NIGERIA CIVIL AVIATION AUTHORITY

REGULATIONS

PART 14

AIR NAVIGATION SERVICES

2023

NIGERIA CIVIL AVIATION REGULATIONS

PART 14
AIR NAVIGATION SERVICES

APRIL 2023

Record of Amendment

Amendment Number	Date of Amendment	Affected sections	Description
4	April,2023	All	Updated to latest amendment of applicable ICAO annexes as per the status stated in Part 1 of this regulations and the introduction to this Part

Made this 17 day of May 2023.

Captain Musa Shuaibu Nuhu

Director General of Civil Aviation

NIGERIA CIVIL AVIATION AUTHORITY

CIVIL AVIATION REGULATIONS

PART 14 – AIR NAVIGATION SERVICES

APRIL 2023

CONTENTS

PART 14: AIR NAVIGATION SERVICES

SUB-PART: 14.0 GENERAL

INTRODUCTION

The Nigeria Civil Aviation Regulations (Nig. CARs) Part 14 incorporates the following annexes: Annex 2 (Amendment 47), Annex 3 (Amendment 80), Annex 4 (Amendment 61), Annex 5 (Amendment 17), Annex 10 Vol. I (Amendment 92), Annex 10 Vol. II (Amendment 92), Annex 10 Vol. III (Amendment 91), Annex 10 Vol. IV (Amendment 91), Annex 10 Vol. V (Amendment 90), Annex 11 (Amendment 52), Annex 12 (Amendment 16) and Annex 15 (Amendment 42) which address the Air Navigation rules procedures and services applications as stated in Articles 13, 37, and 38 of the Convention on International Civil Aviation (Chicago) 1994. The Implementing Standards (IS) provides detailed requirements that support the intent of the Regulations presented in a part, and unless otherwise indicated, have the legal force and effect of the referring Regulations.

This Part 14 of the NigCARs covers AIR NAVIGATION SERVICES as follows:

Subpart 14.0--General
Subpart 14.1--Air Traffic Management (ATM)
Subpart 14.2 – Procedures for Air Navigation- Operations (PANS OPS)
Subpart 14.3 – Search and Rescue (SAR)
Subpart 14.4 – Aeronautical Information Services (AIS)
Subpart 14.5 – Aeronautical Charts (AEROCHARTS)
Subpart 14.6 – Aeronautical Meteorology (AEROMET)
Subpart 14.7 – Aeronautical Telecommunication (CNS)

14.0. GENERAL

14.0.1 Applicability

(a) Unless otherwise specified, this part shall apply to processes for approval and operations of Air Navigation Services (ANS) in the following ANS domain:

(1) Air Traffic Services (within the Nigerian Airspace);
(2) Procedure Design (PANS-OPS) Services;
(3) Aeronautical search and rescue Services;
(4) Aeronautical Information Services;
(5) Aeronautical Charts Services;
(6) Aeronautical Meteorology; and
(7) Aeronautical Telecommunications.

(b) Where the Air Navigation Service (ANS) provider cannot provide any of the Services listed in 14.0.1(a), an ANSP shall subject to the approval of the Authority:

i) enter into agreement with one or more ANSP to provide a joint service; and/or

ii) delegate the provision of the service to external agency(ies).

(c) Air Navigation Services shall be provided in accordance with the approved regulatory framework

14.0.2 Definitions

The following are definitions of terms used in this Part:

ACAS broadcast *means a* broadcast Along Mode S air-air surveillance interrogation (UF= 16) with the broadcast address.

ACASI *means* an ACAS which provides information as an aid to "see and avoid" action but does not include the capability for generating resolution advisories (RAs).

ACASII *means a*n ACAS which provides vertical resolution advisories (RAs) in addition to traffic advisories (TAs).

ACASIII *means a*n ACAS which provides vertical and horizontal resolution advisories (RAs) in addition to traffic advisories (TAs).

Accepting unit means *an* air traffic control unit next to take control of an aircraft.

Accident means an occurrence associated with the operation of an aircraft which takes place between the time any person boards the aircraft with the intention of flight until such time as all such persons have disembarked, in which:

(*a*) a person is fatally or seriously injured as a result of:

(i) being in the aircraft, or

(ii) direct contact with any part of the aircraft, including parts which have become detached from the aircraft, or

(iii) direct exposure to jet blast, *except when* the injuries are from natural causes, self-inflicted or inflicted by other persons, or when the injuries are to stowaways hiding outside the areas normally available to the passengers and crew; or

(*b*) the aircraft sustains damage or structural failure which:

(i) adversely affects the structural strength, performance or flight characteristics of the aircraft, and

(ii) would normally require major repair or replacement of the affected component, *except for* engine failure or damage, when the damage is limited to the engine, its cowlings or accessories; or for damage limited to propellers, wing tips, antennas, probes, vanes, tires, brakes, wheels, fairings, panels, landing gears, doors, windscreens, the aircraft skin (such as small dents or puncture holes), or minor damages to main rotor blades, tail rotor blades, landing gear, and those resulting from hail or bird strike (including holes in the radome); or

(*c*) the aircraft is missing or is completely inaccessible.

Note 1. For statistical uniformity only, an injury resulting in death within thirty days of the date of the accident is classified as a fatal injury by ICAO.

Note 2. An aircraft is considered to be missing when the official search has been terminated and the wreckage has not been located.

Note 3.— The type of unmanned aircraft system to be investigated is addressed in Annex 13, 5.1.

Note 4.— Guidance for the determination of aircraft damage can be found in Annex 13, Attachment E.

Accuracy means a degree of conformance between the estimated or measured value and the true value.

Note. — For measured positional data the accuracy is normally expressed in terms of a distance from a stated position within which there is a defined confidence of the true position falling.

Acrobatic flight *means a* Manoeuvres intentionally performed by an aircraft involving an abrupt change in its attitude, an abnormal attitude, or an abnormal variation in speed.

Active RAC *means a*n RAC is active if it currently constrains the selection of the RA. RACs that have been received within the last six seconds and have not been explicitly cancelled are active.

Adaptive modulation *means a* system's ability to communicate with another system using multiple burst profiles and a system's ability to subsequently communicate with multiple systems using different burst profiles.

ADS application. means an ATN application that provides ADS data from the aircraft to the ATS unit(s) for surveillance purposes.

ADS-B (Automatic Dependent Surveillance – Broadcast) - A means by which aircraft, 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.

ADS-C agreement. means a reporting plan which establishes the conditions of ADS-C data reporting (i.e., data required by the air traffic services unit and frequency of ADS-C reports which have to be agreed to prior to using ADS- C in the provision of air traffic services).

Note—the terms of the agreement will be exchanged between the ground system and the aircraft by means of a contract, or a series of contracts.

Advisory airspace. means an airspace of defined dimensions, or designated route, within which air traffic advisory service is available.

Advisory route means a designated route along which air traffic advisory service is available.

Note. — Air traffic control service provides a much more complete service than air traffic advisory service; advisory areas and routes are therefore not established within controlled airspace, but air traffic advisory service may be provided below and above control areas.

Aerial Work means a aircraft operation in which an aircraft is used for specialised services such as agriculture, construction, photography, surveying, observation and patrol, search and rescue, aerial advertisement, etc.

Aerobatic flight. means a Manoeuvres intentionally performed by an aircraft involving an abrupt change in its attitude, an abnormal attitude, abnormal acceleration, or an abnormal variation in speed not necessary for normal flight

Aerodrome means 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.

Note. — The term "aerodrome" where used in the provisions relating to flight plans and ATS messages is intended to cover also sites other than aerodromes which may be used by certain types of aircraft, e.g., helicopters or balloons.

Aerodrome climatological summary means a Concise summary of specified meteorological elements at an aerodrome, based on statistical data.

Aerodrome climatological table means a Table providing statistical data on the observed occurrence of one or more meteorological elements at an aerodrome.

Aerodrome Control Radio Station *means a* station providing radio-communication between an aerodrome control tower and aircraft or mobile aeronautical stations.

Aerodrome control service means a Air traffic control service for aerodrome traffic.

Aerodrome control tower means a unit established to provide air traffic control service to aerodrome traffic.

Aerodrome elevation means the elevation of the highest point of the landing area.

Aerodrome facilities and equipment means a Facilities and equipment, inside or outside the boundaries of the aerodrome, that are constructed or installed, operated and maintained for the arrival, departure and surface movement of aircraft.

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

Note. — Aerodrome mapping data are collected for purposes that include the improvement of the user's situational awareness, surface navigation operations, training, charting and planning.

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

Aerodrome meteorological office means an office, located at an aerodrome, designated to provide meteorological service for international air navigation.

Aerodrome operating minima means the limits of usability of an aerodrome for:

(*a*) take-off, expressed in terms of runway visual range and/or visibility and, if necessary, cloud conditions;

(*b*) Landing in precision approach and landing operations, expressed in terms of visibility and/or runway visual range and decision altitude/height (DA/ H) as appropriate to the category of the operation;

(*c*) landing in approach and landing operations with vertical guidance, expressed in terms of visibility and/or runway visual range and decision altitude/ height (DA/H); and

(*d*) landing in non-precision approach and landing operations, expressed in terms of visibility and/or runway visual range, minimum descent altitude/ height (MDA/H) and, if necessary, cloud conditions.

Aerodrome reference point means the designated geographical location of an aerodrome.

Aerodrome traffic means All traffic on the maneuvering area of an aerodrome and all aircraft flying in the vicinity of an aerodrome.

Note. — An aircraft is in the vicinity of an aerodrome when it is in, e ntering or leaving an aerodrome traffic circuit.

Aerodrome traffic circuit means the specified path to be flown by aircraft operating in the vicinity of an aerodrome.

Aerodrome traffic zone means an airspace of defined dimensions established around an aerodrome for the protection of aerodrome traffic.

AeroMACS downlink (DL) means the transmission direction from the base station (BS) to the mobile station (MS).

AeroMACS handover *means t*he process in which a mobile station (MS) migrates from the air-interface provided by one base station (BS) to the air-interface provided by another BS. A break-before-make AeroMACS handover is where service with the target BS starts after a disconnection of service with the previous serving BS.

AeroMACS uplink (UL) *means t*he transmission direction from the mobile station (MS) to the base station (BS).

Aeronautical Administrative Communications (AAC) means Communications necessary for the exchange of aeronautical administrative messages.

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

Aeronautical chart means a representation of a portion of the Earth, its culture and relief, specifically designated to meet the requirements of air navigation.

Aeronautical data means representation of aeronautical facts, concepts or instructions in a formalised manner suitable for communication, interpretation or processing.

Aeronautical facility means:

(a) The various types of aeronautical telecommunications systems used in either an aeronautical broadcast service or an aeronautical fixed service, that support IFR flight or an air traffic service; or

(b) The ground elements of communication systems used for an aeronautical mobile service; or

(c) The various types of radio navigation aids used for the aeronautical radio navigation service; or

(d) Any other type of ground-based telecommunication system that supports IFR flight or an air traffic service.

