CIVIL AVIATION AUTHORITY
OF NEW ZEALAND
Te Mana Rererangi Tūmatanui o Aotearoa

Advisory Circular AC119-3

Revision 6

12 August 2011

Air Operator Certification—Part 135 Operations

General

Civil Aviation Authority (CAA) Advisory Circulars (ACs) contain information about standards, practices, and procedures that the Director has found to be an **acceptable means of compliance** with the associated rule.

Consideration will be given to other methods of compliance that may be presented to the Director. When new standards, practices, or procedures are found to be acceptable they will be added to the appropriate AC.

Purpose

This AC describes an acceptable means of compliance with requirements relating to the certification of aircraft operators under Part 119 for air operations conducted in accordance with Part 135.

Related Rules

This AC relates specifically to Civil Aviation Rule Parts 119 and 135, but also refers to requirements in the operating rules of Part 91, 92, 43, 12, 108, 145, and 141.

Related Advisory Circulars

AC119-1	Air Operator – Certification
AC119-2	Air Operations – Fatigue of Flight Crew
AC119-4	Passenger, Crew & Baggage Weights
AC00-3	Internal Quality Assurance

Change Notice

Revision 6 addresses mountain flying requirements and includes:

- amendments to the mountain flying requirements incorporated following industry feedback
- the need to align with recently published pilot licensing requirements for Terrain Awareness and Basic Mountain Flying
- alignment with a revised Mountain Flying Training Standards Guide.

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Rule Compliance

Note: *Only rules requiring guidance and informative/explanatory material are included in this section. Where the Rule is self-explanatory no information is given.*

Abbreviations

AOC means an Air Operator Certificate.

AAOC means an Airline Air Operator Certificate.

AMC means Acceptable Means of Compliance.

ATO means an Air Transport Operation.

CTO means a Commercial Transport Operation.

GAAOC means a General Aviation Air Operator Certificate.

GM means Guidance Material.

Definitions

Some terms used in this AC are yet to be defined; therefore explanations are given for the purpose of this AC. Part I provides the legal definition.

Mountain flying

This AC includes detailed mountain flying training guidance information to assist operators who conduct regular air operations into mountainous terrain. This AC assists operators to meet the training and competency requirements in Part 135 for pilots to fly in such areas.

What is Mountain Flying

Mountain flying is any technique involving the manoeuvring of an aircraft between, over, or around terrain or resultant weather that is, or that could be perceived as being, an obstacle to the aircraft flight path.

Particularly in the case of helicopters the mountains can be an operational workplace.

Areas of New Zealand as defined by AIPNZ to be Mountainous Zones does not preclude the fact that terrain affecting aircraft flight paths to varying degrees exists throughout the country.

It is the intention of this AC that its content and principles be applied to each operator's area of operation. Some content may not be relevant to an operator's area or operation, e.g. hypoxia, when operations do not involve flight at altitudes where hypoxia is typically an issue, and their programme would be modified to reflect such.

Mountain Flying has four essential components:

- terrain
- weather
- aircraft
- pilot

The training programme should reflect the combination and interaction of all four including the variables of:

- size/shape…of terrain
- intensity/type…of weather

- performance/loading/configuration…of aircraft
- training/experience/decision making/situational awareness…of pilot

as each applies to an operator's area of operation and, including any other variable peculiar to an operation.

Note:

This mountain flying programme should not seek to duplicate areas covered by other theory or flight training. For example, principles of Human Factors, Aircraft Technical Knowledge, Performance, Meteorology, Navigation etc. all form an integral part of any mountain flying awareness programme. However the individual operators programme should be designed to advance knowledge and techniques beyond any initial issue standards.

Appendix D and E are not intended to be all encompassing but rather a guideline of basic minimum standard concepts and experiences accepted as a necessary prerequisite to continued survival through safe interaction with a mountainous environment. Where water, snow, remote strip, and advanced helicopter operations are involved, specific training to reflect such activity would be included in this programme.

Subpart A — General

135.1 – Purpose

Part 135 provides the operating requirements for helicopters and small aeroplanes. These rules are applied over and above the general operating and flight rules (Part 91). It should be noted that although the general rules address the pilot-in-command, a person, or an operator, in very general terms, all operations under this Part must be conducted under the authority of an air operator certificate issued under Part 119. This in effect makes the operator responsible for all aspects of the operation. This should be the major consideration when constructing the operator's exposition.

The rule Part matrix produced by the CAA has been developed with this strategy in mind. These matrices are available from the CAA or from the CAA website (www.caa.govt.nz) under the heading 'General Aviation – Fixed-wing Certification or Rotary Certification' as appropriate.

Two types of operation are covered – Air Transport Operations (ATO) and Commercial Transport Operations (CTO). SEIFR passenger operations are not permitted under Part 135. The definitions of CTO and remote aerodrome are contained in Part 1 *Definitions and Abbreviations*.

Seating configuration in relation to this rule means the actual seating arrangements fitted to a particular aircraft. This will partly determine the operating rule Part that the aircraft will be operated under.

The certificated seating capacity on an aircraft is the maximum seating the aircraft type certificate permits. This will determine the maintenance rule Part that the aircraft will be maintained under.

135.3 – Definitions

This Rule is self-explanatory and the definitions contained in Part 1 should also be consulted.

135.5 – Laws, Regulations, and Procedures

This rule places the responsibility on the holder of an Air Operator Certificate to ensure all persons employed, engaged or contracted to perform activities in the air operation are familiar with the appropriate sections of the Civil Aviation Act 1990, Civil Aviation Rules, and the operator's exposition. The exposition may take a systems approach but must contain sufficient

detail when considering the size and complexity of the operation to enable the organisation's procedures to be understood, implemented, and maintained at all levels of the organisation.

135.7 – Procedure Compliance

This rule requires each person performing the air operation to comply with the procedures documented in the AOC holder's (operator's) exposition. This particular rule may not require any specific procedure or statement in the exposition to ensure compliance, as this will be dependent on the structure and detail contained in the exposition. A statement of compliance is required by rules 119.81 and 119.125 to be in the chief executive's statement.

135.13 – Passenger Training

This rule requires briefing or additional training in safety and emergency procedures for a commercial transport flight as appropriate. This should be included in the training and passenger briefing sections of the exposition. These items may be categorised as follows:

(a) General

(i) How to enter and exit the helicopter or aeroplane without assistance.

(ii) Use of harnesses.

(iii) Avoidance of tail rotor and up-hill slopes.

(iv) Use and location of first aid kit and fire extinguisher.

(v) Control of loose items.

(vi) Opening and closing doors.

(vii) Emergency procedures including the emergency locator beacon.

(viii) Communications, between members of the crew, including utilising the aircraft intercom systems if available.

(b) Additional Training

(i) Centre of gravity considerations.

(ii) Details for the carriage of animals.

(iii) Cargo hook operations.

(iv) Considerations for congested area or low height operations.

(v) Any other additional considerations in relation to the kind of operation being conducted.

These are a sample of some activities where the passenger may require extra briefing or training for a commercial transport operation

Subpart B – Flight Operations

135.53 – Aircraft Airworthiness

The intent of this rule is to—

(a) Limit air transport operations to aircraft issued with a standard category airworthiness certificate.

(b) Allow aircraft issued with a restricted category airworthiness certificate to conduct commercial transport operations – provided the aircraft flight manual allows such an operation. Operators should note that the flight manual limitation may prohibit the carriage of passengers.

135.55 – Common Language

This rule is unlikely to affect an air operator under Part 135. However in the event that an air operator engages a foreign speaking crew member, then this could be addressed in the initial training and competency assessment sections of the exposition.

Pilots who have an ICAO operational level 4, 5, or 6 English Language Proficiency credit acknowledged on their licence meet this rule requirement.

135.57 – Flight Preparation and Flight Planning

The intent of this rule is to place responsibility on the operator and the pilot to use reliable information to plan the flight.

135.57(a)

This rule encompasses many other Parts, all of which must be considered during the planning of a flight. These include:

(a) Meteorological information and conditions. Part 135 Subpart C.

(b) Use of aerodromes or landing sites. rule 135.77.

(c) Aircraft performance. Part 135 Subpart D

(d) IFR considerations. Part 91 Subpart E. rules 135.157, 135.159, 135.161, 135.163, 135.165, 135.213, 135.361, 135.511, and 135.607.

(e) Weight and balance. Part 135 Subpart E.

(f) The kind of operation. rule 119.15.

(g) Fatigue of flight crew. Part 135 Subpart K.

(h) Flight following system. rules 119.73, 119.121.

135.57(b)

The content of a VFR flight plan is contained in rule 91.307 and for an IFR flight plan, rule 91.407.

135.57(c)

This rule explains how multiple route segments are to be handled with respect to SARTIME.

135.57(d)

This rule requires operators to ensure that if communications cannot be maintained, a SARTIME is included (in the case of an ATS flight plan) or in the case of a flight following service the time when communications are expected to be re-established with the flight following service.

135.57(f)

Apart from flights that proceed more than 50nm from shore, an operator is not required to submit a flight plan to an ATS Unit provided the flight is under VFR, and is covered by a flight following service that meets the requirements of either rule 119.73(b) or rule 119.121(b) and the pilot maintains a listening watch on the appropriate ATS radio frequency for the area (according to the type of airspace or as published on the AIP FISCOM chart).

An operator's flight following system may identify a UNICOM unit as being the provider of the flight following service.

For operations more than 50nm from shore rule 91.307(a)(1) requires a flight plan to be submitted to an ATS Unit, and for flights over water rule 135.87(d) requires an air transport flight to be conducted under IFR if the flight is to be more than 100nm from shore.

135.57(g)

This requires the pilot-in-command to be informed of the contents of the flight plan if it has been submitted by someone other than that pilot.

135.59 – Emergency and Survival Equipment Information

The intent of this rule is to require the operator to have available for immediate communication to rescue coordination centres, information on the survival equipment carried on board each of its aircraft. The information will be provided within an ATS flight plan and should form a part of the flight following system required by rules 119.73 and 119.121, where a flight plan is not filed with an ATS unit. Detailed requirements for emergency and survival equipment are contained in rules 135.363 and 91.523. This information could also form part of the emergency situation action plan required by rule 135.91. The information should be easily accessible to the provider of the flight following system who should not be expected to search to find it in the operator's Exposition.

135.61 – Fuel

This rule requires a fuel policy to be included in an operator's exposition. The policy needs to take into account the relevant operating conditions for all flights. The variety and nature of CTO's requires a broad and simple approach to fuel planning and in-flight re-planning. Consideration, where applicable, should be given to:

(a) Normal aircraft fuel consumption – derived from the aircraft flight manual or other manufacturer's data and corrected for the actual conditions of the flight.

(b) Unusable Fuel

(c) Expected meteorological conditions.

(d) Anticipated weights.

(e) ATS requirements and restrictions.

(f) The geographic location of the destination aerodrome, reserves, alternates and other relevant data.

(g) Contingencies. At the planning stage, not all factors that could have an influence on the fuel consumption to the destination can be foreseen. Therefore, contingency fuel is carried to compensate for items such as:

(i) Deviations of an individual aircraft from the expected fuel consumption data.

(ii) Deviations from forecast meteorological conditions.

(iii) Deviations from planned routes and or cruising levels/altitudes.

(h) Having considered all of the fuel contingencies for the particular operation, then this data should be included into the flight planning procedures required by rule 135.57.

(i) The minimum fuel requirements for flight planning are contained in rule 91.305 for VFR operations and rule 91.403 for IFR operations. It should be noted that if a helicopter is operated on an air operation under VFR, the option of carrying less than a 20 minute fuel reserve is not permitted..

135.63 – Cockpit Checks

The operator is required to ensure that correct and appropriate cockpit checks are completed at the appropriate time. These checks could be, but are not limited to, pre-flight, pre-takeoff, pre-landing, and emergency checks. The operator has the option of designing the checklists to suite the type of operation. Acceptable forms of checklists would be the aircraft flight manual, mnemonic pattern, flip cards. Checks committed to memory would need to be included into the training and competency assessment programmes. The exposition should make it clear what checks are to be used, and any variation that the operator will allow.

135.65 – Passenger Safety

135.65(a)(1) Influence of Drugs or Alcohol or behavioural characteristics likely to endanger the safety of the aircraft or occupants

The intent of this rule is to ensure that any passenger who appears to be in this condition is not permitted to board the aircraft. Guidance instructions should be provided for ground and flight crew to deal with this situation.

135.65(a)(2) Disabled Passengers

Civil Aviation Rule Part 1 defines a disabled passenger as any passenger whose physical, medical, or mental condition requires individual attention not normally extended to passengers during an air transport operation..

Where practical, disabled passengers should not be allocated, or occupy seats, where their presence could:

(a) Impede the crew in their duties.

(b) Obstruct access to emergency equipment.

(c) Impede the emergency evacuation of the aircraft.

Guidance instructions should be provided for ground and flight crew on how best to evacuate disabled passengers in an emergency as well as consideration of that passenger's special requirements.

135.65(a)(3) Escorted Passenger

An escorted passenger means any passenger requiring the personal attendance of an appointed escort, during an air operation. This rule requires the operator who intends to carry escorted passengers to establish procedures for the transportation of those passengers to ensure the safety of the aircraft and its other passengers. The procedure should establish the maximum number of escorted passengers that may be carried on a flight, and the ratio of escorts to passengers to establish adequate risk management.

135.65(b)

This rule provides an exception, where the operation is conducted for the purpose of search and rescue or an air ambulance flight.

135.69 – Manipulation of Controls

This prohibition could be satisfied by including the intent of this rule in the initial training programme, competency checks, and the passenger briefing particularly if a pilot seat is occupied by a passenger.

135.71 – Flight Recorder Requirements

This rule places the responsibility on the flight crew for the use and conditions that apply when Cockpit Voice Recorder (CVR) and Flight Data Recorder (FDR) are required. Rule 135.71(b)(2),(3) and (4) may require maintenance instructions to ensure compliance with this part.

The CVR (reference rule 135.367) is only applicable to helicopters with a certificated seating capacity of 10 passenger seats or more, excluding any required pilot seat, and where the flight manual requires two or more flight crew members.

The FDR (reference rule 135.369) is only applicable to helicopters with a certificated seating capacity of 10 passenger seats or more, excluding any crew member seat.

As all operations are conducted under the air operator's certificate the awareness of these requirements should form a part of the training and competency check programmes.

135.73 – Refuelling and Defuelling Operations

Requirements for fuelling are separated into the various fuel types. Class 3.1A fuel refers to AVGAS. Class 3.1C fuels include kerosene based fuels such as Jet A1. Class 3.1D includes diesel products.

135.73(a)

This rule prohibits fuelling operations with Class 3.1A fuel (AVGAS) when passengers are on board and/or moving on or off the aircraft.

135.73(b)

This rule permits fuelling operations with Class 3.1C (Jet A1) fuel with passengers onboard and/or moving on or off the aircraft, and when one or more engines are running, provided procedures are established which consider all of the potential hazards to passenger safety and any other third party.

The procedures may include all or any of the following examples. This list should not be considered to be exhaustive as there may be other matters that need to be taken into account. Due consideration should be given to the aircraft size, the number of persons involved, and the area where fuelling is taking place:

(a) One qualified person should remain at a specified location during fuelling operations with passengers on board. This qualified person must be capable of handling emergency procedures concerning fire protection and fire fighting, handling communications and initiating and directing an evacuation.

(b) Any conditions or limitations contained in the aircraft flight manual would have to be observed.

(c) Crew, staff, and passengers should be warned that fuelling operations will take place.

(d) Fasten seat belt signs should be off.

(e) No smoking signs should be on.

(f) Interior lighting should be on to identify emergency exits.

(g) Passengers should be instructed to unfasten their seat belts.

(h) Sufficient qualified persons should be on board and prepared for an emergency evacuation.

(i) If the presence of fuel vapour is detected inside the aircraft, or any other hazard arises during the fuelling operation, the fuelling operation should be stopped immediately.

(j) The ground and area around the exits, intended for emergency evacuation should be kept clear.

(k) Provision should be made for safe and rapid evacuation.

Notwithstanding the above, due to the increased risks that accompany “hot refuelling”, operators should avoid it if possible. If hot refuelling must be done and passengers are on board, they should, if possible, be disembarked and escorted to a safe area to wait for the refuelling operation to finish.

The procedures governing the handling of fuel spills should meet the requirements of the Hazardous Substances and New Organisms Act (1996), see rule 91.15(1)

135.77 – Use of Aerodromes

This rule requires an operator to ensure that any air operation is made to and from an aerodrome/landing site that meets the standard of this rule and rule 91.127 for heliports.

The operator should develop a procedure to assess aerodromes and landing areas to ensure that the landing area, including the approach and take-off areas are suitable for the type and characteristics of the aircraft used, having regard to the performance data as required by Part 135 Subpart D. A record should be retained of any assessment undertaken.

The information derived from the aerodrome or landing area assessment could form part of the register required by rule 135.77(c). Where the aerodrome or landing places are published in the current AIPNZ, this would be the reference information used in the assessment. The results of the performance data assessment should be included in the flight planning process.

Note: *Operators should be aware that under some circumstances, Part 93 Special Aerodrome Traffic Rules and Noise Abatement Procedures, or other local bylaws, may apply and impose conditions or limitations on the use of aerodromes.*

135.77(d)

This rule specifies the minimum runway and runway strip width for VFR aeroplanes operating under Part 135 and this standard should be used in conjunction with the information contained in AC139-6 and AC139-7.

135.77(f)

This rule makes provision for a lesser runway width than normal and gives the conditions that may be applicable.

The "runway" is the prepared surface for take-off and landing for an aeroplane.

In relation to this rule, the "runway strip width" is a prepared surface surrounding the runway, and without irregularities and of sufficient strength that structural damage to an aeroplane should not occur in the event of an excursion into this area during take-off or landing.

135.81 – Operations of Single Engine Aircraft–IFR

This rule prohibits IFR operations carrying passengers in a single engine aircraft operated under Part 135. Such operations come under Part 125.

135.83 – Restriction or Suspension of Operations

The persons authorised to restrict or suspend operations under this rule should have the capability included in their duties and responsibilities or job description. All staff should be aware of which persons hold this authorisation.

135.85 – Minimum Height for VFR Flights

The intent of this rule is to prohibit air transport operations below 500 feet. In this case it would be possible to show compliance with this prohibition through the training and competency checking programme.

