms with an appropriately worded definition:
(a) pressure altitude;
(b) density altitude;
(c) ambient conditions;
(d) forecast conditions.

2.3.2 Calculate density altitude given pressure altitude (or elevation and QNH) and temperature.

2.4 Helicopter landing sites (HLS)

2.4.1 Recall the requirements of basic and secondary HLS in respect to:
(a) physical specifications;
(b) operational requirements;
(c) general conditions for use.

2.5 Take-off and landing weight

2.5.1 Select from a list the statement which best describes:
(a) the effect of the following variables on the take-off and/or landing performance of a helicopter:
(i) weight;
(ii) power;
(iii) ground effect;
(iv) density altitude;
(v) ambient wind component;
(b) the easiest way of determining pressure altitude from a sensitive altimeter.

2.5.2 Determine hover performance in and out of ground effect given the following:
(a) gross weight;

(b) pressure altitude;

(c) temperature;

(d) flight manual performance charts.

2.6 Forward climb performance

2.6.1 Given graphical or tabular information typical of that provided in a flight manual for a single-engine helicopter extract:

(a) the best rate of climb for various conditions of pressure altitude, temperature and weight;

(b) the service ceiling for various conditions of pressure altitude, temperature and weight.

2.7 Cruise performance

2.7.1 Given graphical or tabular information typical of that provided in a flight manual for a single-engine helicopter, calculate:

(a) maximum payload which may be carried after determining the fuel requirements and the nature of the operation;

(b) endurance for holding or search for various combinations of helicopter weight and fuel;

(c) the maximum range, given weight, fuel carried and cruising altitude.

2.8 Weight and balance

2.8.1 Recall the meaning of the following terms used in the computation of weight and balance data:

(a) datum;

(b) arm;

(c) moment;

(d) station;

(e) centre of gravity range;

(f) lateral centre of gravity range;

(g) empty weight;

(h) operating weight;

(i) maximum take-off weight (MTOW).

2.8.2 Given a typical manual for a single-engine helicopter:

(a) extract the following weight and balance information:

(i) MTOW;

(ii) capacity and arm of the baggage lockers;

(iii) capacity, arm, grade and specific gravity of the fuel;

(iv) location and arms of the seating;

(b) determine the forward, aft and lateral limits of the CG for a given weight in the case of the above helicopter;

(c) determine whether the helicopter is safely loaded for flight given various combinations of weight and balance data using arithmetical methods or the specified loading system for the helicopter;

(d) calculate the adjustment of load required to achieve a CG within specified limits if previously determined to be outside limits;

(e) calculate where to position additional load items so that the CG is retained within the specific limits.

2.9 Flight plan preparation

2.9.1 Apply the responsibilities of a pilot in command with regard to weather and operational briefing prior to planning a VFR flight.

2.9.2 Given a route, select appropriate charts for the flight and list the operations for which it is mandatory to obtain a weather briefing.

2.9.3 List the weather services available, and nominate the sources and methods of obtaining this information.

2.9.4 State the minimum flight notification required, the method(s) of submitting this notification, and identify flight plan details that must be submitted.

2.9.5 Given an aerodrome forecast, decide whether it is necessary to:

(a) nominate an alternate aerodrome; or

(b) carry additional fuel for holding, and if so determine the following:

(i) requirement to nominate an appropriate alternate aerodrome;

(ii) determine the quantity of additional fuel required for holding or flight to the alternate.

2.9.6 Given a typical flight scenario, including:

(a) departure and landing points within and outside controlled airspace;

(b) weather and operational briefing;

(c) appropriate performance data;

(d) select safe route/cruise levels to comply with VFR;

(e) select cruise levels for the following:

(i) to comply with VFR and the table of cruising levels;

(ii) which meets passenger and fuel economy requirements;

(f) determine, for the following:

(i) the minimum fuel required;

(ii) the maximum payload (passengers/cargo and fuel) that may be carried whilst meeting the appropriate requirements;

(iii) whether intermediate refuelling is necessary;

(iv) ETD/ETA after considering VFR (day) requirements and flight/duty time limitations;

(g) complete a flight plan and a loading system.

Unit 1.9.4 POPG: PPL operations, performance and planning – gyroplane – *Reserved*

Unit 1.9.5 COPC: CPL operations, performance and planning – all aircraft categories

1. Reserved

2. Flight planning and performance

2.1 Density height

2.1.1 Using the methods under subsection 2.1.2, determine density height, given the following:

(a) OAT and pressure height;

(b) using cockpit temperature and an altimeter setting of 1013.2 hPa.

2.1.2 For subsection 2.1.1, the methods are the following:

(a) density altitude charts;

(b) manual computer;

(c) flight manual charts;

(d) mathematics.

2.2 Take-off and landing

2.2.1 Use the flight manual to extract maximum structural take-off and landing weights mentioned in subsection 2.2.2 according to the requirements mentioned in subsection 2.2.3.

2.2.2 Given a typical flight scenario, for the items mentioned in subsection 2.2.3, use performance charts to extract the following:

(a) maximum take-off weight;

(b) maximum landing weight;

(c) take-off distance required (TODR);

(d) landing distance required (LDR);

(e) climb weight limit;

(f) take-off parameters – power, flap setting, take-off safety speed;

(g) landing parameters – flap, threshold speed and state the conditions on which the parameters listed in (f) and (g) are based.

2.2.3 For subsection 2.2, the following requirements apply:

(a) apply information extracted from ERSA;

(b) determine TODA and LDA at a ground ALA;

(c) apply the CASA regulatory requirements/orders as applicable to single-engine aeroplanes;

(d) extract/derive entry parameters for take-off and landing charts viz:

(i) temperature and pressure;

(ii) take-off and landing weights;

(e) extract structural weight limits from a flight manual.

3. Climb, cruise and descent performance

3.1.1 From typical charts or tables, determine the following data for climb, cruise and descent:

(a) time, speed, distance, fuel flow/quantity;

(b) appropriate engine settings;

(c) rates of climb/descent;

(d) the conditions under which an aeroplane will achieve maximum range and endurance.

3.1.2 Determine the following, using the fuel units of US gal, kg, litres:

(a) best air and ground nm/unit of fuel;

(b) least fuel/air or ground nm.

4. Weight and balance

4.1 Weight calculations

4.1.1 Calculate the following:

(a) mid-zone weight;

(b) landing weight;

(c) take-off weight at an intermediate landing point.

4.2 Loading

4.2.1 Explain the following terms:

(a) arm, moment, datum, station, index unit;

(b) CG and CG limits;

(c) mean aerodynamic chord (MAC);

(d) empty weight, ZFW, ramp weight;

(e) maximum take-off and maximum landing weights;

(f) floor loading limits.

4.2.2 Demonstrate the ability to:

(a) express CG as a % of MAC;

(b) determine CG position relative to the datum;

(c) determine movement of CG with changes in load distribution and mass.

4.2.3 Given appropriate data use a typical loading system or a load sheet to distribute load to maintain CG within limits throughout a flight. This objective requires the ability to perform 1 or more of the following tasks:

(a) extract the following weight limits from a flight manual:

(i) empty weight ZFW;

(ii) maximum structural take-off and landing weight.

(b) determine the following:

(i) maximum payload;

(ii) maximum load per station;

(iii) maximum floor loading capacities;

(iv) fore and aft CG limits for a given/derived weight;

(v) weight of fuel/ballast to be carried;

(c) determine the following:

(i) the maximum payload/fuel that may be carried;

(ii) ballast requirements, if any;

(iii) the position of the CG under different load configurations.

5. Flight plan preparation

5.1.1 Apply the responsibilities of a pilot in command with regard to weather and operational briefing prior to planning a VFR flight.

5.1.2 Given a route applicable to the level of licence and type of operation viz. OCTA/CTA, do the following:

(a) select appropriate visual charts for the flight;

(b) list the operations for which it is mandatory to obtain meteorological and operational briefing;

(c) list the weather services available, and nominate the sources and methods of obtaining this information;

(d) apply CASA requirements/instructions for flight notification of VFR flights and state the preferred methods of submitting this notification.

5.1.3 Given an aerodrome forecast determine whether holding or alternate requirements apply and if so, for the following:

(a) nominate an appropriate alternate aerodrome;

(b) determine the quantity of additional fuel required for holding or flight to the alternate.

5.2 Flight planning

5.2.1 Reserved

5.2.2 For a domestic flight plan form:

(a) given the following:

(i) a typical training navigation route (OCTA/CTA), as applicable;

(ii) appropriate weather and operational briefing;

(iii) aircraft (type) planning data and fuel at start up; and

(b) apply the fuel policy described in CAAP 234-1(0); and

(c) select correct (safe) cruise levels; and

(d) enter information correctly in the flight plan form; and

(e) submit appropriate flight notification details; and

(f) determine minimum (safe) fuel and endurance; and

(g) demonstrate accuracy in computations:

(i) HDG +/- 5°, ETI +/- 2 mins; and

(ii) fuel and endurance +5%.

5.2.3 Given the following:

(a) a departure place and 2 landing points;

(b) weather and operational briefing;

(c) passenger and/or baggage requirements;

(d) appropriate performance data;

then complete a flight plan form after considering the following aspects:

(e) selection of safe route(s) and cruise levels to comply with VFR;

(f) selection of cruise levels in accordance with the table of cruising levels;

(g) fuel for the flight, holding fuel, fuel to an alternate aerodrome, and specified reserves;

(h) weight limitation and aeroplane balance requirements;

(i) latest departure time.

5.2.4 Given a typical commercial task, including the following, do the things mentioned in paragraphs (d), (e), (f) and (g):

(a) departure and landing points within and/or outside controlled airspace;

(b) weather and operational briefing;

(c) appropriate performance data;

then:

(d) select safe routes to comply to VFR;

(e) select cruise levels as follows:

(i) to comply with VFR and the table of cruising levels;

(ii) which meet passenger and fuel economy requirements;

(f) determine the following:

(iii) the minimum (safe) fuel required;

(iv) the maximum payload (passengers/cargo and fuel) that may be carried;

(v) whether intermediate refuelling is necessary;

(vi) ETD and ETA after considering day VFR requirements, flight/duty time limitations and commercial considerations;

(g) complete a flight plan form and a loading system.

5.3 Equi-time point (ETP), point of no return (PNR), diversions

5.3.1 Given fuel on board, use planned/given ground speed to decide which of the following courses of action would require the least fuel (including reserves):

(a) proceed to destination;

(b) return to the departure aerodrome;

(c) proceed to a suitable alternate.

5.3.2 Calculate time and distance to an ETP or PNR between 2 points, using planned or given data.

Unit 1.9.6 COPA: CPL operations, performance and planning – aeroplane

1. Reserved

2. Operational knowledge

2.1 Aerodromes and aeroplane landing areas (ALAs)

2.1.1 ALAs are included as a topic in this syllabus pursuant to a pilot’s responsibilities in accordance with CASA regulations.

2.1.2 Explain and apply the following terms used in CASA publications and documents:

(a) take-off safety speed;

(b) take-off distance available (TODA);

(c) take-off distance required (TODR);

(d) landing distance available (LDA);

(e) landing distance required (LDR).

2.1.3 Determine whether a given aerodrome or ALA is suitable for an aeroplane to take-off and land safety in accordance with guidelines contained in CASA guidance material.

2.2 Climb, cruise and descent performance

2.2.1 From typical charts or tables extract/determine the following data for climb, cruise and descent:

(a) time, speed, distance, fuel flow/quantity;

(b) appropriate engine settings;

(c) rates of climb/descent;

(d) the conditions under which an aeroplane will achieve maximum range and endurance.

2.2.2 Determine the:

(a) best air and ground nm/unit of fuel (for example, 2.5 nm/kg);

(b) least fuel/air or ground nm (for example, 0.4 kg/nm).

3. Fuel units

3.1.1 Using US Gal, kg and litres, estimate:

(a) mid-zone weight;

(b) landing weight;

(c) take-off weight at an intermediate landing point.

Unit 1.9.7 COPH: CPL operations, performance and planning – helicopter

1 Reserved

1. Operational knowledge

1.1 Helicopter limitations

1.1.1 Describe the reason for following operational limitation on helicopter performance:

(a) maximum rotor RPM – power on;
(b) maximum rotor RPM – power off;
(c) minimum rotor RPM – power on;
(d) minimum rotor RPM – power off;
(e) never exceed speed – power on;
(f) never exceed speed – power off;
(g) maximum sideways speed;
(h) maximum rearward speed;
(i) maximum take-off weight;
(j) maximum all up weight;
(k) minimum operating weight;
(l) maximum positive and negative flight load factors.

1.2 Helicopter landing sites (HLS)

1.2.1 Recall the requirements of basic and secondary HLS in respect to:

(a) physical specifications;
(b) operational requirements;
(c) general conditions for use.

1.3 Take-off and landing weight

1.3.1 Select from a list the statement which best describes:

(a) the effect of the following variables on the take-off and/or landing performance of a helicopter:
  (i) weight;
  (ii) power;
  (iii) ground effect;
  (iv) density altitude;
  (v) ambient wind component;
(b) the easiest way of determining pressure altitude from a sensitive altimeter.

1.3.2 Determine hover performance in and out of ground effect given the following:

(a) gross weight;
(b) pressure altitude;
(c) temperature;
(d) flight manual performance charts.

1.4 Forward climb performance

1.4.1 Given graphical or tabular information typical of that provided in a flight manual for a single-engine helicopter extract:

(a) the best rate of climb for various conditions of pressure altitude, temperature and weight;
(b) the service ceiling for various conditions of pressure altitude, temperature and weight.

1.5 Cruise performance

1.5.1 Given graphical or tabular information typical of that provided in a flight manual for a single-engine helicopter, calculate:

(a) maximum payload which may be carried after determining the fuel requirements and the nature of the operation;

(b) endurance for holding or search for various combinations of helicopter weight and fuel;

(c) the maximum range, given weight, fuel carried and cruising altitude.

1.6 Weight and balance

1.6.1 Recall the meaning of the following terms used in the computation of weight and balance data:

(a) datum;

(b) arm;

(c) moment;

(d) station;

(e) centre of gravity range;

(f) lateral centre of gravity range;

(g) empty weight;

(h) operating weight;

(i) maximum take-off weight (MTOW).

1.6.2 Given a typical manual for a single-engine helicopter:

(a) extract the following weight and balance information:

(i) MTOW;

(ii) capacity and arm of the baggage lockers;

(iii) capacity, arm, grade and specific gravity of the fuel;

(iv) location and arms of the seating;

(b) determine the forward, aft and lateral limits of the CG for a given weight in the case of the above helicopter;

(c) determine whether the helicopter is safely loaded for flight given various combinations of weight and balance data using arithmetical methods or the specified loading system for the helicopter;

(d) calculate the adjustment of load required to achieve a CG within specified limits if previously determined to be outside limits;

(e) calculate where to position additional load items so that the CG is retained within the specific limits.

1.7 Flight plan preparation

1.7.1 Apply the responsibilities of a pilot in command with regard to weather and operational briefing prior to planning a VFR flight.

1.7.2 Given a route, select appropriate charts for the flight and list the operations for which it is mandatory to obtain a weather briefing.

1.7.3 List the weather services available, and nominate the sources and methods of obtaining this information.

1.7.4 State the minimum flight notification required, the method(s) of submitting this notification, and identify the flight plan details that must be submitted.

1.7.5 Given an aerodrome forecast, decide whether it is necessary to the following:

(a) nominate an alternate aerodrome;

(b) carry additional fuel for holding and if so:

(i) nominate an appropriate alternate aerodrome;

(ii) determine the quantity of additional fuel required for holding or flight to the alternate.

1.7.6 Given a typical flight scenario, including:

(a) departure and landing points within and outside controlled airspace;

(b) weather and operational briefing;

(c) appropriate performance data;

(d) select safe route/cruise levels to comply with VFR;

(e) select cruise levels for the following:

(i) to comply with VFR and the table of cruising levels;

(ii) which meets passenger and fuel economy requirements;

(f) determine for the following:

(i) the minimum fuel required;

(ii) the maximum payload (passengers/cargo and fuel) that may be carried whilst meeting the appropriate requirements;

(iii) whether intermediate refuelling is necessary;

(iv) ETD/ETA after considering VFR (day) requirements and flight/duty time limitations;

(g) complete a flight plan and a loading system.

Unit 1.9.8 COPG: CPL operations, performance and planning – gyroplane – *Reserved*

Unit 1.9.9 COPP: CPL operations, performance and planning – powered-lift – *Reserved*

Unit 1.9.10 COPS: CPL operations, performance and planning – airship – *Reserved*

SECTION 1.10 FLIGHT PLANNING (FP)

Unit 1.10.1 AFPC: ATPL flight planning – all aircraft categories – *Reserved*

Unit 1.10.2 AFPA: ATPL flight planning – aeroplane

1. Reserved

2. Flight planning and flight monitoring

2.1 Practical considerations

2.1.1 Complete a practical flight planning exercise using specified initial conditions and operations manual data. Other conditions may be inserted or varied en route for test purposes. The exercise is intended as a consolidated test of a candidate's ability to apply flight planning, performance and navigational principles, and will include:

(a) determine take-off limits with consideration of the following as applicable:
- (i) selection of runway;
- (ii) payload/fuel uplift capability;
- (iii) MTOW, including limits imposed by cruise or landing factors;
- (iv) calculation of V-speeds and take-off distances;

(b) preparation of a weight and balance proforma:
- (i) adjustment of load/fuel if required;

(c) selection of route and altitude:
- (i) allowing for wind and temperature;
- (ii) based on (given) forecast or actual conditions:
  - (A) synoptic;
  - (B) SIGMET;
  - (C) upper winds;
  - (D) TAF/METARs;
- (iii) including departure, destination and alternate requirements;

(d) preparation of a fuel plan:
- (i) sector fuel burns;
- (ii) total fuel burn;
- (iii) alternate and reserve fuel;
- (iv) total fuel required;

(e) preparation of a navigation plan:
- (i) sector times, distances, tracks;
- (ii) headings and ground speeds;
- (iii) minimum en route altitudes;
- (iv) allowance for climb and descent;

(f) inflight computations, revisions or replanning:
- (i) fuel state, fuel requirements, fuel reserves;
- (ii) navigational progress:
  - (A) tracks, ETAs, en route wind;
- (iii) diversion from track;
- (iv) change of cruising level;
- (v) engine-out flight;
- (vi) holding;
- (vii) assisting in search;

(g) interpretation of AIP maps and symbols;

(h) interpretation of (given) ATC requirements:
    (i) SID and/or STAR routings;
    (ii) DME descent steps;
(i) calculation of the following types of CP (ETP) and PNR:
    (i) normal;
    (ii) engine-out;
    (iii) depressurised.

Unit 1.10.3 AFPH: ATPL flight planning – helicopter

1. Reserved

2. Flight planning

2.1 Practical considerations

2.1.1 Complete a practical fight planning exercise using specified initial conditions and operations manual data:

(a) determine take-off limits with consideration of the following as applicable:

(i) payload/fuel uplift capability;

(ii) MTOW, including limits imposed by cruise factors;

(b) prepare a weight and balance proforma:

(i) adjustment of load/fuel it required;

(c) selection of route and altitude:

(i) allowing for wind and temperature;

(ii) based on (given) forecast or actual conditions from the following meteorological reports/forecasts with consideration of departure, destination and alternate requirements;

(iii) synoptic;

(iv) SIGMET;

(v) winds;

(vi) TAF, TTF, METARs;

(d) preparation of a fuel plan:

(i) sector fuel burns;

(ii) mid-zone weight (MZW);

(iii) total fuel burn;

(iv) alternate and reserve fuel;

(v) total fuel required;

(e) preparation of a navigation plan:

(i) sector times, distances, tracks;

(ii) headings and ground speeds;

(iii) minimum en route altitudes;

(iv) allowance for climb and descent;

(v) lowest safe altitudes;

(f) inflight computations, revisions or replanning:

(i) fuel state, fuel requirements, fuel reserves;

(ii) navigational progress, including tracks, ETAs, en route wind;

(iii) diversion from track;

(iv) change of cruising level;

(v) engine-out flight;

(g) interpretation of AIP maps and symbols;

(h) interpretation of (given) ATC requirements;

(i) SID and/or STAR routings;

(ii) DME and GNSS descent steps;

(i) calculation of the following types of CP (ETP) and PNR:

(i) normal;

(ii) engine-out.

2.2 Pre-flight considerations

2.2.1 Aircraft equipment fits.

2.2.2 General helicopter exemptions:

(a) performance of straight in approaches;

(b) turns before 500 ft after take-off;

(c) non-requirement to conduct flight control checks before take-off;

(d) refuelling requirements;

(e) crew seating requirements;

(f) hoisting, rappelling and sling loads.

SECTION 1.11 ATPL PERFORMANCE AND LOADING (PL)

Unit 1.11.1 APLC: ATPL performance and loading – all aircraft categories – *Reserved*

Unit 1.11.2 APLA: ATPL performance and loading – aeroplane

1. Reserved

2. Take-off and landing performance

2.1 Terminology

2.1.1 Explain the following terms in the context of take-off and landing performance:

(a) speeds:
- (i) V_1, V_R, V_2;
- (ii) V_S and derivatives (for example, 1.3 V_S);
- (iii) maximum rate and maximum angle climb speed;
- (iv) $V_{MCA,}$ V_{MCG};
- (v) flap retraction speed schedule;

(b) distances:
- (i) TORR/TORA, TODR/TODA, ASDR/ASDA, LDR/LDA;
- (ii) balanced field length;
- (iii) clearway, stopway;

(c) weights:
- (i) TOW/MTOW, LW/MLW, ZFW/MZFW;
- (ii) basic operating weight;
- (iii) useable fuel;
- (iv) payload;

(d) take-off segments:
- (i) first, second, third and fourth segments;

(e) pavement segments:
- (i) LCN, CAN, PCN;
- (ii) pavement concession;
- (iii) wheel loading.

2.2 Theory – take-off performance

2.2.1 Runway:

(a) derivation/basis of take-off distance;

(b) derivation/basis of accelerate-stop distance:
- (i) delay factors assumed;
- (ii) use of reverse thrust;

(c) derivation/basis of V_1;

(d) concept of balanced field length;

(e) clearways and stopways:
- (i) function;
- (ii) effect on V_1;
- (iii) effect on TOW when runway-limited;

(f) V_R and V_2:
- (i) interrelationship with V_1;
- (ii) range of acceptable values;

(g) allowance for headwind/tailwind;
(h) allowance for abnormal runway surfaces:
  (i) wet;
  (ii) standing water/snow;
  (iii) gravel.

2.2.2 Take-off climb:
(a) concept/purpose of take-off segments;
(b) composition of segments:
  (i) first;
  (ii) second;
  (iii) third;
  (iv) fourth;
(c) take-off climb gradients:
  (i) distinction between gross and net gradient;
  (ii) purpose of net gradient;
(d) gradients required in each segment:
  (i) gross and net;
  (ii) two-, three- and four-engine aircraft;
(e) obstacle clearance requirements:
  (i) take-off area (IMC case only);
  (ii) vertical clearance;
(f) curved departures:
  (i) point at which turn may commence;
  (ii) bank angle;
  (iii) vertical clearance.

2.2.3 Take-off weight restrictions:
(a) factors affecting the maximum permissible take-off weight, including;
  (i) structural limit;
  (ii) TODA limit;
  (iii) ASDA limit;
  (iv) second-segment climb limit;
  (v) effect of different flap settings:
    (A) lift-off speed;
    (B) lift-off distance;
    (C) second segment performance;
  (vi) effect of increased V_2 (‘V_2 overspeed’):
    (A) lift-off speed;
    (B) lift-off distance;
    (C) second segment climb performance;
  (vii) typical penalties applied for non-standard take-off:
    (A) line-up allowance;
    (B) use of anti-ice;
    (C) non-availability of reverse thrust;
    (D) non-availability of anti-skid braking;
    (E) non-availability of ground spoilers;
    (F) abnormal runway surface.

2.2.4 Effects of operating technique:

(a) explain the effects of early or late rotation speed:

(i) runway distance to lift-off;

(ii) vertical clearance at runway end;

(b) explain the effects of too-rapid or too-slow rotation rate:

(i) runway distance to lift-off;

(ii) obstacle clearance;

(c) possibility of tail-strike or stall with early or rapid rotation.

2.2.5 Take-off thrust de-rating:

(a) concept of de-rated thrust;

(b) typical restrictions/limitations on use of de-rate;

(c) typical de-rate values.

2.3 Practical application – take-off

(a) use typical operations manual data to determine either:

(i) MTOW on given runway; or

(ii) minimum runway length at given take-off weight incorporating any or all of the following variables:

(A) runway slope;

(B) wet runway;

(C) wind component;

(D) temperature;

(E) altitude;

(F) flap setting;

(G) engine type and/or power derate setting;

(H) obstacles of various heights at various distances;

(b) use typical operations manual data to determine V_1, V_R and V_2.

2.4 Theory – landing performance

2.4.1 Runway:

(a) derivation/basis of landing distance:

(i) certification landing technique;

(ii) factoring;

(b) normal/abnormal runway surfaces;

(c) allowance for wind.

2.4.2 Approach and touchdown:

(a) determination/basis of VREF:

(i) nominally 1.3 V_S;

(ii) typical additives for gust;

(b) nominal approach path:

(i) 3^o-degree slope;

(ii) runway aim point (1,000 ft from threshold);

(iii) threshold crossing height;

(iv) compare with certification landing technique;

(c) effect of different flap settings:

(i) approach speed;

(ii) visibility (cockpit cutoff angle);

(iii) low-speed stability;

(iv) go-around capability.

2.4.3 Flight path gradients – landing:

(a) net path at 1,500 ft above airfield;

(b) missed approach climb:

(i) configuration;

(ii) required gradients for two-, three- and four-engine aircraft;

(c) landing climb:

(i) configuration;

(ii) required gradients for two-, three- and four-engine aircraft.

2.4.4 Landing weight restrictions:

(a) explain the factors affecting the maximum permissible landing weight, including:

(i) structural limit;

(ii) LDA limit;

(iii) missed approach climb limit;

(iv) landing climb limit;

(v) typical penalties applied for non-standard landing:

(A) non-availability of reverse thrust;

(B) non-availability of anti-skid;

(C) non-availability of ground spoilers;

(vi) abnormal runway surface.

2.4.5 Effects of operating technique:

(a) effect of excessive touchdown speed;

(b) effect of late touchdown such as prolonged flare and holding off;

(c) effect of delayed reverse thrust.

2.5 Practical application – landing

(a) using typical operations manual data, calculate each of the following:

(i) MLW on given runway; or

(ii) minimum runway length at given landing weight incorporating any or all of the following variables:

(A) runway slope;

(B) wet runway;

(C) wind component;

(D) temperature;

(E) altitude;

(F) flap setting;

(iii) Reference velocity ($V_{REF)}$; and

(b) using typical operations manual data:

(i) calculate the MTOW and the MLW, taking into consideration the limiting factors that are applicable to the given circumstances, and then deciding which of those factors is the critically limiting one, being aware that the TOW might be limited by cruising level or landing factors; and

(ii) determine the limiting variable for a given take-off situation (for example, the limiting temperature at which a given take-off can be made).

3. <u>Climb, cruise and descent performance</u>

3.1 Terminology

3.1.1 Understand and be able to use terms in correct context:

(a) LRC;

(b) specific range;

(c) PNR;
(d) point of safe diversion (PSD);
(e) ETP;
(f) ISA and temperature derivatives (for example, ISA+10°).

3.2 Theory

3.2.1 Basis of speed and thrust management:
(a) basic theory:
(i) drag (thrust) versus speed;
(ii) thrust/speed required for minimum drag;
(iii) thrust/speed required for minimum fuel consumption;
(iv) specific range;
(v) thrust available versus thrust required;
(vi) excess thrust;
(vii) climb speeds;
(viii) best rate of climb;
(ix) best angle of climb;
(x) graphical representations of the above.
(b) effect of altitude and temperature variations:
(i) fuel consumption;
(ii) range;
(iii) specific range;
(iv) rate of climb.

3.2.2 Effect of operational decisions:
(a) factors affecting choice of cruise speed (general discussion only):
(i) direct costs;
(ii) indirect costs;
(iii) scheduled departure/arrival times;
(iv) effect on connecting flights;
(v) effects of competition;
(vi) making up for delayed departure;
(b) selection of cruise schedules:
(i) economic cruise;
(ii) LRC;
(iii) use of high-speed cruise;
(iv) selection of cruise altitude;
(v) performance index for FMS input;
(c) selection of descent point:
(i) fuel used on descent;
(ii) fuel used at low level;
(iii) effect of early/late descent;
(d) engine-out considerations.

3.2.3 En route flight path gradients:
(a) en route climb gradient:
(i) two-engine aircraft;
(ii) three- and four-engine aircraft;
(b) en route obstacle clearance (IMC case):

(i) horizontal distance from obstacles;

(ii) vertical clearance of obstacles;

(iii) net gradient required at minimum clearance;

(c) drift-down procedure:

(i) increased vertical clearance required.

3.3 Practical application

3.3.1 For the climb segment, given appropriate initial data, including variations from ISA, use typical operations manual information to determine each of the following:

(a) time/distance/fuel used to a given altitude;

(b) altitude reached after a given time or distance;

(c) fuel/distance/time requirements for intermediate level changes.

3.3.2 Cruise and descent:

(a) given appropriate initial data, including variations from ISA, use typical operations manual information to determine, under normal and engine-out conditions:

(i) maximum and optimum cruise levels;

(ii) TAS and fuel consumption at specified altitudes, adjusting for use of airconditioning packs, bleed air, etc. as required;

(iii) maximum weight or temperature at which specified performance and/or altitudes can be attained;

(iv) holding speeds and fuel consumption at specified and optimum altitudes;

(v) appropriate descent points and calculate time/fuel used on descent.

4. Weight and balance

4.1 Terminology

4.1.1 Explain, and be able to apply, the following terms and concepts in their correct context:

(a) CG;

(b) moment arm;

(c) CG index;

(d) CG envelope;

(e) loading zones;

(f) floor limits;

(g) basic weight;

(h) zero-fuel weight;

(i) average weights for passengers and baggage;

(j) approved load control system.

4.2 Theory

4.2.1 Basic weight and balance:

(a) explain the basic theory of CG and moments in respect to the following:

(i) CG index;

(ii) CG envelope;

(b) explain the following terminology for weights:

(i) basic weight;

(ii) operating weight;

(iii) zero-fuel weight;

(iv) fuel weight;

(v) payload;

(c) explain the consequences of overloading on:

(i) take-off performance;

(ii) climb/cruise performance;

(iii) aircraft structure;

(d) understand requirement for passenger seal allocation and need to control seating changes in large aircraft.

4.2.2 Load control system:

(a) describe purpose/function of a load control system:

(i) weight control authority;

(b) describe requirements and responsibilities of approved load controllers (ALC);

(c) describe responsibilities of pilot in command;

(d) describe the requirements for load sheet and explain the contents.

4.3 Practical application

4.3.1 Use typical operations manual information to extract weight and balance data:

(a) given appropriate initial data, determine any or all of:

(i) CG at empty weight;

(ii) movement of CG with addition of fuel and payload;

(iii) movement of CG due to fuel consumption in flight;

(iv) effect on CG of raising/lowering undercarriage and/or flaps;

(b) determine CG limits for take-off, cruise and landing;

(c) determine adjustments (if any) required to fuel or payload to permit operations within the CG envelope;

(d) passenger load may be presented as block loads (for example, 24 adults in Zone A, 36 adults and 4 children in Zone B, etc.).

4.3.2 Given appropriate initial data, assess a completed weight and balance proforma and determine whether it is acceptable for flight.

Unit 1.11.3 APLH: ATPL performance and loading – helicopter

1. Reserved

2. Take-off and landing performance

2.1 Terminology

2.1.1 Explain the following terms in the context of take-off and landing performance:

(a) speeds:

(i) V_{TOSS}, V_{YSE};

(ii) maximum rate and maximum angle climb speed;

(iii) CDP (speed/time), LDP;

(b) distance (a basic understanding is required at the ATPL level):

(i) TORR/TORA, TODR/TODA, ASDR/ASDA, LDR/LDA;

(ii) balanced field length;

(iii) clearway, stopway;

(c) weights:

(i) TOW/MTOW, LW/MLW, ZFW/MZFW;

(ii) basic operating weight;

(iii) useable fuel;

(iv) payload;

(d) pavement parameters:

(i) LCN, ACN, PCN;

(ii) pavement concession;

(iii) wheel loading.

2.2 Theory – take-off performance

2.2.1 For runways and helipads, explain the following:

(a) derivation of take-off distance;

(b) derivation of accelerate-stop distance with delay factors assumed;

(c) clearways and stopways and their function;

(d) allowance for headwind and tailwind.

2.2.2 For take-off performance, explain the following:

(a) concept and purpose of take-off segments;

(b) composition of the first, second, third and fourth segments:

(c) take-off climb gradients, including:

(i) distinction between gross and net gradient; and

(ii) purpose of net gradient;

(d) gradients required in each segment, including:

(i) gross and net obstacle clearance requirements take-off area (IMC case only); and

(ii) vertical clearance;

(e) for curved departures, the point at which turn may commence taking into account vertical clearance.

2.2.3 Take-off weight restrictions:

(a) describe the following factors that affect the maximum permissible take-off weight:

(i) structural limit;

(ii) en route accountability VFR;

(iii) en route accountability night/IFR;

(iv) second-segment climb limit;

(v) landing weight;

(vi) en route climb requirement.

2.2.4 Explain power assessment.

2.3 Practical application – take-off

2.3.1 Use typical flight manual data to determine each of the following:

(a) MTOW for a given runway or helipad;

(b) minimum runway length at given take-off weight incorporating each of the following variables:

(i) wind component;

(ii) temperature;

(iii) altitude;

(iv) engine type and/or power setting.

2.4 Theory – landing performance

2.4.1 For runway landing performance, explain the derivation and basis of landing distance for the following:

(a) certification landing technique;

(b) factoring;

(c) allowance for wind.

2.4.2 For approach and touchdown performance, explain the determination of the nominal landing decision point (LDP):

2.4.3 For landing weight restrictions, explain the factors affecting the maximum permissible landing weight.

2.4.4 Describe effects of different operating techniques on landing performance.

2.5 Practical application-landing

2.5.1 Using typical flight manual data

(a) calculate each of the following:

(i) MLW for a given runway or helipad;

(ii) MTOW and MLW taking into considering the limitations applicable to the given circumstances, including deciding which of those factors is the critical limiting one, being aware that the TOW may be limited by cruising level or landing factors; and

(b) determine the limiting variable for a given take-off situation (for example, the limiting temperature at which a given take-off can be made).

3. <u>Climb, cruise and descent performance</u>

3.1 Terminology

3.1.1 Understand and be able to use terms in correct context:

(a) LRC;

(b) specific range;

(c) PNR;

(d) point of safe diversion (PSD);

(e) CP or ETP;

(f) ISA and temperature derivatives (for example, ISA+10^{o}).

3.2 Theory

3.2.1 Basis of speed management:

(a) effect of altitude and temperature variations:

(i) fuel consumption;

(ii) range;

(iii) specific range;

(iv) rate of climb.

3.2.2 Effect of operational decisions:

(a) factors affecting choice of cruise speed;

(b) selection of descent point;

(c) engine-out considerations.

3.2.3 En route flight path gradients:

(a) en route climb gradient;

(b) en route obstacle clearance (IMC case):

(i) horizontal distance from obstacles;

(ii) vertical clearance of obstacles;

(iii) net gradient required at minimum clearance;

(c) drift down procedure:

(i) increased vertical clearance required.

3.3 Practical application

3.3.1 Climb:

(a) given appropriate initial data, including variations from ISA, use typical flight manual information to determine:

(i) time/distance/fuel used to a given altitude, or altitude reached after a given time or distance.

3.3.2 Cruise and descent:

(a) given appropriate initial data, including variations from ISA, use typical flight manual information to determine, under normal and engine-out conditions:

(i) maximum and optimum cruise levels;

(ii) TAS and fuel consumption at specified altitudes, adjusting for use of bleed air, etc., as required;

(iii) maximum weight or temperature at which specified performance and/or altitudes can be attained;

(iv) holding speeds and fuel consumption at specified and optimum altitudes;

(v) appropriate descent points and calculate time on descent.

4. Weight and balance

4.1 Terminology

4.1.1 Understand, and be able to apply, in correct context the following terms and concepts:

(a) CG;

(b) moment arm;

(c) CG index;

(d) CG envelope;

(e) loading zones;

(f) floor limits;

(g) basic weight;

(h) zero-fuel weight;

(i) average weights for passengers and baggage;

(j) approved load control system.

4.2 Theory

4.2.1 Basic weight and balance:

(a) review basic theory of CG and moments:

(i) CG index and CG envelope;

(b) review standard terminology for weights:

(i) basic weight, operating weight, zero-fuel weight;

(ii) fuel weight, payload;

(c) understand the consequences of overloading on:

(i) take-off performance;

(ii) climb/cruise performance, aircraft structure;

(d) understand requirement for passenger seat allocation and need to control seating changes in large aircraft;

(e) effect of weight on autorotation and landing.

4.2.2 Load control system:

(a) purpose/function of a load control system:

(i) weight control authority;

(b) approved load controlled (ALC):

(i) responsibility of ALC;

(c) responsibilities of pilot in command:

(i) pilots may assume responsibilities of ALC;

(d) load sheet;

(i) requirements;

(ii) contents.

4.3 Practical application

4.3.1 Use typical flight manual information to extract weight and balance data:

(a) given appropriate initial data, determine any or all of:

(i) CG at empty weight;

(ii) movement of CG with addition of fuel and payload;

(iii) movement of CG due to fuel consumption in flight;

(iv) effect on CG of raising/lowering undercarriage;

(b) determine CG limits for take-off, cruise and landing;

(c) determine adjustments (if any) required to the payload to permit operations within the CG envelope.

4.3.2 Given appropriate initial data, assess a completed weight and balance proforma and determine whether it is acceptable for flight.

4.3.3 Sling load/hoist:

(a) effects on CG.

Unit 1.11.4 APLP: ATPL performance and loading – powered-lift – *Reserved*

APPENDIX 2. OPERATIONAL RATINGS

SECTION 2.1 INSTRUMENT RATING

Unit 2.1.1 IREX: Instrument rating

1. Reserved

2. General operational knowledge

2.1 Privileges and limitations conferred by an instrument rating

2.1.1 Describe the privileges of an instrument rating.

2.1.2 State the limitations of an instrument rating, including proficiency checks and recent experience requirements.

2.1.3 State limitations for the conduct of a flight under the IFR in a type rated aircraft.

2.2 Documents

2.2.1 List the documents that must be carried on an IFR flight.

2.3 Procedures, radiotelephony and charts

2.3.1 Operation and limitations of flight instruments required to conduct a flight under the IFR.

2.3.2 Standard radio communication phraseology used to conduct IFR operations in accordance with AIP.

2.3.3 Procedure to be followed in the event of loss of radio communications in different phases of flight.

2.3.4 Requirements for notifying ATC of changes in estimated time of arrival at waypoint in flight.

2.3.5 Symbology and interpretation of information published on charts used to conduct operations under the IFR.

2.3.6 Reporting requirements for a descent, approach and landing at an aerodrome outside controlled airspace.

2.3.7 Differences between 2D and 3D instrument approach operations.

2.3.8 Difference between the minimum altitude MDA and DA when published on an instrument approach chart and the pilot responsibilities.

2.3.9 How variations in temperature above and below ISA affect altimeter accuracy.

2.3.10 Pilot responsibilities when conducting 3D instrument approach operations in temperatures below ISA.

2.3.11 Validity period of flight plans submitted to ATC.

2.3.12 Pilot obligations for cancellation of SAR.

2.3.13 The circumstances in which a missed approach must be conducted.

2.3.14 The criteria for determining the published alternate aerodrome weather minimum specified for an aerodrome and its use in planning.

2.3.15 Aircraft separation standards from other IFR and VFR aircraft.

2.3.16 Procedure/s for operating PAL systems.

2.3.17 The principles of operation and limitations of runway visual approach slope lighting systems used in Australia.

2.3.18 Pilot responsibilities for compliance with the following procedures:

(a) SID;

(b) STAR;

(c) Noise abatement;

(d) Missed approach;

(e) Holding pattern and entry.

2.3.19 Operation of aircraft transponders.

2.3.20 Limitations on use of radar when on the ground.

3. Meteorology

3.1 Weather phenomena

3.1.1 Seasonal variations in the location and frequency of the following phenomena and their impact on IFR operations:

(a) frontal weather;

(b) tropical cyclones;

(c) dust devils;

(d) thunderstorms;

(e) jetstreams;

(f) fog.

3.2 Meteorological information

3.2.1 Requirements for obtaining meteorological information to conduct a flight under the IFR.

3.2.2 Interpret meteorological forecasts required to conduct an IFR flight to determine the operational requirements that apply in accordance with AIP.

3.2.3 Given air temperature in clear air or in cloud, determine approximate height of freezing level, using a temperature lapse rate of 3°C per 1,000 ft in clear air and 1.5°C in cloud.

3.2.4 Given pilot observations, either in clear air or in cloud, of any 1 or more of the following phenomena — turbulence, precipitation, temperature, cloud type predict the probability and likely duration of the following:

(a) airframe icing;

(b) hail;

(c) micro bursts and wind shear;

(d) turbulence (including CAT).

3.2.5 Interpret meteorological information required to conduct a flight under the IFR to determine the possibility of turbulence for the planned route.

3.2.6 Sources for obtaining updates to weather information in flight, including the Volmet service as detailed in AIP.

3.2.7 Obligations for reporting variations to forecast meteorological conditions.

3.3 Sources of altimeter QNH required to conduct operations under the IFR

3.4 Meteorological minima

3.4.1 State the minimum meteorological conditions required for take-off.

4. Operational planning requirements

4.1 Flight plan

4.1.1 Plan an IFR flight between aerodromes in Australia in accordance with the requirements specified in AIP and considering the following:

(a) route limitations;

(b) aircraft performance and forecast freezing level;

(c) table of cruising altitudes/levels.

4.1.2 Determine RNP requirements applicable to an IFR flight.

4.2 Alternate requirements

4.2.1 Describe the alternate aerodrome requirements for the following:

(a) weather;

(b) navigation aids or approach procedures;

(c) aerodrome lighting (including personnel in attendance requirements);

(d) availability of weather reports;

(e) divert time.

4.2.2 Determine holding fuel requirements for:

(a) weather; and

(b) traffic;

4.2.3 When NGT VFR operations are planned on last route segment, determine the following:

(a) pilot night recency requirements;

(b) alternate requirements;

(c) airways clearance requirements.

4.2.4 Requirements when weather conditions at the planned destination deteriorate below conditions prescribed for alternate or landing minima after the flight commences.

4.2.5 The implications of each type of RAIM prediction on operational requirements.

4.3 Lowest safe altitude

4.3.1 Calculate LSALT for a route not specified in AIP charts.

4.3.2 The minimum obstacle clearance criteria for a missed approach as specified in IAL.

4.3.3 The minimum obstacle clearance provided by the minimum circling altitude for different performance category IFR aircraft as defined in IAL, both day and night.

4.3.4 The requirements for establishing the aircraft on track after take-off.

4.3.5 Describe the requirements to establish the aircraft above the LSALT after take-off.

4.3.6 The requirements that must be satisfied for descent below LSALT or minimum safety altitude by day and night under the IFR and night VFR.

4.4 Navigation requirements

4.4.1 Requirements for position fixing in accordance with the AIP.

4.4.2 The determination of aircraft performance category and the implications for operations under the IFR.

4.4.3 The requirements associated with the following waypoints and the symbology used on an instrument approach chart to define each point for the following:

(a) initial approach fix;

(b) final approach fix.

4.4.4 The requirements to conduct visual circling by day or night.

4.4.5 The use of PEC when applied to a DA to determine AOM.

4.4.6 The normal gradient applied in each segment when designing an instrument approach procedure.

4.4.7 Tracking tolerance requirements for the following:

(a) avoidance of CTA;

(b) utilising ground based navigation aids;

(c) when navaids are not available;

(d) notification requirements;

(e) order of precision of navigation aids/systems.

4.4.8 Speed limitations and restrictions in accordance with the AIP for the following:

(a) operations below 10 0000 ft AMSL;

(b) during holding procedures;

(c) during approach procedures;

(d) issued by ATS and when speed restrictions are cancelled.

