

**CAR 170**

**Air Navigation Training Centers (general lay out)**

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## FOREWORD

(a) CAR 170 has been issued by the Civil Aviation Affairs of Oman (hereinafter called the AUTHORITY) under the provisions of the Civil Aviation Law of the Sultanate of Oman.

(b) CAR 170 prescribes the certification and operating requirements for organisations providing Air Navigation Training in Oman.

(c) Amendments to the text in CAR 170 are issued as amendment pages containing revised paragraphs.

New, amended and corrected text will be enclosed within brackets until a subsequent 'Change' is issued

(d) The editing practices used in this document are as follows:

- (1) 'Shall' is used to indicate a mandatory requirement and may appear in CARs.
- (2) 'Should' is used to indicate a recommendation
- (3) 'May' is used to indicate discretion by the AUTHORITY the industry or the applicant, as appropriate.
- (4) 'Will' indicates a mandatory requirement and is used to advise of action incumbent on the AUTHORITY

*NOTE: The use of the male gender implies the female gender and vice versa.*

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## Subpart A –General

### 170.1 Applicability.

- a. This part prescribes the requirements for certification of Air Navigation Training Center, its associated curriculum and the general operating rules for the holders of such certificates.
- b. No person may operate as an Air Navigation Training Center without, or in violation of, an Air Navigation Training Center certificate and training specification issued under this CAR.

### 170.3 Definitions.

**Air Navigation** : a generic term meaning the provision of various services for airspace control including Air Traffic Service, Aeronautical Telecommunication Service, Aeronautical Information Service, Meteorological Service for International Air Navigation, Search and Rescue Service and Procedures for Air Navigation-Aircraft Operations (PANS-OPS).

**Curriculum**: means a set of courses approved by the AUTHORITY, for use by a training center consists of training which is required for certification.

**Instructor**: means a person employed or contracted by a training center and designated to provide instruction in accordance with subpart G/B of this part.

**Training specification**: means a document issued to an Air Navigation training center certificate holder by the AUTHORITY that prescribes that center's training, checking, limitations, and specifies training program requirements.

### 170.5 Eligibility.

To be eligible for Air Navigation Training Center Certificate, the applicant shall meet the requirements of this CAR to the satisfaction of the AUTHORITY and shall submit the following:

- a. Registration in the Ministry of Industry and Commerce according to the applicable national Laws.
- b. Valid Insurance policy with an adequate amount to cover liability in case of accidents, in particular in respect to:
  - 1) The premises;
  - 2) Students; and
  - 3) Employees and Third party.
- c. Ownership or lease agreement for building(s) and workshops appropriate for the ratings applied for and the size of the potential operations. The building(s) must be constructed and established according to a standard acceptable to the authority and at least fulfills the adequate specification of the following aspects:

1. Location. An applicant for, or holder of a training center certificate must have available exclusively, for adequate period of time and at a location approved by the authority.
  2. Separation. The building must be separated from other activities and shall be used only for the school purposes. The separation must be adequate enough to assure limited accessibility to the concerned people, and protection against external intruders.
  3. Environment. The building must be designed and constructed to assure appropriate environment to the students in regard to acceptable level of noise and pollution and adequate air conditioning, lighting and ventilation.
  4. Safety. The building must be designed and constructed to ensure adequate safety relevant aspects such as fire escape, fire protection, and enough instruction in case of accidents.
  5. Accommodation and Entertainment. The building must be designed and established to assure an adequate layout and spaces for non- learning student's activities.
- d) Ownership and operational control for all tools and equipment appropriate to the rating(s) applied for.
- e) A feasibility study that shows a full self-sustaining financial capability for at least 24 months of operation according to the standards applicable in this CAR. The study must contain at least the following aspects:
- 1) Marketing plan.
  - 2) Financial plan.
  - 3) Capital Plan
  - 4) Administrative and operational plan.

#### **170.7 Application for certificate issuance or amendment.**

- a An application for a training certificate and training specifications under this CAR shall:

Be made in a form and in a manner prescribed by this CAR;

Be made at least 120 calendar days before the beginning of any proposed training or 60 calendar days before effecting an amendment to any approved training;

Provide the proposed curriculum;

Provide a description and a list of the facilities and materials to be used;

- b Each applicant for a training center and training specification shall provide:

A list of its qualified instructors;

A statement that the minimum qualification requirements for each instrument management position are met.

