GHANA CIVIL AVIATION (AIR NAVIGATION SERVICES) DIRECTIVES

PART 15 – AERONAUTICAL INFORMATION SERVICES

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15.1 GENERAL

15.1.1 INTRODUCTION

(1) The object of the Aeronautical Information Service is to ensure the flow of aeronautical data and aeronautical information necessary for global air traffic management (ATM) system safety, regularity, economic and efficiency in an environmentally sustainable manner. The role and importance of aeronautical data and aeronautical information changed significantly with the implementation of area navigation (RNAV), performance-based navigation (PBN), airborne computer-based navigation systems, performance-based communication (PBC), performance based surveillance (PBS), data link systems and satellite voice communications (SATVOICE). Corrupt, erroneous, late, or missing aeronautical data and aeronautical information can potentially affect the safety of air navigation.

(2) These Directives shall be used in conjunction with the following:

(a) Procedures for Air Navigation Services — ICAO Abbreviations and Codes (PANS-ABC, Doc 8400);

(b) Aeronautical Information Management (PANS-AIM, Doc 10066); and

(c) Guidance material on the organization and operation of the AIS is contained in the Aeronautical Information Services Manual (Doc 8126).

15.1.2 DEFINITIONS

When the following terms are used in this Part, they shall have the following meanings:

Aerodrome. A defined area on land or water (including any buildings, installations and equipment) intended to be used either wholly or in part for the arrival, departure and surface movement of aircraft.

Aerodrome mapping data (AMD). Data collected for the purpose of compiling aerodrome mapping information.

Aerodrome mapping database (AMDB). A collection of aerodrome mapping data organized and arranged as a structured data set.

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 fixed service (AFS). 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.

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

Aeronautical Information Circular (AIC). 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.

Aeronautical information management (AIM). The dynamic, integrated management of aeronautical information through the provision and exchange of quality-assured digital aeronautical data in collaboration with all parties.

Aeronautical information product. Aeronautical data and aeronautical information provided either as digital data sets or as a standardized presentation in paper or electronic media. Aeronautical information products include:
— Aeronautical Information Publication (AIP), including Amendments and Supplements;
— Aeronautical Information Circulars (AIC);
— Aeronautical charts;
— NOTAM; and
— digital data sets.

Aeronautical Information Publication (AIP). 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 service (AIS). A service established within the defined area of coverage responsible for the provision of aeronautical data and aeronautical information necessary for the safety, regularity and efficiency of air navigation.

AIS Section. The Section under the Directorate of the Air Navigation Services of the Authority responsible for the provision of aeronautical data and aeronautical information necessary for the safety, regularity and efficiency of air navigation.

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.

Air defence identification zone (ADIZ). Special designated airspace of defined dimensions within which aircraft are required to comply with special identification and/or reporting procedures additional to those related to the provision of air traffic services (ATS).

Air traffic management (ATM). The dynamic, integrated management of air traffic and airspace (including air traffic services, airspace management and air traffic flow management) — safely, economically and efficiently — through the provision of facilities and seamless services in collaboration with all parties and involving airborne and ground-based functions.

Application. Manipulation and processing of data in support of user requirements (ISO 19104*).

Area navigation (RNAV). A method of navigation which permits aircraft operation on any desired flight path within the coverage of ground- or space-based navigation aids or within the limits of the capability of self-contained aids, or a combination of these.

ASHTAM. A special series NOTAM notifying by means of a specific format change in activity of a volcano, a volcanic eruption and/or volcanic ash cloud that is of significance to aircraft operations.

Assemble. A process of merging data from multiple sources into a database and establishing a baseline for subsequent processing.

ATS surveillance service. Term used to indicate a service provided directly by means of an ATS surveillance system.

ATS surveillance system. A generic term meaning variously, ADS-B, PSR, SSR or any comparable ground-based system that enables the identification of aircraft.

Automatic dependent surveillance — broadcast (ADS-B). A means by which aircraft, aerodrome vehicles and other objects can automatically transmit and/or receive data such as identification, position and additional data, as appropriate, in a broadcast mode via a data link.

Automatic dependent surveillance — contract (ADS-C). A means by which the terms of an ADS-C agreement will be exchanged between the ground system and the aircraft, via a data link, specifying under what conditions ADS-C reports would be initiated, and what data would be contained in the reports.

Automatic terminal information service (ATIS). The automatic provision of current, routine information to arriving and departing aircraft throughout 24 hours or a specified portion thereof:

Data link-automatic terminal information service (D-ATIS). The provision of ATIS

via data link.

Voice-automatic terminal information service (Voice-ATIS). The provision of ATIS by means of continuous and repetitive voice broadcasts.

Bare Earth. Surface of the Earth including bodies of water and permanent ice and snow, and excluding vegetation and man-made objects.

Calendar. Discrete temporal reference system that provides the basis for defining temporal position to a resolution of one day (ISO 19108*).

Canopy. Bare Earth supplemented by vegetation height.

Confidence level. The probability that the true value of a parameter is within a certain interval around the estimate of its value.

Controller-pilot data link communications (CPDLC). A means of communication between controller and pilot, using data link for ATC communications.

Culture. All man-made features constructed on the surface of the Earth, such as cities, railways and canals.

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.

Danger area. An airspace of defined dimensions within which activities dangerous to the flight of aircraft may exist at specified times.

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

Data completeness. The degree of confidence that all of the data needed to support the intended use is provided.

Data format. A structure of data elements, records and files arranged to meet standards, specifications or data quality requirements.

Data integrity (assurance level). A degree of assurance that an aeronautical data and its value has not been lost or altered since the origination or authorized amendment.

Data product. Data set or data set series that conforms to a data product specification (ISO 19131*).

Data product specification. Detailed description of a data set or data set series together with additional information that will enable it to be created supplied to and used by another party (ISO 19131*).

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 (or equivalent assurance level), traceability, timeliness, completeness and format..

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

Data set. Identifiable collection of data (ISO 19101*).

Data set series. Collection of data sets sharing the same product specification (ISO 19115*).

Data timeliness. The degree of confidence that the data is applicable to the period of its intended use.
Data traceability. The degree that a system or a data product can provide a record of the changes made to that product and
thereby enable an audit trail to be followed from the end-user to the originator.

Datum. Any quantity or set of quantities that may serve as a reference or basis for the calculation of other quantities (ISO 19104*).

Digital Elevation Model (DEM). The representation of terrain surface by continuous elevation values at all intersections of a defined grid, referenced to common datum.

Direct transit arrangements. Special arrangements approved by the public authorities concerned by which traffic which is pausing briefly in its passage through the Contracting State may remain under their direct control.

Ellipsoid height (Geodetic height). The height related to the reference ellipsoid, measured along the ellipsoidal outer normal through the point in question.

Feature. Abstraction of real world phenomena (ISO 19101*).

Feature attribute. Characteristic of a feature (ISO 19101*).

Feature operation. Operation that every instance of a feature type may perform (ISO 19110*).

Feature relationship. Relationship that links instances of one feature type with instances of the same or a different feature type (ISO 19101*).

Feature type. Class of real world phenomena with common properties (ISO 19110*).

Geodesic distance. The shortest distance between any two points on a mathematically defined ellipsoidal surface.

Geodetic datum. A minimum set of parameters required to define location and orientation of the local reference system with respect to the global reference system/frame.

Geoid. The equipotential surface in the gravity field of the Earth which coincides with the undisturbed mean sea level (MSL) extended continuously through the continents.

Geoid undulation. The distance of the geoid above (positive) or below (negative) the mathematical reference ellipsoid.

Gregorian calendar. Calendar in general use; first introduced in 1582 to define a year that more closely approximates the tropical year than the Julian calendar (ISO 19108*).

Height. The vertical distance of a level, point or an object considered as a point, measured from a specific datum.

Heliport. An aerodrome or a defined area on a structure intended to be used wholly or in part for the arrival, departure and surface movement of helicopters.

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 classification (aeronautical data). Classification based upon the potential risk resulting from the use of corrupted data. Aeronautical data are classified as:

a) *routine data:* there is a very low probability when using corrupted routine data that the continued safe flight and landing of an aircraft would be severely at risk with the potential for catastrophe;

b) *essential data:* there is a low probability when using corrupted essential data that the continued safe flight and landing of an aircraft would be severely at risk with the potential for catastrophe; and

c) *critical data:* there is a high probability when using corrupted critical data that the continued safe flight and landing of an aircraft would be severely at risk with the potential for catastrophe.

International airport. Any airport designated by Ghana an airport of entry and departure for international air traffic, where the formalities incident to customs, immigration, public health, animal and plant quarantine and similar procedures are carried out.

International NOTAM office (NOF). The NOTAM office of the Authority for the exchange of NOTAM internationally.

Logon address. A specified code used for data link logon to an ATS unit.

Manoeuvring area. That part of an aerodrome to be used for the take-off, landing and taxiing of aircraft, excluding aprons.

Metadata. Data about data (ISO 19115*).

