SECTION 1.9 OPERATIONS, PERFORMANCE AND PLANNING (OP)

Unit 1.9.1 POPC: PPL operations, performance and planning – all aircraft categories

1. Reserved

2. General flight planning and performance

2.1 Loading

2.1.1 Describe the following terms:

(a) arm, moment, datum, station, index unit;

(b) centre of gravity (CG) and CG limits;

(c) empty weight, zero fuel weight (ZFW), ramp weight;

(d) maximum take-off and maximum landing weights;

(e) floor loading limits.

2.2 Speed limitations

2.2.1 Explain the following terms/abbreviations:

(a) normal operating speed (V_{no});

(b) never exceed speed (V_{NE});

(c) maximum manoeuvre speed (V_A);

(d) turbulence penetration speed (V_B);

(e) limit and design load factors;

(f) flap operating speed (V_{FO}) and flap extended speed (V_{FE}).

2.2.2 Describe situations which may result in an aircraft exceeding speed limits and load factor limits.

2.3 ERSA

2.3.1 Apply all items of information contained in ERSA which are relevant to VFR (day) operations.

2.4 Flight plan preparation

2.4.1 Apply the responsibilities of a pilot in command with regard to weather and operational briefing prior to planning a VFR flight.

2.4.2 Given a route:

(a) select appropriate visual charts for the flight;

(b) list the operations for which it is mandatory to obtain meteorological and operational briefing;

(c) list the weather services available, and nominate the sources and methods of obtaining this information;

(d) apply CASA requirements/instructions for flight notification of VFR flights and state the preferred methods of submitting this notification;

2.4.3 Given an aerodrome forecast, determine whether holding or alternate requirements apply and if so:

(a) nominate an appropriate alternate aerodrome;

(b) determine the quantity of additional fuel required for holding or flight to the alternate.

2.5 PPL – completion standard

2.5.1 Given:

(a) a departure place and 2 landing points;

(b) weather and operational briefing;

(c) passenger and/or baggage requirements;

(d) appropriate performance data.

2.5.2 Complete a flight plan form after considering the following aspects:

(a) selection of safe route(s) and cruise levels to comply with VFR;

(b) selection of cruise levels in accordance with the table of cruising levels;

(c) fuel for the flight, holding fuel, fuel to an alternate aerodrome, and specified reserves;

(d) weight limitation and aeroplane balance requirements;

(e) latest departure time.

2.6 Equi-time point (ETP), point of no return (PNR), diversions

2.6.1 Describe/recognise situations that may require the calculations of an ETP or PNR.

2.6.2 Assuming a constant cruise altitude and TAS, indicate the position of an ETP between 2 points in still air.

2.6.3 Given fuel on board, use planned/given ground speed to decide which of the following courses of action would require the least fuel (including reserves):

(a) proceed to destination;

(b) return to the departure aerodrome;

(c) proceed to a suitable alternate.

2.7 Airworthiness and equipment

2.7.1 State the purpose of certificates of airworthiness and registration.

2.7.2 Given a typical scenario, extract the communication and normal and emergency equipment required to be on board an aircraft.

2.7.3 State the responsibilities of a pilot in command with regard to:

(a) daily inspections;

(b) recording/reporting aircraft defects;

(c) know the types of maintenance that may be carried out by a PPL or CPL holder, as appropriate;

(d) given a copy of a maintenance release:

(i) determine its validity;

(ii) list the class(es) of operation applicable to the aircraft;

(iii) list outstanding defects/endorsements and decide whether these affect the airworthiness of the aircraft.

Unit 1.9.2 POPA: PPL operations, performance and planning – aeroplane

1. Reserved

2. General flight planning and performance

2.1 Aerodromes and aeroplane landing areas (ALAs)

2.1.1 Explain/apply the following terms used in CASA publications and documents:

(a) take-off safety speed;

(b) take-off distance available (TODA);

(c) take-off distance required (TODR);

(d) landing distance available (LDA);

(e) landing distance required (LDR).