5. Ground and space-based navigation systems and infrastructure

5.1 Ground-based systems

5.1.1 For ground-based radio navigation aids:

(a) understand the principles of operation, indications and limitations of the ground-based navigation aids; and

(b) extract from AIP:

(i) the rated coverage of the radio navigation aids considering aircraft location, altitude and time of day; and

(ii) pilot navigation tolerances.

5.1.2 For lateral azimuth guidance provided by NDB, describe the following:

(a) the errors caused by coastal refraction;

(b) the effect thunderstorms may cause;

(c) the indications of loss of signal integrity;

(d) the potential for errors when turning;

(e) the indications of station passage.

5.1.3 Given heading and relative NDB azimuth bearings, for the following:

(a) calculate track to and from the NDB;

(b) fix position given relative bearings of 2 stations;

(c) calculate drift relative to planned track;

(d) calculate the relative bearing which will indicate the aircraft is abeam a station;

(e) calculate the relative bearing which will indicate that a desired track to or from an NDB has been intercepted, given the intercept heading;

(f) calculate the heading to steer to intercept desired inbound track before reaching the NDB.

5.1.4 For lateral guidance provided by VOR course deviation indicator (CDI), describe the following:

(a) the cockpit indications of scalloping;

(b) the indications of loss of signal integrity;

(c) the indications of station passage.

5.1.5 Given VOR lateral course deviation indications, determine the position of the aircraft with reference to the VOR ground station.

5.1.6 VOR OBS settings required to provide command indications when flying on given tracks both to and from the VOR.

5.1.7 Determine aircraft position given cockpit instrument indications utilising a VOR.

5.1.8 Instrument indications when the aircraft is abeam the VOR on a given track.

5.1.9 DME including the following:

(a) the use of DME and its limitations;

(b) effect of aircraft altitude (slant range);

(c) effect when not tracking direct to and from the aid;

(d) DME arrival procedures.

5.1.10 ILS and LOC including the following:

(a) components of the ILS including marker beacons;

(b) operational considerations;

(c) errors including G/S fluctuations and course reversal indications.

5.2 GNSS

5.2.1 The GNSS system and its principles of operation, including the following:

(a) GNSS system components;

(b) space segment;

(c) GNSS satellite signal;

(d) pseudo random code (C/A course acquisition code);

(e) control segment;

(f) user segment (the GNSS receiver);

(g) pseudo ranging;

(h) principle of position fixing/minimum satellites required for navigation functions;

(i) TSO/Performance limitations of various equipment types;

(j) RAIM;

(k) masking function;

(l) receiver displays of system integrity;

(m) operating modes – navigation with and without RAIM, DR;

(n) explain why GNSS use the WGS84 coordinate system;

(o) effect of PDOP/GDOP.

5.2.2 The following terms in relation to a navigational system and recall to what extent the GNSS system meets the associated requirements:

(a) accuracy;

(b) integrity;

(c) means of providing GNSS integrity;

(d) RAIM, procedural, systems integration;

(e) availability;

(f) continuity of service.

5.2.3 Degradation of GNSS accuracy by the following GNSS errors:

(a) ephemeris;

(b) clock;

(c) receiver;

(d) atmospheric/ionospheric;

(e) multipath;

(f) selective availability (SA);

(g) typical total error associated with c/a code;

(h) interference.

5.2.4 Requirements for use of GNSS in the following IFR operations:

(a) en route;

(b) RNP instrument approach operations;

(c) alternates;

(d) RNP operations.

5.2.5 Pilots actions and implications for the following GNSS warnings and messages, including the following:

(a) loss of RAIM;

(b) 2D navigation;

(c) in dead reckoning mode;

(d) database out-of-date;

(e) database missing/failure;

(f) GNSS fail;

(g) barometric input fail;

(h) power/battery fail;

(i) parallel offset on.

5.2.6 Parameters applicable to tracking tolerances, automatic waypoint sequencing, CDI sensitivity and RAIM availability in each of the following segments:

(a) en route;

(b) terminal;

(c) initial approach;

(d) intermediate approach;

(e) final approach;

(f) missed approach.

5.2.7 Indications requiring a missed approach to be initiated.

5.2.8 The effect of availability or otherwise of baro-aiding on RAIM availability and prediction.

5.2.9 Describe the effect of satellite unserviceability on the reliability of each type of prediction.

5.3 3D instrument approach operations

5.3.1 Pilot responsibilities when conducting a 3D instrument approach operation utilising vertical guidance (advisory) provided by the aircraft navigation system on a 2D instrument approach procedure.

5.3.2 The different kinds of 3D instrument approach procedures.

5.3.3 The components required for a GNSS landing system (GLS) instrument approach procedure.

5.3.4 The principles of operation of a GBAS or local area augmentation system.

5.3.5 The validity of GLS guidance information beyond the distance of the GBAS station defined as D-Max.

6. Performance based navigation (PBN)

6.1 Basic principles

6.1.1 The basic principles of PBN, including requirements for RNAV and RNP capability.

6.1.2 The core components that make up the PBN airspace concept, including the following:

(a) communications;

(b) navigation;

(c) surveillance (extended squitter ADS-B);

(d) air traffic management.

6.1.3 The navigation system performance requirements for PBN in respect to the following:

(a) accuracy;

(b) integrity;

(c) continuity;

(d) functionality;

(e) installation requirements.

6.1.4 The function of performance monitoring and alerting in a navigation system approved for PBN operations.

6.2 RNP specifications

6.2.1 RNP specifications and system requirements and their application for the following:

(a) RNP 2 (en route);

(b) RNP 1 (terminal);

(c) RNP APCH – LNAV and LNAV/Baro VNAV;

(d) RNP APCH – LP and LPV (SBAS).

6.2.2 The meaning of the specified RNP value, for example, RNP 1, in terms of the navigational accuracy.

6.2.3 The following RNP navigation system errors:

(a) FTE (flight technical error);

(b) PDE (path definition error);

(c) TSE (total system error);

(d) NSE or PEE (navigation system error/position estimation error).

6.2.4 The meaning of the following RNP leg types:

(a) TF (track to a fix);

(b) RF (constant radius to a fix);

(c) IF (initial fix);

(d) HF (hold to fix);

(e) HM (hold for clearance);

(f) HA (hold to altitude);

(g) DF (direct to a fix);

(h) FA (fix to an altitude);

(i) CF (course to a fix).

6.2.5 The meaning of the following leg transitions and their use in RNP operations:

(a) fly-by;

(b) fly-over;

(c) fixed radius (airspace design limitations).

6.2.6 The basic requirements for an RNP navigation authorisation and use of the following:

(a) communications;

(b) navigation;

(c) surveillance;

(d) airworthiness;

(e) continued airworthiness;

(f) flight operations.

6.2.7 The GNSS receiver requirements to conduct a RNP APCH operation.

6.2.8 The requirements to conduct an RNP instrument approach operation to a published Barometric Vertical Navigation (Baro/VNAV) minimum altitude.

6.2.9 The requirements to conduct a RNP instrument approach operation to a published Localiser Precision (LP) or LPV minimum altitude.

6.2.10 The conditions and actions that allow the GNSS receiver to function in the appropriate mode for the successful conduct of a RNP approach.

6.2.11 The difference between augmented and non-augmented approaches.

6.2.12 Interpret IAP charts and extract the correct minima for a given approach and any relevant operational restrictions.

6.2.13 The requirement for using a valid and accurate local QNH when conducting RNP approaches.

6.2.14 Differentiate between the following RNP approaches that provide 3D vertical guidance:

(a) RNP APCH – LNAV/VNAV (Baro VNAV);

(b) RNP APCH – LPV (SBAS required).

6.2.15 The basic principles of operation of a space-based augmentation system (SBAS) and the kind of minimum published altitudes that can be used when a SBAS is available.

6.2.16 Explain SBAS and how it affects RNP approaches.

6.2.17 Interpret APV Baro-VNAV instrument approach charts, including LNAV/VNAV minima, temperature limitations and vertical flight path angle.

6.2.18 Describe the difference between vertical guidance presented as linear deviation and angular deviation and the relevant operational considerations.

6.2.19 Demonstrate an understanding of the principles of Baro-VNAV vertical guidance, including path angle (VPA) construction and the effect of temperature variation from ISA on VPA.

7. Reduced Vertical Separation Minima (RVSM) operations

7.1.1 Range of flight levels in which RVSM requirements apply within Australian airspace.

7.1.2 Operational requirements to conduct operations in designated RVSM airspace.

7.1.3 Requirements to ensure accuracy of aircraft altimeters are within prescribed tolerances to conduct operations in RVSM airspace.

7.1.4 Vertical height tolerance applicable when levelling off at assigned flight level in RVSM airspace.

7.1.5 Procedures and standard communication phraseology used for operations in RVSM airspace, including procedure following failure of 1 or all primary altimetry systems.

8. Human factors

8.1.1 Physiological factors effecting human performance when conducting flight without visual reference, including the following:

(a) the part played by the vestibular systems, namely the semicircular canals and otiliths, in helping the pilot maintain orientation;

(b) the circumstances aggravate vestibular disorientation, and how to overcome this problem.

8.1.2 The circumstances that may aggravate vestibular disorientation such as somatogravic illusions and somatogyral illusions.

8.1.3 State conditions and causes under which visual illusions, such as 'false horizons', visual-cue illusions, relative motion illusions, 'flicker' effect, ‘black hole' illusion, and autokinesis may occur.

8.1.4 GNSS operating procedures which provide safeguards against navigational errors and loss of situational awareness because of the following:

(a) mode errors;

(b) data entry errors;

(c) data validation and checking, including independent cross-checking procedures;

(d) automation induced complacency;

(e) non-standardisation of the GNSS receiver units;

(f) human information processing and situational awareness.

8.1.5 When conducting an instrument approach operation describe the benefits of utilising a CDFA technique from a human performance limitations perspective.

SECTION 2.2 PRIVATE IFR RATING

Unit 2.2.1 PIFR: Private IFR rating

1. Reserved

2. Pilot's fitness and qualifications

2.1 Pilot medical fitness for IFR flight

2.1.1 State requirements for pilot fitness to conduct an IFR flight.

2.1.2 Describe how a pilot determines whether they are fit to conduct an IFR flight.

2.1.3 State what qualifications a pilot must have to be authorised to conduct an IFR flight.

3. Aircraft instruments, radios and equipment

3.1.1 List the mandatory flight instruments that must be installed and serviceable for conducting an IFR flight.

3.1.2 List the mandatory electrical lighting equipment that must be installed and serviceable for conducting an IFR flight.

3.1.3 List the mandatory aircraft radio communications equipment that must be installed and serviceable for conducting an IFR flight.

3.1.4 List the mandatory radio navigation equipment that must be installed and serviceable for conducting an IFR flight.

3.1.5 Extract from an aircraft flight manual information about the limitations that are specified for operating a particular type of aircraft under the IFR.

4. IFR operations – general

4.1.1 State the IFR operations a single-engine aircraft is limited to.

4.1.2 State the requirements for submission of flight notification and SARWATCH for conducting an IFR operation.

4.1.3 State the speed restrictions an IFR flight must operate to.

4.1.4 State the requirements for inflight progress reports for IFR flights.

4.1.5 State the requirements and procedures for flight plan amendments and advising revised estimates.

5. Documentation for IFR flight

5.1.1 State the documents required to be carried on an IFR flight.

5.1.2 Extract relevant information from operational documents for an IFR flight.

5.1.3 Describe the meteorological forecasts required for conducting an IFR flight.

5.1.4 State sources of, and actions to obtain, meteorological forecasts for IFR flights.

5.1.5 Determine the validity of a meteorological forecast for an IFR flight.

5.1.6 State what meteorological broadcast services are available in Australia for the flight.

6. IFR navigation requirements

6.1.1 Describe the navigation requirements for an IFR flight using radio navigation systems.

6.1.2 State the navigation requirements for an IFR flight using self-contained or long-range navigation systems.

6.1.3 Describe the navigation requirements for an IFR flight using visual reference to ground and water.

6.1.4 State the navigation tolerance for an IFR flight avoiding CTA.

6.1.5 State the requirements for positive radio fixing.

6.1.6 Determine the requirements for the most precise track guidance.

6.1.7 Apply the navigation requirements of IFR flight with respect to time interval between fixes, accuracy of time reference, accuracy and procedures in track keeping.

6.1.8 Apply the procedures of IFR flight in all classes of airspace when diverting from track due navigation or weather.

7. Selection of IFR routes

7.1.1 Select a route for IFR flight with respect to the following:

(a) forecast weather;

(b) controlled airspace;

(c) PRDs;

(d) engine out performance for multi-engine aircraft;

(e) specified route limitations;

(f) airways operational requirements;

(g) the availability of the following:

(i) published routes;

(ii) en route alternate aerodromes;

(iii) navigation aids;

(iv) rated coverage of navigation aids;

(v) radio communication.

1.1.1 Determine the compulsory reporting points for a route selected.

7.1.2 Determine whether the flight may proceed based on route, aircraft equipment and IFR navigation requirements.

8. LSALT and selection of IFR altitudes and levels

8.1 LSALT

8.1.1 Determine LSALT for an IFR flight for a route published on a chart.

8.1.2 Determine the dimensions of the significant safety sector when calculating LSALT for a route not published on a chart.

8.1.3 Determine methods of calculating LSALT for a route not published on a chart.

8.1.4 Calculate LSALT for non-published route.

8.1.5 State the requirements for descent below LSALT.

8.2 Select cruising altitude or level

8.2.1 Select an appropriate cruising altitude/level after assessing the following:

(a) LSALT;

(b) forecast freezing level;

(c) engine out performance for multi-engine aircraft;

(d) CTA and PRDs;

(e) table of IFR cruising levels;

(f) availability of published routes;

(g) availability of navigation aids;

(h) rated coverage of navigation aids;

(i) specified route limitations;

(j) airways operational requirements.

8.3 Determining when flight may proceed – uncertain position

8.3.1 Determine whether a flight may proceed based on the following:

(a) altitude;

(b) aircraft equipment;

(c) IFR navigation requirements.

8.3.2 Determine an appropriate LSALT when uncertain of position.

9. IFR alternate aerodrome requirements

9.1.1 State the alternate aerodrome requirements for an IFR flight to a specified destination, given relevant information, including NOTAM.

9.1.2 Determine the suitability of a specified alternate aerodrome for an IFR flight given relevant information, including NOTAM.

9.1.3 Describe the holding requirements due to weather, traffic, traffic advisory, and procedures.

9.1.4 Calculate the minimum fuel required for an IFR flight in accordance with CASA fuel policy guidance material.

9.1.5 Determine whether a flight may proceed based on alternate or holding requirements and fuel capacity.

10. Operation of aircraft equipment

10.1.1 State the safety precautions that must be observed when operating aircraft radar equipment on the ground.

10.1.2 State the pre-flight altimeter accuracy check for an IFR flight.

10.1.3 Apply altimetry procedures to all stages of an IFR flight.

10.1.4 Describe the correct use of a transponder, and the associated radio phraseology, in all classes of airspace.

11. CTA operations

11.1.1 State airways clearance requirements for operating in all classes of airspace, including lead time required for flight plan submission, contents, 'clearance void time', and 'read back' requirement.

11.1.2 State airways clearance requirements for entering, operating in and departing CTA and CTR, including what details to provide to ATC, and what details to expect from ATC.

11.1.3 State what is 'controlled area protection'.

11.1.4 State ATC requirements for a change of level in CTA, including in an emergency situation.

11.1.5 State the procedures for the following components of a flight profile for day and night operations in CTA and CTR:

(a) departure;

(b) climb;

(c) transition to cruise (levelling out);

(d) cruise;

(e) change of levels;

(f) descent and visual approach.

11.2 Separation standards

11.2.1 State the provision of separation between IFR flights, and IFR and VFR flights in the various classes of CTA.

11.2.2 State the provision of separation between IFR flights, and IFR and VFR flights in Class D airspace.

11.3 Radio procedures

11.3.1 Demonstrate knowledge of radio procedures in CTA and CTR.

11.3.2 Determine procedures for loss of radio communication in CTA and CTR.

11.3.3 Determine procedures for abnormal operations and/or emergencies in CTA and CTR.

12. Radar services

12.1.1 State what radar services are provided by ATC.

12.1.2 Demonstrate knowledge of radar vectoring procedures, including radio procedures and phraseologies.

12.1.3 State the permissible intervals between ATC transmissions during radar vectoring.

12.1.4 Demonstrate knowledge of radar emergency procedures, including loss of radio communication, radar failure, transponder emergency codes, and aircraft emergencies.

13. OCTA operations

13.1 Flight profile procedures – OCTA

13.1.1 State the procedures for the following components of a flight profile for day and night operations in Class G airspace and at non-controlled aerodromes:

(a) departure;

(b) climb;

(c) transition to cruise (levelling out);

(d) cruise;

(e) change of levels;

(f) descent, and arrival.

13.2 Visual approach procedures

13.2.1 State visual approach procedures, day and night, in Class G airspace and at non-controlled aerodromes, including the following:

(a) landing manoeuvres;

(b) cancellation of SARWATCH;

(c) operation of VHF aerodrome lighting (PAL).

13.3 Radio and abnormal procedures

13.3.1 Demonstrate knowledge of radio procedures in Class G airspace and at non-controlled aerodromes.

13.3.2 Determine procedures for loss of radio communication in Class G airspace and at non-controlled aerodromes.

13.3.3 Determine procedures for abnormal operations and/or emergencies Class G airspace and at non-controlled aerodromes.

14. Meteorology relevant to IFR operations:

14.1.1 Demonstrate knowledge of flying conditions likely to be associated with any phenomenon listed in AIP documents and the Bureau of Meteorology publication, Manual of Meteorology, Part 2.

14.1.2 Demonstrate knowledge of Australian climatology as enumerated in Manual of Meteorology Parts 1 and 2, with emphasis on the seasonal variations in the location and frequency of frontal weather, tropical cyclones, dust devils, thunderstorms, fog, and the associated penetration and/or avoidance techniques.

14.1.3 Predict probability and likely duration and extent of airframe icing, hail, microbursts, wind shear, turbulence en route, when experiencing and/or observing certain cloud types, precipitation, temperature and/or turbulence.

15. Navigation systems

15.1 VOR

15.1.1 Describe the instrument indications that would indicate the following:
- (a) scalloping;
- (b) VOR station passage;
- (c) abeam VOR station;
- (d) VOR radial the aircraft is on;
- (e) track error and/or drift experienced.

15.1.2 Determine off-track distance experienced from VOR and DME cockpit indications.

15.1.3 State VOR omni-bearing selector (OBS) settings required to provide command indications when flying on given tracks both to and from the VOR.

15.1.4 Calculate the heading to steer to intercept a new or original track to, or from, a VOR.

15.1.5 Fix position, given cockpit instrument indications utilising 2 VOR stations.

15.1.6 Fix position, given instrument indications utilising combinations of VOR, NDB and DME.

15.2 NDB

15.2.1 State how NDB indications or range may be affected by the following:
- (a) coastal refraction;
- (b) night error;
- (c) thunderstorms;
- (d) mountainous areas;
- (e) types of terrain;
- (f) altitude of aircraft.

15.2.2 State the method of using the most appropriate NDB for tracking during navigation.

15.2.3 Describe how the following are determined using an ADF relative bearing indication:
- (a) NDB station passage;
- (b) abeam NDB station;
- (c) NDB bearing the aircraft is on;
- (d) track error and/or drift experienced.

15.2.4 Calculate track to and from the NDB, given heading and relative bearings.

15.2.5 Calculate heading to steer to intercept a new or original track to or from an NDB.

15.2.6 Calculate heading to steer to intercept desired inbound track before reaching the NDB.

15.2.7 Calculate relative bearing which will indicate that a desired track to or from an NDB has been intercepted, given the intercept heading.

15.2.8 Fix position, given relative bearing indications utilising 2 NDB stations.

15.3 GNSS

15.3.1 GNSS system components and principle of operation:
- (a) Describe the GNSS system and its principles of operation, including the following:
  - (i) GNSS system components;
  - (ii) space segment;
  - (iii) GNSS Satellite signal;
  - (iv) pseudo random code (C/A course acquisition code);
  - (v) control segment;
  - (vi) user segment (the GNSS receiver);
  - (vii) pseudo ranging;
  - (viii) principle of position fixing/minimum satellites required for navigation functions;

(ix) TSO/performance limitations of various equipment types;

(x) RAIM;

(xi) masking function;

(xii) receiver displays of system integrity;

(xiii) operating modes – navigation with and without RAIM, DR.

(b) Explain why GNSS uses the WGS84 coordinate system.

15.3.2 GNSS errors.

15.3.3 Describe the cause and magnitude of typical GNSS errors:

(a) ephemeris;

(b) clock;

(c) receiver;

(d) atmospheric and ionospheric;

(e) multipath;

(f) SA;

(g) typical total error associated with C/A code;

(h) effect of PDOP/GDOP on position accuracy;

(i) susceptibility to interference;

(j) comparison of vertical and horizontal errors;

(k) tracking accuracy and collision avoidance.

16. Flight instrument errors

16.1.1 State how the compass is affected by turning error, acceleration and deceleration error.

16.1.2 State how the attitude indicator is affected by power source output, acceleration and deceleration error, and bank and pitch limits.

17. Human factors relevant to IFR operations

17.1.1 State the part played by the vestibular systems, namely the semicircular canals and otiliths, in helping the pilot maintain orientation.

17.1.2 State what circumstances aggravate vestibular disorientation, and how to overcome this problem.

17.1.3 State what causes, and may aggravate, vestibular disorientation such as somatogravic illusions, somatogyral illusions and 'graveyard spiral', coriolis effect, and 'leans'.

17.1.4 State conditions and causes under which visual illusions, such as 'false horizons', visual-cue illusions, relative motion illusions, 'flicker' effect', black hole' illusion, and autokinesis may occur.

17.1.5 Be aware of the human factors limitations associated with the use of GNSS equipment to provide safeguards against navigational errors and loss of situational awareness because of the following:

(a) mode errors;

(b) data entry errors;

(c) data validation and checking, including independent cross-checking procedures;

(d) automation induced complacency;

(e) non-standardisation of the GNSS receiver units;

(f) human information processing and situational awareness.

SECTION 2.3 AERIAL APPLICATION RATING AND ENDORSEMENTS

Unit 2.3.1 AAGR: aerial application rating – all aircraft categories

1. Reserved

2. Flight rules

2.1 Legislation

2.1.1 Explain the privileges and limitations of an aerial application rating.

2.1.2 State the responsibilities for supervision of a pilot where required.

2.1.3 State the requirements for the conduct of aerial application operations below 500 ft AGL, including pilot responsibilities.

2.1.4 Explain pilot responsibilities for carrying out the following in relation to role equipment that is fitted to an aircraft:

(a) repairs;

(b) replacement;

(c) overhauls.

3. Operational planning

3.1 Pre-flight and after-flight inspection

3.1.1 Describe the areas of the aircraft that should be inspected to ensure the safety of aerial application operations.

3.1.2 Describe inspection and flight preparation of aircraft exposed to outside parking and harsh environmental conditions (for example, wing and control surfaces exposed to freezing conditions, engine, battery care, etc.).

3.1.3 Explain inspection requirements for aircraft role and equipment, including secure fittings of booms, spreader, hoses, pumps and operations of the dump equipment.

3.1.4 Explain fuelling procedures, including drum stowage, use and care of pumps, fuel testing, use of safety equipment/fire extinguishers, vehicle positioning and fuel quantity checks.

3.2 Operational inspections

3.2.1 Explain operating area inspection methods and purpose.

3.2.2 Explain limitations of ground inspections.

4. Flight between airstrip and operating area

4.1.1 Explain the low-flying restrictions, planning notice, precautions and procedures with respect to overflying or in close proximity to buildings during aerial application operations, including stating the required safety distances and minimum height from buildings.

5. Operations on, or in vicinity of, non-controlled and controlled aerodromes or airstrips

5.1.1 State restrictions and conditions on aerial application operations at aerodromes with movements of regular public transport aircraft.

5.1.2 Explain the circuit requirements at various types of aerodromes and ALA, including conditions applying to exemption from compliance with CASA notified procedures.

5.2 Aerial inspection

5.2.1 Explain the method and purpose (i.e. how and what are you looking for).

5.2.2 Explain key considerations for operations between airstrip and the treatment area and for general low-level navigation.

5.2.3 Describe how to locate and plan for the management of obstructions and ground undulations from the air.

5.3 Weather

5.3.1 Describe the effects of inversion on aerial application.

5.3.2 Describe indicators of mechanical and thermal turbulence and shifting wind and explain implications for low-level aerial application.

5.3.3 Describe winds affecting low-level flying and associated flying conditions.

5.3.4 Describe the effect of mountainous influence on airflow and associated flying conditions.

5.3.5 Describe weather phenomena hazardous to low-flying operations.

5.3.6 Recall the terrain and weather conditions that may lead to disorientation during low-level flight (for example, flight into rising ground and toward low ground, false horizons, ridgeline and valley effects) and explain pilot corrective action.

5.3.7 Explain typical terrain and seasonal effects on local wind direction, strength and mechanical or thermal turbulence.

5.4 Planning and risk control

5.4.1 Describe the planning tools available to an aerial application pilot, including:

(a) describing the process of risk assessment, including the following:

(i) identifying potential hazards or risk;

(ii) describing what a risk assessment matrix is, and how to use it;

(iii) assessing risk — probability versus severity;

(iv) assigning priority to identified risk.

5.4.2 Describing risk management, including:

(a) using risk management hierarchy such as eliminating risk, substituting for a smaller risk, engineering and administering around risk.

5.4.3 Explaining what is an Aerial Application Management Plan (AMP), including:

(a) describing its key components and how it affects safety of the flight, the importance of monitoring an AMP, and the need for pilots to meet changing conditions;

(b) describing typical changing weather conditions that require monitoring, for example, wind direction and speed and estimating their magnitude and direction; inversions and changing atmospheric stability; position of the sun and the danger of its glare, and importance of maintaining a clean, clear and serviceable windscreen.

6. <u>Flight – aerial application</u>

6.1 Operational techniques

6.1.1 For the treatment area, describe methods of managing the following given factors (for main runs and clean up swaths):

(a) wind direction;

(b) sun glare;

(c) obstructions, particularly wires and powerlines.

6.1.2 Describe hazards associated with application, such as hilly terrain, downdraughts, turbulence, false horizon effect, high country and irregular areas.

6.1.3 Explain precautionary actions before starting a clean-up.

6.1.4 Explain how to identify wire runs, and minimise associated risks, with the following:

(a) preliminary inspection of treatment area;

(b) how to judge distance to the wire;

(c) the danger and forms of distraction;

(d) considerations for flying above or under the wire;

(e) considerations for crossing oblique wires;

(f) visual cues of wire locations such as pole runs, type, numbers and attitude of;

(g) insulators, cross-stress and angle of cross-stress, supplementary or spur wires buildings;

(h) characteristics and dangers of high wires and guy wires;

(i) factors affecting misjudgment of wire clearance;

(j) how to maintain awareness of located wires;

(k) the hazards of mental overload.

6.1.5 Describe the operation of DGNSS for track guidance, including the importance of maintaining an active scan outside the cockpit while referencing the DGNSS.

6.1.6 Explain considerations for dumping a load.

6.2 Human factors

6.2.1 Demonstrate knowledge of the following human factors issues and their impact on the safety of an aerial application operation:

(a) dehydration and its impact on pilot cognitive function and reaction time;

(b) fatigue and its impact on pilot cognitive function and situational awareness;

(c) stress and its short-term and long-term impact;

(d) drugs (particularly OTC) impact on pilot cognitive function, reaction time and coordination;

(e) spatial disorientation and illusions.

6.2.2 Explain the use of mnemonics as an aide-mémoire to key operational planning issues (for example, ‘WISHSTANDE’).

Unit 2.3.2 AAGA: aerial application rating – aeroplane endorsement

1. Reserved

2. General operational knowledge

2.1 Aircraft performance

2.1.1 Explain how loads and turn rate affect aircraft performance (stall speed, angle of attack, inertia).

2.1.2 Explain the effects of rolling ‘G’ on aircraft.

2.1.3 Explain ground effect and its impact on aircraft performance.

2.1.4 Explain possible aerodynamic and controllability effects associated with load dumping.

2.1.5 Explain how temperature, height above mean sea level (*AMSL*), pressure, humidity, weight, field surface and relative wind affect each of the following:

(a) lift-off distance;

(b) climb angle;

(c) rate of climb;

(d) landing stop distance.

2.1.6 Explain how temperature, pressure, height and humidity affect power available.

2.1.7 Calculate pressure and density height.

2.2 Flight and duty times

2.2.1 Explain the flight and duty time limitations for pilots conducting aerial application operations.

Unit 2.3.3 AAGH: Aerial application rating – helicopter endorsement

1 Reserved

1. Aircraft performance

1.1 Environment affects

1.1.1 Explain how temperature, pressure, height AMSL, humidity, weight, ground surface and relative wind affect each of the following:

(a) hover performance;

(b) distance to achieve translational lift;

(c) climb angle;

(d) rate of climb.

1.1.2 Explain how temperature, pressure, altitude and humidity affect power available and power required.

1.1.3 Calculate pressure and density height.

1.2 Determine payload

1.2.1 Determine payload (under IGE and OGE conditions) and helicopter balance using performance charts, including the following:

(a) maximum payload and fuel that may be carried;

(b) calculation of CG under different load configurations;

(c) calculation of payload and fuel to retain CG within limits throughout the flight;

(d) arithmetic calculations to reposition internal equipment to adjust CG position;

(e) distribution of internal equipment in accordance with deck loading limits.

1.3 Helicoper landing sites (HLS)

1.3.1 Recall the standards recommended for “basic” and “secondary” helicopter landing sites (*HLS*).

1.4 Explain ground effect, Vne and retreating blade stall.

1.5 Rotor disc behaviour under reduced/negative “g”

1.5.1 Explain the relationship between cyclic input, disc attitude, rotor hub and shaft position and fuselage responsiveness on a teetering head helicopter system under 1 “g”, negative “g” and normal disc loading conditions.

1.6 Control power

1.6.1 Explain the term “control power” and how it relates to aircraft performance.

1.7 Dynamic rollover

1.7.1 Explain each of the following:

(a) what is dynamic rollover; and

(b) how to avoid dynamic rollover; and

(c) how to correct in a dynamic rollover situation.

1.8 Loss of tail rotor effectiveness (*LTE*)

1.8.1 Explain each of the following:

(a) the phenomenon of LTE; and

(b) factors that contribute to LTE (high density altitude, high gross weight, turning down wind at low airspeed i.e. below the speed for minimum powered level flight, exceeding manufacturer recommended relative wind and operating gross weight limits); and

(c) indications of LTE; and

(d) recovery from LTE.

1.9 Height-velocity curve

1.9.1 Explain the implications of flying inside the helicopter height-velocity curve.

1.10 Blade contamination

1.10.1 Explain the degradation of performance with contamination on rotor blades (e.g. mud picked up by rotor wash during hovering operations).

SECTION 2.4 INSTRUCTOR RATINGS

Unit 2.4.1 FIRC: Instructor rating – common

1. Reserved

2. Flight rules

2.1 Legislation

2.1.1 Describe the privileges and limitations of the instructor rating and associated training endorsements.

2.1.2 Describe the flight training that must be conducted under the authority of Part 141 or 142 of CASR 1998.

3. Principles and methods of instruction

3.1 Principles of learning

3.1.1 Describe the adult learning process.

3.1.2 Explain what is meant by perception.

3.1.3 Explain the relative importance of each of the physical senses in learning.

3.1.4 Explain how the defence mechanisms listed may hinder learning:

(a) rationalisation;

(b) flight;

(c) aggression;

(d) resignation.

3.1.5 Explain how the level of stress may affect learning.

3.1.6 Explain the relation between perception and understanding.

3.1.7 State how positive and negative motivation affects learning.

3.1.8 Explain the application of the levels of learning.

3.1.9 Explain how the rate of learning may vary with practice.

3.1.10 Explain the role of each of the memory systems in terms of the model of information processing:

(a) sensory register;

(b) short-term memory;

(c) long-term memory.

3.2 Principles of instruction

3.2.1 Explain how a flight instructor could assist the process of perception and understanding.

3.2.2 State examples of how rote learning, understanding of knowledge and correlation apply to flight training.

3.2.3 Identify the outcomes of aeronautical knowledge instruction associated with the 3 domains of learning:

(a) cognitive (knowledge);

(b) affective (attitudes, beliefs and values);

(c) psychomotor (physical skills).

3.2.4 State the factors that may hinder learning with respect to aeronautical knowledge training.

3.2.5 Explain the advantages and disadvantages of guided discussion in flight training and identify flight training activities for which this technique could be suitable.

3.2.6 Give examples of positive and negative transfer in aeronautical knowledge training.

3.2.7 Explain the role of each factor listed in the communication process:
(a) source;
(b) symbols;
(c) receiver.

3.2.8 Recall how these common barriers affect communication:
(a) lack of common experience;
(b) confusion;
(c) abstractions.

3.2.9 Explain how an instructor may monitor, whether communication has been achieved.

3.2.10 Identify adult learning issues applicable to aeronautical knowledge training.

3.2.11 Explain each of the basic steps of the teaching process:
(a) preparation;
(b) presentation;
(c) application;
(d) review and evaluation.

3.2.12 State the purpose of behavioural (performance-based) outcomes in flight training.

3.2.13 Explain the following attributes of effective outcomes:
(a) achievable;
(b) observable;
(c) measurable.

3.2.14 Explain how to develop the 3 essential elements of behavioural outcomes:
(a) performance (what has to be done);
(b) performance criteria;
(c) conditions.

3.2.15 Explain the advantages and disadvantages of the teaching methods listed and give practical examples of situations best suited to each of these techniques in flight training:
(a) lecture;
(b) theory or skill lesson;
(c) group learning;
(d) guided discussion;
(e) briefing.

3.2.16 Explain the role of the instructor in each of the 5 steps involved in providing skill practice to trainees:
(a) explanation;
(b) demonstration;
(c) performance;
(d) supervision;
(e) evaluation.

3.2.17 Explain the difference between a training syllabus and competency-based standards.

3.3 Lesson planning and delivery

3.3.1 Explain the general purpose and content of each of the components of a typical aeronautical knowledge lesson plan:
(a) aim/motivation/revision;
(b) outcomes;
(c) explanation of principles;
(d) explanation/demonstration of technique;

(e) threat and error management;

(f) practice;

(g) review.

3.3.2 State the reasons for limiting the duration of lessons and indicate the desirable duration of a typical lesson.

3.3.3 Explain the purpose and content of a training syllabus (or curriculum).

3.3.4 Explain the purpose and use of training aids.

3.3.5 Give examples of training aids particularly suited to aeronautical knowledge training.

3.3.6 Explain the role of the instructor in each of the following phases of review and evaluation:

(a) fault analysis (diagnosis);

(b) competency assessment;

(c) trainee self-assessment;

(d) training effectiveness.

3.4 Principles of questioning

3.4.1 Explain the reasons for questioning trainees.

3.4.2 Explain the characteristics of an effective or open question.

3.4.3 Give examples of good and poor questions.

3.4.4 Explain how oral questions can promote mental activity.

3.4.5 Explain why oral questions maintain student interest during a lesson.

3.4.6 Explain why is it essential that the instructor always confirm answers to questions.

3.4.7 Explain the purposes of oral questions.

3.4.8 Describe the desired qualities of good oral questions.

3.4.9 Describe the procedure to follow when asking a question.

3.4.10 Explain the key points to observe in the handling of student answers.

3.4.11 Explain the key points to observe in the handling of student questions.

SECTION 2.5 LOW-LEVEL RATING

Unit 2.5.1 LLLR: Low-level rating – all aircraft categories

1. Reserved

2. Flight rules

2.1 Legislation

2.1.1 Explain the privileges and limitations of a low-level rating.

2.1.2 Recall the provisions of 157 of CAR 1988.

2.1.3 State the requirements for the conduct of flights below 500 ft AGL, including pilot responsibilities.

3. Operational planning

3.1 Pre-flight and after-flight inspection

3.1.1 Describe the areas of the aircraft that should be inspected to ensure the safety of low-level operations.

3.1.2 Describe inspection and flight preparation of aircraft exposed to outside parking and harsh environmental conditions (for example, wing and control surfaces exposed to freezing conditions, engine, battery care, etc.).

3.2 Operational inspections

3.2.1 Explain operating area inspection methods and purpose.

3.2.2 Explain limitations of ground inspections.

3.2.3 Explain the low-flying restrictions, planning notice, precautions and procedures with respect to overflying or in close proximity to buildings during aerial application operations, including stating the required safety distances and minimum height from buildings.

4. Operations on, or in vicinity of, non-controlled and controlled aerodromes or airstrips

4.1.1 State restrictions and conditions on low-level operations at aerodromes with movements of regular public transport aircraft.

4.1.2 Explain the circuit requirements at various types of aerodromes and ALA, including conditions applying to exemption from compliance with CASA published procedures.

4.2 Aerial inspection

4.2.1 Explain the method and purpose (i.e. how and what are you looking for?).

4.2.2 Describe how to locate and plan for the management of obstructions and ground undulations from the air.

4.3 Weather

4.3.1 Describe the effects of inversion on low-level operations.

4.3.2 Describe indicators of mechanical and thermal turbulence and shifting wind and explain implications for low-level operations.

4.3.3 Describe winds affecting low-level flying and associated flying conditions.

4.3.4 Describe the effect of mountainous influence on airflow and associated flying conditions.

4.3.5 Describe weather phenomena hazardous to low-level operations.

4.3.6 Recall the terrain and weather conditions that may lead to disorientation during low-level flight (for example, flight into rising ground and toward low ground, false horizons, ridgeline and valley effects) and explain pilot corrective action.

4.3.7 Explain typical terrain and seasonal effects on local wind direction, strength and mechanical or thermal turbulence.

4.4 Planning and risk control

4.4.1 Describe the process of conducting a risk assessment, including the following:

(a) identifying potential hazards or risk;

(b) describing what a risk assessment matrix is, and how to use it;

(c) assessing risk — probability versus severity;

(d) assigning priority to identified risk.

4.4.2 Describing risk management, including:

(a) using risk management hierarchy such as eliminating risk, substituting for a smaller risk, engineering and administering around risk;

(b) consideration of typical changing weather conditions that require monitoring, for example, wind direction and speed and estimating their magnitude and direction, inversions and changing atmospheric stability; position of the sun and the danger of its glare, and importance of maintaining a clean, clear and serviceable windscreen.

5. Flight – low level

5.1 Operational techniques

5.1.1 For the area of operations, describe the methods of managing the following given factors:

(a) wind direction;

(b) sun glare;

(c) obstructions, particularly wires and powerlines.

5.1.2 Describe hazards associated with low-level operations, such as hilly terrain, downdraughts, turbulence, false horizon effect, high country and irregular areas.

5.1.3 Explain precautionary actions before starting a clean-up.

5.1.4 Explain how to identify wire runs, and minimise associated risks, with the following:

(a) preliminary inspection of treatment area;

(b) how to judge distance to the wire;

(c) the danger and forms of distraction;

(d) considerations for flying above or under the wire;

(e) considerations for crossing oblique wires;

(f) visual cues of wire locations such as pole runs, type, numbers and attitude of;

(g) insulators, cross-stress and angle of cross-stress, supplementary or spur wires buildings;

(h) characteristics and dangers of high wires and guy wires;

(i) factors affecting misjudgment of wire clearance;

(j) how to maintain awareness of located wires;

(k) the hazards of mental overload.

5.1.5 Describe the operation of DGNSS for track guidance, including the importance of maintaining an active scan outside the cockpit while referencing the DGNSS.

6. Human factors

6.1.1 Demonstrate knowledge of the following human factors issues and their impact on the safety of an aerial application operation.

6.1.2 Dehydration and its impact on pilot cognitive function and reaction time.

6.1.3 Fatigue and its impact on pilot cognitive function and situational awareness.

6.1.4 Stress and its short-term and long-term impact.

6.1.5 Drugs (particularly OTC) impact on pilot cognitive function, reaction time and coordination.

6.1.6 Spatial disorientation and illusions.

SECTION 2.6 NIGHT VISION IMAGING SYSTEMS (NVIS) RATING

Unit 2.6.1 NVIS: NVIS rating – all aircraft categories

1. Reserved

2. Human factors and physiological limitations

2.1.1 Explain the human factors and physiological limitations for operations using NVIS.

3. Flight rules

3.1 Legislation

3.1.1 Describe the privileges and limitations of an NVIS rating and endorsement.

3.1.2 Explain the requirements for the conduct of a flight using NVIS.

3.1.3 Describe the requirements for the conduct of a flight using NVIS below 500 ft AGL.

3.1.4 Describe minimum aircraft equipment requirements.

3.1.5 Explain how to determine if NVIS equipment meets minimum standards to be authorised for use.

4. Flight – night (non-visual)

4.1 Vision imaging equipment and systems

4.1.1 Describe the operation and limitations of NVIS equipment used, including meteorological conditions likely to effect the performance of the system.

SECTION 2.7 NIGHT VFR RATING

Unit 2.7.1 NVFR: NVFR rating – all aircraft categories

1. Reserved

2. Flight rules

2.1 Legislation

2.1.1 Describe the privileges and limitations of the rating.

2.1.2 Describe the minimum NVFR aircraft equipment requirements.

2.1.3 Describe the ALA/HLS dimension and lighting requirements as applicable.

3. Flight at night

3.1 Operations

3.1.1 Describe the principles of operations, limitations and errors for the radio navigation systems used.

3.1.2 Describe the flight planning/notification; requirements, including LSALT, weather, fuel and lighting.

3.1.3 Explain the requirements for departure and descent for clearance from terrain.

3.1.4 Explain the alternate aerodrome planning requirements.

3.1.5 Describe the operation of PAL.

3.1.6 Describe the ATC procedures relevant to NVFR operations.

3.2 Human factors

3.2.1 Explain the human factors and physiological limitations for the conduct of operations at night as described in CASA guidance material for NVFR operations.

SECTION 2.8 EXAMINER RATINGS

Unit 2.8.1 FERC: flight examiner rating – common – *Reserved*

APPENDIX 3. AIRCRAFT RATINGS AND ENDORSEMENTS

SECTION 3.1 CLASS RATINGS

Unit 3.1.1 MECR: multi-engine aeroplane class rating – all aircraft categories

1. Reserved

2. General operational knowledge

2.1 Principles of asymmetric flight

2.1.1 Describe basic principles of asymmetric flight, changes in thrust and drag vectors and the effect on balanced flight.

2.1.2 State airspeed limitations necessary to ensure control of the aircraft.

2.1.3 Explain the effects on aircraft performance associated with engine failure.

2.1.4 Describe the effects of bank or sideslip on:

(a) vertical stabiliser (fin) and stall speed;

(b) rudder effectiveness;

(c) control load and aircraft trim.

2.1.5 Describe the factors effecting minimum control speeds or other speed specified to achieve optimum performance following the failure of an engine.

2.1.6 Describe the concept of 'commitment height' during approach and landing where applicable and the factors determining that height.

2.1.7 Knowledge of the aircraft certification performance requirements.

3. Aircraft systems

3.1 Aeroplane and engine systems

3.1.1 Describe the normal and non-normal operation of the following systems if installed in the aircraft:

(a) fuel;

(b) electrical;

(c) flight control (primary and secondary);

(d) hydraulic;

(e) flight instruments;

(f) avionics;

(g) braking;

(h) de-icing;

(i) oxygen;

(j) cabin airconditioning and pressurisation;

(k) other systems installed in the aircraft.

3.1.2 Describe the operation and limitations of following engine systems where installed:

(a) fuel;

(b) oil;

(c) starter (including air start for turbo-jets);

(d) ignition;

(e) propeller;

(f) mixture – piston engine only;

(g) turbochargers.

3.1.3 Knowledge of the aeroplane limitations specified in the aircraft flight manual.

SECTION 3.2 TYPE RATINGS

Unit 3.2.1 TYPA: Pilot type rating – aeroplane

1. General note: for this unit

1.1.1 Applicants for a multi-crew certified aircraft type rating are required to satisfy the knowledge standards specified for the ATPL of the same aircraft category, that are relevant to the operation of the aircraft. The following knowledge standards may not be relevant for all aircraft type ratings and can be ignored if not applicable to an aircraft type.