Minimum en-route altitude (MEA). The altitude for an en-route segment that provides adequate reception of relevant navigation facilities and ATS communications, complies with the airspace structure and provides the required obstacle clearance.

Minimum obstacle clearance altitude (MOCA). The minimum altitude for a defined segment of flight that provides the required obstacle clearance.

Movement area. That part of an aerodrome to be used for the take-off, landing and taxiing of aircraft, consisting of them manoeuvring area and the apron(s).

Navigation specification. A set of aircraft and flight crew requirements needed to support performance-based navigation operations within a defined airspace. There are two kinds of navigation specifications:

Required navigation performance (RNP) specification. A navigation specification based on area navigation that includes the requirement for performance monitoring and alerting, designated by the prefix RNP, e.g. RNP 4, RNP APCH.

Area navigation (RNAV) specification. A navigation specification based on area navigation that does not include the requirement for performance monitoring and alerting, designated by the prefix RNAV, e.g. RNAV 5, RNAV 1.

Next intended user. The entity that receives the aeronautical data or information from the aeronautical information service.

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.

Obstacle. All fixed (whether temporary or permanent) and mobile objects, or parts thereof, that:

a) are located on an area intended for the surface movement of aircraft; or

b) extend above a defined surface intended to protect aircraft in flight; or

c) stand outside those defined surfaces and that have been assessed as being a hazard to air navigation.

Obstacle/terrain data collection surface. A defined surface intended for the purpose of collecting obstacle/terrain data.

Origination (aeronautical data or aeronautical information). The creation of the value associated with new data or information or the modification of the value of existing data or information.

Originator (aeronautical data or aeronautical information). An entity that is accountable for data or information origination and/or from which the AIS organization receives aeronautical data and aeronautical information.

Orthometric height. Height of a point related to the geoid, generally presented as an MSL elevation.

Performance-based communication (PBC). Communication based on performance specifications applied to the provision of air traffic services.

Performance-based navigation (PBN). Area navigation based on performance requirements for aircraft operating along an ATS route, on an instrument approach procedure or in a designated airspace.

Performance-based surveillance (PBS). Surveillance based on performance specifications applied to the provision of air traffic services.

Portrayal. Presentation of information to humans (ISO 19117*).

Position (geographical). Set of coordinates (latitude and longitude) referenced to the mathematical reference ellipsoid which define the position of a point on the surface of the Earth.

Post spacing. Angular or linear distance between two adjacent elevation points.

Precision. The smallest difference that can be reliably distinguished by a measurement process.

Pre-flight information bulletin (PIB). A presentation of current NOTAM information of operational significance, prepared prior to flight.

Prohibited area. An airspace of defined dimensions, above the land areas or territorial waters of a State, within which the flight of aircraft is prohibited.

Quality. Degree to which a set of inherent characteristics fulfils requirements (ISO 9000*).

Quality assurance. Part of quality management focused on providing confidence that quality requirements will be fulfilled (ISO 9000*).

Quality control. Part of quality management focused on fulfilling quality

requirements (ISO 9000*).

Quality management. Coordinated activities to direct and control an organization with regard to quality (ISO 9000*).

Radio navigation service. A service providing guidance information or position data for the efficient and safe operation of aircraft supported by one or more radio navigation aids.

Required communication performance (RCP) specification. A set of requirements for air traffic service provision and associated ground equipment, aircraft capability, and operations needed to support performance-based communication.

Required surveillance performance (RSP) specification. A set of requirements for air traffic service provision and associated ground equipment, aircraft capability, and operations needed to support performance-based surveillance.

Requirement. Need or expectation that is stated, generally implied or obligatory (ISO 9000*).

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

Restricted area. An airspace of defined dimensions, above the land areas or territorial waters of a State, within which the flight of aircraft is restricted in accordance with certain specified conditions.

Route stage. A route or portion of a route flown without an intermediate landing.

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.

Terrain. The surface of the Earth containing naturally occurring features such as mountains, hills, ridges, valleys, bodies of water, permanent ice and snow, and excluding obstacles.

Traceability. Ability to trace the history, application or location of an entity by means of recorded identifications (ISO 8402*).

Validation. Confirmation, through the provision of objective evidence, that the requirements for a specific intended use or application have been fulfilled (ISO 9000*).

Verification. Confirmation, through the provision of objective evidence, that specified requirements have been fulfilled (ISO 9000*).

VOLMET. Meteorological information for aircraft in flight:

Data link-VOLMET (D-VOLMET). Provision of current aerodrome routine meteorological reports (METAR) and aerodrome special meteorological reports (SPECI), aerodrome forecasts (TAF), SIGMET, special air-reports not covered by a SIGMET and, where available, AIRMET via data link.

VOLMET broadcast. Provision, as appropriate, of current METAR, SPECI, TAF and SIGMET by means of continuous and repetitive voice broadcasts.

15.1.2 COMMON REFERENCE SYSTEMS FOR AIR NAVIGATION

15.1.2.1 HORIZONTAL REFERENCE SYSTEM

(1) The AIS Section shall use the World Geodetic System — 1984 (WGS-84) as the horizontal (geodetic) reference system for international air navigation. Consequently, the AIS Section shall ensure that published aeronautical geographical coordinates (indicating latitude and longitude) shall be expressed in terms of the WGS-84 geodetic reference datum.

Note. - Comprehensive guidance material concerning WGS-84 is contained in the World Geodetic System — 1984 (WGS-84) Manual (Doc 9674).

(2) In precise geodetic applications and some air navigation applications, temporal changes in the tectonic plate motion and tidal effects on the Earth's crust shall be modelled and estimated. To reflect the temporal effect, an epoch shall be included with any set of absolute station coordinates.

15.1.2.2 VERTICAL REFERENCE SYSTEM

(1) The AIS Section shall use Mean sea level (MSL) datum as the vertical reference system for international air navigation.

Note 1.— The geoid globally most closely approximates MSL. It is defined as the equipotential surface in the gravity field of the Earth which coincides with the undisturbed MSL extended continuously through the continents.

Note 2.— Gravity-related heights (elevations) are also referred to as orthometric heights while distances of points above the ellipsoid are referred to as ellipsoidal heights.

(2) The Earth Gravitational Model - 1996 (EGM-96) shall be used as the global gravity model for international air navigation.

(3) The AIS Section shall ensure that at those geographical positions where the accuracy of EGM-96 does not meet the accuracy requirements for elevation and geoid undulation specified in Parts 14 and 30 on the basis of EGM-96 data, regional, national or local geoid models containing high resolution (short wavelength) gravity

field data are developed and used. When a geoid model other than the EGM-96 model is used, a description of the model used, including the parameters required for height transformation between the model and EGM-96, shall be provided in the Aeronautical Information Publication (AIP).

(4) Specifications concerning determination and reporting (accuracy of field work and data integrity) of elevation and geoid undulation at specific positions at aerodromes/heliports shall be as specified in the PANS-AIM (Doc 10066), Appendix 1.

15.1.2.3 TEMPORAL REFERENCE SYSTEM

(1) The AIS Section shall use the Gregorian calendar and Coordinated Universal Time (UTC) as the temporal reference system for domestic and international air navigation.

Note 1.— A value in the time domain is a temporal position measured relative to a temporal reference system.

Note 2.— UTC is a time scale maintained by the Bureau International de l'Heure and the IERS and forms the basis of a coordinated dissemination of standard frequencies and time signals.

Note 3.— Guidance material relating to UTC is contained in Attachment D of Annex 5 — Units of Measurement to be Used in Air and Ground Operations.

Note 4.— ISO Standard 8601 specifies the use of the Gregorian calendar and 24-hour local or UTC for information interchange while ISO Standard 19108* prescribes the Gregorian calendar and UTC as the primary temporal reference system for use with geographic information.*

(2) When a different temporal reference system is used for some applications, the feature catalogue, or the metadata associated with an application schema or a data set, as appropriate, the AIS Section shall include either a description of that system or a citation for a document that describes that temporal reference system.

15.1.2.4 MISCELLANEOUS SPECIFICATIONS

(1) The AIS Section shall ensure that Aeronautical Information Products for international distribution includes English text for those parts expressed in plain language.

(2) The AIS Section shall ensure that place names are spelt in conformity with local usage, transliterated, when necessary, into the Latin alphabet.

(3) Units of measurement used by the AIS Section in the origination, processing and distribution of aeronautical data and aeronautical information shall be consistent with the Part 22 of the Ghana Civil Aviation Directives.

(4) The AIS Section shall use ICAO abbreviations in aeronautical information products whenever they are appropriate and their use will facilitate distribution of

aeronautical data and aeronautical information.

15.2 RESPONSIBILITIES AND FUNCTIONS

15.2.1 STATE RESPONSIBILITIES

(1) Under the Ghana Civil Aviation Act, as amended, the Authority shall provide information necessary for the safety, regularity and efficiency of international air navigation by means of publications issued by the Authority or by any other means.

(2) The Authority shall take all necessary measures to ensure that the aeronautical data and aeronautical information it provides, covers the territory of the Republic of Ghana, as well as the Accra Flight Information Region.

