NAM-CATS 63

Flight Engineer Licensing

CONTENTS

1. INTRODUCTORY NOTES

1.1 Section 227 of the Civil Aviation Act, 2016 empowers the Executive Director of Civil Aviation to issue technical standard for civil aviation. Section 227 of the Civil Aviation Act, 2016 further empowers the Executive Director of Civil Aviation to incorporate into a technical standard any international aviation standard or any amendment without publishing the text of such standard or any amendment by mere reference to the title, number and year of issue of such standard or amendment or to any other particulars by which such standard or amendment is sufficiently identified.

1.2 The Executive Director of Civil Aviation has, pursuant to the empowerment mentioned above, issued technical standards relating to Regulation Part 47 (Standards Relating to Flight Engineer Licensing) to be known as Document NAM-CATS-63.

1.3 Document NAM-CATS-63 comprises the standards, rules, requirements, methods, specifications, characteristics and procedures which are applicable in respect of the licensing of flight engineers.

1.4 Each reference to a technical standard in this document, is a reference to the corresponding regulation in the Namibian Civil Aviation Regulations.

1.5 Where there is any perceived disparity of meaning or inconsistency between these technical standards and the regulations, the provisions of the regulations will take precedence.

1.6 Where there is a difference between a standard or procedure prescribed in ICAO documents and the Civil Aviation Technical Standards (CATS), the CATS standard will prevail.

1.7 The abbreviation "CAR" is used throughout this document when referring to any civil aviation regulation.

1.8 The abbreviations "TS" or "CATS" are used throughout this document when referring to any technical standard.

1.9 In this document the words "Executive Director" refers to the chief executive officer of the Authority appointed pursuant to section 34 of the Civil Aviation Act 2016 being the Executive Director of Civil Aviation.

2. AMENDMENTS TO THE TECHNICAL STANDARDS

2.1 The NCAA Personnel Licensing Division has responsibility for the technical content of this technical standard.

2.2 This technical standard is issued, and may only be amended, under the authority of the Executive Director of Civil Aviation.

2.3 Requests for changes to the content of this technical standard must be forwarded to the Executive Director and may come from:

- *(a) technical areas within NCAA; or*
- *(b) aviation industry service providers or operators; or*
- *(c) pilots, engineers and maintenance organization staff.*

2.4 The need to change the content of this technical standard may arise for any of the following reasons:

- *(a) to ensure safety;*
- *(b) to ensure standardisation;*
- *(c) to respond to changed NCAA regulations or standards;*
- *(d) to respond to changes initiated by ICAO;*
- *(e) to accommodate proposed initiatives or new technologies.*

2.4 The NCAA may approve trials of new procedures or technologies to develop appropriate standards.

63.01.3 VALIDATION OF LICENCE ISSUED BY APPROPRIATE AUTHORITY

1. Application for validation of licence issued by an appropriate authority

The application form FSS PEL 63-02 must be completed for the issuing of the validation of a flight engineer licence.

2. Requirements and conditions for the issue of a validation

Any valid foreign flight engineer licence and rating may be validated by the Executive Director subject to the following conditions –

(1) the applicant must pass an examination in air law conducted by the holder of an aviation training organization approval, issued in terms of Part 141;

(2) the applicant must pass a practical skill test with a Grade I flight engineer instructor or with a designated examiner;

(3) the applicant must have flown a minimum of 500 hours as a flight engineer in the country of issue of the foreign flight engineer licence or in an environment at least equal or similar to that of Namibia;

(4) the applicant must hold at least a level 4 English Language Proficiency Certificate; or will be expected to undergo a English Language Proficiency test in Namibia; and

(4) no additions can be made to a flight engineer licence regarding the types of aircraft which may be flown.

3. Issuing of a validation

Once all requirements have been met, a validation of a flight engineer licence must be issued by the Executive Director.

4. Renewal of a validation issued by the Executive Director

The Executive Director may renew the validation of a flight engineer licence provided that the holder of such validation has, for the duration of the validation –

(1) exercised the privileges of the flight engineer licence to which the validation refers, in accordance with the provisions of the Act, the Regulations and this Document; and

(2) operated safely and professionally, with a degree of competency appropriate to the privileges granted to the holder of a similar licence.

5. Compliance

The reference to Document SA-CATS 63 in NAMCARs Part 63.01.3(7) means the appropriate standards, rules, requirements, methods, specifications, characteristics and procedures contained in the Act, the Regulations and this Document.

63.01.6 LOGBOOKS

1. Form of logbooks

Logbooks must be maintained in the form contained in Annexure C.

2. Information to be contained in logbooks

The following information must be recorded in logbooks –

(1) full name and address of owner;

(2) summary of previous flying experience, if any; and

(3) particulars of flights –

  (a) date;

  (b) type and registration of the aircraft in which the flight occurs;

  (c) operating capacity of holder;

  (d) flight time; and

  (e) nature of flight.

3. Manner in which logbooks are to be maintained

In order to facilitate the issue of licences, a flight engineer must –

(1) clearly indicate night and instructional flight times; and

(2) summarise his or her logbook.

63.01.12 LANGUAGE

1. Certification

English Language Proficiency Certification is a requirement for all flight engineers licensed in terms of Part 63.

2. English Language requirements

(1) In accordance with ICAO requirements (Chapter 1.2.9 of Annex 1), when flight engineers operate the radio equipment on board the aircraft, they must demonstrate a minimum proficiency of at least Operational Level '4' of both ICAO Standard Phraseology and plain language.

(2) Flight Engineers who have not been rated at Level 6 proficiency must be tested for English Language Proficiency at the intervals stated below to ensure that they remain proficient at the required level.

PROFICIENCY LEVEL	PROFICIENCY TESTING INTERVAL
Level 6: Expert	Retesting not required
Level 5: Extended	Retesting required every six years
Level 4: Operational (Minimum level)	Retesting required every three years
Level 3: Pre-operational	Licence not issued/maintained
Level 2: Elementary	Licence not issued/maintained
Level 1: Pre-elementary	Licence not issued/maintained

(3) Language Proficiency Requirement applies to speaking and listening proficiency only and does not address the ability to read or write in the English Language.

3. Certificate of English Language Proficiency

(1) No person may be issued or re-issued with a licence referred to in Part 63 unless that person is in possession of a certificate of proficiency in the English Language issued by an a Designated Language Examiner pursuant to these technical standards.

(2) A person who wishes to obtain the certificate of proficiency referred to in item (1) above must demonstrate compliance with -

(a) the holistic descriptors described in Annexure C; and
(b) at least operational level 4 of the language proficiency rating standard set out in the attached Annexure D.

4. Designated Language Examiners for the issue of English Language Proficiency Certificates

(1) General:
i. If the Executive Director is satisfied that any person is capable of providing testing in the English language to the level of proficiency which meets the ICAO requirements specified in ICAO document

9835 the Executive Director may designate that person as a Designated Language Examiner for the purpose of English Language proficiency testing.

ii. A Designated Language Examiner referred to in item (i) above is authorized to conduct approved tests in English language proficiency and to issue certificates of proficiency in the English language.

iii. A Designated Language Examiner must use the English Language Proficiency test designed for this purpose in accordance with the Designated Examiner Guidance PEL G001 and PEL DLE001.

iv. A Designated Language Examiner must be appointed for a period of three years.

(2) Requirements for designation:

i. A person may only be considered for designation as an English Language Examiner if
   1. he or she is English proficient at level 6
   2. has successfully completed an English Language Proficiency Rater's course, and
   3. has successfully completed training on the Namibian English Language Proficiency Requirements and test material.

ii Once the documentation has been submitted to support the completion of the abovementioned requirements, the Chief of Personnel Licensing will recommend designation to the Executive Director.

iii An examiner must, upon appointment, receive a stamp from the Authority that reflects the following:
   1. Name of examiner
   2. Designation reference number

(3) Requirements for re-designation:

i. A designated examiner may be considered for re-designation as an English Language Examiner if
   1. He/she has at least completed 48 English Proficiency tests per year, or
   2. He/she has completed at least two standardization workshops, or
   3. He/she has completed a refresher English Proficiency Rater's course.

ii. Once documentation has been submitted to support the completion of the abovementioned requirements, the Chief of Personnel Licensing will recommend designation to the Executive Director.

(4) Examiner duties:

Designated Language examiners are required to:

1. ensure that the original form and audio recording for each test conducted, whether such test was successful or not, is submitted to the Executive Director;
2. record each test carried out with suitable notes explaining the outcome of the test;
3. submit an annual report of tests conducted within 60 days preceding the anniversary date of the designation or within 60 days preceding expiry of the designation;
4. have access to the current NAMCARs, CATS and the current DLE Guidance Material including applicable test standards and test material;
5. administer all language tests in accordance with the test standards and material;
6. sign and stamp all test forms, clearly indicating the DLE reference number and date of the test;
7. sign and stamp the English Language Proficiency certificate;
8. notify the candidate of the outcome of the test; and
9. comply with the code of Ethics for designated examiners.

(5) Examiner Oversight:

i. The designation of examiner status is a privilege and may at any time be withdrawn by the Executive Director.

ii. The Personnel Licensing inspectors must from time to time conduct safety oversight on Designated Language Examiners.

Note: Additional guidance material for English Language training is available in the Manual on Implementation of ICAO Language Proficiency Requirements Document 9835.

5. Issue of English Language Proficiency certificate

(1) Any person who wishes to obtain a certificate of proficiency referred to in item 3 above must contact the Personnel Licensing office on (061) 702240/1 to set up an appointment for a test.

(2) The person must be contacted by the Personnel Licensing Office to confirm the logistical details of his/her test, as well as provide information about documents to be provided at the commencement of the test.

(3) The Designated Language Proficiency Examiner must conduct an approved language proficiency interview or test and if satisfied that the applicant meets the requirements for the issue of a certificate, issue such certificate to the applicant at operational level 4, level 5 or level 6 of the language proficiency rating standard set out in Annexure D.

(4) A person who is issued with a certificate of proficiency which is below Expert Level 6 must be re-evaluated at the intervals set out in paragraph 2 (2) above.

(5) A person who does not meet the ICAO level 4 proficiency requirement will be required to undergo English Language training and must be required to wait for a period of 30 days before being re-tested.

(6) The certificate issued must contain the following –

i. Name of the Certificate, i.e. English Language Proficiency Certificate;
ii. Name of Designated Language Examiner;
iii. Full Names of the person tested;
iv. Identity Number/Passport Number of the person tested;
v. Licence number of the person tested;
vi. Licence type of the person tested;
vii. Colour ID photograph of the person tested;
viii. The overall Language Proficiency Rating.

6. Endorsement on Licence

Upon submission by any licence holder of a certificate of language proficiency issued in terms of 5(2) above the Executive Director must endorse on the flight engineer licence of the certificate holder with the appropriate level of proficiency indicated on the certificate.

7. Level 6 Proficiency

(1) A person who can provide evidence of Expert English Proficiency (Level 6) by means of submission of the following evidence, may be considered for Level 6 Language Proficiency certification –

a. Certified copy of school leavers certificate from a State where English is the first or official language, showing a pass symbol for English; or
a. Certified copy of school leavers certificate from a State where English is the second language, showing a pass symbol for English as a minimum, including proof of residence in an English speaking country; or
b. Acceptable evidence of having completed a college or university degree (at least 3 year degree) in the English language with at least 2 years current English language exposure socially or at work; or
c. Acceptable evidence of long periods of residence in an English speaking country (at least 5 years) where the applicant was working in the English Language; or
d. Acceptable evidence of very high scores in English Language spoken and written tests.

(2) Upon submission of supporting evidence for Level 6 Proficiency to the Personnel Licensing Office, an appointment must be scheduled for a Designated Language Examiner to complete a Level 6 Proficiency test with the Candidate to assess whether the candidate is indeed proficient at Level 6.
(3) If found not to be proficient at Level 6 during Part 1 of the test, the candidate must be informed and the designated examiners shall continue the rest of the test assessing the candidate's ability to speak at levels 5 to 4.

8. Alternative Language Proficiency Certification

(1) For the purposes of paragraph 6. above, the Executive Director may accept a certificate of language proficiency issued by a competent authority of another Contracting State if the Executive Director is satisfied that the standards in that state meets the requirements set out in Chapter 1.2.9 of Annex 1 to the Convention.

(2) All persons submitting evidence for alternative language certification must be evaluated by the Executive Director and/or a delegated Personnel Licensing Inspector and must be required to complete an interview.

(3) The English Language Proficiency testing system of the country of issue of the certificate must be verified by the Executive Director, before the Language Certificate may be accepted.

63.01.13 RETESTING AFTER FAILURE

1. Retesting after failure

(1) The pass mark for any written examination referred to in NAMCARs 63.02.4, 63.03.3, 63.04.4 or 63.05.5 is 75%.

(2) A candidate who fails with a mark of between 71% and 74%, may apply in writing for a re-mark within 30 days from the date of receiving the examination results, on payment of the appropriate fee.

If the re-mark is successful, the fee will be refunded.

(3) A candidate who fails with a mark for above 68%, may apply to be entered for the following examination sitting.

(4) A candidate who fails with a mark of between 60% and 68%, must wait for six months before applying to enter again.

(5) A candidate who fails with a mark of less than 60%, must wait for 12 months before applying to enter again.

63.01.14 DESIGNATION OF EXAMINER

1. Requirements

The Executive Director may designate the holder of a Grade I flight engineer instructor rating as an examiner.

2. Procedures

(1) Any person who desires to be designated as an examiner and meets the requirements listed below may apply in writing to the Executive Director on form FSS PEL 63-06.

(a) have conducted at least one skills test in the role of a candidate examiner for which designation is sought, including briefing, conduct of the skills test, assessment of the person to whom a skills test is given, de-briefing and recording documentation. This "Examiner Designation Acceptance Test" must be supervised by an Authorised Officer or Person of the Authority who has been designated with examining privileges or by a designated flight engineer examiner who has been appointed for the purpose by the Executive Director;

(b) be currently active in the field of aviation for which the designation is sought;

(c) hold a Flight Engineer instructor rating have at least 1000 hours in total with 700 hours of flight engineer instruction; and

(d) for initial approval' appear before and be approved by a panel constituted for the purpose by the Executive Director.

(2) An application for the designation as an examiner must be accompanied by proof that the applicant complies with the conditions, requirements and standards prescribed in this technical standard.

(3) The Executive Director may, after due consideration of the application, designate the applicant as an examiner.

(4) The Executive Director may designate the applicant as an examiner for the period determined by the Executive Director, which period may not exceed one year, calculated from the date of designation.

