Australian Government
Civil Aviation Safety Authority

The Australian Air Transport Pilot Licence (Helicopter) Examination Information Book

September 2025

Acknowledgement of Country

The Civil Aviation Safety Authority (CASA) respectfully acknowledges the Traditional Custodians of the lands on which our offices are located and the places to which we travel for work. We also acknowledge the Traditional Custodians' continuing connection to land, water and community. We pay our respects to Elders, past and present.

Artwork: James Baban.

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This document contains guidance material intended to assist CASA officers, delegates and the aviation industry in understanding the operation of the aviation legislation. However, you should not rely on this document as a legal reference. Refer to the civil aviation legislation including the *Civil Aviation Act 1988* (Cth), its related regulations and any other legislative instruments—to ascertain the requirements of, and the obligations imposed by or under, the law.

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References

Acronyms

The acronyms and abbreviations used in this manual are listed in the table below.

Table 1. Acronyms

Acronym and abbreviation	Description
AALW	Air law examination
AASH	Aerodynamics and aircraft systems examination (Helicopter)
AFPH	Flight planning examination
AHUF	Human factors examination
AIP	Aeronautical Information Package
AMET	Meteorology examination
ANAV	Navigation examination
anm	Air nautical mile(s)
APLH	Performance and loading examination (Helicopter)
ARN	Aviation Reference number
ASIC	Aviation security identification card
ATIS	Automatic terminal information service
ATLN	Alternate
ATPL(H)	Australian Air Transport Pilot (Helicopter) Licence
AVID	Aviation identification
CAA	*Civil Aviation Act 1988*
CAAF	Civil Aviation Authority of Fiji
CAAP	Civil Aviation Advisory Publication
CAO	Civil Aviation Order
CAR	*Civil Aviation Regulations 1988*
CAS	Calibrated airspeed
CASA	Civil Aviation Safety Authority
CASR	*Civil Aviation Safety Regulations 1998*
CP	Critical point
CPL	Commercial pilot licence
CF	Contingency Fuel
DAPs	Departure & approach procedures

Acronym and abbreviation	Description
EFIS	Electronic flight instrument systems
EICAS	Engine indicating and crew alerting system
ERC	En route chart
ERSA	En route supplement Australia
ETP	Equi-time point
FMS	Flight management system
FR	Final reserve
ft	feet
GNSS	Global navigation satellite systems
GPWS	Ground proximity warning system
GPWT	Grid point wind and temperature
HEAD	Head wind
IAS	Indicated airspeed
IFR	Instrument flight rules
KT	Knot
lb	pound
LPSD	Latest point of safe diversion
LSALT	Lowest safe altitude
M	Magnetic North
METAR	Meteorological aerodrome report
MLG	Main landing gear
MOS	Manual of standards
NM	Nautical mile(s)
OEI	One engine inoperative
PEXO	Pilot examination office
PNR	Point of no return
PPL	Private pilot licence
PSD	Point of safe diversion
ROC	Rate of climb
RSWT	Route sector wind and temperature
RVSM	Reduced Vertical Separation Minimum

Acronym and abbreviation	Description
SPECI	Special weather report issued when there is significant deterioration or improvement in airport weather conditions
T	True North
TAC	Terminal area charts
TAF	Terminal area forecast
TAIL	Tail wind
TCAS	Traffic collision avoidance systems
TMN/TAS	True Mach Number/True Airspeed
TOC	Top of climb
VFR	Visual flight rules

Revision history

Revisions to this manual are recorded below in order of most recent first.

Table 2. Revision history

Version number	Date	Parts and sections	Details
2.8	September 2025	All Explanatory notes Section 4.2.11	Links to Aspeq and some of the abbreviations used have been updated. Use of 'Equi-time Point' ETP is replacing 'Critical Point' (CP) and 'Contingency Fuel' (CF) is replacing 'Contingency Reserve' (CR) in examinations. Examination aircraft clarification

Explanatory note on version 2.8

Version 2.8 of this ATPL(H) Information Book makes a number of minor changes, e.g. links to Aspeq and some of the abbreviations used.

In the Navigation Appendix, the ‘examination aircraft’ has been clarified as NOT RVSM-approved, but ‘permitted to operate in RVSM airspace’ in accordance with conventional IFR cruising levels.

The term “Critical Point” (CP) which in the past, has been equated to an “Equi-time Point” (ETP) will no longer be used in this context. Questions will use the term “Equi-time Point” or the abbreviation ETP. The term “Contingency Fuel” (CF) is replacing “Contingency Reserve” (CR) in examinations.

1 General advice to candidates

1.1 Introduction

The Civil Aviation Safety Authority (CASA) is entrusted with the responsibility of ensuring Australian Air Transport Pilot (Helicopter) Licence [ATPL(H)] holders are properly qualified to uphold the high standards of safety due to the Australian travelling public.

As an ATPL(H) authorises the holder to act as pilot in command of complex, high capacity, multi-crew helicopter engaged in passenger carrying operations, it is essential that the holder has demonstrated they have, amongst other requirements, the aeronautical knowledge to exercise this privilege. CASR Part 61 Manual of Standards – Schedule 3 prescribes the necessary areas of knowledge, and the CASA examination is designed to ensure that an applicant for this licence has been trained to the manual of standards and has attained the required standard for safe operations.

1.2 Commitment

Before deciding to attempt the examination for the ATPL(H), candidates should appreciate the importance of acquiring the aeronautical knowledge that will provide them with a sound foundation to successfully undertake endorsement training, and to safely operate rotary wing aircraft in air transport operations. Consequently, the course of study that candidates adopt will have a very important impact on the standard of their aeronautical knowledge.

Candidates must bear in mind that the ATPL(H) examination is set to a standard based on their undergoing a properly structured course of adequate duration, with appropriate study material, and under qualified instruction and supervision. Such courses are available, and may be by classroom attendance at training institutions, or by distance learning. CASA is of the view that the average candidate would need a minimum ten to fifteen weeks of full-time tuition or the equivalent of at least 350 hours of study, depending on the structure of the course, to fully cover the material contained in CASR Part 61, Manual of Standards, and to reach the standard necessary to pass the associated examination.

The time taken is not nearly as great as that required of other professional occupations involving such similarly great responsibility. CASA is absolutely committed to ensuring that a holder of the Australian ATPL(H) is amongst the most competently qualified in the international aviation industry.

1.3 Selecting a course

Intending candidates should be aware that, unlike *flying* training schools, *aeronautical knowledge* training organisations are not legally required to be licensed, hence CASA does ***not*** regulate or supervise them. Therefore, it would be prudent for candidates to carry out very careful assessment of these aeronautical knowledge training organisations (or instructors) before selecting one to conduct their training.

CASR Part 61 Manual of Standards covers the training requirements for every flight crew licence and rating. The manual of standards is the determinant of topic areas by which candidates would have to study to; how well a course subscribes to the manual of standards will serve as an indicator of its standard and quality.

1.3.1 Recommended checks

CASA recommends that candidates check the following before selecting a course:

1. First and foremost, obtain the CASR Part 61 Manual of Standards, and familiarise themselves with the aeronautical knowledge standards specified in it; have a general idea of the scope and depth of the knowledge required of a licence holder.
    a. Unless candidates have a good idea of what will be involved in the study, they will not be aware of what standards an ATPL course should properly teach, and therefore not know whether they are receiving value-for-money for their course fees.
2. Candidates attending a course that does not adhere to the Part 61 MOS may face difficulties in passing the examination.
3. Check whether the training organisation being considered offers a structured study plan that ***covers the Part 61 MOS*** in an ***adequate period of time*** (or, if only a few selected subjects are being contemplated for study, the relevant portions of the Part 61 MOS).
    a. The phrase “structured study plan” means that the course is so constructed that it will enable the average candidate to acquire/assimilate the required knowledge, and to the required standard, in a logical ‘step-by-step’ method.
    b. Common sense will tell that the duration of the course must enable adequate coverage of the Part 61 MOS (or where applicable, the relevant portions) in a manner that permits the knowledge to be assimilated comprehensively, and to the required standard. As mentioned earlier, for the average student, this will be about ten to fifteen weeks of full-time tuition or the equivalent of 350 hours of study for all the subjects.
    c. Courses that promote short cut methods only enable memorisation of the provided materials, but not real acquisition of the aeronautical knowledge required of an ATPL holder.
4. Check the progress and evaluation system the training organisation uses to assess the student’s readiness to sit the examination.