2. Aeroplane limitations and documentation

2.1.1 Identify aircraft limitations and able to locate information contained in the AFM and POH.

2.1.2 Perform pre-flight inspection and determine serviceability of the aircraft for flight.

2.1.3 Apply MEL and CDL, where applicable.

2.1.4 Determine the effects of ADs, ASB/SB where pilot action may be required, as applicable to type.

2.1.5 Aware of licensing obligations for variants, where applicable.

3. Weight and balance

3.1.1 Calculate CG for aircraft and determine if within prescribed limits.

3.1.2 Determine trim settings and MAC, where applicable.

3.1.3 Describe the effects of fuel use and management on CG, if any.

3.1.4 Describe the effects of changes to CG on aircraft performance.

3.1.5 Awareness of aircraft weight limitations, loading limits, cargo hold limitations, and any load/weight limitations for operational equipment contained in the flight manual supplement

4. Meteorology and adverse weather operations

4.1.1 Interpret weather forecasts typically required to conduct a flight in the aeroplane.

4.1.2 State the requirements for low-visibility operations.

4.1.3 Describe the effect on aircraft operations for the following conditions:

(a) ice, slush or snow (as applicable);

(b) turbulence penetration;

(c) heavy rain or falling snow;

(d) windshear techniques during take-off, approach and landing (as applicable);

(e) cold weather operations (as applicable);

(f) low-visibility operations (as applicable).

5. Aerodynamics and performance

5.1.1 Describe basic aerodynamics and high speed aerodynamics for turbo-jet powered aircraft.

5.1.2 Describe the effect of changes in airspeed on longitudinal stability for swept-wing aeroplanes.

5.1.3 Describe the minimum climb gradient performance requirements for each segment for aeroplanes that are certified as a transport or commuter category aircraft.

5.1.4 Describe the effects on airflow over aerofoils and the aerodynamic effects of the following if installed on the aircraft:

(a) spoiler;

(b) speed brakes;

(c) flaps and slats.

5.1.5 Determine the airspeeds to meet performance requirements for different configurations and phases of flight.

5.1.6 Describe stall characteristics and limits of normal operating envelope.

5.1.7 Discuss the meteorological performance limiting factors.

5.1.8 Discuss any unique operational characteristics, including runway requirements/limitations.

6. Fuel and engine oil systems

6.1.1 Describe the following in relation to the aircraft's fuel system:

(a) location of fuel tank/s and capacity;

(b) normal and non-normal fuel system operation and distribution;

(c) location and type of pumps used;

(d) vents system and location of vents and drains;

(e) system controls and indicators;

(f) minimum grades, colour and additives required, if any;

(g) minimum fuel temperature;

(h) indications of reduced or loss of fuel flow.

6.1.2 Determine level of engine oil.

6.1.3 Describe oil system indicators and grade of oil required.

6.1.4 Describe fuel and oil system limitations.

7. Engines

7.1.1 Describe type of engine/s installed, the main components, rated thrust or horsepower and indicators required for operation.

7.1.2 State engine start limits, as applicable.

7.1.3 Describe engine controls and their function.

7.1.4 Describe normal and non-normal engine operation.

7.1.5 Describe operation of the ignition system.

7.1.6 Describe the method of feathering and unfeathering the propeller/s, where applicable.

8. Electrical system

8.1.1 Describe core components of the aircraft's electrical system.

8.1.2 Describe the system design and operation, including use of AC or DC power, as applicable.

8.1.3 Explain the methods of power generation.

8.1.4 Describe the electrical system protections and locations of key components.

8.1.5 Explain the indications of normal and degraded system operation.

8.1.6 Describe the location of connections for external sources of power, if applicable.

8.1.7 Describe the use of the APU when used to provide a source of electrical power.

9. Hydraulic system

9.1.1 Describe core components of the aircraft hydraulic system/s and their method of operation, including alternative sources of operation.

9.1.2 Describe normal system operating pressure and system protections to prevent damage to components or system.

9.1.3 Explain method of determining sufficient system capacity, indicators and controls.

9.1.4 Describe systems operated by the hydraulic system/s.

10. Undercarriage and brakes

10.1.1 Describe the undercarriage system components and safety systems.

10.1.2 Explain normal and alternative method of undercarriage operation.

10.1.3 Describe operation of the nosewheel steering system, if installed.

10.1.4 Describe the brake system components and normal and non-normal operation.

10.1.5 Explain operation of the anti-skid system and limitations.

10.1.6 Determine brake energy limits and brake cooling requirements.

11. Pneumatic system

11.1.1 Describe the aircraft pneumatic system components and methods of operation.

11.1.2 Describe system limitations and safety devices.

12. Environmental system

12.1.1 Explain the operation of aircraft heating, demisting, and airconditioning systems, normal and emergency modes of operation and limitations.

13. Flight controls

13.1.1 Describe primary and secondary flight controls and their method of operation.

13.1.2 Describe degraded modes of operation for aircraft fitted envelope protection systems, the effects on longitudinal stability with changes in aircraft speed.

13.1.3 Knowledge of limitations and safety features that prevent structural damage to the aircraft.

14. Ice and rain protection

14.1.1 Describe the aircraft ice protection system/s, detection systems and explain their operation.

14.1.2 Describe anti-ice system limitations.

15. Fire and overheat protection

15.1.1 Describe the fire and overheat protection system/s installed on the aircraft, including indicators and extinguishing agents used.

15.1.2 Can determine the serviceability of the system/s.

15.1.3 Describe the power sources required for system operation.

16. Flight instruments

16.1.1 Describe the system/s that provide data to the primary flight instruments.

16.1.2 Describe the power sources for the primary flight instruments/displays.

16.1.3 Describe the operation of the warning systems.

16.1.4 Knowledge of alternative sources of flight instrument operation.

16.1.5 Describe the operation of EFIS system and redundant modes of operation.

17. Navigation and radar systems

17.1.1 Knowledge of the operation of the aircraft navigation, communication and surveillance system/s.

17.1.2 Describe the operation of the aircraft navigation receivers and how to determine their operational status and integrity.

17.1.3 Knowledge of the aircraft’s weather detection system/s and safety precautions.

17.1.4 Explain operation of the aircraft FMS and integration with other aircraft systems.

17.1.5 Determine ANP for RNP operations.

17.1.6 Describe the operation of the aircraft windshear detection system.

18. Autoflight system

18.1.1 Explain the operation of the autopilot and autothrottle, if installed, in flight operation in all modes.

18.1.2 Describe failure annunciations, pilot actions and limitations.

18.1.3 Explain the integration of aircraft navigation systems with the autoflight system.

19. Communications

19.1.1 Can operate all the aircraft communication systems, voice and data when installed.

19.1.2 Describe operation of aircraft intercommunication systems.

19.1.3 Describe operation of the communications system in the event of changes in power source.

19.1.4 Explain operation of the CVR and FDR and requirements for operation.

20. Airframe

20.1.1 Describe airframe construction, fuselage sections, materials, cowling and firewalls, as applicable.

20.1.2 Describe aerodynamic surfaces of the airframe.

20.1.3 Describe operation of the doors, exits, windows and monitoring systems.

21. Miscellaneous systems

21.1.1 Describe other systems installed in the aircraft that are likely to be used by the flight crew to operate the aircraft.

21.1.2 Describe the location and operation of emergency equipment installed on the aircraft.

Unit 3.2.2 TYPH: Pilot type rating – helicopter

1. Reserved

2. Helicopter limitations and documentation

2.1.1 State aircraft limitations and demonstrate ability to locate information contained in the RFM and POH, if applicable.

2.1.2 Perform pre-flight inspection and determine serviceability of the aircraft for flight.

2.1.3 Apply MEL and Configuration Deviation List (CDL), where applicable.

2.1.4 Determine the effects of ADs, ASB/SB where pilot action may be required, as applicable to type.

2.1.5 Awareness of licensing obligations for variants, where applicable.

3. Weight and balance

3.1.1 Calculate CG for aircraft and determine if within prescribed limits.

3.1.2 The effects of configuration changes on CG, if any.

3.1.3 The effects of fuel use and the management of the CG, if any.

3.1.4 The effects of changes to CG on aircraft performance.

3.1.5 Aircraft weight limitations, loading limits, cargo hold limitations, and any load/weight limitations for operational equipment contained in the flight manual supplement.

4. Meteorology and adverse weather operations

4.1.1 Interpret weather forecasts typically required to conduct a flight in the helicopter.

4.1.2 State the requirements for low-visibility operations.

4.1.3 Describe the effect on helicopter operations of the following:

(a) ice, slush or snow (contaminated runway);

(b) turbulence penetration;

(c) heavy rain or falling snow;

(d) windshear and localised environments (as applicable);

(e) cold weather operations (as applicable);

(f) low-visibility operations (as applicable).

5. Aerodynamics and performance

5.1.1 Describe basic aerodynamics for single main rotor, tandem rotor or coaxial system, as appropriate.

5.1.2 Describe the effect of changes in airspeed on drag and, therefore, performance.

5.1.3 Describe the minimum climb gradient performance requirements for each segment for helicopters that are certified as an air transport helicopter.

5.1.4 Describe the following aerodynamic effects as they apply to the particular helicopter:

(a) ground resonance;

(b) dynamic rollover;

(c) tail rotor drift and tail rotor roll;

(d) flapback and inflow roll;

(e) vortex ring;

(f) retreating blade stall;

(g) autorotation;

(h) loss of tail rotor effectiveness.

5.1.5 Determine the airspeeds to meet performance requirements for different configurations and phases of flight.

5.1.6 Describe stall characteristics and limits of normal operating envelope.

5.1.7 Discuss the meteorological performance limiting factors.

5.1.8 Discuss any unique operational characteristics, including terrain and environment.

6. Fuel and engine oil systems

6.1.1 Describe the following in relation to the aircraft's fuel system:

(a) location of fuel tank/s and capacity;

(b) normal and non-normal fuel system operation and distribution;

(c) location and type of pumps used;

(d) vents system and location of vents and drains;

(e) system controls and indicators;

(f) minimum grades, colour and additives required, if any;

(g) minimum fuel temperature;

(h) indications of reduced or loss of fuel flow.

6.1.2 Minimum level of engine oil.

6.1.3 The aeroplane's oil system indicators and grade of oil required.

6.1.4 Fuel and oil system limitations for the aeroplane.

7. Engines

7.1.1 Describe type of engine/s installed, the main components, rated horsepower and indicators required for operation.

7.1.2 State engine start limits, as applicable.

7.1.3 Describe engine controls and their function.

7.1.4 Describe normal and non-normal engine operation.

7.1.5 Describe operation of the ignition system.

7.1.6 Describe the method of rotor engagement, as applicable.

8. Electrical system

8.1.1 Describe core components of the aircraft's electrical system.

8.1.2 Describe the system design and operation, including use of AC or DC power, as applicable.

8.1.3 Explain the methods of power generation.

8.1.4 Describe the electrical system protections and locations of key components.

8.1.5 Explain the indications of normal and degraded system operation.

8.1.6 Describe the location of connections for external sources of power, if applicable.

8.1.7 Describe the use of the APU when used to provide a source of electrical power.

9. Hydraulic system

9.1.1 Describe core components of the aircraft hydraulic system/s and their method of operation, including alternative sources of operation.

9.1.2 Describe normal system operating pressure and system protections to prevent damage to components or system.

9.1.3 Explain method of determining sufficient system capacity, indicators and controls.

9.1.4 Describe systems operated by the hydraulic system/s.

10. Undercarriage and brakes

10.1.1 Describe the undercarriage system components and safety systems.

10.1.2 Explain normal and alternative method of undercarriage operation.

10.1.3 Describe operation of the nosewheel steering system, if installed.

10.1.4 Describe the brake system components and normal and non-normal operation.

10.1.5 Determine brake energy limits and brake cooling requirements.

11. Pneumatic system

11.1.1 Describe the aircraft pneumatic system components and methods of operation.

11.1.2 Describe system limitations and safety devices.

12. Environmental/pressurisation system

12.1.1 Explain the operation of aircraft heating, demisting, and airconditioning systems, if applicable, normal and emergency modes of operation and limitations.

13. Flight controls

13.1.1 Describe primary and secondary flight controls and their method of operation.

13.1.2 Knowledge of limitations and safety features that prevent structural damage to the aircraft.

14. Ice and rain protection

14.1.1 Describe the aircraft ice protection system/s, detection systems and explain their operation.

14.1.2 Describe anti-ice system limitations, if applicable.

15. Fire and overheat protection

15.1.1 Describe the fire and overheat protection system/s installed on the aircraft, including indicators and extinguishing agents used, if applicable.

15.1.2 Determine the serviceability of the fire and or overheat system/s, if applicable.

15.1.3 Describe the power sources required for system operation.

16. Flight instruments

16.1.1 Describe the system/s that provide data to the primary flight instruments.

16.1.2 Describe the power sources for the primary flight instruments/displays.

16.1.3 Describe the operation of the warning systems.

16.1.4 Knowledge of alternative sources of flight instrument operation.

16.1.5 Describe the operation of EFIS system and redundant modes of operation.

17. Navigation and radar systems

17.1.1 Knowledge of the operation of the aircraft navigation, communication and surveillance system/s, as applicable.

17.1.2 Describe the operation of the aircraft navigation receivers and how to determine their operational status and integrity.

17.1.3 Knowledge of the aircraft’s weather detection system/s and safety precautions, if applicable.

17.1.4 Explain operation of the aircraft FMS and integration with other aircraft systems, if applicable.

17.1.5 Determine RNP capability.

17.1.6 Conduct RNP operations, as applicable.

17.1.7 Describe the operation of the aircraft windshear detection system, if applicable.

18. Autoflight system

18.1.1 Describe the function and design of stability augmentation, autopilot and flight director systems in both the normal and degraded modes, if applicable.

18.1.2 Describe failure annunciations, pilot actions and limitations.

18.1.3 Explain the integration of aircraft navigation systems with the autoflight system.

19. Communications

19.1.1 Describe operation of all the aircraft communication systems, voice and data when installed.

19.1.2 Describe operation of aircraft intercommunication systems.

19.1.3 Describe operation of the communications system in the event of changes in power source.

19.1.4 Explain operation of the CVR and the FDR and requirements for operation, as applicable.

20. Airframe

20.1.1 Describe airframe construction, fuselage sections, materials, cowling and firewalls, as applicable.

20.1.2 Describe the operation and function of aerodynamic surfaces of the airframe.

20.1.3 Describe operation of the doors, exits, windows and monitoring systems.

21. Miscellaneous systems

21.1.1 Describe deign of role equipment and their use, the applicable procedures during normal and non-normal operations and limitations imposed on such equipment.

21.1.2 Describe other systems installed in the aircraft that are likely to be used by the flight crew to operate the aircraft.

21.1.3 Describe the location and operation of emergency equipment installed on the aircraft.

Unit 3.2.3 FETR: Flight engineer type rating – all aircraft

1. Reserved

2. General operational knowledge

2.1 Aircraft limitations and documentation

2.1.1 Recalls essential aircraft limitations.

2.1.2 Can locate information in the AFM.

2.1.3 General background knowledge on unique aircraft characteristics, similar models and variants, including knowledge required to confirm the serviceability of the aircraft before commencement of flight.

2.1.4 Knowledge of licensing obligations for variants, where applicable.

2.1.5 Use of MEL and configuration deviation list (CDL), where applicable.

2.2 Weight and balance

2.2.1 Describe the effects of fuel burn on the CG.

2.3 Adverse weather operations

2.3.1 Describe operational impact of icing conditions.

2.4 Aerodynamics and performance

2.4.1 General knowledge of airflow over aerofoils and the aerodynamic effects of the following if installed on the aircraft:

(a) spoiler;

(b) speed brakes;

(c) flaps and slats.

2.4.2 Able to calculate or extract relevant aircraft performance data for different phases of flight and the effects of non-normal operations on aircraft range and endurance.

2.4.3 Describe the meteorological performance limiting factors.

2.4.4 Discuss any unique operational characteristics.

2.5 Meteorology

2.5.1 Can interpret the weather forecasts typically required for the normal operation of the aircraft.

3. Aircraft systems

3.1 Fuel and oil systems

3.1.1 Can describe the following in relation to the aircraft's fuel system:

(a) location of fuel tank/s and capacity;

(b) normal and non-normal fuel system operation and distribution;

(c) location and type of pumps used;

(d) vents system and location of vents and drains;

(e) system controls and indicators;

(f) minimum grades, colour and additives required, if any.

3.1.2 Determine minimum level of engine oil.

3.1.3 Describe oil system indicators and grade of oil required.

3.1.4 Knowledge of fuel and oil system limitations.

3.2 Engines

3.2.1 Describe type of engine/s installed, the main components, rated thrust or horsepower and indicators required for operation.

3.2.2 Describe engine controls, their function.

3.2.3 Describe normal and non-normal engine operation.

3.2.4 If installed, the type of propellers/s, indicators and method of control and the method of feathering and unfeathering the propeller.

3.2.5 For turbine engine aircraft, explain the operation of the engine ignition system.

3.3 Electrical system

3.3.1 Describe core components of aircraft's electrical system, including;

(a) method/s of power generation;

(b) system design and operation;

(c) system protections and locations of key components;

(d) indicators and normal and degrade system operation;

(e) APU operation and location of connections for other external sources of power, if applicable.

3.4 Hydraulic system

3.4.1 Describe core components of the aircraft hydraulic system and their method of operation.

3.4.2 Method of determining sufficient system capacity, indicators and controls.

3.4.3 Systems operated by the hydraulic system/s.

3.5 Undercarriage and brakes

3.5.1 Describe the undercarriage system components and safety systems.

3.5.2 Normal and alternative method of operation.

3.5.3 Nosewheel steering system, if installed.

3.5.4 Describe the brake system components and normal and non-normal operation.

3.6 Pneumatic system

3.6.1 Describe the aircraft pneumatic system components and methods of operation.

3.6.2 Describe system limitations and safety devices.

3.7 Environmental/pressurisation system

3.7.1 Describe aircraft pressurisation system components and methods of normal and non-normal operation.

3.7.2 Explain the aircraft pressurisation limitations and safety features.

3.7.3 Describe the differences between gradual and rapid depressurisation experienced by the occupants of the aircraft.

3.7.4 Describes the reason for pressurisation limitation for take-off and landing.

3.7.5 Explain why a pressurised aircraft is fitted with a cabin altimeter.

3.7.6 Describe how to determine that the pressurisation system is functioning correctly.

3.8 Flight controls

3.8.1 Describe primary and secondary flight controls and their method of operation.

3.8.2 Describe the operation of speed-sensing devices that limit or operate flight controls where installed.

3.8.3 Describe degraded modes of operation for aircraft fitted with fly-by-wire flight control systems, the degraded protection provided and the effects on longitudinal stability with changes in aircraft speed.

3.8.4 Knowledge of limitations and safety features that prevent structural damage to the aircraft.

3.9 Ice and rain protection

3.9.1 Describe the aircraft ice protection system/s, detection systems and explain their operation.

3.9.2 Describe anti-ice system limitations.

3.10 Fire and overheat protection

3.10.1 Describe the fire and overheat protection system/s installed on the aircraft, including indicators and extinguishing agents used.

3.10.2 Can determine the serviceability of the system/s.

3.10.3 Describe the power sources necessary for system operation.

3.11 Flight instruments

3.11.1 Describe the system/s that provide data to the primary flight instruments.

3.11.2 Describe the power sources for the primary flight instruments/displays.

3.11.3 Describe the operation of the stall avoidance and/or warning systems.

3.11.4 Knowledge of alternative sources of operation.

3.12 Navigation

3.12.1 Knowledge of the operation of the aircraft navigation system/s, including transponder/s and flight director/s and limitations.

3.12.2 Describe the operation of the aircraft navigation receivers and how to determine their working status.

3.12.3 Knowledge of the aircraft’s weather detection system/s and safety precautions.

3.12.4 Operation of the aircraft FMS and cane determine signals used to determine aircraft position.

3.12.5 Describe the operation of the aircraft TCAS system.

3.12.6 Understanding of the aircraft windshear detection system, if installed.

3.13 Autoflight

3.13.1 Knowledge of autopilot and autothrottle, if installed, in flight operation in all modes.

3.13.2 Describe failure annunciations and pilot actions.

3.13.3 Understanding of interface with aircraft navigation systems.

3.13.4 Describe autoflight limitations.

3.14 Communications

3.14.1 Can operate all the aircraft communication systems, voice and data when installed.

3.14.2 Describe operation of aircraft intercommunication systems.

3.14.3 Describe operation of the communications system in the event of depressurisation or use of emergency oxygen system.

3.14.4 Explain operation of the CVR and FDR.

3.15 Miscellaneous systems

3.15.1 Describe other systems installed in the aircraft that contribute to the safety of the aircraft operation or are likely to be used by the flight crew to operate the aircraft.

3.15.2 Describe the location and operation of emergency equipment installed on the aircraft.

3.15.3 Knowledge of the location and operation of all exits installed on the aircraft.

APPENDIX 4. FOREIGN LICENCE CONVERSION

SECTION 4.1 CPL – *RESERVED*

SECTION 4.2 MPL/ATPL – *RESERVED*

Schedule 4 Aeronautical examinations

The following Table of Contents and Index of Codes are for guidance only and are not part of the Schedule.

Table of Contents

INDEX OF CODES

SECTION 1 FLIGHT CREW LICENCE AND ASSOCIATED CATEGORY RATINGS

APPENDIX 1.0 RECREATIONAL PILOT LICENCE (RPL)

RPL – Aeroplane Category Rating

Examination Code	Examination Subject	Pass Standard %	Time Limit Hours
RPLA	RPL – Aeroplane	70	2.0

RPL – Helicopter Category Rating

Examination Code	Examination Subject	Pass Standard %	Time Limit Hours
RPLH	RPL – Helicopter	70	2.0

RPL – Gyroplane Category Rating

Examination Code	Examination Subject	Pass Standard %	Time Limit Hours
RPLG	RPL – Gyroplane	70	2.0

RPL – NAVIGATION ENDORSEMENT

Examination Code	Examination Subject	Pass Standard %	Time Limit Hours
RPLN	RPL – Navigation	70	1.5

RPL – Powered-Lift Category Rating – *Reserved*

RPL – Airship Category Rating – *Reserved*

APPENDIX 1.1 PRIVATE PILOT LICENCE (PPL)

PPL – Aeroplane Category Rating

Examination Code	Examination Subject	Pass Standard %	Time Limit Hours
PPLA	PPL – Aeroplane	70	3.5

PPL – Helicopter Category Rating

Examination Code	Examination Subject	Pass Standard %	Time Limit Hours
PPLH	PPL – Helicopter	70	3.5

PPL – Gyroplane Category Rating

Examination Code	Examination Subject	Pass Standard %	Time Limit Hours
PPLG	PPL – Gyroplane	70	3.5

PPL – Powered-Lift Category Rating – *Reserved*

PPL – Airship Category Rating – *Reserved*

APPENDIX 1.2 COMMERCIAL PILOT LICENCE (CPL)

CPL – All Aircraft Category Ratings

Examination Code	Examination Subject	Pass Standard %	Time Limit Hours
CNAV	CPL – Navigation	70	1.75
CMET	CPL – Meteorology	70	1.5
CHUF	CPL – Human Factors	70	1.25

CPL – Aeroplane Category Rating

Examination Code	Examination Subject	Pass Standard %	Time Limit Hours
CLWA	CPL – Flight Rules and Air Law – Aeroplane	80	2.0
CADA	CPL – Aerodynamics – Aeroplane	70	1.5
CSYA	CPL – Aircraft General Knowledge – Aeroplane	70	1.5
CFPA	CPL – Operation, Performance and Planning – Aeroplane	70	2.5

CPL – Helicopter Category Rating

Examination Code	Examination Subject	Pass Standard %	Time Limit Hours
CLWH	CPL – Flight Rules and Air Law – Helicopter	80	2.0
CADH	CPL – Aerodynamics – Helicopter	70	1.5
CSYH	CPL – Aircraft General Knowledge – Helicopter	70	1.5
CFPH	CPL – Operation, Performance and Planning – Helicopter	70	2.5

CPL – Gyroplane Category Rating

Examination Code	Examination Subject	Pass Standard %	Time Limit Hours
CLWG	CPL – Flight Rules and Air Law – Gyroplane	80	2.0
CADG	CPL – Aerodynamics – Gyroplane	70	1.5
CSYG	CPL – Aircraft General Knowledge – Gyroplane	70	1.5
CFPG	CPL – Operation, Performance and Planning – Gyroplane	70	2.5

CPL – Powered-Lift Category Rating – *Reserved*

CPL – Airship Category Rating – *Reserved*

APPENDIX 1.3 MULTI-CREW PILOT LICENCE (MPL)

MPL – Aeroplane Category Ratings

Examination Code	Examination Subject	Pass Standard %	Time Limit Hours
CNAV	CPL – Navigation	70	1.75
CMET	CPL – Meteorology	70	1.5
CHUF	CPL – Human Factors	70	1.25
CLWA	CPL – Flight Rules and Air Law – Aeroplane	80	2.0
CADA	CPL – Aerodynamics – Aeroplane	70	1.5
CSYA	CPL – Aircraft General Knowledge – Aeroplane	70	1.5
CFPA	CPL – Operation, Performance and Planning – Aeroplane	70	2.5
AALW	ATPL – Air Law	80	1.5
AHUF	ATPL – Human Factors	70	1.25
AMET	ATPL – Meteorology	70	1.5
ANAV	ATPL – Navigation	70	1.5
AFPA	ATPL – Flight Planning – Aeroplane	70	3.0
APLA	ATPL – Performance and loading – Aeroplane	70	2.5
AASA	ATPL – Aerodynamics and Aircraft Systems – Aeroplane	70	1.5
IREX	Instrument Rating	70	3.5

APPENDIX 1.4 AIR TRANSPORT PILOT LICENCE (ATPL)

ATPL – All Aircraft Category Ratings

Examination Code	Examination Subject	Pass Standard %	Time Limit Hours
AALW	ATPL – Air Law	80	1.5
AHUF	ATPL – Human Factors	70	1.25
AMET	ATPL – Meteorology	70	1.5
ANAV	ATPL – Navigation	70	1.5

ATPL – Aeroplane Category Rating

Examination Code	Examination Subject	Pass Standard %	Time Limit Hours
AFPA	ATPL – Flight Planning – Aeroplane	70	3.0
APLA	ATPL – Performance and Loading – Aeroplane	70	2.5
AASA	ATPL – Aerodynamics and Aircraft Systems – Aeroplane	70	1.5
IREX	Instrument Rating	70	3.5

ATPL – Helicopter Category Rating

Examination Code	Examination Subject	Pass Standard %	Time Limit Hours
AFPH	ATPL – Flight Planning – Helicopter	70	3.0
APLH	ATPL – Performance and Loading – Helicopter	70	2.5
AASH	ATPL – Aerodynamics and Aircraft Systems – Helicopter	70	1.5

ATPL – Powered-Lift Category Rating – *Reserved*

APPENDIX 1.5 FLIGHT ENGINEER LICENCE

Flight Engineer Licence

Examination Code	Examination Subject	Pass Standard %	Time Limit Hours
FENG	Flight Engineer	70	2.0

SECTION 2 OPERATIONAL RATINGS

APPENDIX 2.1 PRIVATE IFR RATING

Private IFR Rating

Examination Code	Examination Subject	Pass Standard %	Time Limit Hours
PIFR	Private IFR Rating	70	2.0

APPENDIX 2.2 INSTRUMENT RATING

Instrument Rating

Examination Code	Examination Subject	Pass Standard %	Time Limit Hours
IREX	Instrument Rating	70	3.5

APPENDIX 2.3 AERIAL APPLICATION RATING

Aerial application – Aeroplane endorsement

Examination Code	Examination Subject	Pass Standard %	Time Limit Hours
AGRA	Aerial Application – Aeroplane	75	2.0

Aerial application– Helicopter endorsement

Examination Code	Examination Subject	Pass Standard %	Time Limit Hours
AGRH	Aerial Application – Helicopter	75	2.0

Aerial application– Gyroplane endorsement

Examination Code	Examination Subject	Pass Standard %	Time Limit Hours
AGRG	Aerial Application – Gyroplane	75	2.0

APPENDIX 2.4 FLIGHT OR SIMULATOR INSTRUCTOR RATING

Examination Code	Examination Subject	Pass Standard %	Time Limit Hours
PIRC	Instructor Rating	75	2.0

SECTION 3 FOREIGN LICENCE CONVERSION

APPENDIX 3.1 COMMERCIAL PILOT LICENCE (CPL) OVERSEAS CONVERSION EXAMINATIONS

All Aircraft Category Ratings

Examination Code	Examination Subject	Pass Standard %	Time Limit Hours
CHUF	CPL – Human Factors	70	1.25

Aeroplane Category Rating

Examination Code	Examination Subject	Pass Standard %	Time Limit Hours
COSA	CPL Overseas Conversion – Aeroplane	80	2.0

Helicopter Category Rating

Examination Code	Examination Subject	Pass Standard %	Time Limit Hours
COSH	CPL Overseas Conversion – Helicopter	80	2.0

Gyroplane Category Rating

Examination Code	Examination Subject	Pass Standard %	Time Limit Hours
COSG	CPL Overseas Conversion – Gyroplane	80	2.0

Powered-Lift Category Rating – *Reserved*

Airship Category Rating – *Reserved*

APPENDIX 3.2 AIR TRANSPORT PILOT LICENCE (ATPL) OR MULTI-CREW PILOT LICENCE (MPL) OVERSEAS CONVERSION EXAMINATIONS

All Aircraft Category Ratings

Examination Code	Examination Subject	Pass Standard %	Time Limit Hours
AHUF	ATPL – Human Factors	70	1.25

Aeroplane Category Rating

Examination Code	Examination Subject	Pass Standard %	Time Limit Hours
AOSA	ATPL Overseas Conversion – Aeroplane Reference the following Unit codes for knowledge standards in Schedule 3 1. AMET 2. CLWA 3. AALW	80	3.0
IREX	Instrument Rating	70	3.5

Helicopter Category Rating

Examination Code	Examination Subject	Pass Standard %	Time Limit Hours
AOSH	ATPL Overseas Conversion – Helicopter Reference the following Unit codes for knowledge standards in Schedule 3 1. CLWH 2. AALW 3. CMET	80	3.0

Powered-lift Category Rating – *Reserved*

Replaced Authorised Version registered 31/05/2024 F2021C00449

SECTION 4 AUSTRALIAN DEFENCE FORCE (ADF) CONVERSION

APPENDIX 4.1 AIR TRANSPORT PILOT LICENCE (ATPL) ADF CONVERSION EXAMINATIONS

All Aircraft Category Ratings

Examination Code	Examination Subject	Pass Standard %	Time Limit Hours
AALW	ATPL – Air Law	80	1.5
AHUF	ATPL – Human Factors	70	1.25
AMET	ATPL – Meteorology	70	1.5
ANAV	ATPL – Navigation	70	1.5

Aeroplane Category Rating

Examination Code	Examination Subject	Pass Standard %	Time Limit Hours
AFPA	ATPL – Flight Planning – Aeroplane	70	3.0
APLA	ATPL – Performance and Loading – Aeroplane	70	2.5
AASA	ATPL – Aerodynamics and Aircraft Systems – Aeroplane	70	1.5
IREX*	Instrument Rating	70	3.5

*Only if applicant has not previously held an instrument rating.

Helicopter Category Rating

Examination Code	Examination Subject	Pass Standard %	Time Limit Hours
AFPH	ATPL – Flight planning – Helicopter	70	3.0
APLH	ATPL – Performance and Loading – Helicopter	70	2.5
AASH	ATPL – Aerodynamics and Aircraft Systems – Helicopter	70	1.5

Powered-lift Category Rating – *Reserved*

Schedule 5 Flight test standards

The following Table of Contents is for guidance only and is not part of the Schedule.

Table of Contents

SECTION G RECREATIONAL PILOT LICENCE (RPL)

Appendix G.1 RPL Aeroplane category rating flight test

1. Flight test requirements

An applicant for a recreational pilot licence with aeroplane category rating flight test must demonstrate the following:

(a) knowledge of the topics listed in clause 2;

(b) ability to conduct the activities and manoeuvres mentioned in clause 3, within the operational scope and under the conditions mentioned in clause 4, to the competency standards required under section 12 of this MOS which are relevant to the flight test.

2. Knowledge requirements

For paragraph 1 (a), the topics are the following:

(a) privileges and limitations of the recreational pilot licence with aeroplane category rating;

(b) applicability of drug and alcohol regulations;

(c) aircraft instrument requirements for VFR operations;

(d) emergency equipment requirements;

(e) fuel planning and oil requirements for the flight;

(f) managing passengers and the carriage of cargo;

(g) aircraft speed limitations;

(h) aircraft systems.

3. Activities and manoeuvres

Note For paragraph 1 (b), the flight test includes all of the following activities and manoeuvres. The sequence set out here is not necessarily intended to direct the order of activities and manoeuvres.

3.1 Pre-flight

Note The relevant competency standards are in unit codes C2 and C4.

(a) perform pre-flight actions and procedures;

(b) perform a pre-flight inspection;

(c) refuel an aeroplane (may be assessed by questioning).

3.2 Ground operations, take-off, departure and climb

Note The relevant competency standards are in unit codes A1, A2, A3, C3 and IFF.

(a) complete all relevant checks and procedures;

(b) taxi an aeroplane;

(c) plan, brief and conduct take-off and departure procedures;

(d) conduct a cross-wind take-off;

(e) conduct a short-field take-off;

(f) conduct climbs on a constant heading and climbing turns, including at least 2 of the following:

(i) maximum rate climb;

(ii) maximum angle climb;

(iii) cruise climb.

3.3 En route cruise

Note The relevant competency standards are in unit code A3.

(a) maintain straight and level flight, and turn an aeroplane;

(b) navigate and transit from a circuit area to a training area and return;

(c) operate safely in local area airspace;

(d) establish and maintain cruise flight for at least 1 of the following configurations:

(i) turbulence;

(ii) flaps selected;

(iii) high speed.

3.4 Test specific activities and manoeuvres

Note The relevant competency standards are in unit codes A1, A5, A6 and IFF.

(a) enter and recover from each of the following flight conditions, 1 of which must be in the approach configuration:
  (i) a fully developed stall;
  (ii) a wing drop at the stall;
(b) conduct steep level turns of at least 45˚ angle of bank;
(c) perform full panel instrument flying;
(d) using a full instrument panel, recover from at least 2 different unusual aircraft attitudes;
(e) manage an engine failure after take-off;
(f) manage the following malfunctions:
  (i) a malfunction during start or shutdown; and
  (ii) any 1 of the following that is not performed under subparagraph (i):
    (A) an aircraft system malfunction;
    (B) engine or cabin fire;
    (C) radio failure;
(g) perform a forced landing.

3.5 Descent and arrival

Note The relevant competency standards are in unit code A3.

(a) conduct descents maintaining a constant heading and descending turns;
(b) plan and conduct aerodrome arrival and circuit joining procedures.

3.6 Circuit, approach and landing

Note The relevant competency standards are in unit codes A3, A4 and A6.

(a) conduct a normal circuit pattern, approach and landing;
(b) conduct a cross-wind landing;
(c) conduct short-field and flapless landings;
(d) perform a go-around procedure;
(e) perform after-landing actions and procedures.

3.7 Shut down and post-flight

Note The relevant competency standards are in unit codes A1 and C2.

(a) park, shutdown, and secure an aeroplane;
(b) complete post-flight administration.

3.8 General requirements

Note The relevant competency standards are in unit codes A3, C1, C3, C4, C5, NTS1 and NTS2.

(a) maintain an effective lookout;
(b) maintain situational awareness;
(c) assess situations and make appropriate decisions;
(d) set priorities and manage tasks effectively;
(e) maintain effective communication and interpersonal relationships;
(f) recognise and manage threats;
(g) recognise and manage errors;
(h) recognise and manage undesired aircraft states;
(i) communicate effectively using appropriate procedures for the airspace being used during the test;
(j) manage the aircraft systems required for the flight;
(k) manage the fuel system and monitor the fuel plan and fuel usage during the flight;
(l) manage passengers and the carriage of cargo.

4. Operational scope and conditions

4.1 The following operational scope applies to the flight test:

(a) managing an aircraft system, which is not required for the flight, is not an assessable item unless the applicant uses the system during the flight;

(b) simulated carriage of passengers and cargo;

(c) a simulated private local area operation;

(d) operating in Class G airspace, at a non-towered aerodrome;

(e) emergencies and abnormal situations relating to aircraft systems, powerplants and the airframe are simulated and limited to those described in the AFM.

4.2 The following conditions apply to the flight test:

(a) activities and manoeuvres are performed in accordance with published procedures;

(b) conducted in an aeroplane;

(c) conducted by day under the VFR;

(d) operating at a non-towered aerodrome may be simulated if the test is conducted at a controlled aerodrome;

(e) if the aerodrome cross-wind conditions for the runway used during the test are less than 70% of the maximum in the AFM, evidence that the applicant has demonstrated competency performing cross-wind take-off and landing manoeuvres may be taken from the applicant's training records.

Appendix G.2 RPL Helicopter category rating flight test

1. Flight test requirements

An applicant for a recreational pilot licence with helicopter category rating flight test must demonstrate the following:

(a) knowledge of the topics listed in clause 2;

(b) ability to conduct the activities and manoeuvres mentioned in clause 3, within the operational scope and under the conditions mentioned in clause 4, to the competency standards required under section 12 of this MOS which are relevant to the flight test.

2. Knowledge requirements

For paragraph 1 (a), the topics are the following:

(a) privileges and limitations of the recreational pilot licence with helicopter category rating;

(b) applicability of drug and alcohol regulations;

(c) aircraft instrument requirements for VFR operations;

(d) emergency equipment requirements;

(e) fuel planning and oil requirements for the flight;

(f) managing passengers and the carriage of cargo;

(g) aircraft speed limitations;

(h) aircraft systems.

3. Activities and manoeuvres

Note For paragraph 1 (b), the flight test includes all of the following activities and manoeuvres. The sequence set out here is not necessarily intended to direct the order of activities and manoeuvres.

3.1 Pre-flight

Note The relevant competency standards are in unit codes C2 and C4.

(a) perform pre-flight actions and procedures;

(b) perform a pre-flight inspection;

(c) refuel a helicopter (may be assessed by questioning).

3.2 Ground operations, take-off, departure and climb

Note The relevant competency standards are in unit codes H1, H2, H3, H4 and H5.

(a) complete all relevant checks and procedures;

(b) lift-off and hover a helicopter;

(c) taxi a helicopter;
(d) air transit a helicopter;
(e) plan, brief and conduct take-off and departure procedures;
(f) conduct climbs on a constant heading, and climbing turns, including at least 2 of the following:
  (i) maximum rate climb;
  (ii) maximum angle climb;
  (iii) cruise climb.

3.3 En route cruise

Note The relevant competency standards are in unit code H5.

(a) maintain straight and level flight, and turn a helicopter;
(b) navigate and transit from a circuit area to a training area and return;
(c) operate safely in local area airspace.

3.4 Test specific activities and manoeuvres

Note The relevant competency standards are in unit codes H2, H6 and H7.

(a) hover a helicopter in cross-wind and tailwind conditions and perform turns around 1 of the following:
  (i) rotor mast;
  (ii) helicopter nose;
  (iii) helicopter tail;
(b) perform sidewards and backwards flight;
(c) conduct steep level turns of at least 45˚ angle of bank;
(d) perform an autorotative flight manoeuvre;
(e) land on and lift off from sloping ground;
(f) land, manoeuvre, and take off in a confined area;
(g) execute a limited power take-off, approach and landing;
(h) perform a forced landing;
(i) manage an engine failure during hover or taxi;
(j) manage a control or tail rotor malfunction in flight and at the hover (simulated);
(k) manage at least 1 of the following:
  (i) an engine fire;
  (ii) electrical failure;
  (iii) hydraulic system malfunction;
  (iv) airframe fuel system malfunction;
  (v) engine governor system malfunction.

3.5 Descent and arrival

Note The relevant competency standards are in unit codes H5.

(a) conduct descents maintaining a constant heading and descending turns;
(b) plan and conduct aerodrome or helicopter landing site arrival and circuit joining procedures.

3.6 Circuit, approach and landing

Note The relevant competency standards are in unit codes H3, H4 and H5.

(a) conduct a normal circuit pattern, approach and landing;
(b) conduct an approach to the hover;
(c) conduct a helicopter air transit;
(d) perform a go-around procedure.

3.7 Post-flight

Note The relevant competency standards are in unit code C2.

(a) park, shutdown and secure the helicopter;
(b) complete post-flight administration.

3.8 General requirements

Note The relevant competency standards are in unit codes C1, C3, C4, C5, NTS1 and NTS2.

(a) maintain an effective lookout;
(b) maintain situational awareness;
(c) assess situations and make appropriate decisions;
(d) set priorities and manage tasks effectively;
(e) maintain effective communication and interpersonal relationships;
(f) recognise and manage threats;
(g) recognise and manage errors;
(h) recognise and manage undesired aircraft states;
(i) communicate effectively using appropriate procedures for the airspace being used during the test;
(j) manage the aircraft systems required for the flight;
(k) manage the fuel system and monitor the fuel plan and fuel usage during the flight;
(l) manage passengers and the carriage of cargo.

4. Operational scope and conditions

4.1 The following operational scope applies to the flight test:

(a) managing an aircraft system, which is not required for the flight, is not an assessable item unless the applicant uses the system during the flight;
(b) simulated carriage of passengers and cargo;
(c) a simulated private local area operation;
(d) operating in Class G airspace and at a non-towered aerodrome;
(e) emergencies and abnormal situations relating to aircraft systems, powerplants and the airframe are simulated and limited to those described in the AFM.

4.2 The following conditions apply to the flight test:

(a) activities and manoeuvres are performed in accordance with published procedures;
(b) conducted in a helicopter;
(c) conducted by day under the VFR;
(d) operating at a non-towered aerodrome may be simulated if the test is conducted at a controlled aerodrome;
(e) assessment of competency for activities and manoeuvres that require the applicant to operate the helicopter in cross-wind and tailwind conditions may be taken from the applicant’s training records if the conditions are insufficient.

Appendix G.3 RPL Gyroplane category rating flight test

RESERVED

Appendix G.4 RPL Airship category rating flight test

RESERVED

SECTION H PRIVATE PILOT LICENCE (PPL)

Appendix H.1 PPL Aeroplane category rating flight test

1. Flight test requirements

An applicant for a private pilot licence with aeroplane category rating flight test must demonstrate the following:

(a) knowledge of the topics listed in clause 2;

(b) ability to conduct the activities and manoeuvres mentioned in clause 3, within the operational scope and under the conditions mentioned in clause 4, to the competency standards required under section 12 of this MOS which are relevant to the flight test.

2. Knowledge requirements

For paragraph 1 (a), the topics are the following:

(a) privileges and limitations of the private pilot licence with aeroplane category rating;

(b) applicability of drug and alcohol regulations;

(c) aircraft instrument requirements for VFR operations;

(d) emergency equipment requirements;

(e) requirements for landing areas and aerodromes;

(f) GNSS and its use in VFR navigation;

(g) fuel planning and oil requirements for the flight;

(h) loading and unloading fuel;

(i) managing passengers and the carriage of cargo;

(j) aircraft loading system;

(k) aircraft performance and landing calculations;

(l) pilot maintenance authorisations;

(m) aircraft speed limitations;

(n) aircraft systems.

3. Activities and manoeuvres

Note For paragraph 1 (b), the flight test includes all of the following activities and manoeuvres. The sequence set out here is not necessarily intended to direct the order of activities and manoeuvres.

3.1 Pre-flight

Note The relevant competency standards are in unit codes C2, C4 and NAV.

(a) perform pre-flight actions and procedures;

(b) perform a pre-flight inspection;

(c) refuel an aeroplane (may be assessed by questioning).

3.2 Ground operations, take-off, departure and climb

Note The relevant competency standards are in unit codes A1, A2, A3, C3, IFF and NAV.

(a) complete all relevant checks and procedures;

(b) taxi an aeroplane;

(c) plan, brief and conduct take-off and departure procedures;

(d) conduct a cross-wind take-off;

(e) conduct a short-field take-off;

(f) conduct climbs on a constant heading and climbing turns, including at least 2 of the following:

  (i) maximum rate climb;

  (ii) maximum angle climb;

  (iii) cruise climb.

