

AERONAUTICAL CIRCULAR CIVIL AVIATION AUTHORITY – MACAO, CHINA

SUBJECT: *Manual of Standards –Aeronautical Information Services*

EFFECTIVE DATE:

01 FEB 2013

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).

1. Purpose

The purpose of this AC is to establish the aeronautical information services requirements in accordance with ICAO Standards and Recommended Practices. The detailed requirements are prescribed in Appendix A of this AC, titled as Manual of Standards – Aeronautical Information Services (MOS – AIS).

The standards and recommended practices in this Manual are based on those stipulated in Annexes 4 and 15 (entitled “Aeronautical Charts” and “Aeronautical Information Services”) to the Convention on International Civil Aviation [as in force and amended from time to time by the Council of the International Civil Aviation Organisation (ICAO)] and other relevant ICAO documents, and with such modifications as may be determined by AACM to be applicable in Macao.

2. Applicability

The requirements contained in this AC are applicable to air information services being provided within Macao.

3. Document change record of ATS Requirements

The complete history of the MOS – AIS in Appendix A to this AC is shown in the following table.

Issue	Revision	Date	Subject	Pages affected
1	0	01/10/2012	Initial issue	All

- END -

Appendix A

Manual of Standards –Aeronautical Information Services (MOS – AIS)

Issue 1. Rev 0

Contents

DEFINITIONS AND ABBREVIATIONS	4
Chapter 1. Introduction	6
Chapter 2. Operation Requirement	8
Chapter 3. Safety Management System	12
Chapter 4. Training and Personnel Requirement	16
Chapter 5. Aeronautical Information Publication	17
Chapter 6. NOTAM	19
Chapter 7. Pre-flight and Post-flight Information Service	21
Chapter 8. Aeronautical Information Regulation and Control.....	23
Chapter 9. Aeronautical Information Circular	24
Chapter 10. Aeronautical Charts.....	25
Chapter 11. Documentation and Records	26

Document Change History

Issue	Revision	Date	Subject	Pages affected
1	0	01/10/2012	Initial issue	All

DEFINITIONS AND ABBREVIATIONS

Definitions

Accuracy

A degree of conformance between the estimated or measured value and the true value

Aeronautical Chart

A representation of a portion of the earth, its culture and relief, specifically designated to meet the requirements of air navigation.

Aeronautical Data

A representation of aeronautical facts, concepts or instructions in a formalized manner suitable for communication, interpretation or processing

Aeronautical Information

Information resulting from the assembly, analysis and formatting of aeronautical data

Aeronautical Information Publication

A publication issued by or with the authority of a State and containing aeronautical information of a lasting character essential to air navigation

Aeronautical Information Circular

A notice containing information that does not qualify for the origination of a NOTAM or for inclusion in the AIP, but which relates to flight safety, air navigation, technical, administrative or legislative matters.

AIP Amendment

Permanent changes to the information contained in the AIP

AIP Supplement

Temporary changes to the information contained in the AIP which are published by means of special pages

AIRAC

An acronym (aeronautical information regulation and control) signifying a system aimed at advance notification based on common effective dates, of circumstances that necessitate significant changes in operating practices.

Aeronautical Information Services

A service established within the defined area of coverage responsible for the provision of aeronautical information/data necessary for the safety, regularity and efficiency of air navigation

Cyclic Redundancy Check (CRC)

A mathematical algorithm applied to the digital expression of data that provides a level of assurance against loss or alteration of data

Data Quality

A degree or level of confidence that the data provided meets the requirements of the data user in terms of accuracy, resolution and integrity

Human Factors Principles

Principles which apply to aeronautical design, certification, training, operations and

maintenance and which seek safe interface between the human and other system components by proper consideration to human performance

Integrity (Aeronautical Data)

A degree of assurance that an aeronautical data and its value have not been lost nor altered since the data origination or authorized amendment

International NOTAM Office (NOF)

An office designated by a State for the exchange of NOTAM internationally

NOTAM

A notice distributed by means of telecommunication containing information concerning the establishment, condition or change in any aeronautical facility, service, procedure or hazard, the timely knowledge of which is essential to personnel concerned with flight operations

Resolution

A number of units or digits to which a measured or calculated value is expressed and used

Station Declination

An alignment variation between the zero degree radial of a VOR and true north, determined at the time the VOR station is calibrated.