    Is this designed to regularly assess the student’s progress in the structured course so that appropriate ***remedial*** training may be programmed to ensure the student acquires the required knowledge? This would be one of the indicators of a well-structured course.

    Or does it merely consist of exposing the student to imitations of CASA’s examinations for the purpose of ‘recognising’ questions and associating these with ‘prepared answers’? This method does not prepare the students to acquire the aeronautical knowledge demanded of an ATPL pilot, but merely to memorise/recognise certain items.
5. Avoid those training organisations (or instructors) that make promises which appear not to require the candidate to study.
6. Assess the aviation and teaching experience of the instructors - do they have the operational background and qualifications to deliver high quality instructions?
7. Check that the instructor or training organisation is registered with CASA The phrase “registered with CASA” does not mean that the organisation is approved by CASA. As a reminder, CASA does not regulate nor supervise aeronautical knowledge training organisations (or ground theory instructors).

    What it means is that the organisation is voluntarily listed with CASA, so that they may receive essential updates on flight crew training and examination matters, as well as the important feedback on their students’ performances. Thus, a registered training organisation is more likely to have up-to-date information to assist the students than would a non-registered organisation.
8. Ask/shop around, but do not base a decision solely on cost or convenience.
9. Finally, if you are a working person and unable to afford time off to do a full-time course covering all the 7 subjects, it will be more practical to attempt the ATPL examination subject by subject, or a manageable number of subjects. CASA has designed the system for working people to achieve incremental accumulation of subject passes towards a full ATPL credit within a prescribed period of time or ‘window’ of 2 years.

There are distance learning courses for those who wish to study without taking leave from their occupations. This situation is no different from other professions who achieve their degrees or diplomas through this method.

Candidates will not only derive the best value for their money with a well-structured course but also enjoy a better prospect of passing the examination.

2 Examination structure

2.1 Introduction

This Information Book aims to assist candidates in their preparation for the Australian ATPL(H) examination by providing relevant basic information.

The examination tests items of the ATPL (Helicopter) Aeronautical Knowledge Standards as per CASR Part 61 Manual of Standard, Schedule 3.

2.2 Examination structure

The ATPL(H) examination consists of a seven separate subject-parts (hereafter called Parts), that may be attempted singly or in any number at a sitting.

Overseas candidates sitting the ATPL(H) under the approved arrangements of their respective national aviation regulatory Authority, which has examination agreements with CASA, are only required to sit for six Parts of this examination, minus the Australian Air Law Part. Under this system the Australian ATPL(H) examination credit will not be issued for the successful candidate. Instead, the results will be forwarded to the respective national authority for its own processing, after the candidate has passed the Air Law paper for the country's ATPL(H).

Table 2. Structure of the examination

Exam paper	Subject part(s)	Time allowed	Code
1	Flight planning	3.0 hours	AFPH
2	Navigation	1.5 hours	ANAV
3	Performance & loading	2.5 hours	APLH
4	Aerodynamics & aircraft systems	1.5 hours	AASH
5	Human factors	1.25 hours	AHUF
6	Meteorology	1.5 hours	AMET
7	Air law	1.5 hours	AALW

2.3 Examination questions

2.3.1 Multi-choice format

Examination questions are generally in multi-choice format, the number of alternative answers varying from three to a maximum of five. Candidates are to select the correct or nearest correct answer for the question asked and denote this selection on the computer by clicking on the radio button next to their choice of answer. Alternatively, a short answer may be required to be entered into a 'box' on the computer screen. These short answers are restricted to numerical values only, e.g.

The distance to the ETP is "_____" NM from YBAS.

For more details about 'fill-in-the-box' answers, see page

Practice using the PEXO exam system | Civil Aviation Safety Authority (casa.gov.au)

2.3.2 'Stand-alone'

All questions are 'stand-alone'; that is, they are not linked to any other question, and therefore will neither affect nor be dependent upon the answers of other questions.

2.3.3 Marks

Each question carries a number of mark(s) to be awarded for its successful solution. In some Parts, the questions may each be allocated different mark(s). The marks awarded to the individual question will be based on the degree of complexity (time involved in answering it) and may range from 1 to 5 marks. This allocation will be denoted against the individual question. The candidate is advised to take note of the marks allocated to each question.

2.3.4 Total marks per examination part

The total number of marks each examination Part carries will be the same for every candidate at the same sitting. However, the importance of ensuring that both the relevancy and quality of the examination does not diminish in the face of known accident and incident trends, emerging aviation technology and/or new operational practices, the examination structure and content will be reviewed regularly. This may result in a new Part content, with a revised total amount of marks for that Part.

2.3.5 Working calculations and assessment

While working calculations in some questions may be necessary, these are not assessed. The scoring of the attempt is based solely on the answer selected or entered. Therefore, a candidate should exercise the utmost care when selecting or entering their answers on the computer.

2.3.6 Re-assessment

All workings are destroyed shortly after the examination. In the event of an application for a re-assessment, a review of the associated workings will not constitute part of the process. The sole criterion for deciding whether a question has been answered correctly or not is by determining what has been selected or entered on the computer.

2.3.7 Removal of questions from a paper

The Authority reserves the right to strike out any questions from any examination Part it sets, where there are valid reasons for doing so.

2.3.8 Adjust score

When a question is deleted from an examination Part, its marks are neither awarded nor subtracted from a candidate's overall result. The total possible score is reduced by the number of marks associated with the deleted question. However, the total time allocated for the Part remains unchanged.

2.4 Minimum standard

To obtain a Pass in the ATPL(H) examination the candidate must attain the following requirements:

1. achieve '**not less than 70%**' of the total possible marks that may be obtained from each paper, with the exception of the Air Law paper (see following sub-paragraph), and
2. achieve '**not less than 80%**' of the total possible marks in the Air Law Part.

2.5 Award of the ATPL(H) examination credit

2.5.1 Time-limited credit for examination parts

An examination part, once passed, may be held in credit for a defined period of time. All seven examination parts must be passed within a permitted rolling period, of 2 years called a 'window'. If all subject-parts are not passed within a 'window', individual subject passes will be lost. The candidates will have to continue to pass subject-part examinations, until all seven subject-parts have been passed within one 'window'.

2.5.2 Air law part

A pass in ATPL Air Law (AALW) must be achieved in the same 'window' as any other subject. The only difference with AALW is it has a pass mark of not less than 80%, whereas all other ATPL subjects have a pass mark of not less than 70%.

2.5.3 ATPL(H) credit

Once all seven subject parts are passed within a 'window', an Australian **ATP(H)L Theory Examination Credit** will be awarded.

3 Administrative information

3.1 Introduction

An important factor in the successful and stress free sitting of an examination is a thorough understanding of the procedures and processes involved. Adherence to these procedures will ensure that CASA is aware of the candidate's requirements, and that the candidate in turn will know what to expect at the examination.

This section details the administrative procedures to be followed to successfully apply for an examination sitting and offers advice about the material supplied with the examination, conduct to be followed during the examination and important guidance about question answering techniques.

The information contained in this section, and familiarity with it will provide the best opportunity for a successful examination result.

3.2 Examination schedule and application to sit

3.2.1 Professional exams

CASA has delegated an independent company, Aspeq (http://aslau.aspeqexams.com) to supervise exams in a number of cities and towns throughout Australia. Professional exams are those for the CPL, ATPL, Flight Engineer licence and various ratings.

More on bookings for professional exams may be found on the Aspeq website.

CASA recommends that the submission of an examination application is not left until the 'last minute', as a position at that venue may not be available.

If a candidate is unsure of the administrative requirements of the examination process, they may obtain information and advice from the CASA web site, commencing on page https://www.casa.gov.au/licences-and-certification/individual-licensing/exams or by telephoning 131-757.