However the rule enables commercial transport operations below 500 feet where it is necessary for the conduct of the operation. This rule does not permit low flying by an aircraft on a commercial transport operation where bad weather is the sole reason for flying low. Where commercial transport operations are to be conducted below 500 feet then the pilot-in-command must prepare a plan for the operation, brief all persons involved in the operation, and take reasonable care to conduct the operation without creating a hazard to any person or property. The plan should preferably be written, or alternatively may be in oral form. A written plan will be more helpful in the event of an investigation into the conduct of the low level operation.

For compliance with this low flying provision, the commercial transport operator should provide the pilot with some guidelines to minimize the risk to aircraft, and third parties within at least a 500ft horizontal radius of the operation.

135.87 – Flights over Water

This rule needs little explanation. However operators should be aware of the limitations and conditions attached to ATO or CTO flights over water.

If an operator intends to conduct operations over water, then the requirements of this rule could form an addition to the flight planning and passenger information procedures. If it is intended to conduct flights over water then some additional instructions will be necessary. Rule 91.211 provides the basic standards for passenger briefing and includes among other things a demonstration on the use of life jackets.

Note: *Notwithstanding the equipment requirements only becoming effective beyond 10 nautical miles gliding or autorotation distance from shore, the requirements of the Health & Safety in Employment Act (1992) also apply to the aircraft as a place of work and the provision of suitable safety equipment would apply if the aircraft was planned to be operated at any distance over water beyond gliding/autorotation range of a suitable landing area.*

Consideration should also be given to the maintenance of safety equipment. Where necessary, the maintenance schedules for such equipment are to be included in the Approved Maintenance Programme.

135.91 – Emergency Situation Action Plans.

The intent of this rule is to provide action plans for handling emergency situations that management, ground staff, or flight crew become aware of. This rule requires plans to be developed for both in-air and on-ground emergencies, and to include provision for passing information to and from the pilot-in-command.

To comply with this rule, an operator needs to complete a risk management assessment of their particular operation. The risks to be identified may include:

(a) Pilot fails to make contact at a pre arranged time. (Flight following system.)

(b) Pilot declares an in-flight emergency.

(c) Management or ground staff become aware of a situation in-flight of which the pilot needs to be advised.

(d) Accident or incident on take-off or landing.

(e) Emergency on ground. (Fire, refuelling spill etc.)

(f) Flight crew or passenger develops a medical condition.

The plan should contain sufficient information to ensure the appropriately trained staff (Refer rules 119.53 and 119.103) know what to do, who to contact, and what details need to be recorded. A record of this training and competency checks should be included in the records required by rules 119.67 and 119.115.

An emergency situation action plan could be contained within an exposition or in a separate manual for convenience. If it is to be a separate manual, then it should be referenced in operator's hierarchy of manuals that form the complete exposition.

The plans should be subject to periodic review to ensure their continued relevance.

135.93 – Operations Over Congested Areas

The intent of this rule is to permit a helicopter CTO, such as filming or survey, to operate below 1000ft over congested areas, it does not permit low flying over congested areas solely because of low cloud or other bad weather. The pilot must prepare a plan and brief all personnel and organisations involved. This rule is directed at the pilot-in-command, however the operation is conducted under the operator's Part 119 certificate, and under rule 119.77 or rule 119.123 as applicable, the operator's exposition should include procedures for the accomplishment and documentation of these types of operations. The plan should be written. A copy of the plan and a chart of the flight areas, should be kept and retained as an integral part of the daily flight record required by rules 135.93, 135.857 and 135.859. This in effect permits the operator to plan, perform and authorise the operation, without the need to notify the CAA.

135.95 – Helicopter Sling Loads

Although the Rule is directed at the pilot-in-command, the operation is conducted under the authority of the operator's Part 119 certificate, and under rule 119.123 as applicable. The limitations and conditions of this rule could be assured by including this as part of the training and competency check procedures.

This rule is addressed to the pilot-in-command and is in two parts. The first prohibits the carriage of a sling load while conducting an air transport operation. The second part permits the operator to carry passenger equipment in a sling load on commercial transport operations.

Note: *Although this rule makes provision for the carriage of passengers while carrying a sling load, the operation must be conducted in accordance with the operating limitations specified in the aircraft flight manual. (Refer Part 91, rule 91.109.) These limitations may prohibit the carriage of passengers with a sling load.*

The rule provides for operations into remote areas where a quantity of equipment must accompany the passengers. This rule does not permit goods not associated with the passengers, such as fuel drums for the operator, or supplies for another client, to be carried.

Examples of operations that may require passenger equipment to be carried as a sling load could be rafting, kayaking groups, hunters, fishermen, trampers, surveyors, and others requiring access into remote areas.

The power margin referred to is intended to be sufficient to enable the helicopter to manoeuvre and to safely depart and clear any obstructions from an out of ground effect (OGE) hover with the load attached.

Subpart C – Operating Limitations and Weather Requirements

135.151 – Purpose

Although this Subpart prescribes the rules governing VFR and IFR operations, and associated weather requirements, these are additional to the general requirements of Part 91, Subparts D & E.

135.153 – Meteorological Information

The intent of this rule is to permit an air operator the flexibility of obtaining accurate weather forecasting information for the area of operations intended. For example some remote areas may be better served with information derived from general area forecasts and local observations.

135.153(a)

This rule permits a VFR operator to use meteorological information of sufficient reliability and accuracy, from a source acceptable to the air operator and pilot-in-command. This need not be an organisation certificated to Part 174 although if aviation weather information was available for the area of operation a prudent operator would, nonetheless, make use of it especially for flights outside the local area (25nm) or night VFR operations. The information gathered during the preparation of the flight plan is required to be retained. Refer rule 135.859(a).

135.153(b) and (c)

This rule requires an IFR operator to use meteorological information provided for aeronautical purposes from an organisation certificated under Part 174.

135.155 – Meteorological Conditions – VFR Flight

The information gathered in rule 135.153 must be sufficient to ensure planned flights remain within the limitations of this rule and the prescribed minima of Part 91, Subpart D. It is recommended that the intent of this rule be addressed in an air operator's training and competency check programme. The limitations of this rule should be applied at the flight-planning phase and reviewed en route.

It should be noted that all the conditions for helicopter VFR commercial transport operations described in rule 135.155(d) must be met i.e. at night the helicopter must be beneath the ceiling, clear of cloud and in continuous sight of the surface and not above more than scattered cloud as well as having the cloud-base and visibility requirements detailed in rule 135.155(d)(4). Further, the minimum heights required in rule 91.311 continue to apply, bad weather not being a bona fide reason for flying at low level.

135.157 – Meteorological Conditions – IFR Flight

Meteorological data for IFR operations must be provided by a Part 174 organisation. This should be addressed in the flight planning procedures, (Refer rule 135.57) and must ensure that the instrument procedure minima prescribed under Part 95 can be complied with. It is recommended that the intent of this rule be addressed in an operator's training and competency check programme.

135.159 – Aerodrome Operating Minima – IFR Flight

This rule is a mandatory limitation that includes the minima of Part 95. It is recommended that the intent of this rule be addressed in an operator's training and competency check programme.

135.161 – IFR Departure Limitations

The intent of this rule is to prohibit the departure of an IFR flight where the landing meteorological minimum for the departure aerodrome is below the authorised landing minimum for that aerodrome, unless for a multi engine aircraft, there is a suitable alternative aerodrome within the applicable flying time limits in the rule.

135.163 – Reduced Take-off Minima

No further explanation is required. Procedures are required to be included in the operator's exposition where an operator intends to utilise reduced take-off minima.

135.165 – IFR Procedures

This rule prescribes the conditions of IFR flight. The operator's exposition should include procedures appropriate to the proposed IFR operations, including the training and competency checks required to conduct the operations.

Subpart D – Performance

135.201 – Purpose

The intent of this rule is to place the responsibility on the operator to produce performance charts, corrected for the limitations applicable to air operations being conducted, for use during flight planning.

Prior to the introduction of the current rules, aeroplane performance criteria were specified in CASO 4. Two methods were employed:

(a) For aeroplanes below 5700 kg, the aeroplane flight manual contained performance charts (P-charts) that gave the operator the means of ensuring compliance with CASO 4.

(b) Group ratings provided a simple method for the operator of an aeroplane below 2270 kg to determine the runway requirements.

The P-charts are an acceptable means of compliance with this Subpart, however the group rating system is not. Since the introduction of the new rules, any flight manual issued to an aeroplane at initial issue of the airworthiness certificate, will not be issued with a P-chart. However if one is available it may be requested from the CAA. It should be noted that, for new aeroplane types being introduced to New Zealand, the CAA will not be developing P-charts.

Alternatively, an operator could engage a suitable organisation to develop the appropriate performance charts, or an operator could develop their own P-charts using the guidance material in Appendix C.

The operator will need to establish for each aeroplane they intend to operate, the type certification basis and appropriate rules within this Subpart that apply to that aeroplane. The aircraft type data sheet for each aeroplane should identify the type certification airworthiness design standard.

Note: *Where the aircraft flight manual does not contain the performance data that complies with the requirements of this Subpart, alternative data to provide the performance limitations may be accepted.*

This rule provides for type certification to an equivalent standard. Where it is not clear from the aeroplane type data information what the type certification basis is for the aeroplane, or when the requirements of this Subpart cannot be fully complied with, the CAA should be consulted.

Generally all aeroplanes operated under Part 135 will fall into the grouping of eitherFAR Part 23 normal category or its predecessor CAR 3, or equivalent British or European standards.

Note: *Information for the determination on the aeroplane certification basis can be found in Advisory Circular 21-1 Appendix 2, and in the applicable Type Acceptance Report if one has been published for the type..*

Note: *For the purposes of this AC, only the Rules relating to those aeroplanes normally operated under Part 135 have been included. These aeroplanes will normally be those in performance Group D and E as described in CASO 4. Aeroplanes falling into other certification categories will be addressed on an individual basis. Rules 135.229 through to 135.235 are not addressed.*

As an alternative to developing their own aeroplane P-charts, an operator can use the CAA P-charts, based on CASO 4, issued as part of the aircraft flight manual prior to October 1995. The P-charts generally cover take-off and landing performance considerations, and in the case of multi engine aeroplanes, the en route single engine performance. It will be found that the CAA P-charts tend to be conservative, and if used as a part of the performance calculation, then the full operational potential of the aeroplane may not be realised.

Definitions

The operator should have an awareness of the following abbreviations when determining performance criteria for their aircraft:

ASDA	accelerate/stop distance available
LDA	landing distance available
TODA	take-off distance available
TORA	take-off run available
V_1 (vee one)	decision speed
V_{mca}	minimum control speed in flight
V_r	rotation speed
V_{2min}	minimum take-off safety speed
V_2	initial climb out speed
V_s	stalling speed or minimum steady flight speed in whatever configuration is being considered

Accelerate/stop distance available – CAR Part 1.

Aircraft flight manual – CAR Part 1.

Altitude of the aerodrome means the pressure altitude of the aerodrome to the nearest 100 feet.

Ambient conditions means conditions of air temperature, pressure, and humidity existing at any particular time and place.

Approved – CAR Part 1.

Clearway – CAR Part 1

Configuration – CAR Part 1

Drift-down means a gradual descent by an aeroplane with one engine inoperative to an altitude at which it can comply with the one engine inoperative en route climb performance requirements.

Elevation of an aerodrome means the height of an aerodrome above mean sea level.

Gradient of climb means the ratio expressed in common units as a percentage.

Gross flight path means the flight path it is assumed an aeroplane will follow when flown in a particular configuration in accordance with specified procedures. The flight path is established from the aeroplane's certification performance data and can be accepted as the average fleet performance of the aeroplane type.

Landing distance available – CAR Part 1.

Landing threshold means the beginning of that portion of the runway declared useable for landing.

Net flight path means the gross flight path of an aeroplane reduced by specified margins.

Pressure altitude – CAR Part 1.

Route area means the en route obstacle clearance airspace requirements according to whether the flight is to be made under IFR or VFR.

Runway – CAR Part 1

Stopway —CAR Part 1.

Take-off distance available – CAR Part 1.

Take-off run available – CAR Part 1.

Take-off threshold means the beginning of that portion of the runway declared useable for take-off.

Visual reference means continuous reference to terrain (land or water).

135.205 – Part 121 Subpart D Compliance

This applies to multi-engine turbojet or turbofan aeroplanes if it is intended to use them on Part 135 operations.

135.207 – General Aeroplane Performance

This rule applies to all aeroplanes operated under this Part. The information should be available for the flight planning and preparation phase of the operation.

135.207(2)(ii) Contaminated Landing Distance

The data considered acceptable to the Director, is the data provided by a competent regulatory authority and/or the manufacturer of the aeroplane.

135.209 – Take-off distance

This rule does not apply to those aeroplanes described in rule 135.201(c). For all other aeroplanes, the information should be available for the flight planning and preparation phase of the operation.

135.211 – Runway Surface and Slope Correction Factors

This rule applies to all aeroplanes. Unless specified in the aircraft flight manual or other performance or operating manuals from the aeroplane manufacturer, the variables affecting the take-off and landing performance, and the associated factors to be applied to the aeroplane flight manual data, are specified in rule 135.211(2).

The operator may need to produce information for the corrections required and this could be satisfied by the production of correction charts for use in the flight planning and preparation phase of the operation.

135.213 – Net Take-off Flight Path – Aeroplanes under IFR

This rule applies to those aeroplanes described in rule 135.201(c)(2) and (3) only for the conduct of IFR flights. The limitations contained in this rule will have to be calculated for each flight. The operator may need to produce information for these calculations and this could be satisfied by the production of correction charts to be used in the flight planning and preparation phase of the operation.

135.215 – Engine Inoperative – Gradient and Stall Corrections

This rule applies to all aeroplanes regardless of the certification standards. Unless specified in the aeroplane flight manual, or other performance or operating manuals from the aeroplane manufacturer, acceptable adjustments are to be made to assure adequate stall margins and gradient corrections by applying the factors in rule 135.215, Table 2.

Note: *The manufacturer's aircraft flight manual data is not normally available to allow the corrections required by this rule to be applied. An operator should apply the corrections if the flight manual data is available. Where no data is available compliance with rule 135.215 is not possible.*

135.217 – En route – Critical Engine Inoperative

This rule applies to all multi-engine aeroplanes regardless of the certification standards. The high terrain or obstacle analysis required for showing compliance with rule 135.217 may be carried out in one of two ways as explained in the following paragraphs:

(a) A detailed analysis of the route should be made using contour maps of the high terrain and plotting the highest points within the prescribed corridor's width along the route. The next step is to determine whether it is possible to maintain level flight with one engine inoperative, 1000 feet above the highest point of the crossing. If this is not possible, or if the associated weight penalties are unacceptable, a drift-down procedure should be worked out, based on engine failure at the most critical point, and being able to clear critical obstacles during the drift-down by at least 2000 feet. The minimum cruise altitude is determined by the intersection of the two drift-down paths, taking into account allowances for decision making (see Figure 1). This method is time consuming and requires the availability of current detailed terrain maps.

(b) Alternatively, the published minimum flight altitudes (Minimum En route Altitude, MEA, or Minimum Off Route Altitude, MORA) may be used for determining whether one-engine-inoperative level flight is feasible at the minimum flight altitude, or if it is necessary to use the published minimum flight altitudes as the basis for the drift-down construction (see Figure 1). This procedure avoids a detailed high terrain contour analysis but may have higher penalties than taking the actual terrain profile into account as in paragraph 1.

An AMC for rule 135.217 would be the use of MORA and MEA provided that the aeroplane meets the navigational equipment requirements for the route.

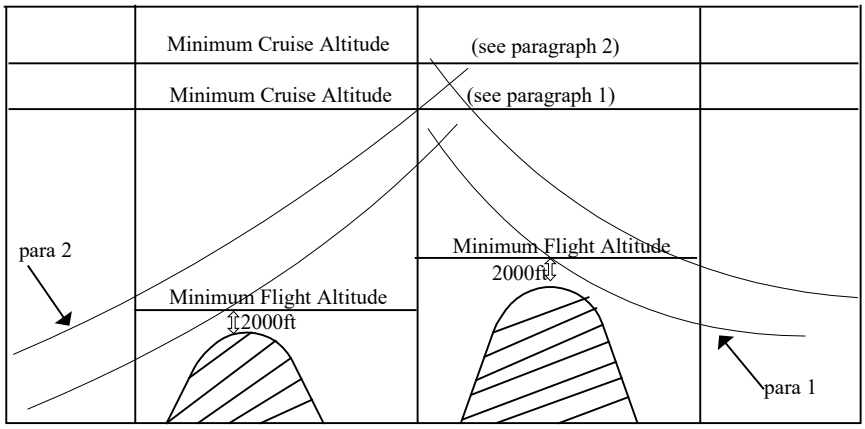

Figure 1

Note: *MEA or MORA normally provides the required 2000 ft obstacle clearance for drift-down. However, at and below 6000 ft altitude, MEA and MORA cannot be used directly as only 1000 ft, clearance is ensured.*

135.219 – En route – 90 Minute Limitation

This rule applies to all multi engine aeroplanes regardless of the certification standards. This is in effect a prohibition and should be included in the route or flight planning process. Aeroplanes with three or more engines could be more than 90 minutes away from a suitable aerodrome if the conditions of rule 135.219(c) are met.

135.221 – Landing–Climb – Destination and Alternative Aerodromes

This rule applies to all aeroplanes regardless of the certification standards. This is in effect a prohibition and should be included in the assessment of the route or as part of the flight planning procedure.

135.223 – Landing Distance – Dry Runway

This rule only applies to aeroplanes described in rule 135.201(c)(2) and (3), and should be included in the assessment of the route or as part of the flight planning procedure.

135.225 – Landing Distance – Wet and Contaminated Runways

This only applies to aeroplanes described in rule 135.201(c)(2) and (3), and should be included in the assessment of the route or as part of the flight planning procedure.

135.225(a)(2)(ii)

The contaminated landing distance is the same as the wet landing distance, when the aircraft flight manual does not contain contaminated landing distance data. If the aircraft flight manual does contain contaminated landing distance data, then this data must be used.

135.227 – Steep Approach and Short Landing Techniques

This rule applies to all aeroplanes regardless of the certification standards. This rule provides for steep approach and short landing techniques. However it imposes limitations that will be detailed in the aeroplane flight manual. If the flight manual does not contain limitations or procedures for these techniques, the rule in effect becomes a prohibition and steep approach and short landings techniques cannot be applied.

If an operator is able to take advantage of this rule, then these techniques should be included in the route flight planning procedure.