(5) The Executive Director may withdraw a designation if –

(a) it becomes evident that the designated examiner does not comply with the provisions of this technical standard; or

(b) the withdrawal is necessary in the interests of aviation safety.

(6) The designated examiner must, upon the withdrawal of the designation by the Executive Director, forthwith surrender the document referred to in NAMCAR 63.01.14(3) to the Executive Director.

3. Designation reference number

(1) A designation number will be allocated to an examiner. This number together with other relevant information as indicated on the document referred to in NAMCAR 63.01.14(3) must be reflected on all the relevant documents signed by the examiner.

(2) The letter (c) will be inserted after designation reference number to indicate that the examiner is restricted to certain tests within a particular company, if applicable.

4. Submission of reports and forms

(1) An examiner must submit a report to the Executive Director quarterly, on all skill tests conducted by the examiner. These reports must be submitted regardless of the results of the skill tests or even if no skill tests were conducted by the examiner.

(2) Competency forms where the test resulted in failure must be forwarded by the examiner to the Executive Director for record keeping.

(3) In the event of a failure, the test form must indicate notes on the debriefing done and the candidate must initial at such notes.

(4) Any competency form not duly completed by an examiner may be rejected by the Executive Director.

5. Stamp

An examiner, must upon receiving the document referred to in CAR 63.01.14(3), have a stamp made that reflects the following information –

		Example
(a)	Name of examiner	J A Fox
(b)	Licence number	Xxxxxxxx
(c)	Class and category	Designation #
(d)	Designation number	099 or 099(C)
(e)	Expiry date	12/97

6. Responsibility

(1) It is the responsibility of the examiner to ensure that the candidate has passed the relevant theoretical knowledge examinations with the Authority before commencing the skill test.

(2) It is also the responsibility of the examiner to ensure that the candidate is in possession of a valid flight engineer licence and that his or her flying hours comply with the requirements for that particular licence as is required by the Civil Aviation Regulations, 2001.

7. Monitoring of the system

The Executive Director may at any time require an examiner to subject himself or herself for a ground or skill test, should it become evident that such examiner is not maintaining the required standard of testing.

63.01.16 CREDIT FOR MILITARY SERVICE

1. Recognition of Prior Learning and Experience by NAF flight engineers

(a) Namibian Air Force flight engineers may be exempted from all or some of the requirement to attend a ground school for a flight engineer or pilot licence CPL only but are required to write the examinations reflected below except where credit is given for prior learning.

(i) Air Law

(b) This exemption is applicable to all applicants who held an Air Force Flight Engineer qualification within the 60 months preceding the date of application; or

(c) For all applicants who held an Air Force Flight Engineer qualification and obtained and maintained a pilot's licence within 60 months of leaving the Namibian Air Force.

(d) Applicants are to include in their exemption request a *Curriculum Vitae* describing his/her Namibian Air Force Career and details of his/her flying experience. Include the following documents:

(i) Letter from Officer Commanding from the squadron or unit where the applicant has served/serving confirm employment or date that applicant left the Air Force and position held. This is necessary to confirm if the applicant complies with the 60 month requirement;

(ii) Confirmation of hours flown and types of aircraft flown in the NAF (Certified copy of logbook must be signed out by Officer Commanding, CFI or responsible person.) This requirement will determine if the applicant is eligible for an exemption;

(iii) Certified copy of ID document/Authority licence;

(iv) Certified Copy of any Namibian DCA/Authority licence held, if any;

(v) An explanation of the hours flown as summarised in the logbook. (This will assist in determining eligibility of the exemption)

(vi) *Exemption at CPL level*. The applicant must in the case of:

(a) A person who has qualified as a flight engineer in the Namibian Air Force (Aeroplane) requiring to be issued with a Commercial Pilot Licence (Aeroplane) and had a minimum of 500 hours operational experience on Namibian Air Force multi-engine transport type aeroplanes, or Namibian Air Force multi-engine helicopters, may be exempted from all technical examinations except Air Law or if an instrument rating is required as part of the licence, then Air Law and Procedures. The applicant must attend a bridging course with an approved Part 141 aviation training organisation prior to entry for the examination.

(b) A person who has qualified as a flight engineer in the Namibian Air Force (Aeroplane) requiring to be issued with a Commercial Pilot Licence (Aeroplane) and who does not have a minimum of operational experience on Namibian Air Force multi-engine transport type aeroplanes, or Namibian Air Force multi-engine helicopters must attend a bridging course with an approved Part 141 aviation training organisation prior to entry for the examination and may be exempted from all technical examinations except Flight Performance and Planning and Air Law or if an instrument rating is required as part of the licence, then Air Law and Procedures;

(c) A person who has qualified as a flight engineer in the Namibian Air Force (Helicopter) requiring to be issued with a Commercial Pilot Licence (Helicopter) and had a minimum of 500 hours operational experience on Namibian Air Force multi-engine transport type aeroplanes, or Namibian Air Force multi-engine helicopters, may be exempted from all technical examinations except Air Law or if an instrument rating is required as part of the licence, then Air Law and Procedures. The applicant must

attend a bridging course with an approved Par 141 aviation training organisation prior to entry for the examination.

(d) A person who has qualified as a flight engineer in the Namibian Air Force (Helicopter) requiring to be issued with a Commercial Pilot Licence (Helicopter) and who does not have a minimum of 500 hours operational experience on Namibian Air Force multi-engine transport type aeroplanes, or Namibian Air Force multi-engine helicopters must attend a bridging course with an approved Par 141 aviation training organisation prior to entry for the examination and may be exempted from all technical examinations except Flight Performance and Planning and Air Law or if an instrument rating is required as part of the licence, then Air Law and Procedures;

63.01.19 CHANGE OF NAME OR ADDRESS

The notification of change of Name or Address must be made on form FSS PEL-G01.

63.01.20 DUPLICATE FLIGHT ENGINEER LICENCE

The application for a duplicate licence must be made on the respective licence application form for the initial issue of the licence.

63.02.1 REQUIREMENTS FOR FLIGHT ENGINEER LICENCE

1. English Language Proficiency

The English Language proficiency requirements are those contained in TS 63.01.12.

63.02.3 TRAINING

1. Aim of training course

The aim of the training course is to train the candidate to the level necessary for the issuing of a flight engineer licence and to operate aeroplanes in commercial air transportation.

The candidate must complete the approved training course with the holder of an aviation training organisation approval issued in terms of Part 141. The course of theoretical knowledge must be completed within 18 months and the skill test within 6 months of passing the theoretical examination

The course comprises a theoretical knowledge course to flight engineer knowledge level.

2. Contents and duration of training course

The theoretical knowledge course must comprise of at least 350 hours (200 hours instruction and 150 hours of monitored self study) of instruction including formal classroom work, computer-based training, slide/tape presentation, interactive video and learning carrels where appropriate.

The 350 hours of instruction should preferably be divided as follows –

Subject	Hours
Air Law and ATC procedures	30
Aircraft general knowledge	40
Flight performance planning	55
Human performance and limitations	10
Meteorology	50
Navigation	50
Operational procedures	10

Principles of flight	25
Communications	20

3. Training course syllabus

3.1 Air Law and ATC procedures

3.1.1 Civil Aviation Regulations, 1997

(1) Structure of Civil Aviation Regulations 2001 (the "NAMCARs")

(2) Contents of the following Parts –

(a) Part 21 – Certification procedures for products and parts

(b) Part 47 – Registration and marking

(c) Part 63 – Flight engineer licensing

(d) Part 67 – Medical requirements

(e) Part 91 – General operating and flight rules

(f) Part 121 – Air transport operations: large aeroplanes

(g) Part 172 – Airspace and air traffic services

3.1.2 International Aviation Law

(1) The Chicago Convention

(a) General principles and application –

- sovereignty; and
- territory.

(b) Flight over territory of Contracting States

- right of non-scheduled flight;
- scheduled air services;
- cabotage;
- landing at customs airports;
- applicability of air regulations;
- rules of the air; and
- search of aircraft.

(c) Measures to facilitate air navigation –

- customs duty;
- conditions to be fulfilled with respect to aircraft, such as certificates of airworthiness, licences of personnel, recognition of certificates and licences;
- cargo restrictions;
- photographic apparatus; and
- documents to be carried in aircraft.

(d) International standards and recommended practices –

- adoption of international standards and procedures;
- endorsement of certificates and licences;
- validity of endorsed certificates and licences; and
- departure from international standards and procedures (notification of differences).

(2) The Air Services Transit Agreement

(a) The five freedoms.

(3) The Tokyo Convention of 1963

(a) Jurisdiction; and

(b) Authority of the pilot-in-command of the aircraft.

(4) The International Civil Aviation Organisation

(a) Annex 8 – Airworthiness of aircraft

- Applicability.

(b) Annex 7 – Aircraft nationality and registration marks

- Applicability.

(c) Annex 1 – Personnel Licencing

- Applicability.

(d) Annex 2 – Rules of the Air

- Essential definitions;
- Applicability of the rules of the air general rules (except water operations);
- Visual flight rules;
- Instruments flight rules;
- Signals;
- Interception of civil aircraft; and
- Table of cruising levels.

(e) Procedures for air navigation – Aircraft Operations Doc. 8168 – OPS/ 611, Volume 1

Altimeter setting procedures (ICAO Doc. 7030 – regional supplementary procedures) –

- Basic requirements (except tables), procedures applicable to operators and pilots (except tables).

Secondary surveillance radar transponder operating procedures (ICAO Doc. 7030 – regional supplementary procedures) –

- Operation of transponders; and
- Phraseology.

(f) Annex 11 – Air traffic services

(i) Air traffic services

- Definitions (see general statements).

(ii) General

- Objectives of ATS, division of ATS, designation of the portions of the airspace and controlled aerodromes where ATS will be provided, establishment and designation of the units providing ATS, specifications (for flight information regions, control areas and control zones), minimum flight altitudes, priority in the event of an aircraft in emergency, in-flight contingencies time in ATS.

(iii) Air traffic control

- Application; and
- Provision of air traffic control service, operation of air traffic control service, separation minima, contents of clearances, co-ordination of clearances, control of persons and vehicles at aerodromes.

(iv) Flight information service

- For VFR flights: application and scope of flight information service; and

- Operational flight information service broadcasts.

(v) Alerting service

- Application, notification of rescue co-ordination centres (only INCERFA, ALERFA, DETRESFA), information to aircraft operating in the vicinity of an aircraft in a state of emergency.

(vi) Principles governing the identification of ATS routes other than standard departure and arrival routes.

(vii) Rules of the air and air traffic services (ICAO Doc. 4444 – RAC/501/11 and ICAO Doc. 7030 – Regional supplementary procedures)

- Definitions (see general statements).

(viii) General provisions

- General air traffic services operating practices –
  - Submission of a flight plan;
  - change from IFR to VFR flight;
  - clearances and information;
  - control of air traffic flow;
  - altimeter setting procedures;
  - indication of heavy wake turbulence category; and
  - position reporting Appendix.
- AIREP form of air report AIEREP form (Model AR), recording and reporting instructions (first 7 items).

(ix) Area control service

- Vertical separation –
  - Vertical separation application;
  - vertical separation minimum;
  - minimum cruising level;
  - assignment of cruising level; and
  - vertical separations during ascent or descent.
- Horizontal separation –
  - Lateral separation application;
  - geographical separation;
  - track separation between aircraft using the same VOR;
  - longitudinal separation application (except between super-sonic aircraft).
- Reduction separation minimum;
- Air traffic control clearances –
  - Contents;
  - description of air traffic control clearances;
  - clearance to fly maintaining own separations while in VMC;
  - essential traffic information;
  - clearance of a requested change in flight plan; and
- Emergency and communication failure –

- Emergency procedures (only general priority);
- emergency descent;
- action by pilot-in-command;
- air-ground communication failure (only concerning the actions by pilot-in-command);
- interception of civil aircraft.

(x) Approach control service

- Departing aircraft –
  - General procedures for departing aircraft;
  - clearances to climb maintaining own separation whilst in VMC;
  - information for departing aircraft; and
- Arriving aircraft –
  - General procedures for arriving aircraft;
  - clearance to descent maintaining own separation in VMC;
  - visual approach;
  - instrument approach;
  - holding;
  - approach sequence;
  - expected approach time;
  - information for arriving aircraft.

(xi) Aerodrome control service

- Functions of aerodrome control towers –
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  - alerting service provided by aerodrome control towers;
  - suspension of VFR operations by aerodrome control towers;
- Traffic and taxi circuits –
  - Selection of runway-in-use;
- Information to aircraft by aerodrome control towers –
  - information related to the operation of the aircraft;
- Information on aerodrome conditions control of aerodrome traffic –
  - Order of priority for arriving and departing aircraft;
  - control of departing and arriving aircraft.

(xii) Flight information services and alerting service

- Air traffic advisory service;
- alerting service; and
- AFIS.

(g) Annex 15 – Aeronautical information service

- Definitions (see general statements); and
- Applicability.

(h) Annex 14 – Aerodromes

(i) Aerodrome data –

- Conditions of the movement area and related facilities.

(ii) Visual aids for navigation –

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- markings;
- lights;
- signs; and
- markers.

(iii) Visual aids for denoting obstacles –

- Marking of objects; and
- lighting of objects.

(iv) Visual aids for denoting restricted use of areas

(v) Emergency and other services –

- Fire and rescue service;
- apron management service; and
- ground servicing of aircraft.

(i) Annex 9 – Facilitation

(i) Entry and departure of aircraft –

- Description, purpose and use of aircraft documents – general declaration.

(ii) Entry and departure of persons and their baggage –

- Entry requirement and procedures for flight crew and other operator's personnel.

(j) Annex 12 – Search and rescue

(i) Organisation –

- Establishment and provision of SAR service;
- establishment of SAR regions; and
- establishment and designation of SAR services units.

(ii) Cooperation –

- Cooperation between States; and
- cooperation with other services.

(iii) Operating procedures –

- Procedures for pilots-in-command intercepting a distress trans-mission; and
- search and rescue signals.

(iv) Search and rescue signals –

- Signals with surface craft;
- ground/air visual signal code; and
- air/ground signals.

(k) Annex 17 – Security

(i) General –

- Aims and objectives.

(ii) Organisation –

- Cooperation and coordination.

(iii) Operators –

- Operators security programme.

(l) Annex 13 – Aircraft accident investigation

- Applicability.

(1) Airframe and system, electrics, power-plant, emergency equipment – Aeroplanes

(a) Airframe and systems

(i) Fuselage –

- Types of construction; and
- structural components and materials.

