

AERONAUTICAL CIRCULAR

SUBJECT:

Aeronautical Telecommunication and Radio Navigation Service

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01 September 2009

CANCELLATION:

Nil.

GENERAL:

The President of Civil Aviation Authority – Macao, China, in exercise of his power under Paragraph 89 of the Air Navigation Regulation of Macao (ANRM) and Article 35 of the Statutes of Civil Aviation Authority, approved by the Decree-Law 10/91/M, establishes this Aeronautical Circular (AC) which defines the Standards and Recommended Practices for Aeronautical Telecommunication and Radio Navigation Service within Macao ATZ.

AC

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REFERENCE

ICAO Annex 10 : Annex 10 (Volume I – V) to the Convention on International Civil Aviation – (incorporates Amendments 1 – 83)

FOREWORD

The following component parts have the status indicated as below:

a) *Standards* and *Recommended Practices* are defined as follows:

Standard: Any specification for physical characteristics, configuration, material, performance, personnel or procedure, the uniform application of which is recognized as necessary for the safety or regularity of international air navigation and to which responsible entities will conform.

Recommended Practice: Any specification for physical characteristics, configuration, material, performance, personnel or procedure, the uniform application of which is recognized as desirable in the interest of safety, regularity or efficiency of international air navigation, and to which the responsible entities will endeavor to conform.

b) *Definitions* of terms used in the AC which are not self-explanatory in that they do not have accepted dictionary meanings. A definition does not have independent status but is an essential part of each Standard and Recommended Practice in which the term is used, since a change in the meaning of the term would affect the specification.

c) *Tables* and *Figures* which add to or illustrate a Standard or Recommended Practice and which are referred to therein, form part of the associated Standard or Recommended Practice and have the same status.

d) *Appendices of ICAO Annex* comprising material grouped separately for convenience but forming part of the ICAO Annex.

e) *Attachments of ICAO Annex* comprising material supplementary to the Standards and Recommended Practices, or included as a guide to their application.

CHAPTER 1: INTRODUCTION

Section 1.1: General

1.1.1 Standards

1.1.1.1 The standards pertaining to the Aeronautical Telecommunication and Radio Navigation service in this AC is in accordance with the Standards and Recommended Practices in [Annex 10](#) to the Convention on International Civil Aviation. The standards comprise specifications (Standards) prescribed by AACM, of uniform application, determined to be necessary for the safety of air navigation. Service providers must document internal actions (Rules) in their own Operational Manuals and maintain the required records, to ensure compliance with the standards. Such Operational Manuals and required records should be available for inspection as well as for exposition of evidence by AACM inspectorate staff.

1.1.2 Differences between ICAO Standards and those in this AC

1.1.2.1 Where there is a difference between a standard prescribed in ICAO Annexes and this AC, the standards in this AC shall prevail.

1.1.3 Differences Published in AIP

1.1.3.1 Differences to the ICAO Standards and Recommended Practices are published in AIP GEN 1.7.

1.1.4 Documentation Change Management

1.1.4.1 The responsibility for the technical content and the amendment of this AC resides with the AACM.

1.1.4.2 The need to change standards in this AC may be generated by a number of causes. These may be to:

☐ ensure safety;

☐ ensure standardization;

☐ respond to changed AACM standards;

☐ respond to amendments to the ICAO Annexes;

☐ accommodate new initiatives or technologies.

1.1.5 Related Documents

1.1.5.1 These standards should be read in conjunction with ICAO [Annex 10](#) Volumes I to V inclusive (incorporates Amendments 1 – 83) including the appendices and attachments, and ICAO Doc 8071 Volume I to III – Testing of Radio Navigation Systems.

Section 1.2: Definitions

Aeronautical telecommunication service An aeronautical broadcast service, or an aeronautical fixed service, or an aeronautical mobile service that supports an ATS, or any system that processes or displays air traffic control data.

Aeronautical radio navigation service A radio navigation service intended for the benefit and for the safe operation of aircraft.

ATS Air Traffic Service as defined in Annex 11 to the Convention on International Civil Aviation.

Facility One or more items of equipment, at one or more locations, that provide an aeronautical telecommunication or radio navigation service.