Subpart E – Weight and Balance

135.301 – Purpose

The intent of this rule is to prescribe the rules governing the control of loading, and weight and balance of an aircraft. The rules in this subpart are in addition to those prescribed in Part 91. Consideration should be given to the requirements of Part 91 in particular rules 91.213 and 91.215.

Weight and balance options for air operations are fully explained in AC 119-4.

135.303 – Goods, Passenger, and Baggage Weights

This rule requires the operator to establish the actual weight of crew members, passengers and goods.

The rule permits the weight of passengers to be established by one of three methods:

(a) Passenger actual weights.

(b) Standard passenger weight that has been determined by the operator (acceptable methods described in AC 119-4) and detailed in the exposition. Standard weights are permissible for children (2 years and under 13 years) and infants (under 2 years of age). They are 46 kg for a child and 15 kg for an infant.

(c) A weight that has been declared by the passenger plus an additional allowance of 4 kg.

The rule permits the weight of crew members to be established by one of two methods:

(a) Actual weight of each crew member;

(b) Standard a standard crew member weight that has been determined by the operator (acceptable survey methods are described in AC 119-4) and detailed in the exposition.

Note: *Passenger weights do not include any carry-on baggage, and as stated in rule 135.303(a), the actual weight of goods and baggage must be established.*

The provision for carry-on baggage in rule 91.213 applies conditions for the stowage of the carry-on baggage. This may require assessment in respect of smaller aircraft where stowage for carry-on baggage in the cabin is not available. The total weight of goods and baggage must be determined by using:

(a) The actual weight of the goods and baggage.

(b) For commercial transport operations operating from a remote aerodrome where it is not practicable to establish the actual weight of the goods and baggage, the operator must establish procedures to enable the pilot in command to assess the weight of those goods and baggage.

The operator is required to have weight and balance procedures to cover situations where a passenger or crew member is clearly greater than either the declared weight or the standard exposition weight if one of those options is used.

135.305 –Aircraft Load Limitations

The operator's exposition is to contain procedures to show how the aircraft flight manual limitations with respect to weight and centre of gravity position will be complied with throughout

the flight. The weight and balance information is recorded as part of the daily flight record required by rule 135.857(b)(11) to (15).

Subpart F – Instruments and Equipment

135.351 – Purpose

This rule prescribes the instruments and equipment that are required in addition to those in Part 91. It also prescribes the airworthiness design standards for the equipment. It is suggested that an applicant produce a checklist/matrix of the applicable instruments/equipment rules, to assist with the assessment of the aircraft and its eligibility for air operations. Any procedure or checklist/matrix logically falls into the functional area for the introduction of an aircraft to the operator's fleet.

135.353 – General

135.353(1)(ii)

Where communication or navigation equipment is required to conduct an air operation, as specified in the Operations Specifications, sufficient equipment must be fitted to ensure that the failure of any independent system will not result in the inability to communicate or navigate:

(a) within the routes; or

(b) to aerodromes or heliports intended for use, including alternates.

Two level 1 or 2 VHF transceivers are required to be fitted for air operations in controlled airspace or mandatory broadcast zones.

For the purpose of this rule the duplication of systems originates from the electrical bus, and in all other respects should be independent.

135.353(4)

This rule requires all instruments and equipment installed in the aircraft to be in an operable condition, unless covered by the provisions of a Minimum Equipment List (MEL). However an MEL cannot contain any instruments or equipment that are:

(a) specifically or otherwise required by the airworthiness requirements under which the aircraft is type certificated; or

(b) required by this Subpart for specific operations; or

(c) required by an airworthiness directive to be in an operable condition.

Reference should be made to rule 91.539 for the approval of an MEL.

135.355 – Seating and Restraints

This rule places the responsibility on the operator to ensure the aircraft is appropriately equipped with the required restraints. This would logically form a part of, or a checklist item, in the introduction of any aircraft to the operator's fleet.

135.357 – Additional Instruments

This rule places the responsibility on the operator to ensure the aircraft is appropriately equipped with the required instruments. This would logically form a part of, or a checklist item, in the introduction of any aircraft to the operator's fleet.

135.359 – Night Flight

This rule places the responsibility on the operator to ensure the aircraft is appropriately equipped with the required equipment if it is to be operated at night. This would logically form a part of, or a checklist item, in the introduction of any aircraft to the operator's fleet.

135.361 – Instrument Flight Rules

This rule places the responsibility on the operator to ensure the aircraft is appropriately equipped with the additional instruments and equipment if it is to be operated under IFR. This would logically form a part of, or a checklist item, in the introduction of any aircraft to the operator's fleet.

135.363 – Emergency Equipment

The intent of this rule is to ensure the aircraft has the emergency equipment required by rule 91.523 regardless of the exceptions relating to seat breaks. Any procedure, checklist/matrix for emergency equipment would logically fall into the functional area for the introduction of an aircraft to the operator's fleet.

135.367 – Cockpit-Voice Recorder

This rule is self explanatory about what helicopters it applies to. Because installation of a CVR is a significant cost, the CAA recommends that the cost of compliance with this rule is factored into the purchase cost of any helicopter that is required to have a CVR fitted.

135.369 – Flight Data Recorder

This rule is self explanatory about what helicopters it applies to. Because installation of a FDR is a significant cost, the CAA recommends that the cost of compliance with this rule is factored into the purchase cost of any helicopter that is required to have a FDR fitted.

135.371 – Additional Attitude Indicator

This rule is unlikely to affect aircraft operated under Part 135.

Subpart G – Maintenance

135.401 – Purpose

This Subpart prescribes maintenance responsibilities and requirements that are additional or complementary to those in Parts 43, 91 and 119.An operator is not permitted to transfer any maintenance responsibilities to the contracted maintenance provider. However, rules 119.61(b) and 119.109(b) allow an operator to transfer maintenance functions to the maintenance provider if details of the functions, scope of maintenance and authority of the maintenance provider are detailed in the exposition. It is also recommended that a comprehensive written contract be established with the maintenance provider.. Further guidance has been provided in the advisory information for rule 119.61 and 119.109 in AC119-1, and in Appendix B of AC119-1.

135.402 – Option for Maintenance

The intention of this rule is to allow the operator to choose whether the company's aircraft will be subject to annual reviews of airworthiness (ARAs) or, under certain circumstances, maintenance reviews (MRs).

For an operator to be eligible to choose the MR option:

(a) the operator must have an organisational management system that complies with rule 119.124(c); and

(b) the aircraft must be maintained by the holder of a Part 145 maintenance organisation certificate.

An operator of multiple aircraft that meets the eligibility requirements above may also choose to subject some aircraft to ARAs and others to MRs.

The option chosen for each aircraft must be identified in the maintenance programme.

This rule also reiterates rule 43.54(a) by requiring an operator of a helicopter that has a MCTOW of more than 5700 kgs or a maximum certificated seating capacity, excluding any required crew member seat, of 10 seats or more to have the maintenance performed by the holder of a Part 145 maintenance organisation certificate, or a similar organisation if the maintenance is performed overseas in a country that is party to a technical arrangement. Operators of smaller helicopters and aeroplanes may choose to have the maintenance performed by a maintenance provider that is not the holder of a Part 145 maintenance organisation certificate, provided the MR option has not been chosen.

Operators should note that if their aircraft are required be maintained by the holder of a Part 145 maintenance organisation certificate (e.g. because the operator has elected to subject their aircraft to MRs, or because of the size of the helicopter), in accordance with rule 43.51(c)(2) **ALL** maintenance on those aircraft must be completed by person(s) that hold a valid Part 145 authorisation. This requirement includes avionics maintenance, component maintenance and pilot maintenance.

135.403 – Responsibility for Airworthiness

The intent of this rule is to give the operator the responsibility for:

(a) the airworthiness of the entire aircraft, including any equipment installed in or attached to the aircraft; and

(b) ensuring that the aircraft is maintained in accordance with the maintenance programme.

This means that the operator is responsible for determining what maintenance is required, when it has to be performed, by whom, and to what standard, in order to ensure the continued airworthiness of the aircraft being operated. An operator should therefore have adequate knowledge of the design status (type certification basis, customer options, ADs, modifications, operational equipment) and the maintenance requirements peculiar to each aircraft being operated.

An operator should establish adequate co-ordination between flight operations and the maintenance provider, to ensure that both receive all information on the condition of the aircraft to enable both to perform their tasks.

This does not mean the operator must perform the maintenance. However, the operator carries the responsibility for the airworthy condition of the aircraft it operates, and thus should be satisfied before the intended flight that all required maintenance has been properly carried out and recorded.

When an operator does not carry out the maintenance, then a clear work order must be given to the contracted maintenance provider. The fact that an operator has contracted its maintenance out should not prevent procedures being established to check any aspect of the contracted work.

Such procedures would ensure that the operator's responsibility for the airworthiness of the aircraft is met.

135.405 – Condition Monitored Maintenance Programmes

Condition monitored maintenance is explained in AC119-5.

Very few aircraft operated under Part 135 utilise condition monitored maintenance programmes. However, if they do, this rule places the responsibility on the operator to provide the Director with monthly reliability reports.

135.415 – Maintenance Review

The intent of this rule is to allow an air operator that meets the eligibility requirements in rule 135.402 to complete a maintenance review (MR) once a year in accordance with rule 135.415(b) or, if the operator is the holder of an airline air operator certificate (AAOC), progressively over each 12-month period in accordance with an internal quality assurance programme that is acceptable to the Director.Rule 135.415(d) requires the operator to authorise the person used to carry out MRs. This person does not necessarily need to be the holder of a Part 66 aircraft maintenance engineer licence and rating on the type of aircraft, but must have equivalent experience to that required to grant a Part 66 rating for the type of aircraft. The authorisation may be just stated in the operator's exposition, or issued as a separate written document.

Subpart H – Crew Member Requirements

135.503 – Assignment of Flight Crew Duties

The intent of this rule places the responsibility on the operator to ensure that flight crew are suitably qualified and designated to crew functions. If this is broken into functional areas then the normal administration functions for proficiency and training could pick up the requirements of rule 135.503(a). The designation of crew positions required by rule 135.503(b) could be included within the standard operating procedures that are general to types of operation.

Reference should be made to advisory material contained in AC 119-1 under rule 119.115 as these rules are related and could be combined. These rules contain the need for a procedure, a requirement to ensure, and prohibitions or mandatory requirements that could be combined.

135.505 – Pilot-in-Command Consolidation of Operating Experience on Type

This rule prescribes the minimum experience on the make and basic model of aircraft type prior to a pilot being designated to act as pilot in command on an air operation.

135.505(a)

This rule describes the operating experience required for single engine aircraft, multi-engine aircraft, and for turbo-jet or turbofan aircraft.

There are additional experience requirements for single pilot air operations under either IFR or VFR at night.

135.505(b)(c)(d)

The consolidation of operating experience can begin after the pilot has completed the initial (including the type rating), and transition training and after the successful completion of the flight crew competency check. This provision enables the consolidation flying to be carried out on a revenue flight.

If the pilot already has a current flight crew competency check for that operator that is less than 180 days old a competency check does not need to be done in the new type. If it is older than 180 days a competency check is required to be done on the new type. If the consolidation flying cannot be completed within 180 days of the competency check another one must be completed before recommencing the consolidation flying.

The rule is specific as to what constitutes consolidating experience. Consolidation experience should be completed on air operations (air transport or commercial transport operations), or for a new type being introduced into an operation, proving flights or ferry flight time can be used. However, any other Company flight that is completed under the authority of the AOC could be considered to be an air operation provided the full flight is conducted in accordance with the operator's exposition requirements including such things as weather planning, passenger briefing, fuel & trip planning, weight & balance, flight following, and decision making.

The pilot undertaking this consolidating experience is required to perform the duties of the pilot in command under the supervision of a pilot who has been authorised in writing by the operator. The supervising pilot is the designated pilot in command and he/she logs pilot in command time. The pilot being supervised also logs pilot in command time but annotates it in the pilot logbook "under supervision". This consolidation flight time does not count towards the pilot's total experience.

Ten hours of the 40 hours of consolidation training for night VFR or IFR may be done in a Flight Training Device that is acceptable to the Director. The Flight Training Device should be essentially similar to the aircraft type.

For multi-pilot aircraft the supervising pilot in command must occupy a crew seat while supervising the consolidating flying and in order to allow him to exercise his/her responsibilities should have a set of dual controls fitted. If the supervising pilot is not an instructor it would be prudent to have him/her checked out to fly in the other seat. However, for single pilot aircraft, the designated pilot in command is not required to occupy an crew member seat but must still supervise the pilot in command under supervision and be in a position to fulfil his duties under sections 13 and 13A of the Civil Aviation Act 1990.

There is no need for an operator to create "two pilot procedures" as long as the operation remains a single pilot one with the supervising pilot would only exercise his right to over-ride the pilot in command under supervision in the event that safety was in doubt.

If the aircraft is certificated for two or less passenger seats, consolidation flying on air operations is not required although the minimum hours prior to commencing air operations still apply.

135.509 – Experience Requirements for IFR pilots

This rule specifies the minimum experience requirements for pilots who are required to perform IFR air operations by day or by night. It refers to specific and total flying experience whereas 135.505 refers to experience on type.

135.511 – Minimum Flight Crew

The first part of this rule specifies the crew and equipment requirements for single pilot IFR air operations.

The second part of this rule specifies the requirements for two pilot operations on IFR or VFR operations. It calls for written procedures covering the duties of both the pilot flying and pilot not flying.

Subpart I – Training

135.553(a) – General

This rule places the responsibility on the operator to establish a training programme that will ensure crew members are trained and competent to perform their assigned duties.

The programme should include all the elements contained in this subpart. It is also an opportunity to include many other rule requirements where the operator is required to ensure or make flight crew aware of prohibitions and mandatory requirements that may be contained in other subparts.

Each holder of an air operator certificate whose area of operation includes mountainous terrain should establish in the operators exposition a CAA accepted mountain training programme to ensure that each of its crew members are trained and competent as a prerequisite requirement before they operate into such areas.

Additional guidance material for establishing in house training courses and assessments can be found in AC141–1 and in the case of Mountain Flying programmes, Appendix D to this AC for fixed wing aircraft and Appendix E to this AC for helicopters.

135.553(b) – General

This rule requires the operator to ensure each crew member is trained in accordance with the programme that is contained in the operator's exposition. Some method of programming and scheduling flight crew within the programme will be required.

The Mountain Flying Ground Course and Flying Course syllabus for aeroplane and helicopter can be found in Appendix D and E to this AC.

If operating in a mountainous environment the minimum flight time to demonstrate ground course syllabus items is:

(a) **Fixed Wing** – Initial training, a minimum of 10 hours flying; or sufficient further hours as required for the pilot to be fully conversant in the appropriate mountainous environment flown by the operator. These 10 hours are to include flying in variable weather conditions so that the pilot can experience and be shown the variance between clear skies, and marginal weather conditions on typical operating routes in the region including escape and alternative routes. The completion of the above hours would desirably be over a period of time, to encounter the variable conditions required. The operator is required to make all reasonable attempts to include experience of typical weather conditions, and the pilot demonstrate to the operator a satisfactory standard and knowledge on the route being operated before a pilot is cleared to fly on line. This needs to be then signed off in the pilots training file.

(b) **Helicopter** - Training beyond the 10 hour CPL issue requirement should be sufficient further hours flown as required for the pilot to be fully conversant in the appropriate specialist operations of the mountainous environment flown by the operator as outlined in the company exposition.

135.553(c) – General

This rule places the responsibility onto the operator to control the training programme. This will entail specifying the training and ensuring that it is carried out in accordance with the operators' requirements. It should not be left up to the training provider to decide what is required without any input from the operator.

135.553(d) – General

This rule provides the operator with the ability to:

(a) conduct the training within the scope of the Part 119 organisation provided that with respect to mountain flying training, instructor requirements of rule 135.567 are met. Training procedures that cover the training to be done (initial, transition, recurrent, type rating) will be required as well as some means of recording it; or

(b) contract the training to an organisation certificated under Part 141 provided that with respect to mountain flying training the organisation has a CAA approved course and the instructor is authorised per rule 135.567 to conduct that training. As noted above the training organisation should have procedures for the conduct of the training they are contracted to do; or

(c) when the training is conducted outside New Zealand, to contract to a training organisation equivalent to a Part 141 organisation.

Where training is conducted outside New Zealand with an organisation that meets an equivalent standard but does not have designated mountainous terrain, it would still be necessary to meet the 10 hour minimum requirement for local knowledge conversion - mountain flying in New Zealand for aeroplanes, and in the case of helicopters, sufficient hours to be conversant in the appropriate mountainous operations.

Where a pilot has experience in similar mountainous environments acceptable to the Director, in fixed wing the further 2 hour minimum training as per rule 135.559 would apply and in helicopters a flight check to establish that competence in mountainous operations meets the intent of this AC.

For an operator to conduct their own training they must employ, contract or otherwise engage appropriately qualified instructors as described in rule 135.567.

135.555 – Training Records

This rule requires the operator to maintain accurate records of training for crew members. This may be provided in a set of procedures that encompass the maintenance and retention of records that are required to be generated by an operator generally or specifically for this Part. Refer rule 119.67 or rule 119.115.

For mountain flying training the operator is to keep accurate records of the training details of each pilot from commencement of such training, demonstrating that each appropriate element of the syllabus in Appendix D and E has been completed. These records should be held along with the pilot's operational competency, and route assessment in the company training files.

The checklist, log and certificate examples included in Appendix D and E provides a guideline as to the means of documenting this training programme.

135.557(a) – Initial Training of Crew Members

This rule places the responsibility on the operator to provide initial training to any crew member. This should have the effect of preparing a crew member to successfully complete a competency check prior to commencing operations with the operator.

135.557(a)(1) – Initial Training of Crew Members

This rule provides that the initial training is structured in a logical manner that progresses the crew member through the programme.

135.557(a)(2) – Initial Training of Crew Members

This rule places responsibility on the operator to develop a syllabus that includes training in all the listed elements that are applicable to the intended operations. This not only includes training on the aircraft type, the routes and aerodromes, but also the operator's policies, procedures and standards.

The ground course and flying programme contained within Appendix D and E to this AC provides an acceptable option for mountain flying training.

On the basis that the completed exposition represents the operator's method of compliance with the appropriate rules, this section could be the procedure that provides compliance with many other Rule Parts that require procedures, the operator to ensure, or prescribes prohibitions and mandatory requirements.