(3) The Authority shall remain responsible for the aeronautical data and aeronautical information published under the authority vested by the Ghana Civil Aviation Act.

(4) The AIS Section shall ensure that the aeronautical data and aeronautical information provided are complete, timely and of required quality in accordance with 15.3.3.

(5) The Authority shall ensure that formal arrangements are established between originators of aeronautical data and aeronautical information and the AIS in relation to the timely and complete provision of aeronautical data and aeronautical information.

Note.— The scope of aeronautical data and aeronautical information that would be the subject of formal arrangements is specified in Chapter 4.

15.2.2 AIS RESPONSIBILITIES AND FUNCTIONS

(1) The AIS Section shall ensure that aeronautical data and aeronautical information necessary for the safety, regularity or efficiency of air navigation are made available in a form suitable for the operational requirements of the air traffic management (ATM) community, including:

(a) those involved in flight operations, including flight crews, flight planning and flight simulators; and

(b) the air traffic services unit responsible for flight information service and the services responsible for pre-flight information.

Note.— A description of the ATM community is contained in the Global Air Traffic Management Operational Concept (Doc 9854).

(2) The AIS Section shall receive, collate or assemble, edit, format, publish/store and distribute aeronautical data and aeronautical information concerning the entire

territory of the Republic of Ghana as well as areas within the Accra Flight Information Region. Aeronautical data and aeronautical information shall be provided as aeronautical information products.

Note.— An AIS may include origination functions.

(3) Where 24-hour service is not provided, the AIS Section shall ensure that service shall be available during the whole period an aircraft is in flight within the Accra Flight Information Region, plus a period of at least two hours before and after such a period. Service shall also be available at such other time as may be requested by an appropriate ground organization.

(4) The AIS Section shall, in addition, obtain information to enable it provide pre-flight information services and to meet the need for in-flight information:

(a) from the AIS of other States;

(b) from other sources that may be available.

Note.— One such source is the subject of a provision in 5.6.

(5) The AIS Section shall ensure that aeronautical data and aeronautical information obtained under 15.2.2(4)(a) are, when distributed, clearly identified as having the authority of the Republic of Ghana.

(6) The AIS Section shall ensure that aeronautical data and aeronautical information obtained under 15.2.2(4)(b) shall, if possible, be verified before distribution and if not verified shall, when distributed, be clearly identified as such.

(7) The AIS Section shall promptly make available to the AIS of other States any aeronautical data and aeronautical information necessary for the safety, regularity or efficiency of air navigation required by them, to enable them to comply with 15.2.2(1).

15.2.3 EXCHANGE OF AERONAUTICAL DATA AND AERONAUTICAL INFORMATION

(1) All elements of the aeronautical information products provided by other States shall be addressed to the AIS Section. The AIS Section shall respond to requests for aeronautical information and aeronautical data provided by other States.

(2) Formal arrangements shall be established between AIS Section and users of its service in relation to the provision of the service.

Note.— Guidance material on such formal arrangements is contained in the Aeronautical Information Services Manual (Doc 8126).

(3) The AIS Section shall arrange, as necessary, to satisfy operational requirements for the issuance and receipt of NOTAM distributed by telecommunication.

(4) The Authority shall, wherever practicable, establish direct contact between aeronautical information services in order to facilitate the international exchange of aeronautical data and aeronautical information.

(5) Except as provided in 15.2.3(7), one copy of each of the following aeronautical information products (where available) that have been requested by the AIS of a Contracting State shall be made available by the originating State and provided in the mutually agreed form(s), without charge, even where authority for publication/storage and distribution has been delegated to a non-governmental agency:

Aeronautical Information Publication (AIP), including Amendments and Supplements;
Aeronautical Information Circulars (AIC);
c) NOTAM; and
d) aeronautical charts.

(6) The exchange of more than one copy of the elements of the Integrated Aeronautical Information Package and other air navigation documents, including those containing air navigation legislation and regulations/Directives, shall be subject to bilateral agreement between the Authority and other ICAO Contracting States.

(7) When aeronautical data and aeronautical information are provided in the form of digital data sets to be used by the AIS Section, they shall be provided on the basis of agreement between the Authority and the Contracting State concerned.

(8) The procurement of aeronautical data and aeronautical information, including the elements of the Integrated Aeronautical Information Package, and other air navigation documents, including those containing air navigation legislation and regulations, by States other than ICAO Contracting States and by other entities shall be subject to separate agreement with the Authority.

(9) Globally interoperable aeronautical data and aeronautical information exchange models shall be used for the provision of data sets.

(10) Specifications concerning globally interoperable aeronautical data and aeronautical information exchange models shall be as specied in the Procedures for Air Navigation Services — Aeronautical Information Management (PANS-AIM, Doc 10066).

Note.— Guidance material on globally interoperable aeronautical data and aeronautical information exchange models is contained in Doc 8126.

15.2.4 COPYRIGHT

1) Any product of the AIS Section of the Authority which has been granted copyright protection by Ghana and provided to another State in accordance with 15.2.3 shall only be made available to a third party on the condition that the third party is made aware that the product is copyright protected and provided that it is appropriately annotated that the product is subject to copyright by the Authority.

2) When aeronautical data and aeronautical information are provided to a State in accordance with 2.3.8, the receiving State shall not provide the digital data sets of the providing State to any third party without the consent of the providing State.

15.2.5 COST RECOVERY

The overhead cost of collecting and compiling aeronautical data and aeronautical information shall be included in the cost basis for airport and air navigation services charges, as appropriate, in accordance with the principles contained in ICAO's Policies on Charges for Airports and Air Navigation Services (Doc 9082).

Note.— When costs of collection and compilation of aeronautical data and aeronautical information are recovered through airport and air navigation services charges, the charge to an individual customer for the supply of a particular aeronautical information product may be based on the costs of printing paper copies, production of electronic media and distribution.

15.3 AERONAUTICAL INFORMATION MANAGEMENT

15.3.1 INFORMATION MANAGEMENT REQUIREMENTS

The information management resources and processes established by the Authority shall be adequate to ensure the timely collection, processing, storing, integration, exchange and delivery of quality-assured aeronautical data and aeronautical information within the Air Traffic Management (ATM) system.

15.3.2 DATA QUALITY SPECIFICATIONS

15.3.2.1 DATA ACCURACY

(1) The AIS Section shall ensure that the order of accuracy for aeronautical data shall be in accordance with its intended use.

(2) Specifications concerning the order of accuracy (including confidence level) for aeronautical data shall be as specified in the Procedures for Air Navigation Services — Aeronautical Information Management (PANS-AIM, Doc 10066), Appendix 1.

15.3.2.2 DATA RESOLUTION

(1) The AIS Section shall ensure that the order of resolution of aeronautical data shall be commensurate with the actual data accuracy.

(2) Specifications concerning the resolution of aeronautical data shall be as specified in the PANS-AIM (Doc 10066), Appendix 1.

Note 2.— The resolution of the data contained in the database may be the same or finer than the publication resolution.

15.3.2.3 DATA INTEGRITY

(1) The AIS Section shall ensure that the integrity of aeronautical data shall be maintained throughout the data chain from origination to distribution to the next intended user.

(2) Specifications concerning the integrity classification related to aeronautical data shall be as specified in the PANS-AIM (Doc 10066), Appendix 1.

(3) Based on the applicable integrity classification, procedures shall be put in place in order to:

(a) **for routine data**: avoid corruption throughout the processing of the data;

(b) **for essential data**: assure corruption does not occur at any stage of the entire process and include additional processes as needed to address potential risks in the overall system architecture to further assure data integrity at this level; and

(c) **for critical data**: assure corruption does not occur at any stage of the entire process and include additional integrity assurance processes to fully mitigate the effects of faults identified by thorough analysis of the overall system architecture as potential data integrity risks.

15.3.2.4 DATA TRACEABILITY

Traceability of aeronautical data shall be ensured and retained by the AIS Section as long as the data is in use.

15.3.2.5 DATA TIMELINESS

Timeliness of aeronautical data shall be ensured by by including limits on the effective period of the data elements.

Note 1.— These limits may be associated with individual data elements or data sets.

Note 2.— If the effective period is defined for a data set, it will account for the effective dates of all of the individual data elements.

15.3.2.6 DATA COMPLETENESS

Completeness of aeronautical data shall be ensured in order to support its intended use.

15.3.2.7 DATA FORMAT

The format of delivered aeronautical data shall be adequate to ensure that the data is interpreted in a manner that is consistent with its intended use.

15.3.3 AERONAUTICAL DATA AND AERONAUTICAL INFORMATION VALIDATION AND VERIFICATION

(1) Material to be issued as part of the aeronautical information product shall be thoroughly checked before it is submitted to the AIS Section, in order to ensure that all necessary information has been included and that it is correct in detail.

(2) The AIS Section shall establish verification and validation procedures, which ensure that upon receipt of aeronautical data and aeronautical information, quality requirements.

15.3.4 DATA ERROR DETECTION

(1) The AIS Section shall use digital data error detection techniques during the transmission and/or storage of aeronautical data and digital data sets.