3.3 En route cruise

Note The relevant competency standards are in unit codes A3, NAV and RNE.

(a) maintain straight and level flight, and turn aeroplane;

(b) navigate en route;
(c) establish and maintain cruise flight for at least 1 of the following conditions:
 (i) turbulence;
 (ii) holding;
 (iii) range;
(d) navigate at low level;
(e) perform a lost recovery procedure;
(f) perform a diversion procedure;
(g) navigate using instrument navigation systems.

3.4 Test specific activities and manoeuvres

Note The relevant competency standards are in unit codes A1, A5, A6, C3 and IFF.

(a) enter and recover from each of the following, 1 of which must be in the approach configuration:
 (i) a fully developed stall;
 (ii) a wing drop at the stall;
(b) conduct steep level turns of at least 45˚ angle of bank;
(c) perform full panel instrument flying;
(d) using a full instrument panel, recover from at least 2 different unusual aircraft attitudes;
(e) manage an engine failure after take-off;
(f) conduct a precautionary search;
(g) manage the following malfunctions:
 (i) a malfunction during start or shutdown; and
 (ii) any 1 of the following that is not performed under subparagraph (i):
  (A) an aircraft system malfunction;
  (B) engine or cabin fire;
  (C) radio failure;
(h) perform a forced landing.

3.5 Descent and arrival

Note The relevant competency standards are in unit codes A3 and NAV.

(a) conduct descents maintaining a constant heading and descending turns;
(b) plan and conduct aerodrome arrival and circuit joining procedures.

3.6 Circuit, approach and landing

Note The relevant competency standards are in unit codes A3, A4 and A6.

(a) conduct a normal circuit pattern, approach and landing;
(b) conduct a cross-wind landing;
(c) conduct short-field and flapless approaches and landings;
(d) perform a go-around procedure;
(e) perform after-landing actions and procedures.

3.7 Shut down and post-flight

Note The relevant competency standards are in unit codes A1 and C2.

(a) park, shutdown and secure an aeroplane;
(b) complete post-flight administration.

3.8 General requirements

Note The relevant competency standards are in unit codes C1, C3, C4, C5, CTA, CTR, OGA, ONTA, NAV. NTS1 and NTS2.

(a) maintain an effective lookout;
(b) maintain situational awareness;
(c) assess situations and make appropriate decisions;
(d) set priorities and manage tasks effectively;
(e) maintain effective communication and interpersonal relationships;

(f) recognise and manage threats;
(g) recognise and manage errors;
(h) recognise and manage undesired aircraft states;
(i) operate in controlled airspace;
(j) operate in Class G airspace;
(k) operate at a controlled aerodrome;
(l) operate at a non-towered aerodrome;
(m) communicate effectively using appropriate procedures for the airspace being used during the test;
(n) manage the aircraft systems required for the flight;
(o) manage the fuel system and monitor the fuel plan and fuel usage during the flight;
(p) manage passengers and the carriage of cargo.

4. Operational scope and conditions

4.1 The following operational scope applies to the flight test:

(a) managing an aircraft system, which is not required for the flight, is not an assessable item unless the applicant uses the system during the flight;
(b) simulated carriage of passengers and cargo;
(c) a simulated private cross-country operation;
(d) operating in Class G and controlled airspace;
(e) operating at a non-towered and a controlled aerodrome;
(f) emergencies and abnormal situations relating to aircraft systems, powerplants and the airframe are simulated and limited to those described in the AFM.

4.2 The following conditions apply to the flight test:

(a) activities and manoeuvres are performed in accordance with published procedures;
(b) conducted in an aeroplane;
(c) conducted by day under the VFR;
(d) the flight must include:
 (i) operating in Class G airspace and in controlled airspace; and
 (ii) operating at a non-towered aerodrome and a controlled aerodrome;
(e) if the area where the test is conducted does not have, or have available, controlled airspace or a controlled aerodrome, operating in controlled airspace or at a controlled aerodrome may be simulated as applicable;
(f) if the aerodrome cross-wind conditions for the runway used during the test are less than 70% of the maximum in the AFM, evidence that the applicant has demonstrated competency performing cross-wind take-off and landing manoeuvres may be taken from the applicant's training records.

Appendix H.2 PPL Helicopter category rating flight test

1. Flight test objective

An applicant for a private pilot licence with helicopter category rating flight test must demonstrate the following:

(a) knowledge of the topics listed in clause 2;
(b) ability to conduct the activities and manoeuvres mentioned in clause 3, within the operational scope and under the conditions mentioned in clause 4, to the competency standards required under section 12 of this MOS which are relevant to the flight test.

2. Knowledge requirements

For paragraph 1 (a), the topics are the following:

(a) privileges and limitations of the private pilot licence with helicopter category rating;
(b) applicability of drug and alcohol regulations;
(c) aircraft instrument requirements for VFR operations;
(d) emergency equipment requirements;

(e) requirements for landing areas and aerodromes;
(f) GNSS and its use in VFR navigation;
(g) fuel planning and oil requirements for the flight;
(h) loading and unloading fuel;
(i) managing passengers and the carriage of cargo;
(j) aircraft loading system;
(k) aircraft performance and landing calculations;
(l) pilot maintenance authorisations;
(m) aircraft speed limitations;
(n) aircraft systems.

3. Activities and manoeuvres

Note For paragraph 1 (b), the flight test includes all of the following activities and manoeuvres. The sequence set out here is not necessarily intended to direct the order of activities and manoeuvres.

3.1 Pre-flight

Note The relevant competency standards are in unit codes C2, C4 and NAV.

(a) perform pre-flight actions and procedures;
(b) perform a pre-flight inspection;
(c) refuel a helicopter (may be assessed by questioning).

3.2 Ground operations, take-off departure and climb

Note The relevant competency standards are in unit codes H1, H2, H3, H4, H5, IFF and NAV.

(a) complete all relevant checks and procedures;
(b) lift-off and hover a helicopter;
(c) taxi a helicopter;
(d) air transit a helicopter;
(e) plan, brief and conduct take-off and departure procedures;
(f) conduct climbs on a constant heading and climbing turns, including at least 2 of the following:
  (i) maximum rate climb;
  (ii) maximum angle climb;
  (iii) cruise climb.

3.3 En route cruise

Note The relevant competency standards are in unit codes H5, NAV, RNE.

(a) maintain straight and level flight, and turn a helicopter;
(b) navigate en route;
(c) navigate at low-level;
(d) perform a lost recovery procedure;
(e) perform a diversion procedure;
(f) navigate using instrument navigation systems.

3.4 Test specific activities and manoeuvres

Note The relevant competency standards are in unit codes H2, H6, H7 and IFF.

(a) hover a helicopter in cross-wind and tailwind conditions and perform turns around 1 of the following:
  (i) rotor mast;
  (ii) helicopter nose;
  (iii) helicopter tail;
(b) perform sidewards and backwards flight;
(c) conduct steep level turns of at least 45˚ angle of bank;
(d) perform full panel instrument flying;
(e) using a full instrument panel, recover from at least 2 different unusual aircraft attitudes;
(f) perform an autorotative flight manoeuvre;

(g) land on and lift off from sloping ground;
(h) land, manoeuvre, and take off in a confined area;
(i) execute a limited power take-off, approach and landing;
(j) perform a forced landing;
(k) manage an engine failure during hover or taxi;
(l) manage a control or tail rotor malfunction in flight and at the hover;
(m) manage at least 1 of the following:
  (i) an engine fire;
  (ii) electrical failure;
  (iii) hydraulic system malfunction;
  (iv) airframe fuel system malfunction;
  (v) engine governor system malfunction.

3.5 Descent and arrival

Note The relevant competency standards are in unit codes H5 and NAV.

(a) conduct descents maintaining a constant heading and descending turns;
(b) plan and conduct an aerodrome or helicopter landing site arrival and circuit joining procedures.

3.6 Circuit, approach and landing

Note The relevant competency standards are in unit codes H3, H4 and H5.

(a) conduct a normal circuit pattern, approach and landing;
(b) conduct an approach to the hover;
(c) conduct a helicopter air transit;
(d) perform a go-around procedure.

3.7 Shut down and post-flight

Note The relevant competency standards are in unit code C2.

(a) park, shutdown and secure a helicopter;
(b) complete the post-flight administration.

3.8 General requirements

Note The relevant competency standards are in unit codes H5, C1, C3, C4, C5, H5, CTA, CTR, ONTA, OGA. NAV, NTS1 and NTS2.

(a) maintain an effective lookout;
(b) maintain situational awareness;
(c) assess situations and make appropriate decisions;
(d) set priorities and manage tasks effectively;
(e) maintain effective communication and interpersonal relationships;
(f) recognise and manage threats;
(g) recognise and manage errors;
(h) recognise and manage undesired aircraft states;
(i) operate in controlled airspace;
(j) operate in Class G airspace;
(k) operate at a controlled aerodrome;
(l) operate at a non-towered aerodrome;
(m) communicate effectively using appropriate procedures for the airspace being used during the test;
(n) manage the aircraft systems required for the flight;
(o) manage the fuel system and monitor the fuel plan and fuel usage during the flight;
(p) manage passengers and the carriage of cargo.

4. Operational scope and conditions

4.1 The following operational scope applies to the flight test:

(a) managing an aircraft system, which is not required for the flight, is not an assessable item unless the applicant uses the system during the flight;

(b) simulated carriage of passengers and cargo;

(c) a simulated private cross-country operation;

(d) operating in Class G airspace and controlled airspace;

(e) operating at a non-towered aerodrome and a controlled aerodrome;

(f) emergencies and abnormal situations relating to aircraft systems, powerplants and the airframe are simulated and limited to those described in the AFM;

(g) activities and manoeuvres involving instrument flying or instrument navigation systems are only included if the aircraft is appropriately fitted and the flight examiner chooses to include them in the test.

4.2 The following conditions apply to the flight test:

(a) activities and manoeuvres are performed in accordance with published procedures;

(b) conducted in a helicopter;

(c) conducted by day under the VFR;

(d) the flight must include:

(i) operating in Class G airspace and in controlled airspace; and

(ii) operating at a non-towered aerodrome and a controlled aerodrome;

(e) if the area where the test is conducted does not have, or have available, controlled airspace or a controlled aerodrome, operating in controlled airspace or at a controlled aerodrome may be simulated as applicable;

(f) assessment of competency for activities and manoeuvres that require the applicant to operate the helicopter in cross-wind and tailwind conditions may be taken from the applicant’s training records if the conditions are insufficient.

Appendix H.3 PPL Powered-lift category rating flight test

RESERVED

Appendix H.4 PPL Gyroplane category rating flight test

RESERVED

Appendix H.5 PPL Airship category rating flight test

RESERVED

SECTION I COMMERCIAL PILOT LICENCE (CPL)

Appendix I.1 CPL Aeroplane category rating flight test

1. Flight test requirements

An applicant for a commercial pilot licence with aeroplane category rating flight test must demonstrate the following:

(a) knowledge of the topics listed in clause 2;

(b) ability to conduct the activities and manoeuvres mentioned in clause 3, within the operational scope and under the conditions mentioned in clause 4, to the competency standards required under section 12 of this MOS which are relevant to the flight test.

2. Knowledge requirements

For paragraph 1 (a), the topics are the following:

(a) privileges and limitations of the commercial pilot licence with aeroplane category rating;

(b) requirements for an AOC;

(c) classification of operations;

(d) type of information contained in an operations manual;

(e) flight and duty time limits;

(f) applicability of drug and alcohol regulations;

(g) aircraft instrument requirements for day VFR commercial operations;

(h) emergency equipment requirements;

(i) requirements for landing areas and aerodromes;

(j) GNSS and its use in VFR navigation;

(k) fuel planning and oil requirements for the flight;

(l) loading and unloading fuel;

(m) managing passengers and the carriage of cargo;

(n) aircraft loading system;

(o) normal and non-normal operation of the propeller system fitted to the aeroplane that is being used for the test;

(p) aircraft performance and landing calculations;

(q) pilot maintenance authorisations;

(r) aircraft speed limitations;

(s) aircraft systems.

3. Activities and manoeuvres

Note For paragraph 1 (b), the flight test includes all of the following activities and manoeuvres. The sequence set out here is not necessarily intended to direct the order of activities and manoeuvres.

3.1 Pre-flight

Note The relevant competency standards are in unit codes C2, C4 and NAV.

(a) perform pre-flight actions and procedures;

(b) perform a pre-flight inspection;

(c) refuel an aeroplane (may be assessed by questioning).

3.2 Ground operations, take-off, departure and climb

Note The relevant competency standards are in unit codes A1, A2, A3, C3, IFF and NAV.

(a) complete all the relevant checks and procedures;

(b) taxi an aeroplane;

(c) plan, brief and conduct take-off and departure procedures;

(d) conduct a cross-wind take-off;

(e) conduct a short-field take-off;

(f) conduct climbs on a constant heading and climbing turns, including at least 2 of the following:

(i) maximum rate climb;

(ii) maximum angle climb;
(iii) cruise climb.

3.3 En route cruise

Note The relevant competency standards are in unit codes A3, NAV and RNE.

(a) maintain straight and level flight, and turn aeroplane;
(b) navigate en route;
(c) establish and maintain cruise flight for at least 1 of the following conditions:
(i) turbulence;
(ii) holding;
(iii) range;
(d) navigate at low level;
(e) perform a lost recovery procedure;
(f) perform a diversion procedure;
(g) navigate using instrument navigation systems.

3.4 Test specific activities and manoeuvres

Note The relevant competency standards are in unit codes A1, A5, A6, C3, IFF and IFL.

(a) enter and recover from the following:
(i) if the test is conducted in a single-engine aeroplane, each of the following, 1 of which must be in the approach configuration:
(A) a fully developed stall;
(B) a wing drop at the stall;
(ii) if the test is conducted in a multi-engine aeroplane, 2 stalls of which 1 must be in the approach configuration;
(b) conduct steep level turns of at least 45˚ angle of bank;
(c) perform full panel and limited panel instrument flying;
(d) recover from at least 2 different unusual aircraft attitudes, including the following:
(i) 1 recovery using a full instrument panel;
(ii) 1 recovery using a limited instrument panel;
(e) manage an engine failure after take-off;
(f) conduct a precautionary search;
(g) manage the following malfunctions:
(i) a malfunction during start or shutdown;
(ii) any 1 of the following that is not performed under subparagraph (i):
(A) an aircraft system malfunction;
(B) engine or cabin fire;
(C) radio failure;
(h) manage an engine failure as follows:
(i) if the test is conducted in a single-engine aeroplane — perform a forced landing;
(ii) if the test is conducted in a multi-engine aeroplane — manage an engine failure en route.

3.5 Descent and arrival

Note The relevant competency standards are in unit codes A3 and NAV.

(a) conduct descents maintaining a constant heading and descending turns;
(b) plan and conduct aerodrome arrival and circuit joining procedures.

3.6 Circuit, approach and landing

Note The relevant competency standards are in unit codes A3, A4 and A6.

(a) conduct a normal circuit pattern, approach and landing;
(b) conduct a cross-wind landing;
(c) conduct short-field and flapless landings;
(d) perform a go-around procedure;
(e) perform after-landing actions and procedures.

3.7 Shut down and post-flight

Note The relevant competency standards are in unit codes A1 and C2.

(a) park, shutdown and secure an aeroplane;

(b) complete post-flight administration.

3.8 General requirements

Note The relevant competency standards are in unit codes A3, C1, C3, C4, C5, CTA, CTR, OGA, ONTA, NAV; NTS1 and NTS2.

(a) maintain an effective lookout;

(b) maintain situational awareness;

(c) assess situations and make appropriate decisions;

(d) set priorities and manage tasks effectively;

(e) maintain effective communication and interpersonal relationships;

(f) recognise and manage threats;

(g) recognise and manage errors;

(h) recognise and manage undesired aircraft states;

(i) operate in controlled airspace;

(j) operate in Class G airspace;

(k) operate at a controlled aerodrome;

(l) operate at a non-towered aerodrome;

(m) communicate effectively using appropriate procedures for the airspace being used during the test;

(n) manage the aircraft systems required for the flight;

(o) manage the fuel system and monitor the fuel plan and fuel usage during the flight;

(p) manage passengers and the carriage of cargo.

4. Operational scope and conditions

4.1 The following operational scope applies to the flight test:

(a) managing an aircraft system, which is not required for the flight, is not an assessable item unless the applicant uses the system during the flight;

(b) simulated carriage of passengers and cargo;

(c) a simulated charter cross-country operation with 1 sector to a small feature turning point or remote aerodrome;

(d) operating in Class G and controlled airspace;

(e) operating at a non-towered and a controlled aerodrome;

(f) emergencies and abnormal situations relating to aircraft systems, powerplants and the airframe are simulated and limited to those described in the AFM.

4.2 The following conditions apply to the flight test:

(a) activities and manoeuvres are performed in accordance with published procedures;

(b) the aeroplane used for the flight test must have the following characteristics:

- (i) cruise true airspeed of not less than 120 kts;
- (ii) a powerplant with 1 of the following:
  - (A) turbine engine with propeller; or
  - (B) piston engine with variable pitch propeller.

(c) conducted by day under the VFR;

(d) the flight must include:

- (i) operating in Class G airspace and in controlled airspace; and
- (ii) operating at a non-towered aerodrome and a controlled aerodrome;

(e) if the area where the test is conducted does not have, or have available, controlled airspace or a controlled aerodrome, operating in controlled airspace or at a controlled aerodrome may be simulated as applicable;

(f) if the aerodrome cross-wind conditions for the runway used during the test are less than 70% of the maximum in the AFM, evidence that the applicant has demonstrated competency performing cross-wind take-off and landing manoeuvres may be taken from the applicant's training records.

Appendix I.2 CPL Helicopter category rating flight test

1. Flight test requirements

An applicant for a commercial pilot licence with helicopter category rating flight test must demonstrate the following:

(a) knowledge of the topics listed in clause 2;

(b) ability to conduct the activities and manoeuvres mentioned in clause 3, within the operational scope and under the conditions mentioned in clause 4, to the competency standards required under section 12 of this MOS which are relevant to the flight test.

2. Knowledge requirements

For paragraph 1 (a), the topics are the following:

(a) privileges and limitations of the commercial pilot licence with helicopter category rating;

(b) requirements for an AOC;

(c) classification of operations;

(d) type of information contained in an operations manual;

(e) flight and duty time limits;

(f) applicability of drug and alcohol regulations;

(g) aircraft instrument requirements for day VFR commercial operations;

(h) emergency equipment requirements;

(i) requirements for landing areas and aerodromes;

(j) GNSS and its use in VFR navigation;

(k) fuel planning and oil requirements for the flight;

(l) loading and unloading fuel;

(m) managing passengers and the carriage of cargo;

(n) aircraft loading system;

(o) aircraft performance and landing calculations;

(p) pilot maintenance authorisations;

(q) aircraft speed limitations;

(r) aircraft systems.

3. Activities and manoeuvres

Note For paragraph 1 (b), the flight test includes all of the following activities and manoeuvres. The sequence set out here is not necessarily intended to direct the order of activities and manoeuvres.

3.1 Pre-flight

Note The relevant competency standards are in unit codes C2, C4 and NAV.

(a) perform pre-flight actions and procedures;

(b) perform a pre-flight inspection;

(c) refuel a helicopter (may be assessed by questioning).

3.2 Ground operations, take-off departure and climb

Note The relevant competency standards are in unit codes C3, H1, H2, H3, H4, H5, IFF and NAV.

(a) complete all relevant checks and procedures;

(b) lift-off and hover a helicopter;

(c) taxi a helicopter;

(d) air transit a helicopter;

(e) plan, brief and conduct take-off and departure procedures;

(f) conduct climbs on a constant heading and climbing turns, including at least 2 of the following:

  (i) maximum rate climb;

  (ii) maximum angle climb;

(iii) cruise climb.

3.3 En route cruise

Note The relevant competency standards are in unit codes H5, NAV and RNE.

(a) maintain straight and level flight, and turn a helicopter;
(b) navigate en route;
(c) navigate at low-level;
(d) perform a lost recovery procedure;
(e) perform a diversion procedure;
(f) navigate using instrument navigation systems.

3.4 Test specific activities and manoeuvres

Note The relevant competency standards are in unit codes H2, H6, H7, IFF and IFL.

(a) hover helicopter in cross-wind and tailwind conditions and perform turns around 1 of the following:
  (i) rotor mast;
  (ii) helicopter nose;
  (iii) helicopter tail;
(b) conduct steep level turns of at least 45˚ angle of bank;
(c) perform full panel and limited panel instrument flying;
(d) recover from at least 2 different unusual aircraft attitudes, including the following:
  (i) 1 recovery using a full instrument panel;
  (ii) 1 recovery using a limited instrument panel;
(e) perform autorotative flight manoeuvre;
(f) land on and lift off from sloping ground;
(g) land, manoeuvre, and take off in 1 of the following situations:
  (i) a confined area;
  (ii) a pinnacle;
  (iii) ridge line;
(h) execute limited power take-off, approach and landing;
(i) manage an engine failure as follows:
  (i) if the test is conducted in a single-engine helicopter — perform a forced landing;
  (ii) if the test is conducted in a multi-engine helicopter — manage an engine failure en route;
(j) manage engine failure during hover or taxi;
(k) manage a control or tail rotor malfunction in flight and at the hover;
(l) manage at least 1 of the following:
  (i) an engine fire;
  (ii) electrical failure;
  (iii) hydraulic system malfunction;
  (iv) airframe fuel system malfunction;
  (v) engine governor system malfunction.

3.5 Descent and arrival

Note The relevant competency standards are in unit codes H5 and NAV.

(a) conduct descents maintaining a constant heading and descending turns;
(b) plan and conduct aerodrome or helicopter landing site arrival and circuit joining procedures.

3.6 Circuit, approach and landing

Note The relevant competency standards are in unit codes H3, H4 and H5.

(a) conduct a normal circuit pattern, approach and landing;
(b) conduct an approach to the hover;
(c) conduct a helicopter air transit;
(d) perform a go-around procedure.

3.7 Shut down and post-flight

Note The relevant competency standards are in unit code C2.

(a) park, shutdown and secure a helicopter;

(b) complete post-flight administration.

3.8 General requirements

Note The relevant competency standards are in unit codes C1, C3, C4, C5, H5, NAV, CTA, CTR, ONTA, OGA, NAV, NTS1 and NTS2.

(a) maintain an effective lookout;

(b) maintain situational awareness;

(c) assess situations and make appropriate decisions;

(d) set priorities and manage tasks effectively;

(e) maintain effective communication and interpersonal relationships;

(f) recognise and manage threats;

(g) recognise and manage errors;

(h) recognise and manage undesired aircraft states;

(i) operate in controlled airspace;

(j) operate in Class G airspace;

(k) operate at controlled aerodromes;

(l) operate at non-towered aerodromes;

(m) communicate effectively using appropriate procedures for the airspace being used during the test;

(n) manage the aircraft systems required for the flight;

(o) manage the fuel system and monitor the fuel plan and fuel usage during the flight;

(p) manage passengers and the carriage of cargo.

4. Operational scope and conditions

4.1 The following operational scope applies to the flight test:

(a) managing an aircraft system, which is not required for the flight, is not an assessable item unless the applicant uses the system during the flight;

(b) simulated carriage of passengers and cargo;

(c) a simulated charter cross-country operation with 1 sector to a small feature turning point or remote aerodrome;

(d) operating in Class G airspace, and controlled airspace;

(e) operating at a non-towered aerodrome and a controlled aerodrome;

(f) emergencies and abnormal situations relating to aircraft systems, powerplants and the airframe are simulated and limited to those described in the AFM;

(g) activities and manoeuvres involving instrument flying, or the use of instrument navigation systems, are only included if the aircraft is appropriately fitted and the flight examiner chooses to include them in the test.

4.2 The following conditions apply to the flight test:

(a) activities and manoeuvres are performed in accordance with published procedures;

(b) conducted in a helicopter;

(c) conducted by day under the VFR;

(d) the flight must include:

(i) operating in Class G airspace and in controlled airspace; and

(ii) operating at a non-towered aerodrome and a controlled aerodrome;

(e) if the area where the test is conducted does not have, or have available, controlled airspace or a controlled aerodrome, operating in controlled airspace or at a controlled aerodrome may be simulated as applicable;

(f) assessment of competency for activities and manoeuvres that require the applicant to operate the helicopter in cross-wind and tailwind conditions may be taken from the applicant's training records if the conditions are insufficient.

Appendix I.3 CPL Powered-lift category rating flight test

RESERVED

Appendix I.4 CPL Gyroplane category rating flight test

RESERVED

Appendix I.5 CPL Airship category rating flight test

RESERVED

SECTION J MULTI-CREW PILOT LICENCE (MPL)

Appendix J.1 MPL Aeroplane category rating flight test

1. Flight test requirements

An applicant for a multi-crew pilot licence with aeroplane category rating flight test must demonstrate the following:

(a) knowledge of the topics listed in clause 2;

(b) ability to conduct the activities and manoeuvres mentioned in clause 3, within the operational scope and under the conditions mentioned in clause 4, to the competency standards required under section 12 of this MOS which are relevant to the flight test.

2. Knowledge requirements

For paragraph 1 (a), the topics are the following:

(a) privileges and limitations of the multi-crew pilot licence with aeroplane category rating;

(b) requirements for an AOC;

(c) classification of operations;

(d) type of information contained in an operation manual;

(e) flight and duty time limits;

(f) applicability of drug and alcohol regulations;

(g) aircraft instrument requirements;

(h) emergency equipment requirements;

(i) requirements for landing areas and aerodromes;

(j) fuel planning and oil requirements for the flight;

(k) managing passengers and the carriage of cargo;

(l) aircraft loading system;

(m) aircraft performance and landing calculations;

(n) pilot maintenance authorisations;

(o) aircraft speed limitations;

(p) aircraft systems.

3. Activities and manoeuvres

Note For paragraph 1 (b), the flight test includes all of the following activities and manoeuvres. The sequence set out here is not necessarily intended to direct the order of activities and manoeuvres.

3.1 Pre-Flight

Note The relevant competency standards are in unit codes C2, C4, CIR and TR-MEA.

(a) plan an IFR flight;

(b) perform pre-flight actions and procedures;

(c) perform a pre-flight inspection.

3.2 Ground operations, take-off, departure and climb

Note The relevant competency standards are in unit codes CIR and TR-MEA.

(a) complete all relevant checks and procedures;

(b) taxi an aeroplane;

(c) plan, brief and conduct take-off and departure procedures;

(d) conduct a cross-wind take-off;

(e) conduct a published instrument departure if available, otherwise in accordance with an ATC clearance (all engines);

(f) conduct climb profiles and climbing turns.

3.3 En route cruise

Note The relevant competency standards are in unit codes CIR and TR-MEA.

(a) navigate en route using ground-based and satellite-based navigation systems;

(b) perform integrity checks for ground-based and satellite-based navigation systems;

(c) identify and avoid hazardous weather conditions;
(d) establish and maintain cruise flight for at least 1 of the following conditions:
  (i) turbulence;
  (ii) holding;
  (iii) range.

3.4 Test specific activities and manoeuvres

Note The relevant competency standards are in unit codes CIR, IFF, IFL and TR-MEA.

(a) perform full and limited panel instrument flying;
(b) recover from at least 2 different unusual aircraft attitudes, including the following:
  (i) 1 recovery using a full instrument panel;
  (ii) 1 recovery using a limited instrument panel;
(c) manage an engine failure during take-off with IAS greater than or equal to V_1;
(d) conduct an instrument departure with 1 engine inoperative;

Note For clarity, this manoeuvre must be separate to the manoeuvre required in paragraph (f), namely a missed approach.

(e) conduct an instrument approach with 1 engine inoperative;
(f) conduct a missed approach procedure with 1 engine inoperative;
(g) manage at least 1 of the following:
  (i) a system malfunction;
  (ii) fire;
  (iii) radio failure.

3.5 Descent and arrival

Note The relevant competency standards are in unit codes CIR, IAP2, IAP3 and TR-MEA.

(a) perform a descent or published arrival procedure to an aerodrome;
(b) track to the holding fix position and conduct a holding pattern or sector 3 entry procedure;
(c) prepare for conducting a 2D instrument approach operation;
(d) conduct a 2D instrument approach operation;
(e) prepare for conducting a 3D instrument approach operation;
(f) conduct a 3D instrument approach operation;
(g) conduct a missed approach procedure for at least 1 instrument approach operation.

3.6 Circuit, approach and landing

Note The relevant competency standards are in unit codes CIR and TR-MEA.

(a) conduct a visual circling approach involving a change of heading to the runway of at least 90˚, if required;
(b) conduct a cross-wind approach and landing;
(c) land and perform after landing actions and procedures.

3.7 Shut down and post-flight

Note The relevant competency standards are in unit code C2.

(a) park, shutdown and secure an aeroplane;
(b) complete post-flight administration.

3.8 General requirements

Note The relevant competency standards are in unit codes C3, C5, CTA, CTR, MCO, NAV, NTS1, NTS2, ONTA and OGA.

(a) maintain an effective lookout;
(b) maintain situational awareness;
(c) assess situations and make appropriate decisions;
(d) set priorities and manage tasks effectively;
(e) maintain effective communication and interpersonal relationships;
(f) recognise and manage threats;
(g) recognise and manage errors;
(h) recognise and manage undesired aircraft states;

(i) operate effectively as a crew member;
(j) demonstrate effective leadership and authority;
(k) maintain multi-crew situational awareness;
(l) make effective decisions;
(m) operate in controlled airspace;
(n) operate in Class G airspace;
(o) operate at a controlled aerodrome;
(p) operate at a non-towered aerodrome;
(q) communicate effectively using appropriate procedures for the airspace being used during the flight;
(r) manage the aircraft systems required for the flight;
(s) manage the fuel system and monitor the fuel plan and fuel usage during the flight;
(t) manage passengers and the carriage of cargo.

4. Operational scope and conditions

4.1 The following operational scope applies to the flight test:
(a) operate and monitor all aircraft systems that are available from the control seat the applicant occupies;
(b) perform the functions of co-pilot in the pilot flying and pilot monitoring roles using checks and procedures applicable to a multi-crew operation;
(c) conduct the operation as an IFR simulated commercial operation;
(d) emergencies and abnormal situations relating to aircraft systems, powerplants and the airframe are simulated and limited to those described in the AFM.

4.2 The following conditions apply to the flight test:
(a) activities and manoeuvres are performed in accordance with published procedures;
(b) conducted in a multi-engine turbine aeroplane, or a flight simulator approved for the purpose, which is configured and equipped for multi-crew operations;
(c) operated using multi-crew standard operating procedures;
(d) conducted under the IFR including the following:
(i) an instrument departure;
(ii) at least 2 different kinds of instrument approach procedure;
(iii) at least one 2D instrument approach operation;
(iv) an ILS or GLS instrument approach operation;
(v) at least 1 missed approach procedure commencing at the MDA or DA as applicable or a higher altitude if appropriate for safety or operational reasons;
(vi) if the applicant is not the holder of a multi-engine aeroplane instrument endorsement, a visual circling approach involving a change of heading to the runway of at least 90˚;
(e) the flight must include:
(i) operating in Class G airspace and in controlled airspace; and
(ii) operating at a non-towered aerodrome and at a controlled aerodrome;
(f) if the area where the test is conducted does not have, or have available, controlled airspace or a towered aerodrome, operating in controlled airspace or at a controlled aerodrome may be simulated as applicable.

4.3 If the flight test is conducted in a flight simulator, the following activities may be assessed by oral questioning:
(a) paragraph 3.1 (c) — perform a pre-flight inspection;
(b) subclause 3.7 — Shut down and post-flight.

SECTION K AIR TRANSPORT PILOT LICENCE (ATPL)

Appendix K.1 ATPL Aeroplane category rating flight test

1. Flight test requirements

An applicant for an air transport pilot licence with aeroplane category rating flight test must demonstrate the following:

(a) knowledge of the topics listed in clause 2;

(b) ability to conduct the activities and manoeuvres mentioned in clause 3, within the operational scope and under the conditions mentioned in clause 4, to the competency standards required under section 12 of this MOS which are relevant to the flight test.

2. Knowledge requirements

For paragraph 1 (a), the topics are the following:

(a) privileges and limitations of the air transport pilot licence with aeroplane category rating;

(b) requirements for an AOC;

(c) classification of operations;

(d) type of information contained in an operations manual;

(e) flight and duty time limits;

(f) applicability of drug and alcohol regulations;

(g) aircraft instrument requirements;

(h) emergency equipment requirements;

(i) requirements for landing areas and aerodromes;

(j) fuel planning and oil requirements for the flight;

(k) managing passengers and the carriage of cargo;

(l) aircraft loading system;

(m) aircraft performance and landing calculations;

(n) pilot maintenance authorisations;

(o) aircraft speed limitations;

(p) aircraft systems.

3. Activities and manoeuvres

Note For paragraph 1 (b), the flight test includes all of the following activities and manoeuvres. The sequence set out here is not necessarily intended to direct the order of activities and manoeuvres.

3.1 Pre-Flight

Note The relevant competency standards are in unit codes C2, C4, CIR and TR-MEA.

(a) plan an IFR flight;

(b) perform pre-flight actions and procedures;

(c) perform a pre-flight inspection.

3.2 Ground operations, take-off, departure and climb

Note The relevant competency standards are in unit codes TR-MEA and CIR.

(a) complete all relevant checks and procedures;

(b) taxi an aeroplane;

(c) plan, brief and conduct take-off and departure procedures;

(d) conduct a published instrument departure if available, otherwise in accordance with an ATC clearance (all engines);

(e) conduct climb profiles and climbing turns.

3.3 En route cruise

Note The relevant competency standards are in unit codes CIR and TR-MEA.

(a) navigate en route using ground-based and satellite-based navigation systems;

(b) perform integrity checks for ground-based and satellite-based navigation systems;

(c) identify and avoid hazardous weather conditions;

(d) establish and maintain cruise flight for at least 1 of the following conditions:
   (i) turbulence;
   (ii) holding;
   (iii) range.

3.4 Test specific activities and manoeuvres

Note The relevant competency standards are in unit codes CIR, IFF, IFL and TR-MEA.

(a) perform instrument flying using normal and stand-by instrument displays;

(b) recover from at least 2 different unusual aircraft attitudes, including the following:
   (i) 1 recovery using a normal display;
   (ii) 1 recovery using a stand-by instrument display;

(c) manage an engine failure during take-off with IAS greater than or equal to $V_{1;}$

(d) conduct an instrument departure procedure with 1 engine inoperative;

Note For clarity, this manoeuvre must be separate to the manoeuvre required in paragraph (f), namely a missed approach.

(e) conduct an instrument approach procedure with 1 engine inoperative;

(f) conduct a missed approach procedure with 1 engine inoperative;

(g) manage at least 1 of the following that is not included in another item in subclause 3.4:
   (i) a system malfunction;
   (ii) fire;
   (iii) radio failure.

3.5 Descent and arrival

Note The relevant competency standards are in unit codes CIR, IAP2, IAP3 and TR-MEA.

(a) perform a descent or published arrival procedure to an aerodrome;

(b) track to the holding fix position and conduct a holding pattern or sector 3 entry procedure;

(c) prepare for conducting a 2D instrument approach operation;

(d) conduct a 2D approach operation;

(e) prepare for conducting a 3D instrument approach operation;

(f) conduct a 3D instrument approach operation;

(g) conduct a missed approach procedure for at least 1 instrument approach operation.

3.6 Circuit, approach and landing

Note The relevant competency standards are in unit codes CIR and TR-MEA.

(a) if applicable, conduct a visual circling approach;

(b) land and perform after landing actions and procedures.

3.7 Shut down and post-flight

Note The relevant competency standards are in unit code C2.

(a) park, shutdown and secure an aeroplane;

(b) complete post-flight administration.

3.8 General requirements

Note The relevant competency standards are in unit codes C3, C5, CTA, CTR, MCO, NTS1, NTS2, OGA, ONTA and TR-MEA.

(a) maintain an effective lookout;

(b) maintain situational awareness;

(c) assess situations and make appropriate decisions;

(d) set priorities and manage tasks effectively;

(e) maintain effective communication and interpersonal relationships;

(f) recognise and manage threats;

(g) recognise and manage errors;

(h) recognise and manage undesired aircraft states;

(i) operate effectively as a crew member;

(j) as pilot in command, demonstrate effective leadership and authority;

(k) maintain multi-crew situational awareness;

(l) make effective decisions as the pilot in command;
(m) operate in controlled airspace;
(n) operate in Class G airspace (only if the flight test involves operating in Class G airspace);
(o) operate at a controlled aerodrome;
(p) operate at a non-towered aerodrome (only if the flight test involves operating at a non-towered aerodrome);
(q) communicate effectively using appropriate procedures for the airspace being used during the flight;
(r) manage the aircraft systems required for the flight;
(s) manage the fuel system and monitor the fuel plan and fuel usage during the flight;
(t) manage passengers and the carriage of cargo.

4. Operational scope and conditions

4.1 The following operational scope applies to the flight test:

(a) operate and monitor all aircraft systems that are available from the control seat the applicant occupies;
(b) perform the functions of pilot in command in the pilot flying and pilot monitoring roles using checks and procedures applicable to a multi-crew operation;
(c) conduct a multi-crew operation as an IFR simulated commercial operation;
(d) operate in controlled airspace;
(e) operate at a controlled aerodrome;
(f) emergencies and abnormal situations relating to aircraft systems, powerplants and the airframe are simulated and limited to those described in the AFM.

4.2 The following conditions apply to the flight test:

(a) activities and manoeuvres are performed in accordance with published procedures;
(b) conducted in a multi-engine turbine aeroplane, or a flight simulator approved for the purpose, which is configured and equipped for multi-crew operations;
(c) for paragraph 3.1 (a), the applicant may use a system-generated flight plan;
(d) operated using multi-crew standard operating procedures;
(e) conducted under the IFR, including the following:
   (i) an instrument departure;
   (ii) at least 2 different kinds of instrument approach procedure;
   (iii) at least one 2D instrument approach operation;
   (iv) an ILS or GLS instrument approach operation;
   (v) at least 1 missed approach procedure commencing at the MDA or DA as applicable or a higher altitude if appropriate for safety or operational reasons;
   (vi) at least 1 instrument approach operation without the autopilot or flight director being used;
   (vii) if the applicant is not the holder of a multi-engine aeroplane instrument endorsement, a visual circling approach involving a change of heading to the runway of at least 90˚;
(f) the flight must include sectors in controlled airspace and at a controlled aerodrome, and may include operations in Class G airspace and at a non-towered aerodrome;
(g) if the flight test is conducted in a flight simulator, the following activities may be assessed by oral questioning:
   (i) paragraph 3.1 (c) — perform a pre-flight inspection;
   (ii) subclause 3.7 — Shut down and post-flight.

Appendix K.2 ATPL Helicopter category rating flight test

1. Flight test requirements

1.1 An applicant for an air transport pilot licence with helicopter category rating flight test must demonstrate the following:

(a) knowledge of the topics listed in clause 2;

(b) ability to conduct the activities and manoeuvres mentioned in clause 3, within the operational scope and under the conditions mentioned in clause 4, to the competency standards required under section 12 of this MOS which are relevant to the flight test.

1.2 Provision is made in clauses 3 and 4 for the test to be conducted under the VFR or IFR. For the test to be conducted under the IFR, the applicant must hold an instrument rating with the relevant aircraft category/class endorsement and instrument approach endorsements.

2. Knowledge requirements

For paragraph 1 (a), the topics are the following:

(a) privileges and limitations of the air transport pilot licence with helicopter category rating;
(b) requirements for an AOC;
(c) classification of operations;
(d) type of information contained in an operations manual;
(e) flight and duty time limits;
(f) applicability of drug and alcohol regulations;
(g) aircraft instrument requirements;
(h) emergency equipment requirements;
(i) requirements for landing areas and aerodromes;
(j) fuel planning and oil requirements for the flight;
(k) managing passengers and the carriage of cargo;
(l) aircraft loading system;
(m) aircraft performance and landing calculations;
(n) pilot maintenance authorisations;
(o) aircraft speed limitations;
(p) aircraft systems.

3. Activities and manoeuvres

Note For paragraph 1 (b), the flight test includes all of the following activities and manoeuvres. The sequence set out here is not necessarily intended to direct the order of activities and manoeuvres.

3.1 Pre-Flight

Note The relevant competency standards are in unit codes C2, C4, CIR (if applicable) and TR-SEH or TR-MEH (as applicable).

(a) plan an IFR flight (if applicable);
(b) perform pre-flight actions and procedures;
(c) perform a pre-flight inspection.

3.2 Ground operations, take-off departure and climb

Note The relevant competency standards are in unit codes CIR (if applicable) and TR-SEH or TR-MEH (as applicable).

(a) complete all relevant checks and procedures;
(b) plan, brief and conduct the take-off and departure procedures;
(c) if the test is an IFR operation, conduct an instrument departure procedure (normal operations);
(d) conduct climb profiles and climbing turns.

3.3 En route cruise

Note The relevant competency standards are in unit codes CIR (if applicable) and TR-SEH or TR-MEH (as applicable).

(a) navigate en route;
(b) perform a diversion procedure;
(c) navigate using instrument navigation systems;
(d) perform navigation systems integrity checks.

3.4 Test specific activities and manoeuvres

Note The relevant competency standards are in unit codes IFF, IFL and TR-SEH or TR-MEH (as applicable).

(a) perform full and limited panel instrument flying;

(b) recover from at least 2 different unusual aircraft attitudes, including the following:
   (i) 1 recovery using a full instrument panel;
   (ii) 1 recovery using a limited instrument panel;
(c) land on and lift off from sloping ground;
(d) execute a limited power take-off, approach and landing;
(e) land, manoeuvre, and take off from 1 of the following:
   (i) a confined area;
   (ii) a pinnacle;
   (iii) ridge line;
(f) manage an engine failure as follows:
   (i) for a test in a single-engine helicopter — in 1 of the following:
      (A) after take-off;
      (B) cruise flight;
      (C) approach and landing;
   (ii) for a flight test in a multi-engine helicopter, 1 engine inoperative in 1 of the following situations:
      (A) after take-off;
      (B) cruise flight;
      (C) approach and landing;
(g) manage a control or tail rotor malfunction in flight and at the hover;
(h) manage at least 1 of the following:
   (i) an engine fire;
   (ii) an electrical failure;
   (iii) an hydraulic system malfunction;
   (iv) an airframe fuel system malfunction;
   (v) an engine governor system malfunction.

3.5 Descent and arrival

Note The relevant competency standards are in unit codes CIR, IAP2 and IAP3 (if applicable), and TR-SEH or TR-MEH (as applicable).

(a) plan and conduct arrival and circuit joining procedures;
(b) for a flight test conducted under the IFR, do the following:
   (i) perform a descent or published arrival procedure to an aerodrome;
   (ii) track to the holding fix position and conduct a holding pattern or sector 3 entry procedure;
   (iii) prepare for conducting a 2D instrument approach operation;
   (iv) conduct a 2D instrument approach operation;
   (v) prepare for conducting a 3D instrument approach operation;
   (vi) conduct a 3D instrument approach operation;
   (vii) conduct a missed approach procedure for at least 1 instrument approach operation.

3.6 Circuit, approach and landing

Note The relevant competency standards are in unit codes CIR (if applicable) and TR-SEH or TR-MEH (as applicable).

(a) conduct a circling approach, if required;
(b) conduct a normal circuit pattern, approach and landing.

3.7 Shut down and post-flight

Note The relevant competency standards are in unit code C2.

(a) park, shutdown and secure a helicopter;
(b) complete post-flight administration.

3.8 General requirements

Note The relevant competency standards are in unit codes, C1, C3, C4, C5, CTA, CTR, MCO, NAV, NTS1, NTS2, ONTA, OGA and TR-SEH or TR-MEH (as applicable).