135.557(b) – Initial Training of Crew Members

This rule enables the operator to assess the training, qualifications and experience of any potential crew member and vary the initial training syllabus as appropriate providing a record is made of the variation on the training record and includes the reasons for the variation.

135.559 – Transition Training for Crew Members

This rule requires the air operator to assess the need for transitional training and then provide appropriate transitional training to flight crew where the crew member is changing from one aircraft type or variant to another, or new procedures or new equipment are introduced. The procedure required for this should provide for an assessment of the degree of training required, dependant on the changes being made, and then providing for that training.

When considering the requirements of this rule the definition of a variant as defined in Part 1 should be used, and this may require consultation with the CAA. Otherwise the extent of the training that is required for the introduction of new aircraft, equipment or procedures should be determined by the degree of change being introduced with particular emphasis being placed on the safety and emergency equipment and procedures.

Where mountain flying operations expand into a region of more challenging terrain the training programme should reflect such by adapting to accommodate.

It is recommended that for fixed wing this expansion would require a minimum of 2 hours flying to ensure the pilots ability to apply the principles in a more challenging area. In the case of helicopter a minimum of a flight check in such terrain be required.

The air operator should ensure the transition training programme for an additional aircraft type rating include mountain flying training specific to that type and model.

135.561 – Recurrent Training for Crew Members

This rule places responsibility on the operator to ensure all crew members are trained, current, and proficient for each aircraft, and type of operation being performed.

For operations being performed under Part 135 the recurrent training would normally be generated from such things as incidents, accidents, areas of weakness identified during routine competency checks, random quality checks or any other indicator that could identify a training need.

When a pilot is required to fly more than one type on air operations the operator should schedule recurrent training (in normal and emergency procedures) in the types that have not been checked on the flight crew competency check. This enables the operator to satisfy the requirement to ensure that crew members are proficient in each aircraft.

In respect of mountain flying where any recurrent training results from occurrences such as in the above paragraph, this training should be documented as per sample checklist in Appendix D and E.

135.565 – Flight Crew Training Programme

This rule combines all the elements of this subpart into a flight crew training programme that is unique to the particular operation.

This is a mandatory requirement for the operator, and should be used to combine the requirements from throughout the rules as much as practicable.

135.567 – Flight Crew Member Instructor Qualifications

This rule places the responsibility on the operator to ensure that any person acting as a flight instructor in the flight crew training programme:

(a) has satisfactorily completed the training required by the operator's training programme to be able to act as pilot-in-command in the operation;

(b) is appropriately qualified as an instructor; and

(c) has completed the initial and recurrent training requirements applicable to the instruction to be carried out.

This rule may require a procedure or a checklist of elements of the rule to ensure compliance with this rule. As there are three main elements to this rule they could be included on the training checklist and completed by the instructor at the time to confirm compliance with the rule.

Part 135 Mountain Flying Training Instructor minimum qualifications and experience except helicopter advanced mountain flying training instruction as follows:

(a) A, B, or C category instructor rating; and

(b) at least one years experience including 50 hours flying in a recognised mountainous environment, or overseas equivalent; and

(c) minimum 700 hours total time in appropriate category including 100 hours instructional experience; and

(d) have completed a CAA accepted Mountain Flying Course; and

(e) have demonstrated competence to an appropriately qualified flight examiner and on successful completion have had their logbook endorsed.

The minimum qualifications and experience to conduct helicopter advanced mountain flying training instruction as follows:

(a) A, B, or C category instructor rating; and

(b) at least one years experience including 150 hours as pilot in command of a helicopter flying in a mountainous environment; and

(c) minimum 700 hours experience in helicopters including 300 hours instructional experience in helicopters; and

(d) have completed a CAA accepted Mountain Flying Course; and

(e) have completed an assessment flight in the presentation of mountain flying by an instructor approved under this AC for the purpose.

Subpart J – Crew Member Competency Requirements

135.601 – Purpose

This subpart prescribes the rules governing the operational competency assessment of flight crew members. It should be read in conjunction with rule 119.53 or rule 119.103 as applicable.

135.603(a) – General

This rule requires the operator to establish and control an operational competency assessment programme that encompasses all the elements of Subpart J. The programme could be structured to provide for the competency checks to be carried out over the required period.

135.603(b) – General

This rule goes on to enable the operator to conduct the competency assessment programme itself, to contract an organisation certificated under Part 141, or where the assessments are conducted outside New Zealand to contract an organisation outside New Zealand that is equivalent to a Part 141 organisation.

For an operator to conduct their own competency testing they must employ, contract or otherwise engage appropriately qualified flight examiners as described in rule 135.605.

135.605(a) – Flight Examiner Qualifications

A method of ensuring compliance with this rule may require a procedure, or could be included in a checklist of the elements of the rule and retained in the personnel records required by rule 119.115.

Rule 135.605 (a) makes it clear that whoever is to be used as a flight examiner to carry out an operator's competency checking programme needs to be type rated, have a current flight examiner rating, be familiar with the types of operations that are conducted and have completed the initial and recurrent training requirements applicable to the testing to be carried out.

135.605(b) – Flight Examiner Qualifications – Simulator Training

This rule would not normally apply to a Part 135 operator, but in the event a simulator is to be used then it is the responsibility of the operator to ensure the flight examiner is appropriately qualified and current.

This rule may require a procedure or a checklist of elements of the rule to ensure compliance with the rule. As there are three main elements to this rule they could be included on the competency checklist and completed by the flight examiner at the time to confirm compliance with the rule.

135.607(1) – Flight Crew Competency Checks

This rule places the responsibility on the operator to ensure that the elements of a route and aerodrome proficiency check are carried out for each pilot acting as pilot-in-command. It then specifies the period that the check must be carried out. It then requires a ground-based procedure check over one route segment and a flight check with one or more landings at an aerodrome representative of the operations to be flown.

During this annual check of competency and route, components of the Mountain Flying principles and techniques should be evaluated for continued competency.

The above, as applicable, should be included as a part of the competency assessment programme that is mandated by rule 135.603, and could be addressed as checklist items with notes or

comments as required confirming the completion of the checks. Any assessment forms associated with this check should be accurate and be retained as specified in rule 135.859.

Where a crew member is conducting both VFR and IFR operations then the elements of both requirements will have to be met. It is suggested that a VFR competency check is combined with each second IFR check.

135.607(2) – Flight Crew Competency Checks VFR

This rule specifies the period for competency checks of a pilot conducting VFR operations and covers operating procedures, including emergency procedures, in an aircraft type normally used by the pilot in the operation. This should form a part of the operational competency assessment programme required by rule 135.603.

Where a pilot is employed by two operators , the flight check for one may be used for both operators provided the aircraft is of the same type, the operations are substantially the same, and the flight examiner is common to both organisations. In this case both operator's flight check forms would be completed and signed by the flight examiner.

135.607(3) – Flight Crew Competency Checks IFR

This rule specifies the period and condition for the conduct of IFR competency checks that are additional to those required for VFR operations.

The check must be conducted in **each aircraft type** that is used for IFR operations, with the exception that for aircraft configured for less than nine passenger seats the check may be taken in rotation in each aircraft type with one in each six-month period.

Where it is intended that IFR operations be conducted this should form a part of the operational competency assessment programme mandated by rule 135.603.

135.607(4) – Flight Crew Competency Checks

This rule specifies the period and mandates a written or oral test of the pilot's knowledge of the items listed in the rule. Regardless of whether a written or oral test is to be conducted the operator would have to develop a set list of items to be tested. This would not only cover those elements covered by this rule, but where it is intended to utilise the training and competency testing programmes to cover areas of the various rules that require an operator to ensure, mandate or apply a prohibition these items should be included. It is accepted that this could make up a very large list of items that would not be practicable to cover each time. In this case providing the programme requires a review of the previous tests, then a random sample of the check items could be satisfactory and over a series of checks the entire list would be completed. **It should be noted that the written or oral test on aircraft systems, performance, operating procedures, and the contents of the flight manual are required for each type flown, not just the type being flown on the check.**

This part of the flight crew competency check is not portable between operators as it covers several operator specific items.

If any significant weaknesses are found by the flight examiner it may identify a need for some recurrent training to be scheduled.

This should form a part of the operational competency assessment programme required by rule 135.603.

135.607(5) – Flight Crew Competency Checks

This rule requires an entry to be made and certified by the flight examiner in the pilot training record indicating the result of the test. This could simply be included on the record of the test.

135.607(6) – Flight Crew Competency Checks

This rule requires the competency check to be carried out in an aircraft or simulator approved for the purpose. This means that the Director must approve both the aircraft type and the simulator.

135.611 – Crew Member – Grace Provisions

Provided a crew member completes a test or flight check within 60 days before the date on which it was due the crew member is deemed to have completed it on the original date. There is no latitude for completing the test later than the due date. If a flight crew competency check cannot be completed by the due date all air operations must cease until it is completed. The new date then becomes the date from which the next check is scheduled.

135.613 – Competency and Testing Records

This rule requires the operator to maintain accurate records of competency assessment. This may be provided in a set of procedures that encompass the maintenance and retention of records that are required to be generated by an operator generally, or specifically for this Part. Refer rule 119.67 or rule 119.115.

Subpart K – Fatigue of Flight Crew

135.801 - Introduction

Fatigue has been defined as weariness from exertion. It can result in a degradation of human performance capability, alertness and mood.

Studies have shown that continued wakefulness after 16 hours has resulted in lower levels of alertness, vigilance, sustained attention to tasks and reaction times of between 12 and 15 percent.

Fatigue is an operational concern because it can reduce the performance capacity of flight crew. Performance degradation can be gradual and insidious, and effectively reduces the physical and mental resources that an individual has available to meet their job requirements.

During the onset of fatigue, the person experiencing this condition is the least capable of making any assessment of their performance.

Fatigue is most likely to increase when a person is subject to unusual or high workload situations, or when an individual must respond under time pressure – this can lead to errors. There are many recognised factors that can contribute to fatigue-related performance degradation:

(a) The duration of a duty period, and the pattern of workload.

(b) Trying to work after inadequate sleep, – both the duration and quality of prior sleep are important.

(c) Trying to work against the circadian biological clock, which effectively programmes people to sleep at night and be awake during the day.

The Cumulative Effects of Extended Duty Periods

Purpose

The purpose of this information is to assist operators to develop their own scheme for the management of fatigue. It is not the purpose of this information to attempt to set any limitations in flight, duty or rest periods for an air transport operator, although limits have been set for commercial transport operations.

Operators are encouraged to develop their own unique scheme to suit their particular operational requirements. The factors that must be considered, where they are applicable, are contained in rule 135.803(a)(2). Factors that are to be considered are not limited to those in the rule.

An operator should, in submitting a flight-and-duty scheme for consideration, document how the factors contained in rule 135.803(a)(2) have been addressed in relation to the operation. This information is to assist in the assessment of the scheme.

There is currently an acceptable flight-and-duty scheme for Part 135 in AC 119-2. This scheme however, by virtue of its broad applicability, does not allow an operator conducting a combination of air transport, commercial transport and other hire-and-reward operations, e.g. agricultural, external load operations, to realise the full potential of the fatigue rules. The purpose of this information is to provide advice on how the full potential of Subpart K may be used commercially.

Rule Requirements

Rule 135.803 places the responsibility on the operator to develop flight and duty time limitations applicable to the particular operation in a method acceptable to the Director. The rule requires

that the operator take consideration of some 21 factors in the design and development of this scheme.

Rule 135.805(b) places a responsibility on the flight crew member to ensure that other hire or reward flight duties will not exceed the flight and duty scheme of the air operator. This will in effect require all hire or reward operations to be considered within the overall scheme. The combination of rule 135.805(b) and rule 135.803(b) makes the management of fatigue a partnership between the operator and the employee, as both have a shared responsibility to ensure that fatigue is taken account of responsibly.

In the presentation of a scheme for the management of fatigue, the Director may accept that scheme for a lesser period than the Air Operator Certificate. This restriction is to show a scheme to be proven and acceptable. During that trial period the CAA may conduct monitoring of the scheme to assess its effectiveness. This may include attendance of the management review meetings, review of corrections and interviews with flight crew.

Definitions

When developing a flight and duty scheme the definitions contained in Part 1 *Definitions and Abbreviations* should be used. However where Part 1 does not specify a definition, the following could be used.

Adequate rest facilities means a single-occupancy bedroom that is subject to a minimal level of noise, is well ventilated and has facilities to control the levels of temperature and light, or where such a bedroom is not available, an accommodation that is suitable for the site and season, is subject to a minimal level of noise, and provides adequate protection from the elements.

Disrupted schedule means a schedule that, by reason of circumstance outside the control of the operator, is prevented from being completed within its scheduled time:

Duty & duty period

Duty means any task (including positioning) that a crew member is required to carry out associated with the business of the air operator.

Duty period means any continuous period during which a crew member is required to carry out any task associated with the business of an air operator. It includes any flight duty period, positioning, ground training, ground duties and standby.

Where a flight crew member is required by an operator to be on duty or available for duty for two or more periods separated by an interval of less then 10 hours, the periods are to be deemed continuous, starting when the first of the periods begins and finishing when the last period ends.

External operation means an operation, excluding an operation to the Chatham Islands, the greater part of which is carried out outside the territorial waters of New Zealand:

Flight duty time means the period of time that starts when a flight crew member reports for a flight, or reports as a flight crew member on standby, and includes the time required to complete any duties assigned by the air operator. For a flight engineer it includes the time required to complete aircraft maintenance duties prior to or after a flight.

Internal operation means an operation that is carried out between places within New Zealand, and includes an operation between the islands of New Zealand:

Positioning means the practice of transferring flight crews from place to place as passengers in surface or air transport at the behest of an air operator.

Recovery period means a period free of duty following a duty cycle of length greater than 48 hours during which the crew member may recover from the cumulative effects of fatigue.

Rest period means any period of time on the ground during which a flight crew member is relieved of all duties by the operator, where the rest is not interrupted by the operator. It should not include travel time to or from the rest facility, meals or time for personal hygiene.

Standby period means the period of time during which a flight crew member is required to hold themselves available for active duty:

Split duty means a flight duty period, which consists of two duties separated by a break on the ground during which the crew member is relieved of all duty.

Split-duty time means a split-duty period during a day where the flight crew member has:

(a) advanced notice of the split-duty time; and

(b) the crew member receives adequate rest in suitable accommodation.

Stay in an area means a stopover in an area for a period that includes a facility for two normal night's rest; that is, two consecutive periods between midnight and 6 am local time:

Tour of duty means the period of time commencing at the start of duties at home base prior to a series of flights and ending at home base on completion of the duties associated with the series of flights:

When a flight crew member is based temporarily at a place other than his home base, that place, for the period of the detachment, will be regarded as his home base:

Total hours of duty means the sum of the duty periods within any particular period that a flight crew member is at the disposal of an operator.

Unforeseen operational circumstances means an event that is beyond the control of the air operator, such as unforecast weather, equipment malfunctions, or air traffic control delays.

Fatigue Management Schemes

Fatigue Management Schemes should aim to take a broader approach to the consideration of fatigue as an operational factor, addressing all possible causes of fatigue. Implicit in this approach is the recognition that factors outside the workplace that can make an important contribution to fatigue, and that fatigue management is a shared responsibility of air operators and individual flight crew.

The considerations and determinations made for each element contained in rule 135.803 should be documented, and records kept, allowing a continuous review to be made for the entire duration of the scheme. The information should be submitted in support of the flight-and-duty scheme for acceptance. Operators conducting both air transport and commercial transport operations will need to show in the scheme how the limitations and rest requirements of both of these operations are to be managed.

A scheme for the management of fatigue should be based on policies and systems. These policies and systems should include, but are not limited to:

(a) identification and assignment of responsibilities;

(b) ongoing education of management and staff;

(c) a fatigue and incident/accident reporting and investigation system;

(d) workload monitoring;

(e) identification and management of fatigued personnel;

(f) system review.

Items for consideration in the development of a scheme for the management of fatigue

An air operator submitting their own flight-and-duty scheme for acceptance must address the elements contained in rule 135.803(a)(2). In addressing rule 135.803(a)(2) and developing a scheme for the management of fatigue, an operator should ensure that at least these five factors below are addressed:

(a) The scheme should identify all the factors influencing fatigue and apply appropriate weightings to these.

(b) The organisation's management, in conjunction with the flight crew, have developed the scheme.

(c) The flight crew or the flight crew representatives have been consulted on all aspects of the scheme.

(d) The scheme should contain a formal method of feed-back from flight crew.

As a part of a quality management system, the scheme should contain a monitoring system with a provision for regular reviews of the scheme by management and flight crew. This review should provide the assurance that the scheme is effective and is achieving the desired outcomes.

Monitoring of Workload of Flight Crew While on Duty

The method by which an operator chooses to monitor the workload of flight crew should be defined in a policy. The policy should indicate trigger levels in the monitoring system that indicate to management and staff at the regular review meetings the need to reassess the current situation and to make any necessary adjustments. The following indicators should be considered:

(a) Geography – Terrain.

(b) Meteorological Conditions – Wind, visibility and low cloud, significant hazardous phenomena, special phenomena.

(c) Type and Density of Traffic – Type of air traffic, density of air traffic, aircraft activity forecasts, peak IFR movements.

(d) Air Traffic Services – Provision of air traffic control services, provision of flight information services, provision of alerting services, proximity of controlled airspace.

(e) Instrument approaches – Instrument approach procedures, approach sequencing, IFR training.

(f) Circuit Patterns – Aerodrome circuit selection, non-standard circuit patterns, noise abatement procedures.

(g) Aerodrome and approach facilities – Runways, railways, navigation approach and landing aids, radio and radar coverage.

(h) Other Aerodromes – Aerodromes in the vicinity of the aerodrome.
Special aircraft operations – Non-scheduled larger aircraft, special events, non-radio equipped aircraft, sport/recreation aircraft, Military aircraft.

Air safety incidents and other occurrences – Air safety incidents, emergencies and accidents, bird hazard, air safety incident reporting, non-compliance with CAA rules, security.

Shift rotation in use

Many aspects of rosters can potentially be modified (duration and timing of operations, number of consecutive operations, direction of rotation, duration of rest periods, etc) and an infinite number of combinations is possible. The type of rostering system that an operator may have in place is less important than the reflection of accepted fatigue management principles in a fatigue management scheme. These principles include the following:

(a) An individual in the management structure who has the responsibility for rostering has received education about the effects of shift work, and shift work management strategies.