A statement acknowledging that the applicant shall notify the AUTHORITY within 10 working days of any change made in the assignment of persons in the required management positions and instructors.

A description of a recordkeeping system that will identify and document the details of training, qualification, and certification of students and instructors.

A statement of the maximum number of students it expects to teach at any one time.

c The certificate holder must file an application to amend training center certificate at least 60 calendar days prior to the applicant's proposed effective amendment date.

#### **170.9 Issue of certificate.**

An applicant who meets the requirements of this CAR is entitled to :

- a. An ANS training center certificate and containing business name, address of the certificate holder, and rating under which the certificate holder may conduct training
- b. Training specifications and limitations issued by the authority to the certificate holder containing type of the training authorized including approved courses.

#### **170.11 Duration of certificates.**

- a Unless sooner surrendered, suspended, or revoked, an ANS training center certificate expires:
  1. At the end of the twenty-fourth month after the month in which it was issued or renewed; or
  2. Upon notice from the authority that the training center has failed to maintain the eligibility of requirements prescribed in this CAR, as amended, for certification in excess of 60 continuous days.
- b An application for the renewal of Air Navigation Training Centers certificate shall be submitted to the authority of not less than 30 days before the expiry date of the certificate.
- c The holder of a certificate that is surrendered, suspended, or revoked, shall return the certificate to the authority within 5 working days after being notified that the certificate is suspended, revoked, or terminated.

**170.13 Rating and competencies.**

- a The following ratings are issued under this CAR:
  - 1. Aerodrome control rating;
  - 2. Approach control procedural rating;
  - 3. Approach control surveillance rating;
  - 4. Approach precision radar control rating;
  - 5. Area control procedural ratings;
  - 6. Area control surveillance ratings.
  
- b The following competencies are issued under this CAR:
  - 1. Aeronautical VHF Communication.
  - 2. Radar Surveillance Technology.
  - 3. Instrument Landing System (ILS).



## Subpart B – Certification Requirements

### 170.51 Personnel requirements

(a) An applicant for the grant of an Air Navigation Training Center Certificate must employ, contract, or otherwise engage—

- (1) a senior person identified as the Chief Executive who must—
  - (i) have the authority within the applicant's organisation to ensure that the organisation's services can be financed and provided in accordance with the requirements and standards prescribed by this CAR; and
  - (ii) be responsible for ensuring that the organisation complies with the requirements of this CAR; and
- (2) a senior person or persons, responsible to the Chief Executive for ensuring that the applicant's organisation complies with the organisation's exposition; and
- (3) sufficient personnel to plan, conduct, and supervise the training courses and assessments listed in the applicant's exposition.

(b) The applicant shall establish a procedure for initially assessing, and a procedure for maintaining, the competence of those personnel conducting the training courses and assessments listed in the applicant's exposition.

(c) Instructor requirements.

- (1) An applicant for an Air Navigation Training Center or for an additional curriculum must provide the number of instructors holding appropriate ANS qualifications that the authority determines necessary to provide adequate instruction and supervision of the students, including at least one such instructor for each 20 students in each training course. However, the applicant may provide specialised instructors, who are not certificated as ANS instructors, to teach Meteorological, Search and Rescue, PANS-OPS, Aeronautical Telecommunication, simulator training, and similar subjects. The applicant is required to maintain a list of the names and qualifications of specialised instructors, and upon request, provide a copy of the list to the Authority.
- (2) An applicant for an Air Navigation Training Center must designate a chief instructor for each approved course of training who is qualified and competent to perform the duties to which that instructor is assigned, and must meet the Instructor qualifications requirements.
- (3) When necessary, an applicant for an Air Navigation Training Center may designate a person to be an assistant chief instructor for an approved training course, provided that person meets the requirements of chief instructor.
- (4) The Chief instructor and his assistant shall be designated in writing by the certificated ANS training center.

(d) Instructor qualifications.

Each person designated as an ANS instructor shall meet the following requirements:

- a) Hold a certificate in the field of specialty as appropriate;
- b) Has minimum experience of at least five years in the field of specialty and/or rating competency for the approved course;
- c) Instructional technique;
- d) Show proficiency in the training procedures and equipment handling of the approved training course.

