

SECTION 3 NAVIGATION AND INSTRUMENT FLYING STANDARDS

NAV Navigate aircraft

1 Unit description

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

2 Elements and performance criteria

2.1 NAV.1 – Prepare documents and flight plan

- (a) select and prepare appropriate navigation charts for the intended flight;
- (b) select a suitable route and altitude considering weather, terrain, airspace, NOTAMs and alternate landing areas;
- (c) obtain and interpret meteorological forecasts, NOTAMs and operational information applicable to the planned flight;
- (d) determine whether the planned flight can be conducted under the applicable flight rules and taking account of the beginning and end of daylight times;
- (e) except for the RPL navigation endorsement and the PPL, calculate and document critical point (CP) and point of no return (PNR) locations;
- (f) complete a flight plan to the planned destination and alternates;
- (g) lodge suitable flight notification for search and rescue (SAR) purposes.

2.2 NAV.2 – Comply with airspace procedures while navigating

- (a) identify airspace restrictions and dimensions applicable to the flight;
- (b) obtain and comply with air traffic clearances, if applicable;
- (c) comply with airspace procedures applicable to the airspace classification throughout the flight.

2.3 NAV.3 – Conduct departure procedures

- (a) organise cockpit to ensure charts, documentation and navigational calculator are accessible from the control seat;
- (b) comply with all departure procedures, clearances and noise abatement requirements;
- (c) establish planned track on departure within 5 nm of airfield or apply alternative procedure if required;
- (d) calculate estimated time of arrival (ETA) for first waypoint.

2.4 NAV.4 – Navigate aircraft en route

- (a) maintain a navigation cycle that ensures accurate tracking, and apply track correctional techniques to re-establish track prior to waypoint or destination;
- (b) maintain heading to achieve a nominated track;
- (c) maintain and revise ETAs (± 2 minutes) for waypoint or destination;
- (d) maintain track in accordance with published flight path tolerances in controlled airspace;
- (e) navigate using accepted map-reading techniques;
- (f) maintain navigation and fuel log to monitor tracking, ETAs and fuel status;
- (g) use appropriate techniques to obtain a positive fix at suitable intervals;
- (h) maintain awareness of route, en route terrain, en route and destination weather, and react appropriately to changing weather conditions;
- (i) perform pre-descent and turning point checks;

- (j) maintain appropriate radio communication and listening watch with ATS and other aircraft if radio is fitted and used;
- (k) configure the aircraft as required for the following environmental and operational conditions:
 - (i) turbulence;
 - (ii) holding;
 - (iii) maximum range;
- (l) maintain awareness of search and rescue times (SARTIME) and revise as required;
- (m) monitor aircraft systems, manage fuel and engine to ensure aircraft is operated to achieve flight plan objectives.

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

- (a) configure the aircraft as required for the following environmental and operational conditions:
 - (i) reduced visibility;
 - (ii) low cloud base;
- (b) navigate aeroplane at minimum heights (not below 500 ft AGL, clear of built-up areas) and remain in VMC;
- (c) maintain separation from terrain, obstacles, allowing for wind and turbulence at low level;
- (d) avoid noise sensitive areas;
- (e) operate appropriately in the vicinity of aerodromes and landing areas.

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

- (a) acknowledge positional uncertainty in a timely manner;
- (b) configure aircraft for range and endurance as required;
- (c) apply recognised method to re-establish aircraft position;
- (d) fix position;
- (e) use radio to request assistance, if applicable;
- (f) plan a timely precautionary search and landing if unable to complete flight safely to suitable aerodrome.

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

- (a) make timely decision to divert;
- (b) identify an acceptable alternate aerodrome;
- (c) select a suitable route and cruising level;
- (d) revise flight plan considering weather, terrain, airspace and fuel available;
- (e) advise ATS of an intention to divert.

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

- (a) initialise navigation system (as applicable);
- (b) conduct navigation system validity check (as applicable);
- (c) conduct RAIM check if required;
- (d) select, load, check and activate the flight plan (as applicable);
- (e) navigate on departure, en route and on arrival using GNSS;
- (f) operate instrument navigation systems correctly;
- (g) use instrument navigation systems to assist with navigation;
- (h) confirm waypoints and fixes using instrument navigation systems.