(ii) Cockpit and cabin windows –

- Construction (laminated glass); and
- structural limitations.

(iii) Aerofoil –

- Types of construction; and
- structural components and materials.

(iv) Control surfaces –

- Vertical, horizontal and V-tail surfaces; and
- construction materials.

(v) Landing gear –

- Types;
- construction;
- locking devices and emergency extension systems;
- accidental retraction prevention devices;
- position, movement lights and indicators;
- nose wheel steering;
- wheels and tyres (construction, limitations); and
- braking systems –
  - Construction;
  - parking brake;
  - mode of operation of antiskid system;
  - mode of operations of auto brake system; and
  - operation, indications and warning systems.

(vi) Flight controls (construction and operation)

- Primary controls –
  - Elevator, aileron and rudder;
  - trim;
  - mode of actuation; and
  - operation, indicators, warning devices and controls.
- secondary controls lift augmentation and wing flaps –

- Lift dumping and speed brakes;
- variable elevator;
- mode of actuation (mechanical, hydraulic, fly-by-wire);
- operation, indicators, warning devices; and
- danger situations and potential failures.

(vii) Hydraulics

- Basic principles of hydromechanics –
  - Hydraulic fluids; and
  - schematic construction and functioning of hydraulic systems.

(viii) Hydraulic systems

- Main, standby and emergency systems;
- operation, indicators, warning systems; and
- ancillary systems.

(ix) Air driven systems (piston engines only)

(x) Pneumatic systems

- Power sources; and
- schematic construction and functioning of pneumatic systems.

(xi) Air conditioning system

- Heating and cooling; and
- construction, functioning and controls.

(xii) Pressurisation

- Cabin altitude, maximum cabin altitude, differential pressure;
- pressurised zones in the aircraft;
- operations and indicators;
- safety devices and warning systems;
- rapid decompression, cabin altitude warning; and
- emergency procedures.

(xiii) De-ice systems

- Pneumatic leading edge de-icing of wings and control surfaces;
- schematic construction;
- operational limitations; and
- initiation/timing of de-icing system usage.

(xiv) Air driven systems

- Pneumatic system –
  - Power sources;
  - schematic construction;
  - potential failures, warning devices;
  - operation, indicators, warning systems; and
  - pneumatic operated systems.
- Air conditioning system –

– Construction, functioning, operation, indicators and warning devices;
– heating and cooling;
– temperature regulation;
– automatic and manual; and
– ram air ventilation.

• Anti-ice systems –
– Aerofoil and control surfaces, power giant, air intakes, windshield;
– schematic construction, operating limitations and initiation, timing of de-icing system usage; and
– ice warning system.

• Non-pneumatic operated de-ice and anti-ice systems.

(xv) Schematic construction functioning and operation of –
• Air intake;
• propeller;
• pitot, static pressure sensor and stall warning devices;
• windshield;
• weeping wing system; and
• rain repellent system.

(xvi) Fuel system
• Fuel tanks –
– Structural components and types;
– location of tanks on single and multi-engine aircraft;
– sequence and types of refuelling; and
– unusable fuel.

• Fuel feed –
– Gravity and pressure feed;
– cross-feed; and
– schematic construction.

• Fuel dumping system.
• Fuel system monitoring –
– Operation, indictors and warning systems;
– fuel management (sequencing of fuel tank switching); and
– dip stick.

(b) Electrics

(i) Direct current (DC)
• General –
– Electric circuits;
– voltage, current, resistance;
– Ohm’s law;
– resistive circuits;

- resistance as a function of temperature;
- electrical power, electrical work;
- fuses (function, type and operation);
- the electrical field; and
- the capacitor (function).

• Batteries –
- Types and characteristics;
- capacity;
- uses; and
- hazards.

• Magnetism –
- Permanent magnetism;
- electromagnetism – relay, circuit breaker, solenoid valve (principle, function and applications);
- electromagnetic power; and
- electromagnetic induction.

• Generators –
- Alternator – principle, function and applications, monitoring devices, regulation, control and protection and modes of excitation;
- starter generator.

• Distribution –
- Current distribution (buses);
- monitoring of the ammeter, voltmeter and annunciator;
- electrical consumers;
- DC power distribution –
  * construction, operation and system monitoring; and
  * elementary switching circuits.
- Inverter (applications).

• The aircraft structure as an electrical conductor.

(ii) Alternating current (AC)

• General –
- Single and multi-phase AC;
- frequency;
- phase shift; and
- AC components.

• Generators –
- 3-phase generator;
- brushless generator (construction and operation);
- generator drive –
  * constant speed drive; and

        * integrated drive.
- AC power distribution –
    – Construction, operation and monitoring; and
    – protection circuits, paralleling of AC-generators.
- Transformers –
    – Function; and
    – types and applications.
- Synchronous and asynchronous motors –
    – Operations; and
    – application.
- Transformer/rectifier units.
- Semiconductors –
    – Principles of semiconductors;
    – semiconductor resistors (properties and application);
    – rectifier (function and application);
    – transistor (function and applications); and
    – diode (function and applications).
- Basic knowledge of computers.
- Logic circuits.
- Logical symbols.
- Switching circuits and logical symbols.
- Basic radio propagation theory; basic principles –
    – Electromagnetic waves;
    – wave length, amplitude, phase angle, frequency;
    – frequency bands, side band, single sideband;
    – pulse characteristics;
    – carrier, modulation, de-modulation;
    – kinds of modulation (amplitude, frequency, pulse, multiplex); and
    – oscillation circuits.
- Antennas –
    – Characteristics;
    – polarisation; and
    – types of antennas.
- Wave propagation –
    – Ground waves;
    – space waves;
    – propagation with the frequency bands;
    – frequency prognosis (MUF);
    – fading; and

– factors affecting propagation (reflection, absorption, interference, twilight, shoreline, mountain, static).

(c) Powerplant

(i) Piston engine

- General –
  - Design types;
  - principles of the 4-stroke internal combustion engine; and
  - mechanical components.
- Lubrication system –
  - Function;
  - schematic construction;
  - monitoring instruments and indicators; and
  - lubricants.
- Air cooling –
  - System monitoring;
  - cylinder head temperature; and
  - cowl flaps.
- Ignition –
  - Schematic construction and function;
  - types of ignition; and
  - magneto check.
- Engine fuel supply –
  - Carburettor (construction and mode of operation, carburettor icing);
  - fuel injection (construction and mode of operation); and
  - alternate air.
- Engine performance –
  - Pressure/density altitude; and
  - performance as a function of pressure and temperature.
- Power augmentation devices –
  - Turbocharger, supercharger construction and effect on engine performance).
- Fuel –
  - Types, grades;
  - detonation characteristics, octane rating;
  - colour coding;
  - additives;
  - water content, ice formation;
  - fuel density; and
  - alternate fuels, differences in specifications, limitations.
- Mixture –
  - Rich and lean mixture; and

  - maximum power and fuel economy mixture setting.
- Rotor –
  - Principles and operation of rotors;
  - rotor check; and
  - rotor efficiency as a function of airspeed.
- Engine handling and manipulation –
  - Power setting, power range;
  - mixture setting; and
  - operational limitations.
- Operational criteria –
  - Maximum and minimum RPM;
  - (induced) engine vibration and critical RPM; and
  - remedial action by abnormal engine start, run-up and in-flight.
- Turbine engine.
- Principles of operation.
- Types of construction –
  - Centrifugal; and
  - axial flow.
- Engine construction.
- Air inlet –
  - Function.
- Compressor –
  - Function;
  - construction and mode of operation;
  - effects of damage;
  - compressor stall and surge (cause and avoidance); and
  - compressor characteristics.
- Diffusor –
  - Function.
- Combustion chamber –
  - Function, types and working principles;
  - mixing ratios;
  - fuel injectors; and
  - thermal load.
- Turbine –
  - Underspeed and overspeed governors;
  - function, construction and working principles;
  - thermal and mechanical stress;
  - effects of damage; and
  - monitoring of exhaust gas temperature.

- Jet pipe –
  - Function;
  - different types; and
  - noise silencing devices.
- Pressure, temperature and airflow in a turbine engine
- Reverse thrust –
  - Function, types and principles of operation;
  - degree of efficiency; and
  - use and monitoring.
- Performance and thrust augmentation –
  - Water injection, principles of operation; and
  - use and system of monitoring.
- Bleed air –
  - Effect of use of bleed air on thrust, exhaust temperature, RPM and pressure ratio.
- Auxiliary gearbox –
  - Function.
- Engine systems.
- Ignition –
  - Function, types, components, operation and safety aspects.
- Starter –
  - Function, type, construction and mode of operation;
  - control and monitoring; and
  - self sustaining and idle speeds.
- Engine start malfunctions –
  - Cause and avoidance.
- Fuel system –
  - Construction, components;
  - operation and monitoring; and
  - malfunctions.
- Lubrication –
  - Construction, components;
  - operation and monitoring; and
  - malfunctions.
- Fuel –
  - Effects of temperature;
  - impurities; and
  - additives.
- Thrust –
  - Thrust formula;
  - flat rated engine; and

– thrust as a function of airspeed, air density, pressure, temperature and RPM.

- Power-plant operation and monitoring.

(ii) Auxiliary power unit (APU)

- General –
  - Function and types;
  - location; and
  - operation and monitoring.
- Ram air turbine –
  - Function.

(d) Emergency equipment

(i) Doors and emergency exits –

- Accessibility;
- normal and emergency operation;
- markings;
- floor exit markings;
- crew emergency exits;
- passenger emergency exits; and
- evacuation slides, general usage or as life rafts or flotation.

(ii) Smoke detection –

- Location, indicators, function test;
- fire detection; and
- location, warning mode, function test.

(iii) Fire fighting equipment –

- Location, operation, contents, gauge, function test.

(iv) Aircraft oxygen equipment –

- Principles of operation;
- protection and surveillance devices;
- drill, use of equipment in case of rapid decompression;
- comparison of constant flow and demand outlet masks;
- oxygen generators; and
- dangers of oxygen use, safety measures.

(v) Emergency equipment –

- Portable, hand-held fire extinguisher;
- smoke mask, smoke protection hood;
- portable oxygen system;
- emergency locator beacon, transmitter;
- life jacket, life raft;
- pocket lamp, emergency lighting;
- megaphone;
- crash axe; and

- fireproof gloves.

(2) Instrumentation – Aeroplanes

(a) Flight Instruments

(i) Air data instruments

(ii) Pilot and static system –

- Pitot tube, construction and principles of operation;
- static source;
- malfunction;
- heating; and
- alternate static source.

(iii) Altimeter –

- Construction and principles of operation;
- display and setting;
- errors;
- correction tables; and
- tolerances.

(iv) Airspeed indicator –

- Construction and principles of operation;
- speed indications (IAS);
- meaning of coloured arcs;
- maximum speed indicator, barber pole; and
- errors.

(v) Mach meter

(vi) Vertical Speed Indicator (VSI) –

- Aneroid and instantaneous VSI (IVSI);
- construction and principles of operation; and
- display.

(vii) Gyroscopic instruments.

(iii) Gyro fundamentals –

- Theory of gyroscopic forces (stability, precession);
- types, construction and principles of operation –
  - Vertical gyro;
  - directional gyro;
  - rate gyro;
  - rate integrating gyro;
  - single degree-of-freedom gyro; and
  - ring laser gyro.
- apparent drift;
- random drift;
- mountings; and

- drive types, monitoring.

(ix) Directional gyro –

- Construction and principles of operation.

(x) Slaved gyro compass –

- Construction and principles of operation;
- components;
- mounting and modes of operation;
- turn and acceleration errors; and
- application, uses of output data.

(xi) Attitude indicator (vertical gyro) –

- Construction and principles of operation;
- display types;
- turn and acceleration errors;
- application, uses of output data;
- turn and bank indicator (rate gyro);
- construction and principles of operation;
- display types;
- application errors;
- application, uses of output data; and
- turn coordinator.

(xii) Magnetic compass –

- Construction and principles of operation; and
- errors (deviation, effect of inclination).

(xiii) Radio Altimeter –

- Components;
- frequency band;
- principle of operation;
- display; and
- errors.

(xiv) Electronic Flight Instrument System (EFIS)–

- Information display types;
- data input;
- control panel, display unit; and
- example of a typical aircraft installation.

(b) Flight control system

(i) Flight Director –

- Function and application;
- block diagram, components;
- mode of operation;
- operation set-up for various flight phases;

- command modes (bars);
- mode indicator;
- system monitoring; and
- limitations, operational restrictions.

(ii) Autopilot –

- Function and application;
- types (different axes);
- block diagram, components;
- lateral modes;
- longitudinal modes;
- common modes;
- auto-land, sequence of operation;
- system concepts for auto-land, go around, take-off fail passive, fail operational (redundant) control modes;
- signal interfacing to control surfaces;
- operation and programming for various flight phases;
- system monitoring; and
- limitations, operational restrictions.

(iii) Yaw damper –

- Function;
- block diagram, components; and
- signal interfacing to vertical stabilizer.

(c) Warning and recording equipment

(i) Warning general –

- Classification of warning; and
- display, indicator system.

(ii) Stall warning –

- Function;
- constituent components of a simplified system;
- block diagram, components of a system with angle-of-attack indicator; and
- operation.

(d) Power plant and system monitoring instruments

(i) Pressure gauge –

- Sensors;
- Pressure indicators; and
- Meaning of coloured arcs.

(ii) Temperature gauge –

- Sensors;
- ram rise, recovery factor;
- temperature indicators; and

- meaning of coloured arcs.

(iii) RPM indicator –

- Interfacing of signal pick-up to RPM gauge;
- RPM indicators, piston and turbine engines; and
- meaning of coloured arcs.

(iv) Consumption gauge –

- Fuel flowmeter (function, indicators); and
- high pressure line fuel flowmeter (function, indications, failure warnings).

(v) Fuel gauge –

- Measurement of volume/mass, units;
- measuring sensors;
- content, quantity indicators; and
- reasons for incorrect indications.

(vi) Torque meter –

- Indicators, units; and
- meaning of coloured arcs.

(vii) Flight hour meter –

- Drive source; and
- indicators.

(viii) Vibration monitoring –

- Indicators units;
- interfacing to bypass turbofan engines; and
- waning system.

(ix) Remote (signal) transmission system –

- Mechanical; and
- electrical.