(2) The AIS Section shall use digital data error detection techniques in order to maintain the integrity levels as specified in 3.2.3.

(3) Detailed specifications concerning digital data error detection techniques shall be as specified in the PANS-AIM (Doc 10066).

15.3.5 USE OF AUTOMATION

(1) The Authority shall apply automation in order to ensure the quality, efficiency and cost- effectiveness of aeronautical information services.

Note.— Guidance material on the development of databases and the establishment of data exchange services is contained in Doc 8126.

(2) The AIS Section shall give due consideration to the integrity of data and information when automated processes are implemented and mitigating steps taken where risks are identified.

Note.— Risks of altering the integrity of data and information may be introduced by automated processes in cases of unexpected systems behaviours.

(3) In order to for the AIS Section to meet the data quality requirements, automation shall:

(a) enable digital aeronautical data exchange between the parties involved in the data processing chain; and

(b) use aeronautical information exchange models and data exchange models designed to be globally interoperable.

(4) The AIS Section shall submit these processes for approval by the Authority.

15.3.6 QUALITY MANAGEMENT SYSTEM

(1) The AIS Section shall implement and maintain quality management systems encompassing all functions of AIS, as outlined in 15.2.2. The execution of such quality management systems shall be made demonstrable for each function stage.

Note.— Guidance material is contained in the Manual on the Quality Management System for Aeronautical Information Services (Doc 9839) (planned for development by November 2019).

(2) The AIS Section shall ensure that Quality management shall 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.

(3) The AIS Section shall ensure that the quality management system established in accordance with 15.3.6(1) shall follow the ISO 9000 series of quality assurance standards, and be certified by an approved organization.

(4) The AIS Section shall ensure that within the context of the established quality management system, the competencies and the associated knowledge, skills and abilities required for each function shall be identified, and AIS personnel assigned to perform those functions shall be appropriately trained. The AIS Section shall have processes in place to ensure that AIS personnel possess the competencies required to perform specific assigned functions. The AIS Section shall maintain appropriate records so that the qualifications of personnel can be confirmed. Initial and periodic assessments shall be established that require personnel to demonstrate the required competencies. Periodic assessments of personnel shall be used as a means to detect and correct shortfalls in knowledge, skills and abilities.

(5) The AIS Section shall ensure that the quality management system includes the necessary policies, processes and procedures, including those for the use of metadata, to ensure and verify that aeronautical data are 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.

(6) The AIS Section shall ensure that the established quality management system shall provide users with the necessary assurance and confidence that distributed aeronautical data and aeronautical information satisfy the aeronautical data quality requirements.

(7) The Authority shall take all necessary measures to monitor compliance with the quality management system in place.

(8) Demonstration of compliance of the quality management system applied shall be by audit. If nonconformity is identified, initiating action to correct its cause shall be determined and taken without undue delay. All audit observations and remedial actions shall be evidenced and properly documented.

15.3.7 HUMAN FACTORS CONSIDERATIONS

(1) The AIS Section shall take into consideration human factors principles in its organization as well as the design, contents, processing and distribution of aeronautical data and aeronautical information to facilitate their optimum utilization.

(2) The AIS Section shall give due consideration to the integrity of information where human interaction is required and ensure mitigating steps are taken where risks are identified.

Note.— This may be accomplished through the design of systems, operating procedures or improvements in the operating environment.

15.4 SCOPE OF AERONAUTICAL DATA AND AERONAUTICAL INFORMATION

Note.— The scope of aeronautical data and aeronautical information provides the minimum requirement to support aeronautical information products and services, aeronautical navigation data bases, air navigation applications and air traffic management (ATM) systems.

15.4.1 Scope of aeronautical data and aeronautical information

(1) The aeronautical data and aeronautical information to be received and managed by the aeronautical information service (AIS) shall include at least the following sub-domains:

(a) national regulations, rules and procedures;
(b) aerodromes and heliports;
(c) airspace;
(d) air traffic services (ATS) routes;
(e) instrument flight procedures;
(f) radio navigation aids/systems;
(g) obstacles;
(h) terrain; and
(i) geographic information.

(2) Detailed specifications concerning the content of each sub-domain shall be specif in the Procedures for Air Navigation Services — Aeronautical Information Management (PANS-AIM, Doc 10066), Appendix 1.

(3) Determination and reporting of aeronautical data shall be in accordance with the accuracy and integrity classification required to meet the needs of the end-user of aeronautical data.

(4) Specifications concerning the accuracy and integrity classification related to aeronautical data are contained in the PANS-AIM (Doc 10066), Appendix 1.

15.4.2 METADATA

(1)The AIS Section shall collect and retain Metadata for aeronautical data processes and exchange points.

(2) This metadata collection shall be applied throughout the aeronautical information data chain, from survey or origin to distribution to the next intended user.

(3) Detailed specifications concerning metadata are contained in the PANS-AIM (Doc 10066).

15.5 AERONAUTICAL INFORMATION PRODUCTS AND SERVICES

15.5.1 GENERAL

(1) The AIS Section shall provide aeronautical information in the form of aeronautical information products and associated services.

(2) Specifications concerning the order of resolution of aeronautical data provided for each aeronautical information product are contained in the Procedures for Air Navigation Services — Aeronautical Information Management (PANS-AIM, Doc 10066), Appendix 1.

(3) When aeronautical data and aeronautical information are provided in multiple formats, processes shall be implemented to ensure data and information consistency between formats.

15.5.2 AERONAUTICAL INFORMATION IN A STANDARDIZED PRESENTATION

15.5.2.1 Aeronautical information provided in a standardized presentation shall include the aeronautical information publication (AIP), AIP Amendments, AIP Supplements, AIC, NOTAM and aeronautical charts.

Detailed specifications about AIP, AIP Amendments, AIP Supplements, AIC and NOTAM are contained in the PANS-AIM (Doc 10066).

Note 2.— Cases where digital data sets may replace the corresponding elements of the standardized presentation are detailed in the PANS-AIM (Doc 10066).

The AIP, AIP Amendment, AIP Supplement and AIC shall be provided on paper and/or as an electronic document.

(1) The AIP, AIP Amendment, AIP Supplement and AIC when provided as an electronic document (eAIP) shall allow for both displaying on electronic devices and printing on paper.

(2) Detailed specifications about AIP, AIP Amendments, AIP Supplements, AIC and NOTAM shall be specified in the PANS-AIM (Doc 10066).

(3) Cases where digital data sets may replace the corresponding elements of the

standardized presentation shall be specified in the PANS-AIM (Doc 10066).

15.5.2.2 AERONAUTICAL INFORMATION PUBLICATION

Note 1.— The AIP is intended primarily to satisfy international requirements for the exchange of aeronautical information of a lasting character essential to air navigation.

Note 2.— The AIP constitutes the basic information source for permanent information and long duration temporary changes.

The GHANA AIP shall include:

(a) a statement of the competent authority responsible for the air navigation facilities, services or procedures covered by the AIP;

(b) the general conditions under which the services or facilities are available for international use;

(c) a list of significant differences between the national Directives and practices of the Authority and the related ICAO Standards, Recommended Practices and Procedures, given in a form that would enable a user to differentiate readily between the requirements of the Authority and the related ICAO provisions;

(d) the choice made by the Authority in each significant case where an alternative course of action is provided for in ICAO Standards, Recommended Practices and Procedures.

15.5.2.3 AIP SUPPLEMENT

(1) A checklist of valid AIP Supplements shall be regularly provided.

(2) Detailed specifications concerning the frequency for providing checklists of valid AIP Supplements shall be specified in the PANS-AIM (Doc 10066).

15.5.2.4 AERONAUTICAL INFORMATION CIRCULARS

(1) An AIC shall be used to provide:

a) a long-term forecast of any major change in legislation, regulations, procedures or facilities; or

b) information of a purely explanatory or advisory nature liable to affect flight safety; or

c) information or notification of an explanatory or advisory nature concerning technical, legislative or purely administrative matters.

(2) An AIC shall not be used for information that qualifies for inclusion in AIP and NOTAM.

(3) The validity of AIC currently in force shall be reviewed at least once a year.

(4) A checklist of currently valid AIC shall be regularly provided.

(5) Detailed specifications concerning the frequency for providing checklists of valid AIC shall be specified in the PANS-AIM (Doc 10066).

15.5.2.5 AERONAUTICAL CHARTS

Note.— Part 21 of Ghana Civil Aviation Directives provides Standards including provision requirements for each chart type.

(1) The aeronautical charts listed below shall, when available for designated international aerodromes/heliports, form part of the AIP, or be provided separately to recipients of the AIP:

a) Aerodrome/Heliport Chart — ICAO;

b) Aerodrome Ground Movement Chart — ICAO;

c) Aerodrome Obstacle Chart — ICAO Type A;

d) Aerodrome Obstacle Chart — ICAO Type B (when available);

e) Aerodrome Terrain and Obstacle Chart — ICAO (Electronic);

f) Aircraft Parking/Docking Chart — ICAO;

g) Area Chart — ICAO;

h) ATC Surveillance Minimum Altitude Chart — ICAO;

i) Instrument Approach Chart — ICAO;

j) Precision Approach Terrain Chart — ICAO;

k) Standard Arrival Chart — Instrument (STAR) — ICAO;

l) Standard Departure Chart — Instrument (SID) — ICAO; and

m) Visual Approach Chart — ICAO.