3.3 Material required for examination

3.3.1 Material supplied by ASPEQ or candidate for each examination

Candidates should refer to the CASA web site, on page Materials allowed in exams | Civil Aviation Safety Authority (casa.gov.au) for information about what 'Permitted material' they are allowed to take into each exam and what material the Aspeq invigilator will supply to them This link also includes information about:

- 'self-printed copies' of documents, such as CASRs, CARs, AIP and CAOs; and
- Marking and tagging of documents; and
- 'Not Permitted materials'.

The candidate is responsible for ensuring all documents are up to date. Where reference to an Australian AIP document is made, this permits the alternative use of the Jeppesen equivalent document, should the candidate prefer the latter. This option for alternative usage ONLY applies to documents that are 'to be supplied by candidates' and does NOT extend to material that will be 'supplied by Aspeq'.

Candidates are advised that if any difference between the AIP and Jeppesen documents results in the selection of an incorrect answer, CASA will NOT accept this consequence as a basis for re-mark. Candidates should also be aware that the area of coverage and scale of Jeppesen maps/charts differs

from those published by Airservices Australia. Where questions refer a candidate to a specific map or chart, the reference will be to the Airservices map/chart, not the Jeppesen equivalent.

Other than the mentioned material for the respective examination Parts, all other references and/or equipment are NOT permitted.

3.4 Location, conduct and security of the examination

3.4.1 Location

3.4.1.1 Australian sittings

The Australian ATPL(H) examination is available only in Australia. All examination sittings are conducted and invigilated by Aspeq officers/employees at official venues, which are listed on the Aspeq website.

3.4.1.2 Overseas sittings

Sitting of Australian pilot theory exams at an overseas location is not possible nor permitted.

Overseas sittings for Fijian candidates are available only under a special arrangement between the Australian CASA and the aviation regulatory Authorities of Fiji (CAAF), who use CASA examinations for their own licensing requirements. These sittings will be conducted and invigilated by CAAF.

3.4.2 Conduct and security

The integrity of the Australian ATPL examination is contingent upon its proper and fair conduct. In turn the quality of the conduct is to a large extent dependent upon good understanding of examination rules and procedures, and the correct behaviour of every candidate. Appendix C provides guidelines for good conduct, while Appendix D contains advice for the candidate on question answering techniques to help achieve a stress-free sitting. Ultimately there is no substitute for the commonsense, timely preparation, decency and integrity of the individual.

3.5 Conduct of candidates for the examination

3.5.1 Introduction

3.5.1.1 Role of the Invigilating Officer

The Invigilating Officer's main role is to enable the examination to be conducted properly and fairly. They ensure that the relevant rules and procedures are complied with. The Invigilating Officer acts on behalf of CASA in assisting the candidate to resolve ***administrative*** problems that may arise immediately before and during the examination, and in recording observations and complaints made by the candidate.

3.5.1.2 Authority of Invigilating Officer

The candidate **MUST** comply with **ALL** instructions and orders issued by the Invigilating Officer.

3.5.1.3 What the Invigilating Officer is NOT

The Invigilating Officer is **NOT** an examiner, nor an instructor. Therefore, they are **NOT** permitted to discuss **NOR** interpret any aspects of a question, including any alleged error contained within the question; they may **NOT** provide any additional information, unless Flight Crew Licensing Section has directly authorised such an action; they may **NOT** assist in the working or calculation process.

3.5.2 Pre-examination

3.5.2.1 Proof of identity

Prior to sitting the examination, the candidate must provide to the Invigilating Officer proof of identity. The ONLY acceptable form of identification is a photographic document, such as an Australian driver's licence, current International Passport, or ASIC/AVID. See Acceptable photo ID page for details.

3.5.2.2 Information/instructions

Candidates are advised to read and understand the instructions on the introductory pages of PEXO prior to commencing their examination, particularly the "Examination Rules" and the list of "Permitted Material". When ready, the candidate can click on the "**Start Examination**" button. Only after the first exam question appears on the screen, will the timer commence its countdown.

3.5.2.3 Material permitted

Other than the material permitted for the respective examination Part, the candidate must not have at, or near, his/her sitting position personal items such as documents, files, bag, briefcase, coats etc. These items may be left at the front or rear of the examination room in accordance with the direction of the Invigilating Officer.

3.5.3 During the examination

3.5.3.1 Seating

During the examination the candidate must sit and remain seated at the position assigned by the Invigilating Officer.

3.5.3.2 Timing

Each candidate will be provided with a **Place card** which includes their:

- Name
- Exam date
- Username (which is their ARN)
- The exam code, e.g. ANAV and
- Booking No.

When instructed by the Invigilator, each candidate uses the place card details to log into PEXO and may commence their exam by clicking on the "**Start Examination**" button. When PEXO determines that the allocated time has been used, no further entries can be made, and the exam will be submitted automatically.

3.5.3.3 Communication

Silence shall be observed at all times; from the moment the candidate enters the examination room until they leaves the place on completion of the examination period. The candidate must NOT engage in any form of communication with anyone other than the Invigilating Officer.

The candidate shall address a query or report an alleged examination error ONLY to the Invigilating Officer, and in a quiet and non-disruptive manner; where possible, this should be done after the examination sitting is completed.

Rights of Other Candidates
Do respect the rights of other candidates. They are entitled to a quiet environment to sit the

examination. The operative word is SILENCE. When a candidate has completed the examination, and has been allowed to leave the room, they should do so **quietly**.

A candidate who insists on disruptive behaviour to demonstrate a perceived dissatisfaction will be asked to leave the examination room immediately

3.5.3.4 Examination material

The examination paper and all materials provided are only for the sitting of the examination itself and must **NOT** be copied or taken out of the examination room for any purpose. This rule covers all calculations, writings, drawings or scribbling done on working paper and/or the scribble pad.

Unauthorised Reference Material
Only 'Permitted material to be supplied by the candidate' may be taken into the exam room. Any unauthorised or 'Not Permitted' material must **NOT** be taken into the examination room, **NOR** should such material be referred to or used during the examination period, whether in or outside the examination room.

3.5.3.5 Sharing of materials

Candidates are **NOT** permitted to share materials.

If a candidate does not have an item of required material, they shall inform the Invigilating Officer of the problem. The Invigilating Officer is **NOT** responsible for procuring material that should have been supplied by the candidate. However, the Invigilating Officer may volunteer to obtain the material, but this must **NOT** be from another candidate sitting the same examination. If the material is not available, the candidate is ultimately responsible for the deficiency.

3.5.3.6 General behaviour

There shall be no eating, drinking, smoking, listening to any electronic devices, or engaging in improper activity during the examination.

3.5.3.7 Proper conduct

Failure to comply with any of the above rules will disqualify the candidate from the sitting. The candidate may also be barred from any CASA examinations for 12 months.

3.5.4 Post examination

3.5.4.1 Candidate comment

CASA does not accept telephone or email request for post-exam discussion or debrief.

Candidates may apply for a re-assessment of their marked exam. The scheduled fee for this service is $130. For more information, refer to the Request a reassessment of your exam result | Civil Aviation Safety Authority (casa.gov.au) page.

There is also a cost-free facility for candidates to submit observations, comments or suggestions to assist CASA improve the exam system. For more information, refer to the Provide feedback after an exam | Civil Aviation Safety Authority (casa.gov.au) page.

3.5.5 When answering the questions

1. The examination does not contain any trick question. Each statement means exactly what it says. Do not look for hidden meanings.
2. First, **read the question stem very carefully**, and where possible, preferably without looking at the alternative answers. Be sure that you understand what is asked of you.

3. Where required, select the relevant map, chart, diagram or document to support your workings. Where possible, without reference to the alternative answers, decide what the correct answer should be, or work out the problem to obtain the answer. Check your selection or calculations to ensure that you have answered the actual question - **NOT** what you **THINK** the question may be.
4. Look at the alternative answers and select the one that is the same as, or closest to, your answer. Only one alternative answer will be correct.
5. If you cannot find an alternative answer that matches your own answer, go back and **read the question again very carefully**. Make sure that you understand what is required, then re-check your calculations or document references.
6. It is **VERY** important that you register your answer choice by 'clicking' on the **CORRECT** radio button.
7. If you find that you have considerable difficulty with a particular question, do not spend too much time on it. Move on to the other questions and answer those of lesser difficulty. Then go back and reconsider the unanswered questions.
8. Remember, you are responsible for your own time management. Use the allocated time fruitfully to answer all or as many questions as possible. Do not waste time during the examination period on disruptive activities such as complaining to, or arguing with, the Invigilating Officer.