3.3 Flight performance and planning

(1) Performance of multi-engine aeroplanes not certified under Part 21 (JAR/FAR 25 (light twin))

- Definitions of terms and speeds.
- Any new terms used for multiengine aeroplane performance.
- Importance of performance calculations.
- Determination of performance under normal conditions i.e. all engines operating.
- Consideration of effects of density altitude, wind, aeroplane mass, run-way slope and runway conditions.
- Elements of performance.
- Take-off and landing distances.
- Rate of climb and descent.
- Effects of selected power settings, speeds and aircraft configuration.
- Cruse altitudes and altitude ceiling.
- Payload/range trade-offs.

- Speed/economy trade-offs.
- Use of performance graphs and tabulated data.
- Performance section of flight manual.

(2) Flight planning and flight monitoring

(a) Flight plans for cross-country flights

(i) Fuel plan –

- Computation of planned fuel usage for each leg and total fuel usage for the flight –
  - Flight manual figures for fuel flow during climb, en-route and during descent; and
  - navigation plan for times *en-route*.
- Fuel for holding or diversion to alternate airfield.
- Reserves.
- Total fuel requirements for flight.
- Completion of pre-flight portion of fuel log.
- Flight monitoring and in-flight re-planning.
- In-flight fuel computations –
  - Recording of fuel quantities remaining at navigational checkpoints.
- Calculation of actual consumption rate –
  - Comparison of actual and planned fuel consumption and fuel state.
- Revision of fuel reserve estimates.
- In-flight re-planning in case of problems –
  - Selection of cruise altitude and power settings for new destination;
  - time to new destination; and
  - fuel state, fuel requirements, fuel reserves.
- Radio communication and navigation aids.
- Communication frequencies and call signs for appropriate control agencies and in-flight service facilities such as weather stations.
- Radio navigation and approach aids, if appropriate –
  - Type;
  - frequencies; and
  - identification.

(b) Air traffic service flight plan

(i) Types of flight plan –

- ICAO flight plan;
  - Format;
  - information included in completed plan; and
  - repetitive flight plan.
- Completing the flight plan.
- Information for flight plan obtained from –
  - navigation flight plan;
  - fuel plan;

– operator's records for basic aircraft information; and
– mass and balance records.
• Filing the flight plan.
• Procedures for filing.
• Agency responsible for processing the flight plan.
• Requirements of the State concerning when a flight plan must be filed.
• Closing the flight plan.
• Responsibilities and procedures.
• Processing agency.
• Checking slot time.
• Adherence to flight plan.

(ii) Tolerances allowed by the State for various types of flight plans
• In-flight amendment of flight plan –
– Conditions under which a flight plan must be amended;
– pilot's responsibilities and procedures for filing an amendment; and
– agency to which amendments are submitted.

(c) Practical flight planning

(i) Simple fuel plans.

(ii) Preparation of fuel logs showing planned values for –
• fuel used on each leg;
• fuel remaining at end of each leg; and
• endurance, based on fuel remaining and planned consumption rate, at end of each leg.

(iii) Completion of fuel plan –
• Time and fuel to top-of-climb;
• cruise sector times and fuel used;
• total time and fuel required to destination;
• fuel required for missed approach, climb, en-route altitude and cruise alternate; and
• reserve fuel.

(iv) Practical completion of an air traffic service flight plan.

3.4 Human performance and limitations

(1) Human factors: basic concepts

(a) Human factors in aviation

(i) Competence and limitations.

(ii) Becoming a competent flight engineer –
• The traditional approach towards "professionalism".

(iii) Accident statistics

(iv) Flight safety concepts.

(b) Basic aviation physiology and health maintenance

(i) Basics of flight physiology –
• The atmosphere –

- – Composition;
- – gas laws; and
- – oxygen requirement of tissues.

- respiratory and circulatory systems –
  - – Functional anatomy;
  - – hypobaric environment;
  - – pressurisatoin, decompression;
  - – rapid decompression-
- entrapped gases, barotraumas;
- counter measures;
- hypoxia;
- symptoms; and
- time of useful consciousness;
  - – hyperventilation; and
  - – accelerations.

(ii) Man and environment: the sensory system –

- Central and peripheral nervous system –
  - – Sensory threshold, sensitivity, adaptation;
  - – habituation; and
  - – reflexes and biological control systems.
- Vision –
  - – Functional anatomy;
  - – visual filed, foveal and peripheral vision;
  - – binocular and monocular vision;
  - – monocular vision cues; and
  - – night vision.
- Hearing –
  - – Functional anatomy; and
  - – flight related hazards to hearing.
- Equilibrium –
  - – functional anatomy;
  - – motion, acceleration, verticality; and
  - – motion sickness.
- Integration of sensory inputs –
  - – Spatial disorientation;
  - – illusions –
    - * Physical origin;
    - * physiological origin; and
  - – approach and landing problems.

(iii) Health and hygiene –

- Personal hygiene.
- Common minor ailments –
  - Cold;
  - influenza; and
  - gastro-intestinal upset.
- Problem areas for flight engineers –
  - Hearing loss;
  - defective vision;
  - hypotension, hypertension, coronary disease;
  - obesity;
  - nutrition hygiene;
  - tropical climates; and
  - epidemic diseases.
- Intoxication –
  - Tobacco;
  - alcohol;
  - drugs and self-medication; and
  - various toxic materials.

(2) Basic aviation psychology

(a) Human information processing

(i) Attention and vigilance –
- Selectivity of attention; and
- divided attention.

(ii) Perception –
- Perceptual illusions;
- Subjectivity of perception; and
- "bottom-up"/"top-down" processing.

(iii) Memory –
- Sensory memory;
- working memory;
- long term memory; and
- motor memory (skills).

(iv) Response selection –
- Learning principles and techniques;
- drives; and
- motivation and performance.

(b) Human error and reliability

(i) Reliability of human behaviour.

(ii) Hypotheses on reality –
- Similarity, frequency; and

- completion casualty.

(iii) Theory and model of human error.

(iv) Error generation –

- Internal factors (cognitive styles);
- external factors –
  - Ergonomics;
  - economics; and
  - social environment (group, organisation).

(v) Decision making –

- Decision making concepts –
  - Structure (phases);
  - limits;
  - risk assessment; and
  - practical application.
- Avoiding and managing errors: cockpit management.
- Safety awareness –
  - Risk area awareness;
  - identification of error proneness (oneself);
  - identification of error sources (others); and
  - situational awareness.

(vi) Personality –

- Personality and attitudes –
  - Development; and
  - environmental influences.
- Individual differences in personality –
  - Self concepts (e.g. action vs. state-orientation).
- Identification of hazardous attitudes (error proneness).
- Human overload and underload.
- Arousal.
- Stress –
  - Definition(s), concept(s), mode(s);
  - anxiety and stress; and
  - effects of stress.
- Fatigue –
  - Types, causes, symptoms; and
  - effects of fatigue.
- Body rhythm and sleep –
  - Rhythm disturbances; and
  - symptoms, effects, management.
- Fatigue and stress management –

- Coping strategies;
- management techniques;
- health and fitness programmes;
- relaxation techniques;
- religious practices; and
- counselling techniques.

- Advanced cockpit automation.
- Advantages and disadvantages (criticalities).
- Automation complacency.
- Working concepts.

3.5 Meteorology

1. METEOROLOGY

1.1 THE ATMOSPHERE

1. Composition of the Atmosphere
2. Water Vapour
3. Condensation Nuclei
4. Ozone
5. Structure of the Atmosphere
6. The Troposphere
7. The Stratosphere
8. The Mesosphere
9. International Standard Atmosphere

1.2. PRESSURE

1. Definition of Atmospheric Pressure
2. Imperial System
3. Metric System
4. Mercury Barometer
5. Aneroid Barometer
6. Barograph
7. Digital Display Barometer
8. Pressure Tendency
9. Density Change
10. Mean Sea Level Pressure Change
11. Depressions
12. Secondary Depressions
13. Trough of Low Pressure
14. Anti-Cyclone or High Pressure
15. Ridge of High Pressure
16. Col Area
17. Pressure Gradient
18. Diurnal Pressure Variation

19. Altimetry
20. QFE
21. QNH
22. QNE
23. Application of Altimetry

3. TEMPERATURE

1. Temperature Scales
2. Thermometers
3. Radiation
4. Conduction
5. Convection
6. Advection
7. Land and Sea Heating/Cooling
8. Diurnal Variations
9. Lapse Rates
10. Inversions
11. Environmental Lapse Rate

4. DENSITY

1. Compressibility of Gasses
2. Pressure
3. Effect of Pressure
4. Effect of Temperature
5. Combined Effect of Pressure and Temperature
6. Effect of Humidity
7. Density Altitude

5. HUMIDITY

1. Water Vapour
2. Saturation
3. Dew Point
4. Condensation
5. Sublimation
6. Evaporation
7. Relative Humidity
8. Vapour Pressure
9. Change of State
10. Psychrometer

6. ADIABATIC PROCESS, LAPSE RATE & STABILITY

1. Adiabatic Process
2. Dry Adiabatic Lapse Rate
3. Saturated Adiabatic Lapse Rate
4. Environmental Lapse Rate

5. Relation SALR and DALR
6. Absolute Stability
7. Absolute Instability
8. Conditional Instability
9. Neutral Stability

7. WIND

1. Buy's Ballot's Law
2. Coriolis Force
3. Geostrophic Wind
4. Gradient Wind
5. Surface Friction
6. Thermal Wind
7. Local Winds
8. The Föhn Wind
9. The Berg Wind
10. Anabatic Wind
11. Katabatic Wind
12. Sea Breeze
13. Land Breeze
14. Monsoons
15. Trade Winds and the ITCZ (Inter-Tropical Convergence Zone)
16. General Global Upper Wind Circulation
17. Westerly Wind Waves
18. Tropical Easterly Wind Wave
19. Jet Streams

8. AIR MASSES

1. Definition of an Air Mass
2. Geographic Classification
3. Moisture Content Classification
4. Thermodynamical Classification
5. Warm Air Masses
6. Cold Air Masses
7. Modification of an Air Mass

9. CLOUDS

1. Causes of Cloud Formation
2. Orographic Cloud
3. Convergent Cloud
4. Convection Cloud
5. Turbulent Cloud
6. Frontal Cloud
7. Cloud Classification

8. Cloud Observations/Amount and Height

10. FOG AND MIST

1. Definition of Fog and Mist
2. Radiation Fog
3. Advection Fog
4. Upslope Fog
5. Valley Fog
6. Frontal Fog
7. Smog

11. VISIBILITY

1. Definition of Visibility
2. Glare
3. Runway Visual Range
4. Visibility from the Air
5. Visibility into Sun/Moon
6. Causes of Reduced Visibility

12. PRECIPITATION

1. Condensation Nuclei
2. Ice Particle Theory
3. Coalescence Theory
4. Drizzle
5. Rain
6. Showers
7. Snow
8. Sleet
9. Hail
10. Freezing Rain
11. Precipitation and Aviation

13. FRONTS

1. Frontal Slope
2. Stationary Front – Stage 1
3. Start of a Front – Stage 2
4. Frontal Wave – Stage 3
5. Moving Front – Stage 4
6. Occluded Front – Stage 5
7. Dissipating Stage – Stage 6
8. The Cold Front
9. The Warm Front
10. Occluded Fronts
11. Factors determining Weather Intensity of Fronts

14. THUNDERSTORMS

1. Developing Conditions
2. Convective Thunderstorms
3. Frontal Thunderstorms
4. Convergent Thunderstorms
5. Orographic Thunderstorms
6. Nocturnal Thunderstorms
7. Cellular Structure of Thunder/s
8. Cumulus Stage
9. Mature Stage
10. Dissipating Stage
11. Surface Weather with T/S
12. Flight Hazards with T/S
13. Penetration Procedures
14. After Entry
15. Avoidance of Thundershowers

15. TURBULENCE

1. Definition of Turbulence
2. Criteria for Turbulence
3. Mechanical Turbulence
4. Low level Turbulence
5. Wake Turbulence
6. Mountain/Standing Waves
7. Microburst
8. Clear Air Turbulence – CAT
9. Low Level Wind Shear Problems during Take-off/Landing-phase
10. Approach Techniques for Wind Shear
11. Terrain Features causing Wind Shear Problems

16. ICE ACCRETION

1. Airframe Icing
2. Hoar Frost
3. Rime Ice
4. Clear Ice
5. Rain Ice
6. Airframe Icing Protection Equipment
7. Jet Engine Icing
8. Throttle Icing
9. Fuel Evaporation Icing
10. Impact Icing
11. Symptoms of Carburettor Icing
12. Dangers of Icing
13. Avoiding Icing Regions

17. PRESSURE SYSTEMS

1. Trough of Low Pressure
2. Thermal Depressions
3. Orographic Depressions
4. Coastal Low
5. Tropical Cyclones
6. Anti-cyclones (Highs)
7. Cold Anti-cyclones
8. Warm Anti-cyclones

18. CLIMATOLOGY

1. General World Circulation
2. Basic Climatic Zones
3. Some World Weather Systems
   (a) Doldrums;
   (b) Trade Winds;
   (c) Horse Latitude & Westerly's
4. South African Summer Patterns
5. South African Winter Patterns
6. The South Westerly Buster
7. The Cape Doctor
8. The Black South Easter

19. AIRCRAFT MET OBSERVATIONS

1. Airep

   Position Information
   (i) Aircraft identification
   (ii) Position
   (iii) Time
   (iv) Flight Level or Altitude
   (v) Next Position and ETA

   Operational Information
   (i) Destination
   (ii) Endurance

   Meteorological Information
   (i) Outside Air Temperature
   (ii) Wind Direction and Wind Speed
   (iii) Turbulence
   (iv) Aircraft Icing
   (v) Cloud Base and Cloud Tops
   (vi) Supplementary Information
2. ASDAR and AMDAR System

Weather satellites

3. Weather Satellites
4. Orbits
5. Imagery
6. Data Collecting and Relay
7. Current Operational Satellites
8. Internet + WWW Satellite Data

20. SYNOPS AND SYNOPTICS

1. Station Model
2. Synoptic Charts
3. Drawing of Isobars
4. Synoptics

21. CODES/DOCUMENTATION

1. Metar
2. Speci
3. Taf
4. Actual Upper Winds
5. Prognostic Upper Winds
6. Significant Weather Charts

22. METEOROLOGICAL ORGANISATIONS

1. World Meteorological Organisation
2. International Civil Aviation Organisation
3. South African Weather Bureau – SAWB
4. Central Forecasting Office – CFO
5. Main Forecasting Offices – MFO
6. Weather Offices – WO
7. Subsidiary Stations
8. Automatic Weather Stations (AWS)
9. Weather Services for Aviation

3.6 Navigation

3.6.1 THE EARTH

1 Latitude, difference of latitude

Longitude, difference of longitude

Use of latitude and longitude co-ordinates to locate any specific position

2 Great circle, small circle, rhumbline, convergency, conversion angle, great circle and rhumbline tracks and bearings calculations

3 Direction

True north, magnetic north, compass north, isogonals, variation, compass deviation.

