APPLICANT NAME:		Licence #							

FSS PEL 61-41

Instrument Rating (A)/(H) Flight Test Guide

Throughout this FTG a reference to an Examiner is taken to be a reference to NCAA Part 61 Designated Flight Examiners, designated pilots and NCAA inspectors.

FOREWORD

The flight test guide book has been published by the NAMIBIA CIVIL AVIATION AUTHORITY (NCAA) to establish the standards for a pilot and aircraft rating practical tests for Aeroplanes. NCAA inspectors, designated Flight Examiners, and designated pilots (referred to as Examiners throughout the remaining practical test standards) shall conduct practical tests in compliance with these standards. Flight instructors and applicants should find these standards helpful in practical test preparation.

Instrument rating – aeroplane

The aim of this flight test is for the applicant to demonstrate competency in the knowledge, skills and attitudes as required in Part 61 Civil Aviation Regulations for the issue, re-validation, renewal and re-issue of the instrument rating.

1.1 Examiner requirements

The following examiner requirements are applicable to the conduct of the IR flight test:

1. The examiner must conduct the IR flight test in accordance with the Flight Examiner Manual.

2. The examiner must ensure that the ground component of the flight test is successfully completed before conducting the pre-flight briefing and flight component of the flight test.

3. The examiner must not introduce simultaneous, multiple or unrelated simulated emergencies or abnormal events during the flight.

4. After a simulated failure, the examiner must ensure the aircraft is configured back to a normal operating mode before another simulated failure may be introduced, except where the simulated failures are linked. The safety of the aircraft should never be jeopardized when simulating emergencies or failures.

5. The following Examiner Designations are allowed to test:

   NCAA Safety Inspector, CIRE,TRE, SFE or OFE

1.2.1 Testing methodology

The examiner should apply the flight test methodology described in Flight Examiner Manual, Assessment of human factors and non- technical skills of the Flight Examiner Manual.

The flight test should be designed such that all required components can be assessed in a logical sequence. Where one or more mandatory units or elements

are unable to be assessed for any reason, the flight test cannot be completed.

The examiner must ensure the applicant is given adequate notice of the intended navigation task to allow for unhurried preparation and planning (simulating a private passenger/cargo carrying operation). The applicant should be given the test route at least 24 hours and not more than 48 hours before the start of the flight test.

It is recommended that the examiner plans an **airborne** time of approximately:

- 1.5 hours for the Flight component task (this should not include time delays which may be
  experienced at a busy airport)

- The examiner may choose to conduct the general handling and instrument components in two separate flights.

SECTION 1: FLIGHT TOLERANCES

Table 1: Aeroplane /Helicopter general flight tolerances – Instrument CPL/PPL

1. Applicability

1.1 The flight tolerances in this subsection apply to the following licences and ratings:

(a) recreational pilot licence;

(b) private pilot licence;

(c) aircraft class rating;

(d) Night VFR rating.

(e) Commercial Pilot licence

Flight tolerances

Flight path or manoeuvre		Flight tolerances
Taxing aircraft		±1.5 metres of centreline
Nominated heading		± 10°
Climb airspeed		-0 / +5 kts
Level off from climb and descent		± 100 ft
Straight and level	Altitude	± 100 ft

Flight path or manoeuvre		Flight tolerances
	IAS	±10 kts
Power descent airspeed		±10 kts
Glide / Autorotation		-5 / +10 kts
Turns		Angle of Bank ±5°
Turns onto nominated headings		Heading ±10°
Steep Turn		Heading ±10°
		Height ±150 ft
Final approach airspeed		-0 / +5 kts
Landing	Touchdown	±120 m
	Centreline tracking	±2 m
Asymmetric flight / Single engine flight	Heading – initial	±20°
	Heading - sustained	±5°
	IAS	-0 +5 kts
Limited panel instrument flying	Heading	±15°
	IAS	±10 kts or ±M0.02
	Height	±200 ft

1.2.2 IR assessment scope and conditions

The IR flight test must be conducted in an aeroplane, helicopter or NCAA approved SFTD under simulated IFR by day or night.

The activities and manoeuvres of the Part 61 CATS and the IR (A) flight test form must be assessed against an appropriate sample of the performance criteria for the relevant competency standards prescribed.

IR flight tolerances and ground reference tolerances are specified on the applicable flight test guide. Sustained deviation outside the applicable flight tolerance is not permitted.

The applicant should remain in control of the aircraft at all times. If the successful outcome is in doubt, corrective action is taken promptly to recover to safe flight.

Where the aircraft is fitted with an autopilot system, the applicant must demonstrate competency in the system on at least one leg.

1.3 Conduct (ground component)

1.3.1 Initial brief to applicant

In accordance with Flight Examiner Manual, the examiner must begin the flight test with a brief to the applicant on the following items:

Flight test context, purpose and content;

- Assessment procedure;
- Function of the examiner;
- Standards and tolerances against which competency will be assessed;
- Actions in the event of a failure assessment.

The applicant should be encouraged to ask for clarification should he become uncertain before commencing any of the flight test elements.

1.3.2 Document review

The examiner must confirm that an applicant for the IR (A) satisfies the eligibility requirements to undertake the flight test for the grant of the NCAA Part 61 licence. To achieve this, the achievement record or training records, logbook, licence and medical certificate must be checked.

Minimum age - The examiner must see one of the following documents to verify that the applicant is at least 17:

- Namibian driver licence
- Namibian ID

- Passport (Any nationality)

Aeronautical knowledge examinations – the examiner must review the applicant's theory examination pass records where applicable.

Flight training requirements – the examiner must review the applicant's pilot training records to ensure that the training requirements have been met. Normal evidence should at least be a course completion certificate where applicable.

Aeronautical experience – the examiner must review the applicant's pilot logbook to ensure that the minimum aeronautical experience requirements have been met.

English language proficiency – the examiner must ensure that the applicant holds a current ELP assessment.

Eligibility certification –The examiner must satisfy himself that the ARN certificate by the training provider is valid.

Medical certificate –The examiner must satisfy himself that the applicant holds a valid class 1 or 2 medical certificate. In the absence of the aforementioned a medical exemption permitting the applicant to exercise the privileges of the instrument rating, will suffice.

If the flight test is a retest following a fail assessment – the examiner must review the applicant's training records for evidence that appropriate remedial training has been successfully carried out with the applicant.

1.3.3 Assessment of knowledge requirements

Questions for the oral knowledge assessment must be in accordance with the knowledge requirements listed of the Part 61 CATS

1.3.4 Assessment of flight planning

As part of the flight test, the applicant must complete a:

- Flight plan;
- Fuel plan;
- Flight notification;
- Weight and balance calculation;
- Take-off and landing distance/performance calculation.

When reviewing the applicant's flight preparation documents, the examiner must be satisfied that the applicant is able to validate the data on which the planning decisions and calculations have been made (including: forecast weather, NOTAMs, aircraft data, chart validity).
The examiner must ensure, through considered questioning, that the preparation is solely the work of the applicant and meets the knowledge standards as applicable.

1.4 Conduct (flight component)

1.4.1 Assessment of the applicant’s performance

The applicant’s performance is assessed for technique, judgement, knowledge, smoothness, accuracy, procedures and flight management. The following explanations are provided to assist the examiner in assessing the flight component:

- **Technique** – the method by which a task is performed. There may be more than one acceptable technique and the examiner should be flexible in their assessment.

- **Judgement** – is applicable to all tasks but is of particular importance in respect of environmental conditions and effects such as cloud, wind and turbulence.

- **Knowledge** – during the course of the flight test the applicant's knowledge may be further tested. The examiner should exercise sound judgement to ensure that questions are not asked in a high workload environment.

- **Smoothness** – the applicant should demonstrate smooth flying in all sequences. Anything less is unacceptable and should result in a fail assessment.

- **Accuracy –** accuracy in the control of height, airspeed, direction, balance and trim are all-important. Persistent errors in any of these aspects should result in a fail assessment.

- **Procedures –** the applicant should demonstrate awareness and practical application of nominated standard operating procedures throughout the flight test.

- **Flight management** – the applicant should demonstrate proficiency in aircraft systems, situational awareness, threat and error management and decision-making during the flight.

Assessment should be based on the technique used by the applicant and not just the ability to perform the task within specified numerical tolerances. Technique involves smooth and
accurate control application in adjusting power, attitude, trim and balance in a timely and coordinated fashion whilst following correct procedures.

It may be that on some occasions the flight conditions are such that even though the applicant's technique is sound, the aircraft may deviate outside specified tolerances for short periods. In such cases the assessment of technique and judgment should be the determining factors.

Applicant's should not be given a second opportunity to demonstrate a manoeuvre unless, in the opinion of the examiner, the circumstances causing failure of the first attempt were outside the control of the applicant in the test environment or the

applicant recognized the error and self-managed corrective actions. This should be considered in relation to safety critical items where the applicant is demonstrating TEM appropriately.

1.4.2 Pre-flight briefing

In accordance with Flight Examiner Manual, and evidence based assessment; the examiner must brief the applicant on:

- Simulating emergencies, methods and calls;
- Actual emergencies;
- Pilot in command;
- Transfer of flight control;
- Flight tolerances and ground references;
- The scenario applied to the test environment (e.g. passenger carrying private/commercial operation / simulation of passengers);
- Multiple flights and the assessment of competencies (if applicable);
- Procedures for simulating IMC.

1.4.3 Assessment of activities and manoeuvres

An examiner must comply with the evidence based Units/elements and take into account the recommendations described below when planning and conducting the **instrument rating - aeroplane** flight test. Where there are no specific recommendations, a blank space is listed in the table against the unit/element.

1.4.4 Theoretical Knowledge

1.1.4.1 Theoretical Knowledge requirements for the IF are specified in Part 61 Document NAM CATS-FCL 61.18 and Appendix 2.0.

1.4.4.2 The Instrument Rating Criteria for aeroplanes, helicopters and powered-lift are detailed below.

1.4.4.3. Unit S1: Management and Operational and Fuel Planning

Unit Description: Knowledge and skills to plan and make flight notification for an IFR flight using all applicable current operational documents, after obtaining and applying pre-flight briefing information and allowing for operational requirements.

Elements		Performance Criteria
S1.1	Possess and use current operational documents	• All current operational documents applicable to the flight are in the pilot's possession and used for flight planning and management.
S1.2	Obtain meteorological and NOTAM pre-flight briefing	• Meteorological, airways facilities, aerodrome and NOTAM information applicable to the flight is obtained and used for planning and conduct of a flight.
S1.3	Plan flight	• Charts suitable for intended flight are selected and prepared. • Applicable information is obtained, analyzed and applied to prepare a flight plan which details tracks, distances, times, altitudes to be flown and fuel requirements to reach destination in accordance with the IFR requirements.
S1.4	Determine operational and fuel requirements	• Duration of flight is determined. • Applicable information is obtained, analyzed and applied to prepare a flight plan which details tracks, distances, times, altitudes to be flown and fuel requirements to reach destination in accordance with the IFR requirements.
S1.5	Determine operational and fuel requirements	• Duration of flight is determined. • Alternate, holding and fuel reserve requirement is determined by applying operational requirements due to weather, navigation aid availability and aerodrome lighting in accordance with regulations.
S1.6	Make flight notification	• Completed flight plan is submitted to and accepted by Aeronautical Information Management at a time adequate to ensure processing of flight plan or at least 30 minutes before flight.

1.4.4.4 Unit S1: Assessment Guide

During assessment the pilot should be observed to perform the following checks and actions as evidence of ability to meet the licensing criteria. The checks and actions detailed in this guide are advisory. Checks and actions in approved checklists, placards, Flight Manual/POHs, or Operations Manuals have precedence and must be complied with.

Elements		Evidence
S1.2	Possess and use operational documents	• Pilot possesses a complete set of approved operational documents that are applicable to the flight. • Pilot demonstrates ability to ascertain currency of operational documents. • All documents required for the flight are stowed and accessible to the pilot during flight. • Applicable information contained in documents is derived and applied for flight planning and management.
S1.3	Obtain meteorological and NOTAM preflight briefing	• Meteorological information is obtained using fax, telephone, internet or briefing offices. Met information includes at least Aerodrome Forecast with TAF and METAR where available for the route and aerodromes to be used including alternate aerodromes. • Met information is valid for the period of the flight. • Met briefing is updated in accordance with requirements in AIP. • NOTAM information is obtained from briefing offices. • NOTAM briefing includes all aerodromes airspace and navigation aids for the proposed flight including flight to an alternate aerodrome.
S1.4	Plan flight	• Planning Chart is used to assist R/T communication planning. Suitability of en route, destination and diversion aerodromes is determined. • En Route Chart (ERC) is used for pre-flight planning and airspace assessment. • The route is planned so that the distance and/or time between position fixes is in accordance with IFR navigation requirements specified in AIP. • Determine MORA/MEA for route segments from published routes or derive MORA by the method specified in AIP where the flight does not follow published routes. • Routes selected allow for engine failure for both SE and ME operations. • Plan tracking tolerances to utilize or avoid controlled airspace when required. • Control, Prohibited, Restricted and Danger areas that the flight may pass close to or through are identified. • Plan to either obtain clearances through or avoid designated airspace. • Any additional information required for the flight is included on the chart.

Elements		Evidence
		• Charts for use in flight are folded secured and accessible. • Compile a flight plan. • Track, distance and Lowest Safe Altitude for route segments are transferred from chart to flight plan. • Plan position reporting points in accordance with full position reporting procedures as specified in AIP. • Obtain, interpret and assess the effect of all applicable aviation meteorological forecast and reports on the flight. • Obtain, interpret and assess the effect of all NOTAMs applicable to the flight. • Most suitable IFR cruising altitude or flight level is selected and entered on flight plan. • Choose route or altitude to avoid forecast icing conditions. • Wind velocity obtained from a meteorological forecast is entered on flight plan. • TAS, heading, ground speed and time intervals are calculated ± 5 kts, ± 3° and ± 2 minutes. • Fuel requirements for flight, holding and reserves are calculated ± 5 minutes. • Beginning and end of daylight is determined. • Flight planning information is transferred to operational flight plan • Elements of Airmanship: Pre-flight planning is used to minimize in flight navigational work load. • A decision to proceed with the cross country flight is made after analysis of meteorological and ATC conditions. • Contingencies are anticipated. • Correct grade of fuel is used. • Situation awareness is maintained.
S1.5	Determine operational and fuel requirements	Operational requirements • Alternate and/or holding requirements are determined, applicable to meteorological forecast. Alternate aerodrome requirement for radio navigation aid is determined, as detailed in AIP. • Alternate requirement for destination aerodrome lighting is determined, as detailed in AIP. Plan fuel requirement • Fuel required for duration of flight is calculated (+5 -0 minutes). • Mandatory fuel reserve is calculated.

Elements		Evidence
		• Fuel allowance is made for diversion to an alternate aerodrome when forecast meteorological conditions are below alternate minima. • Fuel allowance is made for holding or diversions during periods of 'Intermittent' (INTER) or 'temporary' (TEMPO) deterioration of weather conditions below alternate minima. • Fuel allowance is made for ATS routing, departure and arrival procedures which are anticipated. • Fuel allowance is made for pressurization failure if applicable. • Fuel allowance is made to avoid icing conditions. • Fuel log is prepared for navigation. • Any necessary additional fuel reserves are calculated. • Total fuel required for flight and all reserves is calculated. • Fuel planning is revised as flight circumstances change before and during flight. • Elements of Airmanship: Latest diversion time from destination or a point en route is provided to ATS/ATC. • Situation awareness is maintained.
S1.6	Make flight notification	• IFR Flight notification is submitted to ATS using facsimile, telephone or radiotelephone at least 30 minutes before ETD. • Flight details submitted include: • Flight rules – IFR Aircraft performance category; • Navigation aids which are fitted and which pilot is qualified to use ETD; • Route to be flown and EET's; • Any requirements for navigation aid training; • Fuel endurance; • Receipt of facsimile transmission to ATS is confirmed by telephone prior to ETD. • Significant changes to flight notification details are notified as specified in AIP.

2.1.4 Unit S2: Management of Pre and Post Flight

2.1.4.1 Unit Description: Knowledge and skills to determine aircraft equipment suitability for IFR flight, perform and certify daily inspection, conduct serviceability test of flight and radio navigation instruments before flight and complete post flight actions.

Elements		Performance Criteria
S2.1	Determine aircraft meets requirements for IFR flight	• Determine that aircraft is equipped for flight in accordance with Instrument Flight Rules and ensure that the flight and navigation instruments, minimum electrical lighting equipment, navigation equipment and any other requirements fitted to the aircraft are suitable and acceptable for IFR flight in accordance with regulations.
S2.2	Conduct daily inspection	• A daily inspection of aircraft is performed in accordance with aircraft system of maintenance approved by the NCAA and certified in accordance with regulations.
S2.3	Conduct pre flight serviceability test of flight and radio navigation instruments	• Flight instruments and radio navigation aids are checked and serviceable for IFR flight.
S2.4	Complete post flight actions	• Ensure SAR is terminated. • Maintenance release (Flight Technical Log) is certified if required.

2.1.5 Unit S2: Assessment Guide

2.1.5.1 During assessment the pilot should be observed to perform the following checks and actions as evidence of ability to meet the licensing criteria.

2.1.5.2 The checks and actions detailed in this guide are advisory. Checks and actions in approved checklists, placards, Flight Manual/POHs, or Operations Manuals have precedence and must be complied with.

Elements		Evidence
S2.1	Determine aircraft meets requirements for IFR flight	Aircraft certification • Flight manual is valid and carried in the aircraft. • Maintenance Release (Flight Technical Log) certified approved for IFR flight. • Ensure all equipment is serviceable or that any unserviceable equipment is in compliance with Minimum Equipment List (MEL). Aircraft IFR instrumentation • Aircraft is equipped with serviceable flight and navigation instruments suitable for IFR. Radio navigation aids • Radio navigation aids are serviceable. VHF and HF radiotelephone (R/T) equipment • Aircraft is equipped with VHF and/or HF R/T which ensures continuous communication with ATS during normal and abnormal operations, when on

Elements		Evidence
		the ground or airborne, in accordance with regulations. • R/T frequency fit is adequate for the area of operations. • Radio Navigation Chart is used to assist R/T communication planning. • Electric lighting equipment. • Anti-collision beacon is fitted and serviceable.
S2.2	Conduct daily inspection. Daily inspection is carried out in accordance with maintenance schedule or system of maintenance procedures before the first flight of each day	• Daily inspection is carried out in accordance with maintenance schedule or system of maintenance procedures before the first flight of each day, using applicable data. • Daily inspection ensures that no defect or damage to the aeroplane could compromise safety of the operation. • Ensure that maintenance release (Flight Technical Log) is valid for period of intended flight. • Serviceability of aeroplane is determined. • Any endorsements, conditions or limitations on maintenance release can be complied with. • Maintenance release (Flight Technical Log) is applicable to category of intended flight. • Endorsements related to any unserviceability are entered into the maintenance release. • No maintenance will fall due during proposed flight. • Time in service is recorded in maintenance release in accordance with the relevant CAR. • Maintenance release (Flight Technical Log) is endorsed and certified after completion of daily inspection or approved maintenance in accordance with regulations. • The following items relevant to IFR operations are checked: • Operation of anti-collision beacons. • Operation of pitot heats. • Radio navigation and communication antennae are identified and checked. • Elements of Airmanship: • Attention to detail and thoroughness is evident in all actions.

Elements		Evidence
S2.3	Conduct preflight serviceability test of flight and radio navigation instruments. Condition and security of glass on all instruments checked serviceable	• Condition and security of glass on all instruments checked serviceable. • Instrument faces undamaged and readable. • All instrument readings appropriate to existing conditions. • Instrument power sources checked for condition/serviceability. • Altimeter reading ± 75 feet of airfield elevation when QNH is set. • When two altimeters are fitted, pre flight check is conducted in accordance with AIP. • Autopilot operation and disconnect is checked. • Gyroscopic instrument operation is checked during taxiing.
S2.4	Complete post flight actions	• SAR is cancelled by advising ATS using radiotelephone. • Aircraft is secured. • Flight time and aircraft unserviceabilities are entered in Maintenance Release (Flight Technical Log) and certified when applicable.

2.1.6 Unit S4: Compliance with Air Traffic Rules and Procedures

2.1.6.1 Unit Description: Knowledge and skills to communicate and comply with Air Traffic Services (ATS) instructions, maintain separation with other air traffic and manage airspace procedures.

Elements		Performance Criteria
S4.1	Obtain and comply with airspace clearances	• Obtain air traffic clearances when applicable, prior to entry into the airspace and comply with clearances while operating in that airspace.
S4.2	Maintain separation from other traffic	• Separation is maintained from other air traffic in IMC/simulated IMC and during visual approach and departure in accordance with IFR.
S4.3	Communicate using radio	• Maintain two way communication with ATS and other aircraft in accordance with IFR procedures.
S4.4	Use transponder	• Operate and monitor transponder in accordance with AIP during normal operations.

2.1.7 Unit S4: Assessment Guide

2.1.7.1 During assessment the pilot should be observed to perform the following checks and actions as evidence of ability to meet the licensing criteria.

2.1.7.2 The checks and actions detailed in this guide are advisory. Checks and actions in approved checklists, placards, Flight Manual/POHs, or Operations Manuals have precedence and must be complied with.

Elements		Evidence
S4.1	Obtain and comply with airspace clearances	• Traffic clearance requirements are anticipated and planned for. • Automatic broadcasting services are used to obtain information. • Applicable aviation documents are consulted. • Air traffic and airways clearances are requested using standard radiotelephone procedures. • Clearances into controlled airspace are requested and obtained before entry. • Clearances are read back in accordance with requirements in AIP. All clearances are complied with unless aircraft safety is compromised. • Amendments to clearances are recorded and complied with unless aeroplane safety is compromised. • Clearance limits imposed by Air Traffic Services are not exceeded unless aircraft safety is compromised. • Elements of Airmanship: Awareness of the air traffic situation is maintained. • Controlled airspace is not entered without a clearance. • Local and published noise abatement requirements and curfews are observed.
S4.2	Maintain separation from other traffic	• Conflicting traffic is recorded. • Visual separation is maintained in accordance with AIP class of airspace requirement. • Communication is established with other traffic and separation is maintained. • At navigation aids, aircraft is maneuvered to maintain separation from other traffic and holding, approach and missed approach tracks. • During visual arrival and departure to and from an aerodrome, separation is maintained with VFR and IFR traffic. • Elements of Airmanship: Lookout is maintained using a systematic scan technique at a rate determined by traffic density, visibility or terrain.
S4.3	Communicate using radio	• Preflight checks are completed in accordance with Flight Manual/POH. • Serviceability of all required R/T equipment is checked. • All radio control switches are used. • The responsibilities of a radiotelephone operator are carried out.

Elements		Evidence
		• All standard radio reports and broadcasts required for IFR procedures in accordance with AIP are performed. • Received instructions are complied with. • Pilot transmitted information and phraseology is applicable to the flight phase. • Traffic and alerting transmissions are complied with. • Transmission “in the blind” is demonstrated. • Listening watch is maintained. • Simulated transmission of urgency and distress messages is demonstrated. • Awareness of international distress frequencies is demonstrated. • Radio silence is maintained when required. • Ability is demonstrated to recognise carrier wave only transmissions as a transmitting or receiving pilot and react to rectify the abnormal situation. • Loss of radio transmission/reception procedure are performed as specified in NAM AIP. • The ability to communicate with Air Traffic Services and other aircraft, using the RT is demonstrated. • Elements of Airmanship: Standard phraseology is used to communicate, with recourse to colloquial language if unsure of standard phraseology for a particular situation.
S4.4	Use transponder	• Ground mode is selected for taxiing SSR codes for IFR flight are selected and set as specified in AIP. • Code selection is accomplished in standby mode. • Transponder mode A or C is selected entering the runway. • Identification function (Ident) is only activated when requested by ATS/ATC. • Code setting instructions are acknowledged by read back of codes to be set. • Select appropriate code for in-flight emergency, loss of two way communications or unlawful interference when required. • Recognise loss of radio communication when under Radar vectors as specified in SA AIP. • Standby mode is selected as soon as possible after landing. • Elements of Airmanship: Monitor in-flight serviceability of transponder and react appropriately to failure.