4 Technical information

4.1 Introduction

The ATPL (Helicopter) Aeronautical Knowledge Manual of standards is essentially a manual of standards of training, while the ATPL(H) examination is a regulatory audit tool to assess whether such training has been completed, and that the candidate meets the required standard. Hence the examination may test any item within that manual of standards, including those carrying the annotation 'brief discussion only'.

4.2 Commonality with ATPL (Aeroplane) examination

Technological advances made by helicopter manufacturers has enabled modern civilian helicopters to greatly expand their operating envelope in terms of speed, altitude and passengers carried. Equipped with advanced avionics, modern helicopters can now operate complex passenger carrying operations, in all-weather conditions, operating along with heavy jet commercial traffic in high density traffic zones of major capital cities. Accordingly, CASA has identified common core areas of required training and knowledge for both the helicopter and aeroplane category ATPL. This common core knowledge is reflected in a combined knowledge syllabus for aircraft categories in the CASR Part 61 MOS Schedule 3. This allows CASA to provide combined aircraft category examination papers for the common core knowledge.

4.3 General

4.3.1 Appendices

The following appendices contain basic information on all the subject Parts, recommended reading list, standardised methods of calculations, commonly used abbreviations in the examination, and some specimen questions.

4.3.2 Specimen Questions

The specimen questions are representative of the style and layout that the candidate will see in the examination papers. These are provided to give the candidate an idea of what to expect and not meant to be training exercises in themselves. Any such training should be from a proper course.

Specimen questions based on charts/documents are valid at time of writing.

Subsequent chart/document changes may render these questions obsolete. However, this would not diminish their usefulness as specimen questions.

4.3.3 Standardised Methods of Calculation

The standardised methods of calculation for the relevant examination Parts cover rules of interpolation, 'rounding out' and other common assumptions. The objective is to ensure that numerical values derived by the candidate through correct techniques of calculation are similar, or reasonably close, to the values provided by the correct answer to the question.

4.3.4 'Practical'

The use of the word 'practical' to describe a question implies that it is one involving calculations, plotting and/or graphical work.

4.3.5 Use of the *'Non-Electronic'* navigation computer

A competent standard is expected of the candidate in the use of a modern non-electronic 'aviation wind triangle and circular slide rule' pilot computer, including employment of its TMN/TAS conversion facility.

Candidates should be aware of any limitations of the navigation computer that they choose to use in all examinations. Where a wind is put onto the navigation computer to determine the ground speed, CASA's solutions are based on the exact 'triangle of velocities'.

If a candidate uses a 'circular' navigation computer, such as a Jeppesen CR-2 or similar, they need to be aware that this type of computer requires the use of 'Effective TAS' for large drift angles. For drift angles of 5 degrees or less, Effective TAS can be ignored, and will not result in a significant difference in the resultant ground speed. For drift angles greater than 5 degrees, candidates should make allowance for Effective TAS to ensure that there is no significant difference between their calculated ground speed and that of the CASA's solution.

4.3.6 Abbreviations

anm	air nautical mile(s)
GW	gross weight
LW	landing weight
ZFW	zero fuel weight
MZW	mid zone weight
EMZW	estimated mid zone weight
TOW	take-off weight
MTOW	maximum take-off weight
CG	centre of gravity
OEI (or 1-INOP)	one engine inoperative operations
ETP	equi-time point
ETP/OEI	one engine inoperative on and back
FBO	fuel burn off
CF	Contingency Fuel
FR	Final reserve
FOB	fuel on board
PNR	point of no return
PNR/OEI	normal operations out to the PNR and one engine inoperative back
PSD (or LPSD)	point of safe diversion (or Latest Point of Safe Diversion)
PSD/OEI	normal operations out to the PSD and one engine inoperative operations from the PSD to an alternate aerodrome
SAR	specific air range
SGR	specific ground range
RTOD	rejected take-off distance
CTOD	continued take-off distance
PIC	pilot in command
KG	kilograms
lb	pounds

mm	millimetres
NM	nautical mile(s)
pax	passengers
FPM	feet per minute
TOC (TOPC)	Top of Climb
TOD/DSPT	Top of Descent/Descent Point
KT	knots

4.3.7 Suggested list of study references

4.3.7.1 Introduction

In setting questions for the ATPL(H) examination, and for any other flight crew examination, CASA questions are based on the aeronautical knowledge requirements stated in CASR Part 61 Manual of Standards, Schedule 3. Candidates must bear in mind that the ATPL(H) examination is set to a standard based on their attending a properly structured course of adequate duration, with appropriate study material, and under qualified instruction and supervision.

4.3.7.2 Approaches to selecting study references

Until recently, few books have been written specifically for the CASR Part 61 MOS. Local publishers have now produced a number of books to meet this requirement. Nonetheless, in some cases more than one book may be required to cover a subject area adequately. Candidates should expect their training organisations to provide course notes (perhaps as a supplement to a nominated publication) so that a topic may be accorded comprehensive study references.

To further assist candidates' source good study material, a list of study references has been compiled. This list will be revised at regular intervals and include recommendations from the industry.

Inclusion in this list does not necessarily mean that questions will be based specifically on, or limited to, the publications. Equally, a candidate must not expect the correct answers to questions to be direct 'quotes' from any specific text of these publications. The list merely indicates that training organisations have found the publications as satisfactory references for studying to the manual of standards.

However, in testing knowledge of some manual of standards topics, certain situations, dictated mainly by the requirement for standardisation, demand referencing to specific books. The following examples represent these situations:

- where generic books differ markedly on certain topic areas, such as in terminology or procedures, a 'master' publication shall be nominated *e.g. Rolls-Royce "The Jet Engine" for gas turbines topic in Aircraft System*
- where the use of generic book is not available, adequate or practical, a 'type- specific' book (usually a Flight or Operations Manual) shall be nominated *e.g. Sikorsky S76 Performance and Operations Handbook for the Flight Planning and Performance & Loading subjects*

4.3.7.3 Selecting from the list

Books marked with an asterisk (*) are those that CASA nominates as the 'master' reference for purpose of standardisation, particularly of terminology and procedures. These will be subjected to periodic review, as new books come into the market.

CASA does not have the resources to conduct a thorough evaluation of all the books on the list and therefore cannot guarantee their suitability for study of the ATPL(H) exam requirements. A large number of these have been added to the list on the recommendations of members of the training industry. Basically, the list provides guidance to candidates to source study materials.

The list may contain more than one reference text on a particular subject, and candidates must personally decide for themselves which would be appropriate. When making a purchase selection,

candidates are advised to consult experienced instructors for the optimal choice. Generally, candidates attending a structured course may expect the schools to provide supplementary précis and notes, in addition to a publication, to adequately cover a manual of standards topic.

Candidate will find that a large number of books on this list may already be in their possession. These would include CASR, CAR, CAO, AIP, DAPs, Aeronautical Circulars, Manual of Aviation Meteorology, the (old) CAA Operational Notes, and some Human Factors books used in the CPL examination.