(e) Aeronautical facilities include but not limited to the following:

(i) Types of radio navigation aids for aeronautical radio navigation service:

(1) Instrument Landing System (ILS)

(2) VHF Omni-Directional Radio Range (VOR).

(3) Distance Measuring Equipment (DME).

(4) Non-directive radio Beacon (NDB).

(ii) Types of communication systems for the aeronautical broadcast service:

(1) Meteorological information for aircraft in flight (VOLMET):

(2) Automatic Terminal Information Service (ATIS).
(3) Types of communication systems for aeronautical fixed services:
(4) Air Traffic Services Direct Speech circuits (ATS/DS)
(5) Aeronautical fixed telecommunication network (AFTN).
(6) Aeronautical Message Handling System (AMHS).
(7) Ground-ground data interchange.
(8) Ground elements of the following types of communication systems for aeronautical radio navigation service:
(9) HF air-ground communication.
(10) VHF air-ground communication.
(11) UHF air-ground communication.
(12) HF ground-ground communication (SSB).
(13) Satellite ground-ground communications.
(14) Microwave communication systems.

(iii) Types of surveillance Radar and collision avoidance systems:
(1) Primary Surveillance Radar (PSR).
(2) Secondary Surveillance Radar (SSR).
(3) Precision Approach Radar (PAR).
(4) Automatic Dependant System – Broadcast (ADS - B)
(5) Automatic Dependant System – Contract (ADS - C)
(6) Wide Area Multilateration (WAMLAT)

(iv) Types of automation systems that support an air traffic service:
(v) Flight Data Processing System (FDPS).
(vi) Airspace Management System (AMS).
(vii) Data Processing & Display System (DPDS).
(viii) Types of communication systems:
(ix) Voice Communication Switching System (VCSS).
(x) Private Automatic Exchange and Telephony System (PABX)

Aeronautical Fixed Circuit means a circuit forming part of the aeronautical fixed service (AFS).

Aeronautical fixed service (AFS) means 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 fixed station means a station in the aeronautical fixed service

Aeronautical fixed telecommunication network (AFTN) means a worldwide system of aeronautical fixed circuits provided, as part of the aeronautical fixed service, for the exchange of messages and/or digital data between aeronautical fixed stations having the same or compatible communications characteristics.

Aeronautical Fixed Telecommunication Network Circuit means a circuit forming part of the aeronautical fixed telecommunication network (AFTN).

Aeronautical ground light means any light specially provided as an aid to air navigation, other than a light displayed on an aircraft.

Aeronautical Information Circular **(*AIC*) means 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) means 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 means 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.

Note.—Aeronautical information products are intended primarily to satisfy international requirements for the exchange of aeronautical information.

Aeronautical Information Publication **(*AIP*) means 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) means 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.

Aeronautical meteorological station means a station designated to make observations and meteorological reports for use in international air navigation.

Aeronautical Mobile Airport Communications System (AeroMACS) means a high-capacity data link supporting mobile and fixed communications on the aerodrome surface.

Aeronautical Mobile-Satellite(R)*service (RRS1.36) means an aeronautical mobile-satellite service reserved for communications relating to safety and regularity of flights, primarily along national or international civil air routes.

Aeronautical Mobile-Satellite Service (RRS1.35) means a mobile-satellite service in which mobile earth stations are located onboard aircraft; survival craft stations and emergency position-indicating radio beacon stations may also participate in this service.

Aeronautical Mobile(R)*Service (RRS1.33) means an aeronautical mobile service served for communications relating to safety and regularity of flight, primarily along national or international civil air routes.

Aeronautical mobile service **(*RR S1.*32) means a** mobile service between aeronautical stations and aircraft stations, or between aircraft stations, in which survival craft stations may participate; emergency position-indicating radio beacon stations may also participate in this service on designated distress and emergency frequencies.

Aeronautical Operational Control (AOC) means a Communication required for the exercise of authority over the initiation, continuation, diversion or termination of flight for safety, regularity and efficiency reasons.

Aeronautical radio navigation service **means** a radio navigation service intended for the benefit and for the safe operation of aircraft.

Aeronautical station **(*RR S1.81*) means** a land station in the aeronautical mobile service. In certain instances, an aeronautical station may be located, for example, on board ship or on a platform at sea.

Aeronautical Telecommunication Agency means an agency responsible for operating a station or stations in the aeronautical telecommunication service.

Aeronautical Telecommunication Log means a record of the activities of an aeronautical telecommunication station.

***Aeronautical telecommunication network (ATN*) means an** internetwork architecture that allows ground, air-ground and avionic data sub-networks to interoperate by adopting common interface services and protocols based on the International Organization for Standardization (ISO) Open Systems Interconnection (OSI) reference model.

***Aeronautical telecommunication (Aerotel) service* means a** telecommunication service provided to air traffic during all phases of operations and also for any aeronautical purpose which involves three essential elements of International Civil Aviation –Communication, Navigation and Surveillance (CNS).

Aeronautical telecommunication station means a station in the aeronautical telecommunication service.

Aeroplane means a power-driven heavier-than-air aircraft, deriving its lift in flight chiefly from aerodynamic reactions on surfaces which remain fixed under given conditions of flight.

AFTN Communication Centre means an AFTN station whose primary function is the relay or retransmission of AFTN traffic from (to) a number of other AFTN stations connected to it.

AFTN Destination Station means an AFTN station to which messages and/or digital data are addressed for processing for delivery to the addressee.

AFTN Origin Station means an AFTN station where messages and/or digital data are accepted for transmission over the AFTN.

AFTN Station means a station forming part of the aeronautical fixed telecommunication network (AFTN) and operating as such under the authority or control of a State.

AIRAC means 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.

***Airborne collision avoidance system* (*ACAS*) means an** aircraft system based on secondary surveillance radar (SSR) trans- ponder signals which operates independently of ground- based equipment to provide advice to the pilot on potential conflicting aircraft that are equipped with SSR transponders.

Aircraft means any machine that can derive support in the atmosphere from the reactions of the air other than the reactions of the air against the earth's surface.

Aircraft address means a unique combination of 24 bits available for assignment to an aircraft for the purpose of air-ground communications, navigation and surveillance.

Aircraft Data Circuit: Terminating Equipment (ADCE) means an aircraft specific data circuit-terminating equipment that is associated with an airborne data link processor (ADLP). It operates a protocol unique to Mode S data link for data transfer between air and ground.

Aircraft Data Link Processor (ADLP) means an aircraft-resident processor that is specific to a particular air-ground data link (e.g. Mode S) and which provides channel management, and segments and/or reassembles messages for transfer. It is connected to one side of aircraft elements common to all data link systems and on the other side to the air-ground link itself.

Aircraft Earth Station (AES) means a mobile earth station in the aeronautical mobile-satellite service located on board an aircraft

Aircraft identification means a group of letters, figures or a combination thereof which is either identical to, or the coded equivalent of, the aircraft call sign to be used in air-ground communications, and which is used to identify the aircraft in ground-ground air traffic services communications

Aircraft observation *means* the evaluation of one or more meteorological elements made from an aircraft in flight.

Aircraft Operating Agency means the person, organization or enterprise engaged in, or offering to engage in, an aircraft operation.

Aircraft proximity means a situation in which, in the opinion of a pilot or air traffic services personnel, the distance between aircraft as well as their relative positions and speed have been such that the safety of the aircraft involved may have been compromised.

An aircraft proximity is classified as follows:

> ***Risk of collision. -*** The risk classification of an aircraft proximity in which serious risk of collision has existed.

Safety not assured. - The risk classification of an aircraft proximity in which the safety of the aircraft may have been compromised.

No risk of collision. - The risk classification of an aircraft proximity in which no risk of collision has existed.

Risk not determined. - The risk classification of an aircraft proximity in which insufficient information was available to determine the risk involved, or inconclusive or conflicting evidence precluded such determination.

Aircraft stand means a designated area on an apron intended to be used for parking an aircraft.

Aircraft Station means a mobile station in the aeronautical mobile service, other than a survival craft station, located on board an aircraft.

Air defense identification zone **(*ADIZ*) means** 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-ground communication means Two-way communication between aircraft and stations or locations on the surface of the earth.

Air-ground control radio station means an aeronautical tele-communication station having primary responsibility for handling communications pertaining to the operation and control of aircraft in a given area.

Air-Initiated Protocol means a procedure initiated by a Mode S aircraft installation for delivering a standard length or extended length downlink message to the ground.

AIRMET information means Information issued by a meteorological watch office concerning the occurrence or expected occurrence of specified en- route weather phenomena which may affect the safety of low-level aircraft operations and which was not already included in the forecast issued for low- level flights in the flight information region concerned or sub-area thereof.

Air-report means a report from an aircraft in flight prepared in conformity with requirements for position, and operational and/or meteorological reporting.

Note — Details of the AIREP form are given in the PANS-ATM (Doc 4444).

Air-taxiing means Movement of a helicopter/VTOL above the surface of an aerodrome, normally in ground effect and at a ground speed normally less than 37 km/h (20 kt).

Note— The actual height may vary, and some helicopters may require air- taxiing above 8m (25 *ft*) *AGL to reduce ground effect turbulence or provide clearance for cargo slingloads.*

Air-To-Ground Communication means One-way communication from aircraft to stations or locations on the surface of the earth.

Air traffic means all aircraft in flight or operating on the maneuvering area of an aerodrome.

Air traffic advisory service means a service provided within advisory airspace to ensure separation, in so far as practical, between aircraft which are operating on IFR flight plans.

Air traffic control clearance means Authorization for an aircraft to proceed under conditions specified by an air traffic control unit.

Note 1. — For convenience, the term "air traffic control clearance" is frequently abbreviated to "clearance" when used in appropriate contexts.

Note 2. — The abbreviated term "clearance" may be pre-fixed by the words "taxi", "take-off", "departure", "en-route", "approach" or "landing" to indicate the particular portion of flight to which the air traffic control clearance relates.

Air traffic control service means service provided for the purpose of:

(*a*) preventing collisions:

(1) between aircraft, and

(2) on the maneuvering area between aircraft and obstructions; and

(*b*) expediting and maintaining an orderly flow of air traffic.

Air traffic controller schedule means a plan for allocating air traffic controller duty periods and non-duty periods over a period of time, otherwise referred to as a roster.

Air traffic control unit means a generic term meaning variously, area control centre, approach control unit or aerodrome control tower.

Air traffic flow management (ATFM) means a service established with the objective of contributing to a safe, orderly and expeditious flow of air traffic by ensuring that ATC capacity is utilized to the maximum extent possible and that the traffic volume is compatible with the capacities declared by the appropriate ATS authority.

Air traffic management (ATM) means 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.

Air traffic service means a generic term meaning variously, flight information service, alerting service, air traffic advisory service, air traffic control service (area control service, approach control service or aerodrome control service).