Note.— A page pocket may be used in the AIP to include the Aerodrome Terrain and Obstacle Chart — ICAO (Electronic) on appropriate electronic media.

(2) The Enroute Chart — ICAO shall, when available, form part of the AIP, or be provided separately to recipients of the AIP.

(3) The aeronautical charts listed below shall, when available, be provided as aeronautical information products:

a) World Aeronautical Chart — ICAO 1:1 000 000;

b) Aeronautical Chart — ICAO 1:500 000;

c) Aeronautical Navigation Chart — ICAO Small Scale; and

d) Plotting Chart — ICAO chart.

(4) Electronic aeronautical charts shall be provided based on digital databases and the use of geographic information systems.

(5) The chart resolution of aeronautical data shall be that as specified for a particular chart.

(6) Specifications concerning the chart resolution for aeronautical data shall be specified in the PANS-AIM (Doc 10066), Appendix 1.

15.5.2.6 NOTAM

(1) Detailed specifications for NOTAM, including formats for ASHTAM, are contained in the PANS-AIM (Doc 10066).

(2) A checklist of valid NOTAM shall be regularly provided.

(3) Detailed specifications concerning the frequency for providing checklists of valid NOTAM are contained in the PANS-AIM (Doc 10066).

15.5.3 DIGITAL DATA SETS

15.5.3.1 GENERAL

(1) Digital data shall be in the form of the following data sets:

(a) AIP data set;

(b) terrain data sets;

(c) obstacle data sets;

(d) aerodrome mapping data sets; and

(e) instrument flight procedure data sets.

(2) Detailed specifications concerning the content of the digital data sets shall be specified in the PANS-AIM (Doc 10066).

(3) Each data set shall be provided to the next intended user together with at least the minimum set of metadata that ensures traceability.

(4) Detailed specifications concerning metadata shall be specified in the PANS-AIM (Doc 10066).

(5) A checklist of valid data sets shall be regularly provided.

15.5.3.2 AIP DATA SET

(1) An AIP data set shall be provided covering the extent of information as provided in the AIP.

(2) When it is not possible to provide a complete AIP data set, the data subset(s) that are available shall be provided.

(3) The AIP data set shall contain the digital representation of aeronautical information of lasting character (permanent information and long duration temporary changes) essential to air navigation.

15.5.3.3 TERRAIN AND OBSTACLE DATA SETS

Numerical requirements for terrain and obstacle data sets shall be specified in the PANS AIM (Doc 10066), Appendices 1 and 8.

Note 2.— Requirements for terrain and obstacle data collection surfaces shall be specified in the PANS-AIM (Doc 10066), Appendix 8.

(1) Numerical requirements for terrain and obstacle data sets shall be specified in the PANS AIM (Doc 10066), Appendices 1 and 8.

(2) Note 2.— Requirements for terrain and obstacle data collection surfaces shall be specified in the PANS-AIM (Doc 10066), Appendix 8.

(3) The coverage areas for terrain and obstacle data sets shall be specified as:

— Area 1: the entire territory of a State;

— Area 2: within the vicinity of an aerodrome, subdivided as follows:

— Area 2a: a rectangular area around a runway that comprises the runway strip plus any clearway that exists;

Note.— See Part 14, Ghana Civil Aviation (Aerodromes) Directives, for dimensions for runway strips.

— Area 2b: an area extending from the ends of Area 2a in the direction of departure, with a length of 10 km and a splay of 15 per cent to each side;

— Area 2c: an area extending outside Area 2a and Area 2b at a distance of not more than 10 km from the boundary of Area 2a; and

— Area 2d: an area outside Areas 2a, 2b and 2c up to a distance of 45 km from the aerodrome reference point, or to an existing terminal control area (TMA) boundary, whichever is nearest;

— Area 3: the area bordering an aerodrome movement area that extends horizontally from the edge of a runway to 90 m from the runway centre line and 50 m from the edge of all other parts of the aerodrome movement area; and

— Area 4: the area extending 900 m prior to the runway threshold and 60 m each side of the extended runway centre line in the direction of the approach on a precision approach runway, Category II or III.

(4) Where the terrain at a distance greater than 900 m (3 000 ft) from the runway threshold is mountainous or otherwise significant, the length of Area 4 shall be extended to a distance not exceeding 2 000 m (6 500 ft) from the runway threshold.

15.5.3.3.3 TERRAIN DATA SETS

(1) Terrain data sets shall contain the digital representation of the terrain surface in the form of continuous elevation values at all intersections (points) of a defined grid, referenced to common datum.

(2) Terrain data shall be provided for Area 1.

(3) For aerodromes regularly used by international civil aviation, terrain data shall be provided for:

(a) Area 2a;

(b) the take-off flight path area; and

(c) an area bounded by the lateral extent of the aerodrome obstacle limitation surfaces.

(4) For aerodromes regularly used by international civil aviation, additional terrain data shall be provided within Area 2 as follows:

(a) in the area extending to a 10-km radius from the ARP; and

(b) within the area between 10 km and the TMA boundary or a 45-km radius (whichever is smaller), where terrain penetrates a horizontal terrain data collection surface specified as 120 m above the lowest runway elevation.

(5) Arrangements shall be made for coordinating the provision of terrain data for adjacent aerodromes where their respective coverage areas overlap to assure that the data for the same terrain is correct.

(6) For those aerodromes located near territorial boundaries, arrangements shall be made among States concerned to share terrain data.

(7) For aerodromes regularly used by international civil aviation, terrain data shall be provided for Area 3.

(8) For aerodromes regularly used by international civil aviation, terrain data shall be provided for Area 4 for all runways where precision approach Category II or III operations have been established and where detailed terrain information is required by operators to enable them to assess the effect of terrain on decision height determination by use of radio altimeters.

(9) Where additional terrain data is collected to meet other aeronautical requirements, the terrain data sets should be expanded to include this additional data.

15.3.3.4 **OBSTACLE DATA SETS**

(1) Obstacle data sets shall contain the digital representation of the vertical and horizontal extent of obstacles.

(2) Obstacle data shall not be included in terrain data sets.

(3) Obstacle data shall be provided for obstacles in Area 1 whose height is 100 m or higher above ground.

(4) For aerodromes regularly used by international civil aviation, obstacle data shall be provided for all obstacles within Area 2 that are assessed as being a hazard to air navigation.

(5) For aerodromes regularly used by international civil aviation, obstacle data shall be provided for:

(a) Area 2a for those obstacles that penetrate an obstacle data collection surface outlined by a rectangular area around a runway that comprises the runway strip plus any clearway that exists. The Area 2a obstacle collection surface shall have a height of 3 m above the nearest runway elevation measured along the runway centre line, and for those portions related to a clearway, if one exists, at the elevation of the nearest runway end;

(b) objects in the take-off flight path area which project above a plane surface having a 1.2 per cent slope and having a common origin with the take-off flight path area; and

(c) penetrations of the aerodrome obstacle limitation surfaces.

Note.— Take-off flight path areas are specified in Part 21, Ghana Civil Aviation (ANS) Directives. Aerodrome obstacle limitation surfaces are specified in Part 14, Ghana Civil Aviation (Aerodromes) Directives.

(6) For aerodromes regularly used by international civil aviation, obstacle data should be provided for Areas 2b, 2c and 2d for obstacles that penetrate the relevant obstacle data collection surface specified as follows:

(a) Area 2b: an area extending from the ends of Area 2a in the direction of departure, with a length of 10 km and a splay of 15 per cent to each side. The Area 2b obstacle collection surface has a 1.2 per cent slope extending from the ends of Area 2a at the elevation of the runway end in the direction of departure, with a length of 10 km and a splay of 15 per cent to each side;

(b) Area 2c: an area extending outside Area 2a and Area 2b at a distance of not more than 10 km from the boundary of Area 2a. The Area 2c obstacle collection surface has a 1.2 per cent slope extending outside Area 2a and Area 2b at a distance of not more than 10 km from the boundary of Area 2a. The initial elevation of Area 2c has the elevation of the point of Area 2a at which it commences; and

(c) Area 2d: an area outside Areas 2a, 2b and 2c up to a distance of 45 km from the aerodrome reference point, or to an existing TMA boundary, whichever is nearest. The Area 2d obstacle collection surface has a height of 100 m above ground;

except that data need not be collected for obstacles less than a height of 3 m above ground in Area 2b and less than a height of 15 m above ground in Area 2c.

(7) Arrangements shall be made for coordinating the provision of obstacle data for adjacent aerodromes where their respective coverage areas overlap to assure that the data for the same obstacle is correct.