4.3.8 ATPL(H) Examination suggested list of study references

Flight planning:

- Sikorsky S76 Performance & Operations Handbook Version 2.4*
- AIP Book

Performance & Loading:

- Sikorsky S76 Performance & Operations Handbook Version 2.4*
- CASR Part 133 and Part 133 MOS

Navigation:

- CAA Operational notes (NDB, VOR, ILS, DME, INS, RNAV, GPS)*

Most of these are available from page Additional pilot exam study materials | Civil Aviation Safety Authority (casa.gov.au)

- The Global Positioning System and Australian Aviation Navigation*
- The NAVSTAR GPS by Tom Logsdon
- Aviator's Guide to GPS by Bill Clarke
- Avionics & Flight Management Systems for the Air Transport Pilot by Aviation Theory Centre

The Ground Studies for Pilots series by Underdown

- Vol 1 - Radio Aids
- Vol 3 - Navigation General & Instruments
- Aircraft Instruments & Integrated Systems by Pallett
- Manual of Avionics by B Kendall

Aerodynamics & Aircraft systems

- Principles of Helicopter Flight by W.J. Wagtendonk* The Jet Engine by Rolls-Royce*
- Aircraft Gas Turbine Engine Technology by Irwin Treager
- Airframe & Powerplant Mechanics by FAA (2 volumes)*
- The Aircraft Gas Turbine Engine & Its Operation by Pratt & Whitney
- B767-300ER Operations Manual extract* *(obtainable from FCL Section)*
- Avionics & Flight Management Systems for the Air Transport Pilot by Aviation Theory Centre *(also under Navigation)*
- Aerodynamics, Engines & Airframe Systems for the Air Transport Pilot by Aviation Theory Centre
- Flying Glass by Rob Avery
- Pallettt's Aircraft Instruments & Integrated Systems *(also under Navigation)*

The Professional Pilot Study Guide Series by Mike Burton

(also printed as The Commercial Pilot's Study Manual Series - 1997 - in 4 volumes)

- Vol 2 - Gas Turbine Engines
- Vol 4 - Electrics* Vol 5 - Hydraulics*

- Vol 6 - Cabin Pressurisation* Vol 7 - Pneumatics*
- Vol 8 - Advanced Flying Systems
- Aircraft - Electricity & Electronics (5th Ed) by Eismin Aircraft Systems by Ian Moir & Allan Seabridge Automatic Flight Controls by Pallett
- Modern Airmanship by Van Sickle

Meteorology

- Manual of Aviation Meteorology, by Bureau of Meteorology*
- BOM Knowledge Centre

http://www.bom.gov.au/aviation/knowledge-centre/

- AIP Book* with particular emphasis on GEN 3.5

Air law

- CASR, CAR, CAO, AIP*
- Flight Rules and Air Law for the Air Transport Pilot by Aviation Theory Centre

Human factors

- Human Being Pilot by Aviation Theory Centre, in particular, Chapter 11*
- Human Factors for Pilots by Roger Green et al*
- Human Factors in Flight by Frank Hawkins*
- Air Craft - Human Performance & Limitations by Tony Wilson

https://www.casa.gov.au/teaching-and-assessing-non-technical-skills-single-pilot-operations

4.3.9 Flight planning

4.3.9.1 Introduction

The Flight Planning examination tests primarily Unit 1.10.3 of Schedule 3 of the MOS, but may include items from earlier Units, with reference to the practical applications of 2.1 (a) to (i).

The examination will have a mixture of questions on general knowledge and 'practical' problems.

4.3.9.2 Pre-flight planning considerations

Questions testing item 2.1 are of the general knowledge type, with the AIP permitted. While this element of the subject Part adopts the principle of an 'open book' format, the candidate is advised that pre-study and general familiarity with the relevant rules and procedures are necessary to answer the questions within the time permitted.

4.3.9.3 Flight planning

Questions testing Section 1.1 are, in the main, 'practical' types based on the Sikorsky S76 helicopter, and in general will require the use of *the Sikorsky S76 Performance and Operations Handbook* (hereafter referred to as the *Handbook*). Questions are based on Part 2 Company Operations Manual (Extract), Section 1 Flight Planning Data.

The flight planning instructions/data in the Handbook, that have to be observed when calculating a solution, may also be collectively termed as *Company Policy*.

The *Company Policy* is for exam purposes only and it may not reflect ongoing changes to MOS Part 133 Chapter 6 regarding fuel planning requirements and fuel reserve requirements.

All data required to solve the question, other than those to be found in the S76 Performance Handbook, will be provided in each individual question.

The relevant data may be in the form of one or more of the following:

a. Route forecast

b. ATIS, TAF, METAR or SPECI

c. In-flight data provided by GNSS or other onboard navigation systems

d. Distance and track of route sector

The availability of aerodromes/heliports/helipads may be indicated by the use of the terms "suitable" and "acceptable". This may be in reference to a forecast or simply a statement of the aerodromes/heliports/helipads status. This statement of status will generally be for the period of possible use.

In general, the guidelines for working calculations are balanced between simplicity, conservative planning and recognition of the greater accuracy that can be achieved by the use of the electronic calculator.

4.3.9.4 Selecting of cruising altitudes/flight levels

Questions may relate to either IFR or VFR operations, though the majority will be under the IFR. Unless otherwise stated in a question, all operations will cruise at altitudes* in accordance with the AIP ENR 1.7 paragraph 5 Table of Cruising Levels North of 80° S for IFR flights. Candidates are expected to recall and apply the appropriate levels for different sectors. All IFR OEI operations will be conducted at sector LSALT. Cruise levels for VFR OEI operations will be given.

* Hereafter referred to as *IFR Levels*

4.3.9.5 Descent and holding

Descent Distance - When planning the descent, the descent is to be planed using both the cruise ground speed and cruise fuel flows.

Holding - Holding is to be conducted using the TAS and Fuel flow stipulated in the Handbook.

4.3.9.6 One engine inoperative (OEI)

Calculation of Fuel Flow - Fuel flow should be based on the temperature at the OEI cruise level.

OEI Holding - OEI Holding is to be conducted using standard OEI TAS and OEI fuel flow stipulated in the Handbook.

4.3.9.7 Required accuracy limits

Use of Forecast Wind and Temperature Data.

- Extract wind to the nearest 10 degrees and 5 knots. Interpolation between levels is not necessary unless there is a significant wind velocity and/or temperature gradient.
- Fuel Flows - determine to the nearest whole pound/hour (e.g. 524 lb/hr).
- Time Intervals - determine to the nearest whole minute (e.g. 26 minutes).

4.3.9.8 Equi-time point (ETP) and point of no return (PNR)

Equi-Time Point (ETP). An ETP is that point along track where it will take the same time to fly to either of two locations.

ETP calculations may involve any flight condition, both normal and abnormal operations. Descent to an aerodrome, and any approach or holding at an aerodrome, may be ignored for determination of the ETP position. However, descent/approach/holding are to be included when determining the fuel required to cover an ETP situation.

Initial climb to cruise level must be included in the calculation of time or fuel burn off to a ETP.

PNR calculations are based on normal operations to the PNR position, and normal or abnormal operations from the PNR.

Initial climb to cruise level must be included in the calculation of PNR position, as per Company Policy. Descent/approach/holding to the diversion aerodrome must also be considered when determining a PNR.

4.3.9.9 Average data

Average data may be used where appropriate. Candidates should use their discretion as to the use of average data or whether a more detailed calculation should be made.

Generally, in calculations which cover more than one zone of a flight, as in ETP and/or PNR problems, or when determining fuel burn from a given point to landing, the use of average data may be appropriate. Any of the common methods of averaging data such as winds and temperatures are suitable for examination purposes. Average fuel flows and speeds should be extracted at the estimated mid-zone weight of the flight zones.

When the term “average ground speed” is used, no additional allowance for climb need be made when calculating the ETI or Fuel Burn Off to any point during the flight.

ERSA is not a permitted reference for this paper, hence when aerodrome elevation is not given, assume the aerodrome is at MSL for the purpose of calculating any climb allowance required, or any performance limitation.

4.3.9.10 Unit conversion

1 kilogram (KG) = 2.205 pounds (lb)

4.3.9.11 Fuel gauge readings

The fuel gauges in the Sikorsky S76 read in pounds. All fuel quantities, fuel flows and initial fuel weights will be given in pounds.

4.3.9.12 Rounding off procedures

Where rounding off is required at the end of a calculation, round down to the nearest unit for fractions less than one half and round up to the nearest unit for fractions of one half or more.

Examples:

518.1 lb/hr to 518.4 lb/hr would round down to 518 lb/hr

518.5 lb/hr to 518.9 lb/hr would round up to 519 lb/hr

4.3.9.13 Interpolation of data

Interpolation of data outside the highest and lowest values given for a particular item in the flight manual is not permitted (or required).