Support service A service, provided to a service provider, that:

(a) is necessary for the functioning of a telecommunication or radio navigation service; and

(b) consists of information in electronic form and the carrier that carries the information.

CHAPTER 2: AERONAUTICAL TELECOMMUNICATION AND

RADIO NAVIGATION SERVICES AND FACILITIES

Section 2.1: Aeronautical Telecommunication Services

2.1.1 Classification of Services

2.1.1.1 Aeronautical telecommunication services are the ground-based stations of those services defined hereunder supporting an Air Traffic Service. Airborne stations are not included.

(a) Aeronautical Broadcasting Service. A broadcasting service intended for the transmission of information relating to air navigation.

(b) Aeronautical Fixed Service. A telecommunication service between specified fixed points provided primarily for the safety of air navigation and for the regular, efficient and economical operation of air services.

(c) Aeronautical Fixed Telecommunication Network Service. A worldwide system of aeronautical fixed circuits provided, as part of the aeronautical fixed service, for the exchange of messages and/or digital data between aeronautical fixed stations having the same or compatible communication characteristics.

(d) Aeronautical Telecommunication Network Service. An inter-network that allows ground, air-ground and avionics data sub-networks to interoperate by adopting common interface services and protocols based on the International Organization for Standardization (ISO) Open Systems Interconnect (OSI) reference model.

(e) Aeronautical Mobile Service. A mobile service between aeronautical ground stations and aircraft stations, in which survival craft stations may participate; emergency position-indicating radio-beacon stations may also participate in this service on distress and emergency frequencies.

This service does not include ground stations that are provided for other than ATS purposes.

(f) Any telecommunication service which processes or displays air traffic control data (including aviation meteorological data) for use by an ATS provider.

(g) Electronic briefing and flight plan lodgment service for the use of pilots.

Section 2.2: Aeronautical Radio Navigation services

2.2.1 Classification of Services

2.2.1.1 A radio navigation service intended for the benefit, and for the safe operation of aircraft.

2.2.1.2 Radio navigation services include radio determination (radar surveillance services) supporting ATS.

Section 2.3: Aeronautical Telecommunication and Radio Navigation Facilities

2.3.1 Classification of Facilities

2.3.1.1 The following list classifies the kinds of facilities used for the provision of aeronautical telecommunication and radio navigation services and all facilities used should be in compliance with the standards as dictated in Article 1.1.1 of this AC:

(a) VHF air/ground voice communication facilities;

(b) HF air/ground voice communication facilities;

(c) UHF air/ground voice communication facilities;

(d) Precision approach radio navigation aids;

(e) Instrument Landing System facilities;

(f) Non-precision radio navigation aids;

(g) Distance Measuring Equipment;

- (h) VHF Omni-range (VOR) facilities;
- (i) Non-directional beacons (NDB);
- (j) Flight data processing facilities;
- (k) Flight information facilities;
- (l) Radar data processing facilities;
- (m) Primary surveillance radar facilities;
- (n) Secondary surveillance radar facilities;
- (o) Surface movement radar facilities;
- (p) Precision runway monitor facilities;
- (q) Automatic dependent surveillance system facilities;
- (r) Voice switching and control facilities;
- (s) ATS point to point communication facilities;
- (t) Air/ground data links;
- (u) Ground to ground data interchange networks;
- (v) Human Machine Interface systems, including Tower Consoles, ATS Work Stations, and Display facilities;
- (w) Uninterruptible and emergency power supplies;

(x) Essential services in buildings and in equipment shelters housing facilities (electrical power supplies, air-conditioning, and security facilities);

(y) Global Navigation Satellite System ground based augmentation stations or facilities;

(z) Aeronautical databases used in or by a facility;

(aa) Meteorological Display Systems used for ATS;

(bb) Voice and Data Recording facilities;

CHAPTER 3: SAFETY MANAGEMENT SYSTEM

Section 3.1: Standards for the Safety Management System

3.1.1 Requirements for safety management system should be in accordance with the following:

3.1.1.1 Aeronautical Circular No. AC/GEN/005R00 with subject “Safety Management System Requirements” ICAO document 9859 Safety Management Manual

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CHAPTER 4: RESERVED

CHAPTER 5: TECHNICIAN JOB DESCRIPTIONS, QUALIFICATIONS AND TRAINING

Section 5.1: Technician Job Descriptions and Qualifications

5.1.1 Job Descriptions

5.1.1.1 The job descriptions for technicians performing operation and maintenance functions associated with aeronautical telecommunication facilities and/or radio navigation facilities should be developed and document the details of corresponding functions and responsibilities.