(b) Personnel responsible for designing rosters have received education about the effects of shift work, and shift work management strategies.

(c) Personnel working shifts have received education about the effects of shift work and personal coping strategies.

(d) Personnel working shifts have had the opportunity to participate actively in roster design.

(e) Consideration has been given to the rate of accumulation of sleep debt across the roster, and the provision of regular recovery opportunities (two full nights off).

(f) There is a real-time system for monitoring actual (as opposed to rostered) hours worked, and for prioritising eligibility for call back.

There is a system for monitoring concerns about rosters, and regular review of the issues raised. The review team will include representatives of management and the workforce, and will have the capacity to call upon independent expertise, where appropriate.

Methods of Grading Contributing Factors to Fatigue

Fatigue Weighting – It is recommended that an operator develop a method of grading the levels of fatigue that could be expected to be experienced during any particular type of operation, taking into account those elements contained in rule 135.803(a)(2).

Example A – a military system may specify an 8-hour flight and an 18-hour duty period. It will then go on to apply a multiplier for each hour of a particular operational mode. This is shown in Appendix A of this advisory circular.

Example B – could list each element of fatigue that has been identified and must be considered for the proposed operation. When satisfied that all the elements have been identified, apply a weighting to fatigue on a scale of minus 10 to plus 10 against each element. As every element that adds to fatigue has a plus factor the operator will then need to apply elements of rest, meal breaks, time free of duty etc that would apply negative fatigue factors to balance the scheme at an acceptable level. An example of this may be found in Appendix B of this advisory circular.

As previously stated, any scheme must contain a monitoring system with regular management and flight-crew reviews that will provide the assurances that the scheme is not only being

complied with, but is effective and is achieving the desired outcome of managing fatigue within acceptable levels.

135.803 – Fatigue of Flight Crew

135.803(a) The intent of this rule is to require an operator to establish a flight-and-duty scheme for the management of fatigue in flight crew. It provides general considerations for air transport operators and specific limitations for commercial transport operators. **It also places a prohibition on the operator not to permit or cause to permit a person to act as a flight crew member if the operator knows or has reason to believe the person is suffering from fatigue, or is likely to suffer from fatigue.**

To meet the flight-and-duty scheme requirements for air transport operations an operator has two options:

(a) develop a flight-and-duty scheme under rule 135.803(a)(2) or;

(b) use the flight-and-duty scheme contained in AC119-2.

Advisory Circular AC 119-2 is a scheme based on the old CASO 3 and has been proven historically to be sound. If adopted, it must be applied in its entirety to air transport operations conducted under Part 135. It falls well within the limitations specified for commercial transport operations except that the requirement for two consecutive days off in every 30 must be programmed separately.

Any scheme presented for acceptance must contain fixed limits in regard to flight, duty and rest periods. These limits are to be defined and monitored by the operator. In developing these limitations, an operator should show that they have addressed the following items.

(a) Air transport operations

(b) Commercial transport operations

(c) Other hire or reward operations

(d) Casual or free lance flight crew

(e) Single pilot crews

(f) Two-pilot crews

(g) Instrument flight rules operations

(h) Visual flight rules operations

(i) Duty time

(j) Flight time

(k) Standby periods

(l) Rest periods

(m) Meal breaks

(n) Rest facilities

(o) Disrupted schedules due to unforeseen operational circumstances

(p) External operations

(q) Internal operations

(r) Tour of duty

The working documents used in the development of a scheme could be presented in the form of a matrix showing the elements that have been addressed and the weightings that have been applied to each element. Consideration must take into account all the elements that may affect fatigue in relation to the scope of the intended operations.

135.803(a)(2)(i) Rest periods prior to flight. It is recommended that the rest period prior to commencing a duty is a minimum of 12 hours. This break should provide adequate opportunity for sleep to minimise the effects of fatigue prior to commencing a duty cycle.

The greatest risk of fatigue is experienced on night operations. This is where the 12-hour minimum break will be most beneficial to staff and valuable in the management of fatigue. The period may vary but it should provide for adequate sleep, meals, travel and recreation.

The recovery value of rest periods depends on how much sleep a person is able to obtain. This, in turn, depends on how much of the rest period coincides with the time of day when the brain and the body are primed for sleep, by the circadian biological clock.

135.803(a)(2)(ii) Acclimatisation. The intention of this rule is to consider the effects of physiological adaptation to environmental stress. It is recommended that where flight crew are being transferred between temperate, artic or tropical climates a suitable rest period be provided prior to the commencement of duty for acclimatisation. This period may vary dependant on the period of transition between climatic zones. It is unlikely that acclimation will be a consideration for operations within New Zealand territories. This should also consider the affects of night operations and split duties.

135.803(a)(2)(iii) Time zones. It is recommended that where flight crew are being transferred between time zones, a suitable period of rest be provided prior to the commencement of duty for realignment of the normal circadian rhythms. This period may vary dependant on the period of transition between time zones, the direction of travel and the time differences being experienced. It is unlikely that time zones will be a consideration for operations within New Zealand territories.

135.803(a)(2)(iv) Night operations. The intention of this rule is to ensure an operator takes consideration of the effects of night operations and its effect on performance. Night operations will have the greatest effect on an individual's alertness and ability to perform complex tasks due to disruption sleep patterns. Alertness reaches a low point in the early hour of the morning (about 3-5 am, or slightly later on scheduled night operations) when the physiological drive for sleep is the greatest. The urge to fall asleep at this time is stronger when prior sleep has not been adequate. Consideration should be given to rest and meal breaks to overcome the low point in the circadian rhythm during this period of operation. Operations under Part 135 that would be likely to consider this element of fatigue would be night freight, emergency operations or IFR helicopter operations.

135.803(a)(2)(v) Maximum number of sectors. The intention of this rule is to ensure that an operator takes consideration of the number of sectors with respect to workload. Emphasis, in this assessment, may be given to operations that involve high-frequency charter operations; this is due to generally greater workloads that may be experienced.

135.803(a)(2)(vi) Single pilot operations. It is recommended that an operator consider this rule with respect to workload that may be expected in the operation. It is generally accepted that there is high workload associated with single-pilot operations, this will apply to the majority of Part 135 operations. Additional consideration should be given to single pilot IFR operations that may increase workload; this may include night operations.

135.803(a)(2)(vii) Two pilot operations. It is recommended that an operator consider this rule with respect to workload, and the impact of the second pilot. It is generally accepted that the presence of a second pilot has an effect of sharing the workload and possibly reducing fatigue levels. This will have limited impact on Part 135 operators, and will normally only apply to helicopter IFR operations.

135.803(a)(2)(viii) Two pilots plus additional flight crew members. The intention of this rule is to have an operator consider the further fatigue-reducing effects of further shared responsibility. This will have limited impact on Part 135 operators, and will normally only apply to helicopter IFR operations.

135.803(a)(2)(ix) Flight Crew Member's qualifications. The intention of this rule is to give consideration to qualifications over and above the minimum qualification required for the duties being performed by flight crew that could have the effect of reducing the level of fatigue associated with the duties being performed. In the consideration of this rule, experience of the pilot in the situation and environment should not be overlooked. Taking into consideration these two factors an assessment should be made as to a persons ability, with regard to effects of fatigue, to handle the situation in which they are operating.

135.803(a)(2)(x) Mixed duties. The intention of this rule is to give consideration to the mixture of duties likely to be undertaken during any duty period and apply a weighting to the likely stress levels. For example a combination of high-concentration lifting operations and relatively lower level sightseeing operations being conducted during the same duty period may require a reduction in the duty period or an increase in rest to maintain an adequate level of alertness throughout the period.

135.803(a)(2)(xi) Dead Head Transportation. The intention of this rule is to ensure that an operator considers how this time is to be addressed. It is not treated as rest time but should be included as duty time. This is not likely to apply to a Part 135 operation, but in the unlikely event flight crew are to be transferred as passengers after the completion of a flight, or to the commencement of a flight, consideration should be given to this time.

135.803(a)(2)(xii) Reserve or Standby Periods. The intent of this rule is to require any period of reserve or standby away from the place of work or duty to be considered as a form of duty, and some weighting in relation to fatigue should be made. Consideration should also be made for the time of day of commencement and cessation of standby in relation to duty.

135.803(a)(2)(xiii) Flight duty Period. The intent of this rule is to take into account the overall effects of fatigue over one duty period. This is from the time that a person is required by an operator to present themselves for duty to the time that an operator no longer requires that person for duty. For example this would normally effect operations where flight crew work to a roster of a month on and a month off, or any similar arrangement. This may have the effect of extending rest periods.

135.803(a)(2)(xiv) In Flight Relief. The intent of this rule is to allow for relief where multiple flight crews are available to provide in-flight relief of the duty crew. Overall all flight crew will be on duty, but the overall flight and duty period could be extended due to the relief provided by a

second flight crew. This consideration is unlikely for operations conducted under Part 135, and would normally only apply to large airlines flying over very long routes.

135.803(a)(2)(xv) Type of Operation. The intent of this rule is to take into account the stress and associated fatigue that will affect flight crew when undertaking various types of operation. A consideration should also be given where flight crew are required to perform more than one type of operation within the same flight-and-duty period. The workload of the various types of operation should be analysed and a fatigue weighting applied. Some examples are:

(a) VFR air transport operation between airports with paved runways, low traffic density and good weather patterns, that is the primary operation of an operator would have a medium to low fatigue weighting.

(b) IFR air transport operation into areas of high traffic density with poor weather patterns would have a high workload and a higher fatigue weighting.

(c) Commercial transport operation operating a low level or a lifting operation in a confined area would require a high level of concentration and therefore high stress levels and a higher weighting in regard to fatigue.

(d) Charter operation to an unfamiliar aerodrome or landing site would require more pre-flight planning and a higher level of concentration during the flight and consequently a higher fatigue weighting.

135.803(a)(2)(xvi) Cumulative Duty Time. The intent of this rule is to consider the effects of duty over periods of time. This includes the normal working day and the overall period encompassed by the scheme. For example this could include the duty day including any rest and meal breaks, and the annual duty cycle including public holidays, weekends and annual leave allotments. The weightings against fatigue could be negative in relation to a daily period and positive over the annual period where public holidays, weekends and leave are taken into account. Overall there should be a balance.

135.803(a)(2)(xvii) Cumulative Flight Time. The intent of this rule is to consider the effects of flight periods over time. This includes the normal working day and the overall period encompassed by the scheme. For example this could include many factors. The weightings against fatigue could vary in relation to a large number of flights over daily period, morning and afternoon operations with a large rest period during the middle of the day, a combination of mixed air transport, commercial transport operations, lifting or agricultural duties. The scheme should also consider the affects of fatigue over the annual cycle of the scheme. A workload assessment should be carried in relation to the support provided to flight crew in carrying out their duties and the complexity of the flights within the scope of the operation.

135.803(a)(2)(xviii) Discretionary Increases in Flight time Limitations or Flight Duty Times or Both. The intention of this rule is to provide for discretionary increases in flight and duty times within the scheme to provide for contingencies that arise from time to time due to unforeseen operational circumstances. Increases in flight and duty times should be assessed as having a negative effect on fatigue and provisions should be made to increase rest periods, provide meal breaks or any other strategy that will provide for fatigue recovery. The operator should have a procedure for approving discretionary increases in either flight or duty time limits. The procedure would cover the nature of the task, the weather, the pilot's experience, any limits to the increase, workload over the last 24 hours, acceptance by the pilot, authorisation by the Operations Manager after consideration of all the factors.

135.803(a)(2)(xix) Circadian Rhythm. This rule is considered in the assessment of many of the elements of fatigue that are required to be considered in this Subpart. It must be recognised that people do not function, physically or psychologically, at a steady, unchanging level across the 24-hour day. All of the organs of the body cycle through daily peaks and troughs of efficiency known as circadian rhythms, which are coordinated by a biological clock in the brain. The biological clock keeps the body "in step" with the day/night cycle by being sensitive to light and darkness, to work/rest patterns, and to the patterns of activity of other people. The clock is genetically based, and effectively programmes the body for sleep at night and for wakefulness during the day. It does not usually adapt much to night operations because it is constantly being drawn back to its preferred orientation by the unchanged day/night cycle and the activities of the rest of day active society.

Two aspects of circadian rhythms are directly relevant to fatigue management and safety in air operations.

(a) There are circadian rhythms in alertness and performance capacity, which can affect how a person responds to job demands.

Alertness reaches its daily low-point in the early hours of the morning (about 3 –5am, or slightly later on night operations) when the physiological drive for sleep is greatest. There is a second drop in alertness, and increase in sleepiness, in mid afternoon, corresponding to the naptime in siesta cultures. The urge to fall asleep at these times is stronger when prior sleep has not been adequate.

Both physical and mental performance capacity reach a daily low-point at a similar time in the early morning (about 3 – 5am, or slightly later on night operations). People working under time pressure, or with high workload, are most likely to make errors at this time. Particularly for tasks that require vigilance, there is also a secondary slump in performance capacity in the mid afternoon. The time of day of best performance depends on the nature of the task. For example, people usually perform best around noon on tasks that require complex mental processing. On the other hand, they generally perform best in the early evening on tasks requiring physical coordination and vigilance.

In practical terms, the circadian rhythms in performance capacity mean that people cannot be expected to function equally well at all times of the day, and that they are likely to have most difficulty on night operations.

(b) There are also circadian rhythms in the ability to sleep. In other words, people simply cannot sleep "at will". As already mentioned, the physiological drive for sleep is strongest in the early hours of the morning (about 3 – 5am, or slightly later on night operations). The physiological drive for waking up is strongest about 6 hours later. As a result, after night operations, people frequently wake up spontaneously after only a few hours of sleep. The daytime sleep of night workers is consistently found to be about one third shorter than their night time sleep.

In practical terms, the circadian rhythms in sleep propensity mean that it is possible to obtain more sleep in a nigh- time rest period than in a daytime rest period ***of the same length.*** *Thus night work is associated with maximum sleep loss and with working around the daily low-point in performance capacity.*

135.803(a)(2)(xx) Days Off. The intent of this rule requires the operator to consider the number of days off within the overall scheme. The number of days off including leave entitlements have a bearing on the cumulative effects of fatigue as has already been stated and should be assessed as an integral part of the scheme.

Short term and accumulated sleep deficit To be alert and able to function well, each person requires a specific amount of nightly sleep. The average for an adult is about 7 – 8 hours, but there are people who require more or less than this average. When this individual 'sleep need' is not met, waking function is degraded. For most people, getting two hours less sleep than they need on one night (an acute sleep loss of two hours) is sufficient to degrade their performance and alertness the next day. The reduction in performance capacity is particularly marked if less than about 5 hours sleep is obtained. The effects of consecutive nights of reduced sleep accumulate into a sleep debt, with alertness and performance becoming progressively worse.

To recover from the effects of sleep loss generally requires two nights of undisturbed sleep. Recovery sleep is usually deeper and more efficient, and the lost hours of sleep do not need to be recovered hour for hour.

In practical terms, any work pattern that requires a person to change the timing of their sleep, particularly night work, is likely to cause sleep loss. Because of the cumulative effects of sleep loss, it is important in roster design to consider the rate at which sleep loss is likely to be accruing across the roster. This should determine the number of consecutive night operations before a scheduled opportunity for recovery (two full nights).

135.803(a)(2)(xxi) Record Keeping. The intention of this rule is to take into account and clearly establish any record keeping activities the operator requires of the flight crew that are to be considered as a duty under the overall scheme. This will also extend to the records, forms and results of the review meetings generated during monitoring of the scheme.

135.803(3) Where an air operator conducts commercial transport operations the flight and duty scheme must include the limitations that apply to rule 135.803(3) and encompass any other hire-or-reward flight duties that that the pilot may be required to perform. The impact of these limits must be considered when air transport operations are to be carried out in conjunction with commercial transport or other operations. Once a flight-and-duty scheme has been accepted, any amendments to the scheme will require the Director's prior notification and acceptance as stated in rule 119.165.

135.803(b) This rule is a prohibition and places a responsibility onto the operator performing an air operation to not cause or permit any person to fly in an aircraft as a flight crew member if the operator knows or has reason to believe that person is suffering from or is likely to suffer from fatigue. A scheme in itself is not sufficient to satisfy this rule as the effects of fatigue are variable between individuals, and the operator will have to monitor the individual fatigue performance and provide within the scheme a method of feedback from staff and make adjustments to the scheme as appropriate.

135.803(c) This rule requires the operator to keep accurate records in relation to flight and duty and could be covered within the administrative procedures for all types of record.

135.805 – Flight Crew Responsibilities

135.805(a) The intent of this rule is to place a responsibility on the flight crew member not to act as crew when fatigued or likely to become fatigued to a point, which may endanger the aircraft or its occupants. This is a prohibition that could be included in the scheme or initial training programme.

135.805(b) This rule is a prohibition and places a responsibility on the flight crew member from conducting other hire-or-reward duties where these would exceed the flight-and-duty scheme. It should be noted that other hire-or-reward operations could include Part 133 and 137 operations, training, parachuting, balloon and adventure aviation operations etc.

Crew members working on a freelance basis will need to maintain an individual record of their flying and duty hours so that it can be presented to an operator before undertaking a flying duty.

135.805(c) This is a prohibition and places the responsibility on the flight crew member to ensure that the limitation prescribed in the flight-and-duty scheme of the air operator are not exceeded.

This in effect requires the crew member to have access to the progressive totals and limitations of the scheme. The crew member must have the ability to project the flight-and-duty time for the intended flight or series of flights during planning for flights. The limitations may be exceeded under the conditions specified in the Civil Aviation Act section 13A and appropriate reporting made.

Subpart L – Manuals, Logs, and Records

135.853 – Operating Information

The intent of this rule places the responsibility on the operator to ensure that the parts of the exposition relevant to the duties of each crew member are current and available. The currency of any part of the exposition should be covered in the general amendment process. The operator would normally make all or only the relevant parts available to crew through the distribution list.

135.855 – Documents to be Carried

This rule places the responsibility on the operator to ensure that the documents that are listed are carried where appropriate on each individual flight in addition to those documents required by rule 91.111. These requirements could be addressed in the operational functional area of flight preparation. For example in some areas where operations are conducted there may be no NOTAMs or AIS information.

135.857 – Daily Flight Record

This rule places the responsibility on the operator to ensure that accurate daily flight records are kept for each day an operation is conducted and contains the information stated in the rule. This is in addition to that required of a technical log required by rule 91.619. However, provided suitable explanatory procedures are included in the exposition, the detail required by these two rules could be combined if desired.