**170.53 Facilities, equipment, and material requirements.**

An applicant for an Air Navigation Training Center certificate and training specifications or for an amendment of the approved curriculum must have such of the following properly heated, lighted, and ventilated facilities as are appropriate to the curriculum sought and as the authority determines are appropriate for the maximum number of students expected to be taught at any time:

- (a) An enclosed classroom suitable for teaching theory classes.
- (b) Suitable enclosed space for simulators
- (c) Simulators for aerodrome control, approach control, area control and radar control (surveillance) shall include at least the following:
  - Headsets;
  - Microphones;
  - Transceivers;
  - Radio communication with selector panel;
  - Telephone with a selector panel and a handset;
  - Intercom;
  - Recorder; (Audio & Video)
  - Auto-switch capability selection of either headset or speaker status.
  - Power;
  - Digital Clock; (6 digits in: hh:mm:ss)
  - Flight progress boards as appropriate;
  - Fire alarm and extinguishers (including Emergency Exit doors);
  - Desks and consoles;
  - Chairs; and
  - Floor and wall sound-absorbing coverings.
- (d) Radio and telephone positions shall have dual connections for training.
- (e) Radar simulator shall include at least two consoles with programmable displays.
- (f) Simulator training room shall be located within the training facility.
- (g) Every simulator shall have the hardware and/or software to represent the air traffic movement in the ground operations and flight operations stages.

**170.55 General curriculum requirements.**

Each applicant for, or holder of, a training center certificate and training specifications shall submit ANS training curriculum to the Authority for approval:

- a. ANS training curriculum shall include the following:
  - 1. Basic training
  - 2. Advanced training.
  - 3. Other approved courses (radar, computer, management, search and rescue, PANS-OPS ...etc).
- b. Air Traffic Control training curriculum shall include the required knowledge specified in Appendix A of this CAR.

- c. Aeronautical Telecommunication Systems training curriculum shall include the required knowledge specified in Appendix B of this CAR.
- d. Curriculum of Aeronautical Information Services shall be in accordance with Annex 15 to Chicago Convention as amended.
- e. The authority may require a certificate holder to make revisions or to renew an approved training curriculum. The required revisions and renewals should be submitted to the authority within 30 calendar days from the authority requested date. The authority may suspend or revoke the certificate if a certificate holder has not committed to the authority requirements.

#### **170.57 Internal quality assurance**

(a) An applicant for an Air Navigation Training Center certificate shall establish an internal quality assurance system to ensure compliance with, and the adequacy of, the procedures required by this CAR.

(b) The internal quality assurance system shall include—

- (1) a safety policy and safety policy procedures that are relevant to the applicant's organisational goals and the expectations and needs of its customers; and
- (2) a procedure to ensure quality indicators, including defect and incident reports, and personnel and customer feedback, are monitored to identify existing problems or potential causes of problems within the system; and
- (3) a procedure for corrective action to ensure existing problems that have been identified within the system are corrected; and
- (4) a procedure for preventive action to ensure that potential causes of problems that have been identified within the system are remedied; and
- (5) an internal audit programme to audit the applicant's organization for conformity with the procedures in its exposition and achievement of the goals set in its safety policy; and
- (6) management review procedures, which shall include the use of statistical analysis, to ensure the continuing suitability and effectiveness of the internal quality assurance system in satisfying the requirements of this CAR.

(c) The safety policy procedures shall ensure that the safety policy is understood, implemented, and maintained at all levels of the organisation.

(d) The procedure for corrective action shall specify how—

- (1) to correct an existing problem; and
- (2) to follow up a corrective action to ensure the action is effective; and
- (3) management will measure the effectiveness of any corrective action taken.

(e) The procedure for preventive action shall specify how—

- (1) to correct a potential problem; and
- (2) to follow up a preventive action to ensure the action is effective; and
- (3) to amend any procedure required by this Part as a result of a preventive action; and
- (4) management will measure the effectiveness of any preventive action taken.