5.1.2 Minimum Academic Qualifications

5.1.2.1 The minimum academic qualification for technicians performing operation and maintenance functions associated with aeronautical telecommunication facilities and/or radio navigation facilities is a diploma of technology in one of the following:

- (a) radio engineering;
- (b) communications engineering;
- (c) electrical engineering;
- (d) electronic engineering;
- (e) computer science;
- (f) information technology; or
- (g) qualifications equivalent to the above qualifications.

5.1.2.2 For those technicians that carry out or supervise electrical and mechanical work only, the minimum qualification is an electrical or mechanical qualification, as relevant.

5.1.2.3 Where an organization considers, and AACM agrees, that the operation and maintenance of a particular type of facility is not technically complex, lesser qualifications may be acceptable for those technicians who operate and maintain that type of facility.

Section 5.2: Technician Training

5.2.1 Training Programme

5.2.1.1 The training programme for technicians performing operation and maintenance functions associated with aeronautical telecommunication facilities and/or radio navigation facilities should include initial, recurrent and/or specialized training, corresponding to the functions as detailed in the job descriptions, for ensuring the on-going retention of technicians' competency on the facility types for which they are responsible.

5.2.2 Training Records

5.2.1.1 The training records for technicians performing operation and maintenance functions associated with aeronautical telecommunication facilities and/or radio navigation facilities, including initial, recurrent and/or specialized training, should be maintained.

CHAPTER 6: TEST EQUIPMENT AND TEST FACILITIES

Section 6.1: Test Facilities for Aeronautical Telecommunication or Radio Navigation Services and Facilities

6.1.1 Standards

6.1.1.1 An organization should have available the necessary test facilities for use in the operation and maintenance of services and facilities.

6.1.1.2 Organizations should use documented procedures to control, calibrate, and maintain test equipment.

6.1.1.3 Calibrated test equipment should be used in maintenance of a service or facility.

6.1.1.4 Calibration should be carried out at prescribed intervals for each type of test equipment and the calibration should be traceable to national measurement standards.

6.1.1.5 Records of the calibration status of each item of test equipment should be retained.

6.1.1.6 Each item of test equipment should carry a visual identification of its calibration status, the date that the equipment was last calibrated, and the prescribed calibration periodicity.

6.1.1.7 An organization should assess the validity of previous test results whenever an item of test equipment is found to be out of calibration.

Section 6.2: Flight Inspection Types and Periodicity of Aeronautical Telecommunication or Radio Navigation Services and Facilities

6.2.1 Standards and reference

6.2.1.1 Requirements for flight inspection should be in accordance with the following:

(a) ICAO Annex 10 Aeronautical Telecommunications, Volume I – V as standards.

(b) ICAO document 8071 Manual on Testing of Radio Navigation Aids, Volume I – III as standards.

(c) FAA Order 8200.1A United States Standard Flight Inspection Manual as reference material.

6.2.2 Types of Flight Inspections

6.2.2.1 Flight inspections should be classified and carried out as follows:

(a) Site proving: Inspection to confirm that location selected for installation of a new air navigation aid is appropriate

(b) Commissioning: Inspection to determine operability of a newly installed air navigation aids before commencing operation

(c) Periodic: Inspection conducted on a regular basis to confirm the validity of air navigation aids

(d) Surveillance: Inspection that monitors the operational status of other radio navigation aids while an air navigation aid subject to flight inspection is undergoing an inspection

(e) Special: Inspections conducted under following cases

- Inspection conducted in relation to an aircraft accident
- Inspection conducted after suspended operation or repairs of an air navigation aids
- Inspection conducted for an air navigation aid whose flight inspection period has expired
- Inspection conducted to evaluate equipment under research and development
- Other inspections deemed necessary