It should be noted that items 11 to 15 have to be gathered in such a way that the daily flight record details for every flight may be constructed. The placing if this information in the daily flight record rather than a passenger manifest gives the operator more flexibility as to its completion. However, the operator must have systems in place to ensure that the weight and balance information is available to the pilot prior to the flight.

135.859 – Retention Period

This rule requires the operator to ensure records are retained for specified periods. This is one of many rules that require records to be compiled and retained for various periods and it is an opportunity to bring together all the records for retention within one central record system. Reference should also be made to rules 119.67 and 135.555.

For convenience, a summary of record keeping requirements for a Part 119/135 operation over all rule parts is as follows:

- **119.115 –** Personnel records for anyone who is required to hold a Licence or Rating. Kept until **12 months** after the person ceases to be employed.
- **119.117 –** Resource records of the testing, checking and safety calibration of safety critical resources (scales, lifting equipment, fuel pumps, filters). Kept for **two years** from the date the details are recorded.
- **119.157 –** Copy of charter, cross-hire or lease agreement. Kept for **a year** after the date of the last flight under the agreement.
- **133.69 –** A plan covering operations over congested areas. Kept for **6 months** from the date of the operation.

- **133.75 –** Crew member competency checks and flight reviews. Kept for **4 years** from the date of that check flight.
- **135.93 –** Operations over congested areas. Plan kept for **12 months** from the date of the operation.
- **135.555 –** Training records (initial, transition, recurrent). Kept for **12 months** after the employment of the crewmember ceases.
- **135.613 –** Checking records. Kept for **12 months** after the employment of the crewmember ceases.
- **135.803 –** Flight & Duty Records. Kept for **12 months** after the entry was made.
- **135.857 –** Daily flight record. Kept for **12 months** after the date of the flight.
- **135.859 –** Retention period – summary:
    - Flight plan information (met, weather, notification of DGs). **12 months** from date of flight.
    - Flight crew records of flight & duty time. **12 months** from date of records entry.
    - Records of training, checking, and qualifications of each crew member. **12 months** after the crew member has left the AOC holders employment.
    - Daily flight record retained for not less than **12 months** after the date of the flight.

Appendix A

Example A

Crew Endurance Guide

Type of flight	Multiplier
Day	1.0
Day contour flight	1.3
Instrument flight	1.4
Night terrain flight	2.1
Night flight with NVGs	2.3

Appendix B

Example B

In this example an assessment of fatigue has been made and applied to each element relating to fatigue. This weighting is from minus 10 to plus 10. Overall when all the elements of fatigue are totalled up, an acceptable level of fatigue has been established.

For example, a fatigue level of 2 or less may be acceptable, and 3 and above may not. In the event of the level being high, adding factors that apply a negative weighting and bring the overall weighting down to an acceptable level may offset this.

The figures contained in the following table are provided as an example to illustrate the concept of fatigue weighting.

Rest periods prior to flight	-10
Acclimatisation Increase of 15degrees C	+5
Time zones difference 12 hours	+7
Night operations	+9
In flight relief	-3
Type of operation	+6
Meal breaks	-4
CTO operation with sling	+8
IFR	+2
Single pilot	+2
Two pilot	-2
Cumulative duty time	+2
Cumulative flight time	
Discretionary increases in flight and duty time	+4
Rest periods	-5
Standby periods	+2
Total acceptable	+5

Monitoring the scheme and applying adjustments as necessary in a formal manner would be required to make the scheme acceptable.

Monitoring of the scheme would require the following:

(a) Formal completion of questionnaire by flight crew on a regular basis.

(b) Formal completion of questionnaire by flight crew on a random basis.

(c) Feed back from flight crew.

(d) Results from analysis of incident and accident investigation required by rule 12.59.

(e) Results from analysis of any incident or accident investigation conducted by the company that is not required by Part 12.

The following questionnaire is an example that could be used to monitor fatigue of flight crew, but this could be modified where it is more complex than needed for a small operator.

Fatigue Questionnaire

1. Daily report or after an occurrence

..... am or pm?

2. Duty History Prior to Monitoring or Prior to an Event

	Duty Period		Operational Duty		Rest Period	
	Start	Finish	Start	Finish	Start	Finish
Day of monitoring/event						
Day before monitoring/event						
2 days before monitoring/event						
3 days before monitoring/event						

3. Sleep History Prior to Monitoring or the Event

	Sleep Periods		Naps		Sleep Quality		
	Start	Finish	Start	Finish	Good	OK	Poor
Day of monitoring/event							
Day before monitoring/event							
2 days before monitoring/event							
3 days before monitoring/event							

4. Sleep Need

How long would you normally need to sleep at night to feel fully rested the next day?

(If you take naps regularly on days off, include them as well)

..... hours ..... minutes

5. Has a doctor ever told you that you have a particular sleep problem (for example, sleep apnoea, insomnia)?

1☐Yes 2☐No 3☐Don't Know

If yes, please describe .....

.....

6. How likely are you to doze off or fall asleep in the following situations, in contrast to feeling just tired? This refers to your usual way of life in recent times.

PLEASE TICK ONE BOX ON EACH LINE

	would never doze	slight chance	moderate chance	high chance
Sitting and reading	☐ 0	☐ 1	☐ 2	☐ 3
Watching TV	☐ 0	☐ 1	☐ 2	☐ 3
Sitting inactive in a public place (eg. theatre, meeting)	☐ 0	☐ 1	☐ 2	☐ 3
As a passenger in a car for an hour without a break	☐ 0	☐ 1	☐ 2	☐ 3
Lying down in the afternoon when circumstances permit	☐ 0	☐ 1	☐ 2	☐ 3
Sitting and talking to someone	☐ 0	☐ 1	☐ 2	☐ 3
Sitting quietly after a lunch without alcohol	☐ 0	☐ 1	☐ 2	☐ 3
In a car, while stopped for a few minutes in traffic	☐ 0	☐ 1	☐ 2	☐ 3

PLEASE MAKE SURE YOU HAVE TICKED ONE BOX ON EACH LINE

7. Do you believe that fatigue played a part in this working day or this event?

1 ☐ Yes 2 ☐ No 3 ☐ Don't Know

Please explain (use extra pages if necessary)

Appendix C

How to plot a P-Chart

Producing a P-chart is a relatively simple exercise that involves using the manufacturer's data out of the Flight Manual. It is virtually the reverse of using the P-chart. The purpose of the P-chart is to enable simple calculation of required take-off and landing distances which already incorporate the required CAR Part 135 Air Transport safety factors for various runway surface types. The charts also provide convenient corrections for wind and runway slope, which may not be provided in the original manufacturer's manual.

All that is necessary is to locate reference lines for basic distances for one or more operational weights.

STEPS:

(a) Identify the basic charts for takeoff and landing in the manufacturer's approved Flight Manual. (Make sure these are the total distance to 50'. Some manuals provide both the ground and total distances.)

(b) Find the takeoff or landing distance for a specified combination of pressure altitude and ambient temperature, and record these in the table. (Some suitable combinations are listed on the left of the table.) The distance should be found for the zero wind flat paved surface case.

Note: The distance should also be found for the Maximum Takeoff Weight case. It should be used for the P-chart, because this is the worst case so it is conservative. However the same procedure can be used for several other weights if desired, and more than one line produced on the chart. They should be carefully labelled.

(c) Plot the takeoff or landing distances backwards on the P-chart to find the common point in the variable box. I.e. run a horizontal line from the known temperature and altitude on the LHS across to the right-hand bottom box. Run a second line from the calculated distance on the RHS scale across to the bottom line (Private Operations – no safety factor) in the left-hand top box, and then continue the line vertically downwards from that point. The intersection of those two lines in the unmarked bottom box is then one data point. Find similar data points for at least three other temperature/altitude combinations.

(d) Draw a line of best-fit between the data points marked. The P-chart is then completed.

POINTS TO NOTE:

The aircraft configuration to which the original manufacturer's data is applicable should be noted on the P-chart, and also any special techniques or procedures used, such as lift-off speeds if they are not standard. This is because some Flight Manuals give data for several configurations, particularly takeoff, such as different flap settings. Also the Piper manuals in particular use data based on a low (1.2 V_{SI}) lift-off speed.

TAKEOFF DISTANCES

ISA	AIRCRAFT WEIGHT					
	lb./	kg.	lb./	kg.	lb./	kg.
	FEET	METRES	FEET	METRES	FEET	METRES
SL						
1000						
2000						
3000						
4000						

AIRCRAFT CONFIGURATION: …….

REMARKS: ……..……

LANDING DISTANCES

ISA	AIRCRAFT WEIGHT					
	lb./	kg.	lb./	kg.	lb./	kg.
	FEET	METRES	FEET	METRES	FEET	METRES
SL						
1000						
2000						
3000						
4000						

REMARKS: ……..……

If you have any queries about production of P-charts or performance in general please contact the Aircraft Certification Unit of the Civil Aviation Authority.

The P-Chart section is currently under revision

The P-Chart section is currently under revision

The P-Chart section is currently under revision

The P-Chart section is currently under revision

Appendix D – Mountain Flying Training Programme – Fixed Wing

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1. Mountain Flying Ground Course – Fixed Wing

To include as applicable:

1.1 Horizon

- define horizon
- identification of real or imaginary horizon
- superimposing a useable horizon on any variable background ie. visualising where real horizon sits as if terrain or obstacles were transparent
- illusions associated with inaccurate horizon definition
- hazard potential associated with these illusions and poor horizon definition.

1.2 Wind Awareness

- forecast conditions including synoptic
- 'fluid flow' concept of airbetween, over, and around terrain
- significance of direction relative to terrain
- wind patterns less than 15kts
- wind patterns greater than 15kts
- local patterns and effects
- upper winds compared to lower winds ie. comparison of wind in valley with wind at altitude
- indication of wind velocity at altitude i.e. snow, drift, lift/sink patterns, VSI indications, wave, cloud movement
- lift, sink, rotor, wave, turbulence, gusts
- cloud types as indicators of potential flying conditions
- indicators of lower level wind, for example:
    - tussocks
    - water ripples / lanes on stationary water and wind shadows on water
    - poplars
    - willows
    - crop
    - smoke / dust
    - drift, and drift indicators

- G/S versus A/S
- cloud shadows as indicator of upper wind and its influence on lower level wind

- applicability of Va and Vnokatabatic / anabatic winds in a valley
- choice of flying low versus flying high

1.3 Situational Awareness

- threats
- space
- inertia
- drift
- altitude, including pressure and density altitude
- gaining or losing height
- turning radius and effects of speed, configurations, wind, turbulence, weight, visibility
- weather patterns
- sun/shadow
- scale – GA aircraft is but a dot on the landscape
- merging terrain
- clear air effect
- legal requirements
- recognition of height above terrain
- appreciation of the need for anticipation versus reaction
- moral responsibilities – consideration of people & stock
- appropriate clothing & footwear
- passenger safety & comfort
- potential landing options
- distances for position reports
- traffic
- illusions, especially terrain gradient
- fuel remaining
- daylight remaining

- potential for stalling in the turn
- effect of poor visibility configuration on fuel management
- potential dehydration effects
- white water content in rivers as indicator of valley gradient

1.4 Contour/constant altitude flying

- horizon identification / appropriate nose attitude
- awareness of space and position
- appreciation of inertia
- appreciation of available escape options
- right of way
- lookout - high wing versus low wing, left versus right, blind corners, colour schemes
- recognising lift / sink
- Groundspeed versus Airspeed relationship
- flying constant altitude to recognise any changing gradient of valley floor

1.5 Valley Turns

- use of full width anticipating need for 360° turn
- minimise angle of bank to minimise Vs increase
- lower airspeed to reduce turn radius
- use of poor visibility configuration
- reduced flap to maintain performance i.e. 10° flap as opposed to 20°
- need for power to combat drag
- check turns before valley narrows
- large valley – position anywhere right of centre
- confined valley – any need to move over to make turn means one is not correctly positioned (Human Factors 5 – 7.5 seconds reaction time)
- effect of sudden shadow / sun effects
- clear screen
- steep gliding turns and effects of changing horizon, narrowing valley
- roll out position – never in middle of valley
- always positioned to anticipate not react

- if on wrong side…easy decision to change sides, if in middle potential for indecision and lack of space
- if airspeed decays with full power lower nose to convert height to airspeed
- emphasise “caution flying up a valley haven't previously flown down" philosophy.

1.6 Saddle Crossings

- concept of saddle, pass, spur, ridge
- compromise of many variables
- anticipation/assessment of lift and sink
- VSI indications
- appreciation of wind direction relative to terrain
- approach 45° with escape route downhill, downstream
- desirable approach left to right
- escape option ‘obstacle free’ to use minimum bank angle
- knife edge saddle versus prolonged commitment area saddle
- level attitude - maintain airspeed with regard to Va
- not in climb attitude - airspeed and lookout are compromised
- not in descent – airspeed and control limited by Va
- anticipate turbulence
- use of parallax to assess sink and safe height to cross ie. more terrain visible behind as approaching saddle therefore higher than saddle; less terrain visible therefore lower and turn away early; including technique for assessment of 500’ clearance
- decision making including:
    - planning of initial flight path to a mountain range or ridge
    - options
    - approaches to the saddle/pass/ridge/spur
    - commitment point
    - escape routes
    - position and options after crossing
    - position reports for traffic information
    - proximity to cloud including potential for lift

1.7 Route Finding

- water only flows downhill
- identify flow and follow to larger river, lake, sea, roads, town etc.
- awareness of valley alignment relative to compass
- awareness of sun position
- map folding; hold in one hand thumb on moving position whilst holding control– column/stick to facilitate peripheral vision
- effective pre-flight planning

1.8 Difficult Conditions

- cloud, snow, showers, white out, bright out - effects on visibility, disorientation, illusion, work load
- merging terrain – foreground with distant
- dirty windscreen versus clean
- precipitation on screen affecting judgement
- gradient of snow covered areas, depth perception
- sun/shadow effects
- effects of difficult conditions on aircraft management including:
    - distractions
    - fuel
    - icing
    - visual reference
    - attitude control
    - altitude / hypoxia
    - aviate, navigate, communicate
    - below VHF radio coverage levels
    - SARTIME management
    - orientation
    - decision making, including pilot attitudes
    - temperature extremes, temperature factors
    - turbulence
    - air movements including significant up or down flow

- wires and obstacles e.g. wind farms

1.9 Cautions and Emergencies

- Performance comparisons including:
  - utility category versus MAUW
  - effects on turn radius
  - rates of climb
  - handling of sink
  - altitude/power considerations
- New aircraft ratingdifferences including:
  - often faster/heavier
  - greater turn radius required
  - more anticipation needed
  - higher workload (e.g. extra controls and instruments)
- CFIT accidents – most occur by:
  - loss of visual reference (horizon)
  - stall in turn
  - attempting to out-climb terrain
  - poor decision making, resulting in reaction instead of anticipation
  - lack of decision making resulting in inaction
- Forced Landing and Precautionary Landingconsiderations including:
  - limited options
  - priority ~ make a plan; confined spaces may affect the ideal
  - tendency to crowd landing area
  - consider climatic/seasonal wind effects for calculated gamble on wind ie. Anabatic versus Katabatic
  - consider valley gradient
  - awareness of mind sets and illusions
  - consider early Mayday or Pan call
  - habitation in remote area; look for airstrip/fertiliser bins
  - consider elevation

- use of lift conditions to glide down valley closer to potentially more suitable option and habitation
- river beds - consider landing downstream; surface may be smoother
- beaches
  - stoney patches usually indicate firm sand
  - steep indicates soft sand
  - flat, damp sand usually means firm sand
  - debris, especially following period of poor weather
  - no lagoon area above high tide line
  - x/w potential
  - sand type; quartz, iron, coal etc
  - always a gamble

1.10 Consider survival kits, their use and contents relative to basic principles of survival and to the area of operations including:

- Location
- Water
- Food
- Shelter
- Will to survive
- Survival principles after unplanned landing, including basic first aid principles and skills

1.11 Use of survival equipment:

Location

- Have items that will facilitate being found, that enhance your visibility compared to the surroundings ie:
  - bright ground sheet / tent fly / clothing
  - condys crystals, food colouring
  - flares
  - mirrors / reflection items
  - torch
  - ability to ignite fuel / oil as smoke producer
  - candle

- fire axe to break pattern of vegetation for searchers
- lightweight camp shovel (snow ops)
- whistle

Water

- Survival kit container as receptical
- Ability to heat and provide warm drink

Food

- Basic dry freeze type food and means of providing warm food more from principle of preventing hypothermia than satiating hunger.

Shelter

- Items that will facilitate use of resources available to shelter from the elements including parts of aircraft:
  - Ground sheet / tent fly
  - survival blankets
  - duct tape
  - light rope / string

Will to survive

- Awareness that if each survivor retains the will to survive their chances are greater regardless of the availability of the other principles. This alone will make the most difference.
- Have available Mountain Survival guidance material

1.12 Flight following/ELT

- Options for flight following in a mountainous environment
- Limitations and uses of ELT in a mountainous environment

2. Mountain Flying – Fixed Wing Flying Programme.

2.1 Preamble/Philosophy

- The practical exercises listed reflect the application of the ground course principles.
- The flight course requirement and content are to be applied to the operators local mountainous area of operations.
- The intention of maximising opportunity for experiencing varied meteorological and flight conditions should be demonstrated.
- The operator may consider contracting out parts or all of the flying programme where they either:
    - Lack the appropriately qualified or experienced staff.
    - Feel their staff to be better serviced by experiencing part or all of the training in a more challenging region.
- Every opportunity should be taken within the limitations of the training instructors experience and skill to test the trainees decision making. This should take the form of flying the chosen option eg. saddle crossing, and then assessing and flying the alternative(s) to encourage experiencing the effectiveness or lack of effectiveness in their decisions. Until the variables are experienced the pilot lacks the resources to make the best decision in the circumstances that prevail.