(a) maintain an effective lookout;
(b) maintain situational awareness;

(c) assess situations and make appropriate decisions;
(d) set priorities and manage tasks;
(e) maintain effective communication and interpersonal relationships;
(f) recognise and manage threats;
(g) recognise and manage errors;
(h) recognise and manage undesired aircraft states;
(i) operate effectively as a crew member;
(j) as pilot in command, demonstrate effective leadership and authority;
(k) maintain multi-crew situational awareness;
(l) as pilot in command, make effective decisions;
(m) operate in controlled airspace;
(n) operate in Class G airspace;
(o) operate at a controlled aerodrome;
(p) operate at a non-towered aerodrome;
(q) communicate effectively using appropriate procedures for the airspace being used during the flight;
(r) manage the aircraft systems required for the flight;
(s) manage the fuel system and monitor the fuel plan and fuel usage during the flight;
(t) manage passengers and the carriage of cargo.

4. Operational scope and conditions

4.1 The following operational scope applies to the flight test:
(a) operate and monitor all aircraft systems;
(b) perform the functions of pilot in command in the pilot flying and pilot monitoring roles using checks and procedures applicable to a multi-crew operation;
(c) conduct the operation as a simulated commercial VFR or IFR operation;
(d) operate in controlled airspace;
(e) operate at a controlled aerodrome;
(f) emergencies and abnormal situations relating to aircraft systems, powerplants and the airframe are simulated and limited to those described in the AFM.

4.2 The following conditions apply to the flight test:
(a) activities and manoeuvres are performed in accordance with published procedures;
(b) conducted in a sufficiently complex multi-engine or single-engine turbine helicopter, or a flight simulator approved for the purpose, which is configured and equipped for multi-crew operations;
(c) operated using multi-crew standard operating procedures;
(d) except as provided in paragraph (f), conducted by day under the VFR;
(e) the flight must include the following:
(i) operating in Class G airspace and in controlled airspace;
(ii) operating at a non-towered and a controlled aerodrome;
(f) if the applicant is the holder of an instrument rating and chooses to perform the test under the IFR, then he or she must demonstrate competency by performing the following:
(i) at least 2 different kinds of instrument approach procedures;
(ii) at least one 2D instrument approach operation;
(iii) an ILS or GLS instrument approach procedure;
(iv) at least 1 missed approach procedure commencing at the MDA or DA as applicable, or a higher altitude if appropriate for safety or operational reasons;
(v) at least 1 instrument approach operation without the autopilot or flight director being used;
(g) if the flight test is conducted in an area that does not have, or have available, controlled airspace or a controlled aerodrome, operating in controlled airspace or at a controlled aerodrome may be simulated as applicable;

(h) if the flight test is conducted in a flight simulator, the following activities may be assessed by oral questioning:
   (i) paragraph 3.1 (c) — perform a pre-flight inspection;
   (ii) subclause 3.7 — Shut down and post-flight.

Appendix K.3 ATPL Powered-lift category rating flight test

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SECTION L AIRCRAFT RATINGS

Appendix L.1 Single-engine aeroplane class rating flight test

1. Flight test requirements

1.1 An applicant for a single-engine aeroplane class rating flight test must demonstrate the following:

(a) knowledge of the topics listed in clause 2;

(b) ability to conduct the activities and manoeuvres mentioned in clause 3, within the operational scope and under the conditions mentioned in clause 4, to the competency standards required under section 12 of this MOS which are relevant to the flight test.

1.2 An applicant who completes a flight test in an aeroplane covered by the single-engine aeroplane class rating and meets the flight test standard for the grant of a pilot licence with aeroplane category rating is taken to meet these flight test requirements.

2. Knowledge requirements

For paragraph 1 (a), the topics are the following:

(a) privileges and limitations of the class rating;

(b) flight review requirements;

(c) navigation and operating systems;

(d) normal, abnormal and emergency flight procedures;

(e) operating limitations;

(f) weight and balance limitations;

(g) aircraft performance data, including take-off and landing performance data;

(h) flight planning.

3. Activities and manoeuvres

Note For paragraph 1 (b), the flight test includes all of the following activities and manoeuvres. The sequence set out here is not necessarily intended to direct the order of activities and manoeuvres.

3.1 Pre-flight

Note The relevant competency standards are in unit codes C2 and C4.

(a) perform pre-flight actions and procedures;

(b) perform a pre-flight inspection;

(c) refuel an aeroplane (may be assessed by questioning).

3.2 Ground operations, take-off, departure and climb

Note The relevant competency standards are in unit codes A1, A2, A3 and IFF.

(a) complete all relevant checks and procedures;

(b) taxi an aeroplane;

(c) plan, brief and conduct take-off and departure procedures;

(d) conduct a cross-wind take-off;

(e) conduct a short-field take-off;

(f) conduct climbs on a constant heading and climbing turns in at least 2 of the following performance configurations:

(i) cruise climb;

(ii) maximum rate climb;

(iii) maximum angle climb.

3.3 En route cruise

Note The relevant competency standards are in unit code A3.

(a) maintain straight and level flight, and turn an aeroplane;

(b) navigate and transit from an aerodrome circuit area to a training area and return;

(c) operate safely in local area airspace;

(d) establish and maintain cruise flight for at least 1 of the following conditions:

(i) turbulence;

(ii) flaps selected;
(iii) high speed.

3.4 Test specific activities and manoeuvres

Note The relevant competency standards are in unit codes A1, A5, A6 and IFF.

(a) enter and recover from each of the following, 1 of which must be in the approach configuration:
(i) a fully developed stall;
(ii) a wing drop at the stall;
(b) conduct steep level turns of at least 45˚ angle of bank;
(c) perform full panel instrument flying;
(d) using a full instrument panel, recover from at least 2 different unusual aircraft attitudes;
(e) manage an engine failure after take-off;
(f) manage the following malfunctions:
(i) a malfunction during start or shutdown;
(ii) any 1 of the following that is not performed under subparagraph (i):
(A) an aircraft system malfunction;
(B) engine or cabin fire;
(C) radio failure;
(g) perform a forced landing.

3.5 Descent and arrival

Note The relevant competency standards are in unit code A3.

(a) conduct descents and descending turns;
(b) plan and conduct aerodrome arrival and circuit joining procedures.

3.6 Circuit, approach and landing

Note The relevant competency standards are in unit codes A3, A4 and A6.

(a) conduct a normal circuit pattern, approach and landing;
(b) conduct a cross-wind landing;
(c) conduct short-field and flapless landings;
(d) perform a go-around procedure;
(e) perform after-landing actions and procedures.

3.7 Shut down and post-flight

Note The relevant competency standards are in unit codes A1 and C2.

(a) park, shutdown and secure an aeroplane;
(b) complete post-flight administration.

3.8 General requirements

Note The relevant competency standards are in unit codes A3, C1, C4, C5, NTS1 and NTS2.

(a) maintain an effective lookout;
(b) maintain situational awareness;
(c) assess situations and make appropriate decisions;
(d) set priorities and manage tasks effectively;
(e) maintain effective communication and interpersonal relationships;
(f) recognise and manage threats;
(g) recognise and manage errors;
(h) recognise and manage undesired aircraft states;
(i) communicate effectively using appropriate procedures for airspace being used during the test;
(j) manage the aircraft systems required for the flight;
(k) manage the fuel system and monitor the fuel plan and fuel usage during the test;
(l) manage passengers and the carriage of cargo.

4. Operational scope and conditions

4.1 The following operational scope applies to the flight test:

(a) managing an aircraft system, which is not required for the flight, is not an assessable item unless the applicant uses the system during the flight;

(b) simulated carriage of passengers and cargo;

(c) emergencies and abnormal situations relating to aircraft systems, powerplants and the airframe are simulated and limited to those described in the AFM.

4.2 The following conditions apply to the flight test:

(a) activities and manoeuvres are performed in accordance with published procedures;

(b) conducted in:

(i) an aeroplane that is covered by the single-engine aeroplane class rating, except where the flight test must be conducted in an approved flight simulator in accordance with subregulation 61.245 (2); or

(ii) a flight simulator approved for the purpose;

(c) conducted by day under the VFR;

(d) if the aerodrome cross-wind conditions for the runway used during the test are less than 70% of the maximum in the AFM, evidence that the applicant has demonstrated competency performing cross-wind take-off and landing manoeuvres may be taken from the applicant's training records;

(e) if the flight test is conducted in an FSTD, the following activities may be assessed by oral questioning:

(i) paragraph 3.1 (a) — perform a pre-flight inspection;

(ii) subclause 3.7 — Shut down and post-flight.

Appendix L.2 Single-engine helicopter class rating flight test

1. Flight test requirements

1.1 An applicant for a single-engine helicopter class rating flight test must demonstrate the following:

(a) knowledge of the topics listed in clause 2;

(b) ability to conduct the activities and manoeuvres mentioned in clause 3, within the operational scope and under the conditions mentioned in clause 4, to the competency standards required under section 12 of this MOS which are relevant to the flight test.

1.2 An applicant who completes a flight test in a helicopter covered by the single-engine helicopter class rating and meets the flight test standard for the grant of a pilot licence with helicopter category rating is taken to meet these flight test requirements.

2. Knowledge requirements

For paragraph 1 (a), the topics are the following topics:

(a) privileges and limitations of the class rating;

(b) flight review requirements;

(c) navigation and operating systems;

(d) normal, abnormal and emergency flight procedures;

(e) operating limitations;

(f) weight and balance limitations;

(g) aircraft performance data, including take-off and landing performance data;

(h) flight planning.

3. Activities and manoeuvres

Note For paragraph 1 (b), the flight test includes all of the following activities and manoeuvres. The sequence set out here is not necessarily intended to direct the order of activities and manoeuvres.

3.1 Pre-flight

Note The relevant competency standards are in unit codes C2 and C4.

(a) perform pre-flight actions and procedures;

(b) perform a pre-flight inspection;

(c) refuel a helicopter (may be assessed by questioning).

3.2 Ground operations, take-off, departure and climb

Note The relevant competency standards are in unit codes H1, H2, H3, H4, H5.

(a) complete all relevant checks and procedures;

(b) lift-off and hover a helicopter;

(c) taxi a helicopter;

(d) air transit a helicopter;

(e) plan, brief and conduct take-off and departure procedures;

(f) conduct climbs on a constant heading and climbing turns, including at least 2 of the following:

(i) maximum rate climb;

(ii) maximum (best) angle climb;

(iii) cruise climb.

3.3 En route cruise

Note The relevant competency standards are in unit code H5.

(a) maintain straight and level flight, and turn a helicopter;

(b) navigate and transit from a circuit area to a training area and return;

(c) operate safely in local area airspace.

3.4 Test specific manoeuvres

Note The relevant competency standards are in unit codes H2, H6 and H7.

(a) hover a helicopter in cross-wind and tailwind conditions and perform turns around 1 of the following:

(i) rotor mast;

(ii) helicopter nose;

(iii) helicopter tail;

(b) perform sidewards and backwards flight;

(c) conduct steep level turns of at least 45˚ angle of bank;

(d) perform an autorotative flight manoeuvre;

(e) land on and lift off from sloping ground;

(f) land, manoeuvre, and take off in a confined area;

(g) execute a limited power take-off, approach and landing;

(h) perform a forced landing;

(i) manage an engine failure during hover or taxi;

(j) manage a control or tail rotor malfunction in flight and at the hover;

(k) manage at least 1 of the following:

(i) an engine fire;

(ii) electrical failure;

(iii) hydraulic system malfunction;

(iv) airframe fuel system malfunction;

(v) engine governor system malfunction.

3.5 Descent and arrival

Note The relevant competency standards are in unit code H5.

(a) conduct descents and descending turns;

(b) plan and conduct an aerodrome or helicopter landing site arrival and circuit joining procedures.

3.6 Circuit, approach and landing

Note The relevant competency standards are in unit codes H3, H4 and H5.

(a) conduct a normal circuit pattern, approach and landing;

(b) conduct an approach to the hover;

(c) conduct a helicopter air transit;

(d) perform a go-around procedure;

(e) perform after-landing actions and procedures.

3.7 Shut down and post-flight

Note The relevant competency standards are in unit codes C2 and H1.

(a) park, shutdown and secure a helicopter;

(b) complete post-flight administration.

3.8 General requirements

Note The relevant competency standards are in unit codes C1, C3, C4, C5, NTS1 and NTS2.

(a) maintain an effective lookout;

(b) maintain situational awareness;

(c) assess situations and make appropriate decisions;

(d) set priorities and manage tasks effectively;

(e) maintain effective communication and interpersonal relationships;

(f) recognise and manage threats;

(g) recognise and manage errors;

(h) recognise and manage undesired aircraft states;

(i) communicate effectively using appropriate procedures for the airspace being used during the flight;

(j) manage the aircraft systems required for the flight;

(k) manage the fuel system and monitor the fuel plan and fuel usage during the flight;

(l) manage passengers and the carriage of cargo.

4. Operational scope and conditions

4.1 The following operational scope applies to the flight test:

(a) managing an aircraft system that is not required for the flight is not an assessable item unless it is used by the applicant;

(b) simulated carriage of passengers and cargo;

(c) emergencies and abnormal situations relating to aircraft systems, powerplants and the airframe are simulated and limited to those described in the AFM.

4.2 The following conditions apply to the flight test:

(a) activities and manoeuvres are performed in accordance with published procedures;

(b) conducted in a helicopter that is covered by the single-engine helicopter class rating;

(c) conducted in:

- (i) a helicopter that is covered by the single-engine helicopter class rating, except where the flight test must be conducted in an approved flight simulator in accordance with subregulation 61.245 (2); or
- (ii) a flight simulator approved for the purpose;

(d) conducted by day under the VFR;

(e) assessment of competency for activities and manoeuvres that require the applicant to operate the helicopter in cross-wind and tailwind conditions may be taken from the applicant's training records if the conditions are insufficient.

Appendix L.3 Single-engine gyroplane class rating

RESERVED

Appendix L.4 Airship class rating flight test

RESERVED

Appendix L.5 Multi-engine aeroplane class rating flight test

1. Flight test requirements

An applicant for a multi-engine aeroplane class rating flight test must demonstrate the following:

(a) knowledge of the topics listed in clause 2;

(b) ability to conduct the activities and manoeuvres mentioned in clause 3, within the operational scope and under the conditions mentioned in clause 4, to the competency standards required under section 12 of this MOS which are relevant to the flight test.

2. Knowledge requirements

For paragraph 1 (a), the topics are the following:

(a) privileges and limitations of the class rating;

(b) flight review requirements;

(c) navigation and operating systems;

(d) normal, abnormal and emergency flight procedures;

(e) operating limitations;

(f) weight and balance limitations;

(g) aircraft performance data, including take-off and landing performance data;

(h) flight planning.

3. Activities and manoeuvres

Note For paragraph 1 (b), the flight test includes all of the following activities and manoeuvres. The sequence set out here is not necessarily intended to direct the order of activities and manoeuvres.

3.1 Pre-flight

Note The relevant competency standards are in unit codes C2 and AME.

(a) perform pre-flight actions and procedures;

(b) perform a pre-flight inspection;

(c) refuel an aeroplane (may be assessed by questioning).

3.2 Ground operations, take-off, departure and climb

Note The relevant competency standards are in unit codes A1, A2, A3, AME and IFF.

(a) complete all relevant checks and procedures;

(b) taxi an aeroplane;

(c) plan, brief and conduct take-off and departure procedures;

(d) conduct a cross-wind take-off;

(e) conduct a short-field take-off;

(f) conduct climbs on a constant heading and climbing turns in at least 2 of the following performance configurations:

(i) cruise climb;

(ii) maximum rate climb;

(iii) maximum angle climb.

3.3 En route cruise

Note The relevant competency standards are in unit code A3.

(a) maintain straight and level flight, and turn aeroplane;

(b) operate the aeroplane in the cruise configuration for 1 of the following conditions:

(i) turbulence;

(ii) holding;

(iii) range;

(c) navigate using instrument navigation systems.

3.4 Test specific activities and manoeuvres

Note The relevant competency standards are in unit codes A1, A4, A5, AME and IFF.

(a) enter and recover from a stall in the approach configuration and at least 1 other configuration;

(b) conduct steep level turns of at least 45˚ angle of bank;
(c) perform full panel instrument flying;
(d) using a full instrument panel, recover from at least 2 different unusual aircraft attitudes;
(e) manage an engine failure after take-off;
(f) manage an engine failure in the cruise configuration;
(g) conduct an approach and landing with 1 engine inoperative;
(h) conduct a missed approach with 1 engine inoperative;
(i) manage the following malfunctions:
  (i) a malfunction during start or shutdown;
  (ii) any 1 of the following that is not performed under subparagraph (i):
    (A) an aircraft system malfunction;
    (B) engine or cabin fire;
    (C) radio failure.

3.5 Descent and arrival

Note The relevant competency standards are in unit code A3.

(a) conduct descents and descending turns;
(b) plan and conduct aerodrome arrival and circuit joining procedures.

3.6 Circuit, approach and landing

Note The relevant competency standards are in unit codes A3, A4 and AME.

(a) conduct a normal circuit pattern, approach and landing;
(b) conduct a cross-wind landing;
(c) conduct short-field and flapless landings;
(d) perform a go-around procedure with all engines operating;
(e) perform after-landing actions and procedures.

3.7 Shut down and post-flight

Note The relevant competency standards are in unit codes A1 and C2.

(a) park, shutdown and secure an aeroplane;
(b) complete post-flight administration.

3.8 General requirements

Note The relevant competency standards are in unit codes A3, AME, C1, C4, C5, NTS1 and NTS2.

(a) maintain an effective lookout;
(b) maintain situational awareness;
(c) assess situations and make appropriate decisions;
(d) set priorities and manage tasks effectively;
(e) maintain effective communication and interpersonal relationships;
(f) recognise and manage threats;
(g) recognise and manage errors;
(h) recognise and manage undesired aircraft state;
(i) communicate effectively using appropriate procedures for the airspace being used during the flight;
(j) manage the aircraft systems required for the flight;
(k) manage the fuel system and monitor the fuel plan and fuel usage during the flight;
(l) manage passengers and the carriage of cargo.

4. Operational scope and conditions

4.1 The following operational scope applies to the flight test:

(a) managing an aircraft system, which is not required for the flight, is not an assessable item unless the applicant uses the system during the flight;
(b) operate the aircraft under normal, non-normal and emergency conditions with particular attention given to conditions associated with asymmetric engine performance;
(c) simulated carriage of passengers and cargo;

(d) emergencies and abnormal situations relating to aircraft systems, powerplants and the airframe are simulated and limited to those described in the AFM.

4.2 The following conditions apply to the flight test:

(a) activities and manoeuvres are performed in accordance with published procedures;

(b) conducted in:

(i) an aeroplane that is covered by the multi-engine aeroplane class rating, except where the flight test must be conducted in an approved flight simulator in accordance with subregulation 61.245 (2); or

(ii) a flight simulator approved for the purpose;

(c) conducted by day under the VFR;

(d) if the aerodrome cross-wind conditions for the runway used during the test are less than 70% of the maximum in the AFM, evidence that the applicant has demonstrated competency performing cross-wind take-off and landing manoeuvres may be taken from the applicant's training records;

(e) if the flight test is conducted in an FSTD, the following activities may be assessed by oral questioning:

(i) paragraph 3.1 (b) — perform a pre-flight inspection;

(ii) subclause 3.7 — Shut down and post-flight.

Appendix L.6 Single-engine aeroplane type rating flight test

1. Flight test requirements

1.1 An applicant for a single-engine aeroplane type rating flight test must demonstrate the following:

(a) knowledge of the topics listed in subclause 2.1;

(b) ability to conduct the activities and manoeuvres mentioned in clause 3, within the operational scope and under the conditions mentioned in clause 4, to the competency standards required under section 12 of this MOS which are relevant to the flight test.

1.2 For paragraph 61.790 (a), if the flight test for the rating is conducted under the IFR, the applicant must demonstrate his or her knowledge of the items in subclause 2.2 and his or her competency in the activities and manoeuvres in clause 3, as they apply to operating the aircraft under the IFR.

2. Knowledge requirements

For paragraph 1 (a), the topics are the following:

(a) privileges and limitations of the type rating;

(b) flight review requirements;

(c) navigation and operating systems;

(d) normal, abnormal and emergency flight procedures;

(e) operating limitations;

(f) weight and balance limitations;

(g) aircraft performance data, including take-off and landing performance data;

(h) flight planning.

2.2 For subclause 1.2, the additional topics are the following:

(a) privileges and limitations of the type rating with respect to conducting IFR operations;

(b) navigation and flight management systems;

(c) conducting IFR operations in an aeroplane covered by the rating.

3. Activities and manoeuvres

Note For paragraph 1 (b), the flight test includes all of the following activities and manoeuvres. The sequence set out here is not necessarily intended to direct the order of activities and manoeuvres.

3.1 Pre-flight

Note The relevant competency standards are in unit codes TR-SEA and CIR for IFR operations.

(a) perform pre-flight actions and procedures;

(b) perform a pre-flight inspection.

3.2 Ground operations, take-off, departure and climb

Note The relevant competency standards are in unit codes TR-SEA and CIR for IFR operations.

(a) complete all relevant checks and procedures;

(b) taxi the aeroplane;

(c) plan, brief and conduct a take-off and the following as applicable:

(i) for a VFR operation, VFR departure procedures;

(ii) for an IFR operation, an instrument departure;

(d) conduct a cross-wind take-off;

(e) conduct climb profiles and climbing turns.

3.3 En route cruise

Note The relevant competency standards are in unit codes TR-SEA and CIR for IFR operations.

(a) maintain straight and level flight, and turn an aeroplane;

(b) establish and maintain cruise flight for at least 1 of the following conditions:

(i) turbulence;

(ii) holding configuration;

(iii) range;

(c) navigate using instrument navigation systems.

3.4 Test *specific* activities and manoeuvres

Note The relevant competency standards are in unit codes TR-SEA and CIR for IFR operations.

(a) conduct 2 approach to the stall and recovery manoeuvres, 1 of which must be in the approach configuration and 1 in any other configuration;

(b) conduct steep level turns of at least 45˚ angle of bank;

(c) perform full panel instrument flying;

(d) using a full instrument panel, recover from at least 2 unusual attitude manoeuvres;

(e) manage an engine failure after take-off;

(f) manage the following malfunctions:

(i) a malfunction during start or shutdown;

(ii) any 1 of the following that is not performed under subparagraph (i):

(A) an aircraft system malfunction;

(B) engine or cabin fire;

(C) radio failure;

(g) perform a forced landing.

3.5 Descent and arrival

Note The relevant competency standards are in unit code TR-SEA and for IFR operations in unit codes CIR and IAP2.

(a) conduct descent profiles and descending turns;

(b) complete 1 of the following:

(i) for a VFR operation, plan and conduct aerodrome arrival and circuit joining procedures;

(ii) for an IFR operation, plan and conduct the following:

(A) an instrument arrival;

(B) a 2D instrument approach procedure;

(C) a missed approach procedure.

3.6 Circuit, approach and landing

Note The relevant competency standards are in unit code TR-SEA.

(a) conduct a normal circuit pattern, approach and landing;

(b) conduct a cross-wind landing;

(c) perform a go-around procedure;

(d) perform after-landing actions and procedures.

3.7 Shut down and post-flight

Note The relevant competency standards are in unit code TR-SEA.

(a) park, shutdown and secure an aeroplane;

(b) complete post-flight administration.

3.8 General requirements

Note The relevant competency standards are in unit codes NTS1, NTS2, TR-SEA, and CIR for IFR operations.

(a) maintain an effective lookout;
(b) maintain situational awareness;
(c) assess situations and make appropriate decisions;
(d) set priorities and manage tasks effectively;
(e) maintain effective communication and interpersonal relationships;
(f) recognise and manage threats;
(g) recognise and manage errors;
(h) recognise and manage undesired aircraft states;
(i) communicate effectively using appropriate procedures for the airspace being used during the flight;
(j) manage the aircraft systems required for the flight;
(k) manage the fuel system and monitor the fuel plan and fuel usage during the flight.

4. Operational scope and conditions

4.1 The following operational scope applies to the flight test:

(a) managing an aircraft system, which is not required for the grant of the type rating, is not an assessable item unless the applicant uses the system during the flight;
(b) emergencies and abnormal situations relating to aircraft systems, powerplants and the airframe are simulated and limited to those described in the AFM;
(c) for subclause 1.2, the flight has 2 components and includes knowledge and activities and manoeuvres for operating the aircraft under the VFR and under the IFR as follows:
  (i) the component for VFR operations includes general handling manoeuvres;
  (ii) the component for IFR operations includes the standards required to conduct an IFR operation in a single-engine aeroplane covered by the type rating.

4.2 The following conditions apply to the flight test:

(a) activities and manoeuvres are performed in accordance with published procedures;
(b) conducted in 1 of the following:
  (i) an aeroplane that is covered by the type rating, except where the flight test must be conducted in an approved flight simulator in accordance with subregulation 61.245 (2); or
  (ii) a flight simulator approved for the purpose;
(c) except for paragraph (e), conducted by day under the VFR;
(d) if the aerodrome cross-wind conditions for the runway used during the test are less than 70% of the maximum in the AFM, evidence that the applicant has demonstrated competency performing cross-wind take-off and landing manoeuvres may be taken from the applicant's training records;
(e) for subclause 1.2, the flight test includes conducting an IFR operation;
(f) if the flight test is conducted in a flight simulator, the following activities may be assessed by oral questioning:
  (i) paragraph 3.1 (b) — perform a pre-flight inspection;
  (ii) subclause 3.7 — Shut down and post-flight.

Appendix L.7 Single-engine helicopter type rating flight test

1. Flight test requirements

1.1 An applicant for a single-engine helicopter type rating flight test must demonstrate the following:

(a) knowledge of the topics listed in clause 2;
(b) ability to conduct the activities and manoeuvres mentioned in clause 3, within the operational scope and under the conditions mentioned in clause 4, to the competency standards required under section 12 of this MOS which are relevant to the flight test.

1.2 An applicant who completes a flight test in a helicopter covered by a single-engine helicopter type rating and meets the flight test standard for the grant of a pilot licence with helicopter category rating is taken to meet these flight test requirements.

2. Knowledge requirements

For paragraph 1 (a), the topics are the following topics:

(a) privileges and limitations of the type rating;
(b) flight review requirements;
(c) navigation and operating systems;
(d) normal, abnormal and emergency flight procedures;
(e) operating limitations;
(f) weight and balance limitations;
(g) aircraft performance data, including take-off and landing performance data;
(h) flight planning.

3. Activities and manoeuvres

Note For paragraph 1 (b), the flight test includes all of the following activities and manoeuvres. The sequence set out here is not necessarily intended to direct the order of activities and manoeuvres.

3.1 Pre-Flight

Note The relevant competency standards are in unit code TR-SEH.

(a) perform pre-flight actions and procedures;
(b) perform a pre-flight inspection.

3.2 Ground operations, take-off, departure and climb

Note The relevant competency standards are in unit code TR-SEH.

(a) complete all relevant checks and procedures;
(b) lift-off and hover a helicopter;
(c) taxi a helicopter;
(d) air transit a helicopter;
(e) plan, brief and conduct take-off and departure procedures;
(f) conduct a maximum performance take-off;
(g) conduct climbs on a constant heading and climbing turns, including at least 2 of the following:
  (i) maximum rate climb;
  (ii) maximum (best) angle climb;
  (iii) cruise climb.

3.3 En route cruise

Note The relevant competency standards are in unit code TR-SEH.

(a) maintain straight and level flight, and turn a helicopter;
(b) navigate using instrument navigation systems.

3.4 Test specific manoeuvres

Note The relevant competency standards are in unit code TR-SEH.

(a) hover helicopter in cross-wind and tailwind conditions and perform turns around 1 of the following:
  (i) rotor mast;
  (ii) helicopter nose;
  (iii) helicopter tail;
(b) perform sidewards and backwards flight;
(c) conduct steep level turns of at least 45˚ angle of bank;
(d) perform autorotative flight manoeuvres;
(e) land on and lift off from sloping ground;
(f) execute a limited power take-off, approach and landing;
(g) perform a forced landing from level flight;

(h) manage an engine failure during hover or taxi;
(i) manage a control or tail rotor malfunction in flight and at the hover;
(j) manage at least 1 of the following:
  (i) an engine fire;
  (ii) electrical failure;
  (iii) hydraulic system malfunction;
  (iv) airframe fuel system malfunction;
  (v) engine governor system malfunction.

3.5 Descent and arrival

Note The relevant competency standards are in unit code TR-SEH.

(a) conduct descents and descending turns;
(b) plan and conduct aerodrome or helicopter landing site arrival and circuit joining procedures.

3.6 Circuit, approach and landing

Note The relevant competency standards are in unit code TR-SEH.

(a) conduct a normal circuit pattern, approach and landing;
(b) conduct approach to the hover;
(c) conduct helicopter air transit;
(d) perform a go-around procedure;
(e) perform after-landing actions and procedures.

3.7 Shut down and post-flight

Note The relevant competency standards are in unit code TR-SEH.

(a) park, shutdown and secure a helicopter;
(b) complete post-flight administration.

3.8 General requirements

Note The relevant competency standards are in unit codes NTS1, NTS2 and TR-SEH.

(a) maintain an effective lookout;
(b) maintain situational awareness;
(c) assess situations and make appropriate decisions;
(d) set priorities and manage tasks effectively;
(e) maintain effective communication and interpersonal relationships;
(f) recognise and manage threats;
(g) recognise and manage errors;
(h) recognise and manage undesired aircraft states;
(i) communicate effectively using appropriate procedures for airspace;
(j) manage the aircraft systems required for the flight;
(k) manage the fuel system and monitor the fuel plan and fuel usage during the flight.

4. Operational scope and conditions

4.1 The following operational scope applies to the flight test:

(a) managing an aircraft system that is not required for the flight is not an assessable item unless it is used by the applicant;
(b) emergencies and abnormal situations relating to aircraft systems, powerplants and the airframe are simulated and limited to those described in the AFM.

4.2 The following conditions apply to the flight test:

(a) activities and manoeuvres are performed in accordance with published procedures;
(b) conducted in a helicopter that is covered by the type rating or a flight simulator approved for the purpose;
(c) conducted by day under the VFR;
(d) assessment of competency for activities and manoeuvres that require the applicant to operate the helicopter in cross-wind and tailwind conditions may be taken from the applicant's training records if the conditions are insufficient;

(e) if the flight test is conducted in a flight simulator, the following activities may be assessed by oral questioning:
   (i) paragraph 3.1 (b) — perform a pre-flight inspection;
   (ii) subclause 3.7 — Shut down and post-flight.

Appendix L.8 Multi-engine aeroplane type rating flight test

1. Flight test requirements

1.1 An applicant for a multi-engine aeroplane type rating flight test must demonstrate the following:
(a) knowledge of the topics listed in subclause 2.1;
(b) ability to conduct the activities and manoeuvres mentioned in clause 3, within the operational scope and under the conditions mentioned in clause 4, to the competency standards required under section 12 of this MOS which are relevant to the flight test.

1.2 For paragraph 61.790 (a), if the flight test for the rating is conducted under the IFR, the applicant must demonstrate his or her knowledge of the items in subclause 2.2 and his or her competency in the activities and manoeuvres in clause 3, as they apply to operating the aircraft under the IFR.

2. Knowledge requirements

2.1 For paragraph 1 (a), the topics are the following:
(a) privileges and limitations of the type rating;
(b) flight review requirements;
(c) navigation and operating systems;
(d) normal, abnormal and emergency flight procedures;
(e) operating limitations;
(f) weight and balance limitations;
(g) aircraft performance data, including take-off and landing performance data;
(h) flight planning.

2.2 For subclause 1.2, the additional topics are the following:
(a) privileges and limitations of the type rating with respect to conducting IFR operations;
(b) navigation and flight management systems;
(c) conducting IFR operations in an aeroplane covered by the rating.

3. Activities and manoeuvres

Note For paragraph 1 (b), the flight test includes all of the following activities and manoeuvres. The sequence set out here is not necessarily intended to direct the order of activities and manoeuvres.

3.1 Pre-flight

Note The relevant competency standards are in unit codes TR-MEA and CIR for IFR operations.

(a) perform pre-flight actions and procedures;
(b) perform a pre-flight inspection.

3.2 Ground operations, take-off, departure and climb

Note The relevant competency standards are in unit codes TR-MEA and CIR for IFR operations.

(a) complete all relevant checks and procedures;
(b) taxi an aeroplane;
(c) plan, brief and conduct a take-off and the following as applicable:
   (i) for a VFR operation, VFR departure procedures;
   (ii) for a IFR operation, an instrument departure procedure;
(d) conduct cross-wind take-off;
(e) conduct climb profiles and climbing turns.

3.3 En route cruise

Note The relevant competency standards are in unit codes TR-MEA and CIR for IFR operations.

(a) maintain straight and level flight, and turn aeroplane;

(b) establish and maintain cruise flight in at least 1 of the following conditions:
   (i) turbulence;
   (ii) holding;
   (iii) range;
(c) navigate using instrument navigation systems.

3.4 Test specific activities and manoeuvres

Note The relevant competency standards are in unit codes TR-MEA and CIR for IFR operations.

(a) conduct 2 approach to the stall and recovery manoeuvres, 1 of which must be in the approach configuration and 1 in any other configuration;
(b) perform full panel instrument flying;
(c) using a full instrument panel, recover from at least 2 unusual attitude manoeuvres;
(d) manage an incident or malfunction during take-off that requires a rejected take-off procedure;
(e) manage an engine failure during the take-off where IAS is equal to or greater than V_1;
(f) manage an engine failure in flight;
(g) conduct an approach to land with 1 engine inoperative;
(h) conduct a missed approach to land with 1 engine inoperative;
(i) manage a malfunction of any aircraft system other than 1 that has been applied in paragraphs 3.4 (d) to (g).

3.5 Descent and arrival

Note The relevant competency standards are in unit code TR-MEA and for IFR operations in unit codes CIR and IAP2.

(a) conduct descent profiles and descending turns;
(b) complete 1 of the following:
   (i) for a VFR operation, plan and conduct aerodrome arrival and circuit joining procedures;
   (ii) for an IFR operation, plan and conduct the following:
      (A) an instrument arrival;
      (B) a 2D instrument approach procedure;
      (C) a missed approach procedure.

3.6 Circuit, approach and landing

Note The relevant competency standards are in unit codes TR-MEA and CIR for IFR operations.

(a) conduct a normal circuit pattern, approach and landing;
(b) conduct cross-wind landing;
(c) perform a go-around procedure;
(d) perform after-landing actions and procedures.

3.7 Shut down and post-flight

Note The relevant competency standards are in unit codes A1 and C2.

(a) park, shutdown and secure an aeroplane;
(b) complete post-flight administration.

3.8 General requirements

Note The relevant competency standards are in unit codes NTS1, NTS2, TR-MEA and CIR for IFR operations.

(a) maintain an effective lookout;
(b) maintain situational awareness;
(c) assess situations and make appropriate decisions;
(d) set priorities and manage tasks effectively;
(e) maintain effective communication and interpersonal relationships;
(f) recognise and manage threats;
(g) recognise and manage errors;
(h) recognise and manage undesired aircraft states;
(i) communicate effectively using appropriate procedures for the airspace being used during the flight;
(j) manage the aircraft systems required for the flight;

(k) manage the fuel system and monitor the fuel plan and fuel usage during the flight.

4. Operational scope and conditions

4.1 The following operational scope applies to the flight test:

(a) managing an aircraft system, which is not required for the grant of the type rating, is not an assessable item unless the applicant uses the system during the flight;

(b) emergencies and abnormal situations relating to aircraft systems, powerplants and the airframe are simulated and limited to those described in the AFM;

(c) for subclause 1.2, the flight has 2 components and includes knowledge and activities and manoeuvres for operating the aircraft under the VFR and under the IFR.

(i) the component for VFR operations includes general handling manoeuvres;

(ii) the component for IFR operations includes the standards required to conduct an IFR operation in a multi-engine aeroplane covered by the type rating.

4.2 The following conditions apply to the flight test:

(a) activities and manoeuvres are performed in accordance with published procedures;

(b) conducted in 1 of the following:

(i) an aeroplane that is covered by the type rating, except where the flight test must be conducted in an approved flight simulator in accordance with subregulation 61.245 (2); or

(ii) a flight simulator approved for the purpose;

(c) except for paragraph (e), conducted by day under the VFR;

(d) if the aerodrome cross-wind conditions for the runway used during the test are less than 70% of the maximum in the AFM, evidence that the applicant has demonstrated competency performing cross-wind take-off and landing manoeuvres may be taken from the applicant's training records;

(e) for subclause 1.2, the flight test includes conducting an IFR operation;

(f) if the flight test is conducted in an FSTD, the following activities may be assessed by oral questioning:

(i) paragraph 3.1 (b) — perform a pre-flight inspection;

(ii) subclause 3.7 — Shut down and post-flight.

Appendix L.9 Multi-engine helicopter type rating flight test

1. Flight test requirements

1.1 An applicant for a multi engine helicopter type rating flight test must demonstrate the following:

(a) knowledge of the topics listed in clause 2.1;

(b) ability to conduct the activities and manoeuvres mentioned in clause 3, within the operational scope and under the conditions mentioned in clause 4, to the competency standards required under section 12 of this MOS which are relevant to the flight test.

1.2 For paragraph 61.790 (a), if the flight test for the rating is conducted under the IFR, the applicant must demonstrate his or her knowledge of the items in subclause 2.2 and his or her competency in the activities and manoeuvres in clause 3, as they apply to operating the aircraft under the IFR.

2. Knowledge requirements

2.1 For paragraph 1 (a), the topics are the following topics:

(a) privileges and limitations of the type rating;

(b) flight review requirements;

(c) navigation and operating systems;

(d) normal, abnormal and emergency flight procedures;

(e) operating limitations;

(f) weight and balance limitations;

(g) aircraft performance data, including take-off and landing performance data;

(h) flight planning.

2.2 For subclause 1.2, the additional topics are the following:

(a) privileges and limitations of the type rating with respect to conducting IFR operations;

(b) navigation and flight management systems;

(c) conducting IFR operations in a helicopter covered by the rating.

3. Activities and manoeuvres

Note For paragraph 1 (b), the flight test includes all of the following activities and manoeuvres. The sequence set out here is not necessarily intended to direct the order of activities and manoeuvres.

3.1 Pre-Flight

Note The relevant competency standards are in unit code TR-MEH.

(a) perform pre-flight actions and procedures;

(b) perform a pre-flight inspection.

3.2 Ground operations, take-off, departure and climb

Note The relevant competency standards are in unit code TR-MEH.

(a) complete all relevant checks and procedures;

(b) lift-off and hover a helicopter;

(c) taxi a helicopter;

(d) air transit a helicopter;

(e) plan, brief and conduct a take-off and the following as applicable:

(i) for a VFR operation, VFR departure procedures;

(ii) for an IFR operation, an instrument departure procedure;

(f) conduct a maximum performance take-off;

(g) conduct climbs on a constant heading and climbing turns, including at least 2 of the following:

(i) maximum rate climb;

(ii) maximum (best) angle climb;

(iii) cruise climb.

3.3 En route cruise

Note The relevant competency standards are in unit code TR-MEH.

(a) maintain straight and level flight, and turn a helicopter;

(b) navigate using instrument navigation systems.

3.4 Test specific manoeuvres

Note The relevant competency standards are in unit code TR-MEH.

(a) hover helicopter in cross-wind and tailwind conditions and perform turns around 1 of the following:

(i) rotor mast;

(ii) helicopter nose;

(iii) helicopter tail;

(b) perform sidewards and backwards flight;

(c) conduct steep level turns of at least 45˚ angle of bank;

(d) perform full panel instrument flying;

(e) using a full instrument panel, recover from at least 2 unusual attitude manoeuvres;

(f) land on and lift off from sloping ground;

(g) execute a limited power take-off, approach and landing;

(h) manage an engine failure – at least 1 from take-off, cruise flight or approach and landing;

(i) manage an engine failure during hover or taxi;

(j) manage a control or tail rotor malfunction in flight and at the hover;

(k) manage at least 1 of the following:

(i) an engine fire;

(ii) electrical failure;

(iii) hydraulic system malfunction;

(iv) airframe fuel system malfunction;
(v) engine governor system malfunction.

3.5 Descent and arrival

Note The relevant competency standards are in unit code TR-MEH.

(a) conduct descent profiles and descending turns;
(b) complete 1 of the following:
(i) for a VFR operation, plan and conduct an aerodrome or helicopter landing site arrival and circuit joining procedures;
(ii) for an IFR operation, plan and conduct the following:
(A) an instrument arrival;
(B) a 2D instrument approach procedure;
(C) a missed approach procedure.

3.6 Circuit, approach and landing

Note The relevant competency standards are in unit code TR-MEH.

(a) conduct a normal circuit pattern, approach and landing;
(b) conduct an approach to the hover;
(c) conduct a helicopter air transit;
(d) perform a go-around procedure;
(e) perform after-landing actions and procedures.

3.7 Shut down and post-flight

Note The relevant competency standards are in unit code TR-MEH.

(a) park, shutdown and secure a helicopter;
(b) complete post-flight administration.

3.8 General requirements

Note The relevant competency standards are in unit codes NTS1, NTS2 and TR-MEH.

(a) maintain an effective lookout;
(b) maintain situational awareness;
(c) assess situations and make appropriate decisions;
(d) set priorities and manage tasks effectively;
(e) maintain effective communication and interpersonal relationships;
(f) recognise and manage threats;
(g) recognise and manage errors;
(h) recognise and manage undesired aircraft state;
(i) communicate effectively using appropriate procedures for airspace;
(j) manage the aircraft systems required for the flight;
(k) manage fuel system and monitor fuel plan and usage.

4. Operational scope and conditions

4.1 The following operational scope applies to the flight test:

(a) managing an aircraft system that is not required for the flight is not an assessable item unless it is used by the applicant;
(b) if the type rating is for a multi-crew certified helicopter, the roles of Pilot Flying and Pilot Monitoring must be demonstrated by the applicant;
(c) emergencies and abnormal situations relating to aircraft systems, powerplants and the airframe are simulated and limited to those described in the AFM;
(d) for subclause 1.2, the flight has 2 components and includes knowledge and activities and manoeuvres for operating the aircraft under the VFR and under the IFR as follows:
(i) the component for VFR operations includes general handling manoeuvres;
(ii) the component for IFR operations includes the standards required to conduct an IFR operation in a multi-engine helicopter covered by the type rating.

4.2 The following conditions apply to the flight test:

(a) activities and manoeuvres are performed in accordance with published procedures;

(b) conducted in 1 of the following:

(i) a multi-engine helicopter covered by the type rating, except where the flight test must be conducted in an approved flight simulator in accordance with subregulation 61.245 (2); or

(ii) an FSTD approved for the purpose;

(c) except for paragraph (e), conducted by day;

(d) assessment of competency for activities and manoeuvres that require the applicant to operate the helicopter in cross-wind and tailwind conditions may be taken from the applicant's training records if the conditions are insufficient;

(e) for subclause 1.2, the flight test includes conducting an IFR operation;

(f) if the flight test is conducted in an FSTD, the following activities may be assessed by oral questioning:

(i) paragraph 3.1 (c) — perform a pre-flight inspection;

(ii) subclause 3.7 — Shut down and post-flight.

Appendix L.10 Cruise relief co-pilot rating flight test

1. Flight test requirements

An applicant for a cruise relief co-pilot rating flight test must demonstrate the following:

(a) knowledge of the topics listed in clause 2;

(b) ability to conduct the activities and manoeuvres mentioned in clause 3, within the operational scope and under the conditions mentioned in clause 4, to the competency standards required under section 12 of this MOS which are relevant to the flight test.

2. Knowledge requirements

For paragraph 1 (a), the topics are the following:

(a) privileges and limitations of the type rating;

(b) flight review requirements;

(c) navigation and operating systems;

(d) normal, abnormal and emergency flight procedures;

(e) operating limitations;

(f) weight and balance limitations;

(g) aircraft performance data, including take-off and landing performance data;

(h) flight planning.

3. Activities and manoeuvres

Note For paragraph 1 (b), the flight test includes all of the following activities and manoeuvres. The sequence set out here is not necessarily intended to direct the order of activities and manoeuvres.

3.1 Pre-flight

Note The relevant competency standards are in unit code TR-CR.

Perform pre-flight actions and procedures.

3.2 Ground operations, take-off, departure and climb

Note The relevant competency standards are in unit code TR-CR.

Conduct climb profiles and climbing turns.

3.3 En route cruise

Note The relevant competency standards are in unit code TR-CR.

(a) maintain straight and level flight, and turn aeroplane;

(b) establish and maintain cruise flight for at least 1 of the following conditions:

(i) turbulence;

(ii) holding;

(iii) range;

(c) navigate using instrument navigation systems.