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

- (a) obtain updated relevant aerodrome information;

- (b) determine landing direction and aerodrome suitability;
- (c) conduct arrival;
- (d) identify and avoid all traffic;
- (e) observe local and published noise abatement requirements and curfews;
- (f) cancel SARWATCH.

3 Range of variables

- (a) activities are performed in accordance with published procedures;
- (b) different terrain;
- (c) applicable airspace procedures;
- (d) simulated weather conditions.

4 Underpinning knowledge of the following:

- (a) basic GNSS principles;
- (b) en route GNSS navigation principles;
- (c) dead-reckoning navigation;
- (d) navigate in featureless terrain and extended over-water flights;
- (e) diversion considerations and procedures;
- (f) maximum payload and minimum fuel operations.

RNE Radio navigation – en route

1 Unit description

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

2 Elements and performance criteria

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

- (a) select and operate navigation aids and systems;
- (b) monitor and take appropriate action in relation to the integrity of navigation aid systems information.

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

- (a) determine aircraft position fix solely with reference to navigation aids and systems;
- (b) intercept tracks to and from navigation aids and systems;
- (c) maintain tracks within specified tolerances;
- (d) record, assess and revise timings as required;
- (e) recognise station passage.

3 Range of variables

- (a) activities are performed in accordance with published procedures;
- (b) in an aircraft or an approved flight simulation training device;
- (c) azimuth and course deviation indicator display systems.

4 Underpinning knowledge of the following:

- (a) tracking tolerances for radio navigation and GNSS aids;
- (b) for non-directional beacon (NDB):
 - (i) effects of coastal refraction, night error, thunderstorms, mountainous areas, types of terrain and altitude of aircraft on NDB indications or range;
 - (ii) methods of selecting and using the most appropriate NDB for tracking during navigation;
 - (iii) NDB tracking techniques, procedures and limitations;
 - (iv) procedures for sector entry and holding using the NDB;
- (c) for VOR:
 - (i) VOR instrument settings required to provide command indications when flying on given tracks both to and from the VOR;
 - (ii) VOR tracking techniques, procedures and limitations;
 - (iii) procedures for sector entry and holding using the VOR;
- (d) for global navigation satellite system (GNSS):
 - (i) principles of operation, performance limitations and errors of a GNSS system;
 - (ii) methods of position fixing using a GNSS system;
 - (iii) GNSS operating procedures which provide safeguards against navigational error and loss of situational awareness;
 - (iv) GNSS operating procedures for typical navigational tasks using a specific type of aircraft equipment;
 - (v) indications of waypoint passage;
 - (vi) GNSS operational and serviceability checks;
 - (vii) human factors limitations associated with the use of GNSS equipment;
 - (viii) requirements applicable to pilots and equipment for GNSS operations;

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

IFF Full instrument panel manoeuvres**1 Unit description**

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

2 Elements and performance criteria**2.1 IFF.1 – Determine and monitor the serviceability of flight instruments and instrument power sources**

- (a) determine serviceability of flight and navigational instruments;
- (b) perform functional checks of flight and navigational instruments where applicable prior to take-off;
- (c) monitor flight instrument and instrument power sources and react to any warnings, unserviceability or erroneous indications.

2.2 IFF.2 – Perform manoeuvres using full instrument panel

- (a) interpret flight instrument indications and apply procedures and techniques to achieve and maintain a specified flight path using the aircraft's full instrument panel;
- (b) except for RPL, set and maintain power and attitude by reference to the full instrument panel to achieve the following:
 - (i) straight and level performance during normal cruise within the flight tolerances;
 - (ii) nominated climb performance within the flight tolerances;
 - (iii) descent performance within the flight tolerances;
- (c) set and maintain power and attitude by reference to the full instrument panel to establish a rate 1 turn onto a nominated heading within the flight tolerances.

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

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

3 Range of variables

- (a) activities are performed in accordance with published procedures;
- (b) day VFR in variable weather conditions;
- (c) for RPL, PPL, CPL licence and multi-engine aeroplane class rating training and assessment, day VFR simulated inadvertent entry into IMC with a level 180° turn to re-establish visual flight;
- (d) VMC with simulated IMC;
- (e) IMC if conducted in a synthetic flight simulator device;
- (f) fitted flight instruments that are suitable for full panel instrument flight.