(f) The internal quality audit programme shall—

- (1) specify the frequency and location of the audits taking into account the nature of the activity to be audited; and
- (2) ensure audits are performed by trained auditing personnel who are independent of those having direct responsibility for the activity being audited; and

- (3) ensure the results of audits are reported to the personnel responsible for the activity being audited and the manager responsible for internal audits; and
- (4) require preventive or corrective action to be taken by the personnel responsible for the activity being audited if problems are found by the audit; and
- (5) ensure follow up audits to review the effectiveness of any preventive or corrective action taken.

(g) The procedure for management review shall—

- (1) specify the frequency of management reviews of the quality assurance system taking into account the need for the continuing effectiveness of the system; and
- (2) identify the responsible manager who shall review the quality assurance system; and
- (3) ensure the results of the review are evaluated and recorded.

(h) The senior person who has the responsibility for internal quality assurance shall have direct access to the Chief Executive on matters affecting safety.

### **170.59 Organisation exposition**

(a) An applicant for an Air Navigation Training Center certificate shall provide the Authority with an exposition which shall contain—

- (1) a statement signed by the Chief Executive on behalf of the applicant's organization confirming that the exposition and any included manuals—
  - (i) define the organisation and demonstrate its means and methods for ensuring ongoing compliance with this CAR; and
  - (ii) will be complied with at all times; and
- (2) the titles and names of the senior person or persons required by 141.51 (a)(1) and (2); and
- (3) the duties and responsibilities of the senior person or persons specified in paragraph (a)(2), including matters for which they have responsibility to deal directly with the Authority on behalf of the organisation; and
- (4) an organisation chart showing lines of responsibility of the senior persons specified in paragraph (a)(2); and
- (5) a list of the training courses and assessments to be covered by the certificate; and
- (6) the locations at which each training course or assessment will be conducted; and
- (7) the course outline and the curriculum for each of the training courses and assessments to be conducted by the organisation; and
- (8) details of the applicant's procedures required by—
  - (i) 170.51(b) regarding the competence of personnel; and
  - (ii) 170.61 regarding the control of documentation; and
  - (iii) 141.55(b) regarding training courses; and
  - (iv) 170.103 regarding records; and
- (9) procedures to control, amend and distribute the exposition.

(b) The applicant's exposition must be acceptable to the Authority.

**170.61 Documentation**

(a) An applicant for an Air Navigation Training Center certificate shall hold current copies of all relevant technical standards and practices and any other documentation that is necessary for the provision of the training courses and assessments listed in the applicant's exposition.

(b) The applicant shall establish procedures to control the documentation required by paragraph (a). The procedures shall ensure—

(1) all documentation is reviewed and authorised by appropriate personnel before issue; and

(2) current issues of relevant documentation are available to personnel for the provision of training courses and assessments listed in their exposition; and

(3) all obsolete documentation is promptly removed from all points of issue or use; and

(4) changes to documentation are reviewed and approved by appropriate personnel.

**Subpart C – Operating Rules****170.101 Attendance, tests and enrollment.**

a A certificated ANS training center shall

1. Not require any student to attend classes of instruction more than eight hours in any day or more than Five days or 40 hours in any seven day period;
2. Give appropriate tests to each student who completes a unit of instructions as shown in that training center's curriculum;
3. Not graduate a student unless he has completed all of the appropriate curriculum requirements; and
4. Use an approved system for determining final course grades and for recording student attendance. The system must show hours of absence allowed and show how the missed material will be made available to the student.

b A certificated ANS training center shall not accept the application for enrollment nor a person shall enroll in an ANS training center unless he/she:

1. Holds a General Secondary Certificate or equivalent foreign certificate with pass result not less than 70%; and
2. Shall demonstrate the ability to speak, write and understand English language by acceptable means to the authority.
3. Hold second class (2) medical certificate as prescribed by the authority regulation.

**170.103 Records.**

A certificated ANS training center shall:

a Keep a current record of each student enrolled, showing:

- 1- Students attendance, tests and grades received on the subject required by this CAR;
- 2- The instruction credited to him under 170.179 (a)(2), if any; and
- 3- The authenticated transcript of his grades from that training center.

It shall retain the record for at least five years after the end of the student's enrollment, and shall make each record available for inspection by the authority during that period.

b Keep a current progress chart or individual progress record for each of its students, showing the practical projects completed by the student in each subject.