4 Distance

Units of distance and height used in navigation

Nautical mile, statute mile, kilometre, metre, yard, feet, inch

Conversion from one unit to another

Standard nautical mile (6080 feet)

International nautical mile (1852 metres)

Geographical nautical mile (6087 feet)

5 Departure

Relationship between nautical miles and minutes of longitude, calculations

6 Radio bearings

QTE, QDR, QDM, QUJ

7 Navigational computer (slide rule), electronic navigation computers, units used

3.6.2 CHARTS

1 Chart projection theory

Orthomorphism Scale, chart length, earth distance, scale factor, representative fraction, scale problems

2 Mercator chart

Construction and properties, representation of great circle, rhumblines, meridians, parallels of latitude

Plotting radio bearings

Scale variation and calculations

Measurement or calculation of tracks and distance Meridional parts (ATPL only)

3 Lambert Conformal Conic

Construction and properties

Representation of great circles, rhumblines, meridians and parallels of latitude

Plotting radio bearings

Scale variation and calculations

Measurement or calculation of tracks and distance

4 Polar Stereographic (ATPL only)

Construction and properties

Representation of great circles, rhumblines, meridians and parallels of latitude

Plotting radio bearings

Scale variation and calculations

Measurement or calculation of tracks and distance

5 Grid Navigation (ATPL only)

Grid superimposed on Lambert and Polar Stereographic Charts

Grid north, isogrivs, grivation

Calculation of true, magnetic and grid headings or tracks

3.6.3 RELATIVE VELOCITY

Speed of opening and closing
Aircraft separation
Controlled time of arrival by changing speed
Line of constant bearing

3.6.4 SOLAR SYSTEM – TIME

1 Measurement of time
The solar system
Apparent solar day
Mean solar day
Sideral day
Equinox, solstice, aphelion, perihelion
Tropics of Cancer, Capricorn
Arctic and Antarctic circles

2 UTC, GMT, LMT, Standard time
Time conversions
International Date Line

3 Determination of Sunrise, Sunset, Civil
Twilight
Variation of the time of Sunrise, Sunset with latitude and altitude
Sunrise/Sunset along track (ATPL only)
Moonrise, Moonset (ATPL only)

3.6.5 DEAD RECONING (DR) NAVIGATION

1 Basics of DR
Track
Heading (true, magnetic, compass)
Wind velocity
Airspeed (IAS, RAS, TAS, Machnumber)
Groundspeed
ETA
Drift, wind correction angle
DR Position, fix

2 Use of the navigational computer
Speed, distance, time
Fuel consumption
Conversions
Heading, track, groundspeed
RAS, TAS, compressibility correction
Wind velocity

3 Triangle of velocities, determination of
Heading
Track

Groundspeed

Wind velocity

Drift

Track error

3.6.6 NAVIGATION PLOTTING

1 Navigation on the climb and descent

Mean climb TAS

Mean climb wind velocity

Groundspeed

Distance flown

2 En route navigation

Air plot

Track plot

DR position

Use of single position lines, groundspeed check, back bearing, track made good

Running fix, transfer of position lines

Off-track corrections

Revised ETA

1 in 60 rule, alteration of heading

Double the angle on the bow

Relative bearing when abeam NDB

Air plot wind velocity

Track and groundspeed wind velocity

Doppler wind velocity

3 Simple searches, square search

4 PNR and PET (ATPL only)

PNR with alternate aerodrome

PET with alternate aerodrome

3.7 Operational procedures

3.7.1 DEFINITIONS AND ABBREVIATIONS APPLICABLE TO INSTRUMENT FLYING

1. ICAO DOCUMENT 8168 – VOLUME I FLIGHT PROCEDURES

APPROACH PROCEDURES

Chapter 1 – General Criteria

1.2 The instrument approach procedure

1.3 Categories of aircraft

1.4 Obstacle clearance

1.5 Obstacle clearance altitude/height (OCA/H)

1.6 Factor affecting operational minima

Chapter 2 – Approach Procedure Design

2.1 Instrument approach areas

Chapter 3 – Approach Segments

3.1 General

3.2 Standard instrument arrivals

3.3 Initial approach segment

3.4 Intermediate approach segment

3.5 Final approach segment

3.6 Missed approach

HOLDING PROCEDURES

Chapter 1

1.1 Shape and terminology associated with holding pattern

1.2 Speeds, rate of turn, timing, distance and limiting radial

1.3 Entry

1.4 Holding

Chapter 2

2.1 Holding area

2.2 Buffer area

2.3 Minimum holding level

ALTIMETER SETTING PROCEDURES

Chapter 1 – Basic Requirements

Chapter 2 – Procedures applicable to operators and pilots

2.2 Pre-flight operational test

3.7.2 AERONAUTICAL INFORMATION PUBLICATION (AIP)

ARRIVAL AND DEPARTURE PROCEDURES

AIP ENR 1.9 Air Traffic flow management

Slot time sectors

Slot times

AIP ENR 1.5 – Approach procedures

1.5.1 – General

1.5.2 – Arriving flights

General procedures for arriving aircraft

VMC approach

Visual approach

Communication failure procedures

Interpretation of information provided on

Standard Terminal Arrival Routes (STAR) and

Standard Instrument Departures (SID) as published in the AIP

AERODROME CHARTS

Interpretation of information provided on aerodrome charts as published in the AIP

3.7.3 NAVIGATION CHARTS

World Aeronautical Charts

Aerad Route facility chart

Area charts

3.7.4 AERONAUTICAL INFORMATION CIRCULARS

AIC 21.28 – Flying at unmanned aerodromes

AIC 40.1 – Airspace Designation

AIC 42.1 – Filing of flight plans and wake turbulence Categories

3.7.5 ICAO ANNEX 14 – AERODROMES

(a) Definitions

(b) Runway and Taxiway Markings

Runway designation marking

Runway centre line marking

Threshold marking

Displaced threshold markings

Touchdown zone marking

Runway side stripe marking

Taxiway centre line marking

Taxi-holding position markings

(c) Angle of Approach and Runway lighting Systems

PAPI and APAPI

Runway threshold identification lights

Runway edge lights

Runway threshold and wing bar lights

Runway end lights and stopway lights

Runway centre line lights

Runway touchdown lights

Taxiway centre line lights

(d) Declared Distances

Runway length

Landing distance available (LDA)

Clearways and stopways

Accelerate-stop distance available (ASDA)

Take-off run available (TORA)

Take-off distance available (TODA)

3.7.7 AERODROME OPERATING MINIMA

(a) Namibian Civil Aviation Regulations Part 91

91.06.31 – Minimum heights

91.07.1 – Minimum flight altitudes

91.07.5 – Aerodrome operating minima

91.07.7 – Pre-flight selection of aerodromes

91.07.8 – Planning minima for IFR flights

91.07.9 – Meteorological conditions

91.07.24 – Approach and landing conditions

91.07.25 – Commencement and continuation of approach

Low-visibility Operations

91.08.1 – Aerodrome operating minima

91.08.2 – General operating rules for low-visibility operations

91.08.3 – Aerodrome considerations for low-visibility operations

91.08.5 – Operating procedures for low-visibility operations

91.08.6 – Minimum equipment for low-visibility operations

3.8 Principles of flight

3.8.1 Elements of Physics relating to aerodynamics

Review of units of measurement

Mass, weight, force, resolution and composition of forces, speed, acceleration inertia, momentum, motion on a curved track, work, power, energy, pressure, air density, moments and couples, velocity, temperature

3.8.2 Derivation of Lift

Equation of continuity

Bernoulli's theorem

Streamline flow

Angle of attack

Pressure distribution about a wing (transverse and longitudinal)

Centre of pressure

Wing shape (plan and section) and its effect on lift

Lift formula

Lift/drag ratio

3.8.3 Drag

Profile drag

– causes
– variation with speed
– methods of minimising

Induced drag

– causes
– vortices

– variation with speed
– design factors affecting

Total effect of the combination of profile and induced drag

3.8.4 Distribution of forces – balance of couples

Lift/mass and thrust/drag couples

Necessity of achieving balance

Methods of achieving balance

3.8.5 Stability

Axes and planes of rotation

Static stability

Dynamic stability

Effects of design features on stability

Interaction between stability in different planes

Effect of altitude/speed on stability

Roll and yaw dampers

3.8.6 Stalling

Angle of attack

Boundary layer and causes of stalling

Variation of lift and drag in the stall

Movement of the centre of pressure

Tip stalling, its dangers and methods of minimising

The spin (autorotation)

Symptoms of the stall

Stall warning devices

Stall recovery

Effect of turbulent flow over tail surfaces on stall recovery

Stick pushers

Enhanced stalling speed in manoeuvre

3.8.7 Lift augmentation

Flaps

– leading and trailing edge
– effects of
– advantages and disadvantages

Slots and slats

– effects of
– advantages and disadvantages

Effects of lift augmentation devices on lift/drag ratio

3.8.8 Flying controls

Ailerons, elevators, rudders, spoilers

– primary effects of

– secondary effects

Balancing of controls

– aerodynamic balance
– mass balance

Powered controls

– methods of transmitting demands to control surfaces
– feedback of control surface displacement (feel)

Trim (including variable incidence tail plane)

3.9 Communications

1. Classification of airspace and associated air traffic services

1.1 Definitions and abbreviations

1.1.1 Official publications (AIP, AIP-SUP, AIC, NOTAMS, CAR and CATS)

1.1.2 Flight Rules

– Visual Flight Rules (VFR)
– Instrument Flight Rules (IFR)
– Special VFR (SVFR)

1.2 ICAO classification of airspace

1.2.1 Classes in use in Namibia

1.3 Airspace structure

1.3.1 Flight information regions

1.3.2 Controlled airspace

1.3.3 Aerodrome traffic zones, control zones, terminal control areas, Control areas, airways

1.3.4 Avoidance of unauthorised entry into controlled airspace

1.4 Uncontrolled airspace

1.4.1 Aerodrome traffic areas, flight information routes, Advisory airspace, danger, restricted and prohibited areas, Special rules areas

1.5 Recognition of airspace/classes of airspace on aeronautical charts

1.6 Air Traffic Services

1.6.1 Objectives of air traffic services

1.6.2 Air traffic control service, advisory service flight information service, alerting service aerodrome flight information service

1.7 Signals for aerodrome traffic

1.8 Visual ground signals

2. Altimeter setting procedures

2.1 Definitions

QNH, QFE, QNE

Height, altitude and flight level

2.2 Semi-circular rule

2.3 Practical application

2.4 Transition altitude (published/in IMC or VMC)

Transition level (IMC or VMC)

International Standard Atmosphere (ISA)

3. Air traffic services flight plan

3.1 Applicability

3.2 Filing requirements

3.3 Validity

3.4 Amendments to ETA's and changes in TAS

3.5 Methods of filing

3.6 Completion of IFR flight plan form

3.7 Closing of flight plan

3.8 Search and rescue

– methods of indicating on a flight plan

– phases

– method of cancellation

4. IFR procedures

4.1 Air Traffic Flow Management (ATFM)

4.2 Clearance delivery/start clearance/surface movement control (SMC) use of aerodrome charts

4.3 Standard (SID) and non-standard departure charts and procedures

4.4 *En route* planning, use of radio navigation chart, selection of routes, use of MEA and MORA values

4.5 Holding procedures

4.6 Standard arrival (STAR) and non-standard arrival charts procedures

4.7 Use of instrument approach charts, precision/non-precision

4.8 Radar vectoring procedures

5. Technical

5.1 Basic principles of operation of VHF radios

5.2 VHF Frequency Band

5.3 Factors affecting reception and transmission range of VHF radios

5.4 Location and use of VHF frequencies for various types of airspace

5.5 Basic principles of operation of HF radios

5.6 HF Frequency Band

5.7 Factors affecting reception and transmission range of HF radios

5.8 Location and use of HF frequencies for various types of airspace

5.9 Morse code

6. Terminology

6.1 Phonetic alphabet, numerals and Q codes

6.2 Call signs and methods of addressing various RTF stations

6.3 Use of standard words and phrases, test procedures and readability scale

6.4 Listening out requirements and establishing contact

6.5 Mandatory read-back of clearances/instructions

6.6 Categories of messages and order of priority

6.7 Time – purpose and use of Universal Time Co-ordinated (UTC)

6.8 Use of transponder, knowledge of terminology and emergency codes

6.9 Knowledge and understanding of radar terminology, “radar identified”, “under radar control”

7. Radio procedures

7.1 Use of Radio on the ground

7.1.1 Start clearance, taxi clearance, ATC departure clearance (SID/non-standard)

7.1.2 The importance of reading back all clearances

7.1.3 Importance of understanding standard ATC terminology

7.2 Departure Procedures

7.2.1 Obtaining and complying with take-off clearance/instructions

7.2.2 Compliance with departure procedure, standard (SID)/non-standard

7.3 *En route* procedures

7.3.1 Knowing what call should be made to which station and when according to the airspace requirements

7.3.2 Knowing the required in-flight broadcast procedure applicable to uncontrolled airspace

7.3.3 Making position reports, providing initial and revised ETA’s, onward clearance time (OCT)

7.3.4 Obtaining relevant weather information, use of ATIS

7.3.5 Making appropriate weather reports (PIREPS)

7.3.6 Knowing the difference between positively controlled airspace as opposed to a Flight Information Service (FIS)

7.3.7 Transponder use and terminology

7.3.8 Procedure to obtain bearings, headings and position from air traffic control/FIS

7.3.9 Altimeter setting procedures

7.3.10 Relaying messages for other stations

7.4 Arrival Procedures

7.4.1 Standard (STAR)/non-standard arrival, radar vectors, expected approach time (EAT)

7.4.2 Instrument and visual approach procedures

7.4.3 Calls and ATC clearances/instructions during holding and instrument approach procedures (precision and non-precision approaches)

7.4.4 Missed approach procedures, diversion to alternate

8. Communications failure

8.1 In IMC

8.2 In VMC

8.3 When operating according to standard departure (SID) and standard arrival (STAR)

8.4 Use of applicable transponder code

9. Distress and urgency procedures

9.1 MAYDAY calls

9.1.1 Definition of MAYDAY

9.1.2 When to use

9.1.3 Contents of a MAYDAY call

9.1.4 How to make

9.1.5 Frequencies to use

9.1.6 Requirements on hearing a MAYDAY call

9.1.7 Cancellation of MAYDAY call

9.2 PAN calls

9.2.1 Definition of PAN

9.2.2 When to use

9.2.3 Contents of a PAN call

9.2.4 How to make

9.2.5 Frequencies to use

9.2.6 Requirements on hearing a PAN call

9.2.7 Cancellation of PAN call

9.3 Emergency Locator Transmitter (ELT)

9.3.1 Correct use, rules for activation

4. Practical training course

(1) The flight engineer must complete his practical training during his type rating practical course at an approved Part 141 aviation training organization or at an approved Part 145 maintenance organisation.