Abbreviations

AAR	Aerodrome and Air Navigation Services Regulation
AFS	Aeronautical Fixed Services
AIC	Aeronautical Information Circular
AIP	Aeronautical Information Publication
AIRAC	Aeronautical Information Regulation and Control
AIS	Aeronautical Information Services
ATC	Air Traffic Control
ATS	Air Traffic Service
ATM	Air Traffic Management
CRC	Cyclic Redundancy Check
ICAO	International Civil Aviation Organisation
NOF	International NOTAM Office
NOTAM	Notice to Airmen
SARPS	Standards and Recommended Practices
SMS	Safety Management System

Chapter 1. Introduction

- 1.1 The standards and recommended practices in this Manual are based on those stipulated in Annexes 4 and 15 (entitled “Aeronautical Charts” and “Aeronautical Information Services”) to the Convention on International Civil Aviation [as in force and amended from time to time by the Council of the International Civil Aviation Organisation (ICAO)] and other relevant ICAO documents, and with such modifications as may be determined by AACM to be applicable in Macao.
- 1.2 The Manual of Standards - Aeronautical Information Services, contains the standards, requirements and procedures pertaining to the planning and operation of aeronautical information services and the provision of aeronautical charts.
- 1.3 This Manual is based mainly on compliance with the following ICAO documents:
 - (a) ICAO Annex 4 – Aeronautical Charts;
 - (b) ICAO Annex 11 – Air Traffic Services;
 - (c) ICAO Annex 15 – Aeronautical Information Services;
 - (d) ICAO Doc 8126 – Aeronautical Information Services Manual;
 - (e) ICAO Doc 9859 – Safety Management Manual; and
 - (f) ICAO Doc 9674 – World Geodetic System – 1984 (WGS - 84) Manual
 - (G) Guidance Manual for Aeronautical Information Services (AIS) In The Asia/Pacific Region
- 1.4 Where there is a difference between a standard in this Manual and that of the above-mentioned ICAO documents, the standard in this Manual shall prevail.
- 1.5 Differences, where they exist, between the standards in this Manual and those contained in the ICAO Annexes shall be published in section GEN 1.7 of the Macao AIP and also notified to ICAO.
- 1.6 In this Manual, standards are preceded by the word “shall”, whereas recommended practices are preceded by the word “should”. An AIS provider shall comply with all standards at all times and should endeavor to comply with all recommended practices.
- 1.7 The AIS provider shall ensure that the units of measurement as specified in Manual of Standards – Units of Measurement to be used in Air and Ground Operations are used in the provision of aeronautical information services and

aeronautical charts.

- 1.8 When an AIS provider is not able to comply with any standards specified or referenced in this Manual, the AIS provider shall apply to AACM for exemption or deviation from the relevant standards. Applications shall be supported in writing with the reasons for such exemption or deviation including any safety assessment or other studies undertaken, and where appropriate, an indication of when compliance with the current standards can be expected.
- 1.9 When an AIS provider is not able to comply with any recommended practices specified or referenced in this Manual, the AIS provider shall notify AACM of the non-compliance or deviation with the supporting reason including any safety assessment or other studies undertaken, and where appropriate, an indication of when compliance with the current recommended practices can be expected.
- 1.10 Any exemption or deviation granted to an AIS provider shall also be recorded in the operations manual. The operations manual shall also contain the details of the exemption or deviation, such as the reason that the exemption or deviation was requested and any resultant limitations or conditions imposed.