2.1.2 Determine whether a given ALA is suitable for an aeroplane to take-off and land safety in accordance with guidelines contained in CAAP 92.1.

2.2 Take-off and landing performance

2.2.1 State the effect (increase/decrease) of the following factors on take-off, landing, and take-off climb performance:

(a) strength of headwind/tailwind component;

(b) air temperature;

(c) QNH;

(d) density height (non-standard conditions);

(e) airfield elevation;

(f) runway slope and surface, including wet and slushy runways;

(g) ground effect and windshear;

(h) frost on an aircraft.

2.2.2 Differentiate between pressure height and density height.

2.2.3 Describe how to use an altimeter to obtain:

(a) local QNH at an aerodrome; and

(b) pressure height of an aerodrome; and

(c) elevation of an aerodrome.

2.2.4 Explain the terms:

(a) maximum structural take-off and landing weight; and

(b) climb weight limit.

2.2.5 State the likely results of exceeding aircraft weight limits.

2.3 Density height

2.3.1 Using the methods under subsection 2.3.2, determine density height, given the following:

(a) OAT and pressure height;

(b) using cockpit temperature and an altimeter setting of 1013.2 hPa.

2.3.2 For subsection 2.3.1, the methods are the following:

(a) density altitude charts;

(b) manual computer;

(c) flight manual charts;

(d) mathematics.

2.4 Take-off and landing performance

2.4.1 Use the flight manual to extract maximum structural take-off and landing weights.

2.4.2 Given a typical flight scenario, use performance charts to extract:

(a) maximum take-off weight A;

(b) maximum landing weight A;

(c) take-off distance required (TODR) B;

(d) landing distance required (LDR) B;

(e) climb weight limit;

(f) take-off parameters:

(i) power;

(ii) flap setting;

(iii) take-off safety speed;

(g) landing parameters:

(i) flap;

(ii) threshold speed;

(h) State the conditions on which the parameters listed in paragraphs (f) and (g) are based.

2.5 Climb, cruise and descent performance

2.5.1 From typical charts or tables extract/determine the following data for climb, cruise and descent:

(a) time, speed, distance, fuel flow/quantity;

(b) appropriate engine settings;

(c) rates of climb/descent;

(d) the conditions under which an aeroplane will achieve maximum range and endurance.

Unit 1.9.3 POPH: PPL operations, performance and planning – helicopter

1. Reserved

2. General flight planning and performance

2.1 Helicopter limitations

2.1.1 Describe the reason for the following limitations on helicopter performance:

(a) maximum rotor RPM – power on;

(b) maximum rotor RPM – power off;

(c) minimum rotor RPM – power on;

(d) minimum rotor RPM – power off;

(e) never exceed speed – power on;

(f) never exceed speed – power off;

(g) maximum sideways speed;

(h) maximum rearward speed;

(i) maximum take-off weight;

(j) maximum all up weight;

(k) minimum operating weight;

(l) maximum positive and negative flight load factors.

2.2 Flight manual

2.2.1 Select from a list, the information which may be obtained from a flight manual.

2.3 Density altitude

2.3.1 Match each of the following terms with an appropriately worded definition:

(a) pressure altitude;

(b) density altitude;

(c) ambient conditions;

(d) forecast conditions.

2.3.2 Calculate density altitude given pressure altitude (or elevation and QNH) and temperature.

2.4 Helicopter landing sites (HLS)

2.4.1 Recall the requirements of basic and secondary HLS in respect to:

(a) physical specifications;

(b) operational requirements;

(c) general conditions for use.

2.5 Take-off and landing weight

2.5.1 Select from a list the statement which best describes:

(a) the effect of the following variables on the take-off and/or landing performance of a helicopter:

(i) weight;

(ii) power;

(iii) ground effect;

(iv) density altitude;

(v) ambient wind component;

(b) the easiest way of determining pressure altitude from a sensitive altimeter.

2.5.2 Determine hover performance in and out of ground effect given the following:

(a) gross weight;

(b) pressure altitude;

(c) temperature;

(d) flight manual performance charts.