(2) The practical training does not have to be related to a single aeroplane type.

(3) The flight engineer applicant must work together with experienced maintenance staff in the following departments:

1 Fuselage and Flight Controls; 5 days
2 Engines: 5 days
3 Instruments: 5 days
4 Landing Gear and Brakes: 5 days
5 Cabin/Cockpit/Emergency Equipment: 5 days
6 Ground Handling and Servicing: 5 days

(4) Following successful completion of the technical training, the Training Organisation carrying out the practical skill training, must provide the applicant with a certificate of satisfactory completion of the course, or part thereof.

(5) With respect to the table containing the syllabus below, the following symbols mean:

F/E = Trained for the issue of a type rating as applicable.

X= Flight Simulators must be used for this exercise, if available, otherwise an aeroplane must be used if appropriate for the manoeuvre or procedure.

F/E# = The training must be complemented by supervised aeroplane inspection

(6) The practical training must be conducted at least at the training equipment level shown as F/E, or may be conducted up to any higher equipment level shown by the arrow (---------->)

The following abbreviations are used to indicate the training equipment used:

A =	Aeroplane
FS =	Flight Simulator
FTD =	Flight Training Device
OTD =	Other Training Devices

(7) Where the letter "M" appears in the skill test/ proficiency check column this will indicate a mandatory exercise.

(8) A flight simulator or synthetic flight training device must be used for practical training and testing if it forms part of an approved type-rating course. The following considerations will apply to the approval of the course:

(a) the qualification of the flight simulator or flight simulation training device in accordance with Part 61 qualification requirements;

(b) the qualifications of the instructor and examiner;

(c) the amount of line-orientated training provided on the course;

(d) the qualifications and previous line operating experience of the engineer under training; and the amount of supervised line flying experience provided after the issue of the new type rating

	PRACTICAL TRAINING				
Manoeuvres/Procedures (including Multi-Crew Cooperation)	OTD	FTD	FS	A	Instructors initials when training completed
SECTION 1 1. Flight preparation 1.1 Performance calculation	F/E				
1.2 Aeroplane ext. visual inspect.; location of each item and purpose of inspection	F/E#			F/E	
1.3 Cockpit inspection		F/E ---->	----->	----- >	
1.4 Use of checklist prior to starting engines, starting procedures, radio and navigation equipment check, selection and setting of navigation and communication frequencies.	F/E----- >	----- >	----->	----- >	
1.5 Taxiing in compliance with air traffic control or instructions of instructor.			F/E----- >	----- >	
1.6 Before take-off checks		F/E ---->	----->	----- >	
SECTION 2 2. Take-offs 2.1 Normal take offs with different flap settings, including expedited take off.			F/E----- >	----- >	
2.2 Instrument take-off; transition to instrument flight is required during rotation or immediately after becoming airborne.			F/E----- >	----- >	N/A
2.3 Cross wind take-off (A, if practicable)			F/E----- >	----- >	N/A
2.4 Take-off at maximum take-off mass (actual or simulated maximum take-off mass)			F/E----- >	----- >	
2.5 Take-offs with simulated engine failure 2.5.1 shortly after reaching V_2, or			F/E----- >	----- >	
2.5.2 between V_1 and V_2, or			F/E	X	
2.6 Rejected take-off at a reasonable speed before reaching V1			F/E----- >	X	

Manoeuvres/Procedures (including Multi-Crew Cooperation)	PRACTICAL TRAINING				Instructors initials when training completed
	OTD	FTD	FS	A	
SECTION 3 3. Flight Manoeuvres and Procedures 3.1 Turns with and without spoilers.			F/E ---->	---- >	
3.2 Tuck under and Mach buffets after reaching the critical Mach number, and other specific flight characteristics of the aeroplane (e.g. Dutch Roll)			F/E ---->	X An aircraft may not be used for this exercise	
3.3 Normal operation of systems and controls engineer's panel.	F/E ---->	---- >	----->	—>	
3.4 Normal and abnormal operations of following systems:					
3.4.0 Engine (if necessary propeller)	F/E ---->	---- >	----->	—>	
3.4.1 Pressurisation and air-conditioning	F/E ---->	---- >	----->	—>	
3.4.2 Pitot/static system	F/E ---->	---- >	----->	—>	
3.4.3 Fuel system	F/E ---->	---- >	----->	—>	
3.4.4 Electrical system	F/E ---->	---- >	----->	—>	
3.4.5 Hydraulic system	F/E ---->	---- >	----->	—>	
3.4.6 Flight control and Trim-system	F/E ---->	---- >	----->	—>	
3.4.7 Anti- and de-icing system, Glare shield heating	F/E ---->	---- >	----->	—>	
3.4.8 Autopilot/Flight director	F/E ---->	---- >	----->	—>	
3.4.9 Stall warning devices or stall avoidance devices, and stability augmentation devices.	F/E ---->	---- >	----->	—>	
3.4.10 Ground proximity warning system, weather radar, radio altimeter, transponder.		F/E ---->	----->	—>	
3.4.11 Radios, navigation equipment, instruments, flight management system.	F/E ---->	---- >	----->	—>	
3.4.12 Landing gear and brake-system.	F/E ---->	---- >	----->	—>	
3.4.13 Slat and flap system.	F/E ---->	---- >	----->	—>	
3.4.14 Auxiliary power unit.	F/E ---->	---- >	----->	—>	
3.5 Intentionally left blank					

Manoeuvres/Procedures (including Multi-Crew Cooperation)	PRACTICAL TRAINING				Instructors initials when training completed
	OTD	FTD	FS	A	
3.6 Abnormal and emergency procedures:					
3.6.1 Fire drills e.g. Engine, APU, cabin, cargo compartment, flight deck, wing and electrical fires including evacuation.		F/E---- >	---- >	----->	
3.6.2 Smoke control and removal		F/E---- >	---- >	----->	
3.6.3 Engine failures, shut-down and restart at a safe height.		F/E---- >	---- >	----->	
3.6.4 Fuel dumping (simulated).		F/E---- >	---- >	----->	
3.6.5 Windshear at Take off/landing.			F/E	X	
3.6.6 Simulated cabin pressure failure/Emergency descent.			F/E ---->	----->	
3.6.7 Incapacitation of flight crew member.		F/E---- >	---- >	----->	
3.6.8 Other emergency procedures as outlined in the		F/E---- >	---- >	----->	

appropriate aeroplane Flight Manual.					
3.6.9 ACAS event	F/E--->	---->	---->		
3.7 Steep turns with 45° bank, 180° to 360° left and right.		F/E---->	---->	----->	N/A
3.8 Early recognition and counter measures on approaching stall (up to activation of stall warning device) in take-off configuration, (flaps in take-off position), in cruising flight configuration and in landing configuration (flaps in landing position, gear extended)			F/E ---->	----->	
3.8.1 Recovery from full stall or after activation of stall warning device in climb, cruise and approach configuration.			F/E ---->	X	
3.9 Instrument flight procedures.					
3.9.1 Adherence to departure and arrival routes and ATC instructions.		F/E---->	---->	----->	
3.9.2 Holding procedures.		F/E---->	---->	----->	N/A
3.9.3 Precision approaches down to a decision height (DH) not less than 60 m (200 ft)			F/E ---->	----->	
3.9.3.1 manually, without flight director.			F/E ---->	----->	
3.9.3.2 manually, with flight director.			F/E ---->	----->	
3.9.3.3 with autopilot.			F/E ---->	----->	

	PRACTICAL TRAINING				
Manoeuvres/Procedures (including Multi-Crew Cooperation)	OTD	FTD	FS	A	Instructors initials when training completed
3.9.3.4 manually, with one engine simulated in-operative;					N/A
engine failure mustbe simulated during final approach from before passing the outer marker (OM) until touchdown or through the complete missed approach procedure.			F/E---->	----->	
3.9.4 non-precision approach down to the MDH/A			F/E---->	----->	
3.9.5 Circling approach under following conditions: a) approach to the authorised minimum circling approach altitude at the aerodrome in question in accordance with the local instrument approach facilities in simulated instrument flight conditions; followed by: b) circling approach to another runway at least 90° off centreline from final approach used in item a), at the authorised minimum circling approach altitude; Remark: if a) and b) are not possible due to ATC reasons a simulated low visibility pattern may be performed.			F/E---->	----->	

	PRACTICAL TRAINING				
Manoeuvres/Procedures (including Multi-Crew Cooperation)	OTD	FTD	FS	A	Instructors initials when training completed
SECTION 4 4. Missed Approach Procedures 4.1 Go-around with all engines operating after an ILS approach on reaching decision height.			F/E ----->	---->	
4.2 Other missed approach procedures.			F/E --->	---->	
4.3 Manual go-around with engine simulated inoperative after an instrument approach on reaching DH, MDH or MAPt			F/E --->	---->	
4.4 Rejected landing at 15 m (50ft) above runway threshold and go-around.			F/E --->	---->	
SECTION 5					
5. Landings 5.1 Normal landings also after an ILS approach with transition to visual flight on reaching DH.			F/E --->	---->	

5.2 Landing with simulated jammed horizontal stabiliser in any out-of-trim position.			F/E --- >	X an aircraft may not be used for this exercise	
5.3 Cross wind landings (A, if practicable).			F/E --- >	—>	N/A
5.4 Traffic pattern and landing without extended or with partly extended flaps and slats.			F/E --- >	—>	
5.5 Landing with critical engine simulated inoperative.			F/E --- >	—>	
5.6 Landing with two engines simulated inoperative: - Aeroplanes with three engines: the centre engine and one outboard engine as far as practicable according to data of the AFM. - Aeroplanes with four engines: two engines at one side.			F/E	X	

General: Special requirements for extension of a type rating for instrument approaches down to a decision height of less than 200 feet (60m), i.e. Cat II/III operations.

	PRACTICAL TRAINING				
Manoeuvres/Procedures (including Multi-Crew Cooperation)	OTD	FTD	FS	A	Instructors initials when training completed
SECTION 6 6.Additionnal authorisation for instrument approaches down to a decision height of less than 60 m (200 ft) (CAT II/III) The following manoeuvres and procedures are the minimum training requirements to permit instrument approaches down to a DH of less than 60 m (200 ft). During the following instrument approaches and missed approach procedures all aeroplane equipment required for type certification of instrument approaches down to a DH of less than 60 m (200 ft) must be used.					
6.1 Rejected take-off at minimum authorised RVR.			F/E---- >	X an aircraft may not be used for this exercise	
6.2 ILS Approaches in simulated instrument flight conditions down to the applicable DH using flight guidance system. Standard procedures of crew coordination (task sharing, call out procedures, mutual surveillance, information, and support) must be observed.			F/E---- >	—>	
6.3 Go-around after approaches as indicated in 6.2 on reaching DH. The training also must include go-around due to (simulated) insufficient RVR, wind shear, aeroplane deviation in excess of approach limits for a successful approach, and ground/airborne equipment failure prior to reaching DH and, go-around with simulated airborne equipment failure. Special attention must be given to go-around procedures with pre-calculated manual or automatic go-around attitude guidance.			F/E---- >	—>	

	PRACTICAL TRAINING				
Manoeuvres/Procedures (including Multi-Crew Cooperation)					Instructors initials

	OTD	FTD	FS	A	when training completed
6.4 Landing(s). with visual reference established at decision height following an instrument approach. Depending on the specific flight guidance system, an automatic landing must be performed.			F/E ---->	---->	

63.02.4 THEORETICAL KNOWLEDGE EXAMINATION

1. Contents

An applicant for a flight engineer licence must pass a written theoretical knowledge examination on –

(1) (a) flight-time limitations;

(b) the following as set out in the AIP, AIP SUP, NOTAMs and AICs currently in force –

(i) the organisation and operation of the various air traffic service units;

(ii) holding, approach and departure procedures;

(iii) entry and departure requirements;

(iv) search and rescue;

(v) incident reporting procedures;

(2) navigation;

(3) elementary meteorology;

(4) the technical subjects prescribed in paragraphs 2 and 3.

The pass mark for the theoretical knowledge examinations is 75%.

2. General

(1) Elementary principles of theory of flight, definition of terms, e.g. airflow, forces on an aircraft, straight and level flight, relation between speed and angle of attack, angle of incidence, lift/drag ratio, stability, centre of pressure, flaps and slots.

(2) Properties of air, density, pressure, relationship between pressure, density and temperature, and their effect on aircraft and engine performance, isothermal atmosphere, international standard atmosphere.

(3) The action is to be taken in the event of a serious defect or a heavy landing.

(4) The principles of operation of engines and their component parts and accessories.

(5) Definition of the terms associated with propellers, function of constant speed, fully feathering and braking propellers.

(6) Direction of movement of controls, principles of operation and function of trimming, servo or balance tabs and alternative devices.

(7) Elementary knowledge of electricity and magnetism: definition of terms, e.g. volts, amperes, ohms, watts, alternating and direct current, aircraft batteries, charging and functioning.

3. Theoretical examination on type of aeroplane to which application relates

The examination in the following subjects must be confined to the type of aircraft in respect of which application is made –

(1) Operational limitations of the aircraft, including its engines;

(2) definitions of the datum point and position of centre of gravity limits;

(3) aircraft loading and centre of gravity computation prior to and for duration of flight;

(4) information contained in a certificate of airworthiness and associated documents;

(5) aircraft performance with respect to speed limitations;

(6) the procedure to be followed in the case of an emergency, particularly in the even of power plant failure and fire whilst airborne;

(7) knowledge of the operations manual or flight manual and maintenance inspection cycles;

(8) operation of flying controls, trimming, servo or balance tabs and alternative devices;

(9) normal and emergency systems for operating the landing gear and flaps, including a working knowledge of the systems;

(10) the pneumatic pressure and vacuum system, location and functioning of the pumps and important units. Ground tests for correct functioning;

(11) the pressurisation, heating and ventilating system, including a working knowledge of the principle components, the regulation of pressure, temperature and humidity;

(12) the operation and functioning of the de-icing system, including the main units and duration of the supply;

(13) the wheel brake system, pressures and defects liable to reduce the operating efficiency. Knowledge of the landing gear shock-absorbing system;

(14) a knowledge of the fuel system, including the location and function of all important units incorporated in the system;

(15) the location and capacity of the fuel tanks, including supplementary schemes, where applicable, the means of ascertaining fuel consumption en route;

(16) a knowledge of the oil system, including capacity of the tanks, the location and function of all important units incorporated in the system;

(17) the coolant system, where applicable, and the recommended range of temperature to be maintained under various circumstances.