2.1.8 Unit S5: Management of Emergency Procedures

2.1.8.1 Unit Description: Knowledge and skills to identify abnormal situations in IMC, perform appropriate actions, manage abnormal situations and select and proceed to the nearest suitable landing area.

Elements		Performance Criteria
S5.1	Manage engine failure	• After engine failure, single engine aircraft is controlled, immediate actions are performed, aircraft is flown in a safe direction to achieve visual flight and a controlled landing is performed at a suitable landing area. • Multi-engine aeroplane is controlled after failure of an engine, immediate actions and all checks are performed in accordance with the Flight Manual/POH, and if an engine restart is not achieved, asymmetric flight in accordance with IFR procedures is conducted to the nearest suitable aerodrome. • Multi engine helicopter is controlled after failure of an engine, immediate actions and all checks are performed in accordance with the Flight Manual/POH, and if an engine restart is not achieved, a single engine flight in accordance with IFR procedures is conducted to the nearest helicopter landing area (HLA).
S5.2	Manage radio communication and navigation aid or navigation system failure	• Radiotelephone and/or navigation aid failure are identified and abnormal procedures are conducted in accordance with Flight Manual/POH, AIP and emergency procedures.
S5.3	Manage electrical/ vacuum system failure	• Electrical or vacuum system failure is identified, aircraft controlled and abnormal procedures are conducted in accordance with Flight Manual/POH.
S5.4	Manage instrument failure	• Instrument failure is identified, aircraft is controlled by reference to serviceable instruments and failure is managed in accordance with Flight Manual/POH.
S5.5	Manage hazardous weather conditions	• Hazardous weather conditions are identified and avoided. • Procedures for penetration of hazardous weather are demonstrated.
S5.6	Demonstrate turbulence penetration technique	• Turbulence is penetrated in accordance with Flight Manual/POH/RFM.

2.1.9 Unit S5: Assessment Guide

2.1.9.1 During assessment the pilot should be observed to perform the following checks and actions as evidence of ability to meet the licensing criteria.
2.1.9.2 The checks and actions detailed in this guide are advisory. Checks and actions in approved checklists, placards, Flight Manual/POHs, or Operations Manuals have precedence and must be complied with.

Elements		Evidence
S5.1	Manage engine failure	• Single engine aircraft • Control aircraft by reference to flight instruments. • Perform immediate actions in accordance with Flight Manual/POH procedures. • Glide attitude is selected and aeroplane is flown in a safe direction. • Helicopter is turned into last known wind direction (± 10°) and minimum rate of descent speed is achieved (± 10 kts). • Visual flight is achieved. • All emergency procedures are performed in accordance with Flight Manual/POH. • Suitable landing area is selected. • Trouble checks are performed in accordance with aircraft check list. • Emergency is declared to ATC/ATS/other aircraft detailing position and intentions and emergency transponder code is selected. • Engine restart is attempted if the possibility of a successful start is evident. • If engine will not start, shutdown checks are performed in accordance with approved checklist. • Passengers are briefed about the situation, brace position and harness is secure. • Plan is modified to adapt to changed conditions. • Aeroplane/helicopter is landed. • ATC/other aircraft are advised of situation. • Multi engine aeroplane during cruise • Aircraft is controlled by reference to flight instruments. • Failed engine is identified. • Heading is maintained (± 20° initially then ± 5° from datum heading). • Power is adjusted to maintain altitude (± 100 ft). • All emergency procedures are completed in accordance with Flight Manual/POH. • Aircraft is configured for optimum single engine cruise performance (not less than Vyse, power as required on operating engine, not more than 5° bank towards operating engine, without slip or skid,

Elements		Evidence
		rudder trimmed, undercarriage and flap retracted and propeller feathered on failed engine or simulated by setting zero thrust). • ATS/ATC are advised of situation and intentions. • MEA is maintained until visual reference is established. • If MEA cannot be maintained action is taken to ensure terrain clearance. • Passengers are briefed about the situation, brace position and harness is secure. • Aeroplane is landed at nearest suitable aerodrome. • Multi engine helicopter • Helicopter is controlled by reference to flight instruments. • Heading is maintained (± 5° of nominated heading). • Failed engine is identified and shut down in accordance with Flight Manual/POH. • ATS/ATC are simulated to be advised of situation and intentions. • Speed is maintained (± 10 kts). • Height is maintained (± 100 ft). • MEA is maintained until visual reference is established. • If MEA cannot be maintained action is taken to ensure terrain clearance. • Passengers are briefed about the situation, brace position and harness is secure. • Helicopter is landed at nearest suitable helicopter landing area/aerodrome. • Elements of Airmanship: Situation awareness is maintained. • Orientation is maintained. • Plan is formulated and modified as circumstances change. • Any unavoidable obstructions are contacted when the aeroplane or helicopter is on the ground (rather than while airborne). • Passengers are briefed and managed.
S5.2	Manage radio communication and navigation aid or navigation system failure	• Radiotelephone communication failure • Failure of transmission and/or reception capability is identified. • Frequency selector and radiotelephone control switches are checked for appropriate selection.

Elements		Evidence
		• Power source, circuit breakers and fuses are checked for serviceability, engagement and function. • All visible electrical connectors are checked to ensure complete connection. • Communication with spare microphones, speakers or headsets is attempted. • Comply with procedures specified in NCAA AIP, including: • Maintain terrain clearance at all times. • Advise ATS/ATC and other traffic using 'blind' R/T transmission. • Proceed in accordance with latest route clearance and planned altitude. • At clearance limit, maintain last assigned level or MEA and/or hold at nominated location for three minutes then proceed in accordance with ATC route clearance and climb to planned level. • When radar vectored, maintain last assigned heading for two minutes and climb to MEA and proceed in accordance with latest acknowledged ATC clearance. • When holding, complete one more holding pattern then proceed with latest flight plan or acknowledged ATC clearance. • When transponder equipped, squawk 7600 and listen to ATIS and voice modulated navigation aids. • When practical leave/avoid CTA and dense traffic areas and land at the most suitable aerodrome. • Navigation aid • Maintain control of aircraft by reference to flight instruments. • Identify failure of navigation aid. • Advise ATS/ATC and other aircraft of aid failure and pilot's intentions. • Select alternate navigation aid if available. • Apply alternative navigation technique to destination or diversion aerodrome. • Navigation system failure • Maintain control of aircraft by reference to flight instruments. • Identify navigation system failure. • Conduct emergency procedures in accordance with Flight Manual/POH. • Apply alternative navigation technique to destination or diversion aerodrome.

Elements		Evidence
		• Advise ATS/ATC of pilot's intentions.
S5.3	Manage electrical/ vacuum system failure	• Aircraft is controlled by reference to functioning flight instruments and aircraft systems. • Planned track and level are maintained. • Electrical or vacuum system failure is identified. • Any adversely effected flight instruments are identified and not used for reference. • Electrical or vacuum failure emergency procedures are conducted in accordance with Flight Manual/POH. • ATC/ATS are advised of situation, intentions and any assistance required.
S5.4	Manage instrument failure	• Aircraft is controlled by reference to functioning flight instrument. • Planned track and level are maintained. • Failed instruments are identified and not used to control aircraft. • Instrument failure emergency procedure is conducted in accordance with Flight Manual/POH. • ATC/ATS are advised of situation, intentions and any assistance required. • Elements of Airmanship: Functional flight instruments are used and failed instruments ignored. • Orientation is maintained.
S5.5	Manage hazardous weather conditions	• Meteorological forecasts, AIREP, METAR, SIGMET, reports are applied to identify and avoid areas of hazardous weather. • Recognise meteorological phenomena which indicate hazardous weather and take appropriate action to avoid or reduce the effect of the hazard. • Communicate with ATS/ATC and other aircraft for advice on area weather conditions. • Frontal activity • Recognise and interpret cloud formations which indicate frontal activity and take avoidance or minimization action as required. • Determine degree of hazard associated with frontal activity and take appropriate action to avoid damage to or loss of control of aircraft. • Transit front by shortest possible route. • Avoiding active cells. • Thunderstorms • Avoid thunderstorms by a safe distance. • Divert around thunderstorms when possible.

Elements		Evidence
		• When penetrating a thunderstorm, select the most appropriate altitude and track. • Avoid reversal of course. • When fitted, use radar to identify and avoid most intense area of thunderstorm activity. • Adjust aircraft configuration and speed to counter weather hazards. • Avoid flight under thunderstorms. • Avoid landing into an approaching thunderstorm. • Icing • Plan flight clear of known icing conditions. • Remove frost and snow from aircraft before take off. • Identify meteorological conditions conducive to ice formation and take avoiding action. • Use pitot heat when flying in visible moisture. • Take immediate action to leave icing conditions in aircraft not approved for flight in these conditions. • Use anti-icing and de-icing equipment in accordance with Flight Manual/POH in icing conditions. • Climb or descend to an altitude which will reduce icing when icing is encountered. • Use carburettor heat to prevent or eliminate carburettor icing. • Monitor IAS and aircraft performance to avoid stall when wing icing is encountered. • Exercise flight controls ensure freedom from icing. • Hail • Areas of potential hail are identified and avoided. • Turbulence • Ensure passengers and crew restraint is secure and tight. • Achieve manufacturer's recommended turbulence penetration speed (VRA or VA). • When encountering turbulence, maintain straight and level attitude. • Identify and avoid orographic turbulence or take minimizing action. • Maintain constant power settings unless excessive down draughts are encountered near terrain. • Minimize turns in turbulence. • Lightning • In low ambient light conditions, ensure cockpit lighting is set to maximum. • Avoid looking outside cockpit. • Fog

Elements		Evidence
		• Take-off and landing is not attempted in fog. • When fog affects a landing area, formulate an alternative plan of action. • Allow for slant range visibility on approach. • Elements of Airmanship: Avoid any hazardous weather when possible.
S5.6	Demonstrate turbulence penetration technique	• Ensure passengers and crew restraint is secure and tight. • Achieve manufacturer's recommended turbulence penetration speed (VRA or VA). • Maintain straight and level attitude. • Avoid turning aircraft when possible. • Exit turbulent area by shortest route. • Advise ATS/ATC and other aircraft of location and degree of turbulence.

2.1.10 Unit S6: Task Management

2.1.10.1 Unit Description: Knowledge and skills to organize documentation and equipment in the cockpit for IFR flight, prioritize and manage flight tasks, navigation and passengers, and when fitted use autopilot in IMC/simulated IMC.

Elements		Performance Criteria
S6.1	Prioritize tasks	• Flight, navigation, communication and passenger management tasks are organized and prioritized to ensure that the work load at any phase of flight allows the pilot to safely manage the flight.
S6.2	Use autopilot	• Autopilot and Flight Director System (FDS) are employed to assist flight and navigation tasks when available.

2.1.11 Unit S6: Assessment Guide

2.1.11.1 During assessment the pilot should be observed to perform the following checks and actions as evidence of ability to meet the licensing criteria.

2.1.11.2 The checks or Operations and actions detailed in this guide are advisory. Checks and actions in approved checklists, placards, Flight Manual/POHs, Manuals have precedence and must be complied with.

Elements		Evidence
S6.1	Prioritise tasks	• Maintain control of aircraft by reference to flight instruments. • Workload is organized to ensure completion of all tasks relevant to the safety of the flight, in the time available. • Completes all tasks essential for the safety of flight without distraction by less important activities. • Maintain situation awareness. • Elements of Airmanship: Critical events and tasks are anticipated and completed in time available. • Passengers and crew briefed and kept informed.
S6.2	Use autopilot	• Automatic pilot • Autopilot pre-flight functions and serviceability checks are performed in accordance with Flight Manual/POH. • Autopilot is used to assist the conduct of the flight. • Autopilot is engaged in accordance with Flight Manual/POH. • Input to autopilot is appropriate to the navigation and control requirements of the flight. • Autopilot is disengaged in accordance with Flight Manual/POH. • Autopilot is monitored to ensure operation complies with requirements.

2.1.12 Unit S7: Conduct of Instrument Flight Using Full Panel

2.1.12.1 Unit Description: Skills and knowledge to control the aircraft in normal flight and recover from unusual flight attitudes using the full instrument panel in IMC/simulated IMC.

Elements		Performance Criteria
S7.1	Fly level, climb and descend	• Maintain straight and level flight, climb and descend aircraft solely by reference to full instrument panel.
S7.4	Make level, climbing and descending turns and steep turns through at least 180 degrees onto nominated heading	• Turn aircraft during level, climbing and descending flight through more than 180 degrees and achieve a nominated heading. • Turn aircraft using 45° to 60° of bank while maintaining altitude, through 180° and achieving a nominated heading.
S7.5	Recover from unusual attitudes	• Recover from unusual attitudes and resume controlled level flight solely by reference to full instrument panel.

2.1.13 Unit S7: Assessment Guide

2.1.13.1 During assessment the pilot should be observed to perform the following checks and actions as evidence of ability to meet the licensing criteria.

2.1.13.2 The checks and actions detailed in this guide are advisory. Checks and actions in approved checklists, placards, Flight Manual/POHs, or Operations Manuals have precedence and must be complied with.

Elements		Evidence
S7.1	Fly level, climb and descend	• Before instrument flight • Pitot/static systems are checked for serviceability and condition. • Flight instruments are checked for condition and serviceability. • Instrument power sources are checked. • The attitude indicator pitch datum is set to the in flight straight and level attitude appropriate for the aircraft type. • Turn, heading and attitude indicators are functionally checked while taxiing .(or during hover). • During instrument flight • Attitude indicator is used as primary reference instrument for pitch and roll. • Pitch attitude change is made by reference to AI. • Attitude is held constant after change to allow for lag in performance instruments. • Performance instruments (ASI, ALT, VSI) are used to confirm attitude is correct. • Adjustments to attitude are based on performance instrument indications.

Elements		Evidence
		• Aircraft is trimmed to hold attitude constant , once established, without constant pilot elevator control input. • Aircraft is balanced using rudder. • Maintain wings level (± 5°) except during turns. • Aileron and rudder trim are used to maintain lateral level and balance when available. • Nominated HDG is maintained ± 5°, except during turns. • Power and attitude settings achieve desired performance. • Engine instruments are monitored for abnormal indications. • Change of airspeed is made during straight and level flight (± 10 knots of nominated airspeed, heading ± 5°, ± 100 ft altitude). • Straight and level flight is achieved in different air frame configurations. • Straight and level flight is maintained at a simulated MDA (+100 -0 ft). • Additional evidence while climbing and descending during instrument flight • Climb is maintained at nominated speed (± 10 knots). • Descent is maintained at 500 feet per minute (± 150 ft/min) at a nominated speed (± 10 kts). • Initial attitude and power change to commence climb or descent is within ±10 kt of nominated speed before adjustment. • Level off from climb or descent is within ± 100 feet of nominated altitude. • Elements of Airmanship: Sensory illusions are recognised and do not affect aircraft control. • Orientation is maintained. • Corrective control movements are smooth and excessive muscular force avoided. • Instrument power sources are checked for serviceability and monitored in flight. • Heading instruments are synchronized before take-off and every 10 minutes in flight.
S7.4	Make level, climbing and descending turns and steep turns through at least 180 degrees onto	• Attitude is selected and held to maintain level, climbing or descending flight during the turn. • Angle of bank is selected to maintain rate one turn. Rate one turns through minimum of 180°, until specific headings are completed (± 5°). • Level turn altitude is maintained (± 100 feet).

Elements		Evidence
	nominated heading	• Angle of bank is maintained (± 5°). • Nominated airspeed for climb and descent is maintained (± 10 kts). • Aircraft is balanced using rudder. • Turning errors are allowed for when using magnetic compass to achieve initial roll out from turns within ± 15°, of nominated HDG. • Steep turns • Angle of bank is maintained between 40°, and 60° through minimum of 180°, of turn. • Power is adjusted to maintain an airspeed above the stall warning threshold. • Altitude is maintained (± 100 feet). • Aircraft is balanced using rudder. • Recovery to nominated heading is achieved (± 10°).
S7.5	Recover from unusual attitudes	• Aeroplanes •Low or decreasing airspeed attitudes are compensated for by application of power and lowering of nose to horizon. • High or increasing airspeed is corrected by reducing power, levelling wings parallel to horizon and raising nose to horizon. • Attitude indicator is used as primary control instrument. • Bank angle is corrected by paralleling wings to horizon using attitude indicator. • Straight and level attitude is achieved without excessive oscillations at the horizon (± 200 ft of height at which aircraft nose first passed through horizon). • Performance instruments are used to confirm attitudes. • Helicopters Parallel wings on the attitude indicator to the horizon, by reference to the attitude indicator. • Use cyclic pitch control (attitude) to position nose on horizon using attitude indicator. • Apply coordinated use of collective and cyclic pitch control (attitude) to achieve desired altitude, IAS, and heading. • Elements of Airmanship: Orientation is maintained.

2.1.14 Unit S8: Conduct Instrument Flight under Limited Panel

2.1.14.1 Description: Skills and knowledge to perform all normal flight and recover from unusual flight attitudes using the limited instrument panel without the

availability of an artificial horizon, attitude indicator or gyro compass in IMC/simulated IMC.

Elements		Performance Criteria
S8.1	Fly level climb and descend	• Maintain straight and level, climbing and descending flight, solely by reference to limited instrument panel.
S8.2	Make level degrees onto nominated heading climbing and descending turns through at least 180 onto nominated heading	• Turn aircraft during level, climbing and descending flight through more than 180 degrees and achieve a nominated heading.
S8.3	Recover from unusual attitudes	• Recover from unusual attitudes and resume controlled straight and level flight solely by reference to limited instrument panel.

2.1.15 Unit S8: Assessment Guide

2.1.15.1 During assessment the pilot should be observed to perform the following checks and actions as evidence of ability to meet the licensing criteria.

2.1.15.2 The checks and actions detailed in this guide are advisory. Checks and actions in approved checklists, placards, Flight Manual/POHs, or Operations Manuals have precedence and must be complied with.

Elements		Evidence
S8.1	Fly level climb and descend	• During instrument flight. • Gyroscopic instrument power sources and instrument warning systems are monitored and gyroscopic instrument indications are checked against performance instruments for serviceability. • When attitude and/or direction indicator failure is confirmed flight by reference to limited instrument panel is initiated. • Pitch attitude for level flight is confirmed by altimeter and VSI. • Pitch attitude for climb and descent is confirmed by ASI and VSI. • Maintain wings level by reference to turn and balance indicator/coordinator. • Aircraft is balanced using rudder or anti-torque pedals.

Elements		Evidence
		• Pitch attitude change is made by reference to stick/control column position. • Attitude is held constant after change to allow for instrument lag. • Adjustments to attitude are based on performance instrument indications. • Aircraft is trimmed to maintain attitude. • Aircraft is balanced using rudder or anti-torque pedals. • Magnetic compass is used to confirm heading (± 15°). • Level flight altitude is maintained (± 200 ft). • Climb or descent speed is maintained (± 10 kts). • Maintain wings level (± 5°). • Nominated heating is maintained (± 15°). • Ailerons and rudder are trimmed where available. • Power and attitude settings achieve desired performance. • Engine instruments are monitored and any abnormal indications detected and appropriate action taken. • Smooth adjustments are made when changing attitude, power or bank. • Power is set (± 0.5” MAP ± 50 RPM). • Aircraft is balanced using rudder s or anti-torque pedals. • Elements of Airmanship: Orientation is maintained.
S8.2	Make level degrees onto nominated heading climbing and descending turns through at least 180 onto nominated heading	• Angle of bank appropriate to airspeed is selected to maintain rate one turn (± 5°). • Attitude is selected and held to maintain level, climbing or descending flight during turns (± 10 knots). • Attitude for level turns is confirmed by altimeter (± 200 ft). • Attitude for climb or descent is confirmed by reference to ASI (± 10 knots). • Angle of bank is maintained (± 5°). • Aircraft is balanced using rudder or anti-torque pedals. • Rate one turns through a minimum of 180° onto a nominated heading are achieved (± 15°). • Elements of Airmanship: Orientation is maintained Smooth control movement

Elements		Evidence
S8.3	Recover from unusual attitudes	• Aeroplane • Unusual attitude with high or increasing airspeed is recognised and recovery initiated. • Power is reduced wings are levelled by reference to the turn and balance indicator/coordinator nose is raised to the level attitude by stopping increasing airspeed. • Straight and level attitude is achieved without excessive oscillations at the horizon (± 250 ft). • Unusual attitude with low or decreasing airspeed is recognised and recovery initiated • power is increased • wings are levelled by reference to the turn and balance indicator/coordinator • nose is lowered to horizon by stopping the decrease in airspeed. • Aircraft is balanced using rudders • Straight and level attitude is achieved without excessive oscillations at the horizon (± 250 ft of height at which aircraft nose first passed through horizon). • Achievement of level attitude is confirmed by altimeter and VSI. • Level flight is maintained (± 200 ft ± 15°). • Aircraft is balanced using rudders. • Helicopter • Unusual attitude with high or increasing airspeed is recognised and recovery initiated: • Cyclic pitch (attitude) is adjusted until airspeed starts to decrease or stop increasing. • Cyclic pitch (attitude) is adjusted to stop helicopter turning. • Collective pitch (power) is adjusted to achieve level flight. • Helicopter is balanced using anti-torque pedals. • Unusual attitude with low or decreasing airspeed is recognised and recovery initiated: • Cyclic pitch control (attitude) is adjusted until airspeed stops reducing or starts increasing. • Mast bumping is avoided. • Cyclic pitch (attitude) is adjusted to stop helicopter turning. • Collective pitch (power) is adjusted to achieve level flight. • Helicopter is balanced using anti-torque pedals.

Elements		Evidence
		• Achievement of level attitude is confirmed by altimeter and VSI. • Elements of Airmanship: Adverse physiological sensations are recognised but ignored. • Orientation is maintained. • Corrective control movements are smooth and excessive muscular force avoided. • Time is allowed for performance instruments to stabilize.

2.1.16 Unit S9: Navigation using NDB (Non Directional Beacon)

2.1.16.1 Unit Description: Knowledge and skills to navigate the aircraft by reference to the ADF tuned to an NDB in Instrument Meteorological Conditions (IMC) in compliance with Instrument Flight Rules (IFR).

Elements		Performance Criteria
S9.1	Tune, identify and monitor navigation aids	• Tune navigation equipment, identify and monitor navigation aid and test navigation system.
S9.2	Determine position in relation to navigation aids	• Fix position of the aircraft in relation to the navigation aid using overhead passage or two or more bearings.
S9.3	Intercept and maintain desired tracks to and from stations	• Intercept specified tracks to and from navigation aids using intercept angles appropriate to navigation requirements and maintain the track within tracking tolerances in accordance with AIP.
S9.4	Make station Passage	• Maintain planned inbound track within the tolerances specified in AIP, pass overheat the navigation aid and ensure a positive back bearing is achieved.

2.1.17 Unit S9: Assessment Guide

2.1.17.1 During assessment the pilot should be observed to perform the following checks and actions as evidence of ability to meet the licensing criteria.

2.1.17.2 The checks and actions detailed in this guide are advisory. Checks and actions in approved checklists, placards, Flight Manual/POHs, or Operations Manuals have precedence and must be complied with.

Elements		Evidence
S9.1	Tune, identify and monitor navigation aids	• The NDB frequency is tuned. • The NDB is identified by voice or morse code identification. • The aeroplane is within the published range of the NDB.