3.4 Test specific activities and manoeuvres

Note The relevant competency standards are in unit code TR-CR.

(a) conduct 2 approaches to the stall and recovery manoeuvres, 1 of which must be in the approach configuration and 1 in any other configuration;

(b) perform full panel instrument flying;

(c) using a full instrument panel, recover from at least 2 unusual attitude manoeuvres;

(d) manage an engine failure in flight;

(e) conduct an approach to land with 1 engine inoperative;

(f) conduct a missed approach to land with 1 engine inoperative;

(g) manage a malfunction of any aircraft system other than one that has been applied in paragraphs 3.4 (d) to (f).

3.5 Descent and arrival

Note The relevant competency standards are in unit code TR-CR.

(a) conduct descent profiles and descending turns;

(b) plan and conduct aerodrome arrival and circuit joining procedures.

3.6 Circuit, approach and landing

Note The relevant competency standards are in unit code TR-CR.

(a) conduct a normal circuit pattern, approach and landing;

(b) conduct a cross-wind landing;

(c) perform a go-around procedure;

(d) perform after-landing actions and procedures.

3.7 Shut down and post-flight

Note The relevant competency standards are in unit code TR-CR.

(a) park, shutdown and secure an aeroplane;

(b) complete post-flight administration.

3.8 General requirements

Note The relevant competency standards are in unit codes NTS1, NTS2 and TR-CR.

(a) maintain an effective lookout;

(b) maintain situational awareness;

(c) assess situations and make appropriate decisions;

(d) set priorities and manage tasks effectively;

(e) maintain effective communication and interpersonal relationships;

(f) recognise and manage threats;

(g) recognise and manage errors;

(h) recognise and manage undesired aircraft states;

(i) communicate effectively using appropriate procedures for the airspace being used during the flight;

(j) manage the aircraft systems required for the flight;

(k) manage the fuel system and monitor the fuel plan and fuel usage during the flight.

4. Operational scope and conditions

4.1 The following operational scope applies to the flight test:

(a) managing an aircraft system, which is not required for the grant of the type rating, is not an assessable item unless the applicant uses the system during the flight;

(b) emergencies and abnormal situations relating to aircraft systems, powerplants and the airframe are simulated and limited to those described in the AFM.

4.2 The following conditions apply to the flight test:

(a) activities and manoeuvres are performed in accordance with published procedures;

(b) conducted in:

(i) an aeroplane that is covered by the type rating, except where the flight test must be conducted in an approved flight simulator in accordance with subregulation 61.245 (2); or

(ii) a flight simulator that is approved for the purpose;

(c) conducted as an IFR operation;

(d) if the flight test is conducted in a flight simulator, the following activities may be assessed by oral questioning:

(i) subclause 3.1 — Pre-flight;

(ii) subclause 3.7 — Shut down and post-flight.

Appendix L.12 Cruise relief flight engineer rating

RESERVED

SECTION M INSTRUMENT RATING

Appendix M.1 Instrument rating flight test

1. Flight test requirements

An applicant for an instrument rating flight test must demonstrate the following:

(a) knowledge of the topics listed in clause 2 that are relevant to the endorsements that are being assessed during the test;

(b) ability to conduct the activities and manoeuvres mentioned in clause 3, within the operational scope and under the conditions mentioned in clause 4, to the competency standards required under section 12 of this MOS, which are relevant to the endorsements that are being assessed during the flight test.

2. Knowledge requirements

For paragraph 1 (a), the topics are the following topics:

(a) privileges and limitations of the instrument rating and each instrument endorsement covered by the flight test;

(b) proficiency check requirements;

(c) IFR and approach recent experience requirements;

(d) night recent experience requirements;

(e) night VFR operations;

(f) aircraft instrument requirements;

(g) interpreting operational and meteorological information;

(h) take-off minima;

(i) holding and alternate requirements;

(j) IFR procedures for all airspace classifications;

(k) departure and approach instrument procedures;

(l) operations below LSALT and MSA for day and night operations;

(m) GNSS and PBN standards;

(n) circling approaches;

(o) adverse weather operations;

(p) ERSA normal and emergency procedures;

(q) IFR planning.

3. Activities and manoeuvres

Note For paragraph 1 (b), the flight test includes all of the following activities and manoeuvres. The sequence set out here is not necessarily intended to direct the order of activities and manoeuvres.

3.1 Pre-flight

Note The relevant competency standards are in unit code CIR.

(a) plan an IFR flight;

(b) perform pre-flight actions and procedures.

3.2 Ground operations, take-off, departure and climb

Note The relevant competency standards are in unit codes CIR and IFF.

(a) complete all relevant checks and procedures;

(b) plan, brief and conduct take-off and departure procedures;

(c) conduct an instrument departure and, if available, in accordance with:

  (i) a published procedure; or

  (ii) an ATC clearance.

3.3 En route cruise

Note The relevant competency standards are in unit code CIR.

(a) navigate en route using ground-based and satellite-based navigation systems;

(b) perform ground-based and satellite-based navigation system integrity checks;

(c) identify and avoid hazardous weather conditions (may be simulated).

3.4 Test specific activities and manoeuvres

Note The relevant competency standards are in unit codes CIR, IFF and IFL.

(a) perform full panel and limited panel instrument flying;

(b) recover from at least 2 different unusual aircraft attitudes, including the following:

(i) 1 recovery using a full instrument panel;

(ii) 1 recovery using a limited instrument panel;

(c) for a test in a multi-engine aircraft, conduct an instrument departure with 1 engine inoperative;

Note For clarity, this manoeuvre must be separate to the manoeuvre required in paragraph (e), namely a missed approach.

(d) for a test in a multi-engine aircraft, conduct an instrument approach with 1 engine inoperative;

(e) for a test in a multi-engine aircraft, with 1 engine inoperative, conduct 1 of the following:

(i) a missed approach procedure;

(ii) a visual circling procedure.

3.5 Descent and arrival

Note The relevant competency standards are in unit codes CIR, IAP2, and IAP3.

(a) perform a descent or published arrival procedure to an aerodrome;

(b) track to the holding fix position and conduct a holding pattern or sector 3 entry procedure, and if the approach procedure is an RNAV/(GNSS) approach, then the holding pattern or sector 3 entry procedure must be for the RNAV/(GNSS) procedure;

(c) for 2 different kinds of instrument approach procedure, conduct 2D instrument approach operations as follows:

(i) prepare for each operation;

(ii) conduct the operation;

(d) if required for the test — conduct a 3D instrument approach operation as follows:

(i) prepare for the operation;

(ii) conduct the operation;

(e) conduct a missed approach procedure.

3.6 Circuit, approach and landing

Note The relevant competency standards are in unit code CIR.

(a) conduct a visual circling approach involving a change of heading to the runway of at least 90˚;

(b) perform after-landing actions and procedures.

3.7 Shut down and post-flight

Note The relevant competency standards are in unit code CIR.

(a) park, shutdown and secure the aircraft;

(b) complete post-flight administration.

3.8 General requirements

Note The relevant competency standards are in unit codes CIR, NTS1 and NTS2.

(a) maintain an effective lookout;

(b) maintain situational awareness;

(c) assess situations and make appropriate decisions;

(d) set priorities and manage tasks effectively;

(e) maintain effective communication and interpersonal relationships;

(f) recognise and manage threats;

(g) recognise and manage errors;

(h) recognise and manage undesired aircraft states;

(i) communicate effectively using appropriate procedures for the airspace being used during the test;

(j) manage the aircraft systems required for the flight;

(k) manage the fuel system and monitor the fuel plan and fuel usage during the flight.

4. Operational scope and conditions

Note Reference to the same kind of relevant aircraft in this section has the same meaning as relevant aircraft in subregulation 61.880 (9) of Part 61 of CASR 1998.

4.1 The following operational scope applies to the flight test:

(a) managing an aircraft system, which is not required for the flight, is not an assessable item unless the applicant uses the system during the flight;

(b) an IFR operation;

(c) conduct an IFR departure, en route sectors, IFR arrival, 2D instrument approach and missed approach procedure;

(d) operating under the IFR:

(i) in the following:

(A) Class G airspace;

(B) controlled airspace; and

(ii) at the following:

(A) a non-towered aerodrome;

(B) a controlled aerodrome;

(e) emergencies and abnormal situations relating to aircraft systems, powerplants and the airframe are simulated and limited to those described in the AFM.

4.2 The following conditions apply to the flight test and the applicant as applicable:

(a) activities and manoeuvres are performed in accordance with published procedures;

(b) conducted in an appropriate aircraft, except in accordance with subregulation 61.885 (4) where it is conducted in a flight simulator approved for the purpose;

(c) if the flight test is for the grant of an instrument rating, demonstrate competency conducting 2D instrument approach operations for at least 2 different kinds of 2D instrument approach procedures in the same relevant kind of aircraft;

(d) if the flight test is for the grant of an additional aircraft category/class instrument endorsement, demonstrate competency conducting at least one 2D instrument approach operation in the same relevant kind of aircraft;

(e) if the flight test is for the grant of a 3D instrument approach operation endorsement, demonstrate competency conducting an ILS or GLS instrument approach procedure;

(f) for paragraphs (d) and (e), demonstrating competency conducting instrument approach operations includes conducting a missed approach procedure for at least 1 approach operation, from the decision altitude or minimum descent altitude, as applicable, unless for safety or operational reasons a higher altitude is applied;

(g) for paragraph (f), demonstrate competency performing at least 1 instrument approach operation while manually manipulating the flight and power controls;

(h) if the flight test is conducted in an aircraft, it must be certified for operations conducted under the IFR and be appropriately equipped according to the requirements for each instrument endorsement the test is for;

(i) the flight must include:

(i) operating in Class G airspace; and

(ii) operating at a non-towered aerodrome;

(j) operating in controlled airspace or at a controlled aerodrome may be simulated.

SECTION N PRIVATE INSTRUMENT RATING

Appendix N.1 Private instrument rating flight test

1. Flight test requirements

An applicant for a private instrument rating flight test must demonstrate the following:

(a) knowledge of the topics listed in clause 2 that are relevant to the endorsements that are being assessed during the test;

(b) ability to conduct the activities and manoeuvres mentioned in clause 3, within the operational scope and under the conditions mentioned in clause 4, to the competency standards required under section 12 of this MOS, which are relevant to the endorsements that are being assessed during the flight test.

2. Knowledge requirements

For paragraph 1 (a), the topics are the following topics:

(a) privileges and limitations of the private instrument rating and the private instrument endorsement(s) covered by the flight test;

(b) flight review requirements;

(c) recency requirements;

(d) night recency requirements;

(e) night VFR operations;

(f) aircraft instrument requirements;

(g) interpreting operational and meteorological information;

(h) take-off minima;

(i) holding and alternate requirements;

(j) IFR procedures for all airspace classifications;

(k) departure and approach instrument procedures;

(l) operations below LSALT and MSA for day and night operations;

(m) GNSS and PBN standards;

(n) circling approaches;

(o) adverse weather operations;

(p) ERSA normal and emergency procedures;

(q) IFR planning.

3. Activities and manoeuvres

Note For paragraph 1 (b), the flight test includes all of the following activities and manoeuvres. The sequence set out here is not necessarily intended to direct the order of activities and manoeuvres.

3.1 Pre-flight

Note The relevant competency standards are in unit codes C2, C4, CIR and PIF.

(a) plan an IFR flight;

(b) perform pre-flight actions and procedures.

3.2 Ground operations, take-off, departure and climb

Note The relevant competency standards are in unit codes CIR, IFF and PIF.

(a) complete all relevant checks and procedures;

(b) plan, brief and conduct take-off and departure procedures;

(c) for a departure endorsement, plan, brief and conduct an instrument departure;

(d) for a standard instrument departure (SID) endorsement, perform a SID or published departure procedure.

3.3 En route cruise

Note The relevant competency standards are in unit code PIF.

(a) for each navigation endorsement being assessed during the test — navigate en route using the applicable ground-based and satellite-based navigation systems;

(b) perform ground-based and satellite-based navigation system integrity checks;

(c) identify and avoid hazardous weather conditions (may be simulated);

(d) for each navigation endorsement covered by the flight test — using guidance information from the applicable navigation system, track to the holding fix and conduct a holding pattern or sector 3 entry procedure.

3.4 Test specific activities and manoeuvres

Note The relevant competency standards are in unit codes CIR, IFF, IFL, NVR and PIF.

(a) perform full panel instrument flying;

(b) if the flight test is for the grant of the rating, do the following:

(i) perform limited panel instrument flying;

(ii) recover from at least 2 different unusual aircraft attitudes, including the following:

(A) 1 recovery using a full instrument panel;

(B) 1 recovery using a limited instrument panel;

(c) for a multi-engine aircraft departure endorsement — conduct an instrument departure with 1 engine inoperative;

Note For clarity, this manoeuvre must be separate to the manoeuvre required in paragraph (e), namely a missed approach.

(d) for an approach/arrival category specific endorsement — in a multi-engine aircraft of the applicable category, with 1 engine inoperative:

(i) conduct an instrument approach; and

(ii) conduct 1 of the following:

(A) a missed approach;

(B) a visual circling procedure;

(e) for the category specific night endorsement, in an aircraft of the applicable category:

(i) control the aircraft on the ground at night; and

(ii) conduct normal circuit patterns and landings at night with and without landing lights; and

(iii) manage a cockpit lighting failure; and

(iv) perform a go-around at night.

3.5 Descent and arrival

Note The relevant competency standards are in unit codes CIR, IAP2, IAP3 and PIF.

(a) perform a descent to establish and maintain VMC above or at the LSALT or MSA;

(b) perform a visual approach;

(c) for a STAR endorsement — conduct a published STAR procedure;

(d) for the approach/arrival endorsements include in the test — using the applicable published procedure, conduct the following:

(i) for each approach endorsement, an instrument approach procedure;

(ii) for at least 1 approach endorsement, the applicable missed approach procedure;

(iii) for at least 1 approach endorsement, a visual circling approach involving a change of heading to the runway of at least 90°.

3.6 Circuit, approach and landing

Note The relevant competency standards are in unit code PIF.

(a) conduct a normal circuit pattern, approach and landing;

(b) perform after landing actions and procedures.

3.7 Shut down and post-flight

Note The relevant competency standards are in unit code PIF.

(a) park, shutdown and secure the aircraft;

(b) complete post-flight administration.

3.8 General requirements

Note The relevant competency standards are in unit codes CIR, NTS1, NTS2 and PIF.

(a) maintain an effective lookout;

(b) maintain situational awareness;

(c) assess situations and make appropriate decisions;

(d) set priorities and manage tasks effectively;
(e) maintain effective communication and interpersonal relationships;
(f) recognise and manage threats;
(g) recognise and manage errors;
(h) recognise and manage undesired aircraft states;
(i) communicate effectively using appropriate procedures for the airspace being used during the flight;
(j) manage the aircraft systems required for the flight;
(k) manage the fuel system and monitor the fuel plan and fuel usage during the flight.

4. Operational scope and conditions

Note A reference to the same kind of relevant aircraft in this section has the same meaning as relevant aircraft in subregulation 61. 880 (9) of Part 61 of CASR 1998.

4.1 The following operational scope applies to the flight test:

(a) managing an aircraft system, which is not required for the flight, is not an assessable item unless the applicant uses the system during the flight;
(b) conduct a private IFR operation;
(c) a flight test for the grant of a private IFR rating:
(i) must cover the requirements for the grant of the following:
(A) 1 of the aircraft category and class private instrument endorsements mentioned in Part 1 of Table 61.935;
(B) 1 of the navigation endorsements mentioned in Part 2 of Table 61.935; and
(ii) can include the requirements for any other private instrument endorsement that is relevant for the aircraft in which the flight test is conducted;
(d) depending on which private instrument endorsements are being assessed, operating an appropriate category and class of aircraft under the IFR as follows:
(i) for the grant of an aircraft category and class private instrument endorsement mentioned in Part 1 of Table 61.935 — navigating en route, perform an entry and holding procedure using at least 1 instrument navigation system;
(ii) for the grant of a navigation endorsement mentioned in Part 2 of Table 61.935 — navigating en route, perform an entry and holding procedure using the navigation system for the endorsement;
(iii) for the grant of a departure endorsement mentioned in Part 3 of Table 61.935 — conduct an instrument departure, other than a standard instrument departure;
(iv) for the grant of an approach and arrival endorsement mentioned in Part 4 of Table 61.935:
(A) for the grant of the STAR endorsement — conduct an arrival using a procedure published in the AIP; and
(B) for the grant of any other endorsement in Part 4 of the table — conduct an instrument approach operation using the applicable navigation system;
(v) for the grant of a category specific approach and arrival endorsement mentioned in Part 5 of Table 61.935 — conduct an instrument approach operation in a multi-engine aircraft of the applicable category;
(vi) for the grant of the night private instrument endorsement mentioned in Part 6 of Table 61.935 — conduct an operation at night in an aircraft of the specified category;
(e) operating under the IFR:
(i) in the following:
(A) Class G airspace;
(B) controlled airspace; and
(ii) at the following:
(A) a non-towered aerodrome;
(B) a controlled aerodrome;
(f) emergencies and abnormal situations relating to aircraft systems, powerplants and the airframe are simulated and limited to those described in the AFM.

4.2 The following conditions apply to the flight test:

(a) activities and manoeuvres are performed in accordance with published procedures;

(b) conducted in an appropriate aircraft or a flight simulator approved for the purpose;

(c) if the test is for the grant of an approach endorsement, demonstrating competency conducting instrument approaches includes conducting a missed approach procedure for at least 1 approach operation, from the decision altitude or minimum descent altitude, as applicable, unless for safety or operational reasons a higher altitude is applied;

(d) for paragraph (c), demonstrate competency performing at least 1 instrument approach operation while manually manipulating the flight and power controls;

(e) if the flight test is conducted in an aircraft, it must be certified for operations conducted under the IFR and be appropriately equipped according to the requirements for each private instrument endorsement the test is for;

(f) the flight must include:

(i) operating in Class G airspace; and

(ii) operating at a non-towered aerodrome;

(g) if the area where the test is conducted does not have, or have available, controlled airspace or a controlled aerodrome, operating in controlled airspace or at a controlled aerodrome may be simulated as applicable.

SECTION O NIGHT VFR RATING

Appendix O.1 Night VFR rating flight test

1. Flight test requirements

An applicant for a night VFR rating flight test must demonstrate the following:

(a) knowledge of the topics listed in clause 2, which are relevant to the endorsements that are being assessed during the test;

(b) ability to conduct the activities and manoeuvres mentioned in clause 3, within the operational scope and under the conditions mentioned in clause 4, to the competency standards required under section 12 of this MOS, which are relevant to the endorsements that are being assessed during the flight test.

2. Knowledge requirements

For paragraph 1 (a), the topics are the following topics:

(a) privileges and limitations of the night VFR rating and the night VFR endorsement that is covered by the flight test;

(b) flight review requirements;

(c) night recency requirements;

(d) night VFR operations;

(e) interpreting operational and meteorological information;

(f) ground and aircraft lighting requirements;

(g) use of instrument and navigation systems;

(h) take-off minima;

(i) holding and alternate requirements;

(j) operational requirements and procedures for all airspace classifications;

(k) operations below LSALT and MSA for night operations;

(l) GNSS and PBN standards;

(m) hazardous weather conditions;

(n) ERSA normal and emergency procedures;

(o) night VFR planning.

3. Activities and manoeuvres

Note For paragraph 1 (b), the flight test includes all of the following activities and manoeuvres. The sequence set out here is not necessarily intended to direct the order of activities and manoeuvres.

3.1 Pre-flight

Note The relevant competency standards are in unit codes NVR2 and NVR3.

(a) plan a night VFR flight;

(b) perform pre-flight actions and procedures.

3.2 Ground operations, take-off, departure and climb

Note The relevant competency standards are in unit codes IFF, NVR1, NVR2 and NVR3.

(a) complete all relevant checks and procedures;

(b) plan, brief and conduct take-off and departure procedures;

(c) conduct a take-off and departure from an aerodrome which is remote from ground lighting.

3.3 En route cruise

Note The relevant competency standards are in unit codes NVR2 and NVR3.

(a) navigate en route using visual tracking and visual position fixes;

(b) navigate en route using ground-based and satellite-based navigation systems;

(c) perform ground-based and satellite-based navigation system integrity checks;

(d) identify and avoid hazardous weather conditions (may be simulated).

3.4 Test specific activities and manoeuvres

Note The relevant competency standards are in unit codes IFF, IFL, NVR1, NVR2 and NVR3.

(a) perform full panel and limited panel instrument flying;
(b) recover from at least 2 different unusual aircraft attitudes, including the following:
   (i) 1 recovery using a full instrument panel;
   (ii) 1 recovery using a limited instrument panel;
(c) manage a cockpit lighting failure;
(d) for the grant of a multi-engine aeroplane night VFR endorsement — manage an engine failure in a multi-engine aeroplane during the cruise;
(e) for the grant of a multi-engine helicopter night VFR endorsement — manage an engine failure in a multi-engine helicopter during the cruise.

3.5 Descent and arrival

Note The relevant competency standards are in unit codes NVR2 and NVR3.

(a) conduct a descent and perform a visual approach procedure to an aerodrome;
(b) plan and conduct an arrival and circuit joining procedures.

3.6 Circuit, approach and landing

Note The relevant competency standards are in unit codes NVR1, NVR2 and NVR3.

(a) conduct a normal circuit pattern, approach and landing;
(b) conduct an approach and landing at an aerodrome which is remote from ground lighting;
(c) land with and without landing lights;
(d) conduct a go-around procedure;
(e) perform after landing actions and procedures.

3.7 Shut down and post-flight

Note The relevant competency standards are in unit code NVR1.

(a) park, shutdown and secure the aircraft;
(b) complete post-flight administration.

3.8 General requirements

Note The relevant competency standards are in unit codes NTS1, NTS2, NVR1, NVR2 and NVR3.

(a) maintain an effective lookout;
(b) maintain situational awareness;
(c) assess situations and make appropriate decisions;
(d) set priorities and manage tasks effectively;
(e) maintain effective communication and interpersonal relationships;
(f) recognise and manage threats;
(g) recognise and manage errors;
(h) recognise and manage undesired aircraft states;
(i) communicate effectively using appropriate procedures for the airspace being used during the flight;
(j) manage the aircraft systems required for the flight;
(k) manage the fuel system and monitor the fuel plan and fuel usage during the flight.

4. Operational scope and conditions

4.1 The following operational scope applies to the flight test:

(a) managing an aircraft system, which is not required for the flight, is not an assessable item unless the applicant uses the system during the flight;
(b) conduct a night VFR operation;
(c) conduct a night departure, en route sectors, a night VFR arrival, visual approach and landing;
(d) conduct a night VFR operation at an aerodrome that is remote from ground lighting;
(e) for the grant of a night VFR rating — operating under the night VFR:
   (i) in the following:
      (A) Class G airspace;
      (B) controlled airspace; and

(ii) at the following:

(A) a non-towered aerodrome;

(B) a controlled aerodrome;

(f) for the grant of an additional night VFR endorsement — there are no airspace or aerodrome requirements;

(g) emergencies and abnormal situations relating to aircraft systems, powerplants and the airframe are simulated and limited to those described in the AFM.

4.2 The following conditions apply to the flight test and the applicant as applicable:

(a) activities and manoeuvres are performed in accordance with published procedures;

(b) conducted in an aircraft that is relevant to the night VFR endorsement covered by the flight test or a flight simulator that is approved for the purpose;

(c) if the flight test is conducted in an aircraft, it must be certified for operations conducted under the night VFR and be appropriately equipped according to the requirements for the night VFR endorsement included in the test;

(d) for the grant of a night VFR rating — the flight must include:

(i) operating in Class G airspace; and

(ii) operating at a non-towered aerodrome; and

(iii) operating at an aerodrome that is remote from ground lighting; and

(e) if the area where the test is conducted does not have, or have available, controlled airspace or a controlled aerodrome, operating in controlled airspace or at a controlled aerodrome may be simulated as applicable.

SECTION P NIGHT VISION IMAGING SYSTEM (NVIS) RATING

Appendix P.1 Night vision imaging system rating flight test

1. Flight test requirements

An applicant for a night vision imaging system (NVIS) rating flight test must demonstrate the following:

(a) knowledge of the topics listed in clause 2, which are relevant to the endorsement that is being assessed during the test;

(b) ability to conduct the activities and manoeuvres mentioned in clause 3, within the operational scope and under the conditions mentioned in clause 4, to the competency standards required under section 12 of this MOS, which are relevant to the endorsements that are being assessed during the flight test.

2. Knowledge requirements

For paragraph 1 (a), the topics are the following topics:

(a) privileges and limitations of the NVIS rating and the endorsement that is covered by the flight test;

(b) proficiency check requirements;

(c) night recency requirements;

(d) NVFR and IFR operations as applicable to the endorsement that is being assessed during the test;

(e) ground and aircraft lighting requirements;

(f) interpreting operational and meteorological information;

(g) use of instrument and navigation systems;

(h) take-off minima;

(i) holding and alternate requirements;

(j) operational requirements and procedures for all airspace classifications;

(k) operations below LSALT and MSA for day and night operations;

(l) ERSA normal and emergency procedures.

3. Activities and manoeuvres

Note For paragraph 1 (b), the flight test includes all of the following activities and manoeuvres. The sequence set out here is not necessarily intended to direct the order of activities and manoeuvres.

3.1 Pre-flight

Note The relevant competency standards are in unit code NVI.

(a) plan an NVIS operation and determine the serviceability of the aircraft and the night vision goggles (NVG) equipment to be used for the operation;

(b) consult and brief all stakeholders about the proposed operation;

(c) plan a night VFR flight;

(d) perform pre-flight actions and procedures.

Note An NVIS operation is defined in Civil Aviation Order 82.6.

3.2 Ground operations, take-off, departure and climb

Note The relevant competency standards are in unit codes IFF and NVI.

(a) complete all relevant checks and procedures;

(b) lift-off, hover and taxi helicopter using NVG;

(c) plan, brief and conduct take-off and departure procedures using NVG;

(d) establish a stable hover, take-off from and climb out from an unlit helicopter landing site (HLS) using NVG.

3.3 En route cruise

Note The relevant competency standards are in unit code NVI, NAV and CIR (if applicable).

(a) navigate en route using night VFR and IFR procedures as applicable;

(b) transit to and from the operational area using NVG.

3.4 Test specific activities and manoeuvres

Note The relevant competency standards are in unit codes IFF, IFL and NVI.

(a) perform full and limited panel instrument flying;
(b) recover from at least 2 different unusual aircraft attitudes.
(c) perform cockpit procedures and checks during goggled and de-goggled flight;
(d) maintain control of the aircraft during transition between goggled and de-goggled flight;
(e) using NVG, perform 1 of the following:
  (i) land and take off from sloping ground;
  (ii) land and take off from a pinnacle;
  (iii) land and take off from a ridgeline;
(f) manage abnormal and emergency situations while using NVG;
(g) recover from inadvertent entry into IMC conditions and re-establishing VMC while using NVG;
(h) manage flight during multi-crew NVIS operations.

3.5 Descent and arrival

Note The relevant competency standards are in unit code NVI.

(a) plan and conduct an arrival and circuit joining procedures;
(b) descend to an unlit HLS while using NVG.

3.6 Circuit, approach and landing

Note The relevant competency standards are in unit code NVI.

(a) conduct a circuit pattern, approach and landing using NVG;
(b) conduct an approach to, and land on, an unlit HLS using NVG;
(c) perform a baulked landing using NVG;
(d) perform after landing actions and procedures.

3.7 Shut down and post-flight

Note The relevant competency standards are in unit code NVI.

(a) park, shutdown and secure aircraft;
(b) complete post-flight administration;
(c) conduct post-flight operational debriefing.

3.8 General requirements

Note The relevant competency standards are in unit codes NTS1, NTS2 and NVI.

(a) maintain an effective lookout;
(b) maintain situational awareness;
(c) assess situations and make appropriate decisions;
(d) set priorities and manage tasks effectively;
(e) maintain effective communication and interpersonal relationships;
(f) recognise and manage threats;
(g) recognise and manage errors;
(h) recognise and manage undesired aircraft states;
(i) communicate effectively using appropriate procedures for the airspace being used during the flight;
(j) manage the aircraft systems required for the flight;
(k) manage the fuel system and monitor the fuel plan and fuel usage during the flight.

4. Operational scope and conditions

4.1 The following operational scope applies to the flight test:

(a) managing an aircraft system that is not required for the flight is not an assessable item unless it is used by the applicant;
(b) conduct an NVIS operation;
(c) conduct the operation using NVG;

(d) conducted under the night VFR, including an IFR segment if the test is for the grant of a grade 1 endorsement;

(e) emergencies and abnormal situations relating to aircraft systems, powerplants and the airframe are simulated and limited to those described in the AFM.

4.2 The following conditions apply to the flight test:

(a) activities and manoeuvres are performed in accordance with published procedures;

(b) conducted in an aircraft that is relevant to the NVIS endorsement covered by the flight test or an FSTD that is approved for the purpose;

(c) if the flight test is conducted in an aircraft, it must be certified for operations appropriate to the endorsement the flight test is for.

SECTION Q LOW-LEVEL RATING

Appendix Q.1 Low-level rating flight test

1. Flight test requirements

An applicant for a low-level rating flight test must demonstrate the following:

(a) knowledge of the topics listed in clause 2, which are relevant to the endorsements that are being assessed during the test;

(b) ability to conduct the activities and manoeuvres mentioned in clause 3, within the operational scope and under the conditions mentioned in clause 4, to the competency standards required under section 12 of this MOS that are relevant to the endorsements that are being assessed during the test.

2. Knowledge requirements

For paragraph 1 (a), the topics are the following topics:

(a) privileges and limitations of a low-level rating and each of the endorsements included in the test;

(b) flight review requirements;

(c) the limitations of GNSS;

(d) wind effect at low level and associated flying conditions;

(e) analysis of actual and forecast weather relevant to low-level operations;

(f) effect of mountainous terrain on airflow and associated flying conditions;

(g) assessment of the geographical characteristics of an area where flying operations are to be conducted to ensure the task can be completed safely;

(h) hazards associated with low flying and how to identify them prior to and during a low-level operation;

(i) effects of extreme environmental conditions on pilot health and performance;

(j) effects of fatigue and physical health on pilot performance;

(k) risk assessment techniques;

(l) managing risks at low level;

(m) aircraft performance, including:

(i) maximum rate turning; and

(ii) minimum radius turning; and

(iii) best angle of climb; and

(iv) best rate of climb; and

(v) 1 engine inoperative performance and helicopter manoeuvring (if applicable).

3. Activities and manoeuvres

Note For paragraph 1 (b), the flight test includes all of the following activities and manoeuvres. The sequence set out here is not necessarily intended to direct the order of activities and manoeuvres.

3.1 Pre-flight

Note The relevant competency standards are in unit codes C2, LL-A and LL-H.

(a) plan a low-level operation;

(b) identify hazards and manage risks;

(c) ensure performance capability of the aircraft;

(d) consult and brief all stakeholders about the proposed operation;

(e) perform pre-flight actions and procedures.

3.2 Ground operations, take-off, departure and climb

Note The relevant competency standards are in unit codes A1, A2, A3, C3, H1, H2, H3, H4, H5, and NAV.

(a) complete all relevant checks and procedures;

(b) plan, brief and conduct take-off and departure procedures.

3.3 En route cruise

Note The relevant competency standards are in unit codes A3, H5, LL-A, LL-H and NAV.

Conduct appropriate checks and procedures before descending below 500 ft AGL.

3.4 Test specific activities and manoeuvres

Note The relevant competency standards are in unit codes LL-A, LL-H (primary), LL-M, LL-SO and LL-WR (as required).

(a) navigate at low level;
(b) identify and use escape routes;
(c) identify, and operate in the vicinity of, powerlines and wires;
(d) operate in hilly terrain;
(e) manage wind effects, sloping terrain, false horizons and sun glare;
(f) for the aeroplane low-level endorsement, do the following:
  (i) conduct steep turns, maximum rate turn and minimum radius turn;
  (ii) conduct procedure turns;
  (iii) recover from approach to stalls – level and turning;
  (iv) recover from high energy and low energy unusual attitudes;
  (v) for a test that is conducted in a single-engine aeroplane:
    (A) recover from a wing drop at the stall; and
    (B) perform a forced landing;
  (vi) for a test that is conducted in a multi-engine aeroplane, manage an engine failure;
(g) for the helicopter low-level endorsement, do the following:
  (i) conduct steep turns;
  (ii) manoeuvre the helicopter at low level and conduct flight at various speed and configurations;
  (iii) for a flight test that is conducted in a single-engine helicopter, perform a forced landing;
  (iv) for a flight test that is conducted in a multi-engine helicopter, manage an engine failure;
  (v) perform quick stop manoeuvres into wind and downwind;
  (vi) recover from high energy and low energy unusual attitudes;
(h) for the aerial mustering endorsement, do the following:
  (i) plan a stock mustering operation;
  (ii) manoeuvre the aircraft in all planes below 500 ft AGL;
  (iii) perform climbing, descending, low-speed and high-speed manoeuvres;
  (iv) perform reversal turns, decelerations and steep turns;
  (v) conduct stock mustering operations;
(i) for the sling operations endorsement, do the following:
  (i) prepare for an external sling load operation;
  (ii) plan an external sling load operation and conduct pre-flight briefings;
  (iii) operate the aircraft during external load operations;
  (iv) manage abnormal and emergency situations during external load operations;
(j) for the winch and rappelling operations endorsement, do the following:
  (i) plan a winch or rappelling operation and conduct pre-flight briefings;
  (ii) operate the helicopter during a winch or rappelling operation;
  (iii) manage abnormal and emergency situations during a winch or rappelling operation;
  (iv) conduct post-flight activities.

3.5 Descent and arrival

Note The relevant competency standards are in unit codes A3, H5 and NAV.

Plan and conduct an arrival and circuit joining procedures.

3.6 Circuit, approach and landing

Note The relevant competency standards are in unit codes A3, A4, H2, H3 and H4.

(a) conduct a low-level circuit, approach and landing;
(b) perform after landing actions and procedures.

3.7 Shut down and post-flight

Note The relevant competency standards are in unit codes A1, C2 and H1.

(a) park, shutdown and secure the aircraft;
(b) complete post-flight administration.

3.8 General requirements

Note The relevant competency standards are in unit codes LL-A, LL-H, NTS1 and NTS2.

(a) maintain an effective lookout;
(b) maintain situational awareness;
(c) assess situations and make appropriate decisions;
(d) set priorities and manage tasks;
(e) maintain effective communication and interpersonal relationships;
(f) recognise and manage threats;
(g) recognise and manage errors;
(h) recognise and manage undesired aircraft state;
(i) communicate effectively using appropriate procedures for the airspace being used for the test;
(j) manage the aircraft systems required for the flight;
(k) manage the fuel system and monitor the fuel plan and fuel usage during the test.

4. Operational scope and conditions

4.1 The following operational scope applies to the flight test:

(a) managing an aircraft system that is not required for the flight is not an assessable item unless it is used by the applicant;
(b) conduct a low-level operation;
(c) the applicant is only required to demonstrate competency in the activities and manoeuvres mentioned in paragraphs 3.4 (f) to (j) that are applicable to the endorsements covered by the flight test;
(d) emergencies and abnormal situations relating to aircraft systems, powerplants and the airframe are simulated and limited to those described in the AFM.

4.2 The following conditions apply to the flight test:

(a) activities and manoeuvres are performed in accordance with published procedures;
(b) the aircraft must be certified for the operations that apply to the endorsement the flight test is for;
(c) conducted by day under the VFR.

SECTION R AERIAL APPLICATION RATING

Appendix R.1 Aerial application rating and aerial application endorsement flight test

1. Flight test requirements

An applicant for an aerial application rating flight test must demonstrate the following:

(a) knowledge of the topics listed in clause 2, which are relevant to the endorsements that are being assessed during the test;

(b) ability to conduct the activities and manoeuvres mentioned in clause 3, within the operational scope and under the conditions mentioned in clause 4, to the competency standards required under section 12 of this MOS, which are relevant to the endorsements that are being assessed during the test.

2. Knowledge requirements

For paragraph 1 (a), the topics are the following topics:

(a) privileges and limitations of an aerial application rating and the aerial application endorsement included in the test;

(b) proficiency check requirements;

(c) limitations of GNSS;

(d) wind effect at low level and associated flying conditions;

(e) analysis of actual and forecast weather relevant to application operations;

(f) the effect of mountainous terrain on airflow and associated flying conditions;

(g) assessment of the geographical characteristics of the area of flying operations to ensure safe completion of the task;

(h) the hazards associated with low flying and how to identify them prior to and during a low-level operation;

(i) the effects of extreme environmental conditions on pilot health and performance;

(j) the effects of fatigue and physical health on pilot performance;

(k) risk assessment techniques;

(l) managing risks at low level;

(m) aircraft performance, including where appropriate for the category of the aircraft used for the test:

   (i) maximum rate turning;

   (ii) minimum radius turning;

   (iii) best angle of climb;

   (iv) best rate of climb;

   (v) 1 engine inoperative performance and helicopter manoeuvring (if applicable).

3. Activities and manoeuvres

Note For paragraph 1 (b), the flight test includes all of the following activities and manoeuvres. The sequence set out here is not necessarily intended to direct the order of activities and manoeuvres.

3.1 Pre-flight

Note The relevant competency standards are in unit codes AA1 and AA2.

(a) plan an application operation;

(b) identify hazards and manage risks;

(c) ensure the performance capability of the aircraft being used is adequate for the operation;

(d) consult with and brief stakeholders;

(e) perform pre-flight actions and procedures.

3.2 Ground operations, take-off, departure and climb

Note The relevant competency standards are in unit codes LL-A or LL-H (as applicable).

(a) complete all relevant checks and procedures;

(b) plan, brief and conduct take-off and departure procedures.

3.3 En route cruise

Note The relevant competency standards are in unit codes LL-A or LL-H (as applicable).

Conduct appropriate checks and procedures before descending below 500 ft AGL.

3.4 Test specific activities and manoeuvres

Note The relevant competency standards are in unit codes AA1, AA2, and LL-A or LL-H (as applicable).

(a) for a day aerial application endorsement (all aircraft categories) at low level do the following:
  (i) perform straight flight, steep turns and procedure turns;
  (ii) navigate;
  (iii) manage wind effects, sloping and hilly terrain, false horizons and sun glare;
  (iv) demonstrate the use of escape routes;
  (v) recover from high energy and low energy unusual attitude conditions;
  (vi) for the following:
    (A) if the test is conducted in a single-engine aircraft — perform a forced landing;
    (B) if the test is conducted in a multi-engine aircraft — manage an engine failure;
  (vii) fly to, assess, land and take off from an operational airstrip or HLS;
  (viii) fly between an operational airstrip or HLS and an application area;
  (ix) conduct an aerial survey of an application area;
  (x) conduct operations over and under power lines;
  (xi) apply substances;
  (xii) operate aircraft safely and effectively using GNSS swath guidance equipment;
  (xiii) operate at low level in hilly terrain;
  (xiv) jettison a load safely;

(b) for an aeroplane aerial application endorsement, at low level, do the following in an aeroplane:
  (i) conduct maximum rate turns and minimum radius turns;
  (ii) recognise and avoid the stall and recover from a simulated low altitude stall;
  (iii) for single-engine aeroplanes, recover from a wing drop at the stall;
  (iv) conduct an application operation at a certified or registered aerodrome (if available);
  (v) manage abnormal and emergency situations;

(c) for a helicopter aerial application endorsement, do the following:
  (i) manoeuvre the helicopter at low level and conduct flight at various speed and configurations;
  (ii) perform quick stop manoeuvres into wind and downwind;
  (iii) manage risks associated with operating a helicopter during application operations;

(d) For a firefighting endorsement (all categories), do the following:
  (i) demonstrate awareness of relevant human factors;
  (ii) perform pre-flight actions relevant to firefighting operations;
  (iii) demonstrate understanding of fire agency procedures, fire traffic management and other aircraft separation procedures that apply to firefighting operations;
  (iv) plan for and manage applicable operational risks;
  (v) fly to, assess, land and take off from an operational airstrip or HLS or pick-up point;
  (vi) fly between operational airstrip or HLS and drop zone;
  (vii) conduct an aerial survey of a fire area;
  (viii) apply substances;
  (ix) operate aircraft at maximum permissible weights for fire operations;
  (x) operate at low level in hilly terrain;
  (xi) operate in high winds, high density altitude and high turbulence;
  (xii) conduct low-visibility operations;
  (xiii) manage abnormal and emergency situations during a firebombing operation in the vicinity of a fire ground;
  (xiv) jettison load safely;

(e) for a helicopter firefighting endorsement, do the following:
  (i) replenish helicopter load with snorkel or bucket;
  (ii) manage known helicopter risks during firefighting operations;

(f) for a night aerial application operation endorsement, do the following in a relevant aircraft (as applicable):
  (i) check the serviceability of the aircraft and the equipment to be used;
  (ii) conduct a risk assessment for the operation;
  (iii) conduct the pre-flight actions;
  (iv) determine whether an airstrip or HLS is suitable for night operations;
  (v) conduct a take-off and landing at night at an airstrip or HLS remote from ground lighting;
  (vi) conduct a safe transit from an airstrip to the treatment area;
  (vii) operate work lights to illuminate the treatment area.

3.5 Descent and arrival

Note The relevant competency standards are in unit codes LL-A or LL-H (as applicable).

Plan and conduct an arrival and circuit joining procedures.

3.6 Circuit, approach and landing

Note The relevant competency standards are in unit codes LL-A or LL-H (as applicable).

(a) conduct a low-level circuit, approach and landing (day only);
(b) perform after-landing actions and procedures.

3.7 Shut down and post flight

Note The relevant competency standards are in unit codes LL-A or LL-H (as applicable).

(a) park, shutdown and secure the aircraft;
(b) complete post-flight administration.

3.8 General requirements

Note The relevant competency standards are in unit codes LL-A or LL-H (as applicable), NTS1 and NTS2.

(a) maintain an effective lookout;
(b) maintain situational awareness;
(c) assess situations and make appropriate decisions;
(d) set priorities and manage tasks effectively;
(e) maintain effective communication and interpersonal relationships;
(f) recognise and manage threats;
(g) recognise and manage errors;
(h) recognise and manage undesired aircraft states;
(i) communicate effectively using appropriate procedures for the airspace being used during the test;
(j) manage the aircraft systems required for the flight;
(k) manage the fuel system and monitor the fuel plan and fuel usage during the flight.

4. Operational scope and conditions

4.1 The following operational scope applies to the flight test:

(a) managing an aircraft system, which is not required for the flight, is not an assessable item unless the applicant uses the system during the flight;
(b) conduct operations that are relevant to the endorsements being assessed;
(c) emergencies and abnormal situations relating to aircraft systems, powerplants and the airframe are simulated and limited to those described in the AFM.

4.2 The following conditions apply to the aerial application rating flight test:

(a) conducted in an aircraft that is suitable for the endorsements being assessed in the test (see subsection 61.1115 (2));
(b) conducted by day under the VFR except where the test is for a night endorsement;
(c) the aircraft used for an aerial application rating flight test must be of the appropriate category and be capable of being operated for the kind of operations that are covered by the endorsement or endorsements which the flight test is for.

SECTION T PILOT INSTRUCTOR RATINGS

Appendix T.1 Flight instructor rating flight test

1. Flight test requirements

An applicant for a flight instructor rating flight test must demonstrate the following:

(a) knowledge of the topics listed in subclause 2.1, which are relevant to the training endorsements that are being assessed during the test;

(b) ability to conduct aeronautical knowledge training mentioned in subclause 2.2, that is applicable to the training endorsements being assessed;

(c) ability to conduct the activities and manoeuvres mentioned in clause 3, within the operational scope and under the conditions mentioned in clause 4, to the competency standards required under section 12 of this MOS, which are relevant to the endorsements that are being assessed during the flight test.

Note 1 For the purposes of this unit, reference to trainee is a reference to the person who is receiving training that is being delivered by the applicant.

Note 2 For the purposes of this unit, a reference to applicant is a reference to the person who is undertaking this flight test.