Chapter 2. Operation Requirement

2.1 General AIS Operation Requirement

2.1.1 An AIS provider shall ensure that aeronautical information/data necessary for the safety, regularity or efficiency of air navigation is made available in a form in conformity with ICAO Annex 15 and suitable for the operational requirements of:

- (a) those involved in flight operations, including flight crews, flight planning and flight simulators; and
- (b) the ATS units responsible for flight information service and the services responsible for pre-flight information.

2.1.2 An AIS provider shall receive, and/or originate, collate, edit, format, publish/store and distribute aeronautical information/data concerning the airspace in which Macao has responsibility for air traffic services. The AIS provider shall publish the following aeronautical information elements according to its responsibility:

- (a) AIP, including amendment service;
- (b) Supplements to the AIP;
- (c) NOTAM;
- (d) AIC;
- (e) Checklists and lists of valid NOTAM. and

2.1.3 Pre-flight information bulletins (PIB)

2.1.4 An AIS provider shall ensure that published geographical coordinates indicating latitude and longitude are expressed in terms of the World Geodetic System – 1984 (WGS-84) geodetic reference datum as in ICAO Doc 9674 - World Geodetic System – 1984 (WGS-84) Manual.

2.1.5 Automation enabling digital data exchange should be introduced with the objective of improving the speed, quality, efficiency and cost-effectiveness of aeronautical information services.

2.1.6 The AIS provider shall ensure that the organisation of the aeronautical information services as well as the design, contents, processing and distribution of aeronautical information/data shall take into consideration human factors principles which facilitate their optimum utilization. Due consideration shall be given to the integrity of information where human interaction is required and mitigating steps taken where risks are identified.

- 2.1.7 The AIS provider shall make available a recapitulation of current NOTAM and other information of urgent character to flight crews in the form of pre-flight information bulletins (PIB).

2.2 Quality Management System

- 2.2.1 Quality management systems shall be implemented and maintained by an AIS provider encompassing all functions of an aeronautical information service, as described in paragraph 2.1.2.

- 2.2.2 Quality management should be applicable to the whole aeronautical information data chain from data origination to distribution to the next intended user, taking into consideration the intended use of data.

Note 1 – Quality management may be provided by a single quality management system or serial quality management systems.

Note 2, – Letters of agreement concerning data quality between originator and distributor and between distributor and next intended user may be used to manage the aeronautical information data chain.

- 2.2.3 The quality management system implemented in paragraph 2.2.1 shall follow the International Organisation for Standardisation (ISO) 9000 series of quality assurance standards, and be certified by an approved organisation.

- 2.2.4 The quality management system established by the AIS provider shall include the necessary policies, processes and procedures, including those for the use of metadata, to ensure and verify that aeronautical data is traceable throughout the aeronautical information data chain so as to allow any data anomalies or errors detected in use to be identified by root cause, corrected and communicated to affected users.

- 2.2.5 The quality management system established by the AIS provider shall provide users with the necessary assurance and confidence that the aeronautical information/data satisfy the aeronautical data quality for accuracy, resolution and integrity as specified in Appendix 7 of ICAO Annex 15, and the data traceability requirements through the provision of appropriate metadata as specific in 2.1.5. The system shall also provide assurance of the applicability period of intended use of aeronautical information/data as well as that the agreed distribution dates will be met.

- 2.2.6 The AIS provider shall comply with the order of accuracy for aeronautical information/data as specified in ICAO Annex 11, Chapter 2, paragraph 2.19 and Annex 14, Volumes I and II, Chapter 2. The order of publication resolution and data integrity of aeronautical information/data shall comply with Annex 15, paragraph 3.2.9 and Appendices 1 and 7.

- 2.2.7 The AIS provider shall ensure that electronic aeronautical data sets, shall be protected by the inclusion in the data sets of a 32-bit cyclic redundancy check

(CRC) implemented by the application dealing with the data sets.

2.3 Operations Manual

2.3.1 The AIS provider shall submit an operations manual to AACM. The information presented in the operations manual shall serve to demonstrate how the AIS provider will comply with the requirements of this Manual. It also serves as a reference document agreed between the AIS provider and AACM with respect to the standards, conditions and level of service to be maintained for the provision of aeronautical information services.