**170.105 Transcripts and graduation certificates.**

A certificated ANS training center shall:

- a. Upon request, provide a transcript of student's grades to each student who is graduated from that training center or who leaves it before being graduated. An official of the training center shall authenticate the transcript. The transcript shall state the curriculum in which the student was enrolled, whether the student satisfactorily completed that curriculum or not, and the final grades the student received.
- b. Give a graduation certificate or a certificate of completion to each student that he graduates. An official of the training center shall authenticate the certificate. The certificate shall show the date of graduation and the approved curriculum title.

**170.107 Maintenance of instructor requirements.**

A certificated ANS training center shall, after certification or additional curriculum, continue adhering to the instructor requirements specified in section 170.51c of this CAR.

**170.109 Maintenance of facilities, equipment and material.**

A certificated ANS training center shall:

- a. After certification or additional curriculum, continue providing facilities, equipment and material equal to the standards currently required for the issue of the certification and curriculum that it holds.
- b. Not make a substantial change in facilities, equipment or material that have been approved for a particular curriculum, unless that change is approved by the authority in advance.

**170.111 Maintenance of curriculum requirements.**

A certificated ANS training center shall:

- a. Adhere to its approved curriculum.
- b. Not change its approved curriculum unless the change is approved by the authority in advance.

**170.113 Quality of Instruction.**

- a. An applicant for ANS training center certificate shall appoint a senior person who has the authority within the applicant's organization to ensure that all training courses and assessment conducted by the center can be carried out in accordance with the requirements prescribed by this CAR.
- b. A certificated ANS training center shall provide instruction of such quality that the percentage of those passing the applicable AUTHORITY written exams on their first attempt during any period of 24 calendar months is not less than 70% of its graduates.

**170.115 Display of certificate.**

- a. Each holder of an ANS training center certificate must display that certificate in a place that is normally accessible to public and is not obscured.
- b. A certificate must be available for inspection upon request by the authority.

**170.117 Change of location.**

The holder of ANS training center certificate shall not make any change in the center's location unless the change is approved in advance. If the holder desires to change the location, the holder shall notify the authority, in writing, at least 30 days before the date the change is contemplated. If the holder changes the location without approval, the certificate is considered revoked.

**170.119 Audit and Inspection.**

The authority may at any time, inspect a certificated ANS training center to determine its compliance with this part to determine if the center continues to meet the requirements under which it was originally certificated.

After each audit or inspection, the center shall be notified in writing of any deficiencies found during the inspection.

**170.121 Advertising.**

- a. A certificated ANS training center shall not make any statement relating to it self that is false or is designed to mislead any person considering enrollment therein.
- b. Whenever an ANS training center indicates in advertising that it is a certificated center, it shall clearly distinguish between its approved courses and those that are not approved.
- c. A certificate holder whose certificate has been surrendered, suspended, revoked, or terminated must:
  1. Promptly remove all indications, including signs, wherever located , that the training center was certificated by the Oman authority
  2. Promptly cease all advertising indicating that the training center is certificated by the Oman authority.



## Appendices

### Appendix -A

#### Curriculum Subjects for ATC

This appendix lists the general curriculum subjects required in ATC and the subjects that affect the area of ATC responsibility.

**(a) General Curriculum Subjects.**

*Air law:* rules and regulations relevant to the air traffic controller;

*Air traffic control equipment:* principles, use and limitations of equipment used in air traffic control;

*General knowledge:* principles of flight; principles of operation and functioning of aircraft, powerplants and systems; aircraft performance relevant to air traffic control operations;

*Human performance:* human performance including principles of threat and error management;

*Meteorology:* aeronautical meteorology; use and appreciation of meteorological documentation and information; origin and characteristics of weather phenomena affecting flight operations and safety; altimetry;

*Navigation:* principles of air navigation; principle, limitation and accuracy of navigation systems and visual aids; and

*Operational procedures:* air traffic control, communication, radiotelephony and phraseology procedures (routine, non-routine and emergency); use of the relevant aeronautical documentation; safety practices associated with flight.

**(b) Curriculum Subjects that affect the area of ATC responsibility.**

**(1) Air Traffic Control Assistant**

**1.1 Aviation English**

Trainee(s) should be able to demonstrate a knowledge and understanding of English Language and 2 weeks training in aviation English is recommended.