Elements		Evidence
		• The ADF bearing indication is checked against a known bearing or tested by deselecting the loop antenna signal of the ADF. • The identification and serviceability of the NDB is monitored and unreliable indications are not used for navigation.
S9.2	Determine position in relation to navigation aids	• ADF errors are identified and allowed for when obtaining ADF bearings. • ADF bearings are used for navigation only when within published range of NDB. • NDB is used to determine aircraft position using bearings from two or more NDBs within 30 nm of each station. • ADF is used to determine aircraft position using bearings from two or more NDBs within 30 nm of each station. • ADF bearings are plotted on a navigational chart to fix position. • Position is determined by NDB station passage. • Fixed card ADF: The ADF relative bearing is applied to the magnetic heading to calculate (determine) the magnetic track to or from (radial) NDB. • Manually rotatable card ADF: Magnetic heading is set on rotatable card, for the head of ADF needle to indicate magnetic track to NDB and tail of ADF needle to indicate magnetic track from NDB (radial). • Radio Magnetic Indicator: Track to NDB is determined using head of ADF needle, and track from NDB (radial) is determined using tail of ADF needle. • Elements of Airmanship: • Orientation is maintained.
S9.3	Intercept and maintain desired tracks to and from stations	• Intercept track outbound from and inbound to NDB: Determine HDG required to intercept specified track outbound from or inbound to NDB within a specified time or distance. • Track is intercepted.(± 5° initially then on track). • Drift is determined and allowed for to maintain track. • Track is maintained within tolerances specified in AIP (on track or regaining track). • Track is maintained or aircraft is not more than 5° off track for short periods to establish drift allowance.

Elements		Evidence
		• ATC is advised when aircraft is more than ± 5° off track in CTA, and action is taken to regain track. • The NDB with the most accurate signal is used when tracking between two NDBs. • Elements of Airmanship: • Orientation is maintained.
S9.4	Make station Passage	• Specified track is maintained inbound to the NDB station. • ADF relative bearing changes from inbound tracking indication to outbound tracking indication overhead the NDB station without a sustained abeam indication.

2.1.18 Unit S9: Underpinning Knowledge

2.1.18.1 State how NDB indications or range may be affected by coastal refraction, night error, thunderstorms, mountainous areas, types of terrain, altitude of aircraft.

2.1.18.2 State the method of using the most appropriate NDB for tracking during navigation.

2.1.18.3 Determine NDB station passage, abeam NDB station, NDB bearing the aircraft is on, track error and/or drift experienced, from ADF relative bearing indications.

2.1.18.4 Calculate track to and from the NDB, given heading and relative bearings.

2.1.18.5 Calculate heading to steer to intercept a new or original track to or from a NDB.

2.1.18.6 Calculate heading to steer to intercept desired inbound track before reaching the NDB.

2.1.18.7 Calculate relative bearing which will indicate that a desired track to or from a NDB has been intercepted, given the intercept heading.

2.1.18.8 Fix position, given relative bearing indications utilizing two NDB stations.

2.1.19 Unit S10: Navigation using VOR (VHF Omni Directional Radio)

2.1.19.1 Unit Description: Knowledge and skills to navigate the aircraft by reference to the VOR in Meteorological Conditions (IMC) in compliance with Instrument Flight Rules (IFR).

Elements		Performance Criteria
S10.1	Tune, identify and monitor navigation aids	• Tune navigation equipment, identify and monitor navigation aid, ensure no warning flags visible and test navigation system.
S10.2	Determine position in	• Fix position of the aircraft in relation to the navigation aid using overhead passage or two or more bearings.

Elements		Performance Criteria
	relation to navigation aids	
S10.3	Intercept and maintain desired tracks to and from stations	• Intercept tracks to and from navigation aids, with CDI indicating in the command sense using intercept angles appropriate to navigation requirements and maintain tracking tolerances specified in AIP.
S10.4	Make station passage	• Maintain planned inbound track within the tolerances specified in AIP, pass overhead the navigation aid and track outbound on the radial desired.

2.1.20 Unit S10: Assessment Guide

2.1.20.1 During assessment the pilot should be observed to perform the following checks and actions as evidence of ability to meet the licensing criteria.

2.1.20.2 The checks and actions detailed in this guide are advisory. Checks and actions in approved checklists, placards, Flight Manual/POHs, or Operations Manuals have precedence and must be complied with.

Elements		Evidence
S10.1	Tune, identify and monitor navigation aids	• The aeroplane is within the rated coverage of the VOR beacon. • The VOR frequency is tuned. • The VOR is identified by voice or morse code identification. • Before flight: CDI warning flag is visible when tuned to a frequency on which no VOR station is within reception range. • CDI indications are checked with reciprocal OBS settings. • CDI warning flags are not visible when station is tuned. • CDI warning flags are monitored and, if visible, VOR indications are not used.
S10.2	Determine position in relation to navigation aids	• VOR errors are identified and allowed for when obtaining VOR bearings. • VOR is used to determine the VOR radial. • VOR bearings are only used for navigation when within rated coverage of VOR station. • VOR is used to fix position using bearings from two or more VORs within rated coverage of each station. • VOR bearings are plotted on a navigational chart and position is fixed.

Elements		Evidence
		• Position is determined by VOR station passage.
S10.3	Intercept and maintain desired tracks to and from stations	• Determine HDG required to intercept specified VOR radials outbound and inbound within a specified time or distance. • OBS is aligned with track to be intercepted and interception is accomplished when CDI is centred, in the command sense. • Track is intercepted (CDI ± ½ scale deflection initially then on track). • Drift is determined and HDG established to maintain specified track with CDI centred. • Track is maintained within tolerances, specified in AIP. • Track is maintained, but not more than CDI ± ½ scale deflection off track for short periods to establish drift allowance. • ATC is advised when aircraft is off track by more than CDI ± ½ scale deflection in CTA, and track is regained. • The VOR with the most accurate signal is used when tracking between two VORs. • Elements of Airmanship: Orientation is maintained.
S10.4	Make station passage	• Specified track is maintained inbound to the VOR station. • TO – FROM indicator changes from TO to FROM indication. • Specified track is maintained outbound from the VOR station. • CDI maintains on track indication to overhead the VOR station without a sustained abeam indication.

2.1.21 Unit S10: Underpinning Knowledge

2.1.21.1 Determine scalloping, VOR station passage, abeam VOR station, VOR radial the aircraft is on, track error and/or drift experienced, from VOR cockpit indications.

2.1.21.2 Determine off-track distance experienced from VOR and DME cockpit indications.

2.1.21.3 State VOR omni bearing selector (OBS) settings required to provide command indications when flying on given tracks both to and from the VOR.

2.1.21.4 Calculate the heading to steer to intercept a new or original track to or from a VOR.

2.1.21.5 Fix position, given cockpit instrument indications utilizing two VOR stations.

2.1.21.6 Fix position, given instrument indications utilizing combinations of VOR, NDB and DME.

2.1.22 Unit S11: Navigation using GPS (Global Positioning System)

2.1.22.1 Unit Description: Knowledge and skills to navigate the aircraft by reference to Global Positioning System in IMC in compliance with IFR.

Elements		Performance Criteria
S11.1	Check GPS receiver operation	• Check operation, settings and indications of receiver including navigation data base currency, signal integrity by accessing appropriate GPS receiver operational modes.
S11.2	Enter, retrieve, edit, delete and activate flight plan and waypoints	• Use GPS computer functions required to enter, retrieve, edit, and activate flight plan and waypoint information in a GPS.
S11.3	Determine position and other relevant navigational information from GPS	• Use the GPS to determine aircraft position and to extract navigation information including ETA, G/S and W/V relevant to the flight.
S11.4	Intercept and maintain desired track to selected WPT	• Intercept and maintain desired track to selected WPT in accordance with tolerances specified in AIP, using the GPS.
S11.5	Diversion	• Divert from flight planned route and track to selected WPT.
S11.6	Conduct confidence checks of GPS navigational information	• Conduct GPS confidence checks is accordance with GPS operators manual. • Check GPS flight plan track and distances against information shown on current charts and check GPS position information using any data available from other sources.
S11.7	Monitor integrity of GPS Navigation	• Monitor integrity of GPS navigation by reference to RAIM, recognizing the RAIM warnings and messages and take appropriate action.
S11.8	Respond to GPS messages	• Interpret displayed messages on GPS and react appropriately.

2.1.23 Unit S11: Assessment Guide

2.1.23.1 During assessment the pilot should be observed to perform the following checks and actions as evidence of ability to meet the licensing criteria.

2.1.23.2 The checks and actions detailed in this guide are advisory. Checks and actions in approved checklists, placards, Flight Manual/POHs, or Operations Manuals have precedence and must be complied with.

Elements		Evidence
S11.1	Check GPS receiver operation	• Turn receiver on and check self-test operation and position. • Ensure navigational database is current. • Ensure RAIM availability. • Ensure receiver is set as required. • Monitor GPS navigational signal integrity during flight and react appropriately.
S11.2	Enter, retrieve, edit, delete and activate flight plan and waypoints	• Retrieve flight plan from GPS memory. • Edit flight plan saved in GPS memory. • Create and save new flight plan. • Activate selected flight plan. • Retrieve WPTs from navigational database. • Create and save user WPTs. • Retrieve flight plan tracks and distances are confirmed using an aeronautical chart.
S11.3	Determine position and other relevant navigational information from GPS	• Select GPS receiver navigation mode. • Select navigational display which includes CDI display, track, distance and ETE to next WPT. • Determine track and distance from selected WPT. • Determine ground speed, ETA at next WPT and W/V. • Determine track and distance to selected off track WPTs.
S11.4	Intercept and maintain desired track to selected WPT	• Use Direct To and Nearest functions to select next WPT. • Use flight plan to provide automatic sequencing of WPTs. • Determine HDG required to intercept selected track by specified time or distance. • Intercept and maintain desired track to selected WPT. • Determine HDG to maintain desired track. • Use ground based navigation aids in preference to GPS as specified in AIP. • Determine GPS navigation mode in use.
S11.5	Diversion	• Select suitable WPT for diversion. • Navigate to selected WPT, maintain and resume active flight plan. • Navigate to selected WPT with cancellation of active flight plan.
S11.6	Conduct confidence checks of GPS navigational information	• Compare and confirm GPS derived tracks and distances for active flight plan legs against information on navigational charts. • Confirm GPS derived position against position shown by other radio navigation aids.

S11.7	Monitor integrity of GPS navigation	• Monitor RAIM warnings and messages displayed by GPS receiver and react appropriately. • Advise ATC of RAIM loss as specified in AIP.
S11.8	Respond to GPS messages	• Display GPS messages as they occur. • Respond appropriately to GPS messages. • Retrieve GPS messages as required.

2.1.24 Unit S11: Underpinning Knowledge

2.1.24.1 GPS system components and principle of operation.

2.1.24.2 Demonstrate an understanding of the GPS system and its principles of operation:

(a) GPS system components, space, control and user;
(b) Aircraft equipment requirements;
(c) GPS satellite signal and pseudo random code;
(d) Principle of position fixing;
(e) Method of minimizing receiver clock error;
(f) Minimum satellites required for navigation functions;
(g) Masking function;
(h) Performance limitations of various equipment types; and
(i) GPS use of WGS84 co-ordinate system.

2.1.24.3 Navigation system performance requirements:

(a) Define the following terms in relation to a navigational system and recall to what extent the GPS system meets the associated requirements:

(i) Accuracy
(ii) Means of providing GPS integrity
(iii) RAIM, procedural, systems integration
(iv) Availability
(v) Continuity of service.

2.1.24.4 Endorsement and documentation:

(a) Recall the requirements applicable to pilots and equipment for GPS operations;
(b) Pilot training requirements;
(c) Log book certification;
(d) Aircraft e.g. CPL Air Law examination CPL Air Law equipment requirements.

2.1.24.5 GPS Notams:

(a) GPS errors and limitations;
(b) Recall the cause and magnitude of typical GPS errors:
(i) Ephemeris;
(ii) Clock;
(iii) Receiver;
(iv) Atmospheric/ionosphere;
(v) Multipath;
(vi) SA;
(vii) Typical total error associated with C/A code.

2.1.24.6 Effect of PDOP/GDOP on position accuracy:

(a) Susceptibility to interference;

(b) Comparison of vertical and horizontal errors;
(c) Tracking accuracy and collision avoidance.

2.1.24.7 Human factors and GPS

(a) Be aware of the human factors limitations associated with the use of GPS equipment. Apply GPS operating procedures which provide safeguards against navigational errors and loss of situational awareness because of the following:
(i) Mode errors;
(ii) Data entry errors;
(iii) Data validation and checking including independent cross checking procedures;
(iv) Automation induced complacency;
(v) Non-standardization of the GPS – pilot interface;
(vi) Human information processing and situational awareness.

2.1.24.8 GPS equipment-specific navigation procedures

(a) Recall and apply knowledge of appropriate GPS operating procedures to typical navigational tasks using a specific type of aircraft equipment, including:
(i) Select appropriate operational modes;
(ii) Recall categories of information contained in the navigational database;
(iii) Predict RAIM availability;
(iv) Enter and check user defined waypoints;
(v) Enter/retrieve and check flight plan data;
(vi) Interpret typical GPS navigational displays LAT./Long, distance and bearing to waypoint, CDI;
(vii) Interception and maintenance of GPS defined tracks;
(viii) Determine TMG, GS, ETA, time and distance to WPT, WV in flight;
(ix) Indications of waypoint passage;
(x) Use of direct to function;
(xi) Use of nearest airport function;
(xii) Use of GPS in GPS and DME/GPS arrival procedures.

2.1.24.9 GPS equipment checks

(a) For the specific type of aircraft equipment, carry out the following GPS operational and serviceability checks at appropriate times:
(i) TSO status;
(ii) Satellites acquired;
(iii) RAIM status;
(iv) PDOP/GDOP status;
(v) IFR Database currency;
(vi) Receiver serviceability;
(vii) CDI sensitivity;
(viii) Position indication.

2.1.24.10 GPS warnings and messages

(a) For the specific type of aircraft equipment recognise and take appropriate action for GPS warnings and messages, including the following:
(i) Loss of RAIM;
(iii) 2D navigation;
(iii) In Dead Reckoning mode;

(iv) Database out of date;
(v) Database missing;
(vi) GPS fail;
(vii) Barometric input fail;
(viii) Power/battery fail;
(ix) Parallel offset on;
(x) Satellite fail.

2.1.25 Unit S12: Navigation using DME (Distance Measuring Equipment)

2.1.25.1 Unit Description: Skills and knowledge to use DME to fix position in conjunction with bearings from other navigation aids, home to a station and fly DME arcs.

Elements		Performance Criteria
S12.1	Tune and identify DME station	• Tune navigation equipment, identify and monitor navigation aid and check distance indicator.
S12.2	Use DME to provide distance information and fix position	• Fix position using the distance from a DME navigation aid and bearings from a suitable navigation aid with an azimuth capability.
S12.3	Conduct DME homing procedure	• Track to overhead the DME navigation aid using the ground speed function of the DME navigation system.
S12.4	Fly DME arc procedure	• Track aircraft along a DME arc at a nominated distance by reference to a DME navigation aid within the tolerances specified in AIP in IMC/simulated IMC.

2.1.26 Unit S12: Assessment Guide

2.1.26.1 During assessment the pilot should be observed to perform the following checks and actions as evidence of ability to meet the licensing criteria.

2.1.26.2 The checks and actions detailed in this guide are advisory. Checks and actions in approved checklists, placards, Flight Manual/POHs, or Operations Manuals have precedence and must be complied with.

Elements		Evidence
S12.1	Tune and identify DME station	• DME is tuned to the paired VOR frequency. • The DME is identified by voice or morse code identification. • The aeroplane is within the rated coverage of the DME station. • DME distance indication is checked and distance corresponds to aircraft position. • DME station tuning is retained while another VHF azimuth aid is selected.

Elements		Evidence
S12.2	Use DME to provide distance information and fix position	• Determine DME distance and ground speed. • Calculate ETA at DME station. • Fix position using DME distance and a bearing from another aid within rated coverage. • Eliminate ambiguity when using two DME stations to fix position. • Determine position overhead DME station allowing for slant range effect.
S12.3	Conduct DME homing procedure	• Using DME only, outside 25 DME, select a heading which ensures rate of closure with DME station. • Refine heading to achieve maximum rate of closure with DME station. • Maintain heading to achieve maximum rate closure, for at least 15 nm inbound to station.
S12.4	Fly DME arc procedure	• Intercept a DME arc from an inbound track to a DME station using a collocated azimuth tracking aid. • Maintain tracking on the DME arc ± 2 nm over at least a 90° radial sector, in conjunction with a collocated azimuth aid. • Leave the DME arc by In

2.1.27 Unit S13: NDB Holding

2.1.27.1 Unit Description: Skills and knowledge to enter and perform an instrument holding pattern using the NDB.

Elements		Performance Criteria
S13.1	Make sector entry to holding pattern	• Enter holding pattern at or above LSALT/MSA using sector entry as depicted or published in IAL charts appropriate to inbound heading.
S13.2	Fly published holding pattern	• Conduct published holding pattern not below the specified minimum altitude, allowing for wind effect, complying with

2.1.28 Unit S13: Assessment Guide

2.1.28.1 During assessment the pilot should be observed to perform the following checks and actions as evidence of ability to meet the licensing criteria.

2.1.28.2 The checks and actions detailed in this guide are advisory. Checks and actions in approved checklists, placards, Flight Manual/POHs, or Operations Manuals have precedence and must be complied with.

Elements		Evidence
S13.1	Make sector entry to holding pattern	• Tune and identify the NDB to be used for holding. • Maintain at least LSALT or MSA for the inbound track until overhead the NDB. • Make a sector entry to the holding pattern based on aircraft inbound HDG in accordance with the IAL chart. • After passing over the NDB turn outbound onto the HDG appropriate to the sector entry being used. • Comply with airspeed limitations for holding. • Comply with timing and distance limitations for the holding pattern outbound in the entry procedure. • Descend from LSALT/MSA to the minimum altitude for holding or nominated altitude during the entry procedure. • Maintain minimum altitude for holding or nominated holding altitude (± 100 ft). • Turn inbound and establish the aircraft on the specified inbound track of the holding pattern before passing overhead the NDB. • Elements of Airmanship: Orientation is maintained. • Traffic separation is maintained. • Monitor NDB for continued operation.

Elements		Evidence
S13.2	Fly published holding pattern	• After passing over the NDB turn in the direction specified for the holding pattern onto an outbound HDG which allows for wind effect. • Commence timing the outbound leg of the holding pattern from abeam the NDB outbound. • Adjust timing on the outbound track as necessary to allow for wind effect. • Maintain minimum altitude for holding or nominated holding altitude (± 100 ft). • Turn inbound in the holding pattern in compliance with timing and or distance limitations. • Intercept and maintain the inbound track (± 5°) before passing overhead the NDB. • Maximum endurance configuration is achieved when required. Revised endurance using applicable fuel flow and latest time of diversion to alternate aerodrome is calculated. • Elements of Airmanship: Orientation is maintained. • Traffic separation is maintained. • Monitor NDB.

2.1.29 Unit S14: VOR Holding

2.1.29.1 Unit Description: Skills and knowledge to enter and perform an instrument holding pattern using the VOR.

Elements		Performance Criteria
S13.1	Make sector entry to holding pattern	• Enter holding pattern at or above LSALT/MSA using sector entry as depicted or published in IAL charts appropriate to inbound heading.
S13.2	Fly published holding pattern	• Conduct published holding pattern not below the specified minimum altitude, allowing for wind effect, complying with time and/or DME limitations and turning inbound on the prescribed track.

2.1.30 Unit S14: Assessment Guide

2.1.30.1 During assessment the pilot should be observed to perform the following checks and actions as evidence of ability to meet the licensing criteria.

2.1.30.2 The checks and actions detailed in this guide are advisory. Checks and actions in approved checklists, placards, Flight Manual/POHs, or Operations Manuals have precedence and must be complied with.

Elements		Evidence
S13.1	Make sector entry to holding pattern	• Tune and identify the VOR to be used for holding. • Maintain at least LSALT or MSA for the inbound track until overhead the VOR. • Make a sector entry to the holding pattern based on aircraft inbound HDG in accordance with the IAL chart. • After passing over the VOR turn outbound onto the HDG appropriate to the sector entry being used. • Comply with airspeed limitations for holding. • Comply with timing and distance limitations for the holding pattern outbound. • Descend from LSALT/MSA to the minimum altitude for holding or nominated altitude during the entry procedure. • Maintain minimum altitude for holding or nominated holding altitude (± 100 feet Set OBS to holding pattern inbound track. • Turn inbound and establish the aircraft on the specified inbound track of the holding pattern within CDI full scale deflection, before passing overhead the VOR. • Elements of Airmanship: Orientation is maintained. • Traffic separation is maintained. • Monitor VOR.
S13.2	Fly published holding pattern	• After passing over the VOR turn in the direction specified for the holding pattern onto an outbound HDG which allows for wind effect. • Commence timing the outbound leg of the holding pattern from abeam the VOR outbound. • Adjust timing on the outbound leg as necessary to allow for wind effect. • Maintain minimum altitude for holding or nominated holding altitude (± 100 ft). • Set OBS to holding pattern inbound track. • Turn inbound in the holding pattern in compliance with timing and or distance limitations. • Intercept and maintain the inbound track within (CDI ½ scale deflection) before passing overhead the VOR. • Maximum endurance configuration is achieved when required.

Elements		Evidence
		• Revised endurance using applicable fuel flow and latest time of diversion to alternate aerodrome is calculated. • Elements of Airmanship: • Monitor VOR

2.1.31 Unit S14: Underpinning Knowledge

2.1.31.1 VOR or VOR/DME Instrument Approach procedures.

(a) Demonstrate ability to read and interpret a VOR or VOR/DME instrument approach procedure chart.

(b) State the VOR or VOR/DME instrument approach procedures and limitations.

(c) State the correct sector entry join for entering the holding pattern of the VOR or VOR/ DME approach procedure.

(d) State the tracking tolerance and altitude limitations for flying the published DME arc of the VOR/DME approach procedure.

(e) Determine VOR or VOR/DME approach procedure applicable minima for aircraft.

(f) Determine conditions permitting descent below minima.

(g) Determine procedure for joining the circuit from a VOR or VOR/DME approach procedure.

(h) State the VOR or VOR/DME approach procedure missed approach procedure.

(i) State minimum obstacle clearance criteria during a VOR or VOR/DME approach procedure missed approach procedure.

(j) Demonstrate knowledge of VOR or VOR/ DME approach procedure radio procedures.

(k) Determine procedures for loss of radio communication during a VOR or VOR/DME approach procedure.

(l) Determine procedures for abnormal operations and/or emergencies during a VOR or VOR/DME approach procedure, including navigation aid failure.

2.1.32 Unit S15: GPS Holding

2.1.32.1 Unit Description: Skills and knowledge to enter and perform an instrument holding procedure using the GPS.

Elements		Performance Criteria
S15.1	Make sector entry to holding pattern	• Suspend automatic WPT sequencing and enter holding pattern at or above LSALT/MSA using sector entry as depicted or published in IAL charts appropriate to inbound heading.
S15.2	Fly published holding pattern	• Conduct published holding pattern not below the specified minimum altitude, allowing for wind effect, complying with time and/or DME limitations and turning inbound on the prescribed track and resume automatic WPT sequencing to leave the holding pattern.

2.1.33 Unit S15: Assessment Guide

2.1.33.1 During assessment the pilot should be observed to perform the following checks and actions as evidence of ability to meet the licensing criteria.