Examples:

- At a MZW of 10000 lb with a DA of 8700 ft, the fuel flow with 2 engines operating would be 488 lb/hr, the same value as a DA of 8000 ft
- For OEI cruise under ISA+25 conditions, the fuel flow would be 440 lb/hr, the same value as ISA+20 conditions
- For OEI cruise under ISA-10 conditions, the fuel flow would be 420 lb/hr, the same value as ISA conditions

4.3.9.14 Enroute alternate aerodromes and ETP/OEI limitations

For examination purposes only, it is assumed that in the event of an engine failure at the ETP/OEI, a suitable enroute ALTN landing area is available and/or there is no fuel limitation imposed by that engine failure.

The only exception to this assumption would be when a question contains a statement advising there are no suitable enroute ALTN landing areas available. Under those circumstances it is possible a fuel limitation may be imposed by an engine failure at the ETP/OEI and any fuel required calculation must consider this possible limitation.

4.3.9.15 Specimen questions

(Correct answers in **BOLD**)

Question 1 - Manual of standards Item 2.1.1(i)

You are planning an IFR flight from DARWIN to KUPANG. Flight details are:

Track DARWIN to KUPANG	283M
Distance DARWIN to KUPANG	450 NM
TOW at DARWIN	10800 lb
Fuel	1850 lb at startup
Cruise level	A060 for 2 engines operating
	A020 for OEI
Wind	110M/30 KT at A060
	140M/15 KT at A020
Temperature	ISA+20 at all levels and places
QNH	1013 HPA
LSALT	1900 ft

The forecast conditions are IMC enroute with an instrument approach expected on arrival at KUPANG. DARWIN is forecast to remain CAVOK for the duration of the flight. Your calculation of the distance from DARWIN to the PNR/OEI is closest to -

A. 179 NM.

B. 188 NM.

C. 196 NM.

D. 228 NM.

Question 2 - Manual of standards Item 2.1.1(d)

You are planning an IFR flight from DARWIN to KUPANG.

Flight details are:

Track DARWIN to KUPANG	283M
Distance DARWIN to KUPANG	450 NM
TOW at DARWIN	10200 lb
Fuel	1850 lb at startup
Cruise level	A060
Wind	110M/30 KT at A060
Temperature	ISA+15 at all levels and places
QNH	995 HPA

The fuel flow for the flight is closest to –

A. 480 lb/hr.

B. 484 lb/hr.

C. 488 lb/hr.

D. 490 lb/hr.

Question 3 - Manual of standards Item 2.1.1(d)

Refer S76 Performance and Operations Handbook

You are planning a single sector IFR flight between two heliports. You have the following flight planning data:

Sector Distance	124 NM
Track	110 deg M
Cruise Level	A050
Wind at A050	060M/28 KT
QNH	1035 HPA
Temperature	ISA-8
TOW	9500 lb

60 minutes holding fuel and an instrument approach fuel are required at the destination heliport.

Your calculation of the minimum fuel required on board at engine startup is closest to -

A. 1525 lb.

B. 1495 lb.

C. 1600 lb.

D. 1470 lb.

Question 4 - Manual of standards Item 2.1.1(i)

You are planning an IFR flight from DARWIN to KUPANG. Flight details are:

Track DARWIN to KUPANG	283M
Distance DARWIN to KUPANG	450NM
Cruise level	A060 for 2 engines operating
	A020 for OEI
Wind	110M/30 KT at A060
	140M/15 KT at A020
Temperature	ISA+20 at all levels and places
QNH	1013 HPA

The forecast conditions are IMC enroute with an instrument approach expected on arrival at KUPANG. DARWIN is forecast to remain CAVOK for the duration of the flight. Prior to departure, your calculation of the ETI to the ETP/OEI is closest to –

A. 59 minutes.

B. 68 minutes.

C. 73 minutes.

D. 108 minutes.

4.3.10 Performance and loading

4.3.10.1 Introduction

The Performance and Loading examination tests primarily Unit 1.11.3 of Schedule 3 of the MOS but may include items from earlier Units. The exam tests these two topic areas, with a mixture of questions on both ‘general knowledge’ and ‘practical’ problems.

Performance questions examines Item 2 of the manual of standards with reference to the following items:

- Take-off and Landing Performance
- Climb, Cruise and Descent Performance

'Practical' performance questions are based on the Sikorsky S76 Helicopter and will usually require the use of the Handbook.

Loading (Weight and Balance) questions examine Item 4 of the manual of standards with reference Weight and Balance.

4.3.10.2 Methods of calculation

Sections 4.3.9.3 Flight planning to 4.3.9.12 Rounding off procedures, where appropriate, also apply to all Performance and Loading questions.

For exam purposes only, where a climb segment performance calculation involves plotting a required ROC or required limiting weight on a ROC/Forward Climb Performance graph, that calculation and plot will be made based on the TOC (Top Of Climb) position for the climb segment.

4.3.10.3 Required accuracy limits

Centre of Gravity Moments - determine to one decimal place (e.g. 16029.2 KG/mm/1000).

Centre of Gravity Position - determine to the nearest millimetre (e.g. 5073 mm).

For examination purposes, unless a question refers directly to the 'Airspeed Calibration' charts in the Handbook, it is to be assumed that IAS equals CAS.

4.3.10.4 Rounding off procedures

Where rounding off is required at the end of a calculation, round down to the nearest unit for fractions less than one half, and round up to the nearest unit for fractions of one half or more.

Examples:

- 16825.11 KG/mm/1000 relevant data to 16825.14 KG/mm/1000 would round down to 16825.1 KG/mm/1000
- 16825.15 KG/mm/1000 to 16825.19 KG/mm/1000 would round up to 16825.2 KG/mm/1000

The exception to the rounding UP rule is when the method affects safety adversely, where rounding up will involve exceeding final payload or performance limitations. In such cases, the commonsense approach would be to round DOWN.

Examples:

- Where a calculation determines the payload capacity is 9.8 boxes, the final answer would round down to 9 boxes
- Where a calculation determines the payload capacity is 11.7 passengers, the final answer would round down to 11 passengers

4.3.10.5 Centre of gravity (CG) calculations

The helicopter must be within CG limitations as per Figure 1.2.1 in the Handbook for all possible weights during the flight from Take-off Weight to Zero Fuel Weight. For examination purposes Figure 1.2.1 should be entered using Gross Weight in KG and Arm in mm.

Fuel moments are to be calculated using Figure 1.2.10 in the Handbook. For examination purposes the required procedure is to convert the fuel load from pounds to kilograms and interpolate for values not directly available from the table by using the MOMENT/1000 (KG/mm) column. Interpolation to one decimal place is required (see paragraph 12 - Rounding Off Procedures).

For examination purposes, the preferred method of determining the MOMENT/1000 (KG/mm) for useful load other than fuel, is to multiply the weight of an item being loaded by the arm of the item as found on the appropriate Weight and Moment table (see paragraph 12 - Rounding Off Procedures).

4.3.10.6 Specimen questions

Question 1 - Manual of standards Item 4.3.1(a)

You are planning your departure for a multi-stage flight to some offshore floating rigs. The helicopter is loaded as follows:

Crew	2 at 80 KG each
FOB at startup	1480 lb
Row C1	4 passengers at 80 KG each
Row C2	3 passengers at 80 KG each
Row C3	4 passengers at 75 KG each
Cargo in C6	each pax has 12 KG of baggage

The aircraft is in the standard configuration. The flight to the first rig is 54 minutes at a cruise fuel flow of 500 lb/hr. At the first rig you will be off-loading the 4 passengers from row C1, and their baggage. You will then pick up an additional 188 KG of baggage/freight to be loaded into compartment C6 for carriage to the next rig. You will do a rotors running turnaround on the first rig.

From take-off at the initial departure point to take-off at the first rig, what (approximate) movement, if any, has the CG position experienced?