## **1.2 General**

- 1.2.1 Background to Aviation
- 1.2.2 International/National organizations
- 1.2.3 International Documents
- 1.2.4 Aircraft types/Operation requirements
- 1.2.5 Airport operations/layout
- 1.2.6 Altimetry
- 1.2.7 RTF procedures
- 1.2.8 Radio and Nav-Aids
- 1.2.9 AIS and Flight Plan(relevant Excerpts from the AIP such as Charts, restricted/prohibited/danger airspace, airways, approach procedures VFR Routes, SIDs and STARs, FIR Sector Boundaries.

## **1.3 Air Traffic Services**

- 1.3.1 Provision and objectives
- 1.3.2 Airspace structure/routes
- 1.3.3 Air Traffic Service Units
- 1.3.4 Rules of the Air (IFR and VFR rules)
- 1.3.5 Flight information/Advisory and alerting services including emergency procedures.
- 1.3.6 Airspace classification
- 1.3.7 Telecommunications
- 1.3.8 Location Indicators
- 1.3.9 Forms in common ATS use
- 1.3.10 Use of radar in ATC
- 1.3.11 Flight progress strips and marking procedures
- 1.3.12 Coordination between ATS units
- 1.3.13

## **1.4 Meteorology**

## **1.5 Navigation**

- 1.5.1 Direction/Position and Distance on Earth
- 1.5.2 Time and speed
- 1.5.3 Basic Navigational problems
- 1.5.4 Maps projections/uses
- 1.5.5 Radio aids to navigation
- 1.5.6 Area Navigation Systems

## **1.6 Human Performance relevant to ATC.**

**Minimum (250 hours) including RTF and Telephone Techniques.**

### ***(2) aerodrome control rating:***

- 1) aerodrome layout; physical characteristics and visual aids;
- 2) airspace structure;
- 3) applicable rules, procedures and source of information;

- 4) air navigation facilities;
- 5) air traffic control equipment and its use;
- 6) terrain and prominent landmarks;
- 7) characteristics of air traffic;
- 8) weather phenomena; and
- 9) emergency and search and rescue plans;
- 10) human performance relevant to ATC.

Minimum theoretical hours (350 hours and this is excluding Aviation English training hours), and Practical hours for each trainee (42 hours).

**(3) approach control procedural and area control procedural ratings:**

- 1) airspace structure;
- 2) applicable rules, procedures and source of information;
- 3) air navigation facilities;
- 4) air traffic control equipment and its use;
- 5) terrain and prominent landmarks;
- 6) characteristics of air traffic and traffic flow;
- 7) weather phenomena; and
- 8) emergency and search and rescue plans.
- 9) human performance relevant to ATC.

**Minimum theoretical hours (125 hours) and Practical hours for each trainee (40 hours)** for approach control procedural rating or area control procedural rating.

**For combined course of approach and area control procedural minimum theoretical hours (160 hours) and practical hours for each trainee (50 hours).**

**(4) approach control surveillance, approach precision radar control and area control surveillance ratings:**

The applicant shall meet the requirements specified in **(b)(3)** in so far as they affect the area of responsibility, and shall have demonstrated a level of knowledge appropriate to the privileges granted, in at least the following additional subjects:

- 1) Principles, use and limitations of applicable ATS surveillance systems and associated equipment; and
- 2) Procedures for the provision of ATS surveillance service, as appropriate, including procedures to ensure appropriate terrain clearance.

**Minimum theoretical hours for Approach or area control surveillance (80 hours) and 40 practical hours for each trainee.**

**Minimum theoretical hours for combined course of Approach and Area control surveillance (80 hours) and 50 practical hours for each trainee.**

## Appendix-B

### Curriculum Subjects for Communication, Navigation and Surveillance (CNS)

This appendix lists the general curriculum subjects required of each CNS course. Each course shall be designed to acquaint participants with up to date aviation communication concepts, the technical and operational in the field of CNS, the knowledge of operation, troubleshooting and repair of the elements constituent of the system, and aims at enhancing their knowledge in ICAO Annex 10, SARPs in the field of Aeronautical Telecommunication.