2.1.33.2 The checks and actions detailed in this guide are advisory. Checks and actions in approved checklists, placards, Flight Manual/POHs, or Operations Manuals have precedence and must be complied with.

Elements		Evidence
S15.1	Make sector entry to holding pattern	• Select and track to holding WPT. • Ensure CDI scaling is set for ± 1 nm. • Suspend automatic sequencing before reaching holding WPT. • Maintain at least LSALT or MSA for the inbound track until overhead the holding WPT. • Make a sector entry to the holding pattern based on aircraft inbound HDG in accordance with the IAL chart. • After passing over the holding WPT turn outbound onto the HDG appropriate to the sector entry being flown. • Comply with airspeed limitations for holding. • Comply with timing and distance limitations for the holding pattern outbound in the entry procedure. • Descend from LSALT/MSA to the minimum altitude for holding or nominated altitude during the entry procedure. • Maintain minimum altitude for holding or nominated holding altitude (± 100 ft). • Set GPS to track inbound to the holding WPT on the holding pattern inbound track. • Turn inbound and establish the aircraft on the inbound track of the holding pattern, within CDI full scale deflection, before passing overhead the holding WPT.

Elements		Evidence
		• Elements of Airmanship: Orientation is maintained. • Traffic separation is maintained.
S15.2	Fly published holding pattern	• After passing over the holding WPT turn in the direction specified for the holding pattern onto outbound HDG allowing for wind effect. • Commence timing the outbound leg of the holding pattern from abeam the holding WPT. • Adjust timing on the outbound leg to allow for wind effect. • Maintain minimum altitude for holding or nominated holding altitude (± 100ft). • Set the GPS to track inbound to the holding WPT on the holding pattern inbound track. • Turn inbound in the holding pattern in compliance with timing and or distance limitations. • Intercept and maintain the inbound track within CDI ½ scale deflection before passing overhead the holding WPT. • Depart the holding pattern by resuming automatic sequencing before crossing the holding WPT. • Maximum endurance configuration is achieved when required. • Revised endurance using applicable fuel flow and latest time of diversion to alternate aerodrome is calculated. • Elements of Airmanship:

2.1.34 Unit S15: Underpinning Knowledge

2.1.34.1 GPS Non-precision Approaches.

2.1.34.2 GPS/NPA Operational Modes.

(a) Know the conditions and actions which allow the GPS receiver to function in the appropriate mode for the successful conduct of a GPS/NPA. Know the parameters applicable to tracking tolerances, automatic waypoint sequencing, CDI sensitivity and RAIM availability in each of the following segments:

(i) entry;
(ii) RAIM availability;
(iii) initial approach;
(iv) intermediate approach;
(v) final approach;
(vi) missed approach;
(vii) state the indications requiring a missed approach to be initiated;
(viii) correctly state the mode of operation required during each segment of a GPS/NPA, the conditions required to transition to and operate in that mode, and the associated CDI sensitivity and RAIM protection provided.

2.1.34.3 Methods of RAIM prediction.

(a) Know the parameters applicable to RAIM warnings in the enroute, terminal and approach modes.

(b) Know the effect of availability or otherwise of baro-aiding on RAIM availability and prediction.

(c) Be able to predict RAIM availability at destination and ETA using: (i) aircraft GPS receiver; and (ii) if available, an external RAIM prediction service.

(d) Know the effect of satellite unserviceability on the reliability of each type of prediction.

(e) Know the effect of each type of RAIM prediction on operational requirements.

(f) Accurately predict, within a period of 1 hour before departure, the availability of approach RAIM at the destination or alternate aerodrome within ± 15 minutes of ETA.

(g) Know any limitations which apply to the prediction.

2.1.34.4 Operational requirements

(a) Know the operational requirements which apply to planning a flight on the basis of conducting a GPS/NPA at destination.

(b) Given operational situation, correctly state the alternate and/or holding requirements which apply at a destination served by a GPS/NPA procedure.

2.1.34.5 Human factors and GPS operation

(a) Be able to describe how the following factors may adversely affect the conduct of a GPS/NPA and describe suitable pilot procedures to minimize such effects:

(i) data input;
(ii) functions selection logic;
(iii) automation effects;
(iv) fixation;
(v) mode awareness;
(vi) alert modes;
(vii) the control loop; and
(viii) situational awareness.

(b) Know operating procedures for GPS equipment which eliminate, as far as possible, errors due to any of the factors specified.

2.1.35 Unit S16: Operate the Aircraft under Night IFR

2.1.35.1 Unit Description: Skills and knowledge to take-off and land and

Elements		Performance Criteria
S16.1	Determine whether an aerodrome is suitable for night operations	• Determine the aerodrome lighting is suitable and available for night operations. • Determine whether aerodrome requires an alternate or holding fuel due to weather, navigation aids or lighting in accordance with AIP. • Comply with any curfew requirements.
S6.2	Determine that the aircraft is serviceable for flight at night	• Determine the aircraft is equipped for flight in accordance with the IFR at night and ensure that the flight instruments, minimum electrical lighting equipment and navigation aids fitted are suitable

Elements		Performance Criteria
		and serviceable for the flight and ensure ready access to a shock proof torch in accordance with regulations. • Perform an inspection in accordance with aircraft system of maintenance, approved by NCAA and ensure certification in accordance with regulations for flight under the IFR at night.
S16.3	Taxi at night	• Conduct instrument lighting adjustment. • Comply with ATC instructions and manoeuvre the aircraft on the ground at night within the approved movement area as defined by aerodrome ground lighting and using aircraft lighting as required.
S16.4	Take off at night	• Aircraft is lined up in centre of runway in takeoff direction and line up checks appropriate to night take off are completed in accordance with approved checklist. • Execute take-off by reference to flare path/runway lighting and aircraft instruments. • Rotate aircraft at manufacturers recommended speed. • Establish climb attitude and control aircraft in climb after takeoff solely by reference to instruments. • Establish alignment with runway be visual reference and maintain lookout. • Perform after take-off checks at a safe height.
S16.5	Make visual departure under the IFR at night	• Establish aircraft at a height which ensures terrain clearance before departing circuit area. • Intercept departure track within 5 nm of aerodrome. • Climb on track to LSALT.
S16.6	Fly enroute under the IFR at night	• Conduct flight using IFR procedures. • Navigate using NDB, VOR or GPS. • Cockpit and instrument lighting is adjusted to allow reference to documentation, instruments and lookout.
S16.7	Make visual approach under the IFR at night	• Descend from cruising altitude/level to not below LSALT, and maintain track until within the circling area of destination aerodrome, with the aerodrome in sight in accordance with instructions in AIP. • Descend to circuit height, within the circling area by reference to runway lighting.
S16.8	Activate PAL lighting	• Select appropriate radiotelephone frequency and activate PAL system when within radio range.

Elements		Performance Criteria
S16.9	Land at night, with and without the use of aircraft landing lights	• Conduct a circuit and approach controlling aircraft and maintaining a safe altitude by reference to instruments and positioning aircraft by reference to runway lighting. • Land aircraft at night with and without landing lights. • After landing checks are performed in accordance with approved checklist.
S16.10	Make baulked approach	• Conduct a baulked approach from any point on the final approach leg.
S16.11	Take off and land at night at an aerodrome remote from ground lighting	• Conduct take off, circuit procedures and land aircraft at night at an aerodrome remote from any ground lighting which could assist the pilot in maintaining control of the aircraft, using runway lights for positioning aircraft in circuit. • Use runway lighting to position the aircraft in the circuit and for landing.
S16.12	Manage electrical system failure at night	• Maintain control of the aircraft, identify electrical system failure and conduct emergency procedures in accordance with Flight Manual/POH.

2.1.36 Unit S16: Assessment Guide

2.1.36.1 During assessment the pilot should be observed to perform the following checks and actions as evidence of ability to meet the licensing criteria.

2.1.36.2 The checks and actions detailed in this guide are advisory. Checks and actions in approved checklists, placards, Flight Manual/POHs, or Operations Manuals have precedence and must be complied with.

Elements		Evidence
S16.1	Determine whether an aerodrome is suitable for night operations	• Ensure that runway dimensions and approach and take-off areas are adequate for night operations. • Determine whether aerodrome has the minimum runway and ground lighting facilities for night operations.

Elements		Evidence
		• Determine how lighting is to be activated and arrange for a responsible person to be present when required. • Determine whether an alternate aerodrome or holding is required due to the method of lighting activation or availability of standby power. • Ensure that local curfew arrangements permit operations.
S16.2	Determine that the aircraft is serviceable for flight at night	• Determine from aircraft maintenance release that the aircraft is approved and serviceable for flight at night. • Check that radio communications and navigation systems required for night flight under the IFR in accordance with AIP, are fitted and serviceable. • Ensure that flight and navigation instruments meeting the requirements of NAMCARS 91.04,121.05,135.05 as applicable for flight under the IFR at night are fitted and serviceable. • Check serviceability of instrument and cockpit lighting. • Ensure that a shockproof torch is serviceable and readily available for internal and external inspection and for emergency use in flight. • Check that exterior navigation and anti-collision lights required by regulations for flight under the IFR at night are fitted and serviceable.
S16.3	Taxi at night	• Ensure adequate night vision adaptation. • Ensure that required exterior and interior lighting is on prior to starting engine(s). • Adjust cockpit/instrument lighting to a suitable level for taxiing. • Ensure that required runway and aerodrome lighting is activated. • Comply with any ATC clearance requirements and complete radio transmissions applicable to taxiing in accordance with AIP. • Taxi at a speed which allows for an adequate lookout to be maintained. • Use aircraft taxi/landing lights and aerodrome ground lighting to manoeuvre the aircraft on the aerodrome clear of other aircraft and obstacles.

Elements		Evidence
		• Ensure that gyroscopic instruments function correctly while turning in both directions.
S16.4	Take off at night	• Comply with any ATC clearances. • Make radio reports and broadcasts applicable to take off in accordance with AIP. • Pre- take off checks are completed in accordance with approved checklist. • Aircraft is lined up on the runway centre line by reference to the runway lighting. • Line up checks applicable to night flight are completed in accordance with approved checklist. • Execute the takeoff run by reference to runway lighting and aircraft flight instruments. • Rotate aircraft at manufactures recommended speed. • Establish climb attitude (± 10 kts), maintaining positive rate of climb after liftoff. • Track on extended runway centre line (± 5°) to 500 ft AGL. • Control aircraft in climb after take-off solely by reference to instruments. • Establish alignment with runway on initial climb by reference to instruments and visual reference to the runway lighting. • Perform after take-off checks at a safe height above terrain or obstacles along the aircraft's climb path in accordance with approved checklist. • Elements of Airmanship: After liftoff control aircraft by reference to flight instruments. • Visually refer to runway lighting when above 500 ft to position aircraft in the circuit.
S16.5	Make visual departure under the IFR at night	• Maintain climb within the prescribed circling area as specified in AIP for the aircraft performance category until reaching a height where the aircraft may be climbed on track clear of obstacles to the LSALT. • Give departure report and make any other radio transmissions as required by AIP. • Intercept flight planned track within 5 nm of departure aerodrome. • Navigate by reference to radio navigation aids or DR during climb to cruising level. • Maintain a lookout but control aircraft solely by reference to instruments.

Elements		Evidence
		• Elements of Airmanship: Lookout is maintained using a systematic scan technique at a rate determined by traffic density, visibility and terrain.
S16.6	Fly enroute under the IFR at night	• Conduct level cruise and navigation in accordance with the IFR. • Maintain cockpit lighting at a level which ensures that an adequate lookout can be maintained. • Control aircraft solely by reference to instruments, maintaining HDG (± 5°) IAS (± 10 kts) and altitude (± 100 ft). • Make radio position reports in accordance with AIP IFR procedures. • Elements of Airmanship: Awareness of other traffic.
S16.7	Make visual approach under the IFR at night	• Make radio reports and broadcasts as specified in AIP. • Make visual approach in accordance with AIP procedures. • Descent below LSALT/MSA is commenced when: the aerodrome runway lighting is in sight and identified, and the aircraft is within the aerodrome circling area, and a minimum 5000 metres flight visibility and clear of cloud can be maintained, or the aircraft is established on the runway centre line, not below the on slope indication of a VASIS within the distance from the aerodrome as specified in AIP. • Control aircraft by reference to flight instruments and position aircraft by reference to runway lighting. • Monitor rate of descent and reduce high rates of descent when in proximity of terrain. • Maintain obstacle clearance within circling area. • Elements of Airmanship: Lookout is maintained using a systematic scan technique at a rate determined by traffic density, visibility or terrain. • Maintain traffic separation. • Orientation is maintained.
S16.8	Activate PAL lighting	• Determine PAL frequency for aerodrome. • Activate PAL lighting system using VHF transmission. • Monitor wind indicator lighting for end of activation period
S16.9	Land at night, with and without the use of aircraft landing lights	• Position aircraft in the circuit by visual reference to the runway lighting. • Control aircraft by reference to instruments.

Elements		Evidence
		• Monitor altitude and HDG in the circuit by reference to instruments. • Carry out pre landing checks. • Make turn onto final approach path by reference to instruments and align aircraft with runway by reference to runway lighting. • Maintain final approach path by reference to runway lighting. • Carry out landing flare by reference to runway lighting, with and without landing lights. • Make normal landing and maintain directional control by reference to runway lighting. • Elements of Airmanship: Lookout and awareness of other traffic.
S16.10	Make baulked approach	• Make a baulked approach from any point on final approach by applying take off power and transition to climb configuration. • Control aircraft by reference to flight instruments. • Maintain positive rate of climb after assuming climb attitude (± 10 kts). • Climb straight ahead to a safe height controlling aircraft by reference to instruments and positioning aircraft in the circuit by reference to runway lighting. • Elements of Airmanship: Recognise need for baulked approach and initiate baulked approach before encountering a dangerous situation. • Traffic separation.
S16.11	Take off and land at night at an aerodrome remote from ground lighting	• Conduct night take off, circuit and landing procedures at an aerodrome where ground lighting is not sufficient to assist the pilot in maintaining control of the aircraft by visual reference. • Conduct circuits in accordance with elements 16.4 and 16.9. • Control aircraft solely by reference to flight instruments and use runway lights to position aircraft in the circuit and for landing. • Elements of Airmanship: Traffic separation. • Lookout.
S16.12	Manage electrical system failure at night	• Use torch and emergency lighting. • Identify electrical failure and conduct emergency procedures in accordance with Flight Manual/POH. • If electrical power is not restored, reduce electrical load to the minimum to conserve battery power.

Elements		Evidence
		• Land at nearest suitable aerodrome and make emergency radio transmissions in accordance with AIP. • Control of aircraft is maintained. • Radio call.

2.1.37 Unit S17: Perform Standard Arrival Route (STAR)

2.1.37.1 Unit Description: Skills and knowledge to conduct an arrival from an inbound route, tracking via a Standard Arrival Route (STAR) published in AIP, to a position from which an approach and landing can be made at the destination aerodrome.

Elements		Performance Criteria
S17.1	Conduct arrival using STAR.	• Manoeuvre the aircraft from an inbound route in accordance with ATC instructions and published STAR procedures, to a fix at or near the destination aerodrome, using radio navigation aids and transition to an approach as instructed by ATC, in accordance with the IFR.

2.1.38 Unit S17: Assessment Guide

2.1.38.1 During assessment the pilot should be observed to perform the following checks and actions as evidence of ability to meet the licensing criteria.

2.1.38.2 The checks and actions detailed in this guide are advisory. Checks and actions in approved checklists, placards, Flight Manual/POHs, or Operations Manuals have precedence and must be complied with.

Elements		Evidence
S17.1	Conduct arrival using STAR	• After receiving clearance from ATC read back STAR identifier and other information as specified in AIP. • Select the current chart for the STAR to be flown and review and brief the entry to, and conduct of, the STAR procedure for the nominated runway. • Select STAR procedure and WPTs from area navigation system navigation database. • Conduct confidence check of tracks and distances between WPTs against those derived from the area navigation system navigational database. • Review and brief the approach procedure to be used on completion of the STAR. • Review and brief fuel availability and holding or diversion action required if visual reference is not established.

Elements		Evidence
		• Tune and identify the navigation aids to be used for the selected STAR. • Monitor the warning flags and CDI indications during the procedure to ensure signal integrity, and react appropriately to warnings. • Set altimeter to the appropriate QNH before commencing descent. • Track via the WPTs depicted for the arrival runway maintaining altitude clearances and remain above LSALT for each leg of the procedure. • Comply with speed restrictions specified in AIP. • Comply with ATC instructions amending STAR procedure. • On completion of STAR, commence instrument/visual approach to RWY for landing. • Elements of Airmanship.

2.1.39 Unit S17: Underpinning knowledge

2.1.39.1 'STAR'

(a) Demonstrate ability to read and interpret a STAR chart.

(b) State STAR procedures and limitations.

(c) State pilot's responsibilities when STAR clearance is given or cancelled.

(d) Identify applicable instrument approach procedure or visual approach at end of STAR.

(e) Demonstrate knowledge of STAR radio procedures.

(f) Determine procedures for loss of radio communication during STAR.

(g) Determine procedures for abnormal operations and/or emergencies during STAR, including navigation aid failure.

2.1.40 Unit S18: Perform Instrument Departure (SE)

2.1.40.1 Unit Description: Skills and knowledge to plan and conduct a departure from an aerodrome without a published instrument departure procedure, intercept track within 5 nm, while maintaining obstacle clearance during climb to LSALT and manage traffic separation using the radiotelephone, in IMC/simulated IMC under the IFR.

Elements		Performance Criteria
S18.1	Determine applicable standard take off minima	• Using AIP determine standard take off ceiling (300 ft) and visibility (2,000 M) minima for takeoff from the aerodrome.
S18.2	Determine obstacle clearance requirements for take off	• Plan a departure which ensures that the aircraft can maintain obstacle and terrain after takeoff and during the climb to LSALT.
S18.3	Take off and climb to cruising altitude/level under the IFR from an aerodrome which does not have SID and/or SRD procedures	• Take off and climb to cruising altitude/level in IMC/simulated IMC from the standard take off ceiling (300 ft). • Intercept track within 5 nm of the departure aerodrome ensuring obstacle and terrain clearance is maintained below LSALT. • Make all required radio transmissions in accordance with AIP and maintain separation from other traffic.

2.1.41 Unit S18: Assessment Guide

2.1.41.1 During assessment the pilot should be observed to perform the following checks and actions as evidence of ability to meet the licensing criteria.

2.1.41.2 The checks and actions detailed in this guide are advisory. Checks and actions in approved checklists, placards, Flight Manual/POHs, or Operations Manuals have precedence and must be complied with.

Elements		Evidence
S18.1	Determine applicable standard take off minima	• Use standard take off minima, not less than 300 ft ceiling and 2,000 M visibility minima for takeoff from the aerodrome as specified in AIP. Consider factors such as aircraft performance, obstacles and terrain in the vicinity of the aerodrome and possible action required in event of engine failure which might require a higher ceiling or take-off minima to be used.

Elements		Evidence
S18.2	Determine obstacle clearance requirements for take off	• Determine the height of any obstacles in the take-off area and of terrain on the planned climb track to LSALT. • Ensure that aircraft climb performance allows for terrain and obstacle clearance after take-off and during climb to LSALT (minimum 1000 feet above obstacles or terrain within 5 nm of the aircraft outside the circuit area of the departure aerodrome). • When required, increase the ceiling minima and/or plan a track to ensure terrain clearance.
S18.3	Take off and climb to cruising altitude/level under the IFR from an aerodrome which does not have SID and/or SRD procedures	• Take-off under visual conditions and transition to instrument/simulated instrument flight without outside visual reference at 300 feet above the departure aerodrome. • Maintain obstacle and terrain clearance while climbing in the circuit after take-off. • Climb to a height which ensures terrain and obstacle clearance along the planned flight path before departing the circuit area. • Intercept planned track within 5 nm of departure aerodrome. • Climb by reference to instruments to LSALT maintaining terrain clearance (minimum 1000 feet above obstacles or terrain within 5 nm of the aircraft outside the circuit area of the departure aerodrome). • Maintain heading (± 5°), airspeed (± 10 kts) and track within tolerances specified in AIP. • Make radio transmissions in accordance with AIP IFR procedures. • Maintain separation with other traffic. • Elements of Airmanship.

2.1.42 Unit S18: Underpinning Knowledge

2.1.42.1 IF Take-Off & Departure (not using a SID) FPE:

(a) Determine take-off minima for single engine aircraft at aerodromes with and without suitable instrument approach procedures.

(b) Determine conditions for take-off if a forecast cannot be obtained.

(c) State the departure procedure.

(d) Determine what transponder code to use.

(e) State when departure track must be established.

(f) State contents of airborne and departure reports, and when these must be made.

(g) State pilot's responsibility in an IFR visual departure.

(h) Determine procedures for loss of radio communication.

(i) Determine procedures for abnormal operations and/or emergencies.

2.1.43 Unit S19: Perform Standard Instrument Departure (SE)

2.1.43.1 Unit Description: The skills and knowledge to determine the applicable take off ceiling and visibility minima, calculate and maintain the obstacle clearance limits for climb during flight to LSALT while on climb to cruising altitude/level and to comply with SID or SRD graphic depiction or narrative requirements in IMC/simulated IMC under IFR.

Elements		Performance Criteria
S19.1	Determine applicable standard take off minima	• Using AIP determine standard take off ceiling (300 ft) and visibility (2,000 M) minima for take-off from the aerodrome.
S19.2	Determine SID and obstacle clearance requirements	• Determine from aircraft take-off and climb performance charts that obstacle clearance can be maintained in the take-off area and that the minimum design climb gradient of the SID or SRD and any additional specified gradients can be met.
S19.3	Take-off and climb to cruising level using SID and/or SRD procedure	• After take-off, climb to cruising altitude/level in IMC/simulated IMC from standard take-off ceiling (300 ft) in accordance with specified tracking and altitude requirements of the SID or SRD procedure. • Ensure obstacle and terrain clearance is maintained below LSALT. • Make all required radio transmissions in accordance with AIP.

2.1.44 Unit S19: Assessment Guide

2.1.44.1 During assessment the pilot should be observed to perform the following checks and actions as evidence of ability to meet the licensing criteria.

2.1.44.2 The checks and actions detailed in this guide are advisory. Checks and actions in approved checklists, placards, Flight Manual/PO Manuals have precedence and must be complied with.

Elements		Evidence
S19.1	Determine applicable standard take-off minima	• Use standard take-off minima, not less than 300 ft ceiling and 2,000 M visibility minima for take-off from the aerodrome as specified in AIP. • Consider factors such as aircraft performance, obstacles and terrain in the vicinity of the aerodrome and possible action required in event of engine failure which might require a higher ceiling or take-off minima to be used.

S19.2	Determine SID and obstacle clearance requirements	• Obtain airways clearance including SID procedure to be flown. • Read back clearance, including SID, as specified in AIP. • Select current chart for the SID to be flown. •Determine the climb gradient requirements of the SID and ensure that aircraft climb performance will achieve gradient requirements. • Review and brief track and altitude requirements of the SID. • Advise ATC if unable to comply with any element of the SID. •Elements of Airmanship: Maintain awareness of obstacle and terrain clearance during flight.
S19.3	Take-off and climb to cruising level using SID and/or SRD procedure	• Take-off under visual conditions and transition to instrument flight/simulated instrument flight without outside visual reference at 300 feet above the departure aerodrome. • Track via the SID or follow ATC instructions for initial heading and subsequent radar vectors when tracking via a radar SID (SRD). • Climb by reference to instruments to LSALT, maintaining at least the required climb gradient and complying with any altitude restrictions of the SID. • Make radio reports as specified in AIP IFR procedures. • Maintain heading (± 50), airspeed (±10 kts) and tracking within tolerances specified in AIP. • Elements of Airmanship.