2.6 Forward climb performance

2.6.1 Given graphical or tabular information typical of that provided in a flight manual for a single-engine helicopter extract:

(a) the best rate of climb for various conditions of pressure altitude, temperature and weight;

(b) the service ceiling for various conditions of pressure altitude, temperature and weight.

2.7 Cruise performance

2.7.1 Given graphical or tabular information typical of that provided in a flight manual for a single-engine helicopter, calculate:

(a) maximum payload which may be carried after determining the fuel requirements and the nature of the operation;

(b) endurance for holding or search for various combinations of helicopter weight and fuel;

(c) the maximum range, given weight, fuel carried and cruising altitude.

2.8 Weight and balance

2.8.1 Recall the meaning of the following terms used in the computation of weight and balance data:

(a) datum;

(b) arm;

(c) moment;

(d) station;

(e) centre of gravity range;

(f) lateral centre of gravity range;

(g) empty weight;

(h) operating weight;

(i) maximum take-off weight (MTOW).

2.8.2 Given a typical manual for a single-engine helicopter:

(a) extract the following weight and balance information:

(i) MTOW;

(ii) capacity and arm of the baggage lockers;

(iii) capacity, arm, grade and specific gravity of the fuel;

(iv) location and arms of the seating;

(b) determine the forward, aft and lateral limits of the CG for a given weight in the case of the above helicopter;

(c) determine whether the helicopter is safely loaded for flight given various combinations of weight and balance data using arithmetical methods or the specified loading system for the helicopter;

(d) calculate the adjustment of load required to achieve a CG within specified limits if previously determined to be outside limits;

(e) calculate where to position additional load items so that the CG is retained within the specific limits.

2.9 Flight plan preparation

2.9.1 Apply the responsibilities of a pilot in command with regard to weather and operational briefing prior to planning a VFR flight.

2.9.2 Given a route, select appropriate charts for the flight and list the operations for which it is mandatory to obtain a weather briefing.

2.9.3 List the weather services available, and nominate the sources and methods of obtaining this information.

2.9.4 State the minimum flight notification required, the method(s) of submitting this notification, and identify flight plan details that must be submitted.

2.9.5 Given an aerodrome forecast, decide whether it is necessary to:

(a) nominate an alternate aerodrome; or

(b) carry additional fuel for holding, and if so determine the following:

(i) requirement to nominate an appropriate alternate aerodrome;

(ii) determine the quantity of additional fuel required for holding or flight to the alternate.

2.9.6 Given a typical flight scenario, including:

(a) departure and landing points within and outside controlled airspace;

(b) weather and operational briefing;

(c) appropriate performance data;

(d) select safe route/cruise levels to comply with VFR;

(e) select cruise levels for the following:

(i) to comply with VFR and the table of cruising levels;

(ii) which meets passenger and fuel economy requirements;

(f) determine, for the following:

(i) the minimum fuel required;

(ii) the maximum payload (passengers/cargo and fuel) that may be carried whilst meeting the appropriate requirements;

(iii) whether intermediate refuelling is necessary;

(iv) ETD/ETA after considering VFR (day) requirements and flight/duty time limitations;

(g) complete a flight plan and a loading system.

Unit 1.9.4 POPG: PPL operations, performance and planning – gyroplane – *Reserved*

Unit 1.9.5 COPC: CPL operations, performance and planning – all aircraft categories

1. Reserved

2. Flight planning and performance

2.1 Density height

2.1.1 Using the methods under subsection 2.1.2, determine density height, given the following:

(a) OAT and pressure height;

(b) using cockpit temperature and an altimeter setting of 1013.2 hPa.

2.1.2 For subsection 2.1.1, the methods are the following:

(a) density altitude charts;

(b) manual computer;

(c) flight manual charts;

(d) mathematics.

2.2 Take-off and landing

2.2.1 Use the flight manual to extract maximum structural take-off and landing weights mentioned in subsection 2.2.2 according to the requirements mentioned in subsection 2.2.3.