Air traffic services airspaces means Airspaces of defined dimensions, alphabetically designated, within which specific types of flights may operate and for which air traffic services and rules of operation are specified.

Note— ATS airspaces are classified as Class A to G.

Air traffic services reporting office means unit established for the purpose of receiving reports concerning air traffic services and flight plans submitted before departure.

Note— An air traffic services reporting office may be established as a separate unit or combined with an existing unit, such as another air traffic services unit, or a unit of the aeronautical information service.

Air traffic services unit means a generic term meaning variously, air traffic control unit, flight information centre or air traffic services reporting office.

Air transit route means a defined route for the air transiting of helicopters.

AIP Amendment means Permanent changes to the information contained in the AIP.

AIP Supplement means temporary changes to the information contained in the AIP which are published by means of special pages.

Airway means a control area or portion thereof established in the form of a corridor.

AIS product means aeronautical information provided in the form of the elements of the Integrated Aeronautical Information Package (except NOTAM and PIB), including aeronautical charts, or in the form of suitable electronic media.

AIS Provider means the body responsible for providing aeronautical information services.

ALERFA means the code word used to designate an alert phase.

Alert means an indication provided to other aircraft systems or annunciation to the pilot to identify that an operating parameter of a navigation system is out of tolerance.

Alert limit means for a given parameter measurement, the error tolerance not to be exceeded without issuing an alert.

Alerting post *means* any facility intended to serve as an intermediary between a person reporting an emergency and a rescue coordination centre or rescue sub-centre.

Alert phase means a situation wherein apprehension exists as to the safety of an aircraft and its occupants.

Alerting service means a service provided to notify appropriate organizations regarding aircraft in need of search and rescue aid, and assist such organizations as required.

Alternate aerodrome means a aerodrome to which an aircraft may proceed when it becomes either impossible or inadvisable to proceed to or to land at the aerodrome of intended landing where the necessary services and facilities are available, where aircraft performance requirements can be met and which is operational at the expected time of use. Alternate aerodromes include the following:

> *Take-off alternate.* — An alternate aerodrome at which an aircraft can land should this become necessary shortly after take- off and it is not possible to use the aerodrome of departure.
>
> *En-route alternate:* — An aerodrome at which an aircraft would be able to land after experiencing an abnormal or emergency condition while en-route.
>
> *ETOPS en-route alternate:* — A suitable and appropriate alternate aerodrome at which an aeroplane would be able to land after experiencing an engine shut- down or other abnormal or emergency condition while en-route in an ETOPS operation.

Destination alternates: — An alternate aerodrome to which an aircraft may proceed should it become either impossible or inadvisable to land at the aerodrome of intended landing.

Note: —The aerodrome from which a flight departs may also be an en-route or a destination alternate aerodrome for that flight.

Alternative means of communication. —A means of communication provided with equal status, and in addition to the primary means.

Altitude means the vertical distance of a level, a point or an object considered as a point, measured from mean sea level (MSL).

Altitude crossing RA means a resolution advisory is altitude crossing if own ACAS aircraft is currently at least 30m (100ft) below or above the threat aircraft for upward or downward sense advisories, respectively.

Angular displacement sensitivity means the ratio of measured DDM to the corresponding angular displacement from the appropriate reference line.

Antenna Port means a point where the received signal power is specified. For an active antenna, the antenna port is a fictitious point between the antenna elements and the antenna pre-amplifier for a passive antenna, the antenna port is the output of the antenna itself.

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

Application Entity (AE) means an AE represents a set of ISO/OSI communication capabilities of a particular application process (see ISO/IEC 9545 for further details).

Approach Surface means an inclined plane or a combination of planes sloping upwards from the end of the safety area, centered on a line passing through the Centre and through which no obstacle may penetrate

Approach control service means Air traffic control service for arriving or departing controlled flights.

Approach control unit means a unit established to provide air traffic control service to controlled flights arriving at, or departing from, one or more aerodromes.

Appropriate ATS authority means the relevant authority designated by the State responsible for providing air traffic services in the airspace concerned.

Appropriate authority:

(*a*) *Regarding flight over the high seas*—The relevant authority of the State of Registry.

(*b*) *Regarding flight other than over the high seas*—The relevant authority of the State having sovereignty over the territory being over-flown.

Apron means a defined area, on a land aerodrome, intended to accommodate aircraft for purposes of loading or unloading passengers, mail or cargo, fueling, parking or maintenance.

Apron management service means a service provided to regulate the activities and the movement of aircraft and vehicles on an apron.

Area control centre means a unit established to provide air traffic control service to controlled flights in control areas under its jurisdiction.

Area minimum altitude **(*AMA*) means** the minimum altitude to be used under instrument meteorological conditions (IMC) that provides a minimum obstacle clearance within a specified area, normally formed by parallels and meridians.

Area navigation **(*RNAV*) means 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.

Note— Area navigation includes performance-based navigation as well as other operations that do not meet the definition of performance-based navigation.

Area navigation route means an ATS route established for the use of aircraft capable of employing area navigation.

Arrival routes means Routes identified in an instrument approach procedure by which aircraft may proceed from the en-route phase of flight to an initial approach fix.

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

ATN Security Services means a set of information security provisions allowing the receiving end system or intermediate system to unambiguously identify (i.e. authenticate) the source of the received information and to verify the integrity of that information.

ATS Direct Speech Circuit means an aeronautical fixed service (AFS) telephone circuit, for direct exchange of information between air traffic services (ATS) units.

ATS inter facility data communication (AIDC) means Automated data exchange between air traffic services units in support of flight notification, flight coordination, transfer of control and transfer of communication.

ATS Message Handling Service (ATSMHS) means an ATN application consisting of procedures used to exchange ATS messages in store-and-forward mode over the ATN such that the conveyance of an ATS message is in general not correlated with the conveyance of another ATS message by the service provider.

ATS Message Handling System (AMHS) means the set of computing and communication resources implemented by ATS organizations to provide the ATS message handling service.

ATS route means a specified route designed for channeling the flow of traffic as necessary for the provision of air traffic services.

Note 1— The term ATS route is used to mean variously, airway, advisory route, controlled or uncontrolled route, arrival or departure route, etc.

Note 2— An ATS route is defined by route specifications that include an ATS route designator, the track to or from significant points (waypoints), distance between significant points, reporting requirements and, as determined by the appropriate ATS authority, the lowest safe altitude.

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

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

Note—A comparable ground-based system is one that has been demonstrated, by comparative assessment or other methodology, to have a level of safety and performance equal to or better than monopulse SSR.

Authority: *means Nigerian Civil Aviation Authority*

Authorized designer means a person who is the holder of procedure design authorization that is in force.

Authorized path means a communication path suitable for a given message category.

Automatic dependent surveillance **(*ADS*)** ***means a*** surveillance technique in which aircraft automatically provide, via a data link, data derived from on-board navigation and position-fixing systems, including aircraft identification, four- dimensional position and additional data as appropriate.

Automatic Dependent Surveillance-Broadcast (ADS-B) IN means a function that receives surveillance data from ADS-B OUT data sources.

Automatic Dependent Surveillance-Broadcast (ADS-B) OUT means a function on an aircraft or vehicle that periodically broadcasts its state vector (position and velocity) and other information derived from on-board systems in a format suitable for ADS-BIN capable receivers.

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.

Note—The abbreviated term "ADS contract" is commonly used to refer to ADS event contract, ADS demand contract, ADS periodic contract or an emergency mode.

Automatic Telecommunication Log means a record of the activities of an aeronautical telecommunication station recorded by electrical or mechanical means.

Automatic terminal information service (ATIS) means 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.

Auxiliary Data means Data, transmitted in addition to basic data, that provide ground equipment siting information for use in refining air borne position calculations and other supplementary information.

Average Radius of Rated Coverage means the radius of a circle having the same areas the rated coverage.

Axial Ratio means the ratio, expressed in decibels, between the maximum output power and the minimum output power of an antenna to an incident linearly polarized wave as the polarization orientation is varied overall l directions perpendicular to the direction of propagation.

Back Course Sector means the course sector which is situated on the opposite side of the localizer from the runway.

Balked landing means a landing maneuver that is unexpectedly discontinued at any point below the OCA/H

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

Base Station (BS) means a generalized equipment set providing connectivity, management and control of the mobile station (MS).

Basic Data means Data transmitted by the ground equipment that are associated directly with the operation of the landing guidance system.

Base turn means a turn executed by the aircraft during the initial approach between the end of the outbound track and the beginning of the intermediate or final approach track. The tracks are not reciprocal.

Note. — Base turns may be designated as being made either in level flight or while descending, according to the circumstances of each individual procedure.

BDS Comm-B Data Selector means the 8-bit BDS code determines the register whose contents are to be transferred in the MB field of a Comm-B reply. It is expressed in two groups of 4 bits each, BDS1 (most significant 4 bits) and BDS2 (least significant 4 bits).

Beam Centre means the mid-point between the two minus 3-dB points on the leading and trailing edges of the scanning beam main lobe.

Beam width means the width of the scanning beam main lobe measured at the minus 3-dB points and defined in angular units on the bore sight, in the horizontal plane for the azimuth function and in the vertical plane for the elevation function.

Bit Error Rate (BER) means the number of bit errors in a sample divided by the total number of bits in the sample, generally averaged over many such samples.

Blind Transmission means a transmission from one station to another station in circumstances where two-way communication cannot be established but where it is believed that the called station is able to receive the transmission.

Briefing means Oral commentary on existing and/or expected meteorological conditions.

Broadcast means the protocol within the Mode S system that permits uplink messages to be sent to all aircraft in coverage area, and downlink messages to be made available to all interrogators that have the aircraft wishing to send the message under surveillance. or A transmission of information relating to air navigation that is not addressed to a specific station or stations.

Burst means a time-defined, contiguous set of one or more related signal units which may convey user information and protocols, signaling, and any necessary preamble.

Burst profile means Set of parameters that describe the uplink or downlink transmission properties associated with an interval usage code. Each profile contains parameters such as modulation type, forward error correction (FEC) type, preamble length, guard times, etc.

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

Canopy means a bare Earth supplemented by vegetation height.

Capability Report means Information identifying whether the transponder has a data link capability as reported in the capability (CA) field of an all-call reply or squitter transmission (see “data link capability report”).

Carrier-to-Multipath Ratio (C/M) means the ratio of the carrier power received directly, i.e. without reflection, to the multipath power, i.e. carrier power received via reflection.

Carrier-to-Noise Density Ratio (C/No) means the ratio of the total carrier power to the average noise power in a 1 Hz bandwidth, usually expressed in dB/Hz.

Ceiling means the height above the ground or water of the base of the lowest layer of cloud below 6 000 meters (20 000 feet) covering more than half the sky.

Certified designer means a person authorized to carry on instrument on flight procedure of a type covered by the certificate subject to any condition set out therein.