A. No significant change.

B. 110 mm forward.

C. 125 mm rearward.

D. 150 mm rearward.

Question 2 - Manual of standards Item 3.3.2(a)

Given the following flight planning data:

Gross Weight	9600 lb
Pressure Height	2200 ft
OAT	+9 degrees C

For a Category B Take-off with EAPS ON, your calculation of the TOD is -

A. 1005 ft.

B. 980 ft.

C. 1035 ft.

D. 1021 ft.

Question 3 - Manual of standards Item 3.3.2(a)

You are planning an IFR sector with a LSALT of 6000 ft. Given ISA conditions, your calculation of the maximum permitted weight for the sector is –

A. 10200 lb.

B. 10350 lb.

C. 10600 lb.

D. 10750 lb.

4.3.11 Aerodynamics and aircraft systems

4.3.11.1 Introduction

The Aerodynamic and Aircraft Systems examination tests Unit 1.4.1 and 1.4.3 of Schedule 3, but may include items from earlier Units with reference to the following items:

- Advanced Aerodynamics
- Airframe and Systems
- Power Plants - Turbine Engine
- Engine Instruments
- Flight Instrumentation Systems
- Automatic Flight Control System
- Warning and Recording Equipment

4.3.11.2 The use of 'type specific' references for training

Generally, questions in this examination will test items of the manual of standards with a generic approach, except for certain topic areas where there is a lack of readily available or suitable reference material. In such cases, the reference material nominated for the study of such items may be that of an aircraft Pilot or Operations Manual.

The use of the Boeing 767-300ER Operations Manual Extract for the study of some items of the modern aircraft systems manual of standards also represents such an approach. While this reference is a text for aeroplane systems, the information contained within (e.g. TCAS, GPWS, EFIS, EICAS, FMS etc.), are sufficiently generic as to satisfy the training requirements of the helicopter manual of standards.

Use of this reference ensures a reliable source of training material as well as standardisation. The latter is necessary in a multi-choice type of examination.

Another area where some form of standardisation is required, is when generic books differ markedly on certain areas (e.g. terminology or procedures). In such a situation, a book shall be nominated as the 'master' reference *e.g. Rolls-Royce "The Jet Engine" for the gas turbines topic.*

Notwithstanding the use of '*type specific'* references in the training of some manual of standards areas of the Aerodynamics and Aircraft Systems subject, the testing philosophy/concept for this topic, as represented by the examination questions, is generic in nature. This approach is no more different than that for the Flight Planning or Performance subjects, where training to learn the subjects' fundamentals, principles and application of principles, in accordance with the manual of standards, requires the use of a nominated '*type specific'* reference material, such as a modern aircraft Flight or Operations Manual. The training objectives to support the attainment of required knowledge and standards may still be achieved through this way.

4.3.11.3 Commonality with aeroplane systems

The modern helicopter has incorporated many aspects of aeroplane technology and equipment to the extent that general system differences with the typically modern turbo-prop transport aeroplane are rapidly disappearing. Where questions in this subject Part are seen to be based on aeroplane systems, these should be considered as questions testing knowledge of generic *aircraft* systems and are therefore equally applicable to helicopters.

Where a question makes reference to the term *aeroplane*, this shall be taken to mean *aircraft***.** All such questions apply equally to the ATPL(H) examination.

4.3.11.4 Specimen questions

Question 1 - Manual of standards Item 2.1.8(b)

During stabilised autorotative flight a driving force is provided when the total reaction (TR) is inclined forward of the axis of rotation. Over what portion of the blade does a driving force generally occur?

A. The entire length of the blade.

B. The outboard section of the blade.

C. The centre section of the blade.

D. The inboard section of the blade.

Question 2 - Manual of standards Item 3.5.1(a)

An aircraft hydraulic system produces 3000 psi, and the main landing gear (MLG) actuating cylinder has a piston area equivalent to 10 square inches. What force is exerted by the actuator when the MLG is retracted?

A. 30 pounds.

B. 300 pounds.

C. 3000 pounds.

D. 30,000 pounds.

E. 300,000 pounds.

Question 3 - Manual of standards Item 4.5

Which is the most common type of starter used on gas turbine engines fitted to modern large commercial helicopters?

A. Solid propellant starter.

B. Electric motor starter.

C. Cartridge starter.

D. Gas turbine starter.

E. APU starter.

4.3.12 Navigation

4.3.12.1 Introduction

The Navigation examination tests primarily Unit 1.7.3 of Schedule 3 of the MOS, but may include items from earlier Units, which are common to both the Helicopter and Aeroplane. In particular the following items:

- Item 2.1 Navigation Charts.
- Item 2.2 Time Zones.
- Item 2.3 Flight Instruments.
- Item 2.4 Compasses
- Item 2.5 Radio Wave propagation
- Item 2.6 Radio Navigation Aids.
- Item 2.7 Route Navigation.
- Item 2.8 Basic Radar Principles.
- Additional Items from PPL & CPL Navigation may be included, e.g. Unit 1.7.1, Item 2.7 Area Navigation

The examination will have a mixture of questions on 'general knowledge' and 'practical' problems.

'Practical' questions may be based on any appropriate item of the manual of standards.

Questions are typical of those involving high altitude, high speed aircraft on domestic and international flights.

Where a question makes reference to the term *aeroplane*, this shall be taken to mean *aircraft***.** All such questions apply equally to the ATPL(H) examination.

4.3.12.2 Practical navigation

Candidates may be required to refer to a specific route on an En Route Chart (ERC) Low and Terminal Area Charts (TAC). Candidates are to supply these charts.

Practical navigation questions may contain a reference to Route Sector Wind and Temperature (RSWT), or Grid Point Wind and Temperature (GPWT) forecasts.

Winds other than those presented in a recognised forecast format will be annotated T (true) or M (magnetic).

4.3.12.3 Equi-time point (ETP), point of no return (PNR) and point of safe diversion (PSD)

Equi-Time Point (ETP). An ETP is that point along track where it will take the same time to fly to either of two locations. An ETP may be calculated for either normal or abnormal operations, e.g. ETP/OEI.

The term PNR is used for situations where the return flight is to an on-track aerodrome, either the departure point or an alternate aerodrome.

The term PSD or LPSD is used for situations where flight from the PSD is to an off-track alternate aerodrome.

The term *'safe endurance'* used in a PNR or PSD problem means endurance remaining excluding reserves of fuel (or equivalent time). The term **'total endurance'** means endurance remaining including reserves of fuel (or equivalent time).

When total endurance is specified in a question the required reserves to be allowed will be specified [e.g. Contingency Fuel (CF) 10% of safe endurance and Final Reserve (FR) 30 minutes].

ETP, PNR and PSD calculations may involve normal and abnormal operations.

Descent to an aerodrome may be ignored when determining the position of a ETP, PNR or PSD.

4.3.12.4 Average data

Average data may be used where appropriate. Candidates should exercise their discretion as to whether the use of average data would be appropriate, or a more detailed calculation should be made.

Generally, in calculations which cover more than one zone of a flight, as in ETP, PNR and PSD problems, the use of average data may be appropriate. Any of the common methods of averaging data such as winds and temperatures are suitable for examinations purposes.

4.3.12.5 Specimen questions

Question 1 - Item 2.6.3 (e)

When using DME to determine your G/S, the maximum G/S error will occur when:

A. tracking directly towards or directly away from the DME site.

B. tracking obliquely towards or obliquely away from the DME site.

C. tracking abeam the DME site.

D. within 10 NM of the DME site, regardless of your track and/or altitude.

Question 2 - Item 2.7.2(a)

Using a forecast average wind component of 30 KT HEAD, the top-of-climb position for an aircraft is determined to be 115 NM from departure point. Climb time is 19 min. If the average wind component actually experienced during the climb was 20 KT TAIL, the distance from departure point to the actual top-of- climb position would be closest to -

A. 120 NM.

B. 130 NM.

C. 145 NM.

D. 165 NM.

Question 3 - Item 2.7.4 (a)

ERC L8 refers.

Flight from PORT HEDLAND, WA (YPPD) to ADELAIDE, SA (YPAD) along A585

Inflight position:

0437 UTC:	PD VOR/DME	radial 133 @ 90 DME
0525 UTC:	NEWMAN VOR /DME	radial 093 @120 DME

If the HDG and TAS between these two positions have been held constant at 141M and 280 KT.