2.1.45 Unit S19: Underpinning Knowledge

2.1.45.1 IF Take-Off & Departure (using a SID):

(a) Determine take-off minima for single engine aircraft for aerodromes with and without the relevant instrument approach procedures.

(b) Determine conditions for take-off if a forecast cannot be obtained.

(c) Demonstrate ability to read and interpret a SID chart.

(d) State SID procedures and limitations.

(e) State SID tracking and performance requirements, and flight parameters assumed of the aircraft.

(f) State pilot's responsibilities if SID tracking and performance requirements cannot be met.

(g) State pilot's responsibilities when SID clearance is given or cancelled.

(h) State when and what radio reports shall be made in an SID.

(i) Determine procedures for loss of radio communication during SID.

(j) Determine procedures for abnormal operations and/or emergencies during SID, including navigation aid failure.

2.1.46 Unit S20: Instrument Departure Multi Engine Aeroplane

2.1.46.1 Unit Description: Knowledge and skills to determine the take-off ceiling and visibility minima for a multi-engine aeroplane, calculate and maintain obstacle clearance limits during the climb to LSALT in normal and asymmetric flight, resolve whether a return to the aerodrome of departure is possible in the event of engine failure or complete a suitable course of action if otherwise, and manage a simulated/actual engine failure in IMC.

Elements		Performance Criteria
S20.1	Determine applicable standard take-off minima	• Using AIP, determine take-off ceiling and visibility minima for take-off from the aerodrome. • Determine whether an engine failure after take-off in IMC will require a return to the departure aerodrome and if a return is required, select, if necessary, a higher take-off minima which will allow the return to be made using an instrument or visual approach.
S20.2	Determine obstacle clearance requirements for take-off including compliance in event of engine failure	• A departure which ensures an aircraft can maintain obstacle and terrain clearance after take-off and during climb to LSALT in the event of an engine failure.
S20.3	Take-off and climb to cruising altitude/level under the IFR from an aerodrome which does not have SID and/or SRD procedures	• Take-off and climb to cruising altitude/level in IMC/simulated IMC from the standard take-off ceiling applicable to the aircraft type and performance. • Intercept track within 5 nm of the departure aerodrome ensuring obstacle and terrain clearance is maintained below LSALT. • Make all required radio transmissions in accordance with AIP and maintain separation from other traffic.
S20.4	Manage engine failure after take-off	• Manage simulated engine failure after take-off in simulated IMC.

2.1.47 Unit S20: Assessment Guide

2.1.47.1 During assessment the pilot should be observed to perform the following checks and actions as evidence of ability to meet the licensing criteria.

2.1.47.2 The checks and actions detailed in this guide are advisory. Checks and actions in approved checklists, placards, Flight Manual/POHs, or Operations Manuals have precedence and must be complied with.

Elements		Evidence
S20.1	Determine applicable standard take-off minima	• Determine standard take-off minima for take-off from the aerodrome as specified in AIP. • Consider factors including aircraft performance, obstacles and terrain in the vicinity of the aerodrome and possible action required in event of engine failure which might require a higher ceiling or take-off minima to be used. • Determine whether an engine failure after take-off in IMC will require a return to the departure aerodrome. • If a return is required, select, if necessary, a higher take-off minima which will allow the return to be made using an instrument or visual approach.
S20.2	Determine obstacle clearance requirements for take-off including compliance in event of engine failure	• Determine the height of any obstacles in the take-off area and of terrain on the planned climb track to LSALT. • Ensure that aeroplane one engine inoperative climb performance allows for terrain clearance after take-off and during climb to LSALT (minimum 1000 feet above obstacles or terrain within 5 nm of the aeroplane outside the circuit area of the departure aerodrome). • When required, increase the ceiling minima and/or plan a track to ensure terrain clearance. • If aeroplane one engine inoperative climb to LSALT is not possible ensure that take-off minima allows a return to the departure aerodrome.
S20.3	Take-off and climb to cruising altitude/level under the IFR from an aerodrome which does not have SID and/or SRD procedures	• Pre- take-off safety brief includes intended actions in event of engine failure. • Take-off under visual conditions and transition to instrument flight without outside visual reference at 300 feet above the departure aerodrome. • Maintain obstacle and terrain clearance during while climbing in the circuit after take-off. • Climb to a height which ensures terrain and obstacle clearance along the planned flight path before departing the circuit area. • Intercept planned track within 5nm of departure aerodrome.

Elements		Evidence
		• Climb by reference to instruments to LSALT maintaining terrain clearance (minimum 1000 feet above obstacles or terrain within 5 nm of the aircraft outside the circuit area of the departure aerodrome). • Maintain heading (± 5°), airspeed (± 10 kts) and track within tolerances specified in AIP. • Make radio transmissions in accordance with AIP IFR procedures. • Maintain separation with other traffic.
S20.4	Manage engine failure after take-off	• Multi engine aircraft engine failure after take-off • Aeroplane is controlled by reference to flight instruments from 300 feet above aerodrome after take-off. • Failed engine is identified after simulated failure and aeroplane is controlled by reference to instruments. • Heading is maintained (± 20° initially then ± 5°, from datum heading). • Initial climb not less than best single engine angle of climb speed (Vxse) or best single engine rate of climb speed (Vyse) is maintained (+5 -0 kts) until clear of obstacles, then Vyse (± 10 kts/ ± M.02). • Emergency procedures are completed in accordance with Flight Manual/POH. • Aeroplane is configured for optimum single engine climb performance (Vyse ±10 kts, take-off power on operating engine, not more than 5° bank towards operating engine, without slip or skid, rudder trimmed, undercarriage and flap retracted and propeller feathered on failed engine or simulated by setting zero thrust). • Decision is made to continue climb or return to aerodrome. • Terrain clearance is maintained during IMC/simulated IMC phase. • Elements of Airmanship.

2.1.48 Unit S20: Underpinning Knowledge

2.1.48.1 Reserved

2.1.49 'IF Take-Off & Departure' (not using a SID)

(a) Determine take-off minima for twin engine aeroplane at aerodromes with and without suitable instrument approach procedures.

(b) Determine conditions for take-off if a forecast cannot be obtained

(c) State the departure procedure.

(d) Determine what transponder code to use.

(e) State when departure track must be established.
(f) State contents of airborne and departure reports, and when these must be made.
(g) State pilot's responsibility in an IFR visual departure.
(h) Determine procedures for loss of radio communication.
(i) Determine procedures for abnormal operations and/or emergencies.

2.1.50 Unit S21: Standard Instrument Departure Multi Engine Aeroplane

2.1.50.1 Unit Description: The skills and knowledge to determine the applicable take-off ceiling and visibility minima, calculate and maintain the obstacle clearance limits for climb during normal and asymmetric flight to LSALT while on climb to cruising altitude/level and complying with SID or SRD graphic depiction or narrative requirements in IMC/simulated IMC under IFR.

Elements		Performance Criteria
S21.1	Determine applicable standard take-off minima	• Using AIP determine take-off ceiling and visibility minima for take-off from the aerodrome. • Determine whether and engine failure after take-off in IMC will require a return to the departure aerodrome and if a return is required, select a higher take-off minima which will allow the return to be made using an instrument or visual approach.
S21.2	Determine obstacle clearance requirements for take-off	• Determine from aircraft take-off and climb performance charts that obstacle clearance can be maintained in the take-off area and that the minimum design climb gradient of the SID and any additional specified gradients can be met and procedure is able to ensure obstacle and terrain clearance in event of engine failure.
S21.3	Take-off and climb to cruising level using SID and/or SRD procedure	• After take-off, climb to cruising altitude/level in IMC/simulated IMC from standard take-off ceiling (300 ft) in accordance with specified tracking and altitude requirements of the SID or SRD procedure. • Ensure obstacle and terrain clearance is maintained below LSALT. • Make all required radio transmissions in accordance with AIP.
S21.4	Manage engine failure after take-off	• Manage simulated engine failure after take-off in simulated IMC.

2.1.51 Unit S21: Assessment Guide

2.1.51.1 During assessment the pilot should be observed to perform the following checks and actions as evidence of ability to meet the licensing criteria.

2.1.51.2 The checks and actions detailed in this guide are advisory. Checks and actions in approved checklists, placards, Flight Manual/POHs, or Operations Manuals have precedence and must be complied with.

Elements		Evidence
S21.1	Determine applicable standard take-off minima	• Determine standard take-off minima for take-off from the aerodrome as specified in AIP. • Consider factors such as aeroplane performance, obstacles and terrain in the vicinity of the aerodrome and possible action required in event of engine failure which might require a higher ceiling or take-off minima to be used. • Determine whether an engine failure after take-off in IMC will require a return to the departure aerodrome. • If a return is required, select a higher take-off minima which will allow the return to be made using an instrument or visual approach.
S21.2	Determine obstacle clearance requirements for take-off	• Obtain airways clearance including SID procedure to be flown. • Read back clearance, including SID, as specified in AIP. • Select current chart for the SID to be flown. • Determine the climb gradient requirements of the SID and ensure that aeroplane one engine inoperative climb performance will achieve gradient requirements or select an alternative course of action. • If aeroplane one engine inoperative climb to LSALT is not possible ensure that take-off minima allows a return to the departure aerodrome. • Review and brief track and altitude requirements of the SID. • Advise ATC if unable to comply with any element of the SID. • Elements of Airmanship: Maintain awareness of obstacle and terrain clearance during flight.
S21.3	Take-off and climb to cruising level using SID and/or SRD procedure	• Pre- take-off safety brief includes intended actions in event of engine failure. • Take-off under visual conditions and transition to instrument flight/simulated instrument flight without outside visual reference at 300 feet above the departure aerodrome.

Elements		Evidence
		• Track via the SID or follow ATC instructions for initial heading and subsequent radar vectors when tracking via a radar SID (SRD). • Climb by reference to instruments to LSALT, maintaining at least the required climb gradient and complying with any altitude restrictions of the SID. • Make radio transmissions as specified in AIP IFR procedures. • Maintain heading (± 5°), airspeed (±10 kts) and tracking within tolerances specified in AIP. • Elements of Airmanship.
S21.4	Manage engine failure after take-off	• Multi engine aircraft engine failure after take-off • Aeroplane is controlled by reference to flight instruments from 300 feet above aerodrome after take-off. • Failed engine is identified after simulated failure and aeroplane is controlled by reference to instruments. • Heading is maintained (± 20° initially then ± 5° from datum heading). • Initial climb not less than best single engine angle of climb speed (Vxse) or best single engine rate of climb speed (Vyse) is maintained (+5 -0 kts) until clear of obstacles, then Vyse (± 10 kts/ ± M.02). • Emergency procedures are completed in accordance with Flight Manual/POH. • Aeroplane is configured for optimum single engine climb performance (Vyse ± 10 kts, take-off power on operating engine, not more than 5° bank towards operating engine, without slip or skid, rudder trimmed, undercarriage and flap retracted and propeller feathered on failed engine or simulated by setting zero thrust). • Decision is made to continue climb or return to aerodrome. • Terrain clearance is maintained during simulated IMC phase. • ATC is advised of intentions. • Elements of Airmanship.

2.1.52 Unit S21: Underpinning Knowledge

2.1.52.1 IF Take-Off & Departure (using a SID) FPE:

(a) Determine take-off minima for twin engine aeroplane for aerodromes with and without the relevant instrument approach procedures.

(b) Determine conditions for take-off if a forecast cannot be obtained.

(c) Demonstrate ability to read and interpret a SID chart.
(d) State SID procedures and limitations.
(e) State SID tracking and performance requirements, and flight parameters assumed of the aircraft.
(f) State pilot's responsibilities if SID tracking and performance requirements cannot be met.
(g) State pilot's responsibilities when SID clearance is given or cancelled.
(h) State when and what radio reports shall be made in an SID.
(i) Determine procedures for loss of radio communication during SID.
(j) Determine procedures for abnormal operations and/or emergencies during SID, including navigation aid failure.

2.1.53 Unit S22: Instrument Departure (Multi Engine Helicopter)

2.1.53.1 Unit Description: Knowledge and skills to determine the take-off ceiling and visibility minima for a multi-engine helicopter, calculate and maintain obstacle clearance limits during the climb to LSALT in normal and single engine flight, resolve whether a return to the aerodrome of departure is possible in the event of engine failure or complete a suitable course of action if otherwise, and manage a simulated/actual engine failure in IMC.

Elements		Performance Criteria
S22.1	Determine applicable standard take-off minima	• Using AIP determine take-off ceiling and visibility minima for take-off from the aerodrome applicable to the type of helicopter, operating procedures or airfield lighting. • Determine whether and engine failure after take-off in IMC will require a return to the departure aerodrome and if a return is required, select a higher take-off minima which will allow the return to be made using an instrument or visual approach.
S22.2	Determine obstacle clearance requirements for take-off	• Using take-off and climb performance charts, determine obstacle clearance requirements in the take-off area during normal and single engine operations in accordance with regulations.
S22.3	Take-off and climb to cruising altitude/level under the IFR from an aerodrome which does not have SID and/or SRD procedures	• Take-off and climb to cruising altitude/level in IMC/simulated IMC from the standard take-off ceiling applicable to the aircraft type and performance. • Intercept track within 5 nm of the departure aerodrome ensuring obstacle and terrain clearance is maintained below LSALT. • Make all required radio transmissions in accordance with AIP and maintain separation from other traffic.
S22.4	Manage engine failure after take-off	• Manage simulated engine failure after take-off in simulated IMC.

2.1.54 Unit S22: Assessment Guide

2.1.54.1 During assessment the pilot should be observed to perform the following checks and actions as evidence of ability to meet the licensing standards.

2.1.54.2 The checks and actions detailed in this guide are advisory. Checks and actions in approved checklists, placards, Flight Manual/POHs, or Operations Manuals have precedence and must be complied with.

Elements		Evidence
S22.1	Determine applicable standard take-off minima	• Determine standard take-off minima for take-off from the aerodrome as specified in AIP. Consider factors such as helicopter performance, obstacles and terrain in the vicinity of the aerodrome and possible action required in event of engine failure which might require a higher ceiling or take-off minima to be used. • Determine whether an engine failure after take-off in IMC will require a return to the departure aerodrome. • If a return is required, select a higher take-off minima which will allow the return to be made using an instrument or visual approach.
S22.2	Determine obstacle clearance requirements for take-off	• Determine the height of any obstacles in the take-off area and of terrain on the planned climb track to LSALT. • Ensure that helicopter one engine inoperative climb performance allows for terrain clearance after take-off and during climb to LSALT (minimum 1000 feet above obstacles or terrain within 5 nm of the helicopter outside the circuit area of the departure aerodrome). • When required, increase the ceiling minima and/or plan a track to ensure terrain clearance. • If helicopter one engine inoperative climb to LSALT is not possible ensure that TO minima allows a return to the departure aerodrome.
S22.3	Take-off and climb to cruising altitude/level under the IFR from an aerodrome which does not have SID and/or SRD procedures	• Pre- take-off safety brief includes intended actions in event of engine failure. • Take-off under visual conditions and transition to instrument flight without outside visual reference at 300 feet above the departure aerodrome. • Maintain obstacle and terrain clearance during while climbing in the circuit after take-off. • Climb to a height which ensures terrain and obstacle clearance along the planned flight path before departing the circuit area. • Intercept planned track within 5nm of departure aerodrome.

Elements		Evidence
		• Climb by reference to instruments to LSALT maintaining terrain clearance (minimum 1000 feet above obstacles or terrain within 5nm of the aircraft outside the circuit area of the departure aerodrome). • Maintain heading (± 50), airspeed (± 10 kts) and track within tolerances specified in AIP. • Make radio transmissions in accordance with AIP IFR procedures. • Maintain separation with other traffic. • Elements of Airmanship
S22.4	Manage engine failure after take-off	• Multi engine aircraft engine failure after take-off • Helicopter is controlled by reference to flight instruments from 300 feet above aerodrome after take-off. • Failed engine is identified after simulated failure and helicopter is controlled by reference to instruments. • Heading is maintained (± 5° from nominated heading). • One engine inoperative best rate of climb speed (Vyse) is maintained (± 10 kts). • Emergency procedures are completed in accordance with Flight Manual/POH. • Helicopter is configured for optimum single engine climb performance. • Decision is made to continue climb or return to aerodrome. • Terrain clearance is maintained during IMC/simulated IMC phase.

2.1.55 Unit S22: Underpinning Knowledge

2.1.55.1 IF Take-Off & Departure (not using a SID):

(a) Determine take-off minima for multi-engine helicopter at aerodromes with and without suitable instrument approach procedures.

(b) Determine conditions for take-off if a forecast cannot be obtained.

(c) State the departure procedure.

(d) Determine what transponder code to use.

(e) State when departure track must be established.

(f) State contents of airborne and departure reports, and when these must be made.

(g) State pilot's responsibility in an IFR visual departure.

(h) Determine procedures for loss of radio communication.

(i) Determine procedures for abnormal operations and/or emergencies.

2.1.56 Unit S23: Standard Instrument Departure Multi Engine Helicopter

2.1.56.1 Unit Description: The skills and knowledge to determine the applicable take-off ceiling and visibility minima, calculate and maintain the obstacle clearance limits for climb during normal and single engine flight to LSALT while on climb to cruising altitude/level and complying with SID or SRD graphic depiction or narrative requirements in IMC/simulated IMC under IFR.

Elements		Performance Criteria
S23.1	Determine applicable standard take-off minima	• Using AIP or, determine take-off ceiling and visibility minima for take-off from the aerodrome applicable to the type of helicopter, operating procedures or airfield lighting. • Determine whether and engine failure after take-off in IMC will require a return to the departure aerodrome and if a return is required, select a higher take-off minima which will allow the return to be made using an instrument or visual approach.
S23.2	Determine obstacle clearance requirements for take-off	• Determine from aircraft take-off and climb performance charts that obstacle clearance can be maintained in the take-off area and that the minimum design climb gradient of the SID or SRD and any additional specified gradients can be met and procedure is able to ensure obstacle and terrain clearance in event of engine failure.
S23.3	Take-off and climb to cruising level using SID and/or SRD procedure	• After take-off, climb to cruising altitude/level in IMC/simulated IMC from standard take-off ceiling minima in accordance with specified tracking and altitude requirements of the SID or SRD procedure. • Ensure obstacle and terrain clearance is maintained below LSALT. • Make all required radio transmissions in accordance with AIP.
S23.4	Manage engine failure after take-off	• Manage simulated engine failure after take-off in simulated IMC.

2.1.57 Unit S23: Assessment Guide

2.1.57.1 During assessment the pilot should be observed to perform the following checks and actions as evidence of ability to meet the licensing standards.

2.1.57.2 The checks and actions detailed in this guide are advisory. Checks and actions in approved checklists, placards, Flight Manual/POHs, or Operations Manuals have precedence and must be complied with.

Elements		Evidence
S23.1	Determine applicable standard take-off minima	• Determine standard take-off minima for take-off from the aerodrome as specified in AIP. • Consider factors such as aircraft performance, obstacles and terrain in the vicinity of the aerodrome and possible action required in event of engine failure which might require a higher ceiling or take-off minima to be used. • Determine whether an engine failure after take-off in IMC will require a return to the departure aerodrome. • If a return is required, select a higher take-off minima which will allow the return to be made using an instrument or visual approach.
S23.2	Determine obstacle clearance requirements for take-off	• Obtain airways clearance including SID procedure to be flown. • Read back clearance, including SID, as specified in AIP. • Select current chart for the SID to be flown. • Determine the climb gradient requirements of the SID and ensure that helicopter one engine inoperative climb performance will achieve gradient requirements or select an alternative course of action. • If helicopter one engine inoperative climb to LSALT is not possible ensure that TO minima allows a return to the departure aerodrome. • Review and brief track and altitude requirements of the SID. • Advise ATC if unable to comply with any element of the SID. • Elements of Airmanship: • Maintain awareness of obstacle and terrain clearance during flight.
S23.3	Take-off and climb to cruising level using SID and/or SRD procedure	• Pre- take-off safety brief includes intended actions in event of engine failure. • Take-off under visual conditions and transition to instrument flight/simulated instrument flight without outside visual reference at 300 feet above the departure aerodrome. • Track via the SID or follow ATC instructions for initial heading and subsequent radar vectors when tracking via a radar SID (SRD). • Climb by reference to instruments to LSALT, maintaining at least the required climb gradient and complying with any altitude restrictions of the SID.

Elements		Evidence
		• Make radio transmissions as specified in AIP IFR procedures. • Maintain heading (± 5), airspeed (±10 kts) and tracking within tolerances specified in AIP. • Elements of Airmanship.
S23.4	Manage engine failure after take-off	• Multi engine helicopter engine failure after take-off • Helicopter is controlled by reference to flight instruments from 300 feet above aerodrome after take-off. • Failed engine is identified after simulated failure and helicopter is controlled by reference to instruments. • Heading is maintained (± 5° from nominated heading). • One engine inoperative best rate of climb speed (Vyse) is maintained (± 10 kts). • Emergency procedures are completed in accordance with Flight Manual/POH. • Helicopter is configured for optimum single engine climb performance. • Decision is made to continue climb or return to aerodrome. • Terrain clearance is maintained during simulated IMC phase. • ATC is advised of intentions. • Elements of Airmanship.

2.1.58 Unit S23: Underpinning Knowledge

2.1.58.1 IF Take-Off & Departure (using a SID) FPE:

(a) Determine take-off minima for multi-engine helicopter for aerodromes with and without the relevant instrument approach procedures.

(b) Determine conditions for take-off if a forecast cannot be obtained.

(c) Demonstrate ability to read and interpret a SID chart.

(d) State SID procedures and limitations.

(e) State SID tracking and performance requirements, and flight parameters assumed of the aircraft.

(f) State pilots responsibilities if SID tracking and performance requirements cannot be met.

(g) State pilots responsibilities when SID clearance is given or cancelled.

(h) State when and what radio reports shall be made in an SID.

(i) Determine procedures for loss of radio communication during SID.

(j) Determine procedures for abnormal operations and/or emergencies during SID, including navigation aid failure.

2.1.59 Unit S24: Visual Circling Approach

2.1.59.1 Unit Description: Knowledge and skills to determine the visual circling minima for the specified instrument approach and to manoeuvre an aircraft from the MDA while maintaining ceiling and visibility minima appropriate to circling and visual contact with the landing runway environment, staying within the circling area specified for the aircraft category and remaining at or above the MDA until interception of a position on downwind, base or final leg from which a continuous descent with visual reference to the runway, clear of obstacles may be completed to the runway threshold and land or conduct missed approach.

Elements		Performance Criteria
S24.1	Determine minima applicable for visual circling for specified instrument approach	• Using applicable instrument approach charts, determine ceiling and visibility minima for a circling approach appropriate for the instrument approach procedure and category of aircraft being used.
S24.2	Conduct visual circling procedure following instrument approach, using appropriate visual cues	• Manoeuvre an aircraft from the MDA while maintaining ceiling and visibility minima appropriate to circling, and visual contact with the landing runway environment. • Maintain within the circling area specified for the aircraft category. • Remain at or above the MDA until interception of a position on downwind, base or final leg from which a continuous descent with visual reference to the runway, clear of obstacles may be completed to the runway threshold. • Control aircraft and maintain altitude limitations by reference to instruments and use visual cues only for positioning aircraft on approach.
S24.3	Conduct missed approach from visual circling	• Recognise the conditions requiring a missed approach to be initiated, and manoeuvre aircraft to MAPT and conduct a missed approach procedure as detailed on the applicable instrument approach chart. • Maintain obstacle clearance in IMC/simulated IMC in accordance with the IFR.

2.1.60 Unit S24: Assessment Guide

2.1.60.1 During assessment the pilot should be observed to perform the following checks and actions as evidence of ability to meet the licensing standards.