Change-over point means the point at which an aircraft navigating on an ATS route segment defined by reference to very high frequency omni-directional radio ranges is expected to transfer its primary navigational reference from the facility behind the aircraft to the next facility ahead of the aircraft.

Note— Change-over points are established to provide the optimum balance in respect of signal strength and quality between facilities at all levels to be used and to ensure a common source of azimuth guidance for all aircraft operating along the same portion of a route segment.

Channel of Standard Accuracy (CSA) means the specified level of positioning, velocity and timing accuracy that is available to any GLONASS user on a continuous, worldwide basis.

Channel Rate Accuracy means this is relative accuracy of the clock to which the transmitted channel bits are synchronized. For example, at a channel rate of 1.2 kbits/s, maximum error of one part in 106 implies the maximum allowed error in the clock is ±1.2 × 10-3 Hz.

Channel Rate means the rate at which bits are transmitted over the RF channel. These bits include those bits used for framing and error correction, as well as the information bits. For burst transmission, the channel rate refers to the instantaneous burst rate over the period of the burst.

Circuit Mode means a configuration of the communications network which gives the appearance to the application of a dedicated transmission path.

Clearance Guidance Sector means the volume of airspace, inside the coverage sector, within which the azimuth guidance information provided is not proportional to the angular displacement of the aircraft, but is a constant left to right indication of which side the aircraft is with respect to the proportional guidance sector.

Clearance limit means the point to which an aircraft is granted an air traffic control clearance.

Clearway means a defined rectangular area on the ground or water under the control of the appropriate authority, selected or prepared as a suitable area over which an aeroplane may make a portion of its initial climb to a specified height.

Climb RA means a positive RA recommending a climb but not an increased climb.

Close-Out means a command from a Mode S interrogator that terminates a Mode S link layer communication transaction.

Closest Approach means the occurrence of minimum range between own ACAS aircraft and the intruder. Thus, range at closest approach is the smallest range between the two aircraft and time of closest approach is the time at which this occurs.

Cloud of operational significance means a cloud with the height of cloud base below 1,500m (5,000ft) or below the highest minimum sector altitude, whichever is greater, or a cumulonimbus cloud or a towering cumulus cloud at any height.

Cluster of Interrogators means two or more interrogators with the same interrogator identifier (II) code, operating cooperatively to ensure that there is no interference to the required surveillance and data link performance of each of the interrogators, in areas of common coverage.

Collision Avoidance Logic means the sub-system or part of ACAS that analyses data relating to an intruder and own aircraft, decides whether or not advisories are appropriate and, if so, generates the advisories. It includes the following functions: range and altitude tracking, threat detection and RA generation. It excludes surveillance.

Comm-A means a 112-bit interrogation containing the 56-bit MA message field. This field is used by the uplink standard length message (SLM) and broadcast protocols.

Command and control (C2) link means the data link between the remotely piloted aircraft and the remote pilot station for the purposes of managing the flight.

Comm-B means a 112-bit reply containing the 56-bit MB message field. This field is used by the downlink SLM, ground-initiated and broadcast protocols.

Comm-C means a 112-bit interrogation containing the 80-bit MC message field. This field is used by the uplink extended length message (ELM) protocol.

Comm-D means a 112-bit reply containing the 80-bit MD message field. This field is used by the downlink ELM protocol.

Communication Centre means an aeronautical fixed station which relays or retransmits telecommunication traffic from (or to) a number of other aeronautical fixed stations directly connected to it.

Conference communications means Communication facilities whereby direct speech conversation may be conducted between three or more locations simultaneously.

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

Note. — The interval is usually referred to as the accuracy of the estimate.

Connection Establishment delay means Connection establishment delay, as defined in ISO 8348, includes a component, attributable to the called subnetwork (SN) service user, which is the time between the SN-CONNECT indication and the SN-CONNECT response. This user component is due to actions outside the boundaries of the satellite subnetwork and is therefore excluded from the AMS(R) S specifications.

Connection means a logical association between peer-level entities in a communication system.

Consultation means discussion with a meteorologist or another qualified person of existing and/or expected meteorological conditions relating to flight operations; a discussion includes answers to questions.

Continental Shelf means the continental shelf of Nigeria.

Continuous climb operation (CCO) means an operation, enabled by airspace design, procedure design and ATC, in which a departing aircraft climbs continuously, to the greatest possible extent, by employing optimum climb engine thrust and climb speeds until reaching the cruise flight level.

Continuous descent final approach (CDFA) means a technique, consistent with stabilized approach procedures, for flying the final approach segment (FAS) of an instrument non-precision approach (NPA) procedure as a continuous descent, without level-off, from an altitude/height at or above the final approach fix altitude/height to a point approximately 15 m (50 ft) above the landing runway threshold or the point where the flare maneuver begins for the type of aircraft flown; for the FAS of an NPA procedure followed by a circling approach, the CDFA technique applies until circling approach minima (circling OCA/H) or visual flight maneuver altitude/height are reached.

Continuous descent operation (CDO) means an operation, enabled by airspace design, procedure design and ATC, in which an arriving aircraft descends continuously, to the greatest possible extent, by employing minimum engine thrust, ideally in a low drag configuration, prior to the final approach fix/final approach point.

Contour line means a line on a map or chart connecting points of equal elevation.

Control area means a controlled airspace extending upwards from a specified limit above the earth.

Controlled aerodrome means an aerodrome at which air traffic control service is provided to aerodrome traffic.

Note—The term "controlled aerodrome" indicates that air traffic control service is provided to aerodrome traffic but does not necessarily imply that a control zone exists.

Controlled airspace means an airspace of defined dimensions within which air traffic control service is provided in accordance with the airspace classification.

Note— Controlled airspace is a generic term which covers ATS airspace Classes A, B, C, D and E as described in Annex 11, 2.6.

Controlled flight means any flight which is subject to an air traffic control clearance.

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

Control Motion Noise (CMN) means that portion of the guidance signal error which causes control surface, wheel and column motion and could affect aircraft attitude angle during coupled flight, but does not cause aircraft displacement from the desired course and/or glide path.

Control zone the a controlled airspace extending upwards from the surface of the earth to a specified upper limit.

Convolutional Turbo Codes (CTC) means type of forward error correction (FEC) code.

Coordinate System— Conical means a function is said to use conical coordinates when the decoded guidance angle varies as the minimum angle between the surface of a cone containing the receiver antenna, and a plane perpendicular to the axis of the cone and passing through its apex. The apex of the cone is at the antenna phase center. For approach azimuth or back azimuth functions, the plane is the vertical plane containing the runway centerline. For elevation functions, the plane is horizontal.

Coordinate System— Planar means a function is said to use planar coordinates when the decoded guidance angle varies as the angle between the plane containing the receiver antenna and are refence plane. For azimuth functions, the reference plane is the vertical plane containing the runway centerline and the plane containing the receiver antenna is a vertical plane passing through the antenna phase center.

Coordination Interrogation means a Mode S interrogation (uplink transmission) radiated by ACASII or III and containing a resolution message.

Coordination Reply means a Mode S reply (downlink transmission) acknowledging the receipt of a coordination interrogation by the Mode S transponder that is part of an ACASII or III installation.

Coordination means the process by which two ACAS-equipped aircraft select compatible resolution advisories (RAs) by the exchange of resolution advisory complements (RACs).

Core satellite Constellation(s) means the core satellite constellations are GPS and GLONASS.

Corrective RA means a resolution advisory that advises the pilot to deviate from the current flight path.

Course line means the locus of points nearest to the runway centre line in any horizontal plane at which the DDM is zero.

Course Sector means a sector in a horizontal plane containing the course line and limited by the loci of points nearest to the course line at which the DD Mis 0.155.

Coverage Sector means a volume of airspace within which service is provided by a particular function and in which the signal power density is equal to or greater than the specified minimum.

CPDLC Message means Information exchanged between an airborne system and its ground counterpart. A CPDLC message consists of a single message element or a combination of message elements conveyed in a single transmission by the initiator.

CPDLC Message Set means a list of standard message elements and free text message elements.

Cruise climb means an aeroplane cruising technique resulting in a net increase in altitude as the aeroplane mass decreases.

Cruising level means a level maintained during a significant portion of a flight.

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

Current Data Authority means the designated ground system through which a CPDLC dialogue between a pilot and a controller currently responsible for the flight is permitted to take place.

Current flight plan means the flight plan, including changes, if any, brought about by subsequent clearances.

Current Slot means the slot in which a received transmission begins.

Cycle means the term "cycle" used in this chapter refers to one complete pass through the sequence of functions executed by ACASII or ACASIII, nominally once a second.

***Cyclic redundancy check* (*CRC*) means a** mathematical algorithm applied to the digital expression of data that provides a level of assurance against loss or alteration of data.

C2 Link means the data link between the remotely piloted aircraft and the remote pilot station for the purposes of managing the Flight.

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

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

Database means one or more files of data so structured that appropriate applications may draw from the files and update them.

Note— This primarily refers to data stored electronically and accessed by computer rather than in files of physical records.

Data Circuit-Terminating Equipment (DCE) means a DCE is a network provider equipment used to facilitate communications between DTEs.

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

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

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

Data Link-Automatic Terminal Information Service (D-ATIS) means the provision of ATIS via data link.

Data Link Capability Report the information in a Comm-B reply identifying the complete Mode S communications capabilities of the aircraft installation.

Data link communications *means a* form of communication intended for the exchange of messages via a data link.

Data Link Entity (DLE) means a protocol state machine capable of setting up and managing a single data link connection.

Data Link Flight Information Services (D-FIS) means the provision of FIS via data link.

Data Link Initiation Capability (DLIC) means a data link application that provides the ability to exchange addresses, names and version numbers necessary to initiate data link applications.

Data Link Service (DLS) Sublayer means the sublayer that resides above the MAC sublayer. For VDL Mode 4, the DLS sublayer resides above the VSS sublayer. The DLS manages the transmit queue, creates and destroys DLEs for connection-oriented communications, provides facilities for the LME to manage the DLS, and provides facilities for connectionless communications.

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

Data product specification means 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*).

Note— A data product specification provides a description of the universe of discourse and a specification for mapping the universe of discourse to a data set. It may be used for production, sales, end-use or other purpose.

Data quality means a degree or level of confidence that the data provided meet the requirements of the data user in terms of accuracy, resolution and integrity.

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

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

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

Data Signaling Rate means data signaling rate refers to the passage of information per unit of time, and is expressed in bits/second.

Data Terminal Equipment (DTE) means a DTE is an endpoint of a subnetwork connection.

Data timeliness means the degree of confidence that the data is applicable to the period of its intended use.

Data traceability means 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

Data Transfer Delay (95th percentile) means the 95th percentile of the statistical distribution of delays for which transit delay is the average.

Data Transit Delay means In accordance with ISO 8348, the average value of the statistical distribution of data delays. This delay represents the subnetwork delay and does not include the connection establishment delay.

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

DDM—Difference in depth of modulation means the percentage modulation depth of the larger signal minus the percentage modulation depth of the smaller signal, divided by 100.