4 Underpinning knowledge of the following:

- (a) scan technique appropriate to fitted flight instruments and phase of flight;
- (b) attitude and power requirements to achieve specified flight profiles;
- (c) instrument failure and warning systems fitted to the aeroplane.

IFL Limited instrument panel manoeuvres

1 Unit description

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

- (a) without reference to the primary attitude indicator or display;
- (b) without reference to the primary heading indicator or display;
- (c) without reference to reliable airspeed indications.

2 Elements and performance criteria

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

- (a) monitor flight instruments and instrument power sources and recognise warning indicators or erroneous instrument indications;
- (b) transition from a full instrument panel to a limited instrument panel.

2.2 IFL.2 – Perform manoeuvres – limited panel

- (a) interpret and respond appropriately to instrument indications;
- (b) apply power and attitude settings to achieve straight and level performance during:
 - (i) normal cruise;
 - (ii) in an aeroplane-approach configuration with flaps (when fitted) and undercarriage down;
 - (iii) in a helicopter at minimum power for level flight speed;
- (c) apply power and attitude settings to achieve:
 - (i) nominated climb performance;
 - (ii) nominated descent performance;
 - (iii) during climb, descent and straight and level flight, rate 1 turns onto a nominated heading;
- (d) trim (as applicable) and balance aircraft;
- (e) establish level flight at a nominated altitude, from a climb or descent during straight or turning flight.

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

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

2.4 IFL.4 – Re-establish visual flight

- (a) transition from visual flight conditions to instrument flight conditions while maintaining control of the aircraft;
- (b) perform a manoeuvre to re-establish visual flight;
- (c) implement a plan that ensures the flight continues in VMC.

3 Range of variables

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

- (b) single-engine or multi-engine aircraft or approved flight simulation training device;
- (c) manually flown in single-pilot or multi-crew operations;
- (d) simulated IMC conditions;
- (e) up to and including light turbulence.

4 Underpinning knowledge of the following:

- (a) scan technique appropriate to fitted flight instruments and phase of flight (without attitude or stabilised heading indicators);
- (b) performance instrument indications and power requirements to achieve specified flight profiles;
- (c) anti-icing and de-icing controls and switches fitted to the aircraft type, and when these systems should be operated;
- (d) instrument failure and warning systems fitted to the aircraft;
- (e) the safety risks associated with application of large or rapid control inputs in more than 1 axis simultaneously.

CAS Operate airborne collision avoidance systems (ACAS)**1 Unit description**

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

2 Elements and performance criteria**2.1 CAS.1 – ACAS pre-flight check**

- (a) complete a pre-flight check of ACAS equipment;
- (b) determine the serviceability status of the equipment.

2.2 CAS.2 – ACAS operating mode

- (a) select the correct operating mode of an ACAS;
- (b) determine when the ACAS is operating normally.

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

- (a) recognise a TA;
- (b) interpret TA information correctly to determine bearing and range and vertical displacement of displayed traffic;
- (c) make no change to flight path based solely on information displayed by ACAS;
- (d) apply right of way rules with visual acquisition of traffic or maintain safe separation.

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

- (a) recognise an RA, at typical cruise altitudes and below 10,000 ft;
- (b) apply positive control inputs as required within 5 seconds of RA notification;
- (c) notify ATC when vertical speed established;
- (d) apply correct control inputs within 2.5 seconds to modify vertical speed with changes in RA guidance;
- (e) recognise altitude crossing encounters where applicable;
- (f) manage aircraft performance to avoid aircraft upset condition;
- (g) notify ATC when clear of conflict once aircraft safety is assured and flight path resumed.

3 Range of variables

- (a) in an FSTD or interactive computer-based training (CBT) with ACAS display and controls similar to those used to operate an aircraft;
- (b) activities are performed in accordance with published procedures.

4 Underpinning knowledge of the following:

- (a) principles of the TCAS system and operation;
- (b) the ATPL general knowledge standards in Schedule 3 of the Part 61 Manual of Standards relevant to this unit.