2.2.2 Given a typical flight scenario, for the items mentioned in subsection 2.2.3, use performance charts to extract the following:

(a) maximum take-off weight;

(b) maximum landing weight;

(c) take-off distance required (TODR);

(d) landing distance required (LDR);

(e) climb weight limit;

(f) take-off parameters – power, flap setting, take-off safety speed;

(g) landing parameters – flap, threshold speed and state the conditions on which the parameters listed in (f) and (g) are based.

2.2.3 For subsection 2.2, the following requirements apply:

(a) apply information extracted from ERSA;

(b) determine TODA and LDA at a ground ALA;

(c) apply the CASA regulatory requirements/orders as applicable to single-engine aeroplanes;

(d) extract/derive entry parameters for take-off and landing charts viz:

(i) temperature and pressure;

(ii) take-off and landing weights;

(e) extract structural weight limits from a flight manual.

3. Climb, cruise and descent performance

3.1.1 From typical charts or tables, determine the following data for climb, cruise and descent:

(a) time, speed, distance, fuel flow/quantity;

(b) appropriate engine settings;

(c) rates of climb/descent;

(d) the conditions under which an aeroplane will achieve maximum range and endurance.

3.1.2 Determine the following, using the fuel units of US gal, kg, litres:

(a) best air and ground nm/unit of fuel;

(b) least fuel/air or ground nm.

4. Weight and balance

4.1 Weight calculations

4.1.1 Calculate the following:

(a) mid-zone weight;

(b) landing weight;

(c) take-off weight at an intermediate landing point.

4.2 Loading

4.2.1 Explain the following terms:

(a) arm, moment, datum, station, index unit;

(b) CG and CG limits;

(c) mean aerodynamic chord (MAC);

(d) empty weight, ZFW, ramp weight;

(e) maximum take-off and maximum landing weights;

(f) floor loading limits.

4.2.2 Demonstrate the ability to:

(a) express CG as a % of MAC;

(b) determine CG position relative to the datum;

(c) determine movement of CG with changes in load distribution and mass.

4.2.3 Given appropriate data use a typical loading system or a load sheet to distribute load to maintain CG within limits throughout a flight. This objective requires the ability to perform 1 or more of the following tasks:

(a) extract the following weight limits from a flight manual:

(i) empty weight ZFW;

(ii) maximum structural take-off and landing weight.

(b) determine the following:

(i) maximum payload;

(ii) maximum load per station;

(iii) maximum floor loading capacities;

(iv) fore and aft CG limits for a given/derived weight;

(v) weight of fuel/ballast to be carried;

(c) determine the following:

(i) the maximum payload/fuel that may be carried;

(ii) ballast requirements, if any;

(iii) the position of the CG under different load configurations.

5. Flight plan preparation

5.1.1 Apply the responsibilities of a pilot in command with regard to weather and operational briefing prior to planning a VFR flight.

5.1.2 Given a route applicable to the level of licence and type of operation viz. OCTA/CTA, do the following:

(a) select appropriate visual charts for the flight;

(b) list the operations for which it is mandatory to obtain meteorological and operational briefing;

(c) list the weather services available, and nominate the sources and methods of obtaining this information;

(d) apply CASA requirements/instructions for flight notification of VFR flights and state the preferred methods of submitting this notification.

5.1.3 Given an aerodrome forecast determine whether holding or alternate requirements apply and if so, for the following:

(a) nominate an appropriate alternate aerodrome;

(b) determine the quantity of additional fuel required for holding or flight to the alternate.

5.2 Flight planning

5.2.1 Reserved

5.2.2 For a domestic flight plan form:

(a) given the following:

(i) a typical training navigation route (OCTA/CTA), as applicable;

(ii) appropriate weather and operational briefing;

(iii) aircraft (type) planning data and fuel at start up; and

(b) apply the fuel policy described in CAAP 234-1(0); and

(c) select correct (safe) cruise levels; and

(d) enter information correctly in the flight plan form; and

(e) submit appropriate flight notification details; and

(f) determine minimum (safe) fuel and endurance; and

(g) demonstrate accuracy in computations:

(i) HDG +/- 5^{o}, ETI +/- 2 mins; and

(ii) fuel and endurance +5%.