Dead reckoning (DR) navigation means the estimating or determining of position by advancing an earlier known position by the application of direction, time and speed data.

Decision altitude (DA) or decision height (DH) means a specified altitude or height in a 3D instrument approach operation at which a missed approach must be initiated if the required visual reference to continue the approach has not been established.

Note 1 — Decision altitude (DA) is referenced to mean sea level and decision height (DH) is referenced to the threshold elevation.

Note 2 — The required visual reference means that section of the visual aids or of the approach area which should have been in view for sufficient time for the pilot to have made an assessment of the aircraft position and rate of change of position, in relation to the desired flight path. In Category III operations with a decision height the required visual reference is that specified for the particular procedure and operation.

Note 3 — For convenience where both expressions are used they may be written in the form “decision altitude/height” and abbreviated “DA/H”.

Declared capacity means a measure of the ability of the ATC system or any of its subsystems or operating positions to provide service to aircraft during normal activities. It is expressed as the number of aircraft entering a specified portion of airspace in a given period of time, taking due account of weather, ATC unit configuration, staff and equipment available, and any other factors that may affect the workload of the controller responsible for the airspace.

Degree of Standardized Test Distortion means the degree of distortion of the restitution measured during a specific period of time when the modulation is perfect and corresponds to a specific text.

Dependent parallel approaches means Simultaneous approaches to parallel or near-parallel instrument runways where ATS surveillance system separation minima between aircraft on adjacent extended runway centre lines are prescribed.

Descend RA means a positive RA recommending a descent but not an increased descent.

Descent fix means a fix established in a precision approach at the FAP to eliminate certain obstacles before the FAP, which would otherwise have to be considered for obstacle clearance purposes.

Descent point (DP) means a point defined by track and distance from the MAPt to identify the point at which the helicopter may descend below the OCA/H on a visual descent to the heliport or landing location.

Designated Operational Coverage (DOC) area means the area in which a particular service is provided and in which the service is afforded frequency protection.

Design work means in relation to a terminal instrument flight procedure, means any of the following work:

(*a*) designing the procedure or a part of the procedure;

(*b*) verifying, maintaining, reviewing or amending the procedure;

(*c*) supervising a person carrying on any work mentioned in paragraph (*a*) or (*b*)

Detect and avoid means the capability to see, sense or detect conflicting traffic or other hazards and take the appropriate action.

DETRESFA means the code word used to designate a distress phase.

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

Note— Digital Terrain Model (DTM) is sometimes referred to as DEM.

Direct Link Service (DLS) means a data communications service which makes no attempt to automatically correct errors, detected or undetected, at the link layer of the air-ground communications path.

(Error control may be affected by end-user systems.)

Directory Service (DIR) means a service based on the ITU-T X.500 series of recommendations, providing access to and management of structured information relevant to the operation of the ATN and its users.

Direct transit arrangements means 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.

Direct visual segment (Direct-VS) means a visual segment designed as:

a) a leg in a PinS approach, which may contain a single turn, from the MAPt direct to the heliport or landing location or via a descent point to the heliport or landing location; or

b) a straight leg from the heliport or landing location to the IDF in a PinS departure.

Displaced threshold means a threshold not located at the extremity of a runway.

Displacement Sensitivity (localizer) means the ratio of measured DDM to the corresponding lateral displacement from the appropriate reference line.

Distress phase means a situation wherein there is a reasonable certainty that an aircraft and its occupants are threatened by grave and imminent danger and require immediate assistance.

Ditching means the forced landing of an aircraft on water.

DME Dead Time means a period immediately following the decoding of a valid interrogation during which a received interrogation will not cause a reply to be generated.

DME/N means distance measuring equipment, primarily serving operational needs of enroute or TMA navigation, where the “N” stands for narrow spectrum characteristics.

DME/P means the distance measuring element of the MLS, where the “P” stands for precise distance measurement. The spectrum characteristics are those of DME/N.

Domain means a set of end systems and intermediate systems that operate according to the same routing procedures and that is wholly contained within a single administrative domain.

Doppler Shift means the frequency shift observed at a receiver due to any relative motion between transmitter and receiver.

Double channel simplex means Simplex using two frequency channels, one in each direction.

Note— This method was sometimes referred to as crossband

Downlink ELM (DELM) means a term referring to extended length downlink communication by means of 112-bit Mode S Comm-D replies, each containing the 80-bit Comm-D message field (MD).

Downlink means a term referring to the transmission of data from an aircraft to the ground. Mode S air-to-ground signals are transmitted on the 1 090 MHz reply frequency channel.

Downstream clearance means a clearance issued to an aircraft by an air traffic control unit that is not the current controlling authority of that aircraft.

.

Duplex means a method in which telecommunication between two stations can take place in both directions simultaneously.

Duty means any task that an air traffic controller is required by an air traffic services provider to perform. These tasks include those performed during time-in-position, administrative work and training.

Duty period means a period which starts when an air traffic controller is required by an air traffic services provider to report for or to commence a duty and ends when that person is free from all duties.

Effective acceptance bandwidth means the range of frequencies with respect to the assigned frequency for which reception is assured when all receiver tolerances have been taken into account.

Effective adjacent channel rejection means the rejection that is obtained at the appropriate adjacent channel frequency when all relevant receiver tolerances have been taken into account.

Effective Coverage means the area surrounding an NDB within which bearings can be obtained with an accuracy sufficient for the nature of the operation concerned.

Effective Margin means that margin of an individual apparatus which could be measured under actual operating conditions.

Electronic aeronautical chart display means the electronic device by which flight crews are enabled to execute, in a convenient and timely manner, route planning, route monitoring and navigation by displaying required information.

Elevation means the vertical distance of a point or a level, on or affixed to the surface of the earth, measured from mean sea level.

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

Emergency phase means a generic term meaning, as the case may be, uncertainty phase, alert phase or distress phase.

Employee of a certified designer or an authorized designer means a person who carries on design work on a terminal instrument flight procedure for the designer in the course of performing services for the designer.

End-to-End means Pertaining or relating to an entire communication path, typically from (1) the interface between the information source and the communication system at the transmitting end to (2) the interface between the communication system and the information user or processor or application at the receiving end.

End-User means an ultimate source and/or consumer of information.

Energy Per Symbol to Noise Density Ratio (Es/No) means the ratio of the average energy transmitted per channel symbol to the average noise power in a 1 Hz bandwidth, usually expressed in dB. For A-BPSK and A-QPSK, one channel symbol refers to one channel bit.

Equivalent Isotropically Radiated Power (EIRP) means the product of the power supplied to the antenna and the antenna gain in a given direction relative to an isotropic antenna (absolute or isotropic gain).

Essential radio navigation service means a radio navigation service whose disruption has a significant impact on operations in the affected airspace or aerodrome.

Established Track means a track generated by ACAS air-air surveillance that is treated as the track of an actual aircraft.

Estimated elapsed time means the estimated time required to proceed from one significant point to another.

Estimated off-block time means the estimated time at which the aircraft will commence movement associated with departure.

Estimated time of arrival means for IFR flights, the time at which it is estimated that the aircraft will arrive over that designated point, defined by reference to navigation aids, from which it is intended that an instrument approach procedure will be commenced, or, if no navigation aid is associated with the aerodrome, the time at which the aircraft will arrive over the aerodrome. For VFR flights, the time at which it is estimated that the aircraft will arrive over the aerodrome.

Expected approach time means the time at which ATC expects that an arriving aircraft, following a delay, will leave the holding fix to complete its approach for a landing.

Note— The actual time of leaving the holding fix will depend upon the approach clearance.

Extended Golay Code means an error correction code capable of correcting multiple bit errors.

Extended Length Message (ELM) means a series of Comm-C interrogations (uplink ELM) transmitted without the requirement for intervening replies, or a series of Comm-D replies (downlink ELM) transmitted without intervening interrogations.

Extended range operation means any flight by an aeroplane with two turbine engines where the flight time at the one engine in operative cruise speed (in ISA and still air conditions), from a point on the route to an adequate alternate aerodrome, is greater than the threshold time approved by the State of the Operator.

Facility Performance Category I-ILS means an ILS which provides guidance information from the coverage limit of the ILS to the point at which the localizer course line intersects the ILS glide path at a height of 30m (100ft) or less above the horizontal plane containing the threshold.

Facility Performance Category II—ILS means an ILS which provides guidance information from the coverage limit of the ILS to the point at which the localizer course line intersects the ILS glide path at a height of 15m (50ft) or less above the horizontal plane containing the threshold.

Facility Performance Category III-ILS means an ILS which, with the aid of ancillary equipment where necessary, provides guidance information from the coverage limit of the facility to, and along, the surface of the runway.

Fan marker beacon means a type of radio beacon, the emissions of which radiate in a vertical fan-shaped pattern.

Fatigue means a physiological state of reduced mental or physical performance capability resulting from sleep loss, extended wakefulness, circadian phase, and/or workload (mental and/or physical activity) that can impair a person's alertness and ability to perform safety-related operational duties.

Fatigue risk management system (FRMS) means a data-driven means of continuously monitoring and managing fatigue-related safety risks, based upon scientific principles, knowledge and operational experience that aims to ensure relevant personnel are performing at adequate levels of alertness.

Feature means abstraction of real-world phenomena (ISO 19101*).

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

Note—A feature attribute has a name, a data type and a value domain associated with it.

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

Note—An operation upon the feature type dam is to raise the dam. The result of this operation is to raise the level of water in the reservoir.

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

Feature type means class of real-world phenomena with common properties (ISO 19110*).

Note— In a feature catalogue, the basic level of classification is the feature type. Filed flight plan—The flight plan as filed with an ATS unit by the pilot or a designated representative, without any subsequent changes.

Filed flight plan (FPL) means the flight plan as filed with an ATS unit by the pilot or a designated representative, without any subsequent changes.

Note. — When the word "message" is used as a suffix to this term, it denotes the content and format of the filed flight plan data as transmitted.

Final approach means that part of an instrument approach procedure which commences at the specified final approach fix or point, or where such a fix or point is not specified,

(*a*) at the end of the last procedure turn, base turn or inbound turn of a racetrack procedure, if specified; or

(*b*) at the point of interception of the last track specified in the approach procedure; and ends at a point in the vicinity of an aerodrome from which:

(1) a landing can be made; or

(2) a missed approach procedure is initiated.

Final approach and take-off area **(*FATO*) *means* a** defined area over which the final phase of the approach maneuvers to hover or landing is completed and from which the take-off maneuver is commenced. Where the FATO is to be used by performance Class 1 helicopters, the defined area includes the rejected take-off area available.

Final approach fix or point means that fix or point of an instrument approach procedure where the final approach segment commences.

Final approach segment means that segment of an instrument approach procedure in which alignment and descent for landing are accomplished.

Flight crew member means a licensed crew member charged with duties essential to the operation of an aircraft during a flight duty period.