(8) For those aerodromes located near territorial boundaries, arrangements shall be made among States concerned to share obstacle data

(9) For aerodromes regularly used by international civil aviation, obstacle data should be provided for Area 3 for obstacles that penetrate the relevant obstacle data collection surface extending a half-metre (0.5 m) above the horizontal plane passing through the nearest point on the aerodrome movement area.

(10) For aerodromes regularly used by international civil aviation, obstacle data shall be provided for Area 4 for all runways where precision approach Category II or III operations have been established.

(11) Where additional obstacle data is collected to meet other aeronautical requirements, the obstacle data sets shall be expanded to include this additional data.

15.3.4 AERODROME MAPPING DATA SETS

(1) Aerodrome mapping data sets shall contain the digital representation of aerodrome features.

Note.— Aerodrome features consist of attributes and geometries, which are characterized as points, lines or polygons. Examples include runway thresholds, taxiway guidance lines and parking stand areas.

(2) Aerodrome mapping data sets shall be made available for aerodromes regularly used by international civil aviation.

5.3.5 INSTRUMENT FLIGHT PROCEDURE DATA SETS

(1) Instrument flight procedure data sets shall contain the digital representation of instrument flight procedures.

(2) Instrument flight procedure data sets shall be made available for aerodromes regularly used by international civil aviation.

5.4 DISTRIBUTION SERVICES

5.4.1 GENERAL

(1) Aeronautical information products shall be distributed to authorized users who request them.

(2) AIP, AIP Amendments, AIP Supplements and AIC shall be made available by the most expeditious means.

(3) Global communication networks such as the Internet shall, whenever practicable, be employed for the provision of aeronautical information products.

15.5.4.2 NOTAM DISTRIBUTION

(1) NOTAM shall be distributed on the basis of a request.

(2) NOTAM shall be prepared in conformity with the relevant provisions of *Part 23.2 of Ghana Civil Aviation (ANS) Directives* on communication procedures.

(3) The aeronautical fixed service (AFS) shall, whenever practicable, be employed for NOTAM distribution.

(4) When a NOTAM is sent by means other than the AFS, a six-digit date-time group indicating the date and time of NOTAM origination, and the identification of the originator shall be used, preceding the text. The Authority shall select the NOTAM that are to be given international distribution.

(5) International exchange of NOTAM shall take place only as mutually agreed between the international NOTAM offices concerned, and between the NOTAM offices and

multinational NOTAM processing units.

(6) The originating State shall, upon request, grant distribution of NOTAM series other than those distributed internationally.

(7) Selective distribution lists shall be used when practicable.

Note.— Guidance material relating to selective distribution lists is contained in the Aeronautical Information Services Manual (Doc 8126).

15.5.5 PRE-FLIGHT INFORMATION SERVICE

(1) For any aerodrome/heliport used for international air operations, aeronautical information relative to the route stages originating at the aerodrome/heliport shall be made available to flight operations personnel, including flight crews and services responsible for pre-flight information.

(2) Aeronautical information provided for pre-flight planning purposes shall include information of operational significance from the elements of aeronautical information products.

Note 1.— The elements of aeronautical information products may be limited to national publications and when practicable, those of adjacent States, provided a complete library of aeronautical information is available at a central location and means of direct communications are available with that library.

Note 2.— A recapitulation of valid NOTAM of operational significance and other information of urgent character may be made available to flight crews in the form of plain-language pre-flight information bulletins (PIB). Guidance material on the preparation of PIB is contained in Doc 8126.

15.5.6 POST-FLIGHT INFORMATION SERVICE

(1) For any aerodrome/heliport used for international air operations, arrangements shall be made to receive information concerning the state and operation of air navigation facilities or services noted by flight crews.

(2) The arrangements specified in 5.6.1 shall ensure that such information is made available to the aeronautical information service (AIS) for distribution as the circumstances necessitate.

(3) For any aerodrome/heliport used for international air operations, arrangements shall be made to receive information concerning the presence of wildlife hazards observed by flight crews.

(4) The information about presence of wildlife hazards shall be made available to the aeronautical information service for distribution as the circumstances necessitate.

Note.— See Part 14, Ghana Civil Aviation (Aerodromes) Directives,

15.6 AERONAUTICAL INFORMATION UPDATES

15.6.1 GENERAL SPECIFICATIONS

Aeronautical data and aeronautical information shall be kept up to date.

15.6.2 AERONAUTICAL INFORMATION REGULATION AND CONTROL (AIRAC)

(1) Information concerning the following circumstances shall be distributed under the regulated system (AIRAC), i.e. basing establishment, withdrawal or significant changes upon a series of common effective dates at intervals of 28 days, including 8 November 2018:

a) limits (horizontal and vertical), regulations and procedures applicable to:

1) flight information regions;
2) control areas;

3) control zones;

4) advisory areas;

5) air traffic services (ATS) routes;

6) permanent danger, prohibited and restricted areas (including type and periods of activity when known) and air defence identification zones (ADIZ);

7) permanent areas or routes or portions thereof where the possibility of interception exists;

b) positions, frequencies, call signs, identifiers, known irregularities and maintenance periods of radio navigation aids, and communication and surveillance facilities;

c) holding and approach procedures, arrival and departure procedures, noise abatement procedures and any other pertinent ATS procedures;

d) transition levels, transition altitudes and minimum sector altitudes;

e) meteorological facilities (including broadcasts) and procedures;

e) runways and stopways;

g) taxiways and aprons;

h) aerodrome ground operating procedures (including low visibility procedures);

i) approach and runway lighting; and

j) aerodrome operating minima if published by a State.

(2) The information notified under the AIRAC system 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.

(3) Information provided under the AIRAC system shall be made available by the aeronautical information service (AIS) so as to reach recipients at least 28 days in advance of the effective date.

Note.— AIRAC information is distributed by the AIS unit at least 42 days in advance of the AIRAC effective dates with the objective of reaching recipients at least 28 days in advance of the effective date.

(4) When information has not been submitted by the AIRAC date, a NIL notification shall be distributed not later than one cycle before the AIRAC effective date concerned.

(5) Implementation dates other than AIRAC effective dates shall not be used for pre-planned operationally significant changes requiring cartographic work and/or for updating of navigation databases.

(6) The regulated system (AIRAC) shall be used for the provision of information relating to the establishment and withdrawal of, and premeditated significant changes in, the circumstances listed below:

a) position, height and lighting of navigational obstacles;

b) hours of service of aerodromes, facilities and services;

b) customs, immigration and health services;

d) temporary danger, prohibited and restricted areas and navigational hazards, military exercises and mass movements of aircraft; and

e) temporary areas or routes or portions thereof where the possibility of interception exists.

(7) Recommendation. — Whenever major changes are planned and where advance notice is desirable and practicable, information shall be made available by the AIS so as to reach recipients at least 56 days in advance of the effective date. This should be applied to the establishment of, and premeditated major changes in, the circumstances listed below, and other major changes if deemed necessary:

a) new aerodromes for international instrument flight rules (IFR) operations;

b) new runways for IFR operations at international aerodromes;

c) design and structure of the ATS route network;

c) design and structure of a set of terminal procedures (including change of procedure bearings due to magnetic variation change);

e) circumstances listed in 6.2.1 if the entire State or any significant portion thereof is affected or if cross-border coordination is required.

Note.— Guidance material on what constitutes a major change is included in the Aeronautical Information Services Manual (Doc 8126).

15.6.3 AERONAUTICAL INFORMATION PRODUCT UPDATES

15.6.3.1 AIP UPDATES

(1) The aeronautical information publication (AIP) shall be amended or reissued at such regular intervals as may be necessary to keep it up to date.

(2) Permanent changes to the AIP shall be published as AIP Amendments.

(3) Temporary changes of long duration (three months or longer) and information of short duration which contains extensive text and/or graphics shall be published as AIP Supplements.

15.6.3.2 NOTAM

(1) When an AIP Amendment or an AIP Supplement is published in accordance with AIRAC procedures, a Trigger NOTAM shall be originated.

(2) Detailed specifications concerning the Trigger NOTAM shall be contained in the Procedures for Air Navigation Services — Aeronautical Information Management (PANS-AIM, Doc 10066).

(3) A NOTAM shall be originated and issued promptly 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.