  It should be noted that while in the course of this training the trainee may be taken outside their comfort zone. **Under no circumstances should the instructor exceed their own limitations.**
- Emphasis should be placed on recognising threats pertaining to the terrain and associated weather, including the appropriate mitigation strategies. Likewise developing strategies to trap errors and minimise potential for entry into an 'undesired aircraft state' should be emphasised.
- The flying programme will in most cases place trainees in circumstances they have not previously experienced. It will also be a workload that tests their concentration and ability to operate at an optimum level. Instructors should therefore be aware of the workload they are placing the pilots under, and therefore timetable initial training with this in mind.
- The most dangerous position a pilot can experience in mountain flying is when they are forced to react and therefore rely on their skill to retrieve an otherwise hazardous circumstance.
- The appropriate approach is that through training and experience the pilot learns to understand and appreciate the significant factors in order to anticipate and as a result always have a pre-planned, calculated set of options or if necessary escape.
- Initial training will involve the pilot responding *reactively* when experiencing the results of either their own decisions, good or bad, or the simulated experiences provided by the instructor. A measure of the trainees' progress will be the degree to which they begin *anticipating* and have pre-planned options available should their decision not be the best.

2.2 Reference Reading: GAP Booklets Mountain Flying; In, Out and Around Milford; In, Out and Around Mt Cook; In, Out and Around Queenstown; Winter Flying; Survival.

Additional references: Mountain Flying DVD; Mountain Flying Training Standards Guide

2.3 Horizon

Exercise: Maintaining a constant height and/or contour flying in areas of varying terrain (e.g slope, surface covered by vegetation /snow) where defined horizon is lacking.

Aim: To consistently identify a usable imaginary horizon and superimpose on any background.

Technique:

- Fly a constant altitude (terrain contour line) maintaining a constant wing tip distance from the terrain.
- Develop co-ordination of elevator, aileron, rudder and power using outside reference confirming with instruments.
- Fly constant height above a descending valley floor to appreciate gradient and shifting horizon perspective.
- Fly a constant altitude above a rising valley (or terrain) to appreciate gradient and horizon effects.

Principles to experience:

- consistent nose attitude
- awareness of space and position
- appreciation of inertia
- maintenance of escape options
- legal position / right of way
- lookout technique with blind corners
- minor lift / sink where attitude is difficult to maintain
- maintenance of attitude versus altitude
- G/S versus A/S relationship
- anticipation versus reaction
- illusions created by varying slope and or gradient of terrain
- effect of ballooning out in turns and restricting options in confined space
- use of throttle in lift / sink
- wind conditions < 15 knots compared to > 15 knots

- comparison of upper winds with valley winds
- assessing wind using lift, sink, drift, tussocks, water, trees etc.
- applicability of Va (maximum manoeuvring speed)
- katabatic and anabatic conditions
- cloud patterns and resultant cues to turbulence, lift, sink, rotor, wave
- terrain texture differences ie. bush, forest, tussock, rock, sand, snow etc.
- precipitation on screen affecting judgement
- awareness that by the time an instrument shows a change of attitude or altitude such change has been long evident by outside visual cues. VSI indications to confirm.

Note: Reasonable accuracy of superimposing an imaginary horizon on variable terrain may require approximately 5 hours disciplined flight experience.

Standards:

After 5 hours:

- in calm conditions with ill defined horizon:
  - ¼ ball
  - +/- 50'
  - smooth, co-ordinated control inputs
  - clean windscreen
- in turbulent conditions ie. where attitude not altitude is priority:
  - chooses most comfortable flight path
  - maintains most consistent attitude
  - consistently verbalises options available
  - maximises comfort by co-ord elevator, aileron, rudder and throttle while respecting Va
  - anticipates such conditions by securing loose items before flight
  - clean windscreen

2.4 Valley Turns

Exercise: Using valleys with as many variables that are available practise mainly level, but also climbing and descending turns.

Aims:

- To appreciate the safe level turn radius using different configurations in valleys with an ill-defined horizon.
- To make check turns to ensure operating space is available before valley narrows to the extent escape is compromised
- To learn appropriate positioning in both large and confined valleys
- To appreciate effects of a changing horizon perspective and reducing radius in descending turns in confined space
- To appreciate lack of performance in climbing turns with changing horizon in confined space and the need to identify best flight path to maximise space and lift to improve performance

Technique:

- Practise level 360° turns using full width of valley in cruise configuration
- Practise level 360° turns using poor visibility configuration
- In narrowing valley make check turns to evaluate turn radius and exit options with appropriate escape space available
- Compare position for flying a large valley with that of a confined valley ie. anywhere right of centre in large valley
- Make steep descending turns into a valley ensuring correct anticipated position for roll out
- Make efficient climbing turns from the valley to climb out of valley system or to position for saddle crossing
- From beside a vertical face (if available) experience the aircraft turning radius through 180° in both cruise and poor visibility configurations

Principles to experience:

- Establishing and maintaining level turns with ill defined horizon in as many combinations of the following variables available:
    - steep valley walls - up to vertical
    - varying slopes in valley walls
    - varying terrain effects as background for ill defined horizon eg. Bush, forest, tussock, rock, snow etc.
    - varying valley floor gradient
    - deep valleys, shallow valleys
    - wind with rugged terrain compared to smoothly contoured terrain
    - calm conditions, windy conditions, turbulence
    - clear, cloudy, and precipitation conditions

- bright sun glare behind ridges and suddenly exposed
- deep shadow effects
- white-out horizons

- If need to move over in a valley in order to make turn then weren't correctly positioned. Ref. Human Factors 5-7.5 seconds to respond.
- Planned entry, sufficient power to control speed, minimum AOB to minimise stall speed, use the space available
- High wing - lean forward to anticipate horizon
- Anticipation of roll out position to not compromise options available
- Steep gliding turns:
  - changing horizon perspective
  - narrowing valley
  - roll out position - never in the middle
- If airspeed decays with full power lower nose to convert height to A/S
- Awareness of higher performance aircraft effects:
  - less time
  - inertia
  - greater turn radius
  - workload
- Difference of conditions in valley lower regions compared to above valley ie. at altitude greater wind can often be experienced with more severe turbulence. Recognising the 'shear level'.
- Awareness of greater power requirement at MAUW especially in poor visibility configuration

Standards after 5 hours:

- Calm conditions:
  - +/- 50'
  - ¼ ball
  - smooth, co-ord control inputs
  - roll into appropriate AOB for valley size to use space available with no pressure
  - correct start position - max space available
  - correct finish position - options available

- power use appropriate to maintain safe speed but not excess speed

- Turbulent conditions:
  - maximises comfort
  - maintains speed not above Va but with margin above Vs
  - ensures margins for safe turning radius and escape options
  - controls attitude without disrespecting altitude
  - anticipates circumstances of unsafe turning radius
  - keeps escape options available

2.5 Saddle Crossing

Exercise: To consider variables associated with any particular saddle/pass/ridge/spur and assess best compromise options for safe crossing.

Aim: To recognise and assess options for best approach, crossing and positioning after crossing.

Technique:

- Assess lift/sink sides of saddle
- Approach 45° or less to provide escape downhill, downstream with minimum AOB required
- Desirably fly left to right for best visibility
- If obstacle obstructed or in serious sink then right to left
- Choose "knife edge" saddle versus an area of prolonged commitment
- Approach level Va under control
  - not in a climb – no A/S back up and poor visibility
  - not in a descent – limited Va control; anticipate turbulence.
- Use PARALLAX to assess sink and height in relation to pass
  - should see more terrain behind as approaching – therefore higher
  - less terrain - therefore lower

Principles to experience:

- benefits of early planning of approach
- left to right versus right to left:
- best option often a compromise of several variables
- best approach combined with best escape, both before and after crossing

- choice of saddle offering minimum commitment time crossing ie. "knife edge" preferred with face of the saddle as flat as possible compared to concave face which requires greater angle of bank during turn away
- identify a commitment point up to which escape away is available
- use of parallax to recognise 500' clearance to cross, including height recognition/calculation technique
- retaining height after crossing in case return is necessary
- both calm conditions and conditions of lift and sink where good decision making is required and reliance on aircraft performance is not available
- wind direction relative to terrain
- anticipating terrain with potential for viable saddle option when saddle not initially visible
- where decision making is lacking, providing instructors experience, judgement and skill is not compromised, ensure pilot under training is put into reactive scenarios to improve anticipation and decisions eg. simulating "In significant sink, turn away now!" ie. Take pilot to their commitment point and then test their escape option
- making appropriate position calls for other traffic

Standards : After 5 hours:

- Chooses best approach and escape. Accurately assesses parallax and height relative to saddle. Maintains speed and attitude control throughout manoeuvre with smooth co-ordinated control inputs. Chooses best postioning after crossing to maintain options of escape or return

2.6 Route Finding

Exercise: Using real or simulated circumstances of disorientation to develop strategies for re-orienting in place and time awareness.

Aims:

- To recognise and experience disorientation
- To identify cues and steps for re-orienting
- To keep evaluating with an open mind and not continue to convince oneself of a false scenario

Technique:

- At some point during training exercises, where orientation in place and time awareness may be a challenge for the pilot under training, simulate the scenario to develop strategies for re-orientation.

Principles to experience:

- water only flows downhill - identify the flow direction

- small streams lead to larger flows, lakes or ocean which ultimately means roads, power lines, towns etc.
- much white water means steep gradient to valley floor
- valley alignment (compass rose)
- sun position going in, versus going out, assuming time covered is not significant
- map folding and holding to maximise peripheral vision and therefore LOOKOUT while referring to map
- high level – use peaks
- low level – use valleys

Standard:

- Maintains situational awareness to a degree that provides training instructor with confidence. Any disorientation is momentary and has little or no effect on flight path and flight safety.

2.7 Emergencies

Exercise: To experience simulated forced landings and precautionary landings in mountainous areas.

Aim: To practice emergencies where options may be limited, where terrain and or weather are intrusive to the ideal.

Technique:

- In real or simulated circumstances provide as much variety from the ideal simulated forced landing or precautionary landing as local resources permit, where the selected landing site means descent below the ridge line is required i.e. real horizon reference is unavailable.

Principles to experience:

- Lack of real horizon
- Variables:
    - height available
    - distance from options/gliding distance
    - option types eg. strips, paddocks, clearings, beaches, sand bars, roads, etc.
    - conditions of wind, turbulence, and precipitation
    - conditions of load and performance
    - conditions of visibility including light/sun/shadow effects
- priority - make plan - confined spaces may affect
- climatic / seasonal wind effects eg. for a calculated gamble use anabatic / katabatic?

- use of lift conditions/avoidance of sink for glide range considerations
- valley gradient
- illusions and mind sets
- need for early mayday - what frequency, consider 121.5, ELT/tracking system activation
- habitation in remote areas - look for airstrip/fertiliser bins
- consider elevation
- consider wires
- contents of survival kit and uses relative to principles of survival

Standards:

- Can safely 'select, assess, plan and execute' for a real or simulated precautionary landing and forced landing onto a variety of the options within the area of company operations.
- Demonstrates threat and error management, sound decision making and situational awareness minimising the risk of any emergency or of mismanagement of any emergency.
- Knows the contents and potential uses of the aircraft survival kit.

3. Specialist Applications in Mountainous Regions

Particular flight operations by their nature have a specialist application to the mountain flying principles and techniques. Such operations would be reflected in the training programme and would include, but be not limited to the following for:

3.1 Amphibian/Float Aircraft

Taxiing, sailing, docking, beaching, mooring, step taxi and turns, glassy / rough water take offs and landings, fresh / salt water, normal take off and landings, cross wind take off and landings, assessment of unfamiliar landing areas, operation in confined space, pressure/density altitude effects.

3.2 Ski/Snow Operations

Snow operations rating syllabus shall include but not limited to the following:

- snow assessment, snow marking, snow types
- pressure/density altitude effects
- taxiing, parking, retrieving ski from breaking through surface, vapour locking (piston aircraft)
- take-off/landings, flat lighting, varying slopes (cross, up and down slopes)
- wind assessment, (snow drift, tail wind/head wind, ground speed)

3.3 Remote Strips

Ground briefing:

- Strip owners name, contact details, permission
- Obstructions:
    - wires
    - trees
    - buildings
    - fences
    - stock and their behaviour
    - terrain
- wind and local effects
- surface conditions including:
    - seasonal variables
    - following adverse weather conditions
    - stock effects ie. frozen turds, rabbit holes, hollows from stock use
    - ruts
- preferred landing and take off directions
- length, width, best path
- approx. MAUW for safe take off
- EFATO options
- availability of ATS communications and nearest ground contact
- elevation / density altitude
- awareness of performance ie. 2 POB verses MAUW
- slope versus wind
- one way options

In Flight Procedures – positioning aircraft for assessing:

- wind
- surface conditions
- vector in use
- approach and overshoot variables
- obstacle clearance

- safe circuit height and direction
- use of flap on approach / take off / turbulence
- approach speeds / profiles
- touchdown precision
- decision points:
    - missed approach
    - overshoot
    - abort / commit for take off and landing
- use of braking
- ground handling / taxiing / turning
- illusions
- slope verses wind

4. Records

The following checklist or similar provides a guideline to the means of documenting the training programme.

4.1 Checklist

4.2 Training Log

4.3 Certification

4.4 Specialist Application Checklist

4.5 Remote Strips Check Form

4.1 Mountain Flying Training Checklist

Name: _____ Licence No: _____

Training carried out by: _____

as per operators Part 119 Exposition: _____

or contracted to: _____ under Part 141

Ground Course

Horizon definition	☐	Contour flying	☐
Wind awareness	☐	Valley position/Turns	☐
Situational awareness	☐	Saddle crossing	☐
Difficult conditions	☐	Route finding	☐
Emergencies	☐	Survival	☐

Flying Programme

Horizon definition	☐	Contour flying	☐
Dev. wind awareness	☐	Valley position/Turns	☐
Dev. situational awareness	☐	Saddle crossing	☐
Difficult conditions	☐	Routine finding	☐
Emergencies	☐	Dev. anticipation	☐

Training area: _____

Total time: _____ Mountain region time: _____

Mountain flying training experience time under this programme: _____

Approved aircraft types: _____

Instructor: _____ Signature: _____

Category: _____ Licence No: _____ Date: _____

Comments: _____

Recurrent or transition training

Exercise completed: _____

Aircraft type: _____ Date: _____

Instructor: _____ Licence No: _____

Signature: _____ Comments: _____

4.2 Training Log

Log of Initial Training Programme:

DATE	A/C TYPE	REG	PILOT	INSTRUCTOR	EXERCISE/AREA	TIME

Recurrent or Transition Training:

DATE	A/C TYPE	REG	PILOT	INSTRUCTOR	EXERCISE/AREA	TIME

4.3 Logbook Certification

XYZ Flying Company

MOUNTAIN FLYING

I certify that

_____

has _____ hours Mountain Flying Training IAW AC 119-3

Instructor: _____ Signature: _____

Cat: _____ Licence No: _____ Date: _____

4.4 Specialist Applications Checklist

Name: _____ Licence No: _____

Aircraft Type: _____ Registration: _____

Checked by: _____ Date: _____

Amphibian/Float:

Taxiing	☐	Glassy/Rough Landing	☐
Sailing	☐	Fresh/Salt Water	☐
Docking	☐	Normal T/O	☐
Beaching	☐	Normal Landing	☐
Mooring	☐	Crosswind T/O	☐
Step Taxi and Turns	☐	Crosswind Landing	☐
Glassy/Rough T/O	☐	Unfamiliar landing areas	☐
Confined Areas	☐		☐

Ski/Snow:

Snow Assessment	☐	Taxiing	☐
Snow Marking	☐	Parking	☐
Landings	☐	Retrieving	☐
Take off	☐		☐

NOTE: COMPETENCY IS DEFINED AS THE PILOT'S ABILITY FOLLOWING THE BRIEFING AND INFLIGHT PROCEDURES TO DEMONSTRATE CORRECT ASSESSMENT OF THE CHECK FROM ITEMS FOR A CONTINUED SAFE OPERATION.

Signature: _____ Licence No: _____

4.5 Remote Strips Check Form

Name: _____ Airstrip: _____

Licence No: _____ Aircraft type: _____ Registration: _____

Checked By: _____ Date: _____

NOTE: COMPETENCY IS DEFINED AS THE PILOTS ABILITY FOLLOWING THE BRIEFING AND IN-FLIGHT PROCEDURES TO DEMONSTRATE CORRECT ASSESSMENT OF THE CHECK-FORM ITEMS FOR A CONTINUED SAFE OPERATION.

GROUND BRIEFING		**IN-FLIGHT PROCEDURES**	
LAND OWNERS NAME:		AIRCRAFT POSITIONING FOR:	
OBSTRUCTIONS: ~ WIRES		~ ASSESSING WIND	
~ TREES		~ SURFACE CONDITIONS	
~ BUILDINGS		~ VECTOR IN USE	
~ FENCES		~ OBSTACLES / ILLUSIONS	
~ STOCK		SAFE CIRCUIT HEIGHT, DIRECTION	
~ TERRAIN		USE OF FLAP ON APPROACH	
~ OTHERS		MAINTENANCE OF APPROACH A/SPEEDS	
WIND AND LOCAL WIND EFFECTS		TOUCH DOWN	
SURFACE CONDITIONS : SEASONALLY AND AFTER ADVERSE WX CONDITIONS, STOCK EFFECTS ETC.		RECOGNITION OF MISSED APPROACH POINT	
PREFERRED LAND AND T/O DIRECTIONS		OVERSHOOT / ABORT	
LENGTH OF AIRSTRIP		BRAKING, GROUND HANDLING	
APPROX. MAUW FOR SAFE TAKE-OFF		SLOPE V WIND TAKE-OFF	
EFATO OPTIONS		USE OF FLAP ON CLIMB OUT	
AVAILABILITY OF ATS COMMS. AND NEAREST GROUND CONTACT		CLIMB OUT : OBSTACLE CLEARANCE	
ELEVATION / DENSITY ALTITUDE		**REMARKS:**	
AWARENESS OF DIFFERENCE IN AIRCRAFT PERFORMANCE BETWEEN 2 POB AND MAUW			

SIGNATURE (APPROVED PERSON): _____ ID: _____

Appendix E – Helicopter Mountain Flying Training Course

1. Helicopter Mountain Flying: General

Helicopter basic mountain flying training completed as part of CPL(H) training is only intended to introduce the pilot to the basic techniques and principles of operating a helicopter through or within mountainous terrain and is normally only conducted in benign weather conditions. Therefore, it is not necessarily sufficient to prepare a helicopter pilot to conduct all commercial operations in a mountainous environment.

Mountains are not necessarily defined as high or rugged terrain. However, it is incumbent on the operator to conduct appropriate structured theory and practical training and to provide additional experience as necessary to ensure the pilot has the level of knowledge, skill and experience required to safely conduct the type of mountain operations covered in the operator's exposition.