2.1.60.2 The checks and actions detailed in this guide are advisory. Checks and actions in approved checklists, placards, Flight Manual/POHs, or Operations Manuals have precedence and must be complied with.

Elements		Evidence
S24.1	Determine minima applicable for visual circling for specified instrument approach	• Prior to instrument approach, use applicable instrument approach chart to determine MDA and visibility minima for a circling approach. • Select minima for category of aircraft being used. • Determine position and height of significant obstacles in the circling area. • Review and brief the position of the runway relative to the aircraft as it will appear to the pilot when approaching minima and a plan of a circling procedure which maintains obstacle clearance in the circling area. • Elements of Airmanship.
S24.2	Conduct visual circling procedure following instrument approach, using appropriate visual cues	• After establishing visual reference from an instrument approach where a straight in runway approach is not available, manoeuvre within the circling area for a landing. • Maintaining ceiling and visibility minima appropriate to circling. • Maintain visual contact with the landing runway environment. • Maintain aircraft within the circling area specified for the aircraft category. • Configure aircraft at a suitable speed and flap setting for flight in reduced visibility. • Complete pre landing checks in accordance with approved checklist. • Descend below MDA from a position at which a continuous descent with visual reference to the runway, clear of obstacles may be completed to the runway threshold. • By day, maintain obstacle clearance visually along the flight path subsequent to visual descent below MDA. • By night, remain at or above the MDA until interception of a position on downwind, base or final leg from which the visual descent may be commenced. • Control aircraft and maintain altitude limitations by reference to instruments. • Use visual cues for positioning aircraft on approach. • Limit maneuvering to a bank angle of ± 30° along a stabilized approach path. • Elements of Airmanship.

Elements		Evidence
S24.3	Conduct missed approach from visual circling	• Commence a missed approach if visual reference to the runway is lost during circling. • Manoeuvre aircraft on climb to MAPT within circling area. • Conduct a missed approach procedure from MAPT as specified on the instrument approach chart. • Maintain obstacle clearance in IMC/simulated IMC in accordance with the IFR. • Elements of Airmanship: Make a positive decision and conduct a missed approach if ceiling and visibility minima is not achieved at MDA or if visibility reduces below minima while maneuvering for landing.

2.1.61 Unit S25: NDB Instrument Approach

2.1.61.1 Unit Description: Knowledge and skills to conduct an instrument approach using the NDB approach procedure beginning with a descent from a route MSA or LSALT in compliance with any altitude restrictions on a prescribed track, to the MDA applicable to the aircraft category whilst maintaining obstacle clearance in accordance with instructions in AIP and conducting a published missed approach if visual reference is not achieved by the MAPT specified for the procedure.

Elements		Performance Criteria
S25.1	Select approach and determine applicable minima	• In flight select the current IAL chart for the NDB approach to be flown and review and brief the entry to, and conduct of, the instrument approach and missed approach procedure. • Determine the applicable meteorological minima for the approach for the aircraft performance category. • Review and brief fuel availability and holding or diversion action required if visual reference is not established.
S25.2	Monitor aid signal integrity	• Tune and identify the NDB to be used for the selected approach and monitor the morse code identification and ADF indications throughout the approach to ensure signal integrity.
S25.3	Conduct initial approach	• Ensure altimeter is set to the appropriate QNH and conduct the initial approach from a distance of at least 25 nm from the NDB, maintaining the inbound track at or above route MSA or LSALT in accordance with instructions in AIP, using the NDB.
S25.4	Conduct holding pattern	• Enter the holding pattern at or above LSALT or MSA in accordance with the specified sector entry

Elements		Performance Criteria
		and perform a holding pattern is accordance with instructions in AIP, using the NDB.
S25.5	Conduct instrument approach procedure	• Conduct an instrument approach, descending on a specified track, complying with any altitude restrictions to not below the MDA within the tolerances specified in regulations, using the NDB. • After establishing visual reference, identify the landing runway and conduct visual circling or runway approach for a landing on the selected runway. • Note: Visual circling need not be demonstrated if a flight procedure endorsement for visual circling is already held.
S25.6	Conduct missed approach procedure	• Commence the published missed approach procedure if visual reference is not established before reaching the MAPT, or any other event specified in AIP as requiring conduct of a missed approach occurs. • Conduct the missed approach procedure by tracking to the MAPT and complying with the published missed approach procedure specified on the IAL chart.

2.1.62 Unit S25: Assessment Guide

2.1.62.1 During assessment the pilot should be observed to perform the following checks and actions as evidence of ability to meet the licensing criteria.

2.1.62.2 The checks and actions detailed in this guide are advisory. Checks and actions in approved checklists, placards, Flight Manual/POHs, or Operations Manuals have precedence and must be complied with.

Elements		Evidence
S25.1	Select approach and determine applicable minima	• In flight select the current IAL chart for the NDB approach to be flown. • Review and brief • whether entry to the approach will be direct via the holding pattern; • minimum altitude (LSALT or MSA) prior to approach entry; • tracks, distances, timing and descent limitations for the approach; • the approach minima for the aircraft performance category and runway to be used; • the conduct of visual circling if required; • the missed approach procedure; • the holding or diversion action required if visual reference is not established; and • fuel availability and latest divert time if required.
S25.2	Monitor aid signal integrity	• Tune and identify the NDB to be used for the selected approach. • Monitor the morse code identification and ADF indications during the approach to ensure signal integrity. • Initiate missed approach if operation of the NDB or ADF becomes suspect.
S25.3	Conduct initial approach	• Altimeter is set to the aerodrome QNH. • Conduct the initial approach from a distance of at least 25 nm from the NDB. • Maintain the inbound track at or above route MSA or LSALT within the tracking tolerances specified in AIP, or within 25 nm and at or above MSA, divert to intercept a track for direct entry to the approach procedure in accordance with instructions in AIP. • Comply with airspeed limitations specified in AIP. • Make radio reports and broadcasts and obtain clearances as specified in AIP Traffic separation is maintained. • Elements of Airmanship.
S25.4	Conduct holding pattern	• Conduct holding pattern using the NDB, as specified in Unit 13 of this syllabus.

Elements		Evidence
S25.5	Conduct instrument approach procedure	• Aircraft is established ± 30° of the initial track of the approach procedure before passing overhead the NDB to commence the approach. • After crossing the NDB the aircraft is established on the specified outbound track (±5) before commencing descent. • Timing is commenced for the outbound leg of the approach passing overhead the NDB. • Outbound timing is adjusted to allow for the effect of a head or tail wind component. • Descend on the specified outbound track and comply with altitude limitations. • Outbound track is maintained (± 5°). • A reversal or base turn as specified for the procedure is conducted. • The aircraft is established on the final approach track (± 5°) before continuing descent below the specified altitude. • The specified final approach track is maintained (± 5°). • Altitude limitations on descent are complied with. • Rate of descent does not exceed 1000 fpm on final approach. • Descent on final approach is made to not below the MDA (+100 feet - 0 feet) until visual reference is established. • Aircraft is on specified track at MDA (± 5°). • If visual reference is not established by the MAPT a missed approach is commenced. • If visual reference is established, the landing runway is identified and a visual approach is made to the circling area as specified in AIP for day or night When established within the circling area, a visual circling or a runway approach for a landing on the selected runway is conducted. • Note: Visual circling need not be demonstrated if a flight procedure endorsement for visual circling is held. • Elements of Airmanship.
S25.6	Conduct missed approach procedure	• Commence the published missed approach procedure if visual reference is not established before reaching the MAPT, or any other event specified in AIP as requiring conduct of a missed approach occurs. • Initiate the missed approach by immediately establishing a climb and tracking to the MAPT.

Elements		Evidence
		• Comply with the published missed approach procedure specified on the chart: direction of turn if applicable, maintain published track, climb to published altitude maintaining terrain clearance. • Elements of Airmanship: Make a positive decision and conduct a missed approach if ceiling and visibility minima is not achieved at MDA or if visibility reduces below minima while manoeuvring for landing.

2.1.63 Unit S25: Underpinning Knowledge

2.1.63.1 'NDB or NDB/DME' (including 'Twin Locator") Instrument Approach FPE:

(a) Demonstrate ability to read and interpret a NDB instrument approach procedure chart.

(b) State the NDB instrument approach procedures and limitations.

(c) State the correct sector entry join for entering the holding pattern of the NDB approach procedure.

(d) State the tracking tolerance and altitude limitations for flying the published DME arc of the NDB approach procedure.

(e) Determine NDB approach procedure applicable minima for aircraft.

(f) Determine conditions permitting descent below minima.

(g) Determine procedure for joining the circuit from a NDB approach procedure.

(h) State the NDB approach procedure missed approach procedure.

(i) State minimum obstacle clearance criteria during a NDB approach procedure missed approach procedure.

(j) Demonstrate knowledge of NDB approach procedure radio procedures.

(k) Determine procedures for loss of radio communication during a NDB approach procedure.

(l) Determine procedures for abnormal operations and/or emergencies during a NDB approach procedure, including navigation aid failure.

2.1.64 Unit S26: VOR Instrument Approach

2.1.64.1 Unit Description: Knowledge and skills to conduct an instrument approach using the VOR approach procedure beginning with a descent from a route MSA or LSALT in compliance with any altitude restrictions on a prescribed track, to the MDA applicable to the aircraft category whilst maintaining obstacle clearance in accordance with instructions in AIP and conducting a published missed approach if visual reference is not achieved by the MAPT for the procedure.

Elements	Performance Criteria

S26.1	Select approach and determine applicable minima	• In flight select the current IAL chart for the VOR approach to be flown and review and brief the entry to, and conduct of, the instrument approach and missed approach procedure. • Determine the applicable meteorological minima for the approach for the aircraft performance category. • Review and brief fuel availability and holding or diversion action required if visual reference is not established.
S26.2	Monitor aid signal integrity	• Tune and identify the VOR to be used for the selected approach and monitor the warning flags and CDI indications throughout the approach to ensure signal integrity.
S26.3	Conduct initial approach	• Ensure altimeter is set to the appropriate QNH and conduct the initial approach from a distance of at least 25 nm from the VOR, maintaining the inbound track at or above route MSA or LSALT in accordance with instructions in AIP, using the VOR.
S26.4	Conduct holding pattern	• Enter the holding pattern at or above LSALT or MSA in accordance with the specified sector entry and perform a holding pattern is accordance with instructions in AIP, using the VOR.
S26.5	Conduct approach procedure	• Conduct an instrument approach, descending on a specified track, complying with any altitude restrictions to not below the MDA within the tolerances specified in AIP, using the VOR. • After establishing visual reference, identify the landing runway and conduct visual circling or runway approach for a landing on the selected runway. • Note: Visual circling need not be demonstrated if a flight procedure endorsement for visual circling is already held.
S26.6	Conduct missed approach procedure	• Commence the published missed approach procedure if visual reference is not established before reaching the MAPT, or any other event specified in AIP as requiring conduct of a missed approach occurs. • Conduct the missed approach procedure by tracking to the MAPT and complying with the published missed approach procedure specified on the IAL chart.

2.1.65 Unit S26: Assessment Guide

2.1.65.1 During assessment the pilot should be observed to perform the following checks and actions as evidence of ability to meet the licensing criteria.
2.1.65.2 The checks and actions detailed in this guide are advisory. Checks and actions in approved checklists, placards, Flight Manual/POHs, or Operations Manuals have precedence and must be complied with.

Elements		Evidence
S26.1	Select approach and determine applicable minima	• In flight select the current IAL chart for the VOR approach to be flown. • Review and brief: • whether entry to the approach will be direct or via the holding pattern; • minimum altitude (LSALT or MSA) prior to approach entry; • tracks, distances, timing and descent limitations for the approach; • the approach minima for the aircraft performance category and runway to be used; • the conduct of visual circling if required; • the missed approach procedure; • the holding or diversion action required if visual reference is not established; and • fuel availability and latest divert time if required.
S26.2	Monitor aid signal integrity	• Tune and identify the VOR to be used for the selected approach. • Monitor the warning flag and CDI indications throughout the approach to ensure signal integrity. • Initiate missed approach if operation of the VOR becomes suspect.
S26.3	Conduct initial approach	• Altimeter is set to the aerodrome QNH. • Conduct the initial approach from a distance of at least 25 nm from the VOR. • Maintain the inbound track at or above route MSA or LSALT within the tracking tolerances specified in AIP, or Within 25nm and at or above MSA, divert to intercept a track enabling direct entry to the approach procedure in accordance with instructions in AIP. • Comply with airspeed limitations specified in AIP. • Make radio reports and broadcasts and obtain clearances as specified in AIP. • Traffic separation is maintained. • Elements of Airmanship.
S26.4	Conduct holding pattern	• Conduct holding pattern using the VOR, as specified in Unit 14 of this syllabus.

Elements		Evidence
S26.5	Conduct approach procedure	• Aircraft is established ±30° of the initial track of the approach procedure before passing overhead the VOR to commence the approach. • After crossing the VOR the aircraft is established on the specified outbound track (± 1/2 scale CDI) before commencing descent. • Timing is commenced for the outbound leg of the approach passing overhead the VOR. • Outbound timing is adjusted to allow for the effect of a head or tail wind component. • Descend on the specified outbound track and comply with altitude limitations. • Outbound track is maintained (± 1/2 scale CDI). • A reversal or base turn as specified for the procedure is conducted. • The aircraft is established on the final approach track (± 1/2 scale CDI) before continuing descent below the specified altitude. • OBS is set to align with final approach track so that CDI indicates in the command sense. • The specified final approach track is maintained (± 1/2 scale CDI). • Altitude limitations on descent are complied with. • Rate of descent does not exceed 1000 fpm on final approach. • Descend on final approach to not below the MDA (+100 feet - 0 feet) until visual reference is established. • Aircraft is on specified track at MDA (± 1/2 scale CDI). • If visual reference is not established by the MAPT a missed approach is commenced. • If visual reference is established, the landing runway is identified and a visual approach is made to the circling area as specified in AIP for day or night. • When established within the circling area, a visual circling or a runway approach for a landing on the selected runway is conducted. • Note: Visual circling need not be demonstrated if a flight procedure endorsement for visual circling is held. • Elements of Airmanship.
S26.6	Conduct missed approach procedure	• Commence the published missed approach procedure if visual reference is not established before reaching the MAPT, or any other event

Elements		Evidence
		specified in AIP as requiring conduct of a missed approach occurs. • Initiate the missed approach by immediately establishing a climb and tracking to the MAPT. • Comply with the published missed approach procedure specified on the IAL chart: direction of turn where applicable, maintain published track, climb to published altitude maintaining terrain clearance. • Elements of Airmanship: Make a positive decision and conduct a missed approach if ceiling and visibility minima is not achieved at MDA or if visibility reduces below minima while manoeuvring for landing.

2.1.66 Unit S26: Underpinning Knowledge

2.1.66.1 'VOR or VOR/DME' Instrument Approach FPE:

(a) Demonstrate ability to read and interpret a VOR or VOR/DME instrument approach procedure chart.

(b) State the VOR or VOR/DME instrument approach procedures and limitations.

(c) State the correct sector entry join for entering the holding pattern of the VOR or VOR/DME approach procedure.

(d) State the tracking tolerance and altitude limitations for flying the published DME arc of the VOR/DME approach procedure.

(e) Determine VOR or VOR/DME approach procedure applicable minima for aircraft.

(f) Determine conditions permitting descent below minima.

(g) Determine procedure for joining the circuit from a VOR or VOR/DME approach procedure.

(h) State the VOR or VOR/DME approach procedure missed approach procedure.

(i) State minimum obstacle clearance criteria during a VOR or VOR/DME approach procedure missed approach procedure.

(j) Demonstrate knowledge of VOR or VOR/DME approach procedure radio procedures.

(k) Determine procedures for loss of radio communication during a VOR or VOR/ DME approach procedure.

(l) Determine procedures for abnormal operations and/or emergencies during a VOR or VOR/DME approach procedure, including navigation aid failure.

2.1.67 Unit S27: LLZ Instrument Approach

2.1.67.1 Unit Description: Knowledge and skills to conduct an instrument approach using the LLZ approach procedure beginning with a descent from a route MSA or LSALT in compliance with any altitude restrictions to intercept track on the

LLZ using marker beacons or DME to fix position on the LLZ track, descending in accordance with specified distance/altitude limitations to the MDA applicable to the aircraft category and conducting a published missed approach if visual reference is not achieved by the MAPT specified for the procedure.

Elements		Performance Criteria
S27.1	Select approach and determine applicable minima	• In flight select the current IAL chart for the LLZ approach to be flown and review and brief the entry to, and conduct of, the instrument approach and missed approach procedure. • Determine the applicable meteorological minima for the approach for the aircraft performance category. • Review and brief fuel availability and holding or diversion action required if visual reference is not established.
S27.2	Monitor aid signal integrity	• Tune and identify the LLZ to be used for the selected approach and monitor the warning flags and CDI indications throughout the approach to ensure signal integrity. • Tune and identify locator beacon used for initial approach fix. • Test marker beacon operation and monitor visual and aural indications during approach. • Tune and identify DME and monitor distance indications during approach.
S27.3	Conduct initial approach	• Set the altimeter to the aerodrome QNH and conduct the initial approach from a distance of at least 25 nm from the LLZ, maintaining track to the initial approach fix using appropriate tracking aids or radar vectors at or above route MSA or LSALT.
S27.4	Conduct holding pattern	• Enter the instrument approach procedure at or above LSALT or MSA in accordance with the specified sector entry and perform a holding pattern is accordance with instructions in AIP, using the LLZ and the other navigation aid used to identify the holding fix.
S27.5	Conduct approach procedure	• Conduct an instrument approach, descending on the LLZ track, complying with any distance/altitude restrictions to not below the MDA within the tolerances specified in AIP, using the LLZ for tracking and marker beacons or DME to provide distance indications. • After establishing visual reference, identify the landing runway and conduct straight-in runway approach or visual circling for a landing on the selected runway.

Elements		Performance Criteria
		• Note: Visual circling need not be demonstrated if a flight procedure endorsement for visual circling is already held.
S27.6	Conduct missed approach procedure	• Commence the published missed approach procedure if visual reference is not established before reaching the MAPT, or any other event specified in AIP as requiring conduct of a missed approach occurs. • Conduct the missed approach procedure by tracking to the MAPT and complying with the published missed approach procedure specified on the IAL chart.

2.1.68 Unit S27: Assessment Guide

2.1.68.1 During assessment the pilot should be observed to perform the following checks and actions as evidence of ability to meet the licensing criteria.

2.1.68.2 The checks and actions detailed in this guide are advisory. Checks and actions in approved checklists, placards, Flight Manual/POHs, or Operations Manuals have precedence and must be complied with.

Elements		Evidence
S27.1	Select approach and determine applicable minima	• In flight select the current IAL chart for the LLZ approach to be flown. • Review and brief: • whether entry to the approach will be direct or via the holding pattern; • Minimum altitude (LSALT or MSA) prior to approach entry; • tracks, distances, timing and descent limitations for the approach; • the applicable approach minima for the aircraft performance category and runway to be used; • the conduct of visual circling if required; • the missed approach procedure; • the holding or diversion action required if visual reference is not established; and • fuel availability and latest divert time if required.
S27.2	Monitor aid signal integrity	• Tune and identify the LLZ to be used for the selected approach. • Tune and identify locator beacon used for initial approach fix. • Test marker beacon operation and monitor visual and aural indications during approach. • Tune and identify DME and monitor distance indications during approach.

Elements		Evidence
		• Monitor the LLZ warning flag and CDI indications during the approach to ensure signal integrity. • Initiate missed approach if operation of the LLZ becomes suspect or if CDI indication reaches full scale deflection during the approach.
S27.3	Conduct initial approach	• Set altimeter to the aerodrome QNH. • Conduct the initial approach from a distance of at least 25 nm from the LLZ. • Track to the initial approach fix using appropriate tracking aids or radar vectors at or above route LSALT, MSA or MVA. • Monitor other navigation aids to identify LLZ course reversal indications. • Comply with airspeed limitations specified in AIP. • Make radio reports and broadcasts and obtain clearances as specified in AIP. • Establish track on the LLZ before crossing the initial approach fix. • Elements of Airmanship:
S27.4	Conduct holding pattern	• LLZ and navigation aid used to identify the holding fix are both tuned and identified. • LSALT or MSA for the inbound track is maintained until crossing the LLZ holding fix. • Sector entry to the holding pattern is made based on aircraft inbound HDG in accordance with the IAL chart. • Turns are made in direction specified for the holding pattern. • Timing for the outbound leg of the holding pattern is commenced abeam the holding fix outbound. • Timing and HDG on the outbound leg is adjusted as necessary to allow for wind effect. • Minimum altitude for holding or nominated holding altitude is maintained (±100 ft). • Inbound turn in the holding pattern is made in compliance with timing and or distance limitations. • Intercept and maintain the LLZ track inbound in the holding pattern within CDI ½ scale deflection before passing the holding fix. • Elements of Airmanship:
S27.5	Conduct approach procedure	• The aircraft is established within a ±5° sector either side of the specified LLZ track before crossing the initial approach fix. • Aircraft is established (within ±1/2 scale deflection) on the LLZ track before commencing descent.

Elements		Evidence
		• LLZ track is maintained (±1/2 scale CDI) on final approach. • Aircraft is maintained on the LLZ track by establishing a HDG which allows for drift. • Comply with altitude limitations on descent using marker beacons or DME to fix position. • Aircraft is maintained on the approach profile by establishing a configuration of stabilized power, airspeed and rate of descent. • Rate of descent does not exceed 1000 fpm on final approach. • On final approach, the LLZ track is maintained without constant changes of HDG. • Descend on final approach to not below the MDA (+100 - 0 ft) until visual reference is established. • Aircraft is on LLZ track at MDA (± ½ scale CDI). • If visual reference is not established by the MAPT commence a missed approach. • If visual reference is established conduct a straight in approach to land or a circling approach to another runway. • Note: Visual circling need not be demonstrated if a flight procedure endorsement for visual circling is held. • Elements of Airmanship
S27.6	Conduct missed approach procedure.	• Commence the published missed approach procedure if visual reference is not established before reaching the MAPT, or any other event specified in AIP as requiring a missed approach occurs. • Initiate the missed approach by immediately establishing a climb and tracking to the MAPT. • Comply with the published missed approach procedure specified on the IAL chart: direction of turn if applicable, maintain published track; and climb to published altitude maintaining terrain clearance. • Elements of Airmanship Make a positive decision and conduct a missed approach if ceiling and visibility minima is not achieved at MDA or if visibility reduces below minima while manoeuvring for landing.

2.1.69 Unit S27: Underpinning Knowledge

2.1.69.1 (The use of the term ‘ILS’ in Module 24 shall also be taken to mean ILS/DME, LLZ/DME or LLZ)

(a) Demonstrate ability to read and interpret an ILS instrument approach procedure chart.

(b) State the ILS instrument approach procedures and limitations, including the minimum system components required to conduct an approach.

(c) State the correct sector entry join for entering the holding pattern of the ILS approach procedure.

(d) State the tracking tolerance and altitude limitations for flying the published DME arc of the ILS approach procedure.

(e) Determine the ILS approach procedure applicable minima for aircraft.

(f) State the procedure for altimeter check during the ILS final approach.

(g) Determine conditions permitting descent below minima.

(h) Determine procedure for joining the circuit from an ILS approach procedure.

(i) State the ILS approach procedure missed approach procedure.

(j) State minimum obstacle clearance criteria during an ILS approach procedure missed approach procedure.

(k) Demonstrate knowledge of ILS approach procedure radio procedures.

(l) Determine procedures for loss of radio communication during an ILS approach procedure.

(m) Determine procedures for abnormal operations and/or emergencies during an ILS approach procedure, including the failure of any of its system components.