(4) A NOTAM shall be originated and issued concerning the following information:

a) establishment, closure or significant changes in operation of aerodrome(s) or heliport(s) or runways;

b) establishment, withdrawal or significant changes in operation of aeronautical services (aerodromes, AIS, ATS, communications, navigation and surveillance (CNS), meteorology (MET), search and rescue (SAR), etc.);

c) establishment, withdrawal or significant changes in operational capability of radio navigation and air-ground communication services. This includes: interruption or return to operation, change of frequencies, change in notified hours of service,

change of identification, change of orientation (directional aids), change of location, power increase or decrease amounting to 50 per cent or more, change in broadcast schedules or contents, or irregularity or unreliability of operation of any radio navigation and air-ground communication services or limitations of relay stations including operational impact, affected service, frequency and area;

d) unavailability of back-up and secondary systems, having a direct operational impact;

e) establishment, withdrawal or significant changes to visual aids;

f) interruption of or return to operation of major components of aerodrome lighting systems;

g) establishment, withdrawal or significant changes to procedures for air navigation services;

h) occurrence or correction of major defects or impediments in the manoeuvring area;

i) changes to and limitations on availability of fuel, oil and oxygen;

j) major changes to search and rescue facilities and services available;

k) establishment, withdrawal or return to operation of hazard beacons marking obstacles to air navigation;

l) changes in regulations requiring immediate action, e.g. prohibited areas for SAR action;

m) presence of hazards which affect air navigation (including obstacles, military exercises, displays, fireworks, sky lanterns, rocket debris, races and major parachuting events outside promulgated sites);

n) planned laser emissions, laser displays and search lights if pilots' night vision is likely to be impaired;

o) erecting or removal of, or changes to, obstacles to air navigation in the take-off/climb, missed approach, approach areas and runway strip;

p) establishment or discontinuance (including activation or deactivation) as applicable, or changes in the status of prohibited, restricted or danger areas;

q) establishment or discontinuance of areas or routes or portions thereof where the possibility of interception exists and where the maintenance of guard on the VHF emergency frequency 121.5 MHz is required;

r) allocation, cancellation or change of location indicators;

s) changes in aerodrome/heliport rescue and firefighting category provided (see Annex 14, Volume I, Chapter 9, and Attachment A, Section 17);

t) presence or removal of, or significant changes in, hazardous conditions due to snow,

slush, ice, radioactive material, toxic chemicals, volcanic ash deposition or water on the movement area;

u) outbreaks of epidemics necessitating changes in notified requirements for inoculations and quarantine measures;

v) observations or forecasts of space weather phenomena, the date and time of their occurrence, the flight levels where provided and portions of the airspace which may be affected by the phenomena;

w) an operationally significant change in volcanic activity, the location, date and time of volcanic eruptions and/or horizontal and vertical extent of volcanic ash cloud, including direction of movement, flight levels and routes or portions of routes which could be affected;

x) release into the atmosphere of radioactive materials or toxic chemicals following a nuclear or chemical incident, the location, date and time of the incident, the flight levels and routes or portions thereof which could be affected and the direction of movement;

y) establishment of operations of humanitarian relief missions, such as those undertaken under the auspices of the United Nations, together with procedures and/or limitations which affect air navigation; and

z) implementation of short-term contingency measures in cases of disruption, or partial disruption, of ATS and related supporting services.

(5) The following information shall not be notified by NOTAM:

a) routine maintenance work on aprons and taxiways which does not affect the safe movement of aircraft;

b) runway marking work, when aircraft operations can safely be conducted on other available runways, or the equipment used can be removed when necessary;

c) temporary obstructions in the vicinity of aerodromes/heliports that do not affect the safe operation of aircraft;

d) partial failure of aerodrome/heliport lighting facilities where such failure does not directly affect aircraft operations;

d) partial temporary failure of air-ground communications when suitable alternative frequencies are known to be available and are operative;

f) the lack of apron marshalling services and road traffic control;

g) the unserviceability of location, destination or other instruction signs on the aerodrome movement area;

h) parachuting when in uncontrolled airspace under VFR (see 6.3.2.3 m)), when controlled, at promulgated sites or within danger or prohibited areas;

i) training activities by ground units;

j) unavailability of back-up and secondary systems if these do not have an operational impact;

k) limitations to airport facilities or general services with no operational impact;

l) national regulations not affecting general aviation;

m) announcement or warnings about possible/potential limitations, without any operational impact;

n) general reminders on already published information;

o) availability of equipment for ground units without containing information on the operational impact for airspace and facility users;

p) information about laser emissions without any operational impact and fireworks below minimum flying heights;

q) closure of movement area parts in connection with planned work locally coordinated of duration of less than one hour;

r) closure or unavailability of, or changes in, operation of aerodrome(s)/heliport(s) outside the aerodrome(s)/heliport(s) operational hours; and

s) other non-operational information of a similar temporary nature.

Note.— Information which relates to an aerodrome and its vicinity and does not affect its operational status may be distributed locally during pre-flight or in-flight briefing or other local contact with flight crews.

15.6.3.3 DATA SET UPDATES

(1) Data sets shall be amended or reissued at such regular intervals as may be necessary to keep them up to date.

(2) Permanent changes and temporary changes of long duration (three months or longer) made available as digital data shall be issued in the form of a complete data set or a subset that includes only the differences from the previously issued complete data set.

(3) When made available as a completely reissued data set, the differences from the previously issued complete data set shall be indicated.

(4) When temporary changes of short duration are made available as digital data (digital NOTAM), they shall use the same aeronautical information model as the complete data set.

(5) Updates to AIP and digital data sets shall be synchronized.

15.7 ADDITIONAL REQUIREMENTS FOR AIS

15.7.1 MANAGEMENT

(1) The AIS Section shall have a documented organizational structure clearly defining lines of accountability of personnel with respect to the provision of services in accordance with ICAO requirements.

(2) The AIS Section shall have a documented organizational structure showing the relationship between operational units.

(3) The AIS Section shall have the functions, duties and responsibilities of its management staff clearly defined and documented.

(4) The AIS Section shall ensure that management positions are filled with personnel who are appropriately qualified to perform the required functions.

(5) The AIS Section shall have adequate personnel to plan, perform, supervise and provide the required services to ensure aviation safety at all times.

(6) The AIS Section shall ensure that a system of supervision for all tasks performed shall be established, with clear descriptions of supervisory functions and supervisors adequately trained to effectively perform these functions.

(7) The AIS Section shall ensure procedures for control, analysis and storage of records, documents and safety related data shall be documented.

(8) The AIS Section shall have job descriptions for operations and training personnel clearly defined and documented and a system of personal files containing all relevant information of persons under training, OJT instructors and leave records shall be maintained.

(9) The AIS Section shall have a procedure in place for taking remedial action following an error or offence done by an officer on duty.

(10) The AIS Section shall establish a system of communication in the following form:

(a) Circulars,

(b) Orders and,

(c) Log entries.

(11) The AIS Section shall conduct regular operational meetings. Minutes of the meetings shall be kept and follow up done on matters arising from the meetings.

(12) The AIS Section shall supply monthly serviceability reports and statistics on AFTN/AMHS and other facilities and equipment to the Head of the Department.

15.7.2 PERSONNEL REQUIREMENTS

(1) The Authority shall ensure that the AIS Section is staffed with appropriately skilled personnel to ensure the provision of aeronautical information service in a safe, efficient, continuous and sustainable manner. In this context, they shall establish policies for the recruitment and training of personnel.

(2) The Authority shall employ, contract, or otherwise engage:

(a) a senior person or persons responsible to the head of the AIS Section for ensuring that all activities undertaken by the AIS Section are in compliance with these requirements and those prescribed by the Ghana Civil Aviation Directives, and who shall have unrestricted access to work performed or activities undertaken by all other persons as employees of, and other persons rendering services for and on behalf of the AIS Section.

(b) Sufficient personnel to Promulgate and maintain the facilities listed in the Operations Manual.

(3) The AIS Section shall ensure that its personnel are competent and are of sufficient numbers and have been provided with written evidence of the scope of their authorization to be able to discharge their allocated responsibilities. The job description should depict the job purpose, key responsibilities, and outcome to be achieved of each staff.

(4) The Authority shall have a documented methodology for determining the number of staff required to work efficiently for each unit.

(5) The AIS Section shall establish procedures for personnel, who are authorized to place into operational service any of the facilities listed in their Operations Manual, to:

(a) Assess the competence of those authorized personnel;

(b) Maintain the competence of those authorized personnel; and

(c) Establish a means to provide those personnel with written evidence of the scope of their authorization.

15.7.3 OPERATIONS MANUAL

(1) The AIS Section shall develop and keep up-to-date operations manual relating to the provision of their services for the use and guidance of operations personnel.

(2) The contents of the operations manual shall include but not be limited to the following:

(a) a table of contents based on the items in the manual, indicating the page number on which each item begins;

(b) a description of the organizational structure and a statement setting out the functions that the AIS Section performs, or proposes to perform;

(c) a description of the chain of command established and a statement of the duties and responsibilities of any supervisory positions within the organizational structure;

(d) a statement showing how the AIS Section determines the number of operational staff required including the number of operational supervisory staff;

(e) a statement of the responsibilities and functions for each position;

(f) a description of the AIS Section's record keeping system;

(g) a description of the processes and documentation used to provide operational instructions to staff;

(h) a description of the procedures to be followed to ensure all operational staff are familiar with any operational changes that have been issued since they last performed operational duties;

(i) a description of the procedures to be used in commissioning new facilities, equipment and services;

(j) the procedures to be followed for revising the operations manual.

(3) The AIS Section shall ensure that:

(a) operations manuals contain the instructions and information required by the operations personnel to perform their duties;

(b) relevant parts of the operations manuals are accessible to the personnel concerned;

(c) the operations personnel are expeditiously informed of amendments to the operations manual applying to their duties as well as of their entry into force.