CTR Operate at a controlled aerodrome**1 Unit description**

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

2 Elements and performance criteria**2.1 CTR.1 – Controlled aerodrome pre-flight preparation**

- (a) using a current ERSA and NOTAM, for the controlled aerodrome, extract all the relevant operational information;
- (b) interpret the extracted information;
- (c) identify all special aerodrome procedures;
- (d) check current weather forecast and local observations;
- (e) identify all relevant radio and navigation aid frequencies.

2.2 CTR.2 – Taxi aircraft at a controlled aerodrome

- (a) obtain and comply with ATC clearances;
- (b) manoeuvre aircraft to holding point as instructed and take appropriate action to avoid other aircraft and obstructions;
- (c) recognise ground markings during taxi and take appropriate action;
- (d) recognise lighting signals and take appropriate action;
- (e) identify airport runway incursion hotspots;
- (f) manoeuvre aircraft to avoid jet blast hazard;
- (g) request taxi guidance if unsure of position;
- (h) use strobes when crossing any runway.

2.3 CTR.3 – Perform departure from controlled aerodrome

- (a) receive and correctly read back an airways clearance;
- (b) check and ensure runway approach is clear prior to entering a runway;
- (c) correctly set transponder code and mode prior to entering runway for take-off;
- (d) comply with ATC departure instructions;
- (e) advise ATC as soon as possible if unable to comply with clearance;
- (f) contact approach with airborne report or give departure call to tower;
- (g) maintain lookout;
- (h) avoid wake turbulence;
- (i) comply with airways clearances within tracking and altitude tolerances and maintain traffic lookout until clear of the aerodrome control zone.

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

- (a) check ERSA and NOTAM prior to entering control area and extract required operational information;
- (b) receive ATIS and correctly set the appropriate QNH;
- (c) request and receive ATC clearance and set correct transponder code prior to entering control area;
- (d) advise ATC as soon as possible if unable to comply with clearance;
- (e) maintain lookout at all times;
- (f) update QNH as required;

- (g) maintain tracking tolerances;
- (h) establish aircraft on the correct leg of the circuit in preparation for landing and maintain separation from traffic;
- (i) confirm clearance to land;
- (j) vacate runway and obtain taxi clearance.

3 Range of variables

- (a) activities are performed in accordance with published procedures;
- (b) Class C or D aerodromes;
- (c) day VFR conditions.

4 Underpinning knowledge of the following:

- (a) NOTAM decoding;
- (b) aerodrome ground markings and lighting;
- (c) standard RT phraseology;
- (d) radio failure procedures in ERSA;
- (e) transponder codes for radio failure and emergency.

ONTA Operate at non-towered aerodromes

1 Unit description

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

2 Elements and performance criteria

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

- (a) using a current ERSA and NOTAM, for the non-towered aerodrome or landing area, extract all of the relevant operational information;
- (b) interpret the extracted information;
- (c) identify all special aerodrome procedures;
- (d) check current weather forecast and local observations;
- (e) identify all relevant radio and navigation aid frequencies.

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

- (a) refer to aerodrome or landing area chart (if available);
- (b) set local QNH or area QNH;
- (c) broadcast intentions on appropriate frequency;
- (d) obtain and interpret traffic information;
- (e) maintain lookout for, and separation from, other aircraft, wildlife and other obstructions;
- (f) recognise ground markings during taxi and take appropriate action;
- (g) Reserved;
- (h) taxi aircraft to holding point;
- (i) use strobes when crossing any runway.

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

- (a) check and ensure runway approach is clear prior to entering a runway;
- (b) correctly set transponder code and mode prior to entering runway for take-off;
- (c) confirm runway approaches clear in all directions prior to entering runway;
- (d) broadcast line up details;
- (e) Reserved;
- (f) transmit appropriate radio calls and maintain separation with other aircraft;
- (g) advise air service provider of departure details, if required;
- (h) conduct departure.