The minimum knowledge and skills expected of a recently-qualified commercial pilot are contained in Advisory Circulars 61-3 and 61-5. The pilot should have received 10 hours of theory training and completed 10 hours flight experience in mountainous terrain, including at least 6 hours dual instruction and 2 hours solo.

Mountain operations cover a wide scope of tasks and environments so training may be conducted in stages and divided into "core" advanced skills, which all commercial helicopter pilots flying in a mountainous environment should possess; and "specialist" skills only required for specific situations, operations or environments.

2. Helicopter Mountain Flying Theory Course

An operator's approved theory course should cover the following core topics:

1.0	**AIRCRAFT HANDLING**
1.1.0	**Horizon awareness**
1.2.0	**Height and altitude considerations**
2.0	**WEATHER PATTERNS AND WIND AWARENESS**
2.1.0	**Mountain weather**
2.2.0	**Wind awareness**
3.0	**TRANSIT FLYING**
3.1.0	**Pre-flight planning**
3.2.0	**Flying techniques**
4.0	**APPROACH AND LANDING TO UNPREPARED SITE**
4.1.0	**Reconnaissance**
4.2.0	**Power checks**
4.3.0	**Wind direction & demarcation line**

4.4.0	**Approach direction and angle**
4.5.0	**Committal point and escape route**
4.6.0	**Aiming point/hover or touchdown point**
4.7.0	**Typical terrain features**
4.8.0	**Main/tail rotor awareness**
5.0	**TAKE OFF FROM UNPREPARED SITE**
5.1.0	**Power checks**
5.2.0	**Take-off and climb-out**
6.0	**EMERGENCIES**
6.1.0	**Controlled flight into terrain**
6.2.0	**Forced/Precautionary Landings**
7.0	**HUMAN FACTORS**
7.1.0	**Situational awareness**
7.2.0	**Aircraft management**
7.3.0	**Airmanship**
7.4.0	**Aviation medicine**
7.5.0	**SAR aspects**

An example syllabus for a course covering the above topics is included at Annex 1.

3. Helicopter Mountain Flying Practical Training Course

An operator's approved practical training course should cover the following topics:

1.0	AIRCRAFT HANDLING
2.0	WEATHER PATTERNS AND WIND AWARENESS
3.0	TRANSIT FLYING
4.0	APPROACH AND LANDING TO UNPREPARED SITE
5.0	TAKE OFF FROM UNPREPARED SITE
6.0	EMERGENCIES
7.0	HUMAN FACTORS

An example syllabus for a practical training course covering the above topics is included at Annex 2. Sufficient dual and pilot-command hours should be flown for the pilot to achieve competence in all areas.

4. Training for Specialist Applications in Mountainous Regions

An operator's approved specialist training should cover the following topics as applicable for the operations outlined in the operator's exposition.

7.0	**ADVANCED OPERATIONS**
7.1.0	**High altitude considerations (above ~ 5,000ft)**
7.2.0	**Snow/ice conditions**
7.3.0	**Applied (non-agricultural) operations**

Example theory and practical syllabi for a course covering the above topics is included at Annex 3.

5. Records

The following checklist or similar provides a guideline to the means of documenting the training programme:

5.1 Core Competency Checklist
5.2 Training Log
5.3 Logbook Certification
5.4 Specialist Applications Checklist

5.1 Mountain Flying Core Competency Checklist

Name: _____ Licence No: _____

Training carried out by: _____

as per operators Part 119 Exposition: _____

or contracted to: _____ under Part 141

Ground Course

Aircraft handling	☐	Take-off from unprepared site	☐
Weather patterns and wind awareness	☐	Emergencies	☐
Transit flying	☐	Human factors	☐
Approach and landing to unprepared site	☐		

Flying Programme

Aircraft handling	☐	Take-off from unprepared site	☐
Weather patterns and wind awareness	☐	Emergencies	☐
Transit flying	☐	Human factors	☐
Approach and landing to unprepared site	☐		

Training area: _____

Total time: _____ Mountain region time: _____

Mountain flying training experience time under this programme: _____

Approved helicopter types: _____

Instructor: _____ Signature: _____

Category: _____ Licence No: _____ Date: _____

Comments: _____

Recurrent or transition training

Exercise completed: _____

Aircraft type: _____ Date: _____

Instructor: _____ Licence No: _____

Signature: _____ Comments: _____

5.2 Training Log

Log of Initial Training Programme:

DATE	A/C TYPE	REG	PILOT	INSTRUCTOR	EXERCISE/AREA	TIME

Recurrent or Transition Training:

DATE	A/C TYPE	REG	PILOT	INSTRUCTOR	EXERCISE/AREA	TIME

5.3 Logbook Certification

XYZ Flying Company

MOUNTAIN FLYING

I certify that

_____

has _____ hours Mountain Flying Training IAW AC 119-3

Instructor: _____ Signature: _____

Cat: _____ Licence No: _____ Date: _____

5.4 Specialist Applications Checklist

Name: _____ Licence No: _____

Aircraft Type: _____ Registration: _____

Checked by: _____ Date: _____

THEORY

High Altitude Considerations:

Wind conditions	☐	Density altitude	☐
		Specific aircraft performance HIGE/HOGE	☐

Snow/Ice Conditions:

Hazardous lighting	☐	Landing hazards	☐
Falling snow in flight	☐	Take-off hazards	☐
Cues to judge slope and surface	☐	Visual illusions	☐
Surface definition	☐		

Applied Operations

External loads	☐	Night flight	☐
Low speed/low height	☐	Other	☐

PRACTICAL

Advanced Operations:

Approaches	☐	Snow	☐
Take-offs	☐	Bone fide <500’	☐
High altitude	☐	Applied ops	☐

NOTE: COMPETENCY IS DEFINED AS THE PILOT’S ABILITY FOLLOWING THE BRIEFING AND INFLIGHT PROCEDURES TO DEMONSTRATE CORRECT ASSESSMENT OF THE CHECK FROM ITEMS FOR A CONTINUED SAFE OPERATION.

Signature: _____ Licence No: _____

Annex 1 - Helicopter Mountain Flying Theory Course Syllabus

1.0	**AIRCRAFT HANDLING**
1.1.0	**Horizon awareness**
1.1.2	Outline the illusions associated with inaccurate horizon definition
1.2.0	**Height and altitude considerations**
1.2.1	State the visual cues used for lateral and vertical clearances
1.2.2	Outline how a barometric altimeter is used to gauge height above terrain
1.2.3	Describe the effect of density altitude on the following aspects of performance:
2.0	**WEATHER PATTERNS AND WIND AWARENESS**
2.1.0	**Mountain weather**
2.1.1	Evaluate the general weather situation and pressure systems in terms of likely mountain weather
2.1.2	Outline typical seasonal differences in mountain weather
2.1.3	Describe how to recognise mountain waves and rotor zones and the hazards they pose
2.1.4	Describe the likely flying conditions associated with various cloud types
2.1.5	Outline the rapidity of weather changes, including the importance of those behind the aircraft
2.1.6	State how free air & surface temperature vary with altitude
2.1.7	State the environmental factors that influence visibility plus the effect of precipitation on windscreen
2.2.0	**Wind awareness**
2.2.1	Describe, in fluid terms, the flow of air that is obstructed by terrain
2.2.2	Describe the difference between wind over flat land and in the mountains
2.2.3	Outline the formation and characteristics of local winds, including katabatic and anabatic winds
2.2.4	Describe updraughts, down draughts, funnelling, mechanical/thermal turbulence, gusts and turbulence, rotors and lee waves
2.2.5	Describe the behaviour of wind at less than ~15kts and above 15kts
2.2.6	Define the demarcation line
2.2.7	Outline the following methods of wind-finding:
a	cloud shadows as indicators of upper winds
b	indicators of lower level wind, e.g.:
	(1) smoke/dust/precipitation
	(2) drift and groundspeed/airspeed correlation
	(3) updraughts and downdraughts
	(4) cloud/mist formation

	(5) movement of vegetation
	(6) water ripples/lanes/shadows on bodies of water
	(7) rotor wash/blowing snow
3.0	**TRANSIT FLYING**
3.1.0	**Pre-flight planning**
3.1.2	Select an appropriate route and height, taking into account:
a	VFR minima
b	terrain & map interpretation
c	wind, turbulence etc
d	cloud base
e	sun/shadow
f	power available
g	forced landing areas
h	wires
i	radio coverage
j	alternate/escape routes
k	legal requirements (incl. the minimum height/lateral separation specified in CAR 91.311)
3.2.0	**Flying techniques**
3.2.1	Describe valley flying techniques for:
a	entering & manoeuvring in a wide valley
b	selecting where in valley, and how far up the side, to fly
c	anticipating the effect of sudden shadow / sun effects
d	flying up a valley compared to flying down a valley
e	entering a narrow valley/re-entrant/gully
f	flying at reduced airspeed, with particular attention to translational lift and turning downwind
g	making reversal turns, including the use of valley width and the effect of airspeed and wind on radius of a balanced turn; the benefits and dangers of using yaw/pitch
3.2.2	Describe techniques for maintaining orientation:
a	how to maintain situational awareness: map reading, sun, valley alignment, compass. Note the limitations of GNSS
b	using a kneeboard and map. Map folding
c	lost procedure: escape route downstream
3.2.3	Describe saddle/ridge crossing techniques:
a	the variables determining how to cross, and the relative importance of each.

b	assessing up and down draughts
c	safest approach direction and escape route
d	difference between a knife edge saddle and a prolonged commitment area saddle
e	aircraft attitude and altitude at saddle/ridge
f	anticipation of turbulence
g	estimating a safe height to cross by appropriate use of parallax and horizon
h	effect of different backgrounds
3.2.4	State the importance of prompt and effective decision making for crossing saddles/ridges, including the consideration of the following factors:
a	identify and consider all options
b	select the best approach direction
c	select and review a fixed committal point
d	identify a safe escape route
e	consider the helicopter position and options after crossing
4.0	**APPROACH AND LANDING TO UNPREPARED SITE**
4.1.0	**Reconnaissance**
4.1.1	State how permission to land/approach is obtained
4.2.0	**Power checks**
4.2.1	Use flight manual/supplements/performance graphs & tables to accurately determine power requirements
4.3.0	**Wind direction & demarcation line**
4.3.1	Illustrate the general wind flow and local disturbances over a mountain feature and identify the demarcation line
4.3.2	Illustrate the wind flow in very light (≤ 3kt) conditions
4.4.0	**Approach direction and angle**
4.4.1	State the benefits of remaining above the demarcation line
4.4.2	Describe how a constant angle/straight-in approach should be flown
4.4.3	Describe when a curved/offset/climbing approach may be required and how the approach may be flown
4.5.0	**Committal point and escape route**
4.5.1	Describe the points to consider before commencing an approach
4.5.2	State how translational lift can be differentiated from turbulence
4.6.0	**Aiming point/hover or touchdown point**
4.6.1	State the need to positively identify the point
4.6.2	State the factors to be considered in assessing suitability of the point
4.7.0	**Typical terrain features**

4.7.1	Describe the following typical terrain features and associated considerations:
a	river flat, open ground above the tree line
b	rounded knoll/crown
c	sharp peak/pinnacle
d	plateau
e	rounded ridge, razorback, saddle
f	spur/ledge
g	col/bowl/basin
h	valley/creek bed (with consideration of rocks, boulders, sand etc)
4.8.0	**Main/tail rotor awareness**
4.8.1	Describe the techniques for landing on uneven ground and considerations for clearances
4.8.2	State when hover-loading or an out-of wind landing may be required
4.8.3	State the dangers involved in backing up
4.8.4	Describe how tail rotor effectiveness can be lost at high density altitude
5.0	**TAKE OFF FROM UNPREPARED SITE**
5.1.0	**Power checks**
5.1.1	Use flight manual/supplements/performance graphs & tables to accurately determine power requirements
5.1.2	State why sufficient power should normally be available to conduct at least a shallow towering take-off from any unprepared site in the mountains.
5.1.3	State the requirement to maintain RRPM within the normal operating range.
5.1.4	State the requirement to check hover power available
5.2.0	**Take-off and climb-out**
5.2.1	Describe how to safely lift from rough terrain into the hover
5.2.2	Describe the standard take-off technique; including take-off direction with respect to wind, when to transition forward, the height to climb to or when a descent may be initiated, and the climb-out path to follow
5.2.3	Outline the limited circumstances when a cushion-creep or running take-off are safe and necessary options
5.2.4	Outline tail rotor considerations
5.2.5	Describe when an offset/circling take-off may be required and how it may be flown
6.0	**EMERGENCIES**
6.1.0	**Controlled flight into terrain**
6.1.1	Outline the consequences of poor decision making, resulting in reaction instead of anticipation
6.1.2	Describe how to recover from sink/overpitching/settling with power
6.1.3	Describe how to recover from the loss of visual reference or entry into inadvertent IMC

6.2.0	**Forced/Precautionary Landings**
6.2.1	Describe the actions to be taken in the event of a complete engine failure or catastrophic failure requiring immediate landing:
a	immediate actions
	(1) lower collective, or as required by flight manual
	(2) effect of altitude on: collective position; RRPM; ROD
b	know the (often limited) options, including:
	(1) wind direction/strength/turbulence
	(2) possibility that no open flat ground is available
	(3) landing on valley floor versus ridgeline
	(4) landing upslope/downslope
	(5) type of engine-off landing
	(6) autorotation distance
c	have a plan
6.2.2	Describe the actions to be taken in the event of a partial engine failure or other helicopter or weather emergencies requiring landing as soon as possible including; Loss of Tail Rotor Effectiveness, low or high RRPM, low G, exceeding Vne
a	immediate actions
b	know the options
c	have a plan
7.0	**HUMAN FACTORS**
7.1.0	**Situational awareness**
7.1.1	Describe the importance of correct orientation and how to maintain it
7.1.2	Outline the impact of the scale of the landscape and clear visibility on estimating heights and distances
7.1.3	Describe the psychological stresses of operating in the mountains, particularly for inexperienced pilots
7.2.0	**Aircraft management**
7.2.1	Outline the additional factors required in fuel planning
7.2.2.	Detail the factors that lead to airframe/engine icing and how to avoid or minimise them
7.3.0	**Airmanship**
7.3.1	Explain the need for positive action rather than reaction to events
7.3.2	Explain the need for, and techniques of, effective decision-making
7.3.3	Outline the need to apply fundamental principles: aviate- navigate –communicate
7.3.4	Outline radio communications/flight follow considerations
7.3.5	Outline multi-crew considerations

7.3.6	Outline the requirements to ensure the care, comfort and safety of passengers
7.4.0	**Aviation medicine**
7.4.1	Outline the physiological effects relating to pressure & temperature
7.4.2	Outline the causes and effects of hypoxia/anxiety/load-shedding
7.4.3	Outline the effect of glare on effective vision
7.4.4	Describe the type of clothing/footwear that should be worn
7.5.0	**SAR aspects**
7.5.1	Outline typical aircraft and personal survival kits, their use and contents with respect to basic principles of survival, the area of operations and the likely time before pickup
7.5.2	Outline the principles of survival: First Aid; Protection; Location; Water; Food; Will to Survive

Annex 2- Helicopter Mountain Flying Practical Training Course Syllabus

1.0	**AIRCRAFT HANDLING**
1.1	Fly at constant height above a contour line for:
	horizon identification & to maintain appropriate disc/nose attitude
	maintaining constant altitude
	awareness of lateral and vertical distance from terrain
	appreciation of inertia
	appreciation of available escape routes
1.2	Estimate height by visual means, use of barometric or radio altimeters
2.0	**WEATHER PATTERNS AND WIND AWARENESS**
2.1	Recognise up and down draughts and areas of likely turbulence
2.2	Estimate wind strength and direction using visual indicators
2.3	Estimate wind strength and direction using groundspeed/airspeed correlation
3.0	**TRANSIT FLYING**
3.1	Fly at an appropriate height for the conditions
3.2	Select and fly an appropriate route/position for wind or weather conditions etc
3.3	Fly in a confined valley
3.4	Cross a ridge/saddle
4.0	**APPROACH AND LANDING TO UNPREPARED SITE**
4.1	Carry out a reconnaissance and power check
4.2	Accurately determine the surface wind
4.3	Experience flight ahead of and behind demarcation line
4.5	Conduct a straight-in constant angle (“gun barrel”) approach
4.6	Execute an overshoot to the pre-planned escape route
5.0	**TAKE OFF FROM UNPREPARED SITE**
5.1	Calculate power required and check power available in hover
5.2	Conduct a towering take-off directly into wind
6.0	**EMERGENCIES**
6.1	Enter and sustain an autorotation from high altitude, recovering as required
6.2	Experience LTE and low RRPM and recovery from both
7.0	**HUMAN FACTORS**

7.1	Maintain situational awareness
7.2	Demonstrate good aircraft management
7.3	Demonstrate good airmanship
7.4	Carry a personal first aid and survival kit

Annex 3- Helicopter Mountain Flying (Specialist Applications) Training Course Syllabus

Theory Element

8.0	ADVANCED OPERATIONS
8.1.0	**High altitude considerations (above ~ 5,000ft)**
8.1.1	Explain how wind conditions and terrain change with increasing altitude
8.1.2	Describe the effects of increased density altitude on engine and airframe performance
8.2.0	**Snow/ice conditions**
8.2.1	Describe hazardous lighting conditions, including: flat light, overcast, bright sunlight, sun and shadow, white out, "bright out"
8.2.2	Describe the effects of falling snow on flight
8.2.3	Describe cues used to judge slope and surface
8.2.4	Define surface definition and describe the associated hazards
8.2.5	Describe landing hazards, including: breaking through crust, hidden obstacles, landing on powder, close to cornice, skid spreading, freezing to surface
8.2.6	Describe take-off hazards, including blown snow
8.2.7	Describe the weather, terrain and snow conditions that pose a danger of avalanches
8.2.8	Describe common visual illusions associated with snow conditions
8.3.0	**Applied (non-agricultural) operations**
8.3.1	Explain the additional factors to be considered when carrying external loads
8.3.2	Explain the challenges and techniques required for safe flight at low speed and low height AGL
8.3.3	Explain the challenges and techniques required for safe flight at night: unaided and using ANV
8.3.4	Explain other specialised tasks as required

Practical Element

8.0	ADVANCED OPERATIONS
8.1	Conduct advanced approaches and take-offs (different types & to/from demanding terrain features)
8.2	Conduct high altitude operations
8.3	Conduct snow operations
8.4	Fly at heights below 500' for bona fide purposes
8.5	Conduct applied operations