(18) a general knowledge of the electrical system, voltage and amperage in particular circuits, position and current-carrying capacity of fuses, circuit breakers and main units in the installation; importance of using and method of replacing correct fuses and resetting of circuit breakers;

(19) the functioning of electrical engine starters and generators; location and checking of security and condition of batteries, action to be taken in the case of failure of any unit in the electrical system;

(20) flight planning based on loading and performance charts, fuel consumption and engine power curves. Control of power outputs and the computations involved;

(21) the operation and elementary principles of the automatic pilot, including the method of engagement and disengagement, emergency release and power source, as applicable;

(22) a working knowledge of the principles of operation of the engine instruments;

(23) characteristics of particular engines and their component parts and accessories and methods of control used therefore;

(24) types of fuel and oil used and refuelling procedures;

(25) operation and control of propellers fitted to the particular power plants;

(26) operation and control of jet engines; and

(27) all normal procedures, alternate procedures as contained in the aeroplane flight manual.

63.02.5 SKILL TEST

1. Procedures and manoeuvres

The procedures and manoeuvres referred to in CAR 63.02.5 are the exercises of the practical training course referred to in TS 63.02.3, including –

(1) the ability to perform normal, alternate and emergency manoeuvres, appropriate to the category and class of aeroplane types for which a licence is applied, with a degree of competency appropriate to that of a flight engineer;

(2) tracking from or to VOR stations and utilising navigation aids as applicable;

(3) flight planning and mass and balance problems appropriate to the type of aeroplane a licence is applied for;

(4) the ability to recognize and manage threats and errors;

(5) use aircraft systems within the aircraft's capabilities and limitations;

(6) exercise good judgement and airmanship;

(7) apply aeronautical knowledge;

(8) perform all the duties as part of an integrated crew with the successful outcome assured; and

(9) communicate effectively with the other flight crew members.

63.02.6 APPLICATION FOR FLIGHT ENGINEER LICENCE

1. Application form for flight engineer licence

The application form for the issuing of a flight engineer licence is form FSS PEL 63-01 that can be obtained from the Authority

2. Skill test report

The skill test report that must accompany an application for the issuing of a flight engineer licence in form FSS PEL 63-30 that can be obtained from the Authority

63.03.2 TRAINING

1. Training course

An applicant for the first issue of a type rating must hold a certificate of satisfactory completion of multi-crew co-operation course (MCC) as required in terms of Part 61. If the MCC course is included in the type rating course, this will be acceptable.

The type rating training course is the course contained in TS 63.02.3.

63.03.3 THEORETICAL KNOWLEDGE EXAMINATION

1. Theoretical examination on type

The examination in the following subjects is confined to the type of aircraft in respect of which application is made –

(1) Operational limitations of the aircraft, including its engines;

(2) definitions of the datum point and position of centre of gravity limits;

(3) aircraft loading and centre of gravity computation prior to and for duration of flight;

(4) information contained in a certificate of airworthiness and associated documents;

(5) aircraft performance with respect to speed limitations;

(6) the procedure to be followed in the case of an emergency, particularly in the event of power plant failure and fire whilst airborne;

(7) knowledge of the operations manual or flight manual and maintenance inspection cycles;

(8) operation of flying controls, trimming, servo or balance tabs and alternative devices;

(9) normal and emergency systems for operating the landing gear and flaps, including a working knowledge of the systems;

(10) the pneumatic pressure and vacuum system, location and functioning of the pumps and important units. Ground tests for correct functioning;

(11) the pressurisation, heating and ventilating system, including a working knowledge of the principle components, the regulation of pressure, temperature and humidity;

(12) the operation and functioning of the de-icing system, including the main units, and duration of the supply;

(13) the wheel brake system, pressures and defects liable to reduce the operating efficiency. Knowledge of the landing gear shock-absorbing system;

(14) a knowledge of the fuel system, including the location and function of all important units incorporated in the system;

(15) the location and capacity of the fuel tanks, including supplementary schemes, where applicable, the means of ascertaining fuel consumption en route;

(16) a knowledge of the oil system, including capacity of the tanks, the location and function of all important units incorporated in the system;

(17) the coolant system, where applicable, and the recommended range of temperature to be maintained under various circumstances;

(18) the functioning of electrical engine starters and generators; location and checking of security and condition of batteries, action to be taken in the case of failure of any unit in the electrical system;

(19) the functioning of electrical engine starters and generators; location and checking of security and condition of batteries, action to be taken in the case of failure of any unit in the electrical system;

(20) flight planning based on loading and performance charts, fuel consumption and engine power curves. Control of power output and the computations involved;

(21) the operation and elementary principles of the automatic pilot, including the method of engagement and disengagement; emergency release and power source, as applicable;

(22) a working knowledge of the principles of operation of the engine instruments;

(23) characteristics of particular engines and their component parts and accessories and methods of control used thereof;

(24) types of fuel and oil used and refuelling procedures;

(25) operation and control of propellers fitted to the particular power plants;

(26) operation and control of jet engines; and

(27) all normal procedures, alternate procedures and emergency procedures as contained in the aeroplane flight manual.

The pass mark for the theoretical knowledge examinations is 75%.

63.03.4 SKILL TEST

1. Procedures and manoeuvres

The procedures and manoeuvres referred to in NAMCARs 63.03.4 are the exercises of the practical training course referred to in TS 63.03.2, including –

(1) the ability to perform normal, alternate and emergency manoeuvres, appropriate to the category and class of aeroplane type for which a licence is applied, with a degree of competency appropriate to that of a flight engineer;

(2) tracking from origin to VOR and NDB stations and utilising navigation aids as applicable; and

(3) flight planning and mass and balance problems appropriate to the type of aeroplane a licence is applied for.

63.03.6 APPLICATION FOR TYPE RATING

1. Application form for type rating

The application form for the issuing of a type rating is form FSS PEL 63-03 that can be obtained from the Authority.

2. Skill test report

The skill test report that must accompany an application for the issuing of a type rating is form FSS PEL 63-30 that can be obtained from the Authority

63.03.10 RENEWAL

1. Proficiency check

The proficiency check required for the renewal of a type rating is the skill test referred to in TS 63.03.4.

2. Certificate of competency

The certificate of competency required for the renewal of a type rating, is contained in Annexure B.

63.03.11 RE-ISSUE

1. Skill test report

The skill test report to be provided to the Executive Director for the reissuing of type rating is form FSS PEL 63-30.

63.04.5 SKILL TEST

1. Procedures

The procedures referred to in CAR 63.04.5 are the exercises contained in TS 63.02.5.

63.04.6 APPLICTION FOR GRADE I FLIGHT ENGINEER INSTRUCTOR RATING

1. Application form for flight engineer instructor's rating

The application form for the issuing of a Grade I flight engineer instructor rating is form FSS PEL 63-05 that can be obtained from the Authority

2. Skill test report

The skill test report that must accompany an application for the issuing of a Grade I flight engineer instructor rating is form FSS PEL 63-30 that can be obtained from the Authority

63.04.10 RENEWAL

1. Flight engineer instructor refresher seminar

(1) Flight engineer instructor refresher seminars will be co-ordinated and arranged by the Authority at various centres, taking due regard of the distribution of instructors in Namibia.

(2) The seminars will run for between one and two days, and if credit is required in terms of this Part, attendance from participants will be required for the whole duration of the seminar including breakout groups/workshops.

(3) The Executive Director will make use of the services of experienced flight engineer instructors and Designated Flight Engineer Examiners who are well versed in various levels of flying training to participate in, or to provide lectures and group discussions at the seminars.

(4) The attendance form must be completed and signed by the organiser of the Seminar and must accompany the revalidation application.

(5) The content of the Flight Engineer Instructor refresher seminar will generally be selected from the following topics –

(a) new and/or current rules/regulations, with emphasis on knowledge of NAMCARs as applicable to the job of the flight instructor;

(b) teaching and learning;

(c) instructional techniques;

(d) the role of the instructor;

(e) human factors;

(f) topical and recent accidents and their probable cause;

(g) flight safety, incident and accident prevention;

(h) airmanship;

(i) legal aspects and enforcement procedures;

(j) navigational skills including new/current radio navigation aids;

(k) teaching instrument flying;

(l) weather related topics including methods of distribution of aeronautical information; and

(m) feedback on knowledge and skills deficiencies revealed in the prescribed theoretical and practical examinations and tests, for improvement in instruction.

(6) The seminar will consist of formal sessions, which will typically allow for a presentation time of 45 minutes and 15 minutes for questions. Group breakouts and discussions will be facilitated and summarised at the end of the day's proceedings.

2. Skill test report

The skill test report to be provided to the Executive Director for the renewal of a Grade I flight engineer instructor rating, is form FSS PEL 63-30 that can be obtained from the Authority

63.04.11 RE-ISSUE

1. Skill test report

The skill test report to be provided to the Executive Director for the reissuing of a Grade I flight engineer instructor rating, is form FSS PEL 63-30 that can be obtained from the Authority

63.05.3 TRAINING

1. Aim of training course

(1) The training course should be designed for the applicant to be given adequate training in ground and flying instructional techniques based upon established teaching methods.

(2) On successful completion of the training course and final test, the applicant will be issued with a Grade II flight engineer instructor rating permitting the holder to give ground and flight training appropriate to the issue or a flight engineer licence or type rating.

(3) The training course should stress the role of the individual in relation to the importance of human factors in the man-machine environment. Special attention should be paid to the applicant's maturity and judgement, including an understanding of adults, their behavioural attitudes and variable levels of education.

(4) With the exception of paragraph 2, all the subject detail contained in the ground and flight training syllabus is complementary to the training course prescribed in TS 63.02.3. The purpose of the course is to –

(a) refresh and bring up to date the technical knowledge of the student instructor;

(b) train the student instructor to teach the ground subjects and air exercises;

(c) ensure that the student instructor's flying is of a sufficiently high standard; and

(d) teach the student instructor the principles of basic instruction and to apply them at the flight engineer level.

(5) During the training course, the student instructor should be made aware of his or her attitude to the importance of flight safety. The flight engineer instructor is the critical link in the flight training process and his or her attitude to flight safety has a major impact upon student flight engineers. Improving safety awareness is therefore a fundamental objective throughout the training course. It will be of major importance for the training course to aim at giving the student instructor knowledge, skills and attitudes relevant to a flight engineer instructor's task and to achieve this the training course syllabus should comprise at least –

(a) teaching and learning; and

(b) flight training.

2. Teaching and learning

(1) The learning process

(a) Motivation;

(b) perception and understanding;

(c) memory and its application;

(d) habits and transfer;

(e) obstacles to learning;

(f) incentives to learning;

(g) learning methods; and

(h) rates of learning.

(2) The teaching process

(a) Elements of effective teaching;

(b) planning of instructional activity;

(c) teaching methods;

(d) teaching from the “known” to the “unknown”; and

(e) use of “lesson plans”.

(3) Training philosophies

(a) Value of a structured training course;

(b) importance of a planned syllabus; and

(c) integration of ground and flight training.

(4) Techniques of applied instruction

(a) Classroom instruction techniques –

(i) Use of training aids;

(ii) group lectures;

(iii) individual briefings; and

(iv) student participation/discussion.

(b) Airborne instruction techniques –

(i) The fight/cockpit environment;

(ii) as the 2nd or 3rd crew member;

(iii) techniques of applied instruction; and

(iv) post flight and in-flight judgement and decision making.

(5) Student evaluation and testing

(a) Assessment of student performance –

(i) The function of progress tests;

(ii) recall of knowledge;

(iii) translation of knowledge into understanding;

(iv) development of understanding into actions; and

(v) the need to evaluate rate of progress.

(b) Analysis of student errors –

(i) Establish the reason for errors;

(ii) tackle major faults first, minor faults second;

(iii) avoidance of over criticism; and

(iv) the need for clear concise communication.

(6) Training programme development

(a) Lesson planning;

(b) preparation;

(c) explanation and demonstration;

(d) student participation and practice; and

(e) evaluation.

(7) Human performance and limitations relevant to flight instruction

(a) Physiological factors;

(b) psychological factors;

(c) human information procession;

(d) behavioural attitudes; and

(e) development of judgement and decision making.

(8) Hazards involved in simulating systems failures and malfunctions in the aeroplane during flight

(a) Selection of a safe altitude;

(b) importance of "touch drills";

(c) situational awareness; and

(d) adherence to correct procedures.

(9) Training administration

(a) Flight/ground training records;

(b) flight engineers personal flying log book;

(c) the flight/ground curriculum;

(d) study material;

(e) official forms;

(f) aircraft flight/owner's manuals/flight crew operating handbooks;

(g) flight authorisation papers;

(h) aircraft documents; and

(i) the regulations applicable to a flight engineer licence, type rating and a Grade I and Grade II flight engineer instructor rating.

(10) Ground training

The ground training consists of all instruction given on the ground for the purpose of the training course by a competent person, and includes classroom lectures, tutorials, long briefings and directed private study, but excludes pre-flight briefings and post-flight discussions which form part of the flight training.

(11) Flight training

The student instructor must occupy the seat normally occupied by the flight engineer instructor, in both aeroplane and simulator, except when acting as a flight engineer on mutual flights.

(12) Air exercises

(a) The air exercises are similar to those used for the training of flight engineers but with additional items designed to cover the needs of a flight engineer instructor.

(b) The numbering of exercises should be used primarily as an exercise reference list and as a broad instructional sequence guide. The demonstrations and practices need not necessarily be given in the order listed. The actual order and content will depend upon the following inter-related factors –

(i) The applicant's progress and ability;

(ii) the weather conditions affecting the flight;

(iii) the flight time available;

(iv) instructional technique considerations;

(v) the local operating environment; and

(vi) the exercises being carried out by the other crew members under instruction.

(c) A student instructor will eventually be faced with similar interrelated factors and they should be shown and taught how to construct flight lesson plans, taking these factors into account, so as to make the best use of each flight lesson, combining parts of the set exercises as necessary. There must be liaison with the pilot instructor as to the best use of available time and crew coordination for all the exercises.