(d) the initial copy of the manual shall be submitted to the Authority both in hard and soft copies for review and approval.

15.7.4 TRAINING

(1) The Authority shall:

(a) Ensure that all its AIS personnel possess the skills and competencies required in the provision of the Aeronautical Information Services.

(b) Develop an AIS Training Manual, which shall contain the overall training policy and program for its AIS personnel, which include the details of the training courses that different levels of technical staff have to undergo to perform their duties. This shall include Basic, Advanced, Specialized, Recurrent training, On-the-job-training and Human factor initial and recurrent training, where applicable in accordance with ICAO Training Manual for AIS or any such training program, which is acceptable to the Authority.

(c) Maintain individual training records for each of its AIS staff, which should include a training plan detailing the courses completed by each staff as well as the time frame for attending future courses as required under this training plan.

(2) The Authority shall ensure that the AIS Section trains personnel dedicated to OJT.

(3) The Authority shall ensure the implementation of its training policy and programme for its technical staff.

(1) Training for AIS technical personnel shall be as prescribed in Doc 7192, Part E-3 (ICAO AIS Training manual).

(2) The head of the AIS Section shall maintain training files for the operational staff.

15.7.5 AERONAUTICAL INFORMATION FACILITY REQUIREMENTS

The AIS Section shall establish a procedure in its Operations Manual to ensure that each Aeronautical Information Service facility:

(a) Is designed, installed, and commissioned to meet the applicable operational specification for that facility

(a) Conforms with the applicable system characteristics and specification standards prescribed in the Ghana Civil Aviation Directives and relevant ICAO Documents;

(b) Is installed with suitable power supplies and means to ensure continuity of services.

15.7.6 DOCUMENTATION

(1) The Aeronautical Information Service Section shall:

(a) Document the format and standards for the aeronautical information published under the authority of the mandate of the Director-General;

(b) Ensure that the format and standards take into account the circumstances under which the information will be used;

(c) Hold copies of relevant reference materials, standards, practices and procedures, and any other documentation that is necessary for the aeronautical information service listed in their Operations Manual.

(2) These documents shall include, but not be limited to:

(a) Applicable Ghana Civil Aviation Directives,

(b) ANNEX 4 – Aeronautical Charts,

(c) ANNEX 15 – Aeronautical Information Services

(d) ICAO Doc 9839 – Manual on the Quality Management System for Aeronautical Information Services

(e) ICAO Doc 7383 – Aeronautical Information Services provided by States

(f) ICAO Doc 7910 – ICAO Location Indicators

(g) ICAO Doc 8126 – Aeronautical Information Services Manual

(h) ICAO Doc 8400 – ICAO Abbreviations and Codes

(i) ICAO Doc 8585 – Designators for Aircraft Operating Agencies

(j) ICAO Doc 8697 – Charting Manual

(k) ICAO Doc 9377 – Manual on Coordination between Air Traffic Service, Aeronautical Information Services and Aeronautical Meteorological Services

(l) ICAO Doc 9674 – World Geodetic System – 1984 (WGS – 84) Manual

(m) ICAO Doc 9683 – Human Factors Training Manual

(1) All documents developed by the AIS Section shall be reviewed and approved by the Authority.

15.7.7 **AIS OPERATIONS LOGBOOK**

(1) The AIS Section shall establish procedures in its Operations Manual to ensure that a logbook, with sequentially numbered pages, is kept at each office and where an office has physically separate operation areas, at each of such location within the office.

(2) The procedure shall ensure that:

(a) The logbook is maintained by the senior person, or the person on duty at a nominated operating position;

(b) the logbook is maintained throughout the operating hours of the office;

(c) all entries include the date, time of entry and signature;

(d) Every page of the logbook must be signed by the Shift manager or a designated senior person;

(e) Logbook entries are:

(i) In chronological sequence and in ink;

(ii) Without erasure, defacement, or obliteration; and

(iii) Corrected by drawing a single line through the erroneous information and initialing the correction.

(f) Actual times of opening and closing of the office are recorded in the logbook, together with the reason for every variation from published hours of service; and

(g) Logbooks are retained for a period of not less than two (2) years from the date of final entry to serve as a source of Archiving for future referencing.

15.7.8 **PREVENTION OF FATIGUE**

(1) The AIS Section shall establish procedures to ensure that AIS Personnel are not subject to fatigue in that:

(a) There is a minimum of 12 consecutive hours rest period between shifts and minimum of 24 hours after night shifts.

(b) At any time a minimum of two (2) personnel shall be present in a shift;

(c) Except in an emergency, AIS Personnel shall refrain from performing any duties for at least 24 consecutive hours at least once during each 7 consecutive days.

(2) The AIS Section shall establish a five (5) Group shift system.

15.7.9 **SHIFT ADMINISTRATION**

The AIS Section shall establish a procedure to ensure that:

(a) Adequate time is provided at the beginning and end of each shift, for the performance of those duties required:

(b) Before start of the shift; and after the end of the shift.

(c) A minimum of 30 minutes is provided for each transfer of duties. This shall be done to ensure all briefings to the incoming team have been done well and all handovers of both documentation and other related things such as cash in the briefing office is well handed over.

15.7.10 USE OF UNAUTHORISED DRUGS

The AIS Section shall establish procedures to ensure that no AIS personnel whose function is critical to the safety of aviation shall undertake that function while under the influence of any psychoactive substance, by reason of which human performance is impaired and that they shall not engage in any unauthorized use of such substances.

15.7.11 COORDINATION

The AIS Section shall establish systems and procedures in its Operations Manual to ensure where applicable, co-ordination with the following:

(a) The Air Traffic Control Section
(b) The Search and Rescue Unit;

(c) National Security Agencies;

(d) Agencies responsible for Search And Rescue;

(e) The Aeronautical Telecommunication Service Section;

(f) Airport and aerodrome operators;

(g) Ghana Meteorological Agency.

15.7.12 RECORDS

(1) The AIS Section shall establish procedures to identify, collect, index, store, maintain and dispose of the records that are necessary for the Aeronautical Information Service listed in their Operations Manual.

(2) Procedures shall ensure that:

(a) There are records enabling all incoming and outgoing aeronautical information to be readily identified and that supplementary information can be similarly identified, verified and where necessary, authenticated;

(b) There is a record of each person who is authorized by the AIS Section to check, edit and publish aeronautical information;

(c) There is a record of each occurrence of error correction under the procedure;

(d) There is a record of each internal quality assurance review of the AIS Section carried out under the procedure;

(e) There is a record of all audits and reviews required under the Quality management procedure;

(f) All records are legible and of a permanent nature; and

(g) All records are retained for at least 5 years except NOTAM, AIP Supplements and Aeronautical Information Circulars, which need only to be retained for 31 days after cancellation.

15.7.13 **SAFETY MANAGEMENT SYSTEM (SMS)**

(1) The Aeronautical Information Service Section shall establish a Safety Management System in accordance with Part 36 of Ghana Civil Aviation (SMS) Directives.

(2) The safety management system shall include:

(a) Hazard identification;

(b) Risk management;

(c) Safety assurance;

(d) Safety performance monitoring, auditing and measurement;

(e) Change management; and

(f) Management Reviews.

(3) The AIS Section shall develop procedures for managing safety when introducing new functional systems or changing the existing functional systems.

(4) The AIS Section shall notify the Authority of all planned safety related changes where the changes may impact on the safety of an air traffic service.

15.7.14 **CONTINGENCY PLAN**

(1) The AIS Section shall have in place contingency plans for all the services they provide in the case of events which result in significant degradation or interruption of their operations.

(2) Interruption of operations refers to a major event which impacts on the AIS Section's ability to continue to provide a safe service such as a major ATS equipment failure, serious aircraft incident, terrorist incident, fire, bomb threat, pandemic influenza, major IT failures etc. Such situations would normally be considered as part of a business continuity plan requiring specific contingency plans to be drawn up as mitigation.

(3) Emergency procedures shall detail the responsibilities and accountabilities of all personnel involved.

(4) Procedures shall be established for events that cause operational deficiencies to arise whereby the facilities promulgated in the Ghana AIP are temporarily not available.

15.7.15 **SECURITY MANAGEMENT SYSTEM**

(1) The AIS Section shall establish a security management system to ensure:

(a) the security of their facilities and personnel so as to prevent unlawful interference with the provision of aeronautical information service;

(b) the security of operational data they receive or produce or otherwise employ, so that access to it is restricted only to those authorized.

(2) The security management system shall define:

(a) the procedures relating to security risk assessment and mitigation, security monitoring and improvement, security reviews and lesson dissemination;

(b) the means designed to detect security breaches and to alert personnel with appropriate security warnings;

(c) the means of containing the effects of security breaches and to identify recovery action and mitigation procedures to prevent reoccurrence.

(3) The AIS Section shall ensure the security clearance of their personnel and coordinate with the relevant civil and military authorities to ensure the security of their facilities, personnel and data.