2.3.2 The contents of the operations manual shall contain:

- (a) the information required of the AIS provider as mentioned in this Manual;
- (b) Scope of the services provided;
 - i. A statement setting out the aeronautical information services, the related functions, and the hours of operation of the services provided.
 - ii. A statement identifying the location from where the services are provided.
- (c) an organization chart of the AIS provider that shows the position of each personnel and the name, qualification, experience, duties and responsibilities of personnel who are responsible for ensuring the compliance of the organization with the requirements in subparagraph (a);
- (d) the procedures and flowcharts for the aeronautical information services; and
- (e) the procedures related to contingency and emergency
 - i. The AIS provider's contingency plan shall describe in detail the actions that operational staff are to follow to maintain safety in the event of the failure or non-availability of staff, facilities or equipment which affects the provision of air traffic services. The plan must also cover procedures for the safe and orderly transition back to full service provision.
 - ii. The AIS provider's emergency plan shall outline the procedures under various emergency situations as general guide to air traffic services personnel
- (f) information on the compliance of the aeronautical information services with the applicable requirements of ICAO Annex 4 and 15 and this Manual of Standards – Aeronautical Information Services.

2.3.3 The operations manual may consist of a main manual covering the main areas that need to be addressed, as well as separate supporting documents and manuals.

2.3.4 The operations manual is an important document and shall be issued under the authority of the AIS provider. The AIS provider shall control the distribution of

the operations manual and ensure that it is amended whenever necessary to maintain the accuracy of the information in the operations manual and to keep its contents up to date.

Chapter 3. Safety Management System

3.1 Introduction

3.1.1 The AIS provider shall establish a Safety Management System (SMS), the requirements of which are stipulated in ICAO Annex 11, Chapter 2, paragraphs 2.27.3. and 2.27.4. As a minimum, the SMS shall:

- (a) identify safety hazards;
- (b) ensure the implementation of remedial action necessary to maintain agreed safety performance;
- (c) provide for continuous monitoring and regular assessment of the safety performance; and
- (d) aim at a continuous improvement of the overall performance of the safety management system.

3.2 SMS Framework

3.2.1 The SMS to be established shall comply with a SMS framework consisting of the following components:

(a) Safety Policy and Objectives

- (i) Management commitment and responsibility The SMS shall have a clear definition of the philosophy and fundamental approach the service provider will adopt for the management of safety within its organization. This includes setting the safety policies and how they relate to the operation and maintenance processes of the service provider. The policies shall also clearly encapsulate the senior management's commitment to improve safety in the organization as a top priority, with the provision of the necessary human and financial resources for its implementation. The safety policy shall be periodically reviewed to ensure it remains relevant.

(ii) Safety accountabilities

The SMS shall have clear lines of safety accountabilities within the organization, including a direct accountability for safety on the part of senior management. Safety accountabilities shall be documented and communicated throughout the organization.

(iii) Appointment of key safety personnel

The AIS provider shall appoint a safety manager to serve as the

focal point and driving force for the implementation and maintenance of SMS activities. However, the safety manager should not be held solely responsible for safety. Specific safety activities and the functional or operational safety performance and outcome are the responsibility of the relevant operational or functional managers and staff.

(iv) SMS implementation plan

The AIS provider shall develop and maintain an SMS implementation plan that defines the organization's approach to manage safety in a manner that meets the organization's safety needs. The SMS implementation plan shall be endorsed by senior management of the organization. A Safety Committee should be formed to set safety policies, direct and oversee SMS implementation and promotion and review safety performance. It should also serve as a forum to discuss any safety-related issues. The committee should be well represented to include key operational staff.

(v) Documentation

A SMS manual shall be produced as part of the operations manual, as this is the key instrument for guiding and communicating the organisation's SMS approach and methodology to the whole organization. Guidance on the production of an SMS manual can be found in ICAO Doc 9859. It should also consist of the components of SMS as described in this chapter. Operating an SMS generates large amount of data, document and records. A systematic record of these documents should be maintained and kept up to date. Such records would also be required as evidence of ongoing SMS processes including hazard identification and risk assessment.