#### (a) Air-Ground Communication VHF and UHF

##### Minimum Hours (50 hours)

##### Method of training

Group training presentations conducted in classroom formal lectures by subject matter experts constitute the theoretical foundations of the course, and fault finding and troubleshooting through practices

##### Contents

- Principles of communication
- Transmitter and receiver technical description
- Fault findings of the transmitter and receiver
- Transmitter and receiver fault repairs
- Diagnose and repair Antenna element fault
- Diagnose and repair power supply system fault
- ICAO Standards for Radio Communication VHF.
- Human factors principles

#### (b) Radar Technology

##### Minimum Hours (100 hours)

##### Methods of Training

Group training presentations conducted in classroom formal lectures by subject matter experts constitute the theoretical foundations of the course, and site visit.

- Radar Display
  
- Radar Antennas
  
- Electronic Waveform (ECM & ECC)

- Conventional and Monopulse Secondary Surveillance Radar
- ICAO Standards for Primary and Secondary Surveillance Radar
- Human Factors Principles.

### **(c) Instrument Landing System (ILS) Principles and Operation Training Course**

#### **Minimum Hours (50 hours)**

#### **Methods of Training**

Group training presentations conducted in classroom formal lectures by subject matter experts constitute the theoretical foundations of the course, and site visit.

#### **Course Outline**

- Introduction to Nav-aids Systems
- ILS in Brief
- ILS Approach and Landing
- Modulation Concepts and Principles: Amplitude Modulation (AM) ,  
Phase or representation of AM, Power in AM Signals, Double Side  
Band Suppressed Carrier (DSB-SC), Power in DSB-SC Signals.
- ILS Waveforms
- ILS Signal Development and Space Modulation
- Difference in Depth of Modulation (DDM) Definition: Normal and  
Abnormal Cases
- Sum in Depth of Modulation (SDM) Definition
- Carrier with Side Band (CSB), Side Band Only (SBO) Signals  
requirements: Amplitude, Low Frequency (LF) Phase, Radio Frequency  
(RF) Phase.
- Antenna Radiation Concept
- Multiple Antenna Pairs and Image Theory
- Localizer Antenna: Log Periodic Dipole Antenna, Beam Bend Potential
- Null Reference Glide Slope, Side band Reference Glide Slope
- Proximity Effect for Glide Slope, Antenna Offsets, Forward Slope,

Sideway Slope.

- Capture Effect Phenomenon
- Capture Effect Glide Slope: Principles and Antenna Power Distribution
- Glide Slope Antenna heights Calculation
- Collocating DME with ILS, Interlocking Two ILS Systems
- Monitoring: Localizer Monitoring, Glide Slope Monitoring
- ICAO Standards for ILS.
- Human factors principles.

## Appendix C

### Criteria for the use of simulators in ATC training

Subpart B Part 170.153 Paragraph C. state that ATC training Center must have at least one ATC training simulator or ATC training device approved by the authority. The simulator will be approved as part of the course approval process for any particular training plan. The ATC training provider is required to demonstrate how the simulator and the associated exercises will provide adequate support for the particular training plan. The approval of the use of a simulator and the part of the particular training plan for which the training provider proposes to use will be based on an assessment against the criteria listed below.

- a) The general environment. This should provide an environment in which simulator exercises may be run without undue interference from unrelated activities;
- b) The simulator layout;
- c) The equipment provided;
- d) The display presentation, functionality, and updating of operational information;
- e) Date displays, including strip displays, where appropriate;
- f) Co-ordination facilities;
- g) Aircraft performance characteristics, including the availability of maneuvers, eg holding or ILS operation, required for a particular simulation;
- h) The availability of real-time changes during an exercise;
- I) the ability of the simulated environment to enable students to meet the stated objectives of the practical training exercise;
- J) The ability of the simulator and its exercises to enable the performance objectives to be assessed to the level determined in the training programme;
- k) The processes by which the provider can be assured that staff associated with conduct of the simulation are competent;
- l) The degree of realism of any voice recognition system associated with the simulator;
- m) Where a simulator is an integral part of an operational ATC system, the processes by which the provider is assured that interference between the simulated and operational environments is prevented.



The extent to which the simulator achieves these criteria will be used to determine the adequacy of the simulator for the proposed use. As a general principle, the greater the degree of replication of the operational position being represented, the greater the use that will be possible in any particular training plan.