Flight information centre means a unit established to provide flight information service and alerting service.

Flight information region means an airspace of defined dimensions within which flight information service and alerting service are provided.

Flight information service means a service provided for the purpose of giving advice and information useful for the safe and efficient conduct of flights.

Flight level means a surface of constant atmospheric pressure which is related to a specific pressure datum, 1 013.2 hectopascals (hPa), and is separated from other such surfaces by specific pressure intervals.

Note 1. — A pressure type altimeter calibrated in accordance with the Standard Atmosphere:

(*a*) *when set to a QNH altimeter setting, will indicate altitude;*

(*b*) *when set to a QFE altimeter setting, will indicate height above the QFE reference datum;*

(*c*) *when set to a pressure of* 1013.2 *hPa, may be used to indicate flight levels.*

Note 2.—The terms "height" and "altitude", used in Note 1 above, indicate altimetric rather than geometric heights and altitudes.

Flight plan means specified information provided to air traffic services units, relative to an intended flight or portion of a flight of an aircraft.

Flight visibility means the visibility forward from the cockpit of an aircraft in flight.

Flow control means measures designed to adjust the flow of traffic into a given airspace, along a given route, or bound for a given aerodrome, so as to ensure the most effective utilization of the airspace.

Forecast means a statement of expected meteorological conditions for a specified time or period, and for a specified area or portion of airspace.

Forward error correction (FEC) means the process of adding redundant information to the transmitted signal in a manner which allows correction, at the receiver, of errors incurred in the transmission.

Frame means the basic unit of transfer at the link level. In the context of Mode S subnetwork, a frame can include from one to four Comm-A or Comm-B segments, from two to sixteen Comm-C segments, or from one to sixteen Comm-D segments. Or The link layer frame is composed of a sequence of address, control, FCS and information fields. For VDL Mode 2, these fields are bracketed by opening and closing flag sequences, and a frame may or may not include a variable-length information field.

Free route airspace means this is a specified volume of Airspace within *which users can freely plan a route between defined* entry (E), intermediate (I) and exit (X) points, without reference to the ATS route network, subject to airspace availability. Flights remain subject to air traffic control service.

Free text message element means part of a message that does not conform to any standard message element in the PANS-ATM (Doc 4444).

Frequency assignment means a logical assignment of centre frequency and channel bandwidth programmed to the base station (BS).

Frequency Channel means a continuous portion of the frequency spectrum appropriate for a transmission utilizing a specified class of emission.

Front course sector means the course sector which is situated on the same side of the localizer as the runway.

Fully Automatic Relay Installation means a teletypewriter installation where interpretation of the relaying responsibility in respect of an incoming message and the resultant setting- up of the connections required to affect the appropriate retransmissions is carried out automatically, as well as all other normal operations of relay, thus obviating the need for operator intervention, except for supervisory purposes.

Function means a particular service provided by the MLS, e.g. approach azimuth guidance, back azimuth guidance or basic data, etc.

Gain-to-noise temperature ratios means the ratio, usually expressed in dB/K, of the antenna gain to the noise at the receiver output of the antenna subsystem. The noise is expressed as the temperature that a 1-ohm resistor must be raised to produce the same noise power density.

GAMET area forecast means an area forecast in abbreviated plain language for low-level flights for a flight information region or sub-area thereof, prepared by the meteorological office designated by the meteorological authority concerned and exchanged with meteorological offices in adjacent flight information regions, as agreed between the meteorological authorities concerned.

Gaussian filtered frequency shift keying (GFSK) means a continuous-phase, frequency shift keying technique using two tones and a Gaussian pulse shape filter.

GBAS/E.A means a ground-based augmentation system transmitting an elliptically-polarized VHF data broadcast.

GBAS/H means a ground-based augmentation system transmitting a horizontally-polarized VHF data broadcast.

GBAS landing system (GLS) means a system for approach and landing operations utilizing GNSS, augmented by a groundbased augmentation system (GBAS), as the primary navigational reference.

General formatter/manager (GFM) means the aircraft function responsible for formatting messages to be inserted in the transponder registers. It is also responsible for detecting and handling error conditions such as the loss of input data.

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

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

Note—The geoid is irregular in shape because of local gravitational disturbances (*wind tides, salinity, current, etc.*) *and the direction of gravity is perpendicular to the geoid at every point.*

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

Note— In respect to the World Geodetic System — 1984 (*WGS*-84) *defined ellipsoid, the difference between the WGS-84 ellipsoidal height and orthometric height represents WGS*-84 *geoid undulation.*

Glide path means the descent profile determined for vertical guidance during a final approach.

Global navigation satellite system (GLONASS) means the satellite navigation system operated by the Russian Federation.

Global navigation satellite system (GNSS) means a worldwide position and time determination system that includes one or more satellite constellations, aircraft receivers and system integrity monitoring, augmented as necessary to support the required navigation performance for the intended operation.

Global positioning system (GPS) means the satellite navigation system operated by the United States.

Global signaling channel (GSC) means a channel available on a worldwide basis which provides for communication control.

GNSS position error means the difference between the true position and the position determined by the GNSS receiver.

Gregorian calendar means 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*).

Note— In the Gregorian calendar, common years have 365 *days and leap years 366 days divided into twelve sequential months.*

Grid point data in digital form means computer processed meteorological data for a set of regularly spaced points on a chart, for transmission from a meteorological computer to another computer in a code form suitable for automated use.

Note — In most cases, such data are transmitted on medium- or high-speed telecommunications channels.

Ground-based augmentation system (GBAS) means an augmentation system in which the user receives augmentation information directly from a ground-based transmitter

Ground-Based Regional Augmentation System (GRAS) means an augmentation system in which the user receives augmentation information directly from one of a group of ground-based transmitters covering a region.

Ground Data Circuit-Terminating Equipment (GDCE) means a ground specific data circuit-terminating equipment associated with a ground data link processor (GDLP). It operates a protocol unique to Mode S data link for data transfer between air and ground.

Ground Data Link Processor (GDLP) means a ground-resident processor that is specific to a particular air-ground data link (e.g. Mode S), and which provides channel management, and segments and/or reassembles messages for transfer. It is connected on one side (by means of its DCE) to ground elements common to all data link systems, and on the other side to the air-ground link itself.

Ground Earth Station (GES) means an earth station in the fixed satellite service, or, in some cases, in the aeronautical mobile-satellite service, located at a specified fixed point on land to provide a feeder link for the aeronautical mobile- satellite service.

Ground effect means condition of improved performance (lift) due to the interference of the surface with the airflow pattern of the rotor system when a helicopter or other VTOL aircraft is operating near the ground.

Note. — Rotor efficiency is increased by ground effect to a height of about one rotor diameter for most helicopters.

Ground-Initiated Comm-B (GICB) means the ground-initiated Comm-B protocol allows the interrogator to extract Comm-B replies containing data from a defined source in the MB field.

Ground-Initiated Protocol means a procedure initiated by a Mode S interrogator for delivering standard length or extended length messages to a Mode S aircraft installation.

Ground-To-Air Communication means One-way communication from stations or locations on the surface of the earth to aircraft.

Ground visibility means the visibility at an aerodrome as reported by an accredited observer or by automatic systems.

Half course sector means the sector, in a horizontal plane containing the course line and limited by the loci of points nearest to the course line at which the DDM is 0.0775.

Half ILS glide path sector means the sector in the vertical plane containing the ILS glide path and limited by the loci of points nearest to the glide path at which the DDM is 0.0875.

Head designer for a certified designer means a person appointed as head designer for the certified designer.

Heading means the direction in which the longitudinal axis of an aircraft is pointed, usually expressed in degrees from North (true, magnetic, compass or grid).

Height means the vertical distance of a level, a point or an object considered as a point, measured from a specified datum.

Helicopter stand means an aircraft stand which provides for parking a helicopter and where ground taxi operations are completed or where the helicopter touches down and lifts off for air taxi operations.

Heliport means 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.

Heliport reference point (HRP) means the designated location of a heliport or a landing location.

High frequency network protocol data unit (HFNPDU) means User data packet.

High performance receiver means UAT receiver with enhanced selectivity to further improve the rejection of adjacent frequency DME 198 interference

Holding fix means geographical location that serves as a reference for a holding procedure.

Holding procedure means predetermined maneuvers which keeps an aircraft within a specified airspace while awaiting further clearance.

Homing means the procedure of using the direction-finding equipment of one radio station with the emission of another radio station, where at least one of the stations is mobile, and where by the mobile station proceeds continuously towards the other station.

Hot spot means a location on an aerodrome movement area with a history or potential risk of collision or runway incursion, and where heightened attention by pilots/drivers is necessary.

Human Factors principles means 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.

Human performance means Human capabilities and limitations which have an impact on the safety and efficiency of aeronautical operations.

Hypsometric tints means a succession of shades or color gradations used to depict ranges of elevation.

ICAO meteorological information exchange model (IWXXM) means a data model for representing aeronautical meteorological information.

IFR means a symbol used to designate the instrument flight rules.

IFR flight means a flight conducted in accordance with the instrument flight rules.

ILS continuity of service means that quality which relates to the rarity of radiated signal interruptions. The level of continuity of service of the localizer or the glide path is expressed in terms of the probability of not losing the radiated guidance signals.

ILS glide path means that locus of points in the vertical plane containing the runway centre line at which the DDM is zero, which, of all such loci, is the closest to the horizontal plane.

ILS glide path angle means the angle between a straight line which represents the mean of the ILS glide path and the horizontal.

ILS glide path sector means the sector in the vertical plane containing the ILS glide path and limited by the loci of points nearest to the glide path at which the DDM is 0.175.

ILS integrity means that quality which relates to the trust which can be placed in the correctness of the information supplied by the facility. The level of integrity of the localizer or the glide path is expressed in terms of the probability of not radiating false guidance signals.

ILS Point "A" means a point on the ILS glide path measured along the extended runway centerline in the approach direction a distance of 7.5km (4NM) from the threshold.

ILS Point "B" means a point on the ILS glide path measured along the extended runway centerline in the approach direction a distance of 1050m (3500 ft) from the threshold.

ILS Point "C" means a point through which the downward extended straight portion of the nominal ILS glide path passes at a height of 30m (100ft) above the horizontal plane containing the threshold.

ILS Point "D" means a point 4m (12ft) above the runway centerline and 900m (3000ft) from the threshold in the direction of the localizer.

ILS Point "E" means a point 4m (12ft) above the runway centerline and 600m (2000ft) from the stop end of the runway in the direction of the threshold.

ILS reference datum (Point "T") means a point at a specified height located above the intersection of the runway centerline and the threshold and through which the downward extended straight portion of the ILS glide path passes.

IMC means the symbol used to designate instrument meteorological conditions.

INCERFA means the code word used to designate an uncertainty

Incident means an occurrence, other than an accident, associated with the operation of an aircraft which affects or could affect the safety of operation.