2.1.70 Unit S28: ILS Instrument Approach (MEA)

2.1.70.1 Unit Description: Knowledge and skills to conduct an instrument approach using the ILS approach procedure, beginning with a descent from a route MSA or LSALT in compliance with any altitude restrictions to intercept track on the LLZ using marker beacons or DME to fix position on the LLZ track, descending by reference to the GS to the decision altitude (DA) and land or conduct a published missed approach if visual reference is not established by DA or DH.

Elements		Performance Criteria
S28.1	Select approach and determine applicable minima	• In flight select the current IAL chart for the ILS approach to be flown and plan the transition to, and conduct of, the instrument approach and missed approach procedure. • Determine the applicable meteorological minima for the approach for the aircraft performance category. • Review and brief fuel availability and holding or diversion action required if visual reference is not established.
S28.2	Monitor aid signal integrity	• Tune and identify the LLZ to be used for the selected approach and monitor the warning flags and CDI indications for both LLZ and glideslope throughout the approach to ensure signal integrity.

Elements		Performance Criteria
		• Tune and identify locator beacon used for initial approach fix. • Test marker beacon operation and monitor visual and aural indications during approach. • Tune and identify DME and monitor distance indications during approach.
S28.3	Conduct initial approach	• Set the altimeter to the aerodrome QNH and conduct the initial approach from a distance of at least 25 nm from the ILS, maintaining track to the initial approach fix using appropriate tracking aids or radar vectors at or above route MSA or LSALT to intercept the LLZ track.
S28.4	Conduct holding pattern	• Enter the holding pattern at or above LSALT or MSA in accordance with the specified sector entry and perform a holding pattern in accordance with instructions in AIP, using the LLZ and the other navigation aid used to identify the holding fix.
S29.5	Conduct approach procedure	• Conduct an ILS approach from the initial approach fix, tracking by reference to the LLZ, descending on the glideslope and using marker beacons or DME to provide distance indications. • Make at least one specified altitude check on glideslope and adjust DA or DH if necessary. • Continue descent on glideslope to the DA or DH as applicable within the tolerances specified in AIP. • After establishing visual reference, identify the landing runway and conduct straight-in runway approach or visual circling for a landing on another runway. • Note: Visual circling need not be demonstrated if a flight procedure endorsement for visual circling is already held.
S28.6	Conduct missed approach procedure	• Commence the published missed approach procedure if visual reference is not established at DA or DH, or any other event specified in AIP as requiring conduct of a missed approach occurs. • Conduct the missed approach procedure by tracking to the MAPT and complying with the published missed approach procedure specified on the IAL chart.

2.1.71 Unit S28: Assessment Guide

2.1.71.1 During assessment the pilot should be observed to perform the following checks and actions as evidence of ability to meet the licensing criteria.

2.1.71.2 The checks and actions detailed in this guide are advisory. Checks and actions in approved checklists, placards, Flight Manual/POHs, or Operations Manuals have precedence and must be complied with.

Elements		Evidence
S28.1	Select approach and determine applicable minima	• In flight select the current IAL chart for the ILS approach to be flown. • Review and brief: • whether entry to the approach will be direct or via the holding pattern; • minimum altitude (LSALT or MSA) prior to approach entry; • tracks, distances, timing and descent limitations for the approach; • the applicable approach minima for the aircraft performance category and runway to be used; • apply pressure error correction to DA; • the conduct of visual circling if required; • the missed approach procedure; • the holding or diversion action required if visual reference is not established; and • fuel availability and latest divert time if required.
S28.2	Monitor aid signal integrity	• Tune and identify the LLZ to be used for the ILS approach. • Tune and identify locator beacon used for initial approach fix. • Test marker beacon operation and monitor visual and aural indications during approach. • Tune and identify DME and monitor distance indications during approach. • Monitor the LLZ and GS warning flags and CDI and GS indications during the approach to ensure signal integrity. • Initiate missed approach if operation of the LLZ becomes suspect or if CDI or GS indication reaches full scale deflection during the approach.
S28.3	Conduct initial approach	• Set altimeter to the aerodrome QNH. • Conduct the initial approach from a distance of at least 25 nm from the ILS. • Track to the initial approach fix using appropriate tracking aids or radar vectors at or above route LSALT, MSA or MVA.

Elements		Evidence
		• Monitor other navigation aids to identify LLZ course reversal indications. • Comply with airspeed limitations specified in AIP. • Make radio reports and broadcasts and obtain clearances as specified in AIP Establish track on the LLZ before crossing the initial approach fix. • Commence descent when established on the GS. • Elements of Airmanship.
S29.5	Conduct approach procedure	• Aircraft is established within a 30° sector either side of the specified LLZ track before crossing the initial approach fix. • Aircraft is established on the LLZ track (±½ scale CDI) and on or above GS before commencing descent. • Aircraft is maintained on the LLZ track (±½ scale CDI) by establishing a HDG which allows for drift. • Aircraft is maintained on the GS (±½ scale GS) by establishing a stabilized power/airspeed/rate of descent. • Rate of descent does not exceed 1000 fpm on final approach. • A check of GS accuracy is made and DA or DH adjusted as specified in AIP. • Descend on final approach to DA or DH (+100 - 0 ft) until visual reference is established. • Constant HDG changes are not required to maintain LLZ track Aircraft is on LLZ track at DA/DH (±½ scale CDI). • Aircraft is on GS at DA/DH (±½ scale GS). • If visual reference is not established by DA or DH a missed approach is commenced. • If visual reference is established, a straight in approach to land or a circling approach to another runway is conducted. • Maintain stabilized power/airspeed rate of descent for a straight-in runway approach after establishing visual reference to maintain aircraft on the glideslope by reference to the VASI. • Configure aircraft for landing. • Note: Visual circling need not be demonstrated if a flight procedure endorsement for visual circling is held. • Elements of Airmanship.
S28.4	Conduct holding pattern	• Conduct holding pattern using the LLZ in conjunction with another navigation aid to provide

Elements		Evidence
		a holding fix as specified for LLZ holding in element 27.4 of this syllabus. • Elements of Airmanship.
S28.6	Conduct missed approach procedure	• Commence the published missed approach procedure if visual reference is not established before reaching the DA or DH, or any other event specified in AIP as requiring a missed approach occurs. • Initiate the missed approach by immediately establishing a climb and tracking to the MAPT. • Comply with the published missed approach procedure specified on the IAL chart: direction of turn if applicable; maintain published track; and climb to published altitude maintaining terrain clearance. • Elements of Airmanship: Make a positive decision and conduct a missed approach if ceiling and visibility minima is not achieved at DA or DH or if visual reference is lost before landing.

2.1.72 Unit S28: Underpinning Knowledge

2.1.72.1 (The use of the term 'ILS' in Module 24 shall also be taken to mean ILS/DME, LLZ/DME or LLZ ILS Instrument Approach)

(a) Determine procedures for abnormal operations and/or emergencies during an ILS approach procedure, including the failure of any of its system components.

(b) Demonstrate ability to read and interpret an ILS instrument approach procedure chart.

(c) State the ILS instrument approach procedures and limitations, including the minimum system components required to conduct an approach.

(d) State the correct sector entry join for entering the holding pattern of the ILS approach procedure.

(e) State the tracking tolerance and altitude limitations for flying the published DME arc of the ILS approach procedure.

(f) Determine the ILS approach procedure applicable minima for aircraft.

(g) State the procedure for altimeter check during the ILS final approach.

(h) Determine conditions permitting descent below minima.

(i) Determine procedure for joining the circuit from an ILS approach procedure.

(j) State the ILS approach procedure missed approach procedure.

(k) State minimum obstacle clearance criteria during an ILS approach procedure missed app-roach procedure.

(l) Demonstrate knowledge of ILS approach procedure radio procedures.

(m) Determine procedures for loss of radio communication during an ILS approach procedure.

(n) Determine procedures for abnormal operations and/or emergencies during an ILS approach procedure, including the failure of any of its system components.

2.1.73 Unit S29: DME/GPS Arrival

2.1.73.1 Unit Description: Knowledge and skills to conduct a DME or GPS arrival procedure from the LSALT, within a specified sector or on a specified track, descending not below the distance/altitude descent steps specified for the procedure to the MDA applicable to the aircraft category and conducting a published missed approach if visual reference is not achieved by the MAPT, using NDB or VOR for tracking and DME or GPS to provide distance indications.

Elements		Performance Criteria
S29.1	Select approach and determine applicable minima	• In flight select the current IAL chart for the DME or GPS arrival procedure to be flown according to inbound track or sector and review and brief the entry to, and conduct of, the instrument approach and missed approach procedure. • Determine the applicable meteorological minima for the approach for the aircraft performance category. • Review and brief fuel availability and holding or diversion action required if visual reference is not established.
S29.2	Use appropriate tracking aid and distance information and monitor aid signal integrity	• Tune and identify the NDB or VOR to be used for tracking inbound and monitor the aid throughout the approach to ensure signal integrity. • Tune and identify DME or select the reference WPT for GPS and check the distance indication and signal integrity as required. Use DME or GPS to provide distance indications for descent via the distance/altitude steps of the approach.
S29.3	Conduct initial approach	• Set the altimeter to the aerodrome QNH and conduct the initial approach from a distance of at least 25 nm from the reference aid, and maintain at or above route MSA or LSALT until commencing descent not below the specified limiting altitude for the distance/altitude descent steps. • Elements of Airmanship.
S29.4	Conduct approach procedure	• Conduct the arrival procedure, descending on the specified track or sector, descending not below the specified distance/altitude descent steps to the MDA within the tolerances specified in AIP. • Comply with applicable tracking and speed restrictions after passing the initial approach fix. • After establishing visual reference, identify the landing runway and conduct visual circling or

Elements		Performance Criteria
		straight-in runway approach or for a landing on the selected runway. • Note: Visual circling need not be demonstrated if a flight procedure endorsement for visual circling is already held. • Elements of Airmanship.
S29.5	Conduct missed approach procedure	• Commence the published missed approach procedure if visual reference is not established before reaching the MAPT, or any other event specified in AIP as requiring conduct of a missed approach occurs. • Conduct the missed approach procedure by tracking to the MAPT and complying with the published missed approach procedure specified on the IAL chart.

2.1.74 Unit S29: Assessment Guide

2.1.74.1 During assessment the pilot should be observed to perform the following checks and actions as evidence of ability to meet the licensing criteria.

2.1.74.2 The checks and actions detailed in this guide are advisory. Checks and actions in approved checklists, placards, Flight Manual/POHs, or Operations Manuals have precedence and must be complied with.

Elements		Evidence
S29.1	Select approach and determine applicable minima	• In flight select the current DME or GPS arrival procedure for the aerodrome. • Select the arrival procedure according to inbound track or sector. • Review and brief the entry to, and conduct of, the DME or GPS Arrival and missed approach procedure. • Determine the approach minima for the aircraft performance category. • Review and brief fuel availability and holding or diversion action required if visual reference is not established.

Elements		Evidence
S29.2	Use appropriate tracking aid and distance information and monitor aid signal integrity	• Tune and identify the NDB or VOR to be used for tracking inbound and monitor the aid throughout the approach to ensure signal integrity. • Tune and identify DME or select the reference WPT for GPS. • Check the distance indication and signal integrity as required. • Monitor DME indications and GPS integrity throughout the approach.
S29.3	Conduct initial approach	• Set the altimeter to the aerodrome QNH. • Obtain and comply with ATC clearance and/or make radio reports and broadcasts as specified in AIP. • Conduct the initial approach from a distance of at least 25 nm from the reference aid. • Maintain at or above route MSA or until arrival procedure is commenced.
S29.4	Conduct approach procedure	• Aircraft is established on the specified track or in the specified sector using NDB or VOR for track guidance, before commencing descent below LSALT/MSA. • Use DME or GPS to provide distance indications for the distance/altitude steps of the approach. • Descend not below the specified distance/altitude descent steps (± 100 feet). • Establish a rate of descent which maintains the descent profile above the arrival steps. • Comply with tracking and speed restrictions specified in AIP after passing the initial approach and the final approach fix. • If DME distance indications fail conduct a missed approach. • If GPS RAIM is lost, continue not below the minimum altitude specified for the step in which the loss occurred. • Descend on final approach to not below the MDA (+100 feet - 0 feet). • Aircraft is on specified track at MDA (± 50 or ± ½ scale CDI). • If visual reference is not established by the MAPT conduct the missed approach procedure. • After establishing visual reference, identify the landing runway and conduct visual circling or straight-in runway approach or for a landing on the selected runway.

Elements		Evidence
		• Note: Visual circling need not be demonstrated if a flight procedure endorsement for visual circling is already held.
S29.5	Conduct missed approach procedure	• Commence the published missed approach procedure if visual reference is not established before reaching the MAPT, or any other event specified in AIP requiring a missed approach occurs. • Conduct the missed approach procedure by tracking to the MAPT and complying with the published missed approach procedure specified on the IAL chart. • Elements of Airmanship: Make a positive decision and conduct a missed approach if ceiling and visibility minima is not achieved at MDA or if visibility reduces below minima while manoeuvring for landing.

2.1.75 Unit S29: Underpinning Knowledge

2.1.75.1 Section 1- Primary Means of En-Route Navigation

2.1.75.2 GPS system components and principle of operation:

(a) Demonstrate an understanding of the GPS system and its principles of operation:

(i) GPS system components, Space, control and user;
(ii) Aircraft equipment requirements;
(iii) GPS satellite signal and pseudo random code;
(iv) Principle of position fixing;
(v) Method of minimizing receiver clock error;
(vi) Minimum satellites required for navigation functions;
(vii) Masking function;
(viii) Performance limitations of various equipment types;
(ix) GPS use of WGS84 co-ordinate system.

2.1.75.3 Navigation system performance requirements:

(a) Define the following terms in relation to a navigational system and recall to what extent the GPS system meets the associated requirements:

(i) Accuracy;
(ii) Means of providing GPS integrity;
(iii) RAIM, procedural, systems integration;

(iv) Availability;
(v) Continuity of service.

2.1.75.4 Endorsement and documentation

(vi) Recall the requirements applicable to pilots and equipment for GPS operations.
(vii) Pilot training requirements.
(viii) Log book certification.
(ix) Aircraft equipment requirements.
(x) GPS Notams.

2.1.75.5 GPS errors and limitations

(a) Recall the cause and magnitude of typical GPS errors:
(i) Ephemeris;
(ii) Clock;
(iii) Receiver;
(iv) Atmospheric/ionospheric;
(v) Multipath;
(vi) SA;
(vii) Typical Total error associated with C/A code.

2.1.75.6 Effect of PDOP/GDOP on position accuracy

(a) Susceptibility to interference
(b) Comparison of vertical and horizontal errors
(c) Tracking accuracy and collision avoidance.

2.1.75.7 Human factors and GPS

(a) Be aware of the human factors limitations associated with the use of GPS equipment. Apply GPS operating procedures which provide safeguards against navigational errors and loss of situational awareness because of the following:
(i) Mode errors;
(ii) Data entry errors;
(iii) Data validation and checking including independent cross checking procedures;
(iv) Automation induced complacency;
(v) Non-standardization of the GPS - pilot interface;
(vi) Human information processing and situational awareness.

2.1.75.8 GPS equipment-specific navigation procedures

(a) Recall and apply knowledge of appropriate GPS operating procedures to typical navigational tasks using a specific type of aircraft equipment, including:
(i) Select appropriate operational modes;
(ii) Recall categories of information contained in the navigational database;
(iii) Predict RAIM availability;
(iv) Enter and check user defined waypoints;
(v) Enter/retrieve and check flight plan data;
(vi) Interpret typical GPS navigational displays Lat./Long., distance and bearing to waypoint, CDI;
(vii) Intercept and maintain GPS defined tracks;
(viii) Determine TMG, GS, ETA, time and distance to WPT, WV in flight;
(ix) Indications of waypoint passage.

(b) Use of direct to function
(c) Use of nearest airport function
(d) Use of GPS in GPS and DME/GPS arrival procedures.

2.1.75.9 GPS Equipment checks

(a) For the specific type of aircraft equipment, carry out the following GPS operational and serviceability checks at appropriate times:
(i) TSO status;
(ii) Satellites acquired;
(iii) RAIM status;
(iv) PDOP/GDOP status;
(v) IFR Database currency;
(vi) Receiver serviceability;
(vii) CDI sensitivity;
(viii) Position indication.

2.1.75.10 GPS warnings and messages

(a) For the specific type of aircraft equipment recognize and take appropriate action for GPS warnings and messages, including the following:
(i) Loss of RAIM;
(ii) 2D navigation;
(iii) In Dead Reckoning mode;
(iv) Database out of date;
(v) Database missing;
(vi) GPS fail;
(vii) Barometric input fail;
(viii) Power /battery fail;
(ix) Parallel offset on;
(x) Satellite fail.

2.1.75.11 Section 2 - GPS Non-Precision Approaches

(a) Demonstrate ability to read and interpret a GPS/NPA instrument approach procedure chart.

2.1.75.2 GPS/NPA Operational Modes

(a) Know the conditions and actions which allow the GPS receiver to function in the appropriate mode for the successful conduct of a GPS/ NPA.

(b) Know the parameters applicable to tracking tolerances, automatic waypoint sequencing, CDI sensitivity and RAIM availability in each of the following segments:
(i) entry;
(ii) RAIM availability;
(iii) initial approach;
(iv) intermediate approach;
(v) final approach;
(vi) missed approach.

(c) State the indications requiring a missed approach to be initiated.

(d) Correctly state the mode of operation required during each segment of a GPS/NPA, the conditions required to transition to and operate in that mode, and the associated CDI sensitivity and RAIM protection provided.

2.1.75.3 Methods of RAIM prediction

(a) know the parameters applicable to RAIM warnings in the enroute, terminal and approach modes;

(b) know the effect of availability or otherwise of baro-aiding on RAIM availability and prediction;

(c) be able to predict RAIM availability at destination and ETA using:

(i) aircraft GPS receiver; and

(ii) if available, an external RAIM prediction service;

(d) know the effect of satellite unserviceability on the reliability of each type of prediction;

(e) know the effect of each type of RAIM prediction on operational requirements;

(f) accurately predict, within a period of 1 hour before departure, the availability of approach RAIM at the destination or alternate aerodrome within ± 15 minutes of ETA;

(g) knows any limitations which apply to the prediction.

2.1.75.14 Operational requirements

(a) know the operational requirements which apply to planning a flight on the basis of conducting a GPS/NPA at destination;

(b) given operational situation, correctly state the alternate and/or holding requirements which apply at a destination served by a GPS/ NPA procedure.

2.1.75.15 Human factors and GPS operation

(a) be able to describe how the following factors may adversely affect the conduct of a GPS/NPA and describe suitable pilot procedures to minimize such effects:

(i) data input;

(ii) functions selection logic;

(iii) automation effects;

(iv) fixation;

(v) mode awareness;

(vi) alert modes;

(vii) the control loop;

(viii) situational awareness;

(ix) know operating procedures for GPS equipment which eliminate, as far as possible, errors due to any of the factors specified.

2.1.76 Unit S30: GPS/NPA Approach

2.1.76.1 Unit Description: Skills and knowledge to conduct a GPS/NPA instrument approach from route LSALT, entering the GPS/NPA approach procedure in compliance with any altitude restrictions, tracking via the specified approach WPTs, descending in accordance with specified altitude limitations to a straight in or circling MDA, and perform a straight-in or circling approach or conduct a published missed approach if visual reference is not established by the MAPT, using the GPS.

Elements		Performance Criteria
S30.1	Select approach and determine applicable minima	• In flight select the current IAL chart for the GPS/NPA approach to be flown and review and brief the entry to, and conduct of, the instrument approach and missed approach procedure.

Elements		Performance Criteria
		• Determine the applicable meteorological minima for the approach for the aircraft performance category. • Review and brief fuel availability and holding or diversion action required if visual reference is not established.
S30.2	Select, retrieve and activate approach from database	• Select the GPS approach for the appropriate runway from the GPS receiver navigation database. • Select the initial approach fix to be used to transition to the approach procedure, enter the aerodrome QNH in the GPS receiver, and activate the approach. • Make a confidence check of tracks and distances between the approach WPTs as calculated by the GPS receiver. • Check CDI is selected to GPS as applicable.
S30.3	Monitor GPS signal integrity	• Check RAIM availability for the approach and monitor RAIM indications throughout the approach.
S30.4	Conduct initial approach	• Set the altimeter to the aerodrome QNH and conduct the initial approach from a distance of at least 25 nm from the GPS/NPA MAPT, maintaining track to the initial approach WPT at or above route MSA or LSALT.
S30.5	Conduct holding pattern	• Suspend automatic sequencing of the GPS and enter the published holding pattern at the appropriate initial approach WPT using the prescribed sector entry procedure. • Conduct the published holding pattern and resume automatic sequencing to continue the approach.
S30.6	Conduct approach procedure	• Conduct the GPS/NPA instrument approach, descending on the specified track to each approach WPT while complying with approach altitude restrictions. • Check that the GPS receiver transitions to approach mode no later than the FAP WPT or discontinue approach. • Continue descent to not below the MDA while tracking to the MAP WPT within the tolerances specified in AIP. • After establishing visual reference, identify the landing runway and conduct straight-in runway approach or visual circling for a landing on the selected runway. • Note: Visual circling need not be demonstrated if a flight procedure endorsement for visual circling is already held.

Elements		Performance Criteria
S30.7	Conduct missed approach procedure	• Commence the published missed approach procedure if visual reference is not established before reaching the MAPT or RAIM is lost, or any other event specified in AIP or in the GPS operations manual as requiring conduct of a missed approach occurs. • Conduct the missed approach procedure by tracking to the MAPT, selecting missed approach mode and complying with the published missed approach procedure and tracking to the MAP Holding WPT. • Configure GPS receiver to conduct another approach or to hold or divert as required.

2.1.77 Unit S30: Assessment Guide

2.1.77.1 During assessment the pilot should be observed to perform the following checks and actions as evidence of ability to meet the licensing criteria.

2.1.77.2 The checks and actions detailed in this guide are advisory. Checks and actions in approved checklists, placards, Flight Manual/POHs, or Operations Manuals have precedence and must be complied with.

Elements		Evidence
S30.1	Select approach and determine applicable minima	• In flight select the current IAL chart for the GPS/NPA approach to be flown. • Review and brief the entry to, and conduct of, the instrument approach and missed approach procedure. • Determine the applicable meteorological minima for the approach for the aircraft performance category. • Review and brief fuel availability and holding or diversion action required if visual reference is not established.
S30.2	Select, retrieve and activate approach from database	• Select the GPS approach for the appropriate runway from the current GPS navigation database. Select the initial approach fix to be used to transition to the approach procedure. • Enter the aerodrome QNH in the GPS receiver. • Activate the GPS approach. • Make a confidence check of tracks and distances between the approach WPTs as calculated by the GPS receiver against those shown on the approach chart. • Check CDI is selected to GPS as applicable and CDI scaling is applicable to the approach phase.
S30.3	Monitor GPS signal integrity	• Check RAIM availability for the approach and monitor RAIM indications throughout the approach.