5.2.3 Given the following:

(a) a departure place and 2 landing points;

(b) weather and operational briefing;

(c) passenger and/or baggage requirements;

(d) appropriate performance data;

then complete a flight plan form after considering the following aspects:

(e) selection of safe route(s) and cruise levels to comply with VFR;

(f) selection of cruise levels in accordance with the table of cruising levels;

(g) fuel for the flight, holding fuel, fuel to an alternate aerodrome, and specified reserves;

(h) weight limitation and aeroplane balance requirements;

(i) latest departure time.

5.2.4 Given a typical commercial task, including the following, do the things mentioned in paragraphs (d), (e), (f) and (g):

(a) departure and landing points within and/or outside controlled airspace;

(b) weather and operational briefing;

(c) appropriate performance data;

then:

(d) select safe routes to comply to VFR;

(e) select cruise levels as follows:

(i) to comply with VFR and the table of cruising levels;

(ii) which meet passenger and fuel economy requirements;

(f) determine the following:

(iii) the minimum (safe) fuel required;

(iv) the maximum payload (passengers/cargo and fuel) that may be carried;

(v) whether intermediate refuelling is necessary;

(vi) ETD and ETA after considering day VFR requirements, flight/duty time limitations and commercial considerations;

(g) complete a flight plan form and a loading system.

5.3 Equi-time point (ETP), point of no return (PNR), diversions

5.3.1 Given fuel on board, use planned/given ground speed to decide which of the following courses of action would require the least fuel (including reserves):

(a) proceed to destination;

(b) return to the departure aerodrome;

(c) proceed to a suitable alternate.

5.3.2 Calculate time and distance to an ETP or PNR between 2 points, using planned or given data.

Unit 1.9.6 COPA: CPL operations, performance and planning – aeroplane

1. Reserved

2. Operational knowledge

2.1 Aerodromes and aeroplane landing areas (ALAs)

2.1.1 ALAs are included as a topic in this syllabus pursuant to a pilot's responsibilities in accordance with CASA regulations.

2.1.2 Explain and apply the following terms used in CASA publications and documents:

(a) take-off safety speed;

(b) take-off distance available (TODA);

(c) take-off distance required (TODR);

(d) landing distance available (LDA);

(e) landing distance required (LDR).

2.1.3 Determine whether a given aerodrome or ALA is suitable for an aeroplane to take-off and land safety in accordance with guidelines contained in CASA guidance material.

2.2 Climb, cruise and descent performance

2.2.1 From typical charts or tables extract/determine the following data for climb, cruise and descent:

(a) time, speed, distance, fuel flow/quantity;

(b) appropriate engine settings;

(c) rates of climb/descent;

(d) the conditions under which an aeroplane will achieve maximum range and endurance.

2.2.2 Determine the:

(a) best air and ground nm/unit of fuel (for example, 2.5 nm/kg);

(b) least fuel/air or ground nm (for example, 0.4 kg/nm).

3. Fuel units

3.1.1 Using US Gal, kg and litres, estimate:

(a) mid-zone weight;

(b) landing weight;

(c) take-off weight at an intermediate landing point.

Unit 1.9.7 COPH: CPL operations, performance and planning – helicopter

1 Reserved

1. Operational knowledge

1.1 Helicopter limitations

1.1.1 Describe the reason for following operational limitation on helicopter performance:

(a) maximum rotor RPM – power on;

(b) maximum rotor RPM – power off;

(c) minimum rotor RPM – power on;

(d) minimum rotor RPM – power off;

(e) never exceed speed – power on;

(f) never exceed speed – power off;

(g) maximum sideways speed;

(h) maximum rearward speed;

(i) maximum take-off weight;

(j) maximum all up weight;

(k) minimum operating weight;

(l) maximum positive and negative flight load factors.

1.2 Helicopter landing sites (HLS)

1.2.1 Recall the requirements of basic and secondary HLS in respect to:

(a) physical specifications;

(b) operational requirements;

(c) general conditions for use.