Increased rate RA means an resolution advisory with a strength that recommends increasing the altitude rate to a value exceeding that recommended by a previous climb or descend RA.

Independent parallel approaches means Simultaneous approaches to parallel or near-parallel instrument runways where ATS surveillance system separation minima between aircraft on adjacent extended runway centre lines are not prescribed.

Independent parallel departures means simultaneous departures from parallel or near-parallel instrument runways.

Initial approach fix (IAF) means a fix that marks the beginning of the initial segment and the end of the arrival segment, if applicable. In RNAV applications this fix is normally defined by a fly-by waypoint.

Initial approach (IA) mode means the condition of DME/P operation which supports those flight operations outside the final approach region and which is interoperable with DME/N.

Initial approach segment means that segment of an instrument approach procedure between the initial approach fix and the intermediate approach fix or, where applicable, the final approach fixes or point.

Note. — The types of incidents which are of main interest to the International Civil Aviation Organization for accident prevention studies are listed in Annex 13, Attachment C.

Initial departure fix (IDF) means the terminal fix for the visual segment and the fix where the instrument phase of the PinS departure begins.

Instrument approach procedure means a series of predetermined manoeuvres by reference to flight instruments with specified protection from obstacles from the initial approach fix, or where applicable, from the beginning of a defined arrival route to a point from which a landing can be completed and thereafter, if a landing is not completed, to a position at which holding or en- route obstacle clearance criteria apply. Instrument approach procedures are classified as follows:

Non-precision approach (*NPA*) *procedure* — An instrument approach procedure which utilizes lateral guidance but does not utilize vertical guidance.

Approach procedure with vertical guidance (*APV*) —An instrument approach procedure which utilizes lateral and vertical guidance but does not meet the requirements established for precision approach and landing operations.

Precision approach (*PA*) *procedure*— An instrument approach procedure using precision lateral and vertical guidance with minima as determined by the category of operation.

Note— Lateral and vertical guidance refers to the guidance provided either by:

(*a*) *a ground-based navigation aid; or*

(*b*) *computer-generated navigation data.*

Instrument flight procedure design service means a service established for the design, documentation, validation, maintenance and periodic review of instrument flight procedures necessary for the safety, regularity and efficiency of air navigation.

Instrument meteorological conditions (IMC) means meteorological conditions expressed in terms of visibility, distance from cloud, and ceiling, less than the minima specified for visual meteorological conditions.

Note 1.— The specified minima for visual meteorological conditions are contained in Chapter 4 of Annex 2.

Note 2. — In a control zone, a VFR flight may proceed under instrument meteorological conditions if and as authorized by air traffic control

Integrated Aeronautical Information Package means a package which consists of the following elements:

(i) AIP, including amendment service;

(ii) Supplements to the AIP;

(iii) NOTAM and PIB;

(iv) AIC; and

(v) checklists and lists of valid NOTAMS.

Integrity means a measure of the trust that can be placed in the correctness of the information supplied by the total system. Integrity includes the ability of a system to provide timely and valid warnings to the user (alerts).

Integrity **(*aeronautical data*) means a** degree of assurance that an aeronautical data and its value has not been lost or altered since the data origination or authorized amendment.

Integrity classification (aeronautical data) means a 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.

Intermediate fix (IF) means a fix that marks the end of an initial segment and the beginning of the intermediate segment. In RNAV applications this fix is normally defined by a fly-by waypoint.

Intermediate approach segment means that segment of an instrument approach procedure between either the intermediate approach fix and the final approach fix or point, or between the end of a reversal, racetrack or dead reckoning track procedure and the final approach fix or point, as appropriate.

Intermediate holding position means a designated position intended for traffic control at which taxiing aircraft and vehicles shall stop and hold until further cleared to proceed, when so instructed by the aerodrome control tower.

International airport means any airport designated by the Contracting State in whose territory it is situated as 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 Airways Volcano Watch **(*IAVW*) means any** International arrangement for monitoring and providing warnings to aircraft of volcanic ash in the atmosphere.

Note—The IAVW is based on the cooperation of aviation and non-aviation operational units using information derived from observing sources and networks that are provided by States. The watch is coordinated by ICAO with the cooperation of other concerned international organizations.

International NOTAM office **(*NOF*) means an** office designated by a State for the exchange of NOTAM internationally.

Inter Pilot Air-To-Air Communication means Two-way communication on the designated air-to-air channel to enable aircraft engaged in flights over remote and oceanic areas out of range of VHF ground stations to exchange necessary operational information and to facilitate the resolution of operational problems.

International Telecommunication Service means a telecommunication service between offices or stations of different States, or between mobile stations which are not in the same State, or are subject to different States.

Intruder means an aircraft for which ACAS has an established track.

Isogonal means a line on a map or chart on which all points have the same magnetic variation for a specified epoch.

Isogriv means a line on a map or chart which joins points of equal angular difference between the North of the navigation grid and Magnetic North.

ITP aircraft means an aircraft approved by the State of the Operator to conduct in-trail procedure (ITP).

ITP distance means the distance between the ITP aircraft and a reference aircraft as defined by:

a) aircraft on the same track, the difference in distance to an aircraft calculated common point along a projection of each other's track; or

b) aircraft on parallel tracks, the distance measured along the track of one of the aircraft using its calculated position and the point abeam the calculated position of the other aircraft.

Note. — Reference aircraft refers to one or two aircraft with ADS-B data that meet the ITP criteria and are indicated to ATC by the ITP aircraft as part of the ITP clearance request

Joint rescue coordination centre (***JRCC***) means a rescue coordination centre responsible for both aeronautical and maritime search and rescue operations.

Key down time means the time during which a Dot or dash of a Morse character is being transmitted.

Landing area means that part of a movement area intended for the landing or take-off of aircraft.

Landing direction indicator means a device to indicate visually the direction currently designated for landing and for take-off.

Landing location means a marked or unmarked area that has the same physical characteristics as a visual heliport final approach and take-off area (FATO).

Level means a generic term relating to the vertical position of an aircraft in flight and meaning variously, height, altitude or flight level.

Link means a link connects an aircraft DLE and a ground DLE and is uniquely specified by the combination of aircraft DLS address and the ground DLS address. A different subnetwork entity resides above every link endpoint.

Link layer means the layer that lies immediately above the physical layer in the Open Systems Interconnection protocol model. The link layer provides for the reliable transfer of information across the physical media. It is subdivided into the data link sub layer and the media access control sub layer.

Link Management Entity (LME) means a protocol state machine capable of acquiring, establishing and maintaining a connection to a single peer system. An LME establishes data link and sub network connections, "hands-off" those connections, and manages the media access control sub layer and physical layer. An aircraft LME tracks how well it can communicate with the ground stations of a single ground system. An aircraft VME instantiates an LME for each ground station that it monitors. Similarly, the ground VME instantiates an LME for each aircraft that it monitors. An LME is deleted when communication with the peer system is no longer viable.

Link Protocol Data Unit (LPDU) means data unit which encapsulates a segment of an HFNPDU.

Localizer performance with vertical guidance (LPV) means the label to denote minima lines associated with APV-I performance on approach charts.

Location Indicator means a four-letter code group formulated in accordance with rules prescribed by ICAO and assigned to the location of an aeronautical fixed station.

Locator means an LF/MFNDB used as an aid to final approach.

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

Low Modulation Rates means modulation rates up to and including 300 bauds.

Magnetic variation means the angular difference between True North and Magnetic North.

Note— The value given indicates whether the angular difference is East or West of True North.

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

Maneuvering visual segment (Maneuvering-VS) means PinS visual

segment protected for the following maneuvers for:
PinS approaches. Visual maneuver from the MAPt around the heliport or landing location to land from a direction other than directly from the MAPt. *PinS departures.* Take-off in a direction other than directly to the IDF followed by visual maneuver to join the instrument segment at the IDF.

Margin means the maximum degree of distortion of the circuit at the end of which the apparatus is situated which is compatible with the correct translation of all the signals which it may possibly receive.

Marking means a symbol or group of symbols displayed on the surface of the movement area in order to convey aeronautical information.

M-Ary Phase Shift Keying (M-PSK) Modulation means a digital phase modulation that causes the phase of the carrier wave form to take on one of a set of M values.

M Burst means a management channel data block of bits used in VDL Mode 3. This burst contains signaling information needed for media access and link status monitoring.

Mean Course Error means the mean value of the azimuth error along the runway extended centerline

Mean Glide Path Error means the mean value of the elevation error along the glide path of an elevation.

Mean power (of a radio transmitter) means the average power supplied to the antenna transmission line by a transmitter during an interval of time sufficiently long compared with the lowest frequency encountered in the modulation taken under normal operating conditions.

Note— A time of 1/10 *second during which the mean power is greatest will be selected normally.*

Media Access Control (MAC) means the sub layer that acquires the data path and controls the movement of bits over the data path. Mode 2. A data-only VDL mode that uses D8PSK modulation and a carrier sense multiple access (CSMA) control scheme. Mode 3. A voice and data VDL mode that uses D8PSK modulation and a TDMA media access control scheme.

Media Access Protocol Data Unit (MPDU) means Data unit which encapsulates one or more LPDUs.

Medium Modulation Rates means modulation rates above 300 and up to and including 3 000 bauds.

Message Field means an assigned area of a message containing specified elements of data.

Metadata means data about data (ISO 19115*).

Note— Data that describes and documents data.

Meteorological authority means the authority providing or arranging for the provision of meteorological service for international air navigation on behalf of a Contracting State.

Meteorological bulletin means a text comprising meteorological information preceded by an appropriate heading.

Meteorological information means meteorological report, analysis, forecast, and any other statement relating to existing or expected meteorological conditions.

Meteorological office means an office designated to provide meteorological service for international air navigation.

Meteorological Operational Channel means a channel of the aeronautical fixed service (AFS), for the exchange of aeronautical meteorological information.

Meteorological Operational Telecommunication Network means an integrated system of meteorological operational channels, as

Meteorological report means a statement of observed meteorological conditions related to a specified time and location.

Meteorological satellite means an artificial Earth satellite making meteorological observations and transmitting these observations to Earth.

Meteorological watch office (MWO) means an office designated to provide information concerning the occurrence or expected occurrence of specified en-route weather and other phenomena in the atmosphere that may affect the safety of aircraft operations within its specified area of responsibility.

Minimum descent altitude (MDA) or minimum descent height

(MDH) means a specified altitude or height in a 2D instrument approach operation or circling approach operation below which descent must not be made without the required visual reference.

Note 1.— Minimum descent altitude (MDA) is referenced to mean sea level and minimum descent height (MDH) is referenced to the aerodrome elevation or to the threshold elevation if that is more than 2 m (7 ft) below the aerodrome elevation. A minimum descent height for a circling approach is referenced to the aerodrome elevation.

Note 2.— The required visual reference means that section of the visual aids or of the approach area which should have been in view for sufficient time for the pilot to have made an assessment of the aircraft position and rate of change of position, in relation to the desired flight path. In the case of a circling approach the required visual reference is the

Note 3.— For convenience when both expressions are used they may be written in the form "minimum descent altitude/height" and abbreviated "MDA/H".