(b) Safety Risk Management

(i) Hazard identification

The AIS provider shall develop and maintain a formal process for effectively collecting, recording, acting on and generating feedback about hazards in operations, based on a combination of reactive, proactive and predictive methods of safety data collection.

(ii) Safety risk assessment and mitigation process

The AIS provider shall develop and maintain a formal risk management process that ensures analysis (in terms of probability and severity of occurrence), assessment (in terms of

tolerability) and control (in terms of mitigation) of risks to an acceptable level.

(c) Safety Assurance

(i) Safety performance monitoring and measurement

(1) The AIS provider shall develop and maintain the means to verify the safety performance of the organization compared to the safety policy and objectives, and to validate the effectiveness of safety risks controls.

(2) The AIS provider shall establish and submit the safety performance indicators and targets of its SMS to AACM for agreement. Details on the establishment of the safety performance indicators and targets can be found in ICAO Doc 9859. The safety performance indicators and targets should be periodically reviewed by the Safety Committee to ensure they remain relevant.

(ii) Management of change

The AIS provider shall develop and maintain a formal process to identify changes within the organization which may affect established processes and services. A risk assessment should be carried out before the implementation of such changes.

(iii) Continuous improvement of the SMS

The AIS provider shall develop and maintain a formal process to identify the causes of sub-standard performance of the SMS, determine the implications of sub-standard performance in operations, and eliminate or mitigate such causes, in order to ensure the continual improvement of the SMS.

(iv) Safety audit

Regular internal safety audits should be conducted by the service provider to assure the effectiveness of its SMS. The safety audit should be conducted by a team of trained auditors who are familiar with the operation of the aeronautical information service, but also independent and not involved with the day to day operation of the service. Records of such safety audits and corrective follow up actions should be kept.

(d) Safety Promotion

(i) Training and education

The AIS provider shall develop and maintain a safety training programme to ensure that personnel are trained and competent

to perform the SMS duties. The scope of the safety training shall be appropriate to each individual's involvement in the SMS.

(ii) Safety communication

The AIS provider shall communicate and promote the organization's SMS processes and activities to its entire staff, to ensure that staff is fully aware of the SMS. The AIS provider shall develop and maintain formal means for safety communication to ensure that staff are fully aware why particular safety actions and procedures are introduced or changed.

Chapter 4. Training and Personnel Requirement

4.1 Training Requirement

- 4.1.1 The AIS provider shall establish procedures to ensure that all its personnel, including cartographic technical staff, possess the skills and competencies required in the provision of aeronautical information services. The AIS provider shall develop an overall training policy and programme and detailed job descriptions for its staff. The training policy and programme should lay down the training courses that different levels of staff have to undergo to perform their duties, including initial, recurrent and specialized training. The job description should depict the job purpose, key responsibilities, and outcome to be achieved of each staff.
- 4.1.2 The AIS provider shall ensure that its staff undergo a suitable period of supervised on-the-job training before being deployed for duties.
- 4.1.3 The AIS provider shall maintain individual training records for each of its staff, which should include a training plan detailing the courses completed by each staff.
- 4.1.4 The AIS provider shall conduct annual recurrent competency check to identify any gaps in competency, changes in training requirement and prioritize the type of training required for the coming year.

4.2 Personnel Requirement

- 4.2.1 The AIS provider shall employ sufficient number of competent personnel to perform the operation of the service. The AIS provider shall provide in the operations manual an analysis of the number of personnel required to perform the aeronautical information service taking into account the duties and workload required.