2. Knowledge requirements

2.1 For paragraph 1 (a), the topics are the following topics:

(a) privileges and limitations of a flight instructor rating and the training endorsements included in the flight test;

(b) proficiency check requirements;

(c) flight review requirements;

(d) standardisation and proficiency obligations of Part 141 and Part 142 operators;

(e) preparing a student for training;

(f) principles and methods of instruction;

(g) aeronautical knowledge;

(h) practical training aspects of the units and elements of competency;

(i) assessment techniques and standards;

(j) common errors experienced by students and methods for resolving them;

(k) determining a student’s ability to conduct a solo flight;

(l) managing a student’s first solo flight;

(m) supervision;

(n) environmental conditions;

(o) managing common threats and errors;

(p) administrative matters which are relevant to the training endorsements held or being tested;

(q) if the training endorsement authorises the instructor to conduct a flight review, the applicant is required to demonstrate knowledge of conducting flight reviews associated with the endorsement.

2.2 For paragraph 1 (b), and the endorsements being assessed, conduct aeronautical knowledge training

Note The relevant competency standards are in unit FIR4 and the relevant unit for the training endorsement or endorsements included in the test.

Long briefing — conduct a lesson for at least 1 topic that is relevant to a training endorsement, which is included in the flight test, by doing the following:

(a) plan the lesson and the delivery method to be used;

(b) state the training objectives and follow the lesson plan;

(c) use training aids effectively;

(d) present accurate technical knowledge;

(e) provide opportunities for the trainee to participate;

(f) discuss applicable non-technical skills as well as threat and error management issues;

(g) confirm training objectives are achieved and provide feedback to the trainee.

3. Activities and manoeuvres

Note For paragraph 1 (b), the flight test includes all of the following activities and manoeuvres. The sequence set out here is not necessarily intended to direct the order of activities and manoeuvres.

3.1 Pre-Flight

Note The relevant competency standards are in unit code FIR4, FIR7, FIR9, and the relevant units for the training endorsements included in the flight test.

(a) plan a flight training exercise;

(b) perform pre-flight actions and procedures;

(c) **pre-flight briefing** — conduct a pre-flight briefing for a training lesson that is relevant to a training endorsement, which is included in the test, by doing the following:

(i) confirm the trainee is prepared for the training lesson and can recall underpinning knowledge;

(ii) brief the trainee on the training outcomes of the proposed training lesson, including the associated performance criteria;

(iii) brief the trainee on the format of the training lesson, how it will be conducted, and the actions required of the trainee during the training lesson;

(iv) discuss threat and error management issues applicable to the proposed flight.

3.2 Ground operations, take-off, departure and climb

Note The relevant competency standards are in unit code FIR3.

(a) complete all relevant checks and procedures;

(b) plan, brief and conduct take-off and departure procedures.

3.3 En route cruise

Note The relevant competency standards are in unit code FIR3.

Maintain straight and level and turn aircraft.

3.4 Test specific activities and manoeuvres

Note The relevant competency standards are in unit codes FIR4, FIR7, FIR9 and the relevant units for the training endorsements included in the flight test.

(a) implement the hand-over and take-over procedure;

(b) intervene to manage undesired aircraft states;

(c) **Air exercise 1** — conduct flight training for a selected training activity nominated by the flight examiner and perform the following:

(i) demonstrate manoeuvres and provide clear explanations to the trainee;

(ii) direct the trainee performing manoeuvres and tasks;

(iii) monitor and assess the trainee performing manoeuvres and tasks and provide further instruction as required;

(d) **Air exercise 2** — conduct flight training for selected training manoeuvres nominated by the flight examiner and perform the following:

(i) manage pilot in command responsibilities effectively;

(ii) demonstrate and direct manoeuvres and provide clear explanations to the trainee;

(iii) monitor and assess the trainee performing manoeuvres and tasks and provide further instruction as required;

(e) for a training endorsement that is for a multi-crew operation — conduct a multi-crew flight training air exercise by demonstrating and assessing the following:

(i) teamwork and collaborative problem solving;

(ii) non-technical skills that are applicable to both roles of a multi-crew operation;

(iii) standard operating procedures, cockpit discipline and use of automation.

3.5 Descent and arrival

Note The relevant competency standards are in unit code FIR4 and the relevant units for the training endorsements included in the flight test.

Plan and conduct arrival and circuit joining procedures.

3.6 Circuit, approach and landing

Note The relevant competency standards are in unit code FIR4 and the relevant units for the training endorsements included in the flight test.

(a) conduct a normal circuit pattern, approach and landing;

(b) perform after landing actions and procedures.

3.7 Shut down and post-flight

Note The relevant competency standards are in unit code FIR3.

(a) park, shutdown and secure the aircraft;

(b) complete post-flight administration;

(c) **post-flight debriefing** — conduct a post-flight debriefing for the training activities included during the test by doing the following:

(i) the trainee is given the opportunity to self-assess their performance against the prescribed performance criteria and the objectives of the training activity;

(ii) the trainee's performance is assessed accurately and discussed effectively with the trainee;

(iii) trainee performance deficiencies are identified, and remedial actions and proposed training are discussed;

(iv) discuss with the trainee any threat and error management issues that were encountered during the flight.

3.8 General requirements

Note The relevant competency standards are in unit codes FIR3, NTS1 and NTS2.

(a) maintain an effective lookout;

(b) maintain situational awareness;

(c) assess situations and make appropriate decisions;

(d) set priorities and manage tasks effectively;

(e) maintain effective communication and interpersonal relationships;

(f) recognise and manage threats;

(g) recognise and manage errors;

(h) recognise and manage undesired aircraft state;

(i) communicate effectively using appropriate procedures for airspace;

(j) manage the aircraft systems required for the flight;

(k) manage the fuel system and monitor the fuel plan and fuel usage during the flight.

4. Operational scope and conditions

4.1 The following operational scope applies to the flight test:

(a) managing an aircraft system, which is not required for the flight, is not an assessable item unless the applicant uses the system during the flight;

(b) deliver a long briefing chosen by the flight examiner that is relevant to the training endorsements included in the flight test;

(c) deliver a pre-flight briefing chosen by the flight examiner that is relevant to the training endorsements included in the flight test;

(d) conduct a flight training operation where the flight examiner performs the role of a trainee pilot and the applicant performs the role of flight instructor;

(e) conduct 2 air exercises that are chosen by the flight examiner;

(f) as directed by the flight examiner, perform general handling manoeuvres that are relevant to the training endorsements, which are included in the flight test;

(g) emergencies and abnormal situations relating to aircraft systems, powerplants and the airframe are simulated and limited to those described in the AFM.

4.2 The following conditions apply to the flight test:

(a) activities and manoeuvres are performed in accordance with published procedures;

(b) the flight test must be conducted in an aircraft, or an FSTD that is approved for the purpose, which is suitable for the training endorsements included in the flight test, except where the test must be conducted in a suitable helicopter in accordance with paragraph 61.1185 (3) (c);

(c) for the grant of a flight instructor rating — demonstrate competency conducting aeronautical knowledge and flight training for at least 1 training endorsement;

(d) for the grant of an additional training endorsement — demonstrate competency conducting aeronautical knowledge and flight training for the endorsement.

Appendix T.2 Simulator instructor rating flight test

1. Flight test requirements

An applicant for a simulator instructor rating flight test must demonstrate the following:

(a) knowledge of the topics listed in subclause 2.1, which are relevant to the training endorsements that are being assessed during the test;

(b) ability to conduct aeronautical knowledge training mentioned in subclause 2.2, that is applicable to the training endorsements being assessed;

(c) ability to conduct the activities and manoeuvres mentioned in clause 3, within the operational scope and under the conditions mentioned in clause 4, to the competency standards required under section 12 of this MOS, which are relevant to the endorsements that are being assessed during the flight test.

Note 1 For the purposes of this unit, reference to trainee is a reference to the person who is receiving training that is being delivered by the applicant.

Note 2 For the purposes of this unit, reference to applicant is to the person who is undertaking this flight test.

2. Knowledge requirements

2.1 For paragraph 1 (a), the topics are the following topics:

(a) privileges and limitations of a simulator instructor rating and the training endorsements included in the flight test;

(b) proficiency check requirements;

(c) flight review requirements;

(d) standardisation and proficiency obligations of Part 141 and Part 142 operators;

(e) preparing a student for training;

(f) principles and methods of instruction;

(g) using FSTDs for training and assessment, including limitations and advantages;

(h) aeronautical knowledge;

(i) practical training aspects of the units and elements of competency;

(j) assessment techniques and standards;

(k) common errors experienced by students and methods for resolving them;

(l) supervision;

(m) environmental conditions;

(n) managing common threats and errors;

(o) administrative matters which are relevant to the training endorsements held or being tested;

(p) if the training endorsement authorises the instructor to conduct a flight review, the applicant is required to demonstrate knowledge of conducting flight reviews associated with the endorsement.

2.2 For paragraph 1 (b), and the endorsements being assessed, conduct aeronautical knowledge training.

Note The relevant competency standards are in unit code SIR.

Long briefing — conduct a lesson for at least 1 topic that is relevant to a training endorsement, which is included in the flight test, by doing the following:

(a) plan the lesson and the delivery method to be used;

(b) state the training objectives and follow the lesson plan;

(c) use training aids effectively;

(d) present accurate technical knowledge;

(e) provide opportunities for the trainee to participate;

(f) discuss applicable non-technical skills as well as threat and error management issues;

(g) confirm training objectives are achieved and provide feedback to the trainee.

3. Activities and manoeuvres

Note For paragraph 1 (b), the flight test includes all of the following activities and manoeuvres. The sequence set out here is not necessarily intended to direct the order of activities and manoeuvres.

3.1 Pre-Flight

Note The relevant competency standards are in unit code SIR.

(a) plan a flight training exercise;

(b) perform pre-flight actions and procedures;

(c) **pre-flight briefing** — conduct a pre-flight briefing for a training lesson that is relevant to a training endorsement, which is included in the test, by doing the following:

(i) confirm the trainee is prepared for the training lesson and they can recall the relevant underpinning knowledge;

(ii) brief the trainee on the training outcomes of the proposed training lesson, including the associated performance criteria;

(iii) brief the trainee on the format of the training lesson, how it will be conducted, and the actions required of the trainee during the training lesson;

(iv) discuss threat and error management issues applicable to the proposed flight.

3.2 Ground operations, take-off, departure and climb
Reserved

3.3 En route cruise
Reserved

3.4 Test specific activities and manoeuvres

Note The relevant competency standards are in unit codes SIR and FIR9.

(a) **Air exercises** — conduct FSTD training for 2 selected training activities nominated by the flight examiner and perform the following:

(i) guide and facilitate the learning activity, provide clear explanations to the trainee and manage the trainee's cognitive load;

(ii) monitor and assess the trainee performing manoeuvres and tasks and provide further instruction as required;

(iii) address any technical issues or unusual conditions as they arise;

(iv) demonstrate the ability to operate the instructor station;

(v) demonstrate the ability to operate the functional controls of the pilot station;

(vi) demonstrate a flight sequence;

(b) for a training endorsement that is for a multi-crew operation — conduct a multi-crew FSTD training exercise by demonstrating and assessing the following:

(i) teamwork and collaborative problem solving are emphasised;

(ii) non-technical skills that are applicable to both roles of a multi-crew operation;

(iii) standard operating procedures, cockpit discipline and use of automation.

3.5 Descent and arrival
Reserved

3.6 Circuit, approach and landing
Reserved

3.7 Shut down and post-flight

Note The relevant competency standards are in unit code SIR.

(a) perform post-flight FSTD and instructor station administration;

(b) **post-flight debriefing** — conduct a post-flight debriefing for the training activities included during the test by doing the following:

(i) the trainee is given the opportunity to self-assess their performance against the prescribed performance criteria and the objectives of the training activity;

(ii) the trainee's performance is assessed accurately and discussed effectively with the trainee;

(iii) trainee performance deficiencies are identified, and remedial actions and proposed training are discussed;

(iv) discuss with the trainee any threat and error management issues that were encountered during the flight.

3.8 General requirements

Note The relevant competency standards are in unit code SIR.

Communicate effectively using appropriate procedures for airspace.

4. Operational scope and conditions

4.1 The following operational scope applies to the flight test:

(a) deliver a long briefing chosen by the flight examiner that is relevant to the training endorsements included in the flight test;

(b) deliver a pre-flight briefing chosen by the flight examiner that is relevant to the training endorsements included in the flight test;

(c) conduct an FSTD training activity where the applicant performs the role of simulator instructor;

(d) operate the FSTD, including the instructor station and other systems as required.

4.2 The following conditions apply to the flight test:

(a) activities and manoeuvres are performed in accordance with published procedures;

(b) the flight must be conducted in an FSTD that is approved for the training endorsements included in the flight test;

(c) for the grant of a simulator instructor rating — demonstrate competency conducting aeronautical knowledge and FSTD training for at least 1 training endorsement;

(d) for the grant of an additional training endorsement — demonstrate competency conducting aeronautical knowledge and FSTD training for the endorsement.

SECTION U FLIGHT EXAMINER RATING

Appendix U.1 Flight examiner rating flight test

1. Flight test requirements

An applicant for a flight examiner rating flight test must demonstrate the following:

(a) knowledge of the topics listed in subclause 2.1, which are relevant to the flight examiner endorsements that are being assessed during the FER test;

(b) ability to conduct a pre-flight test and a pre-proficiency check knowledge assessment and briefing as mentioned in subclause 2.2;

(c) ability to conduct the activities and manoeuvres mentioned in clause 3, within the operational scope and under the conditions mentioned in clause 4, to the competency standards required under section 12 of this MOS, which are relevant to the flight examiner endorsements that are being assessed during the FER test.

Note 1 To avoid doubt, in this unit, ***FER*** test means the flight examiner rating flight test and ***flight test*** means the activity the applicant is conducting and being assessed for the purposes of the FER test.

Note 2 To assist readers correctly interpret this standard the following terms are used: (a) ***candidate*** means the person who is undertaking a flight test or proficiency check, or the person acting as that person – which could be the flight examiner conducting the FER test; and (b) ***applicant*** means the person who is undertaking the FER test.

2. Knowledge requirements

2.1 For paragraph 1 (a), the topics are the following topics:

(a) privileges and limitations of the flight examiner rating and the flight examiner endorsements included in the FER test;

(b) proficiency check requirements;

(c) flight review requirements;

(d) preparing a candidate for a flight test or proficiency check;

(e) assessment methods;

(f) aeronautical knowledge;

(g) assessment techniques and standards;

(h) common errors that are made by candidates;

(i) environmental conditions;

(j) managing common threats and errors;

(k) administrative matters that are relevant to the flight examiner endorsements being tested.

2.2 For paragraph 1 (b) and the endorsements being tested, do the following:

(a) brief the flight examiner conducting the FER test by doing the following:

- (i) demonstrate knowledge of the following:
  - (A) applicable flight test standards;
  - (B) proficiency check standards (if applicable);
  - (C) eligibility requirements for a candidate to undertake the flight test;
- (ii) provide a flight test plan;
- (iii) describe the methods of evidence gathering to be applied;
- (iv) describe how the candidate’s knowledge is going to be assessed;

(b) brief the candidate as follows:

- (i) explain the context of the flight test or proficiency check, the content and performance criteria that will be used during the test or check;
- (ii) explain the function of the flight examiner applicant and his or her role in relation to actual emergency procedures or critical flight conditions;
- (iii) explain the action that would be taken in the event of a failure assessment.

3. Activities and manoeuvres

Note For paragraph 1 (b), the FER test includes all of the following activities and manoeuvres. The sequence set out here is not necessarily intended to direct the order of activities and manoeuvres.

3.1 Pre-Flight
Reserved

3.2 Ground operations, take-off, departure and climb
Reserved

3.3 En route cruise
Reserved

3.4 Test specific activities and manoeuvres

Note The relevant competency standards are in unit codes FER2 and FER4.

(a) apply the flight test process correctly;
(b) conduct and manage the flight test effectively;
(c) monitor and record the candidate's performance accurately;
(d) manage any contingencies and any abnormal or emergency situations effectively;
(e) ensure the flight test or proficiency check is completed safely;
(f) evaluate the evidence of the candidate's performance objectively;
(g) make an assessment decision based on an objective evaluation of the evidence.

3.5 Descent and arrival
Reserved

3.6 Circuit, approach and landing
Reserved

3.7 Shut down and post-flight

Note The relevant competency standards are in unit codes FER5 and FER6.

(a) **post-flight debriefing for the candidate** — conduct a post-flight debriefing to the person conducting the flight test by doing the following:
 (i) advise the candidate of the result of the test or check and provide feedback on his or her performance and, if applicable, provide guidance on further training;
 (ii) discuss with the candidate opportunities to overcome competency gaps and advise him or her about the reassessment procedures;
(b) **post-flight debriefing for the training provider responsible for the training** — conduct a post-flight debriefing to the training provider by:
 (i) advising them of the result of the test or check; and
 (ii) providing feedback on the candidate's performance; and
 (iii) providing information to assist the training provider improve its training course;
(c) complete post-flight administration.

3.8 General requirements

Note The relevant competency standards are in unit codes NTS1 and NTS2.

(a) maintain an effective lookout;
(b) maintain situational awareness;
(c) assess situations and make appropriate decisions;
(d) set priorities and manage tasks effectively;
(e) maintain effective communication and interpersonal relationships;
(f) recognise and manage threats;
(g) recognise and manage errors;
(h) recognise and manage undesired aircraft state.

4. Operational scope and conditions

4.1 The following operational scope applies to the FER test:
(a) managing an aircraft system, which is not required for the flight, is not an assessable item unless the applicant uses the system during the flight;
(b) prepare for and conduct a flight test or proficiency check as determined by the flight examiner conducting the FER test;
(c) deliver a pre-flight briefing that is relevant to the flight examiner endorsements included in the FER test;

(d) deliver a post-flight debriefing for the candidate and the training provider.

4.2 The following conditions apply to the FER test:

(a) activities and manoeuvres are performed in accordance with published procedures;

(b) the flight must be conducted in an aircraft that is suitable for the flight examiner endorsements included in the FER test, or a flight simulator that is approved for the purpose.

Appendix U.2 English language assessment endorsement

RESERVED

SECTION V FLIGHT ENGINEER LICENCE

Appendix V.1 Flight engineer licence flight test

RESERVED

SECTION W FLIGHT ENGINEER TYPE RATING

Appendix W.1 Flight engineer type rating flight test

RESERVED

SECTION X FLIGHT ENGINEER INSTRUCTOR RATING

Appendix X.1 Flight engineer instructor rating flight test

RESERVED

SECTION Y FLIGHT ENGINEER EXAMINER RATING

Appendix Y.1 Flight engineer examiner rating flight test

RESERVED

Appendix Y.2 English language assessment endorsement

RESERVED

Schedule 6 Proficiency check standards

The following Table of Contents is for guidance only and is not part of the Schedule.

Table of Contents

Appendix 1 Instrument rating proficiency check

1. Proficiency check requirements

An applicant for an instrument rating proficiency check must demonstrate the following:

(a) knowledge of the topics listed in clause 2 that are relevant to the endorsements that are being assessed during the check;

(b) ability to conduct the activities and manoeuvres mentioned in clause 3, within the operational scope and under the conditions mentioned in clause 4, to the competency standards required under section 13 of this MOS that are relevant to the endorsements that are being assessed during the check.

2. Knowledge requirements

For paragraph 1 (a), the topics are the following topics:

(a) privileges and limitations of the instrument rating and each instrument endorsement covered by the check;

(b) proficiency check requirements;

(c) IFR and approach recent experience requirements;

(d) aircraft instrument requirements;

(e) interpreting operational and meteorological information;

(f) take-off minima;

(g) holding and alternate requirements;

(h) IFR procedures for all airspace classifications;

(i) departure and approach instrument procedures;

(j) operations below LSALT and MSA for day and night operations;

(k) GNSS and PBN standards;

(l) circling approaches;

(m) adverse weather operations;

(n) ERSA normal and emergency procedures;

(o) IFR planning.

3. Activities and manoeuvres

Note For paragraph 1 (b), the flight test includes all of the following activities and manoeuvres. The sequence set out here is not necessarily intended to direct the order of activities and manoeuvres.

3.1 Pre-flight

Note The relevant competency standards are in unit code CIR.

(a) plan an IFR flight;

(b) perform pre-flight actions and procedures.

3.2 Ground operations, take-off, departure and climb

Note The relevant competency standards are in unit codes CIR and IFF.

(a) complete all relevant checks and procedures;

(b) plan, brief and conduct take-off and departure procedures;

(c) conduct an instrument departure and, if available, in accordance with 1 of the following:

(i) a published procedure; or

(ii) an ATC clearance;

3.3 En route cruise

Note The relevant competency standards are in unit code CIR.

(a) navigate en route using ground-based and satellite-based navigation systems;

(b) perform ground-based and satellite-based navigation system integrity checks;

(c) identify and avoid hazardous weather conditions (may be simulated).

3.4 Check specific activities and manoeuvres

Note The relevant competency standards are in unit codes CIR, IFF and IFL.

(a) perform full panel and limited panel instrument flying;

(b) recover from at least 2 different unusual aircraft attitudes, including the following:

(i) 1 recovery using a full instrument panel;

(ii) 1 recovery using a limited instrument panel;

(c) for a test in a multi-engine aircraft, conduct an instrument departure with 1 engine inoperative;

Note For clarity, this manoeuvre must be separate to the manoeuvre required in paragraph (e), namely a missed approach.

(d) for a test in a multi-engine aircraft, conduct an instrument approach with 1 engine inoperative;

(e) for a test in a multi-engine aircraft, with 1 engine inoperative, conduct 1 of the following:

(i) a missed approach procedure;

(ii) a visual circling procedure.

3.5 Descent and arrival

Note The relevant competency standards are in unit codes CIR, IAP2, and IAP3.

(a) perform a descent or published arrival procedure to an aerodrome;

(b) track to the holding fix position and conduct a holding pattern or sector 3 entry procedure, and if the approach procedure is an RNAV/(GNSS) approach, then the holding pattern or sector 3 entry procedure must be for the RNAV/(GNSS) procedure;

(c) conduct a 2D instrument approach operation as follows:

(i) prepare for the operation;

(ii) conduct the operation;

(d) if required for the test — conduct a 3D instrument approach operation as follows:

(i) prepare for the operation;

(ii) conduct the operation;

(e) conduct a missed approach procedure.

3.6 Circuit, approach and landing

Note The relevant competency standards are in unit code CIR.

(a) conduct a visual circling approach involving a change of heading to the runway of at least 90˚;

(b) perform after-landing actions and procedures.

3.7 Shut down and post-flight

Note The relevant competency standards are in unit code CIR.

(a) park, shutdown and secure the aircraft;

(b) complete post-flight administration.

3.8 General requirements

Note The relevant competency standards are in unit codes CIR, NTS1 and NTS2.

(a) maintain an effective lookout;

(b) maintain situational awareness;

(c) assess situations and make appropriate decisions;
(d) set priorities and manage tasks effectively;
(e) maintain effective communication and interpersonal relationships;
(f) recognise and manage threats;
(g) recognise and manage errors;
(h) recognise and manage undesired aircraft states;
(i) communicate effectively using appropriate procedures for the airspace being used during the test;
(j) manage the aircraft systems required for the flight;
(k) manage the fuel system and monitor the fuel plan and fuel usage during the flight.

4. Operational scope and conditions

Note Reference to the same kind of relevant aircraft in this section has the same meaning as relevant aircraft in subregulation 61.880 (9) of Part 61 of CASR 1998.

4.1 The following operational scope applies to the proficiency check:
(a) managing an aircraft system, which is not required for the flight, is not an assessable item unless the applicant uses the system during the flight;
(b) an IFR operation;
(c) conduct an IFR departure, en route sectors, IFR arrival, instrument approach operations using at least 2 different procedures, and at least 1 missed approach procedure;
(d) emergencies and abnormal situations relating to aircraft systems, powerplants and the airframe are simulated and limited to those described in the AFM.

4.2 The following conditions apply to the flight test:
(a) activities and manoeuvres are performed in accordance with published procedures;
(b) conducted in an appropriate aircraft or a flight simulation training device approved for the purpose;
(c) the check must include at least one 2D instrument approach operations;
(d) demonstrating competency conducting instrument approach operations includes conducting a missed approach procedure for at least 1 approach operation, from the decision altitude or minimum descent altitude, as applicable, unless for safety or operational reasons a higher altitude is applied;
(e) for paragraph (d), demonstrate competency performing at least 1 instrument approach operation while manually manipulating the flight and power controls;
(f) if the proficiency check is conducted in an aircraft, it must be certified for operations conducted under the IFR and be appropriately equipped according to the requirements for each instrument endorsement the check includes;
(g) a suitable means of simulating instrument meteorological conditions must be used, if necessary, to ensure competency conducting the operation without reference to external visual cues is achieved.

Appendix 2 Instrument rating proficiency check — co-pilot

1. Proficiency check requirements

1.1 This proficiency check applies to an applicant for an instrument rating proficiency check who is subject to the condition that he or she is not authorised to act as pilot in command of an aircraft conducting an IFR operation and who has not yet satisfied the requirements for the removal of the condition as prescribed in regulation 61.887 and subregulation 202.266 (5).

1.2 The applicant must demonstrate the following:
(a) knowledge of the topics listed in clause 2 that are relevant to the endorsements that are being assessed during the check;
(b) ability to conduct the activities and manoeuvres mentioned in clause 3, within the operational scope and under the conditions mentioned in clause 4, to the competency standards required under section 13 of this MOS that are relevant to the endorsements that are being assessed during the check.

2. Knowledge requirements

For paragraph 1 (a), the topics are the following topics:

(a) privileges and limitations of the instrument rating and each instrument endorsement covered by the check;

(b) proficiency check requirements;

(c) IFR and approach recent experience requirements;

(d) aircraft instrument requirements;

(e) interpreting operational meteorological information;

(f) take-off minima;

(g) holding and alternate requirements;

(h) IFR procedures for all airspace classifications;

(i) departure and approach instrument procedures;

(j) operations below LSALT and MSA for day and night operations;

(k) GNSS and PBN standards;

(l) circling approaches;

(m) adverse weather operations;

(n) ERSA normal and emergency procedures;

(o) IFR planning.

3. Activities and manoeuvres

Note For paragraph 1 (b), the flight test includes all of the following activities and manoeuvres. The sequence set out here is not necessarily intended to direct the order of activities and manoeuvres.

3.1 Pre-flight

Note The relevant competency standards are in unit code CIR.

(a) plan an IFR flight;

(b) perform the pre-flight actions and procedures.

3.2 Ground operations, take-off, departure and climb

Note The relevant competency standards are in unit codes CIR and IFF.

(a) complete all of the relevant checks and procedures;

(b) plan, brief and conduct the take-off and departure procedures;

(c) conduct an instrument departure and, if available, in accordance with 1 of the following:

  (i) a published procedure; or

  (ii) an ATC clearance.

3.3 En route cruise

Note The relevant competency standards are in unit code CIR.

(a) navigate the aircraft en route using ground-based and satellite-based navigation systems;

(b) perform ground-based and satellite-based navigation system integrity checks;

(c) identify and avoid hazardous weather conditions (may be simulated).

3.4 Check specific activities and manoeuvres

Note The relevant competency standards are in unit codes CIR, IFF and IFL.

(a) perform full panel and limited panel instrument flying;

(b) recover from at least 2 different unusual aircraft attitudes, including the following:

  (i) 1 recovery using a full instrument panel;

  (ii) 1 recovery using a limited instrument panel.

3.5 Descent and arrival

Note The relevant competency standards are in unit codes CIR, IAP2, and IAP3.

(a) perform a descent or published arrival procedure to an aerodrome;

(b) track to the holding fix position and conduct a holding pattern or sector 3 entry procedure, and if the approach procedure is an RNAV/(GNSS) approach, then the holding pattern or sector 3 entry procedure must be for the RNAV/(GNSS) procedure;

(c) conduct a 2D instrument approach operation as follows:
   (i) prepare for the operation;
   (ii) conduct the operation;
(d) if required for the check — conduct a 3D instrument approach operation as follows:
   (i) prepare for the operation;
   (ii) conduct the operation;
(e) conduct a missed approach procedure.

3.6 Circuit, approach and landing

Note The relevant competency standards are in unit code CIR.

(a) conduct a visual circling approach involving a change of heading to the runway of at least 90˚;
(b) perform after-landing actions and procedures.

3.7 Shut down and post-flight

Note The relevant competency standards are in unit code CIR.

(a) park, shutdown and secure the aircraft;
(b) complete post-flight administration.

3.8 General requirements

Note The relevant competency standards are in unit codes CIR, NTS1 and NTS2.

(a) maintain an effective lookout;
(b) maintain situational awareness;
(c) assess situations and make appropriate decisions;
(d) set priorities and manage tasks effectively;
(e) maintain effective communication and interpersonal relationships;
(f) recognise and manage threats;
(g) recognise and manage errors;
(h) recognise and manage undesired aircraft states;
(i) communicate effectively using appropriate procedures for the airspace being used during the test;
(j) manage the aircraft systems required for the flight;
(k) manage the fuel system and monitor the fuel plan and fuel usage during the flight.

4. Operational scope and conditions

Note Reference to the same kind of relevant aircraft in this section has the same meaning as relevant aircraft in subregulation 61.880 (9) of Part 61 of CASR 1998.

4.1 The following operational scope applies to the proficiency check:

(a) managing an aircraft system, which is not required for the flight, is not an assessable item unless the applicant uses the system during the flight;
(b) a multi-crew IFR operation in an appropriate aircraft or flight simulator approved for the purpose;
(c) conduct an IFR departure, en route sectors, IFR arrival, instrument approach operations using at least 2 different procedures, and at least 1 missed approach procedure;
(d) emergencies and abnormal situations relating to aircraft systems, powerplants and the airframe are simulated and limited to those described in the AFM.

4.2 The following conditions apply to the flight test:

(a) activities and manoeuvres are performed in accordance with published procedures;
(b) the check must include at least one 2D instrument approach operations;
(c) demonstrating competency conducting instrument approach operations includes conducting a missed approach procedure for at least 1 approach operation, from the decision altitude or minimum descent altitude, as applicable, unless for safety or operational reasons a higher altitude is applied;
(d) if the proficiency check is conducted in an aircraft, it must be certified for operations conducted under the IFR and be appropriately equipped according to the requirements for each instrument endorsement the check includes;

(e) a suitable means of simulating instrument meteorological conditions must be used, if necessary, to ensure competency conducting the operation without reference to external visual cues is achieved.

Appendix 3 Night vision imaging system rating proficiency check

1. Proficiency check requirements

1.1 An applicant for a night vision imaging system (NVIS) rating proficiency check must demonstrate the following:

(a) knowledge of the topics listed in clause 2, which are relevant to the endorsement that is being assessed during the check;

(b) ability to conduct the activities and manoeuvres mentioned in clause 3, within the operational scope and under the conditions mentioned in clause 4, to the competency standards required under section 13 of this MOS that are relevant to the endorsements that are being assessed during the check.

2. Knowledge requirements

For paragraph 1 (a), the topics are the following topics:

(a) privileges and limitations of the NVIS rating and the endorsement that is covered by the flight test;

(b) proficiency check requirements;

(c) night recency requirements;

(d) night VFR and IFR operations as applicable to the endorsement that is being assessed during the check;

(e) ground and aircraft lighting requirements;

(f) interpreting operational and meteorological information;

(g) use of instrument and navigation systems;

(h) take-off minima;

(i) holding and alternate requirements;

(j) operational requirements and procedures for all airspace classifications;

(k) operations below LSALT and MSA for day and night operations;

(l) ERSA normal and emergency procedures.

3. Activities and manoeuvres

Note For paragraph 1 (b), the proficiency check includes all of the following activities and manoeuvres. The sequence set out here is not necessarily intended to direct the order of activities and manoeuvres.

3.1 Pre-flight

Note The relevant competency standards are in unit code NVI.

(a) plan an NVIS operation and determine the serviceability of the aircraft and the night vision goggles (NVG) equipment to be used for the operation;

(b) plan a night VFR flight;

(c) perform pre-flight actions and procedures.

Note An NVIS operation is defined in Civil Aviation Order 82.6.

3.2 Ground operations, take-off, departure and climb

Note The relevant competency standards are in unit codes NVI and IFF.

(a) complete all relevant checks and procedures;

(b) lift-off, hover and taxi helicopter using NVG;

(c) plan, brief and conduct take-off and departure procedures using NVG;

(d) establish a stable hover, take-off from and climb out from an unlit helicopter landing site (HLS) using NVG.

3.3 En route cruise

Note The relevant competency standards are in unit code NVI.

(a) transit to and from an operational area using NVG;

(b) navigate en route using night VFR or IFR procedures as applicable.

3.4 Check specific activities and manoeuvres

Note The relevant competency standards are in unit codes NVI, IFF and IFL.

(a) perform full and limited panel instrument flying;

(b) recover from at least 2 different unusual aircraft attitudes, including the following:

(i) 1 recovery using a full instrument panel;

(ii) 1 recovery using a limited instrument panel;

(c) perform cockpit procedures and checks during goggled and de-goggled flight;

(d) maintain control of the aircraft during transition between goggled and de-goggled flight;

(e) using NVG, perform 1 of the following:

(i) land and take off from sloping ground;

(ii) land and take off from a pinnacle;

(iii) land and take off from a ridgeline;

(f) manage abnormal and emergency situations while using NVG;

(g) recover from inadvertent entry into IMC conditions and re-establishing VMC while using NVG;

(h) manage flight during a multi-crew NVIS operation.

3.5 Descent and arrival

Note The relevant competency standards are in unit code NVI.

(a) plan and conduct an arrival and circuit joining procedure;

(b) descend to an unlit HLS while using NVG.

3.6 Circuit, approach and landing

Note The relevant competency standards are in unit code NVI.

(a) conduct a circuit pattern, approach and landing using NVG;

(b) conduct an approach to, and land on, an unlit HLS using NVG;

(c) conduct a baulked landing using NVG;

(d) perform after landing actions and procedures.

3.7 Shut down and post-flight

Note The relevant competency standards are in unit code NVI.

(a) park, shutdown and secure the helicopter;

(b) complete post-flight administration.

3.8 General requirements

Note The relevant competency standards are in unit codes NTS1, NTS2 and NVI.

(a) maintain an effective lookout;

(b) maintain situational awareness;

(c) assess situations and make appropriate decisions;

(d) set priorities and manage tasks effectively;

(e) maintain effective communication and interpersonal relationships;

(f) recognise and manage threats;

(g) recognise and manage errors;

(h) recognise and manage undesired aircraft states;

(i) communicate effectively using appropriate procedures for the airspace being used during the flight;

(j) manage the aircraft systems required for the flight;

(k) manage the fuel system and monitor the fuel plan and fuel usage during the flight.

4. Operational scope and conditions

4.1 The following operational scope applies to the proficiency check:

(a) managing an aircraft system that is not required for the flight is not an assessable item unless it is used by the applicant;

(b) conduct an NVIS operation;

(c) conduct the operation using NVG;

(d) conducted under the night VFR, including an IFR segment if the check is for the holder of a grade 1 NVIS endorsement;

(e) emergencies and abnormal situations relating to aircraft systems, powerplants and the airframe are simulated and limited to those described in the AFM.

4.2 The following conditions apply to the proficiency check:

(a) activities and manoeuvres are performed in accordance with published procedures;

(b) conducted in a helicopter or a flight simulation training device approved for the purpose;

(c) if the check is conducted in an aircraft, it must be certified for the operation.

Appendix 4 Aerial application rating proficiency check

1. Proficiency check requirements

An applicant for an aerial application rating proficiency check must demonstrate the following:

(a) knowledge of the topics listed in clause 2, which are relevant to the endorsement(s) that are being assessed during the check;

(b) ability to conduct the activities and manoeuvres mentioned in clause 3, within the operational scope and under the conditions mentioned in clause 4, to the competency standards required under section 13 of this MOS, which are relevant to the endorsements that are being assessed during the check.

2. Knowledge requirements

For paragraph 1 (a), the topics are the following topics:

(a) privileges and limitations of an aerial application rating and the endorsements held by the applicant;

(b) proficiency check requirements;

(c) limitations of GNSS;

(d) wind affect at low level and associated flying conditions;

(e) analysis of actual and forecast weather relevant to application operations;

(f) the effect of mountainous terrain on airflow and associated flying conditions;

(g) assessment of the geographical characteristics of the area of flying operations to ensure safe completion of the task;

(h) the hazards associated with low flying and how to identify them prior to and during a low-level operation;

(i) the effects of extreme environmental conditions on pilot health and performance;

(j) the effects of fatigue and physical health on pilot performance;

(k) risk assessment techniques;

(l) managing risks at low level;

(m) aircraft performance, including where appropriate for the category of the aircraft used for the check:

- (i) maximum rate turning;
- (ii) minimum radius turning;
- (iii) best angle of climb;
- (iv) best rate of climb;
- (v) 1 engine inoperative performance (if applicable);
- (vi) helicopter manoeuvring (if applicable).

3. Activities and manoeuvres

Note For paragraph 1 (b), the proficiency check includes all of the following activities and manoeuvres. The sequence set out here is not necessarily intended to direct the order of activities and manoeuvres.

3.1 Pre-flight

Note The relevant competency standards are in unit codes AA1, and AA2.

(a) perform pre-flight actions and procedures;

(b) plan an application operation;

(c) identify hazards and manage risks;

(d) ensure the performance capability of the aircraft being used is adequate for the operation.

3.2 Ground operations, take-off, departure and climb

Note The relevant competency standards are in unit codes LL-A or LL-H (as applicable).

(a) complete all relevant checks and procedures;

(b) plan, brief and conduct take-off, departure procedure.

3.3 En route cruise

Note The relevant competency standards are in unit codes LL-A or LL-H (as applicable).

Conduct appropriate checks and procedures before descending below 500 ft AGL.

3.4 Check specific activities and manoeuvres

Note The relevant competency standards are in unit codes AA1, AA2, and LL-A or LL-H (as applicable).

(a) at low level, do the following:
- (i) manoeuvre at various speeds and configurations;
- (ii) navigate;
- (iii) apply substances;
- (iv) jettison load;

(b) for the aeroplane aerial application endorsement, at low level, do the following:
- (i) perform steep turns and procedure turns at or below 500 ft AGL;
- (ii) recognise and avoid the stall and recover from a simulated low altitude stall;

(c) for a check conducted in a single-engine aeroplane, perform a forced landing from below 500 ft AGL;

(d) manage abnormal and emergency situations during low-level operations;

(e) for the firefighting endorsements (all categories), do the following:
- (i) demonstrate a thorough understanding of fire agency procedures, fire traffic management and other aircraft separation procedures that apply to firefighting operations;
- (ii) conduct an aerial survey of a fire area;
- (iii) apply firebombing substances;
- (iv) operate aircraft at maximum permissible weights for fire operations;
- (v) manage abnormal and emergency situations during a firebombing operation;

(f) for the helicopter firefighting endorsement, replenish the helicopter load with snorkel or bucket (as applicable).

3.5 Descent and arrival

Note The relevant competency standards are in unit codes LL-A or LL-H (as applicable).

Plan and conduct descent, arrival and circuit joining procedures.

3.6 Circuit, approach and landing

Note The relevant competency standards are in unit codes LL-A or LL-H (as applicable).

(a) conduct a low-level circuit, approach and landing (day only);

(b) perform after-landing actions and procedures.

3.7 Shut down and post flight

Note The relevant competency standards are in unit codes LL-A or LL-H (as applicable).

(a) park, shutdown and secure the aircraft;

(b) complete post-flight administration.

3.8 General requirements

Note The relevant competency standards are in unit codes LL-A or LL-H (as applicable), NTS1 and NTS2.

(a) maintain an effective lookout;

(b) maintain situational awareness;

(c) assess situations and make appropriate decisions;

(d) set priorities and manage tasks effectively;

(e) maintain effective communication and interpersonal relationships;

(f) recognise and manage threats;

(g) recognise and manage errors;

(h) recognise and manage undesired aircraft states;
(i) communicate effectively using appropriate procedures for the airspace being used during the test;
(j) manage the aircraft systems required for the flight;
(k) manage the fuel system and monitor the fuel plan and fuel usage during the flight.

4. Operational scope and conditions

4.1 The following operational scope applies to the proficiency check:
(a) managing an aircraft system, which is not required for the flight, is not an assessable item unless the applicant uses the system during the flight;
(b) conducting operations that are relevant to the endorsements being assessed;
(c) the check may be conducted by observation if the check is conducted in a single-seat aircraft;
(d) emergencies and abnormal situations relating to aircraft systems, powerplants and the airframe are simulated and limited to those described in the AFM.

4.2 The following conditions apply to the aerial application rating proficiency check:
(a) conducted in an aircraft that is suitable for the endorsements being assessed in the test (see paragraph 61.1110 (4) (a));
(b) conducted by day under the VFR.

Appendix 5 Instructor rating proficiency check

1. Proficiency check requirements

An applicant for an instructor rating proficiency check must demonstrate the following:
(a) knowledge of the topics listed in subclause 2.1, which are relevant to the training endorsements that are being assessed during the check;
(b) ability to conduct aeronautical knowledge training mentioned in subclause 2.2, that is applicable to the training endorsements being assessed;
(c) ability to conduct the activities and manoeuvres mentioned in clause 3, within the operational scope and under the conditions mentioned in clause 4, to the competency standards required under section 13 of this MOS, which are relevant to the endorsements that are being assessed during the check.

Note 1 For the purposes of this unit, reference to trainee is a reference to the person who is receiving training that is being delivered by the applicant.

Note 2 For the purposes of this unit, a reference to applicant is a reference to the person who is undertaking this proficiency check.

2. Knowledge requirements

2.1 For paragraph 1 (a), the topics are the following topics:
(a) privileges and limitations of a pilot instructor rating and the training endorsements included in the proficiency check;
(b) proficiency check requirements;
(c) flight review requirements;
(d) preparing a student for training;
(e) principles and methods of instruction;
(f) aeronautical knowledge;
(g) practical training aspects of the units and elements of competency;
(h) assessment techniques and standards;
(i) common errors experienced by students and methods for resolving them;
(j) determining a student’s ability to conduct a solo flight;
(k) managing a student’s first solo flight;
(l) supervision;
(m) environmental conditions;
(n) managing common threats and errors;

(o) administrative matters which are relevant to the training endorsements held or being assessed;

(p) if the training endorsement authorises the instructor to conduct a flight review, the applicant is required to demonstrate knowledge of conducting flight reviews associated with the endorsement.

2.2 For paragraph 1 (b), and the endorsements being assessed, conduct the following aeronautical knowledge training:

Note The relevant competency standards are in unit FIR1 and the relevant unit for the training endorsement or endorsements included in the check.

(a) **long briefing** — conduct a lesson for at least 1 topic that is relevant to a training endorsement, which is included in the check, by doing the following:

(i) plan the lesson and the delivery method to be used;

(ii) state the training objectives and follow the lesson plan;

(iii) use training aids effectively;

(iv) present accurate technical knowledge;

(v) provide opportunities for the trainee to participate;

(vi) discuss applicable non-technical skills as well as threat and error management issues;

(vii) confirm training objectives are achieved and provide feedback to the trainee;

(b) **Reserved**

3. Activities and manoeuvres

Note For paragraph 1 (b), the proficiency check includes all of the following activities and manoeuvres. The sequence set out here is not necessarily intended to direct the order of activities and manoeuvres.

3.1 Pre-Flight

Note The relevant competency standards are in unit code FIR3.

(a) plan a flight training exercise that achieves an effective, efficient and safe outcome;

(b) perform pre-flight actions and procedures;

(c) **pre-flight briefing** — conduct a pre-flight briefing for a training lesson that is relevant to a training endorsement, which is included in the check, by doing the following:

(i) confirm the trainee is prepared for the training lesson and can recall underpinning knowledge;

(ii) brief the trainee on the training outcomes of the proposed training lesson, including the associated performance criteria;

(iii) brief the trainee on the format of the training lesson, how it will be conducted, and the actions required of the trainee during the training lesson;

(iv) discuss threat and error issues applicable to the proposed flight.

3.2 Ground operations, take-off, departure and climb

Note The relevant competency standards are in unit code FIR3.

(a) complete all relevant checks and procedures;

(b) plan and conduct take-off, departure procedures and climb.

3.3 En route cruise

Note The relevant competency standards are in unit code FIR3.

Maintain straight and level and turn aircraft.