Elements		Evidence
S30.4	Conduct initial approach	• Set the altimeter to the aerodrome QNH. • Obtain and comply with ATC clearance and/or make radio reports and broadcasts as specified in AIP. • Conduct the initial approach from a distance of at least 25 nm from the GPS/NPA MAPT. • Maintain track to the initial approach WPT at or above route LSALT or sector MSA. • Elements of Airmanship.
S30.5	Conduct holding pattern	• Suspend automatic WPT sequencing and enter the published holding pattern at the holding initial approach WPT using the prescribed sector entry procedure. • Conduct the published holding pattern as per Unit 15 of this syllabus. • Resume automatic WPT sequencing before leaving the holding pattern and continue the approach. • Elements of Airmanship.
S30.6	Conduct approach procedure	• Conduct the GPS/NPA instrument approach, tracking on the specified track to each approach WPT (± ½ scale deflection). • Initiate turns prior to crossing flyby WPTs so as to intercept the required track to the next WPT. • Descend in compliance with altitude restrictions for each segment (± 100 feet). • Check that the GPS receiver transitions to approach mode no later than the FAP WPT or conduct missed approach. • Continue descent to not below the MDA (+100-0 feet at MDA). • Maintain track to the MAP WPT (± ½ scale CDI). • If RAIM is lost or a RAIM warning is received conduct a missed approach. • If visual reference is not established at the MAP WPT conduct a missed approach. • After establishing visual reference, identify the landing runway and conduct straight in runway approach or visual circling for a landing on the selected runway. • Note: Visual circling need not be demonstrated if a flight procedure endorsement for visual circling is already held. • Elements of Airmanship: Do not attempt to access other GPS modes during the approach Do not fixate on GPS.

Elements		Evidence
		• Cross reference GPS indications from other available data.
S30.7	Conduct missed approach procedure	• Commence the published missed approach procedure if visual reference is not established before reaching the MAPT or RAIM is lost, or any other event specified in AIP or in the GPS operations manual as requiring conduct of a missed approach occurs. • Commence climb and track to the MAP WPT. • At MAP WPT commence or maintain climb and turn to intercept the specified track to the MAP holding WPT. • After establishing the aircraft in the missed approach, select GPS missed approach mode. • Comply with the published missed approach procedure and track to the MAP Holding WPT. • Configure GPS receiver to conduct another approach or to hold or divert as required. • Elements of Airmanship.

2.1.78 Unit S30: Underpinning Knowledge

2.1.78.1 Section 1 Primary Means En-Route Navigation

2.1.78.2 GPS system components and principle of operation

(a) Demonstrate an understanding of the GPS system and its principles of operation:

(i) GPS system components, Space, control and user

(ii) Aircraft equipment requirements

(iii) GPS satellite signal and pseudo random code

(iv) Principle of position fixing

(v) Method of minimizing receiver clock error

(vi) Minimum satellites required for navigation functions

(vii) Masking function

(viii) Performance limitations of various equipment types

(ix) GPS use of WGS84 co-ordinate system.

2.1.78.3 Navigation system performance requirements

(a) Define the following terms in relation to a navigational system and recall to what extent the GPS system meets the associated requirements:

(i) Accuracy
(ii) Means of providing GPS integrity
(iii) RAIM, procedural, systems integration
(iv) Availability
(v) Continuity of service.

2.1.78.4 Endorsement and documentation

(a) Recall the requirements applicable to pilots and equipment for GPS operations.

(i) Pilot training requirements
(ii) Log book certification
(iii) Aircraft equipment requirements
(iv) GPS Notams.

2.1.78.5 GPS errors and limitations

(a) Recall the cause and magnitude of typical GPS errors:
(i) Ephemeris
(ii) Clock
(iii) Receiver
(iv) Atmospheric/ionospheric
(v) Multipath
(vi) SA
(vii) Typical Total error associated with C/A code.

2.1.78.6 Effect of PDOP/GDOP on position accuracy

(i) Susceptibility to interference
(ii) Comparison of vertical and horizontal errors
(iii) Tracking accuracy and collision avoidance.

2.1.78.7 Human factors and GPS

(a) Be aware of the human factors limitations associated with the use of GPS equipment.

(b) Apply GPS operating procedures which provide safeguards against navigational errors and loss of situational awareness because of the following:

(i) Mode errors
(ii) Data entry errors
(iii) Data validation and checking including independent cross checking procedures
(iv) Automation induced complacency
(v) Non-standardization of the GPS-pilot interface
(vi) Human information processing and situational awareness.

2.1.78.1 GPS Equipment-specific navigation procedures

(a) Recall and apply knowledge of appropriate GPS operating procedures to typical navigational tasks using a specific type of aircraft equipment, including:

(i) Select appropriate operation-al modes
(ii) Recall categories of information contained in the navigational database
(iii) Predict RAIM availability
(iv) Enter and check user defined waypoints
(v) Enter/retrieve and check flight plan data

(vi) Interpret typical GPS navigational displays Lat./Long., distance and bearing to waypoint, CDI
(vii) Intercept and maintain GPS defined tracks
(viii) Determine TMG, GS, ETA, time and distance to WPT, WV in flight
(ix) Indications of waypoint pass-age
(x) Use of direct to function
(xi) Use of nearest airport function
(xii) Use of GPS in GPS and DME/ GPS arrival procedures.

2.1.78.9 GPS equipment checks

(a) For the specific type of aircraft equipment, carry out the following GPS operational and serviceability checks at appropriate times:
(i) TSO status
(ii) Satellites acquired
(iii) RAIM status
(iv) PDOP/GDOP status
(v) IFR Database currency
(vi) Receiver serviceability
(vii) CDI sensitivity
(viii) Position indication.

2.1.78.10 GPS warnings and messages

(a) For the specific type of aircraft equipment recognise and take appropriate action for GPS warnings and messages, including the following:
(i) Loss of RAIM
(ii) 2D navigation
(iii) In Dead Reckoning mode
(iv) Database out of date
(v) Database missing
(vi) GPS fail
(vii) Barometric input fail
(viii) Power/battery fail
(ix) Parallel offset on
(x) Satellite fail.

2.1.78.11 Section 2 GPS Non Precision Approaches

2.1.78.12 GPS/NPA Operational Modes. Know the conditions and actions which allow the GPS receiver to function in the appropriate mode for the successful conduct of a GPS/NPA.

(a) Know the parameters applicable to tracking tolerances, automatic waypoint sequencing, CDI sensitivity and RAIM availability in each of the following segments:
(i) entry
(ii) RAIM availability
(iii) initial approach
(iv) intermediate approach
(v) final approach
(vi) missed approach.
(b) State the indications requiring a missed approach to be initiated.

(c) Correctly state the mode of operation required during each segment of a GPS/NPA, the conditions required to transition to and operate in that mode, and the associated CDI sensitivity and RAIM protection provided.

2.1.78.13 Methods of RAIM prediction

(a) know the parameters applicable to RAIM warnings in the en-route, terminal and approach modes.

(b) know the effect of availability or otherwise of baro-aiding on RAIM availability and prediction.

(c) be able to predict RAIM availability at destination and ETA using: aircraft GPS receiver; and if available, an external RAIM prediction service.

(d) know the effect of satellite unserviceability on the reliability of each type of prediction.

(e) know the effect of each type of RAIM prediction on operational requirements.

(f) accurately predict, within a period of 1 hour before departure, the availability of approach RAIM at the destination or alternate aerodrome within ± 15 minutes of ETA

(g) knows any limitations which apply to the prediction.

2.1.78.14 Operational requirements

(a) know the operational requirements which apply to planning a flight on the basis of conducting a GPS/NPA at destination.

(b) given operational situation, correctly state the alternate and/or holding requirements which apply at a destination served by a GPS/NPA procedure.

2.1.78.15 Human factors and GPS operation

(a) be able to describe how the following factors may adversely affect the conduct of a GPS/NPA and describe suitable pilot procedures to minimize such effects:

(i) data input
(ii) functions selection logic
(iii) automation effects
(iv) fixation
(v) mode awareness
(vi) alert modes
(vii) the control loop
(viii) situational awareness

(b) know operating procedures for GPS equipment which eliminate, as far as possible, errors due to any of the factors specified.

2.1.79 Unit S31: Instrument Approach and Missed Approach Multi Engine

2.1.79.1 Unit Description: Skills and knowledge to conduct an instrument approach and published missed approach and maintain control an aeroplane during asymmetric flight in IMC/simulated IMC under the IFR.

Elements		Performance Criteria
S31.1	Simulate engine failure during instrument approach procedure	• A simulated engine failure is identified during an instrument approach, the aeroplane is controlled and operated in accordance with the Flight Manual/POH and the instrument approach is conducted within the tolerances specified in AIP.
S31.2	Conduct missed approach with simulated engine failure	• A simulated engine failure is identified during an instrument approach, and a published missed approach is conducted from the MAPT in accordance with Flight Manual/POH.

2.1.80 Unit S31: Assessment Guide

2.1.80.1 During assessment the pilot should be observed to perform the following checks and actions as evidence of ability to meet the licensing standards.

2.1.80.2 The checks and actions detailed in this guide are advisory. Checks and actions in approved checklists, placards, Flight Manual/POHs, or Operations Manuals have precedence and must be complied with.

Elements		Evidence
S31.1	Simulate engine failure during instrument approach procedure	• A simulated engine failure is identified during an instrument approach. • The aeroplane is controlled by reference to flight instruments and the instrument approach procedure is maintained, (heading ± 20° initially then ± 5°). • Descent is continued in compliance with altitude limitations. • The failed engine is identified and secured in accordance with the Flight Manual/POH. • Aeroplane is configured for optimum single engine cruise performance (not less than VYSE, power as required on operating engine, not more than 5° bank towards operating engine, without slip or skid, rudder trimmed, undercarriage and flap retracted and propeller feathered on failed engine or simulated by setting zero thrust). • MDA is increased if necessary to allow for obstacle clearance with OEI performance during missed approach. • Radio transmissions are made in accordance with AIP and ERSA emergency procedures. • If visual reference is not established by MAPT or DA, a missed approach is conducted. • Elements of Airmanship. • Situation awareness is maintained.

Elements		Evidence
S31.2	Conduct missed approach with simulated engine failure	• A published missed approach is conducted from the MAPT. • A simulated engine failure is identified prior to or during the missed approach. • Climb is established and drag is minimized. • Aeroplane is configured for optimum single engine best rate of climb performance (Vyse ±10 kts, take-off power on operating engine, not more than 5° bank towards operating engine, without slip or skid, rudder trimmed, undercarriage and flap retracted and propeller feathered on failed engine or simulated by setting zero thrust). • The missed approach is initiated not below DA for a precision approach or to ensure descent not below MDA for non-precision approach. • Aeroplane is tracked to the MAPT (heading ± 5°). • Published missed approach procedure specified on the IAL chart are complied with; Direction of turn if applicable, Published track and Climb to published altitude maintaining terrain clearance. • Elements of Airmanship. • Maintain control of aircraft using flight instruments. • Maintain situation awareness.

2.2 Instrument Rating Achievement Record

NAME: ARN:

INSTRUMENT RATING ACHIEVEMENT RECORD

I have completed the training specified in the elements, which have been certified on this Achievement Record.

When each unit and element of competency have been achieved to the specified standard both the instructor responsible for the assessment and the student must certify in the appropriate column. All instrument flight competencies and relevant FPEs required for the issue of an instrument rating must be achieved prior to the flight test.

	Unit	Element	Instructor/ ARN/ Date	Student/ Date
S1	Flight Management and operational and fuel planning.	• Possess and use current operational documents • Obtain meteorological and NOTAM pre-flight briefing • Plan flight • Determine operational and fuel requirements • Make Fight Notification		
S2	Management of pre and post flight actions.	• Determine aircraft meets requirements for IFR flight • Conduct daily inspection • Conduct preflight serviceability test if flight and radio navigation instruments • Complete post flight actions		
S4	Compliance with air traffic rules and procedures	• Obtain and comply with airspace clearances. • Maintain separation from other traffic. • Communicate using radio. • Use transponder.		

	Unit	Element	Instructor/ ARN/ Date	Student/ Date
S5	Management of emergency procedures	• Manage engine failure. • Manage radio communication and navigation aid or navigation system failure. • Manage electrical/vacuum system failure. • Manage instrument failure. • Manage hazardous weather conditions. • Demonstrate turbulence penetration technique. •		
S6	Task management	• Prioritise tasks. • Use autopilot.		
S7	Conduct of instrument flight using full panel	• Fly level, climb and descent. • Make level, climbing and descending turns and steep turns through at least 1800 onto nominated heading. • Recover from usual attitudes.		
S8	Conduct of instrument flight using limited instrument panel (without reference to attitude or direction indicator)	• Fly level, climb and descent. • Make level, climbing and descending turns and steep turns through at least 1800 onto nominated heading. • Recover from usual attitudes.		
S9	Navigation using NDB (Non Directional Beacon)	• Tune, identify and monitor navigational aids. • Determine position in relation to navigation aids. • Intercept and maintain desired tracks to and from stations. • Make station passage.		
S10	Navigation using VOR	• Tune, identify and monitor navigational aids.		

	Unit	Element	Instructor/ ARN/ Date	Student/ Date
	(VHF Omni Directional Radio Range)	• Determine position in relation to navigation aids. • Intercept and maintain desired tracks to and from stations. • Make station passage.		
S11	Navigation using GPS (Global Positioning System)	• Check GPS receiver operation. • Enter, retrieve, edit, delete and activate flight plan and waypoints. • Determine position and other relevant navigational information from GPS. • Intercept and maintain desired track to selected WPT. • Diversion. • Conduct confidence checks of GPS navigational information. • Monitor integrity of GPS navigation. • Respond to GPS messages.		
S12	Navigation using DME (Distance Measuring Equipment)	• Tune and identify DME station. • Use DME to provide distance information and fix position. • Conduct DME homing procedure. • Fly DME arc procedure.		
S13	NDB holding	• Make sector entry to holding pattern. • Fly published holding pattern.		
S14	VOR holding	• Make sector entry to holding pattern. • Fly published holding pattern.		
S15	GPS holding	• Make sector entry to holding pattern. • Fly published holding pattern.		
S16	Operate Aircraft under Night IFR	• Determine whether an aerodrome is suitable for night operations. • Determine that the aircraft is serviceable for flight at night. • Taxi at night. • Take-off at night. • Make visual departure under the IFR at night.		

	Unit	Element	Instructor/ ARN/ Date	Student/ Date
		• Fly enroute under the IFR at night. • Make visual approach under the IFR at night. • Activate PAL lighting. • Land at night, with and without the use of aircraft landing lights. • Make baulked approach. • Take-off and land at night at an aerodrome remote from ground lighting. • Manage electrical system failure at night.		
S17	Perform STAR	• Conduct arrival using STAR		
S18	Perform Instrument Departure (SE)	• Determine applicable standard take-off minima. • Determine obstacle clearance requirements for take-off. • Take-off and climb to cruise altitude/level under the IFR from an aerodrome which does not have SID and/or SRD procedures.		
S19	Instrument Departure (SE) SID	• Determine applicable standard take-off minima. • Determine SID and obstacle clearance requirements. • Take-off and climb to cruise altitude/level using SID and/or SRD procedures.		
S20	Instrument Departure (MEA)	• Determine applicable standard take-off minima. • Determine obstacle clearance requirements for take-off including compliance in event of engine failure. • Take-off and climb to cruise altitude/level under the IFR from an aerodrome which does not have SID and/or SRD procedures. • Manage engine failure after take-off.		

	Unit	Element	Instructor/ ARN/ Date	Student/ Date
S21	Instrument Departure (MEA) SID	• Determine applicable standard take-off minima. • Determine obstacle clearance requirements for take-off including compliance in event of engine failure. • Take-off and climb to cruise altitude/level under the IFR using SID and/or SRD procedures. • Manage engine failure after take-off.		
S22	Instrument Departure (MEH)	• Determine applicable standard take-off minima. • Determine obstacle clearance requirements for take-off including compliance in event of engine failure. • Take-off and climb to cruise altitude/level under the IFR from an aerodrome which does not have SID and/or SRD procedures. • Manage engine failure after take-off.		
S23	Instrument Departure (MEH) SID	• Determine applicable standard take-off minima. • Determine obstacle clearance requirements for take-off including compliance in event of engine failure. • Take-off and climb to cruise altitude/level using SID and/or SRD procedures. • Manage engine failure after take-off.		
S24	Visual Circling Approach	• Determine minima applicable for visual circling for specified instrument approach. • Conduct visual circling procedure following instrument approach, using appropriate visual cues.		

	Unit	Element	Instructor/ ARN/ Date	Student/ Date
		• Conduct missed approach from visual circling.		
S25	NDB Instrument Approach	• Select approach and determine applicable minima. • Monitor aid signal integrity. • Conduct initial approach. • Conduct holding pattern. • Conduct instrument approach procedure. • Conduct missed approach procedure.		
S26	VOR Instrument Approach	• Select approach and determine applicable minima. • Monitor aid signal integrity. • Conduct initial approach. • Conduct holding pattern. • Conduct instrument approach procedure. • Conduct missed approach procedure.		
S27	LLZ Instrument Approach	• Select approach and determine applicable minima. • Monitor aid signal integrity. • Conduct initial approach. • Conduct holding pattern. • Conduct instrument approach procedure. • Conduct missed approach procedure.		
S28	ILS Instrument Approach (MEA)	• Select approach and determine applicable minima. • Monitor aid signal integrity. • Conduct initial approach. • Conduct holding pattern. • Conduct instrument approach procedure. • Conduct missed approach procedure.		
S29	DME GPS Arrival	• Select approach and determine applicable minima. • Use appropriate tracking aid and distance information and monitor aid signal integrity. • Conduct initial approach.		

	Unit	Element	Instructor/ ARN/ Date	Student/ Date
		• Conduct approach procedure. • Conduct missed approach procedure.		
S30	GPS/NPA Approach	• Select approach and determine applicable minima. • Select, retrieve and activate approach from database. • Monitor GPS signal integrity. • Conduct initial approach. • Conduct holding pattern. • Conduct approach procedure. • Conduct missed approach procedure.		

I have completed the training specified in the elements, which have been certified on this Achievement Record.

(Signature).

2.3 Skills Test Recommendation and Advice

Name of applicant:	ARN
Flight Training Operator:	ARN
Examiner:	ARN
Type of test:	Date of test:
Place of test	Time of test:

I have personally checked that the applicant meets all of the following requirements, in terms of Part 61 CAR's and CATS, for the issue of a –

Licence/rating.

Training requirements and achievement record are complete Y/N	
Passed examination Y/N	

Age				
Current Medical Class Valid to:				
Aeronautical experience	Dual	PIC	IF	Night

In my opinion the applicant meets the standard required to pass the skills test as specified in Part 61.

Chief Flight Instructor Date

Name CFI:	ARN

The IR (A) test form must be assessed and outcome indicated in the following manner:

□□Satisfactory- All evidence as described in the Practical test standard demonstrated

X Unsatisfactory **-** The evidence described in the practical test standards was not demonstrated within test tolerances

TR Training Records **-** Test element was reviewed from training records as it was not practically possible to demonstrate evidence

N Not Tested- Evidence not assessed

Items indicated with "**M"** indicates mandatory items

Items indicated with "**F"** indicates mandatory items in Full flight simulator only

1.4.4 Failure assessment

The failure to perform a maneuver or procedure may be broken into two levels depending on the safety implications during the flight test. Both levels result in a fail assessment.

Safety critical items

The highest level, being safety critical, is where the control of the aircraft is such that the safe outcome of the manoeuvre or procedure is in doubt and the examiner has to take control (physically or by direction).

Examples of safety critical failure items include, but are not limited to:

- failure to complete checklist items mandated by the AFM
- failure to correctly prepare the aircraft for flight
  failure to comply with ATC clearances and airspace requirements
- failure to operate the aircraft within the limitations of the AFM
- failure to maintain required flight visibility and cloud separation during a visu al segment
- failure to maintain required terrain clearance
- failure to comply with minimum descent altitudes
- failure to maintain minimum traffic separation standards
- failure to comply with the hand-over/take-
  over technique (not applicable to single pilot authorisations)
- failure to safely and consistently apply the elements of

  TEM
- If the error is safety critical and the examiner needs to take control or inter vene, the flight test must be terminated immediately.

Some credits may be given for test items already assessed
that are not associated with or relevant to the safety critical event.

Non safety critical items

The second level is where the control of the aircraft is such that the safe outcome of the manoeuvre or procedure is certain, but the flight tolerances have been exceeded or the technique is unsatisfactory. Under these circumstances the flight test may be continued and credit given for successfully completed test items.

The examiner has the discretion to enable the applicant to demonstrate TEM to avoid the situation where the error becomes safety critical.

Credits are only valid for one retest.

1.5 Complete (post flight) 1.5.1 Debriefings

The examiner must debrief the applicant and the training provider as soon as practicable after the conclusion of the flight component.

In the event of a fail assessment, in addition to the verbal debriefing, the examiner should ensure sufficient detail is entered into the applicant's training records to allow the training provider to construct a remedial training program.

1.5.2 Flight test administration

At the conclusion of the flight test, the examiner must:

- within 7 days after the day of the test, complete the flight test report and provide a copy of the report to the applicant, training provider and NCAA
- Licence entries made by the examiner (if applicable) must be in accordance with the Flight Examiner Manual.

FSS PEL 61-41 – Instrument Rating – (A) (H)

FLIGHT TEST REPORT

APPLICANT NAME:		Licence #							

Initial/Reissue ☐ OR Renewal/Revalidation ☐ OR Additional endorsement ☐

S = Satisfactory **U = Unsatisfactory** **N =** Not Tested **TR** = Training Record **M**=Mandatory

Item No.	Description	Unit Ref	Result	
	GROUND COMPONENT			
1	Document review		M	
2	Assessment of knowledge requirements and flight planning		M	
3	Assessment of knowledge NAMCARs, NAMCATS, AIP		M	
4	Special emphasis - AWOPS		M	
5	Special emphasis - RWY incursion, CFIT, Ice, Wake turbulence		M	
	FLIGHT COMPONENT			
6	Flight Management and operational and fuel planning	S 1	M	
7	Management of pre and post flight actions	S 2	M	
8	Compliance with air traffic rules and procedures	S 4	M	
9	Management of emergency procedures	S 5	M	
10	Task Management	S 6	M	
11	Conduct of instrument flight using full panel	S 7	M	
12	Conduct of flight using limited instrument panel (without ref to attitude or direction indicator)	S 8	M	
13	Navigation using NDB (Non-Directional-Beacon)	S 9	M	
14	Navigation using VOR(VHF Omni-Directional Radio Range	S 10	M	
15	Navigation using GPS (Global Positioning System)	S 11	M	
16	Navigation using DME (Distance Measuring Equipment)	S 12	M	
17	NDB Holding	S 13	M	
18	VOR Holding	S 14	M	
19	GPS Holding	S 15	M	
20	Operate aircraft under Night IFR	S 16	M	
21	Perform STAR	S 17	M	
22	Perform Instrument Departure (SE)	S 18	M	
23	Perform Instrument Departure (SE) SID	S 19	M	
24	Instrument Departure (MEA)	S 20	M	
25	Instrument Departure (MEA) SID	S 21	M	
26	Instrument Departure (MEH)	S 22	M	
27	Instrument Departure (MEH) SID	S 23	M	
28	Visual Circling Approach	S 24	M	
29	NDB Instrument Approach	S 25	M	
30	VOR Instrument Approach	S 26	M	
31	LLZ Instrument Approach	S 27	M	
32	ILS Instrument Approach (MEA)	S 28	M	
33	DME GPS Arrival	S 29	M	
34	GPS / NPA Approach	S 30	M	
35	RNP (GNSS) Approach		M	
36	Aeronautical Decision-Making, Risk Management, Crew Resource Management and Single-Pilot Resource Management		M	

FLIGHT TEST REPORT

Examiner Comments:

Date	**Pass** ☐ **Fail** ☐	Applicant Name	Applicant Signature	Applicant PEL No.	Test Number
Reg.	Aircraft Type	Examiner Name & PEL No.	Examiner Signature	Ground Time	Flight Time
SFTD Reg.	Sim Type		SFTD - A/C Type		SFTD Flt Time

APPROACHES TESTED: NDB ☐ VOR ☐ ILS ☐ LLZ ☐ RNP ☐ OTHER ☐

Other = CAT 2 ☐ CAT 3 ☐ LVPO ☐

Examiner's Final Remarks: