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Competency Guide
Complex Aeroplane

First Edition
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Canada

COMPETENCY GUIDE
COMPLEX AEROPLANE

This reference sets out the competency requirements for the complex aeroplane experience required in CPL(A) and CPL(A)/IR integrated courses.

Detailed descriptions and explanations of the exercises as can be found by referring to the corresponding chapter number in the *Flight Training Manual* (Catalogue No. T52-14/1994E) published under the authority of Transport Canada.

Complex aeroplane competency is determined by check instructors appointed by the Flight Training Unit. Certification that this competency has been attained will be recorded on the training records for the trainee. Where the commercial pilot flight test is conducted on a complex aeroplane, or where a multi-engine class rating is obtained, a separate determination of complex aeroplane competency is not required.

"complex aeroplane" - means an aeroplane having retractable landing gear, flaps, and a constant speed propeller. A complex seaplane is one having flaps and a constant speed propeller.

For more information, visit our web site at

www.tc.gc.ca/aviation/general/flttrain/index.htm

Également disponible en français

Exercises

EX. 2 AEROPLANE FAMILIARIZATION AND PREPARATION FOR FLIGHT

A. Documents and Airworthiness

Aim

To determine that the trainee can correctly assess the validity of documents required to be carried on board and, from these documents, determine that the aircraft is airworthy.

Description

The trainee shall determine the validity of all documents required to be carried on board the aeroplane and determine that required maintenance certifications have been completed.

Performance Criteria

The trainee will:

- ensure that flight authorization is confirmed and encompasses the requirements of the proposed flight in accordance with the applicable operational control system;
- determine that the required documents on board are valid;
- determine that the maintenance release ensures aeroplane serviceability and currency of inspection for the proposed period of flight;
- determine the number of flying hours before the next service or maintenance task is due;
- ensure that any conditions or limitations on the maintenance release can be complied with;
- determine the impact on aeroplane operations of unserviceabilities for the proposed flight;
- Determine that the aeroplane is equipped in accordance with the installed Aircraft Equipment List, as amended;
- explain the process for dealing with aeroplane unserviceabilities discovered during a flight.

B. Aeroplane Performance

Aim

To determine that the trainee understands the performance capabilities, approved operating procedures, and limitations for the aeroplane being used for the flight.

Description

The trainee will be required to explain and state the performance capabilities, approved operating procedures and operating limitations and placards for the aeroplane to be used on the flight. Essential performance speeds shall be quoted from memory. Other aeroplane performance data may be determined from the Pilot's Operating Handbook .

Performance Criteria

The trainee will state from memory the following speeds:

- best angle of climb speed;
- best rate of climb speed;
- manoeuvring speed.

Calculate, for the proposed flight:

- Take-off distance required to clear a 50 foot or existing obstacle;
- Landing distance required to clear a 50 foot or existing obstacle.

The trainee will determine from the Pilot's Operating Handbook any other required operational data for the aeroplane used for the flight.

C. Weight and Balance, Loading

Aim

To determine that the trainee can correctly complete weight and balance calculations for the aeroplane used for the flight.

Description

The trainee will be required, using actual weights, to apply the approved weight and balance data for the aeroplane used and complete accurate practical computations for the intended flight, including takeoff and landing weights and if applicable the zero fuel weight. If a loading graph or computer is available with the aeroplane, it may be utilized. Knowledge of weight and balance graphs and envelopes, shall be demonstrated.

Performance Criteria

The trainee will:

- determine if the take-off and landing weights, centres of gravity and if applicable zero-fuel weight are within permissible limits for the intended flight;
- demonstrate practical knowledge of how to correct a situation in which the centre of gravity is out of limits and/or in which the gross weight has been exceeded.

D. Operation of Aircraft Systems

Aim

To determine that the trainee can operate aircraft systems in accordance with the Pilot's Operating Handbook.

Description

The trainee shall be expected to demonstrate practical knowledge of the operation of systems installed on the aeroplane being used for the flight test.

Performance Criteria

The trainee shall operate the aeroplane systems in accordance with the Pilot's Operating Handbook and explain the operation of at least three of the following systems:

- primary flight controls and trim
- flaps, leading edge devices, and spoilers
- powerplant and propeller
- landing gear
- fuel, oil, and hydraulic system
- electrical system
- avionics system
- pitot-static system, vacuum/pressure system and associated flight instruments
- environmental system
- de-icing and anti-icing systems

E. Pre-Flight Inspection

Aim

To determine that the trainee can complete internal and external checks in accordance with the approved checklist.

Description

The trainee shall determine that the aeroplane is ready for the intended flight.

All required equipment and documents shall be located and, so far as can be determined by pre-flight inspection, the aeroplane shall be confirmed to be airworthy. Visual checks for fuel quantity, proper grade of fuel, fuel contamination and oil level shall be carried out in accordance with the Pilot's Operating Handbook. If the aircraft design precludes a visual check, fuel chits, fuel logs or other credible procedures may be used to confirm the amount of fuel actually on board.

The candidate shall conduct an oral passenger safety briefing. Should the candidate omit the passenger safety briefing the examiner will ask the candidate to provide one.

Performance Criteria

The trainee will:

- using an orderly procedure, inspect the aeroplane including at least those items listed by the manufacturer or aeroplane owner/operator;
- identify and verify switches, circuit breakers/fuses, and spare fuses pertinent to day and night operations;
- ensure that no defect or damage to the aeroplane could compromise safety;
- describe the appropriate action to take for any unsatisfactory item detected (or described by the instructor);
- notes any discrepancy, and determines whether the aeroplane requires maintenance;
- confirm that there is sufficient fuel and oil for the intended flight;
- verify that the aeroplane is in condition for safe flight;
  identify and verify the location and security of baggage and required equipment;
- organize and arrange material and equipment in a manner that makes the items readily available;
- perform an effective passenger safety briefing which shall include:
  - the location and use of emergency exits, emergency locator transmitter, fire extinguisher
  - smoking limitations
  - use of seat belts
  - items specific to the aeroplane type being used
  - action to take in the event of an emergency landing
  - other items for use in an emergency

F. Engine Starting and Run-up, Use of Check Lists

Aim

To determine that the trainee can complete engine start, warm-up, run-up, and systems checks in accordance with the Pilot's Operating Handbook.

Description

The trainee shall use the checklists provided by the aircraft manufacturer or owner and use recommended procedures for engine starting, warm-up, run-up and to check aeroplane systems and equipment to determine that the aeroplane is airworthy and ready for flight. The trainee shall take appropriate action with respect to unsatisfactory conditions encountered or specified by the instructor.

Performance Criteria

The trainee will:

- demonstrate an awareness of other persons and property before and during engine start;
- accurately complete the engine and aeroplane systems checks;
- take appropriate action with respect to unsatisfactory conditions;
- use the appropriate checklist provided by the manufacturer or aeroplane owner;
- determine that the radio navigation aids to be used on the flight test are serviceable;
- check flight controls for freedom of operation and correct movement.

EX. 4 TAXIING

Aim

To determine that the trainee can manoeuvre the aeroplane safely and avoid unnecessary interference with movement of other traffic.

Description

The trainee will be expected to taxi the aircraft to and from the runway in use and as otherwise required. Provided that traffic and other conditions permit, the trainee shall taxi along taxiway centrelines where they exist. The trainee shall position the flight controls appropriately for wind conditions. During calm wind conditions, the examiner will specify wind speed and direction in order to test this ability.

While taxiing, the trainee shall confirm the proper functioning of the flight instruments. Should the candidate omit the flight instrument checks, the examiner will ask the candidate to complete these checks prior to take-off.

Performance Criteria

The trainee will:

- perform a brake check immediately after the aeroplane begins moving;
- safely manoeuvre the aeroplane, considering other traffic on aprons and manoeuvring areas;
- use appropriate taxiing speeds;
- adhere to local taxi rules, procedures and Air Traffic Control clearances and instructions;
- use flight controls and brakes correctly;
- confirm the proper functioning of the flight instruments;
- identify and correctly interpret airport, taxiway and runway signs, markings and lighting;
- after landing, clear the runway/landing area and taxi to suitable parking/refueling area;
- park the aeroplane properly, considering the safety of nearby persons or property.

EX. 9 STEEP TURN

Aim

To determine the trainee's ability to perform a level, co-ordinated steep turn.

Description

At an operationally safe altitude, the trainee will be asked to execute a steep turn through 180°, with an angle of bank of 45°, then without pause, reverse the turn to roll out on the original heading. The trainee will specify the selected altitude, airspeed and initial heading prior to entering the turn.

Performance Criteria

The trainee will:

- complete appropriate safety precautions before entering the steep turn;
- enter a smooth, coordinated 180° steep turn with 45° bank, immediately followed by a 180° steep turn in the opposite direction;
- maintain altitude within +/- 100 feet;
- maintain airspeed within +/- 10 knots;
- maintain angle of bank within +/- 10° of that assigned;
- Divide attention between aeroplane and lookout;
- roll out on the entry heading +/- 10° .

EX. 11 SLOW FLIGHT

Aim

To determine the trainee's ability to establish and manoeuvre the aircraft in slow flight, maintain flight control within this range, prevent a stall, and recover promptly and smoothly to normal flight.

Description

At an operationally safe altitude that allows recovery at or above the altitude recommended by the manufacturer or 2,000 feet AGL, whichever is higher, the trainee shall establish and manoeuvre the aircraft in slow flight.

Performance Criteria

The trainee will:

- complete appropriate safety precautions before entering slow flight;
- stabilize and maintain the airspeed at 1.2 Vso, +/- 5 knots;
- establish straight and level flight and complete level turns, with gear and flaps selected as specified by the instructor;
- maintain the specified altitude, +/- 100 feet;
- maintain the specified heading during straight flight within +/- 10 °;
- maintain the bank angle within +/- 10 ° during turns;
- roll out on a specified heading within +/- 10 °;
- maintain co-ordinated flight;
- divide attention between aeroplane and lookout;
- prevent a stall;
- recover promptly and smoothly to normal flight.

EX. 12 STALL

Aim

To determine that the trainee can recognize indications of the approach to either departure or arrival stalls, the full stall, and can accomplish a positive and smooth recovery with a minimum loss of altitude.

Description

At an operationally safe altitude that allows recovery at or above the altitude recommended by the manufacturer or 2,000 feet AGL, whichever is higher, the stall manoeuvres will be entered from practical flight situations such as slow flight, simulated overshoot, or climbing or descending turns. The aeroplane configuration for the stalls shall be specified by the instructor.

Performance Criteria

The trainee will:

- complete appropriate safety precautions before entering a stall;
- establish the appropriate configuration;
- transition smoothly to a pitch attitude that will induce a stall;
- recognize and announce the onset of the stall by identifying the first aerodynamic buffeting or decay of control effectiveness;
- stall the aeroplane;
- use immediate and correct recovery procedures;
- retract flaps to the recommended setting and retract landing gear (where applicable) after a positive rate of climb is established, or as recommended by the manufacturer;
- accelerate to at least V_x+10 knots or the speed recommended by the manufacturer, before a final flap retraction;
- avoid secondary stall, excessive airspeed, or excessive altitude loss;
- return to the altitude, heading and airspeed specified by the instructor.

EX. 16 TAKEOFF

Aim

To determine the trainee's ability to take off safely using the correct procedure and technique for the actual wind conditions, runway surface and length (or those specified by the instructor), and to assess the possibility of such further conditions as wind shear and wake turbulence.

Description

The trainee shall demonstrate the ability to perform:

- a normal take-off into wind and in cross-wind conditions
- a short field take-off, or a soft field take-off

If possible, at least one of the takeoffs shall be completed under crosswind conditions.

For the purpose of this exercise, the examiner may specify simulated conditions for the takeoff such as surface conditions, obstacles to be cleared and available runway length.

Note: The candidate must be able to explain the operational necessity for any variation from recommended speeds, e.g. gusty or crosswind conditions.

Performance Criteria - Normal Takeoff

The trainee will:

- perform an effective passenger safety review;
- complete appropriate checklists;
- position the flight controls and configure the aeroplane for the existing conditions;
- clear the area, taxi into the take-off position, and align the aeroplane on the runway centre line;
- advance the throttle smoothly to take-off power;
- confirm that take-off power has been achieved;
- maintain the nosewheel (or tailwheel) within 10 feet of the centreline during the take-off roll;
- rotate at recommended airspeed, (+5 / -0 knots);
- accelerate to and maintain recommended climb speed (+/- 5 knots);
- retract the landing gear (where applicable) at a safe height;
- maintain take-off power to a safe height, then set climb power (+/- 0.5" MAP, +/- 50 RPM);
- eliminate drift and track along runway centreline and extended centreline;
- comply with noise abatement procedures;
- complete appropriate checks.

Performance Criteria - Soft Field Takeoff

The candidate will:

- perform an effective passenger safety review;
- complete appropriate checklists;
- position the flight controls and flaps for the existing conditions;
- clear the area;
- taxi onto the take-off surface at a speed consistent with safety and align the aeroplane without stopping while advancing the throttle smoothly to take-off power;
- confirm take-off power has been achieved;
- establish and maintain a pitch attitude that will effectively and efficiently transfer the weight of the aeroplane from the wheels to the wings;
- maintain directional control during the take-off roll;
- lift off at minimum possible airspeed;
- remain in ground effect after takeoff while accelerating to recommended climb speed;
- maintain recommended climb speed (+/- 5 knots);
- retract the landing gear (where applicable) at a safe height;
- retract flaps (where applicable) at a safe height;
- maintain take-off power to a safe height, then set climb power (+/- 0.5" MAP, +/- 50 RPM);
- maintain proper drift correction in the climb;
- complete appropriate checks.

Performance Criteria - Short Field Takeoff

The candidate will:

- perform an effective passenger safety review;
- complete appropriate checklists;
- position the flight controls and flaps for the existing conditions;
- clear the area, taxi into position for maximum utilization of available take-off distance;
- advance the throttle smoothly to take-off power while holding brakes, or as specified by the manufacturer;
- confirm take-off power has been achieved;
- maintain directional control during the take-off roll;
- rotate at the recommended airspeed (+5 / -0 knots);
- accelerate to and maintain recommended climb speed (+/- 5 knots);
- retract the landing gear (where applicable) at a safe height;
- retract flaps (where applicable) at a safe height;
- maintain takeoff power to a safe height, then set climb power (+/- 0.5" MAP, +/- 50 RPM);
- maintain proper drift correction in the climb;
- complete appropriate checks.

EX. 17 CIRCUIT

Aim

To determine that the trainee can operate the aeroplane in a safe manner in the vicinity of a controlled and/or uncontrolled aerodrome.

Description

The trainee shall demonstrate correct circuit procedures, including departure and joining procedures.

The ability to comply with MF procedures and ATC clearances or instructions while maintaining separation from other aircraft shall be demonstrated.

Performance Criteria

The trainee will:

- fly an accurate circuit maintaining correct position and separation from other aircraft;
- comply with actual or simulated ATC clearances or instructions;
- comply with established circuit entry and departure procedures;
- comply with established circuit patterns;
- establish an appropriate distance from the runway/landing area;
- correct for wind drift to maintain proper ground track;
- remain oriented with the runway/landing area in use;
- maintain and hold circuit altitude and airspeed (+/- 100 feet, +/- 10 knots);
- complete appropriate checklists;
- comply with other procedures that may be in effect at the time.

EX. 18 APPROACH AND LANDING

Aim

To determine the trainee's ability to approach and land safely using the correct procedure and technique for the actual wind conditions, runway surface and length, to assess the possibility of such further conditions as wind shear and wake turbulence, and to execute overshoot procedures.

Description

The trainee will be required to demonstrate:

- a normal landing into wind and in cross-wind conditions
- a short field landing, or soft field landing
- an overshoot

If possible, at least one of the landings shall be completed under crosswind conditions.

The simulated surface conditions, obstacles on approach, runway threshold and length of surface available to the candidate for the short or soft field approach and landing will be clearly specified by the examiner prior to commencing the exercise.

The overshoot may be called for and assessed from any of the landing approaches, the forced landing or precautionary landing.

Assessment of approaches and landings will be based on the candidate's ability to select the proper approach profile for the actual conditions, or for those specified by the examiner.

Note: The trainee must be able to explain the necessity for any variation from recommended speed, e.g. gusty or crosswind conditions.