3.4 Test specific activities and manoeuvres

Note The relevant competency standards are in unit code FIR3.

(a) implement the hand-over and take-over procedure;

(b) intervene to manage undesired aircraft states;

(c) **Air exercise 1** — conduct flight training for a selected training activity nominated by the flight examiner and perform the following:

(i) demonstrate manoeuvres and provide clear explanations to the trainee;

(ii) direct the trainee performing manoeuvres and tasks;

(iii) monitor and assess the trainee performing manoeuvres and tasks and provide further instruction as required;

(d) **Air exercise 2** — conduct flight training for a selected training activity nominated by the flight examiner and perform the following:
   (i) manage pilot in command responsibilities;
   (ii) demonstrate and direct manoeuvres and provide clear explanations to the trainee;
   (iii) monitor and assess the trainee performing manoeuvres and tasks and provide further instruction as required;

(e) for a training endorsement that is for a multi-crew operation — conduct a multi-crew flight training air exercise by demonstrating and assessing the following:
   (i) teamwork and collaborative problem solving;
   (ii) non-technical skills that are applicable to both roles of a multi-crew operation;
   (iii) standard operating procedures, cockpit discipline and use of automation.

3.5 Descent and arrival

Note The relevant competency standards are in unit code FIR3.

Plan and conduct arrival and circuit joining procedures.

3.6 Circuit, approach and landing

Note The relevant competency standards are in unit code FIR3.

(a) conduct a normal circuit pattern, approach and landing;
(b) perform after landing actions and procedures.

3.7 Shut down and post-flight

Note The relevant competency standards are in unit code FIR3.

(a) park, shutdown and secure the aircraft;
(b) complete post-flight administration;
(c) **post-flight debriefing** — conduct a post-flight debriefing for the training activities included during the test by doing the following:
   (i) the trainee is given the opportunity to self-assess their performance against the prescribed performance criteria and the objectives of the training activity;
   (ii) the trainee's performance is assessed accurately and discussed effectively with the trainee;
   (iii) trainee performance deficiencies are identified, and remedial actions and proposed training are discussed;
   (iv) discuss with the trainee any threat and error management issues that were encountered during the flight.

3.8 General requirements

Note The relevant competency standards are in unit codes NTS1, NTS2 and FIR3.

(a) maintain an effective lookout;
(b) maintain situational awareness;
(c) assess situations and make appropriate decisions;
(d) set priorities and manage tasks effectively;
(e) maintain effective communication and interpersonal relationships;
(f) recognise and manage threats;
(g) recognise and manage errors;
(h) recognise and manage undesired aircraft state;
(i) communicate effectively using appropriate procedures for airspace;
(j) manage the aircraft systems required for the flight;
(k) manage the fuel system and monitor the fuel plan and fuel usage during the flight.

4. Operational scope and conditions

4.1 The following operational scope applies to the proficiency check:

(a) managing an aircraft system, which is not required for the flight, is not an assessable item unless the applicant uses the system during the flight;
(b) deliver a long briefing chosen by the flight examiner that is relevant to the training endorsements included in the check;

(c) deliver a pre-flight briefing chosen by the flight examiner that is relevant to the training endorsements included in the check;

(d) conduct a flight training operation where the flight examiner performs the role of a trainee pilot and the applicant performs the role of flight instructor;

(e) conduct 2 air exercises that are chosen by the flight examiner;

(f) as directed by the flight examiner, perform general handling manoeuvres that are relevant to the training endorsements, which are included in the check;

(g) emergencies and abnormal situations relating to aircraft systems, powerplants and the airframe are simulated and limited to those described in the AFM.

4.2 The following conditions apply to the proficiency check:

(a) activities and manoeuvres are performed in accordance with published procedures;

(b) conducted in an aircraft, or a flight simulation training device that is approved for the purpose, that is suitable for the training endorsements included in the check;

(c) demonstrate competency conducting aeronautical knowledge and flight training for at least 1 training endorsement.

Appendix 6 Examiner rating proficiency check

1. Proficiency check requirements

An applicant for a flight examiner rating proficiency check must demonstrate the following:

(a) knowledge of the topics listed in subclause 2.1, which are relevant to the endorsements that are being assessed during the check;

(b) ability to conduct a pre-flight test and a pre-proficiency check knowledge assessment and briefing as mentioned in subclause 2.2;

(c) ability to conduct the activities and manoeuvres mentioned in clause 3, within the operational scope and under the conditions mentioned in clause 4, to the competency standards required under section 13 of this MOS, which are relevant to the endorsements that are being assessed during the check.

Note 1 To avoid doubt, in this unit, ***FER check*** means the flight examiner rating proficiency check and ***flight test*** means the activity the applicant is conducting and being assessed for the purposes of the FER check.

Note 2 To assist readers correctly interpret this standard, the following terms are used: (a) ***candidate*** means the person who is undertaking a flight test or proficiency check, or the person acting as that person – which could be the flight examiner conducting the FER check; and (b) ***applicant*** means the person who is undertaking the FER check.

2. Knowledge requirements

2.1 For paragraph 1 (a), the topics are the following:

(a) the privileges and limitations of a flight examiner rating and the flight test endorsements the applicant holds;

(b) proficiency check requirements;

(c) flight review requirements;

(d) preparing a candidate for a flight test or proficiency check;

(e) assessment methods;

(f) aeronautical knowledge;

(g) assessment techniques and standards;

(h) common errors demonstrated by candidates;

(i) environmental conditions;

(j) managing common threats and errors;

(k) administrative matters which are relevant to the flight examiner endorsement(s) being checked.

2.2 For paragraph 1 (b), and the endorsements being checked, do the following:

(a) brief the flight examiner conducting the FER check by doing the following:

(i) demonstrate knowledge of the following:

(A) applicable flight test standards;

(B) proficiency check standards (if applicable);

(C) eligibility requirements for a candidate to undertake the flight test;

(ii) provide a flight test plan;
(iii) describe the methods of evidence gathering to be applied;
(iv) describe how the candidate's knowledge is going to be assessed.

(b) brief the candidate as follows:
(i) explain the context of the flight test or proficiency check, the content and performance criteria that will be used during the test or check;
(ii) explain the function of the proficiency check applicant and his or her role in relation to actual emergency procedures or critical flight conditions;
(iii) explain the action that would be taken in the event of a failure assessment.

3. Activities and manoeuvres

Note For paragraph 1 (b), the FER check includes all of the following activities and manoeuvres. The sequence set out here is not necessarily intended to direct the order of activities and manoeuvres.

3.1 Pre-Flight
Reserved

3.2 Ground operations, take-off, departure and climb
Reserved

3.3 En route cruise
Reserved

3.4 Test specific activities and manoeuvres

Note The relevant competency standards are in unit codes FER2 and FER4.

(a) apply the flight test process correctly;
(b) conduct and manage the flight test effectively;
(c) monitor and record the candidate's performance accurately;
(d) manage any contingencies and any abnormal or emergency situations effectively;
(e) ensure the flight test or proficiency check is completed safely;
(f) evaluate the evidence of the candidate's performance objectively;
(g) make an assessment decision based on an objective evaluation of the evidence.

3.5 Descent and arrival
Reserved

3.6 Circuit, approach and landing
Reserved

3.7 Shut down and post-flight

Note The relevant competency standards are in unit codes FER5 and FER6.

(a) **post-flight debriefing for the candidate** — conduct a post-flight debriefing to the person conducting the flight test or proficiency check by doing the following:
(i) advise the candidate of the result of the test or check and provide feedback on his or her performance and, if applicable, provide guidance on further training;
(ii) discuss with the candidate opportunities to overcome competency gaps and advise him or her about the reassessment procedures;

(b) **post-flight debriefing for the training provider** responsible for the training — conduct a post-flight debriefing to the training provider by:
(i) advising them of the result of the test; and
(ii) providing feedback on the candidate's performance; and
(iii) providing information to assist the training provider improve its training course.

(c) complete flight test or proficiency check administration.

3.8 General requirements

Note The relevant competency standards are in unit codes NTS1, NTS2, FIR4 and the relevant units for the training endorsements included in the flight test.

(a) maintain an effective lookout;
(b) maintain situational awareness;
(c) assess situations and make appropriate decisions;
(d) set priorities and manage tasks effectively;

(e) maintain effective communication and interpersonal relationships;
(f) recognise and manage threats;
(g) recognise and manage errors;
(h) recognise and manage undesired aircraft state.

4. Operational scope and conditions

4.1 The following operational scope applies to the FER check:

(a) managing an aircraft system, which is not required for the flight, is not an assessable item unless the applicant uses the system during the flight;
(b) prepare for and conduct a flight test or proficiency check as determined by the flight examiner conducting the FER check;
(c) deliver a pre-flight briefing that is relevant to the flight examiner endorsements included in the FER check;
(d) deliver a post-flight briefing for the candidate and the training provider.

4.2 The following conditions apply to the FER check:

(a) activities and manoeuvres are performed in accordance with published procedures;
(b) the flight must be conducted in an aircraft or flight simulation training device that is approved for the purpose, and is suitable for the flight examiner endorsements included in the FER check.

Schedule 7 Flight review standards

The following Table of Contents and Index of Codes are for guidance only and are not part of the Schedule.

Table of Contents

INDEX OF CODES

Appendix L Aircraft rating flight review

1. Flight review requirements

1.1 The flight review requirements for an applicant who does not hold a commercial, multi-crew pilot or air transport pilot licence are specified in subclause 1.2.

1.2 For subclause 1.1 the applicant must demonstrate her or his competency, in the units of competency mentioned in clause 3, by doing the following:

(a) for manoeuvres in a class-rated aeroplane — performing operations within the flight tolerances specified in table 1 in Section 1 of Schedule 8 of this MOS;

(b) for manoeuvres in a type-rated aeroplane — performing operations within the tolerances specified in table 2 in Section 1 of Schedule 8 of this MOS:

(c) for manoeuvres in a class-rated single-engine helicopter — performing operations within the flight tolerances specified in table 3 in Section 1 of Schedule 8 of this MOS;

(d) for manoeuvres in a type-rated helicopter — performing operations within the flight tolerances specified in table 4 in Section 1 of Schedule 8 of this MOS;

(e) for manoeuvres in a gyroplane — performing operations within the flight tolerances specified in table 6 in Section 1 of Schedule 8 of this MOS.

1.3 The flight review requirements for an applicant who holds a commercial, multi-crew pilot or air transport pilot licence are specified in subclause 1.4.

1.4 For subclause 1.3, the applicant must demonstrate her or his competency, in the units of competency mentioned in clause 3, by doing the following:

(a) for manoeuvres in an aeroplane — performing operations within the tolerances specified in table 2 in Section 1 of Schedule 8 of this MOS;

(b) for manoeuvres in a helicopter — performing operations within the flight tolerances specified in table 4 in Section 1 of Schedule 8 of this MOS;

(c) for manoeuvres in a gyroplane — performing operations within the flight tolerances specified in table 7 in Section 1 of Schedule 8 of this MOS.

1.5 For subclauses 1.2 and 1.4, a sustained deviation outside of the applicable flight tolerance is not permitted.

2. Knowledge requirements

2.1 The applicant is required to demonstrate her or his knowledge of the topics specified in clause 4 of each unit of competency mentioned in the table in clause 3, Practical flight standards, except where the topic is not relevant for the particular aircraft rating.

3. Practical flight standards

Unit code	Unit of competency	Modifications
C1	Communicating in aviation environment	Nil
C2	Perform pre- and post-flight actions and procedures	Nil
NTS1	Non-technical skills 1	Nil
NTS2	Non-technical skills 2	Nil
FR-SEAC	Single-engine aeroplane class rating flight review	This unit is only required if the flight review is for the single-engine aeroplane class rating.
FR-MEAC	Multi-engine aeroplane class rating flight review	This unit is only required if the flight review is for the multi-engine aeroplane class rating.
FR-SEAT	Single-engine aeroplane type rating flight review	This unit is only required if the flight review is for the single-engine aeroplane class rating.

Unit code	Unit of competency	Modifications
FR-MEAT	Multi-engine aeroplane type rating flight review	This unit is only required if the flight review is for the single-engine aeroplane class rating.
FR-SEHT	Single-engine helicopter type rating flight review	This unit is only required if the flight review is for the single-engine helicopter class rating or the single-engine helicopter type rating.
FR-MEHT	Single-engine helicopter class rating flight review	This unit is only required if the flight review is for the single-engine helicopter class rating.
FR-SEGC	Single-engine gyroplane class rating flight review	This unit is only required if the flight review is for the single-engine gyroplane class rating.

Appendix N Private instrument rating flight review

1. Flight review requirements

1.1 An applicant for a private instrument rating flight review must demonstrate her or his competency, in the units of competency mentioned in clause 3, by doing the following:

(a) conducting an IFR operation;

(b) for manoeuvres in an aeroplane — performing operations within the flight tolerances specified in table 2 in Section 1 of Schedule 8 of this MOS;

(c) for manoeuvres in a helicopter — performing operations within the tolerances specified in table 4 in Section 1 of Schedule 8 of this MOS.

1.2 For paragraphs 1.1 (b) and (c), a sustained deviation outside of the applicable flight tolerance is not permitted.

2. Knowledge requirements

2.1 The applicant is required to demonstrate her or his knowledge of the following topics except where the topic is not relevant to the endorsement the applicant holds:

(a) the privileges and limitations of the private IFR rating;

(b) flight review requirements;

(c) private IFR planning and operations;

(d) the interpretation of operational and meteorological information;

(e) night recency requirements;

(f) ground and aircraft lighting requirements;

(g) use of instrument and navigation systems;

(h) take-off minima;

(i) holding and alternate requirements;

(j) conducting instrument approaches;

(k) operational requirements and procedures for all airspace classifications;

(l) operations below LSALT and MSA for day and night operations;

(m) hazardous weather and conditions;

(n) ERSA normal and emergency procedures.

3. Practical flight standards

Unit code	Unit of competency	Modifications
NTS1	Non-technical skills 1	Nil
NTS2	Non-technical skills 2	Nil
C2	Pre- and post flight actions and procedures	Nil
PIF	Conduct a private instrument flight rules flight	Element PIF.2 – *Conduct a visual departure* is only required if Element PIF.5 – *Conduct instrument departure,* is not included.
IAP2	Conduct an instrument approach 2D	This unit is only required if the applicant holds a private instrument endorsement prescribed in Part 4 – Approach/arrival endorsements in Table 61.935 of Part 61 of CASR 1998.

Unit code	Unit of competency	Modifications
IAP3	Conduct an instrument approach 3D	This unit is only required if the applicant holds a private instrument endorsement prescribed in Part 4 – Approach/arrival endorsements in Table 61.935 of Part 61 of CASR 1998 that is in the following list: (a) item 22, Approach – RNP APCH3D private instrument endorsement; (b) item 23, Approach – ILS private instrument endorsement.
IFF	Full instrument panel manoeuvres	Nil
IFL	Limited instrument panel manoeuvres	Element A8.4/IFL.4 – *Re-establish visual flight is not required*.

Appendix O Night VFR rating flight review

1. Flight review requirements

1.1 An applicant for a night VFR rating flight review must demonstrate her or his competency, in the units of competency mentioned in clause 3, by doing the following:

(a) conducting an operation at night under the VFR;

(b) for manoeuvres in an aeroplane — performing operations within the flight tolerances specified in table 1 in Section 1 of Schedule 8 of this MOS;

(c) for manoeuvres in a helicopter — performing operations within the flight tolerances specified in table 3 in Section 1 of Schedule 8 of this MOS.

1.2 For paragraphs 1.1 (b) and (c), a sustained deviation outside of the applicable flight tolerance is not permitted.

2. Knowledge requirements

2.1 The applicant is required to demonstrate her or his knowledge of the topics of the following topics except where the topic is not relevant to the flight test:

(a) the privileges and limitations of the NVFR rating;

(b) flight review requirements;

(c) night recency requirements;

(d) NVFR operations;

(e) the interpretation of operational and meteorological information;

(f) ground and aircraft lighting requirements;

(g) use of instrument and navigation systems;

(h) take-off minima;

(i) holding and alternate requirements;

(j) operational requirements and procedures for all airspace classifications;

(k) operations below LSALT for night operations;

(l) hazardous weather and conditions;

(m) ERSA normal and emergency procedures.

3. Practical flight standards

Unit code	Unit of competency	Modifications
NTS1	Non-technical skills 1	Nil
NTS2	Non-technical skills 2	Nil
IFF	Full instrument panel manoeuvres	Nil
IFL	Limited instrument panel manoeuvres	Nil
NVR1	Conduct a traffic pattern at night	Nil

Unit code	Unit of competency	Modifications
NVR2	Night VFR – single-engine aircraft	This unit is only required if the flight review is conducted in a single-engine aircraft. The following elements are not required: (a) NVR2.13 – *Conduct a diversion to revised route or alternate aerodrome at night*; (b) NVR2.15 – *Perform a go-round*. The following elements are not required if the applicant completed a Night VFR rating flight review within the previous 24 months and these elements were included in that flight review: (a) NVR2.2 – *Obtain and use current operational documents*; (b) NVR2.3 – *Prepare flight plan for NVFR flight*; (c) NVR2.4 – *Determine operational requirements*; (d) NVR2.5 – *Make flight notification*; (e) NVR2.6 – *Program navigation system*; (f) NVR2.11 – *Manage hazardous weather conditions*; For element NVR2.9 – *Navigate the aircraft in night VFR*, the performance criteria are the following: (a) cockpit and instrument lighting is adjusted to allow reference to documentation, instruments and lookout; (b) fixes aircraft position using navigation systems; (c) tracks are intercepted and maintained to and from stations or navigation positions.

Unit code	Unit of competency	Modifications
NVR3	Night VFR – multi-engine aircraft	This unit is only required if the flight review is conducted in a multi-engine aeroplane. The following elements are not required: (a) NVR3.8 – *Take-off at night at other than departure aerodrome which is remote from ground lighting*; (b) NVR3.9 – *Engine failure after take-off;* (c) NVR3.16 – *Conduct a diversion to revised route or alternate aerodrome at night*; (d) NVR3.18 – *Land at night, with and without the use of aircraft landing lights at other than departure aerodrome which is remote from ground lighting*. The following elements are not required if the applicant completed a Night VFR rating flight review within the previous 24 months and these elements were included in that flight review: (a) NVR3.2 – *Obtain and use current operational documents*; (b) NVR3.3 – *Prepare flight plan for NFVR flight*; (c) NVR3.4 – *Determine operational requirements*; (d) NVR3.5 – *Make flight notifications*; (e) NVR3.6 – *Program navigation system*; (f) NVR3.12 – *Engine failure during cruise*; (g) NVR3.14 – *Manage hazardous weather conditions*; For element NVR3.11 – *Navigate the aircraft in night VFR*, the performance criteria are the following: (a) cockpit and instrument lighting is adjusted to allow reference to documentation, instruments and lookout; (b) fixes aircraft position using navigation systems; (c) tracks are intercepted and maintained to and from stations or navigation positions.

Appendix Q Low-level rating flight review

1. Flight review requirements

1.1 A low-level rating flight review must include an assessment of competency of at least 1 low-level endorsement.

1.2 An applicant for an low-level rating flight review must demonstrate her or his competency, in the units of competency mentioned in clause 3, by doing the following:

(a) conducting low-level operations;

(b) for manoeuvres in an aeroplane — performing operations within the flight tolerances specified in table 2 in Section 1 of Schedule 8 of this MOS;

(c) for manoeuvres in a helicopter — performing operations within the flight tolerances specified in table 4 in Section 1 of Schedule 8 of this MOS.

1.3 For paragraphs 1.1(b) and (c), a sustained deviation outside of the applicable flight tolerance is not permitted.

2. Knowledge requirements

2.1 The applicant is required to demonstrate her or his knowledge of the following topics:

(a) the privileges and limitations of the low-level rating and low-level endorsements held by the applicant;

(b) flight review requirements;

(c) operating the aircraft's navigation and operating systems;

(d) applying operating limitations;

(e) weight and balance requirements;

(f) the interpretation of operational and meteorological information;

(g) applying aircraft performance data, including take-off and landing performance data for the class of aircraft;

(h) operational requirements and procedures – all airspace classifications;

(i) airworthiness requirements;

(j) reporting requirements;

(k) ERSA normal and emergency procedures;

(l) recent changes to legislation and procedures;

(m) wind affect at low level and associated flying conditions;

(n) the effect of mountainous terrain on airflow and associated flying conditions;

(o) the hazards of, and managing the risks associated with, low flying;

(p) operating in hilly terrain;

(q) aircraft performance, including:

   (i) maximum rate turning;

   (ii) minimum radius turning;

   (iii) best angle of climb;

   (iv) best rate of climb;

   (v) 1 engine inoperative performance (if applicable);

(r) the effects of typical and extreme environmental conditions on pilot health and performance that are relevant to aerial application operations;

(s) the effects of fatigue and physical health on pilot performance;

(t) analysis of actual and forecast weather relevant to low-level operations;

(u) assessment of the geographical characteristics of the area of flying operations to ensure safe completion of the task.

3. Practical flight standards

Unit code	Unit of competency	Modifications
C1	Communicating in aviation environment	Nil
C2	Perform pre- and post-flight actions and procedures	Nil
LL-A	Aeroplane low-level operations	For this unit, the following elements are not required: (a) LL-A.2 – *Flight component*; (b) LL-A.3 – *Aircraft handing*; (c) LL-A.8 – *Operate at low level in hilly terrain*. If the flight review is conducted in a single-engine aeroplane, element LL-A.7 – *Execute engine failure (simulated) from below 500 ft AGL* (multi-engine aeroplane only) is not required. If the flight review is conducted in a multi-engine aeroplane, element LL-A.6 – *Execute forced landing (simulated) from below 500 ft AGL* (single-engine aeroplane only) is not required.
LL-H	Helicopter low-level operations	For this unit, the following elements are not required: (a) LL-H.2 – *Flight component*; (b) LL-H.3 – *Aircraft handing*; (c) LL-H.7 – *Operate at low level in hilly terrain*. If the flight review is conducted in a single-engine helicopter, element LL-H.6 – *Execute engine failure (simulated) from below 500 ft AGL* (multi-engine aeroplane only) is not required. If the flight review is conducted in a multi-engine helicopter, element LL-H.5 – *Execute autorotative forced landing (simulated) from below 500 ft AGL* (single-engine aeroplane only) is not required.
LL-G	Gyroplane low-level operations	For this unit, the following elements are not required: (a) LL-G.2 – *Flight component*; (b) LL-G.3 – *Aircraft handing*; (c) LL-G.6 – *Operate at low level in hilly terrain*.
LL-M	Aerial mustering operations	Nil
LL-SO	Sling operations	Nil
LL-WR	Winch and rappelling operations	Nil

Schedule 8 Tolerances

The following Table of Contents is for guidance only and is not part of the Schedule.

Table of Contents

SECTION 1: FLIGHT TOLERANCES

Table 1: Aeroplane general flight tolerances – private level

Applicability

1.1 The flight tolerances in this subsection apply to the following licences and ratings:

(a) recreational pilot licence;

(b) private pilot licence;

(c) aircraft class rating;

(d) Night VFR rating.

2. Requirements

2.1 A person is required to perform flight manoeuvres within the flight tolerances mentioned in this table to be assessed as competent in the associated unit of competency.

3. Flight tolerances

Flight path or manoeuvre		Flight tolerances
Taxing aircraft		±1.5 metres of centreline
Nominated heading		±10°
Climb airspeed		-0 / +5 kts
Level off from climb and descent		±150 ft
Straight and level	Altitude	±150 ft
	IAS	±10 kts
Power descent airspeed		±10 kts
Glide		-5 / +10 kts
Turns		Angle of Bank ±5°
Turns onto nominated headings		Heading ±10°
Steep Turn		Heading ±10°
		Height ±150 ft
Final approach airspeed		-0 / +5 kts
Landing	Touchdown	±120 m
	Centreline tracking	±2 m
Asymmetric flight	Heading – initial	±20°
	Heading - sustained	±5°
	IAS	-0 +5 kts
Limited panel instrument flying	Heading	±15°
	IAS	±10 kts or ±M0.02
	Height	±200 ft

Table 2: Aeroplane general flight tolerances – professional level

Applicability

1.1 The flight tolerances in this subsection apply to the following licences and ratings:
- (a) commercial pilot licence;
- (b) multi-crew pilot licence;
- (c) air transport pilot licence;
- (d) pilot instructor rating;
- (e) instrument rating;
- (f) private IFR rating;
- (g) flight examiner rating;
- (h) aerial application rating;
- (i) low-level rating;
- (j) aircraft type rating.

Requirements

2.1 A person is required to perform flight manoeuvres within the flight tolerances mentioned in this table to be assessed as competent in the associated unit of competency.

Flight tolerances

Flight path or manoeuvre		Flight tolerances
Taxing aircraft		±1.5 metres of centreline
Nominated heading		±5°
Climb airspeed		-0 / +5 kts
Level off from climb and descent		±100 ft
Straight and level	Altitude	±100 ft
	IAS	±10 kts or ±M.02 Not below minimum approach speed.
Power descent		±10 kts
Glide		-5 / +10 kts
Turns		Angle of Bank ±5°
Turns onto nominated headings		Heading ±5°
Steep Turn		Heading ±10°
		Height ±100 Ft
Final approach airspeed		-0 / +5 kts
Landing	Touchdown	±60 m For ATPL, within the published touchdown zone relevant to the runway landing distance available.
	Centreline tracking	±2 m
Asymmetric flight	Heading – initial	±20°
	Heading – sustained	±5°
	IAS	-0 +5 kts
Limited panel instrument flying	Heading	±15°
	IAS	±10 kts or ±M0.02

Flight path or manoeuvre		Flight tolerances
	Height	±200 ft

Table 3: Helicopter general flight tolerances – private level

Applicability

1.1 The flight tolerances in this subsection apply to the following licences and ratings:

(a) recreational pilot licence;

(b) private pilot licence;

(c) aircraft class rating;

(d) NVFR rating.

Requirements

2.1 A person is required to perform flight manoeuvres within the flight tolerances mentioned in this table to be assessed as competent in the associated unit of competency.

Flight tolerances

Flight path or manoeuvre		Flight tolerances
Hover		±1 metre of hover point
Ground taxi/hover taxi and manoeuvring		±1 metre of track
		±5° of nominated heading
		±20% of nominated height
Climbing		-0 +5 kts nominated IAS
Level off from climb and descent		±100 ft of nominated altitude
Straight and level	Altitude	±100 ft
	IAS	±5 kts
	Heading	±5° of nominated heading
Power descent	IAS	±5 kts
	Heading	±5° of nominated heading
Turns	Angle of bank	Angle of bank ±5°
	Altitude	±100 ft of nominated altitude
Exit turn onto a heading	Initial	±15° of heading
	Sustained	±5° of heading
Level speed in IMC – U/A recovery		Not less than V_{min} IMC
Final approach airspeed		-0_+10 kts
Landing (normal)		Within a 5 metre diameter circle of nominated point
Multi-engine – 1 engine disengaged	Heading	±5° of nominated heading
	IAS	±10 kts of nominated speed/not below approach speed for configuration
Control helicopter during advanced manoeuvres – steep turns	altitude	±100 ft
	speed	±5 kts
	Exit on specified heading	±15° initially, then ±5°
	Nominated heading	±15° initially, then ±5° thorough to min descent of 500 ft

Flight path or manoeuvre		Flight tolerances
Autorotation – single engine helicopter	Heading	±5° Able to turn into the last known wind direction and maintain heading within tolerance
	IAS	±5 kts From recommended minimum rate of descent airspeed
Advanced manoeuvre – autorotative flight	Descent at nominated heading	±5°
	Manufacturer's recommended speed	±5 kts
	Steep turn altering heading	360° using 45° bank
	Best range speed and minimum descent rate	±5 kts
	Distance from the nominated touchdown or termination point	±25 m
Advanced manoeuvre – power recovery	Rotor RPM	Within limitation
	Nominated minimum descent altitude	+100 /-0 ft
	Climb speed	±5 kts

Table 4: Helicopter general flight tolerances – professional level

Applicability

1.1 The flight tolerances in this subsection apply to the following licences and ratings:

(a) commercial pilot licence;
(b) multi-crew pilot licence;
(c) air transport pilot licence;
(d) pilot instructor rating;
(e) private IFR rating;
(f) instrument rating;
(g) flight examiner rating;
(h) aerial application rating;
(i) low-level rating;
(j) aircraft type rating.

Requirements

2.1 A person is required to perform flight manoeuvres within the flight tolerances mentioned in this table to be assessed as competent in the associated unit of competency.

Flight tolerances

Flight path or manoeuvre		Flight tolerances
Hover		±0.5 metre of hover point
Ground taxi/hover taxi and manoeuvring		±1 metre of track
		±5° of nominated heading
		±20% of nominated height
Climbing		-0 +5 kts nominated IAS
Level off from climb and descent		±100 ft of nominated altitude
Straight and level	Altitude	±100 ft
	IAS	±5 kts
	Heading	±5° of nominated heading
Power descent	IAS	±5 kts
	Heading	±5° of nominated heading
Turns	Angle of bank	Angle of bank ±5°
	Altitude	±100 ft of nominated altitude
Exit turn onto a heading	Initial	±15° of heading
	Sustained	±5° of heading
Level speed in IMC – U/A recovery		Not less than V_{min} IMC
Final approach airspeed		-0, +10 kts
Landing (normal)		Within a 5 metre diameter circle of nominated point
Multi-engine – 1 engine disengaged	Heading	±5° of nominated heading
	IAS	±10 kts of nominated speed/not below approach speed for configuration
Control helicopter during advanced manoeuvres – steep turns	Altitude	±100 ft
	Speed	±5 kts

Flight path or manoeuvre		Flight tolerances
	Exit on specified heading	±15° initially, then ±5°
	Nominated heading	±15° initially, then ±5° thorough to min descent of 500 ft
Autorotation – single engine helicopter	Heading	±5° Able to turn into the last known wind direction and maintain heading within tolerance
	IAS	±5 kts From recommended minimum rate of descent airspeed
Advanced manoeuvre – autorotative flight	Descent at nominated heading	±5°
	Manufacturer's recommended speed	±5 kts
	Steep turn altering heading	360° using 45° bank
	Best range speed and minimum descent rate	±5 kts
	Distance from the nominated touchdown or termination point	±25 m
Advanced manoeuvre – power recovery	Rotor RPM	Within limitation
	Nominated minimum descent altitude	+100 /-0 ft
	Climb speed	±5 kts

Table 5: Instrument approach tolerances

Applicability

1.1 The flight tolerances in this subsection apply to the following licences and ratings:
(a) instrument rating;
(b) multi-crew pilot licence;
(c) air transport pilot licence.

Requirements

2.1 A person is required to perform flight manoeuvres within the flight tolerances mentioned in this table to be assessed as competent in the associated unit of competency.

Flight tolerances

Parameter	Tolerance
2D approach Lateral Path Tracking	± 5° of nominated track using azimuth guidance
	± ½ scale deflection of nominated track using lateral course deviation indicator guidance
	Within the RNP value specified for the published minimum altitude
	± 2nm of a DME or GNSS arc
3D Approach Lateral Path Tracking	As above for the lateral path guidance being used
3D Approach Vertical Path	± ½ scale deflection or +/_ 75 ft for RNP BARO VNAV procedure
	For an RNP LPV transients associated with aircraft configuration changes above +1/2 scale are acceptable Transients associated with aircraft configuration changes above +75 ft are acceptable
Minimum Altitude	+100 ft, -0 ft at published minima descent altitude Missed approach initiated not below decision altitude

Table 6: Gyroplane class rating tolerances – private

1 Applicability

1.1 The flight tolerances in this subsection apply to the following licences and ratings:

(a) recreational pilot licence;

(b) private pilot licence;

(c) aircraft class rating;

(d) NVFR rating.

2. Requirements

2.1 A person is required to perform flight manoeuvres within the flight tolerances mentioned in this table to be assessed as competent in the associated unit of competency.

3. Flight tolerances

Flight path or manoeuvre		Flight tolerances
Ground taxi/hover taxi and manoeuvring		±1.5 metres of track/centreline
		±10° of nominated heading
Climbing	Best rate	-0 +5 kts of nominated airspeed
	Best angle	±5 kts of nominated airspeed
	Heading	±5° of nominated heading
Level off from climb and descent		±100 ft of nominated altitude
Straight and level	Altitude	±100 ft
	IAS	±10 kts
	Heading	±10° of nominated heading
Power descent Airspeed/Autorotation	IAS	±10 kts
	Heading	±10° of nominated heading
	Rate of descent	±150 ft/min
Turns	Angle of bank	Angle of bank ±5°
	Altitude	±100 ft of nominated altitude
Exit turn onto a heading	Initial	±15° of heading
	Sustained	±10° of heading
Final approach airspeed		±5 kts
Touchdown		±2 metres of centreline
Landing (normal)		±50 metres of selected touchdown point

Table 7: Gyroplane class rating tolerances – professional

Applicability

1.1 The flight tolerances in this subsection apply to the following licences and ratings:

(a) commercial pilot licence;

(b) pilot instructor rating;

(c) instrument rating;

(d) private IFR rating;

(e) flight examiner rating;

(f) aerial application rating;

(g) low-level rating;

(h) aircraft type rating.

Requirements

2.1 A person is required to perform flight manoeuvres within the flight tolerances mentioned in this table to be assessed as competent in the associated unit of competency.

Flight tolerances

Flight Path or Manoeuvre		Flight tolerances
Ground taxi and manoeuvring		±1.5 metres of track/centreline
		±10° of nominated heading
Climbing	Best rate	-0 +5kts of nominated airspeed
	Best angle	±5 kts of nominated airspeed
	Heading	±5° of nominated heading
Level off from climb and descent		±100 ft of nominated altitude
Straight and level	Altitude	±100 ft
	IAS	±5 ts
	Heading	±5° of nominated heading
Power descent Airspeed/Autorotation	IAS	±10 kts
	Heading	±10° of nominated heading
	Rate of descent	±150 ft/min
Turns	Angle of bank	Angle of bank ±5°
	Altitude	±100 ft of nominated altitude
Exit turn onto a heading	Initial	±15° of heading
	Sustained	±10° of heading
Final approach airspeed		-±5 kts
Touchdown		±2 metres of centreline
Landing (normal)		Within a 100 metre of selected touchdown point

Table 8: Aerobatics

Applicability

1.1 The flight tolerances in this subsection apply to the aerobatics endorsements.

Requirements

2.1 A person is required to perform flight manoeuvres within the flight tolerances mentioned in this table to be assessed as competent in the associated unit of competency.

Flight tolerances

Manoeuvres	Parameter	Tolerances
Looping manoeuvres	Nominated line feature	±10°
	Nominated airspeed	±10 kts
	Entry and recovery heights	±100 ft
Rolling manoeuvres	Nominated airspeed	±10 kts
	Direction	±10°
	Altitude	±100 ft
Stall turn-hammerhead	Nominated air speed	±10 kts
	Nominated line feature 180°	±15°

SECTION 2: ENGLISH LANGUAGE PROFICIENCY RATING SCALES

Applicability

1.1 The following rating scale applies to Aviation English language proficiency assessments:

(a) Level 6 – expert level;

(b) Level 5 – extended;

(c) Level 4 – operational.

Requirements

2.1 Applicants are assessed for aviation English language proficiency against the rating scales in clause 3 below.

Rating scales

3.1 Level 6 – Expert

3.1.2 The person must communicate effectively face-to-face using clear and precise English so that each of the following is the case for the person:

(a) pronunciation, stress, rhythm and intonation, though possibly influenced by the first language or regional variation, almost never interfere with ease of understanding;

(b) both basic and complex grammatical structures and sentence patterns are consistently well-controlled;

(c) vocabulary range and accuracy are sufficient to communicate effectively on a wide variety of familiar and unfamiliar topics;

(d) vocabulary is idiomatic, nuanced and sensitive to register;

(e) able to speak at length with a natural, effortless flow;

(f) varies speech flow for stylistic effect, e.g. to emphasise a point;

(g) uses appropriate discourse markers and connectors spontaneously;

(h) comprehension is consistently accurate in nearly all contexts and includes comprehension of linguistic and cultural subtleties;

(i) interacts with ease in nearly all situations;

(j) is sensitive to verbal and non-verbal cues and responds to them appropriately.

3.1.3 The person must communicate effectively in voice-only radiotelephone communications, so that each of the following is the case for the person:

(a) uses plain English effectively;

(b) receives appropriate responses to transmissions;

(c) responds to transmissions and takes appropriate action;

(d) identifies and manages communication errors and misunderstandings promptly and effectively;

(e) seeks clarification in the time available if the message is unclear or if there is uncertainty about the message;

(f) reacts appropriately to a variety of regional accents;

(g) communicates effectively in unexpected, stressful or non-standard situations using standard phraseology or plain English.

3.2 Level 5 – Extended

3.2.1 The person must communicate effectively face-to-face using clear and precise English, so that each of the following is the case for the person:

(a) stress, rhythm and intonation, though influenced by the first language or regional variation, rarely interfere with ease of understanding;

(b) basic grammatical structures and sentence patterns are consistently well-controlled. Complex structures are attempted but with errors which sometimes interfere with meaning;

(c) vocabulary range and accuracy are sufficient to communicate effectively on common, concrete, and work-related topics. Paraphrases consistently and successfully. Vocabulary is sometimes idiomatic;

(d) 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;

(e) 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 accent) or registers;

(f) interacts with ease in nearly all situations. Is sensitive to verbal and non-verbal cues and responds to them appropriately;

(g) 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.

3.2.2 The person must communicate effectively in voice-only radiotelephone communications, so that each of the following is the case for the person:

(a) uses plain English effectively;

(b) receives appropriate responses to transmissions;

(c) responds to transmissions and takes appropriate action;

(d) identifies and manages communication errors and misunderstandings promptly and effectively;

(e) seeks clarification in the time available if message is unclear or uncertainty exists;

(f) reacts appropriately to a variety of regional accents;

(g) communicates effectively in unexpected, stressful or non-standard situations using standard phraseology or plain English.

3.3 Level 4 – Operational

3.3.1 The person must communicate effectively face-to-face using clear and precise English, so that each of the following is the case for the person:

(a) stress, rhythm and intonation are influenced by the first language or regional variation but only sometimes interfere with ease of understanding;

(b) basic grammatical structures and sentence patterns are used creatively and are usually well-controlled. Errors may occur, particularly in unusual or unexpected circumstances, but rarely interfere with meaning;

(c) vocabulary range and accuracy are usually sufficient to communicate effectively on common, concrete, and work-related topics. Can often paraphrase successfully when lacking vocabulary in unusual or unexpected circumstances;

(d) 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;

(e) 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;

(f) 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.

3.3.2 The person must communicate effectively in voice-only radiotelephone communications, so that each of the following is the case for the person:

(a) uses plain English effectively;

(b) receives appropriate responses to transmissions;

(c) responds to transmissions and takes appropriate action;

(d) identifies and manages communication errors and misunderstandings promptly and effectively;

(e) seeks clarification in the time available if message is unclear or uncertainty exists;

(f) reacts appropriately to a variety of regional accents;

(g) communicates effectively in unexpected, stressful or non-standard situations using standard phraseology or plain English.

Schedule 9 CPL(H) training for paragraph 61.615 (1B) (b) (non-integrated training courses)

1 For paragraph 61.615 (1B) (b), the minimum requirements for an applicant for the CPL(H) who has not completed an integrated training course are as follows:

(a) at least 105 hours of flight training must be completed in no more than 2 types or models of helicopter;

(b) for paragraph (a):

(i) the first 15 hours must be completed in 1 of the types or models of helicopter mentioned in paragraph (a);

(ii) at least 20 hours must be completed in each type or model of helicopter mentioned in paragraph (a);

(iii) at least 40 hours must be completed as dual flight training in any of the types or models of helicopter mentioned in paragraph (a);

(iv) at least 25 hours must be completed as pilot in command (but not as cross-country flight time) in any of the types or models of helicopter mentioned in paragraph (a);

(v) the final 30 hours of flight training actually undertaken must be completed within the 3 months immediately before the flight test.

Note Additional flight training may be undertaken, including tethered helicopter flight training and flight training in additional types of helicopter.

2 Subject to clause 3, for paragraph 1 (a), a type or model of a helicopter means the single-engine helicopter, or 1 of the single-engine helicopters, mentioned by name in a single cell of column 2 of Schedule 14 of the *Prescription of aircraft and ratings — CASR Part 61 Instrument,* of the Edition that is in force at the time of the particular flight training (the ***relevant Prescription instrument***).

Note 1 The *Prescription of aircraft and ratings — CASR Part 61 (Edition 5) Instrument 2018* is the Edition of the prescription instrument that is in force immediately before the end of 31 August 2018. It is a legislative instrument, freely available on the Federal Register of Legislation. If and when a prescription instrument is superceded by a later edition, the earlier edition remains freely available on the Federal Register of Legislation.

Note 2 Although, for Schedule 14 of the relevant Prescription instrument, more than 1 type or model of helicopter in a single cell of column 2 may attract the same type rating on a pilot licence, each type or model of helicopter mentioned in a single cell of column 2 is to be considered a different type or model of helicopter for clause 1.

3 Despite subsection 2, the 2 helicopter types or models mentioned in the first cell of column 2 of Schedule 14 of the relevant Prescription instrument for the Sikorsky Aircraft Corp may be treated interchangeably as a single type or model.

Note These are the Hughes 269 (all piston engine models) and the Schweizer 300 (all piston engine models).

Note to Part 61 Manual of Standards (MOS)

The Part 61 Manual of Standards (MOS) (in force under the *Civil Aviation Safety Regulations 1998*) as shown in this compilation comprises Part 61 Manual of Standards amended as indicated in the Tables below.

Table of Manual of Standards and Amendments

Year and number	Date of registration on FRLI	Date of commencement	Application, saving or transitional provisions
Part 61 MOS 2014	21 August 2014 (*see* F2014L01102)	1 September 2014	—
Part 61 MOS 2016 Amendment No. 1	25 May 2015 (*see* F2016L00831)	26 May 2016	—
Part 61 MOS 2018 Amendment No. 1	17 July 2018 (*see* F2018L01036)	17 July 2018	—
Part 61 MOS 2018 Amendment No. 2	10 August 2018 (*see* F2018L01104)	1 September 2018*	—
Part 61 MOS 2021 Amendment No. 1	15 January 2021 (*see* F2021L00049)	16 January 2021	—
Part 61 MOS 2021 Amendment No. 2	17 May 2021 (see F2021L00588)	18 May 2021	—

*Immediately after commencement of *Civil Aviation Safety Amendment (Flight Crew Licensing Measures No. 1) Regulations 2018*, which commenced immediately before the end of 31 August 2018.

Table of Amendments

ad. = added or inserted am. = amended rep. = repealed rs. = repealed and substituted

Provision affected	How affected
s. 2	rep. *Legislation Act 2003*, s. 48C
s. 4	rs. F2018L01036
subs. 5.5	ad. F2018L01036
subs. 5.6	ad. F2018L01036
s. 12	rs. F2018L01036
s. 13	rs. F2018L01036
s. 15	ad. F2018L01104
Schedule 1, Appendix G.8	am. F2018L01104
Schedule 1, Appendix H.1	am. F2018L01104
Schedule 1, Appendix H.2	am. F2018L01104
Schedule 1, Appendix H.2A	ad. F2018L01104
Schedule 1, Appendix I.1	am. F2018L01104
Schedule 1, Appendix I.2	am. F2018L01104
Schedule 1, Appendix I.2A	ad. F2018L01104
Schedule 2, Section 4	am. F2021L00049, F2021L00588
Schedule 2, Section 5	am. F2021L00049
Schedule 2, Section 6	am. F2021L00049
Schedule 3, Appendix 1	am. F2021L00049, F2021L00588
Schedule 5	am. MOS 61 2016 No. 1
Schedule 5	rs. F2018L01036

Table of Amendments

ad. = added or inserted am. = amended rep. = repealed rs. = repealed and substituted

Provision affected	How affected
Schedule 5, Section G	am. F2021L00049
Schedule 5, Section H	am. F2021L00049
Schedule 5, Section I	am. F2021L00049
Schedule 5, Section L	am. F2021L00049
Schedule 5, Section Q	am. F2021L00049
Schedule 5, Section R	am. F2021L00049
Schedule 6	rs. F2018L01036
Schedule 9	ad. F2018L01104