1.3 Take-off and landing weight

1.3.1 Select from a list the statement which best describes:

(a) the effect of the following variables on the take-off and/or landing performance of a helicopter:

(i) weight;

(ii) power;

(iii) ground effect;

(iv) density altitude;

(v) ambient wind component;

(b) the easiest way of determining pressure altitude from a sensitive altimeter.

1.3.2 Determine hover performance in and out of ground effect given the following:

(a) gross weight;

(b) pressure altitude;

(c) temperature;

(d) flight manual performance charts.

1.4 Forward climb performance

1.4.1 Given graphical or tabular information typical of that provided in a flight manual for a single-engine helicopter extract:

(a) the best rate of climb for various conditions of pressure altitude, temperature and weight;

(b) the service ceiling for various conditions of pressure altitude, temperature and weight.

1.5 Cruise performance

1.5.1 Given graphical or tabular information typical of that provided in a flight manual for a single-engine helicopter, calculate:

(a) maximum payload which may be carried after determining the fuel requirements and the nature of the operation;

(b) endurance for holding or search for various combinations of helicopter weight and fuel;

(c) the maximum range, given weight, fuel carried and cruising altitude.

1.6 Weight and balance

1.6.1 Recall the meaning of the following terms used in the computation of weight and balance data:

(a) datum;

(b) arm;

(c) moment;

(d) station;

(e) centre of gravity range;

(f) lateral centre of gravity range;

(g) empty weight;

(h) operating weight;

(i) maximum take-off weight (MTOW).

1.6.2 Given a typical manual for a single-engine helicopter:

(a) extract the following weight and balance information:

(i) MTOW;

(ii) capacity and arm of the baggage lockers;

(iii) capacity, arm, grade and specific gravity of the fuel;

(iv) location and arms of the seating;

(b) determine the forward, aft and lateral limits of the CG for a given weight in the case of the above helicopter;

(c) determine whether the helicopter is safely loaded for flight given various combinations of weight and balance data using arithmetical methods or the specified loading system for the helicopter;

(d) calculate the adjustment of load required to achieve a CG within specified limits if previously determined to be outside limits;

(e) calculate where to position additional load items so that the CG is retained within the specific limits.

1.7 Flight plan preparation

1.7.1 Apply the responsibilities of a pilot in command with regard to weather and operational briefing prior to planning a VFR flight.

1.7.2 Given a route, select appropriate charts for the flight and list the operations for which it is mandatory to obtain a weather briefing.

1.7.3 List the weather services available, and nominate the sources and methods of obtaining this information.

1.7.4 State the minimum flight notification required, the method(s) of submitting this notification, and identify the flight plan details that must be submitted.

1.7.5 Given an aerodrome forecast, decide whether it is necessary to the following:

(a) nominate an alternate aerodrome;

(b) carry additional fuel for holding and if so:

(i) nominate an appropriate alternate aerodrome;

(ii) determine the quantity of additional fuel required for holding or flight to the alternate.

1.7.6 Given a typical flight scenario, including:

(a) departure and landing points within and outside controlled airspace;

(b) weather and operational briefing;

(c) appropriate performance data;

(d) select safe route/cruise levels to comply with VFR;

(e) select cruise levels for the following:

(i) to comply with VFR and the table of cruising levels;

(ii) which meets passenger and fuel economy requirements;

(f) determine for the following:

(i) the minimum fuel required;

(ii) the maximum payload (passengers/cargo and fuel) that may be carried whilst meeting the appropriate requirements;

(iii) whether intermediate refuelling is necessary;

(iv) ETD/ETA after considering VFR (day) requirements and flight/duty time limitations;

(g) complete a flight plan and a loading system.

Unit 1.9.8 COPG: CPL operations, performance and planning – gyroplane – ***Reserved***

Unit 1.9.9 COPP: CPL operations, performance and planning – powered-lift – ***Reserved***

Unit 1.9.10 COPS: CPL operations, performance and planning – airship – ***Reserved***