Then the average wind between the 0437 UTC and 0525 UTC positions is closest to –

A. 170M/75 KT.

B. 340M/75 KT.

C. 290M/65 KT.

D. 110M/65 KT.

E. 160M/65 KT.

4.3.13 Meteorology

4.3.13.1 Introduction

The Meteorology examination tests Unit 1.8.4 and Unit 1.8.***5*** of Schedule 3 of the MOS, but may include items from earlier Units, which are common to both the Helicopter and Aeroplane. In particular the following items:

- The Atmosphere.
- Clouds and Precipitation.
- Motion of the Atmosphere.
- Visibility.
- Ice Accretion.
- Airmasses and Fronts.
- Airmasses and Frontal Analysis
- Synoptic Charts.
- Upper Level Weather.
- Upper Level Charts.
- Climatology.
- Met Observations.
- Reports & Forecasts.

The examination will have a mixture of questions on general knowledge and 'practical' problems.

'Practical' questions may be based on any appropriate item of the manual of standards, and involves pilot interpretation of charts, satellite photographs, and weather forecasts and reports. These will be provided during the examination.

Questions are typical of those involving high-altitude, high-speed aircraft on domestic and international flights.

Where a question makes reference to the term aeroplane, this shall be taken to mean aircraft. All such questions apply equally to the ATPL(H) examination.

4.3.13.2 Specimen questions

Question 1 - Item 2.12.5

TAF YBTL 270448Z 2706/2806 33010G25KT 5000 RA BKN030 OVC120

FM271400 16020KT 8000 SH SCT035 OVC120

INTER2710/2714 3000 +TSRA BKN020 SCT030CB

The visibility expected for arrival at TOWNSVILLE (YBTL) at 1100 UTC is -

A. 5000 metres.

B. 5000 metres reducing to 3000 meters for periods of 30 minutes or less.

C. 8000 metres.

D. 8000 metres reducing to 3000 meters for periods of 30 minutes or less.

Question 2 – Unit 1.8.5 Item 2.3.4

Prior to departure you observe that there are cumulus clouds with base 5000 feet in the vicinity of your take-off flight path. Light rain is seen beneath the clouds though the precipitation does not reach the ground.

You delay your departure to avoid severe turbulence and down draft on take-off, as you anticipate the hazards associated with a -

A. thunderstorm gust front.

B. mountain wave.

C. microburst.

D. radiation inversion.

4.3.14 Human factors

4.3.14.1 1 Introduction

The Human Factors examination tests Unit 1.6.3 of Schedule 3 of the MOS, but may include items from earlier Units, which are common to both the Helicopter and Aeroplane. In particular the following items:

- Item 2 Aviation Medicine.
- Item 3 Human Information Processing.
- Item 4 Human Behaviour.
- Item 5 Flying and Health.
- Item 6 Threat & Error Management.

Questions are typical of those involving multi-crew, turbine powered, high-altitude, high-speed aircraft on domestic and international flights.

Where a question makes reference to the term *aeroplane*, this shall be taken to mean *aircraft***.** All such questions apply equally to the ATPL(H) examination.

4.3.14.2 Reference material

The wide range of reading material available on this topic, with their rich variety of terminology and information, has made standardisation a fairly important consideration. CASA has therefore nominated the following reference material for the study of this manual of standards topic:

a. Human Being Pilot by Aviation Theory Centre

b. Human Factors for Pilots by Roger G Green et al

c. Human Factors in Flight by Frank H Hawkins

d. AC 61-08 Teaching and Assessing Single Pilot Human Factors and Threat and Error Management

(https://www.casa.gov.au/teaching-and-assessing-non-technical-skills-single-pilot-operations)

e. Air Craft - Human Factors & Limitations by Tony Wilson

The use of these textbooks as training material builds up logically, and consolidates firmly, on the aeronautical knowledge training attained during the training to the PPL/CPL manual of standards.

4.3.14.3 Specimen questions

Question 1 - Manual of standards Item 2.2.6

While in flight, you notice the other pilot is breathing heavily, her speech is slurred, and she complains of feeling dizzy. You also notice her lips and fingertips are blue-tinged. She is probably suffering from -

A. hyperventilation.

B. CO poisoning.

C. hypoxia.

D. food poisoning.

Question 2 - Manual of standards Item 3.2.1(h)

How should a pilot look at a visual object in poor light conditions, so that her night vision may be optimised?

A. In the most direct manner.

B. A little from the side of the eye.

C. Directly, and one eye closed.

D. A little from the side of the eye, and with the other eye closed.

Question 3 - Manual of standards Item 4.2.3(e)

In a multi-crew cockpit environment, a captain is more likely to heed any crucial information provided by the co-pilot if it is delivered in a communication style that is both -

A. assertive and submissive.

B. assertive and supportive.

C. aggressive and submissive.

D. aggressive and supportive.

4.3.15 Air law

4.3.15.1 Introduction

The Air Law examination tests Unit 1.5.14 and 1.5.15 of Schedule 3 of the MOS, but may include items from earlier Units, which are common to both the Helicopter and Aeroplane. In particular the following items:

- Item 2.2 Aircraft Nationality and Registration.
- Item 2.3 Airworthiness of Aircraft.
- Item 2.4 Personnel Licensing.
- Item 2.5 Rules of the Air.
- Item 2.6 Procedures for Air Navigation.
- Item 2.7 Air Traffic Services.
- Item 2.8 Rules of the Air and Air Traffic Services
- Item 2.9 Aeronautical Information Service
- Item 2.10 Aerodromes.
- Item 2.11 Facilitation.
- Item 2.12 Search and Rescue.
- Item 2.13 Security.
- Item 2.14 Aircraft Accidents and Incidents.
- Item 2.15 Air Service Operations.

Generally, questions are based on multi-crew, turbine powered, high-altitude, high-speed aircraft, with emphasis being placed on the knowledge required of the pilot in command.

These questions will mainly test rules and procedures pertaining to IFR air transport operations, both domestic and internationally. However, candidates are expected to possess a very sound foundation of Private and VFR operations.

The examination is organised along an '*open book'* format, but candidates will be required in some questions to exercise a high level of competency in 'factual recall' on the basic rules and procedures in order to answer the questions within the time permitted.

Where a question makes reference to the term *aeroplane*, this shall be taken to mean *aircraft***.** All such questions apply equally to the ATPL(H) examination.

4.3.15.2 Specimen questions

Question 1 – CASR Part 61 MOS, Schedule 3 Unit 1.5.14, Item 2.4.2 (a)

CASR Part 133 operations apply.

What is the MINIMUM experience required to conduct VFR operations by day in a multi-engine helicopter as pilot in command?

A. 10 hours as pilot in command or as pilot in command under supervision.

B. 5 hours as pilot in command.

C. 200 hours total time and 5 hours as pilot in command or as pilot in command under supervision.

D. 10 hours as pilot in command and 5 hours as pilot in command under supervision.

Ref: CASR Part 133.385

Question 2 – CASR Part 61 MOS, Schedule 3 Unit 1.5.14, Item 2.8.6 (b)

Which statement correctly describes the conditions under which LAHSO operations are permitted?

A. Simultaneous take-offs are permitted both by day and by night.

B. Simultaneous take-off and landing is permitted both by day and by night.

C. Simultaneous take-off and landings are permitted by day only.

D. Simultaneous landings may be conducted by day only.

Ref: AIP ENR 1.1 (paragraph 7.5.1 b.)

Question 3 – CASR Part 61 MOS, Schedule 3 Unit 1.5.14, Item 2.4.2 (b) (iii)

CASR Part 133 operations apply.

You are conducting operations in your company's multi-engine helicopter under the IFR. You just completed your Flight Crew Member Proficiency Check (FCMPC) with the operator.

How long is your current check valid for, and what buffer of time applies for when you can complete the next FCMPC?

A. 12 months, 30 days before or after the expiry date.

B. 12 months, 90 days before or after the expiry date.

C. 6 months, 30 days before or after the expiry date.

D. 6 months, 14 days before or after the expiry date.

Ref: CASR Part 133 MOS, 12.08 (3) (b) (5)

References valid at time of writing.