6.2.3 Periodicity of Flight Inspection

6.2.3.1 Facilities subject to flight inspections and frequency of their inspections should be as follows.

- Instrument Landing System(LLZ, GP): 90/120/180 days
- Instrument Guidance System (LLZ): 360 days
- Radar System (Primary, SSR, SMR): 360 days
- VHF Omni-Directional Range (VOR): 360/540 days
- Distance Measurement Facility (DME): Inspected at the same time as co-located facilities are inspected
- Lighting Systems: 360 days
- ATC Facility (VHF, UHF) and aeronautical information broadcasting facilities: Inspected when the radar facilities are inspected or once every 360 days for those without radar facilities

6.2.3.2 ILS operation checks shall be done every 90 days and will be extended to every 120 days if no defects are found in the main components after 3 consecutive flight inspections (including 2 times with monitor) conducted at 90 day intervals and the last of which may be substituted as the first 120-day interval flight inspection.

6.2.3.3 Inspection period of ILS flight inspections can be extended to every 180 days if no defects are found in the main components after 3 consecutive flight inspections conducted at 120 day intervals and the last of which may be substituted as the first 180-day interval flight inspection.

6.2.3.4 If results of inspections conducted every 120 or 180 days finds the same defect in the main ILS component two consecutive times or if 3 or more defects are found in any single inspection, the inspection period of 180-day and 120-day interval inspections shall be reduced to every 120 days and 90 days, respectively.

6.2.3.5 When a change in inspection date is necessary due to bad weather condition, breakdown of flight inspection aircraft and other inevitable reasons, the inspection date may be rescheduled for 15 days before or after the scheduled date for inspections conducted every 90 days and before or after 60 days for inspections conducted every 120 days.

CHAPTER 7: DOCUMENT DATA AVAILABILITY AND CONTROL

Section 7.1: Documents to be Held by the Provider

7.1.1 Standards

7.1.1.1 The following documentation is essential for the provision of services:

- (a) [Annex 10](#) Volumes I to V inclusive (incorporates Amendments 1 – 83);
- (b) the functional specification and technical specification of services and facilities;
- (c) records of the configuration of facilities;
- (d) facility operation and maintenance plans;
- (e) interface agreements with other organizations;
- (f) facility technical manuals or instructions;
- (g) local instructions and technical procedures;

CHAPTER 8: RECORDS

Section 8.1: Records System and Procedures

8.1.1 General

8.1.1.1 The records system and procedures identify, collect, index, store, and maintain records necessary for the safe provision of services.

8.1.2 Standards

8.1.2.1 The procedures must ensure that legible and permanent records are kept which provide a traceable history over the lifecycle of services. Records that should be kept include:

- (a) records of design, manufacturing, procurement, installation, testing, commissioning, modification, and decommissioning;
- (b) records of the designated authorities for the design, operation and maintenance for each system;
- (c) records of hazard analysis and risk assessments;
- (d) records of facility performance and facility maintenance history including performance parameter values, test facilities utilized identity of authorized technicians conducting operation and maintenance, changes to maintenance procedures;
- (e) records of facility failures and faults
- (f) records of defect reports and associated defect investigations;
- (g) records of technician's competencies, including details of experience, qualifications, training.

Section 8.2: Site Logs

8.2.1 Standards for Site Logs

8.2.1.1 Site logs should be kept for all facilities used to provide an aeronautical telecommunication service or a radio navigation service.

8.2.1.2 The site log should record all occurrences and actions relating to operation, maintenance, modification, failure, faults, and removal from and restoration to service.

8.2.1.3 Entries in site logs should include the date/time of the entry and the occurrence and are signed by the technician or other person making the entry.

8.2.1.4 Site log records should be retained for at least five years.

CHAPTER 9: SECURITY

Section 9.1: Security Program for Aeronautical Telecommunication and Radio Navigation Facilities

9.1.1 Purpose

9.1.1.1 The purpose of a security program is to minimize the risk of unauthorized access, entry by animals, or malicious damage to a service or facilities.

9.1.2 Standards

9.1.2.1 The security program should include, but is not limited to, the physical security measures, and the procedures to be followed, for:

- (a) preventing and detecting intentional or unintentional damage to any facility or equipment used for providing an aeronautical telecommunication or radio navigation service;
- (b) responding to a threat of intentional damage to a facility or equipment;
- (c) preventing unauthorized people from having access to any facility or equipment used by the provider in providing an aeronautical telecommunication or radio navigation service.

- END -