Performance Criteria - Normal Approach and Landing

The trainee will:

- perform an effective passenger safety review;
- consider the wind conditions, landing surface and obstructions;
- select a suitable touch-down zone and specify a touchdown point;
- establish the recommended approach and landing configuration;
- maintain a stabilized approach and recommended airspeed, or in its absence 1.3 Vso, (+10 / - 0 knots);
- make smooth, timely, and correct control application during the flare and touchdown;
- touch down smoothly at a minimum speed for existing conditions, at or within 200 feet beyond a specified touchdown point;
- touch down with no drift and with the aeroplane's longitudinal axis aligned with and within 10 feet of the centre of the landing surface;
- touch down on main wheels with nose wheel clear of ground;
- maintain crosswind correction and directional control throughout the approach and landing roll;
- control nose wheel contact with the runway;
- apply brakes without lockup or skidding;
- complete appropriate checks.

Performance Criteria - Soft Field Approach and Landing

The candidate will:

- perform an effective passenger safety review;
- consider the wind conditions, landing surface and obstructions;
- select the most suitable touchdown zone;
- establish the recommended approach and landing configuration;
- maintain a stabilized approach and recommended airspeed which will result in a threshold crossing airspeed of 1.2 Vso (+10 / - 0 knots);
- maintain crosswind correction and directional control throughout the approach and landing;
- touch down softly using power as necessary to achieve the landing attitude for the slowest possible touch down on the main wheels, while preventing nose wheel or tail cone contact with the soft ground;
- touch down with no drift and with the aeroplane's longitudinal axis aligned with the landing surface;
- maintain the required nose-up control during the landing roll;
- complete appropriate checks.

Performance Criteria - Short Field Approach and Landing

The candidate will:

- perform an effective passenger safety review;
- consider the wind conditions, landing surface and obstructions;
- select the most suitable touchdown zone and specify a touchdown point;
- establish the recommended approach and landing configuration;
- maintain a stabilized approach and recommended airspeed which will result in a threshold crossing airspeed of 1.2 Vso (+10 / - 0 knots);
- make smooth, timely and correct control application during the flare and touchdown;
- touch down at or within 100 feet beyond a specified point;
- touch down with no drift, and with the longitudinal axis aligned with and within 10 feet of the centre of the landing surface;
- maintain crosswind correction and directional control throughout the approach and landing;
- apply brakes, without lockup or skidding, to stop in the shortest distance consistent with safety;
- complete appropriate checks.

Overshoot

The trainee will:

- make a timely decision to discontinue the approach to landing;
- promptly and smoothly apply maximum allowable power and establish the pitch attitude that will stop the descent;
- retract flaps in stages or as recommended by the manufacturer;
- retract the landing gear (as applicable) after a positive rate of climb is established, or as recommended by the manufacturer;
- accelerate to and maintain recommended climb speed (+10 / - 0 knots);
- maintain maximum allowable power to a safe manoeuvring altitude, then set climb power (+/- 0.5” MAP, +/- 50 RPM);
- complete the appropriate checks.

EX. 29 EMERGENCY PROCEDURES

Aim

To determine that the trainee can react promptly and correctly to emergencies and systems or equipment malfunctions.

Description

The instructor will assess the trainee's knowledge of emergency procedures or abnormal conditions.

Performance Criteria

The trainee shall, for at least five of the following simulated emergencies, analyze the situation and take appropriate action, following the appropriate emergency checklists or procedures:

- partial power loss
- rough engine operation or overheat
- loss of oil pressure
- fuel starvation
- electrical fire
- vacuum system failure
- pitot or static blockage
- cabin fire
- icing
- electrical malfunctions
- landing gear malfunctions
- flap failure
- door opening in flight
- emergency descent
- any other emergency unique to the aeroplane flown

COMPLEX AEROPLANE COMPETENCY

Name of Trainee (Print)	Licence/Permit Number

Complex Aeroplane Flight Experience Dual Solo	Type/s

The trainee meets the complex aeroplane competency requirements required for a CPL(A) or CPL(A)/IR integrated course of pilot training.

Name of Instructor (Print)	Class	Licence Number

Signature	Date	Flight Training Unit

Name of Check Instructor (Print)	Licence Number

Signature	Date

A copy of this certification shall be retained on the trainee's records at the Flight Training Unit.