Chapter 5. Aeronautical Information Publication

5.1 AIP Requirement

- 5.1.1 The AIS provider shall publish an Aeronautical Information Publication (AIP) containing current information, data and aeronautical charts relating to the airspace in which Macao has responsibility for air traffic services. The contents of the AIP shall be in accordance with Chapter 4 and Appendix 1 of Annex 15.
- 5.1.2 The AIS provider shall ensure that the AIP to be published is self-contained and includes:
- (a) a statement of the competent authority responsible for the air navigation facilities, services or procedures covered by the AIP;
 - (b) the general condition under which the services or facilities are available for international use;
 - (c) a list of the significant differences with the ICAO SARPS that Macao has filed with ICAO with regards to its own regulations and practices;
 - (d) a summary of any significant regulations and practices followed by Macao where the ICAO SARPS allow alternative course of action.
- 5.1.3 The AIS provider shall establish a system to disseminate and make the AIP, AIP Amendment and AIP Supplement available to any person upon request.

5.2 AIP Amendment

- 5.2.1 The AIS provider shall ensure that permanent changes to the AIP are published as AIP Amendments. Each AIP Amendment shall be allocated a serial number, which shall be consecutive. Each AIP Amendment page, including the cover sheet, shall display a publication date. A brief indication of the subjects affected by the amendment shall be given on the AIP Amendment cover sheet.
- 5.2.2 The AIS provider should establish and publish the publication dates for its AIP Amendments in the AIP

5.3 AIP Supplement

- 5.3.1 The AIS provider shall ensure that temporary changes of long duration (three months or longer) and information of short duration which contains extensive text and/or graphics are published as AIP Supplement. 5.3.2 Each AIP Supplement shall be allocated a serial number which shall be consecutive and based on the calendar year. AIP Supplement pages shall be kept in the AIP as long as all or some of their contents remain valid.
- 5.3.2 The AIS provider shall issue a checklist of valid AIP Supplements at intervals of not more than one month. This information shall be issued through the medium of the monthly printed plain language list of valid NOTAM required by

paragraph 6.3.3.

5.4 Electronic AIP (eAIP)

- 5.4.1 The AIS provider should publish the AIP, AIP Amendment, AIP Supplement and AIC in a format that allows for displaying on a computer screen and printing on paper.
- 5.4.2 Note 1. – This composite electronic document is named “Electronic AIP” (eAIP) and may be based on a format that allows for digital data exchange.
- 5.4.3 When provided, the information content of the eAIP and the structure of chapters, sections and sub-sections shall follow the content and structure of the paper AIP. The eAIP shall include files that allow for printing a paper AIP.
- 5.4.4 When provided, the eAIP should be available on a physical distribution medium (CD, DVD, etc.) or online on the Internet.

Chapter 6. NOTAM

6.1 General NOTAM Requirement

- 6.1.1 The AIS provider shall promptly originate and issue a NOTAM whenever the information to be distributed is of a temporary nature and of short duration or when operationally significant permanent changes, or temporary changes of long duration are made at short notice, except for extensive text and/or graphics.
- 6.1.2 The AIS provider shall ensure that the NOTAM service to be established shall:
- (a) designate a NOF for Macao;
 - (b) operate the NOF on a 24-hour basis;
 - (c) establish agreements with other international NOTAM offices for the exchange of NOTAM;
 - (d) use appropriate telecommunication facilities to issue and receive NOTAM;
 - (e) issue a checklist of the NOTAMs that are currently in force, at intervals of not more than one month; and
 - (f) issue promptly NOTAM in a format in accordance with ICAO Annex 15.

6.2 Specific NOTAM Requirement

- 6.2.1 The AIS provider shall ensure that:
- (a) each NOTAM issued is allocated a series identified by a letter and a four-digit number followed by a stroke and a two-digit number for the year. The four-digit number shall be consecutive and based on the calendar year;
 - (b) each NOTAM issued is brief, deal with only one subject, and be compiled so that its meaning is clear without reference to another document;
 - (c) if a NOTAM contains information that requires an amendment to the AIP or an AIP Supplement, the NOTAM shall contain a cross reference to the affected AIP text or AIP Supplement;
 - (d) if a NOTAM is issued which cancels or supersedes a previous NOTAM, the serial number of the previous NOTAM shall be specified;
 - (e) if an error is detected in a NOTAM, a replacement NOTAM which cancels the original shall be issued;