(13) General

(a) The briefing normally includes a statement of the aim and a brief allusion to principles of flight only if relevant. An explanation must be made of exactly what air exercises are to be taught by the student instructor and practiced by the student instructor during the flight. It should include how the flight will be conducted with regard to who is to fly the aeroplane and what airmanship, weather and flight safety aspects currently apply. The nature of the lesson will govern the order in which the constituent parts are to be taught.

(b) The four basic components of the briefing will be –

(i) The aim;

(ii) principles of flight (briefest reference only);

(iii) the air exercise(s) (what, and how and by whom); and

(iv) airmanship (weather, flight safety, etc.).

(14) Planning of flight lessons

The preparation of lesson plans is an essential prerequisite of good instruction and the student instructor must be given supervised practice in the planning and practical application of flight lesson plans.

(15) General considerations

(a) The student instructor should complete flight training to practice the principles of basic instruction at the flight engineer level.

(b) During this training, except when acting as a flight engineer for mutual flights, the student instructor must occupy the seat normally occupied by the flight engineer instructor. The flight engineer instructor giving or monitoring to the student instructor may occupy the flight engineer seat, although it is more desirable that the student instructor gives instruction to a line flight engineer and the flight engineer instructor occupies an extra seat in the cockpit or simulator.

3. Suggested approximate breakdown of hours for the ground training part of the training course.

(The item numbers shown below relate to the item numbers of paragraph 2 “Teaching and learning” above.)

Item No.	Tuition hours	Practice hours in class	Comment	Progress tests
	2.00	–	Allow for questions and short discussion periods	0.30
2	4.00	–	The tuition time should allow for questions and short discussion periods	1.00
3	2.00	–	The training syllabus prescribed in TS 63.02.3 should get used as reference material	0.30
4(a)	5.00	34	The time spent in practice under this item will involve the student instructor refreshing his or her technical knowledge, and developing his or her classroom instruction techniques. It will also include discussion between student instructors	

			and advice on teaching from the supervising instructor should include all systems as contained in the operations manual of the aeroplane	
4(b)	4.00	34	The time spent in practice will be mainly directed to the giving of pre-flight briefings. It will allow the student instructor to develop his or her ability to give a practical and short briefing (10 – 15 minutes) to another student instructor. The briefing will outline in a logical sequence the flight lesson to the undertaken	
5(a)	2.00	–	Emphasis should be placed on the validity of questions used in progress tests	1.00
5(b)	2.00	–	Emphasis should be placed on the need to give encouragement to the student	1.00
6	5.00	15	The time spent in practice will be directed towards the planning of classroom lesson periods and the development of the ability of the student instructor to construct lesson plans	
7	5.00	–	Scenarios relevant to good judgement and decision making should be set and analysed	1.00
8	2.00	–	Examples of hazards should cover a broad range of light aircraft and types of operation and not to be confined to the aeroplane used on the course	1.00
9	2.00	–	General revision of relevant documents	
TOTAL	35.00	**83.00**		**7.00**
COURSE TOTAL = 125 HOURS				

Note: Technical ground classroom could be longer for large aircraft

4. Flight training

4.1 Contents

(1) Briefing before and after exercises.

(2) Airworthiness certificate limitation and manufacturers recommend limitation for all exercises to be adhered to.

(3) Operation restriction and procedures as called for in the minimum equipment and configuration deviation lists for all exercises to be adhered to.

(4) Pre-flight –

(a) Cockpit safety inspection;

(b) external safety inspection;

(c) cockpit preparation;

(d) external inspection; and

(e) before start check list.

(5) Normal procedure and check lists for –

(a) engine start;

(b) taxi out;

(c) take-off;

(d) rejected take-off;

(e) engine failure after V1;

(f) climb;

(g) cruise;

(h) descent;

(i) approach;

(j) go-around;

(k) landing;

(l) landing roll;

(m) taxi in;

(n) parking;

(o) shut down;

(p) cold weather operation;

(q) hot weather operation;

(r) wet or slippery runways;

(s) severe turbulence; and

(t) wind shear.

(6) Alternate operational procedure and check lists.

(7) Abnormal procedure and check lists.

(8) Emergency procedures and check lists.

4.2 General

All exercises to have an assessment rating or grade scale 1 – 5 for the following aspects –

(1) Technical knowledge 1, 2, 3, 4, 5;

(2) standard and normal procedures;

(3) general flying;

(4) monitoring and crew coordination;

(5) crew coordination;

(6) abnormal and emergency procedures; and

(7) instructional skill.

4.3 Numerical scale for assessment

5	High standard
4	Good standard with no ingrained faults
3	Satisfactory some instructor input
2	Requires further training
1	Requires considerable further training

Note: See skill test report form FSS PEL 63-20.

63.05.4 THEORETICAL KNOWLEDGE EXAMINATION

1. Examination

An applicant for a Grade I flight engineer instructor rating must pass a written theoretical knowledge examination on –

(1) theory of flight;

(2) principles of flying instruction;

(3) navigation and meteorology;

(4) the Regulations made under the Act relating to the licensing requirements applicable to flight engineers licences and ratings;

(5) theory of high-altitude flight;

(6) the application of aero-medicine to high-altitude flying; and

(7) human factor performance and limits relevant to instruction.

The pass mark for the theoretical knowledge examinations is 75%.

63.05.5 SKILL TEST

1. Procedures

The procedures referred to in NAMCARs Part 63.05.5 are the exercises contained in TS 63.02.5.

63.05.6 APPLICATION FOR GRADE II FLIGHT ENGINEER INSTRUCTOR RATING

1. Application form for Grade II flight engineer instructor rating

The application form for the issuing of a Grade II flight engineer instructor rating is form FSS PEL 63-05 that can be obtained from the Authority

2. Skill test report

The skill test report that must accompany an application for the issuing of a Grade II flight engineer instructor rating, is form FSS PEL 63-30 that can be obtained from the Authority

63.05.10 RENEWAL

1. Flight engineer instructor refresher seminar

(1) Flight engineer instructor refresher seminars will be co-ordinated and arranged by the Authority at various centres, taking due regard of the distribution of instructors in Namibia.

(2) The seminars will run for between one and two days, and if credit is required in terms of this Part, attendance from participants will be required for the whole duration of the seminar including breakout groups/workshops.

(3) The Executive Director will make use of the services of experienced flight engineer instructors and Designated Flight Engineer Examiners who are well versed in various levels of flying training to participate in, or to provide lectures and group discussions at the seminars.

(4) The attendance form must be completed and signed by the organiser of the Seminar and must accompany the revalidation application.

(5) The content of the Flight Engineer Instructor refresher seminar will generally be selected from the following topics –

(a) new and/or current rules/regulations, with emphasis on knowledge of NAMCARs as applicable to the job of the flight instructor;

(b) teaching and learning;

(c) instructional techniques;

(d) the role of the instructor;

(e) human factors;

(f) topical and recent accidents and their probable cause;

(g) flight safety, incident and accident prevention;

(h) airmanship;

(i) legal aspects and enforcement procedures;

(j) navigational skills including new/current radio navigation aids;

(k) teaching instrument flying;

(l) weather related topics including methods of distribution of aeronautical information; and

(m) feedback on knowledge and skills deficiencies revealed in the prescribed theoretical and practical examinations and tests, for improvement in instruction.

(6) The seminar will consist of formal sessions, which will typically allow for a presentation time of 45 minutes and 15 minutes for questions. Group breakouts and discussions will be facilitated and summarised at the end of the day's proceedings.

2. Skill test report

The skill test report to be provided to the Executive Director for the renewal of a Grade II flight engineer instructor rating, is form FSS PEL 63-30 that can be obtained from the Authority.

63.05.11 RE-ISSUE

1. Flight engineer instructor refresher seminar

The flight engineer instructor refresher seminar is contained in TS 63.05.10.

2. Skill test report

The skill test report to be provided to the Executive Director for the reissue of a Grade II flight engineer instructor rating, is form FSS PEL 63-30 that can be obtained from the Authority.

Annexure A

FLIGHT ENGINEER LOGBOOK								
Year		**Aircraft**		**Pilot-in-command**	**Details of flight Route**	**Duration of flight**		**Remarks**
Day	**Month**	**Type**	**Registration marks**			**Hours**	**Minutes**	
					Totals brought forward	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....	.....	.....
Totals carried forward								

Annexure B

THE NAMIBIA CIVIL AVIATION AUTHORITY
CIVIL AVIATION REGULATIONS, 2017

CERTIFICATE OF COMPETENCY FOR RENEWAL OF TYPE RATING

1. Surname of holder: .....

2. Forenames of holder: .....

3. I, the undersigned, certify that .....
meets the prescribed requirements to renew his or her type rating.

Name of flight engineer instructor: .....
Capacity: .....

....
Signature Date

Annexure C

Holistic descriptors

Proficient speakers must:

a) communicate effectively in voice-only (telephone/radiotelephone) and in face-to-face situations;

b) communicate on common, concrete and work-related topics with accuracy and clarity;

c) use appropriate communicative strategies to exchange messages and to recognize and resolve misunderstandings (e.g. to check, confirm, or clarify information) in a general or work-related context;

d) handle successfully and with relative ease the linguistic challenges presented by a complication or unexpected turn of events that occurs within the context of a routine work situation or communicative task with which they are otherwise familiar; and

e) use a dialect or accent which is intelligible to the aeronautical community.

ANNEXURE D - LANGUAGE PROFICIENCY RATING SCALE

LEVEL	PRONUNCIATION **Assumes a dialect and/or accent intelligible to the aeronautical community.**	STRUCTURE **Relevant grammatical structures and sentence patterns are determined by language functions appropriate to the task.**	VOCABULARY	FLUENCY	COMPREHENSION	INTERACTIONS
Expert 6	Pronunciation, stress, rhythm, and intonation, though possibly influenced by the first language or regional variation, almost never interfere with ease of understanding.	Both basic and complex grammatical structures and sentence patterns are consistently well controlled.	Vocabulary range and accuracy are sufficient to communicate effectively on a wide variety of familiar and unfamiliar topics. Vocabulary is idiomatic, nuanced, and sensitive to register.	Able to speak at length with a natural, effortless flow. Varies speech flow for stylistic effect, e.g. to emphasize a point. Uses appropriate discourse markers and connectors spontaneously.	Comprehension is consistently accurate in nearly all contexts and includes comprehension of linguistic and cultural subtleties.	Interacts with ease in nearly all situations. Is sensitive to verbal and non-verbal cues and responds to them appropriately.
Extended 5	Pronunciation, stress, rhythm, and intonation, though influenced by the first language or regional variation, rarely interfere with ease of understanding.	Basic grammatical structures and sentence patterns are consistently well controlled. Complex structures are attempted but with errors which sometimes interfere with meaning.	Vocabulary range and accuracy are sufficient to communicate effectively on common, concrete, and work-related topics. Paraphrases consistently and successfully. Vocabulary is sometimes idiomatic.	Able to speak at length with relative ease on familiar topics but may not vary speech flow as a stylistic device. Can make use of appropriate discourse markers or connectors.	Comprehension is accurate on common, concrete, and work related topics and mostly accurate when the speaker is confronted with a linguistic or situational complication or an unexpected turn of events. Is able to comprehend a range of speech varieties (dialect and/or accent) or registers.	Responses are immediate, appropriate, and informative. Manages the speaker/listener relationship effectively.
Operational 4	Pronunciation, stress, rhythm, and intonation are influenced by the first language or regional variation but only sometimes interfere with ease of understanding.	Basic grammatical structures and sentence patterns are used creatively and are usually well controlled. Errors may occur, particularly in unusual or unexpected circumstances, but rarely interfere with meaning.	Vocabulary range and accuracy are usually sufficient to communicate effectively on common, concrete, and work-related topics. Can often paraphrase successfully when lacking vocabulary in unusual or unexpected circumstances.	Produces stretches of language at an appropriate tempo. There may be occasional loss of fluency on transition from rehearsed or formulaic speech to spontaneous interaction, but this does not prevent effective communication. Can make limited use of discourse markers or connectors. Fillers are not distracting.	Comprehension is mostly accurate on common, concrete, and work related topics when the accent or variety used is sufficiently intelligible for an international community of users. When the speaker is confronted with a linguistic or situational complication or an unexpected turn of events, comprehension may be slower or require clarification strategies.	Responses are usually immediate, appropriate, and informative. Initiates and maintains exchanges even when dealing with an unexpected turn of events. Deals adequately with apparent misunderstandings by checking, confirming, or clarifying.

LEVEL	PRONUNCIATION Assumes a dialect and/or accent intelligible to the aeronautical community.	STRUCTURE Relevant grammatical structures and sentence patterns are determined by language functions appropriate to the task.	VOCABULARY	FLUENCY	COMPREHENSION	INTERACTIONS
Preoperational 3	Pronunciation, stress, rhythm, and intonation are influenced by the first language or regional variation and frequently interfere with ease of understanding.	Basic grammatical structures and sentence patterns associated with predictable situations are not always well controlled. Errors frequently interfere with meaning.	Vocabulary range and accuracy are often sufficient to communicate on common, concrete, or work-related topics, but range is limited and the word choice often inappropriate. Is often unable to paraphrase successfully when lacking vocabulary.	Produces stretches of language, but phrasing and pausing are often inappropriate. Hesitations or slowness in language processing may prevent effective communication. Fillers are sometimes distracting.	Comprehension is often accurate on common, concrete, and work related topics when the accent or variety used is sufficiently intelligible for an international community of users. May fail to understand a linguistic or situational complication or an unexpected turn of events.	Responses are sometimes immediate, appropriate, and informative. Can initiate and maintain exchanges with reasonable ease on familiar topics and in predictable situations. Generally inadequate when dealing with an unexpected turn of events.
Elementary 2	Pronunciation, stress, rhythm, and intonation are heavily influenced by the first language or regional variation and usually interfere with ease of understanding.	Shows only limited control of a few simple memorized grammatical structures and sentence patterns.	Limited vocabulary range consisting only of isolated words and memorized phrases.	Can produce very short, isolated, memorized utterances with frequent pausing and a distracting use of fillers to search for expressions and to articulate less familiar words.	Comprehension is limited to isolated, memorized phrases when they are carefully and slowly articulated.	Response time is slow and often inappropriate. Interaction is limited to simple routine exchanges.
Pre-elementary 1	Performs at a level below the Elementary level.	Performs at a level below the Elementary level.	Performs at a level below the Elementary level.	Performs at a level below the Elementary level.	Performs at a level below the Elementary level.	Performs at a level below the Elementary level.