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

- (a) check ERSA and NOTAM prior to entering circuit area;
- (b) set correct area or local QNH;
- (c) use correct radio frequency to transmit inbound calls as required;
- (d) maintain effective lookout;
- (e) maintain aircraft separation and avoid other traffic;
- (f) maintain tracking tolerances;
- (g) determine wind velocity;
- (h) determine landing direction;
- (i) confirm runway is serviceable for the operation;

- (j) determine circuit direction;
- (k) conduct landing area inspection (if applicable);
- (l) position aircraft in the circuit in preparation for landing and maintain separation from traffic;
- (m) make all necessary circuit radio calls;
- (n) verify runway is clear of other traffic, wildlife and other obstructions;
- (o) land the aircraft;
- (p) vacate runway;
- (q) cancel SARWATCH, if applicable.

3 Range of variables

- (a) activities are performed in accordance with published procedures;
- (b) non-towered aerodromes;
- (c) landing areas;
- (d) Class G airspace;
- (e) CTAF;
- (f) day VFR conditions.

4 Underpinning knowledge of the following:

- (a) decode NOTAM;
- (b) aerodrome ground markings and lighting;
- (c) standard RT phraseology for operations at non-towered aerodromes and landing areas;
- (d) radio failure procedures in ERSA;
- (e) transponder codes for G airspace.

CTA Operate in controlled airspace

1 Unit description

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

2 Elements and performance criteria

2.1 CTA.1 – Operate aircraft in controlled airspace

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

- (a) comply with airways clearance requirements for operating in all classes of airspace, including lead time required for flight plan submission, contents, 'clearance void time', and 'readback' requirement;
- (b) apply airways clearance requirements for entering, operating in and departing from CTA and CTR, including details that need to be provided to ATC, and what details to expect from ATC;
- (c) maintain control area protection tolerances;
- (d) maintain tracking and altitude tolerances when operating on an airways clearance;
- (e) reconfirm any clearance items when doubt exists;
- (f) advise ATC as soon as possible if unable to maintain clearance due to adverse weather conditions;
- (g) follow ATC requirements for a change of level in CTA, including in an emergency situation;
- (h) comply with departure, climb, transition to cruise (levelling out), cruise, change of levels, descent and visual approach procedures in CTA and CTR instructions;
- (i) apply separation standards between IFR flights, and IFR and VFR flights in the various classes of CTA;
- (j) perform appropriate actions in the event of the loss of radio communication in CTA and CTR;
- (k) perform appropriate actions in the event of abnormal operations and emergency procedures in CTA and CTR;
- (l) operate under radar vectoring procedures, including radio procedures and phraseologies;
- (m) maximum permissible time interval between ATC transmissions during radar vectoring are not exceeded;
- (n) perform appropriate actions in the event of abnormal operations and emergencies;
- (o) recall transponder emergency code and communication failure code.

3 Range of variables

- (a) activities are performed in accordance with published procedures;
- (b) day VFR conditions;
- (c) any category of aircraft;
- (d) Class C, D, or G airspace.

4 Underpinning knowledge of the following:

- (a) decode NOTAMS;
- (b) aerodrome ground markings and lighting;
- (c) standard RT phraseology for operations at controlled aerodromes;
- (d) radio failure procedures that are published in the ERSA;
- (e) transponder codes.

OGA Operate in Class G airspace

1 Unit description

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

2 Elements and performance criteria

2.1 OGA – Operate aircraft in Class G airspace

- (a) maintain tracking and altitude tolerances to remain outside controlled airspace;
- (b) apply separation tolerances between IFR flights, and IFR and VFR flights;
- (c) when using an aircraft radio:
 - (i) monitor appropriate radio frequency;
 - (ii) make appropriate radio calls;
 - (iii) obtain operational information from air services provider and other aircraft;
 - (iv) use information to ensure aircraft separation is maintained;
 - (v) apply loss of radio communication procedures;
- (d) using a suitable chart:
 - (i) operate clear of active aerodromes and landing areas in the vicinity of the aircraft;
 - (ii) identify and remain clear of controlled and restricted airspace;
 - (iii) take appropriate action when operating in the vicinity of a danger area;
- (e) perform actions in the event of abnormal operations and emergencies;
- (f) recall transponder emergency code and communication failure code.

3 Range of variables

- (a) activities are performed in accordance with published procedures;
- (b) day VFR conditions;
- (c) Class G airspace;
- (d) simulated or actual abnormal, emergency situations and radio failure.

4 Underpinning knowledge of the following:

Class G airspace.