6.3 Distribution of NOTAM

- 6.3.1 The AIS provider shall ensure that each NOTAM is distributed on the basis of a request and shall be distributed as a single telecommunication message.
- 6.3.2 The AIS provider shall ensure that whenever practicable, the AFS is employed for NOTAM distribution. A predetermined distribution system for NOTAM transmitted on the AFS shall be used, subject to agreement established with other international NOTAM offices.
- 6.3.3 The AIS provider shall ensure that a monthly printed plain language list of valid

NOTAM, including indications of the latest AIP Amendments, AIC issued and a checklist of AIP Supplements is prepared with a minimum of delay and forwarded by the most expeditious means to recipients of the Integrated Aeronautical Information Package.

Chapter 7. Pre-flight and Post-flight Information Service

7.1 Pre-Flight Information

7.1.1 The AIS provider shall make available to flight operations personnel, including flight crews at aerodromes of departure in Macao, aeronautical information that is essential for the safety, regularity and efficiency of air navigation.

7.1.2 The aeronautical information to be provided for pre-flight information shall include:

- (a) relevant elements of the Integrated Aeronautical Information Package
- (b) a summary of current NOTAM and other information of an urgent character, in the form of plain-language pre-flight information bulletins (PIB);
- (c) relevant maps and charts;
- (d) current information relating to the aerodrome of departure concerning the following:
 - (i) construction or maintenance work on or immediately adjacent to the manoeuvring area;
 - (ii) rough portions of any part of the manoeuvring area, whether marked or not;
 - (iii) presence and depth of water on runways and taxiways, including their effect on runway friction;
 - (iv) parked aircraft or other objects on or immediately next to taxiways;
 - (v) presence of other temporary hazards, including birds;
 - (vi) failure or irregular operation of part or all of the aerodrome lighting system and aerodrome power supply;
 - (vii) failure or irregular operation or changes in the operational status of air navigation facilities;

7.2 Automated Pre-flight Information System

7.2.1 The AIS provider shall ensure that the automated pre-flight information system for the supply of aeronautical information/data for self-briefing, flight planning and flight information service:

- (a) provide for continuous and timely updating of the system database and monitoring of the validity and quality of the aeronautical data stored;
- (b) permit access by operations personnel, including flight crew members and other aeronautical users through suitable telecommunications means;
- (c) ensure provision, in paper copy form, of the aeronautical information/data accessed, as required;
- (d) use access and interrogation procedures based on abbreviated plain language and ICAO location indicators, as appropriate; and
- (e) provide rapid response to a user request for information.

7.3 Post-flight Information

- 7.3.1 The AIS provider shall ensure that arrangements are made to receive at Macao aerodromes, information concerning the state and operation of air navigation facilities and the presence of birds noted by aircrews and shall ensure that such information is made available to the AIS provider for such distribution as the circumstances necessitate.

Chapter 8. Aeronautical Information Regulation and Control

- 8.1 The AIS provider shall publish under the AIRAC system the establishment, withdrawal of, and premeditated significant changes (including operational trials) to aeronautical information stipulated under Appendix 4 of ICAO Annex 15. Guidance material on the procedures applicable to the AIRAC system is found in ICAO Doc 8126 – AIS Manual.
- 8.2 The information under the AIRAC system shall be published in paper copy form and shall be distributed at least 42 days in advance of the effective date with the objective of reaching recipients at least 28 days in advance of the effective date. The information published shall not be changed further for at least another 28 days after the effective date, unless the circumstance notified is of a temporary nature and would not persist for the full period.
- 8.3 The AIS provider should publish, on a yearly basis, an AIC listing the AIRAC effective dates, publication dates and latest dates on which the raw data must reach AIS in order for an AIRAC AIP Supplement to be published and reach recipients at least 28 days in advance of the effective date

Chapter 9. Aeronautical Information Circular

- 9.1 The AIS provider shall originate an AIC whenever it is necessary to promulgate aeronautical information which does not qualify for inclusion in the AIP or NOTAM. An AIC shall be originated whenever it is desirable to promulgate:
- (a) a long-term forecast of any major change in legislation, regulations, procedures or facilities;
 - (b) information of a purely explanatory or advisory nature liable to affect flight safety;
 - (c) information or notification of an explanatory or advisory nature concerning technical, legislative or purely administrative matters.
- 9.2 Each AIC shall be issued in printed form and be allocated a serial number which should be consecutive and based on the calendar year.
- 9.3 A checklist of AIC currently in force shall be issued at least once a year, with distribution as for the AIC.

Chapter 10. Aeronautical Charts

- 10.1 The AIS provider shall ensure that all aeronautical charts which are produced in Macao are in conformity with ICAO Annex 4.
- 10.2 The AIS provider shall publish the following aeronautical charts which are applicable in Macao:
 - (a) Aerodrome Chart – ICAO
 - (b) Aerodrome Obstacle Chart – ICAO Type A
 - (a) Precision Approach Terrain Chart – ICAO
 - (f) Area Chart – ICAO
 - (g) Standard Departure Chart – Instrument (SID) – ICAO
 - (h) Standard Arrival Chart – Instrument (STAR) – ICAO
 - (i) Instrument Approach Chart – ICAO
 - (j) Visual Approach Chart – ICAO
- 10.3 The AIS provider shall ensure that all aeronautical charts listed in 11.2 are readily available to users, including from other ICAO Contracting States. The AIS provider shall take all reasonable measures to ensure that the information it provides and the aeronautical charts made available are adequate and accurate and that they are maintained up-to-date by an adequate revision service.
- 10.4 The AIS provider shall ensure that each type of aeronautical chart provides information relevant to the function of the chart and its design shall observe human factors principles which facilitate its optimum use.
- 10.5 The AIS provider shall ensure that the presentation of information in the aeronautical charts is accurate, free from distortion and clutter, unambiguous, and readable under all normal operating conditions.
- 10.6 The AIS provider shall ensure that aeronautical data quality requirements related to the data integrity and charting resolution are in accordance with ICAO Annex 4 paragraph 2.17 and Tables 1 to 5 in Appendix 6. The integrity of the data shall be maintained throughout the data process from survey/origin to the next intended user. Aeronautical data integrity requirement shall be based upon the potential risk resulting from the corruption of data and the use to which the data item is put.
- 10.7 The AIS provider shall ensure that electronic aeronautical data shall be protected by the inclusion in the data sets of a 32-bit cyclic redundancy check (CRC) implemented by the application dealing with the data sets.

Chapter 11. Documentation and Records

11.1 Documents and Records to be Maintained

11.1.1 The AIS provider shall maintain all documents and records which are necessary for the operation of the service. Copies of these documents shall also be made available to personnel where needed. These documents shall include but not limited to:

- (a) the Manual of Standards – Aeronautical Information Services;
- (b) the AIS provider's operations manual;
- (c) ICAO Annexes 4 and 15, Doc 8126, Doc 9859 and other relevant ICAO documents;
- (d) records of all incoming and outgoing aeronautical information to be identified by serial number and date;
- (e) records of each person who is authorized to check, edit and publish aeronautical information;
- (f) records of internal quality and safety audit reports;
- (g) records of reporting, investigation and correction of error;
- (h) records of job description, training programme and plan.

11.2 Document Control

11.2.1 The AIS provider shall establish a process for the authorization and amendment of the documents stipulated in paragraph 10.1.1 to ensure that they are constantly updated. The AIS provider shall establish a system to ensure that:

- (a) the currency of the documents can be readily determined;
- (b) amendments to the documents are controlled in accordance with established quality management principles; and
- (c) only current versions of documents are available.

11.2.2 The AIS provider shall ensure that where documents are held as computer based records and where paper copies of computer based records are made, they are subjected to the same control as paper documents.