Minimum en-route altitude (MEA) means 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 Glide Path means the lowest angle of descent along the zero-degree azimuth that is consistent with published approach procedures and obstacle clearance criteria. Note. This is the lowest elevation angle which has been approved and promulgated for the Instrument runway.

Minimum instrument meteorological conditions airspeed (Vmini) means the minimum indicated airspeed that a specific helicopter is certified to operate in instrument meteorological conditions.

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

Minimum sector altitude means the lowest altitude which may be used which will provide a minimum clearance of 300 m (1,000 ft) above all objects located in an area contained within a sector of a circle of 46 km (25 NM) radius centered on a radio aid to navigation.

Minimum stabilization distance (MSD) means the minimum distance to complete a turn manoeuvre and after which a new manoeuvre can be initiated. The minimum stabilization distance is used to compute the minimum distance between waypoints.

Missed approach holding fix (MAHF) means a fix used in RNAV applications that marks the end of the missed approach segment and the centre point for the missed approach holding.

Missed approach point (MAPt) means that point in an instrument approach procedure at or before which the prescribed missed approach procedure must be initiated in order to ensure that the minimum obstacle clearance is not infringed.

Missed approach procedure means the procedure to be followed if the approach cannot be continued.

Mobile Station (MS) means a station in the mobile service intended to be used while in motion or during halts at unspecified points. An MS is always a subscriber station (SS).

Mobile Surface Station means a station in the aeronautical telecommunication service, other than an aircraft station, intended to be used while in motion or during halts at unspecified points.

Mode 4 means a data-only VDL mode using a GFSK modulation scheme and self-organizing time division multiple access (STDMA).

Mode S Air-Initiated Comm-B (AICB) protocol means a procedure initiated by a Mode S transponder for transmitting a single Comm-B segment from the aircraft installation.

Mode S Broadcast Protocols means procedures allowing standard length uplink or downlink messages to be received by more than one transponder or ground interrogator respectively.

Mode S Ground-Initiated Comm-B (GICB) protocol means a procedure initiated by a Mode S interrogator for eliciting a single Comm-B segment from a Mode S aircraft installation, incorporating the contents of one of 255 Comm-B registers within the Mode S transponder.

Mode S Multisite-Directed Protocol means a procedure to ensure that extraction and close-out of a downlink standard length or extended length message is affected only by the particular Mode S interrogator selected by the aircraft.

Mode S Packet means a packet conforming to the Mode S subnetwork standard, designed to minimize the bandwidth required from the air-ground link. ISO 8208 packets may be transformed into Mode S packets and vice-versa.

Mode S Specific Protocol (MSP) means a protocol that provides restricted datagram service within the Mode S subnetwork.

Mode S Specific Services Entity (SSE) means an entity resident within an XDLP to provide access to the Mode S specific services.

Mode S Specific Services means a set of communication services provided by the Mode S system which are not available from other air-ground subnetworks, and therefore not interoperable.

Mode S Subnetwork a means of performing an interchange of digital data through the use of secondary surveillance radar (SSR) Mode S interrogators and transponders in accordance with defined protocols.

Mode W, X, Y, Z means a method of coding the DME transmissions by time spacing pulses of a pulse pair, so that each frequency can be used more than once.

Modulation Rate means the reciprocal of the unit interval measured in seconds. This rate is expressed in bauds.

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

M-PSK symbol means One of the M possible phase shifts of the M-PSK modulated carrier representing a group of log 2 M coded chips.

Navigation specification means 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:

(a) *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.

(b) *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.

Note 1.—The Performance-based Navigation (PBN) Manual (Doc. 9613), Volume II, contains detailed guidance on navigation specifications.

Note 2. —The term RNP, previously defined as "a statement of the navigation performance necessary for operation within a defined *airspace", has been removed from Annex 11 as the concept of RNP has been overtaken by the concept of PBN. The term RNP in Annex 11 is now solely used in the context of navigation specifications that require performance monitoring and alerting, e.g., RNP 4 refers to the aircraft and operating requirements, including a 4 NM lateral performance with on-board performance monitoring and alerting that are detailed in Doc. 9613.*

Near-parallel runways means non-intersecting runways whose extended centre lines have an angle of convergence/divergence of 15 degrees or less.

Network (N) means the word "network" and its abbreviation "N" in ISO 8348 are replaced by the word "subnetwork" and its abbreviation "SN", respectively, wherever they appear in relation to the subnetwork layer packet data performance.

Network Station means an aeronautical station forming part of a radiotelephony network.

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

Non-duty period means a continuous and defined period of time, subsequent to and/or prior to duty periods, during which the air traffic controller is free of all duties.

Non-Network Communications means Radiotelephony communications conducted by a station of the aeronautical mobile service, other than those conducted as part of a radio telephony network.

Normal operating zone (NOZ) means Airspace of defined dimensions extending to either side of a published instrument approach procedure final approach course or track. Only that half of the normal operating zone adjacent to a no transgression zone (NTZ) is taken into account in independent parallel approaches.

NOTAM means 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.

No transgression zone (NTZ) means In the context of independent parallel approaches, a corridor of airspace of defined dimensions located centrally between the two extended runway centre lines, where a penetration by an aircraft requires a controller intervention to maneuver any threatened aircraft on the adjacent approach.

Observation (meteorological) means the evaluation of one or more meteorological elements.

Obstacle means 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.

Note. —The term obstacle is used in this Annex solely for the purpose of specifying the charting of objects that are considered a potential hazard to the safe passage of aircraft in the type of operation for which the individual chart series is designed.

Obstacle clearance altitude (OCA) or obstacle clearance height **(*OCH*) means t**he lowest altitude or the lowest height above the elevation of the relevant runway threshold or the aerodrome elevation as applicable, used in establishing compliance with appropriate obstacle clearance criteria.

Note 1.—Obstacle clearance altitude is referenced to mean sea level and obstacle clearance height is referenced to the threshold elevation or in the case of non-precision approaches to the aerodrome elevation or the threshold elevation if that is more than 2 m (7 ft) below the aerodrome elevation. An obstacle clearance height for a circling approach is referenced to the aerodrome elevation.

Note 2. —For convenience when both expressions are used, they may be written in the form "obstacle clearance altitude/height" and abbreviated "OCA/H".

Note 3.— See Procedures for Air Navigation Services — Aircraft Operations (Doc 8168), Volume I, Part I, Section 4, Chapter 1, 1.5, and Volume II, Part I, Section 4, Chapter 5, 5.4, for specific applications of this definition.

Obstacle free zone (OFZ) means the airspace above the inner approach surface, inner transitional surfaces, and balked landing surface and that portion of the strip bounded by these surfaces, which is not penetrated by any fixed obstacle other than a low-mass and frangibly mounted one required for air navigation purposes.

Offset frequency simplex means a variation of single channel simplex where in telecommunication between two stations is affected by using in each direction frequencies that are intentionally slightly different but contained within a portion of the spectrum allotted for the operation.

Operational control means the exercise of authority over the initiation, continuation, diversion or termination of a flight in the interest of the safety of the aircraft and the regularity and efficiency of the flight.

Operational Control Communications means Communications required for the exercise of authority over the initiation, continuation, diversion or termination of a flight in the interest of the safety of the aircraft and the regularity and efficiency of a flight.

Operational flight plan means the operator's plan for the safe conduct of the flight based on considerations of aeroplane performance, other operating limitations and relevant expected conditions on the route to be followed and at the aerodromes concerned.

Operational planning means the planning of flight operations by an operator.

Operator means a person, organization or enterprise engaged in or offering to engage in an aircraft operation.

Optimum Sampling Point means the optimum sampling point of a received UAT bit stream is at the nominal centre of each bit period, when the frequency offset is either plus or minus 312.5 kHz.

Origination: (aeronautical data or aeronautical information) means 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) means 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 means height of a point related to the geoid, generally presented as an MSL elevation.

Out-of-Coverage Indication Signal means a signal radiated into areas outside the intended coverage sector where required to specifically prevent in valid removal of an airborne warning indication in the presence of misleading guidance information.

Own Aircraft means the aircraft fitted with the ACAS that is the subject of the discourse, which ACAS is to protect against possible collisions, and which may enter a maneuver in response to an ACAS indication.

Packet means the basic unit of data transfer among communication devices within the network layer (e.g. an ISO 8208 packet or a Mode S packet).

Partial Rise Time means the time as measured between the 5 and 30 percent amplitude points on the leading edge of the pulse envelope.

Partial Usage Sub-Channelization (PUSC) means a technique in which the orthogonal frequency division multiplexing (OFDM) symbol subcarriers are divided and permuted among a subset of sub-channels for transmission, providing partial frequency diversity.

Path Following Error (PFE) means that portion of the guidance signal error which could cause aircraft displacement from the desired course and/or glide path.

Path Following Noise (PFN) means that portion of the guidance signal error which could cause aircraft displacement from the mean course line or mean glide path as appropriate.

Peak Envelope Power (PEP) means the peak power of the modulated signal supplied by the transmitter to the antenna transmission line.

Performance-based communication (PBC) means Communication based on performance specifications applied to the provision of air traffic services. Note— An RCP specification includes communication performance requirements that are allocated to system components in terms of the communication to be provided and associated transaction time, continuity, availability, integrity, safety and functionality needed for the proposed operation in the context of a particular airspace concept.

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

Note. — Performance requirements are expressed in navigation specifications (RNAV specification, RNP specification) in terms of accuracy, integrity, continuity, availability and functionality needed for the proposed operation in the context of a particular airspace concept.

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

Note.— An RSP specification includes surveillance performance requirements that are allocated to system components in terms of the surveillance to be provided and associated data delivery time, continuity, availability, integrity, accuracy of the surveillance

Physical Layer Protocol Data Unit (PPDU) means data unit passed to the physical layer for transmission, or decoded by the physical layer after reception.

Physical Layer means the lowest level layer in the Open Systems Interconnection protocol model. The physical layer is concerned with the transmission of binary information over the physical medium (e.g. VHF radio).

Pilot-in-command means the pilot designated by the operator, or in the case of general aviation, the owner, as being in command and charged with the safe conduct of a flight.

Point-in-space (PinS) approach means an approach procedure designed for helicopters only that includes both a visual and an instrument segment.

Point-in-space (PinS) departure means a departure procedure designed for helicopters only that includes both a visual and an instrument segment.

Point-in-space reference point (PRP) means Reference point for the point-in-space approach as identified by the latitude and longitude of the MAPt

Point-in-space (PinS) visual segment means the segment of a helicopter PinS procedure between a point (MAPt or IDF) and the heliport or the landing location.

Point light means a luminous signal appearing without perceptible length.

Point-to-Point means Pertaining or relating to the interconnection of two devices, particularly end-user instruments. A communication path of service intended to connect two discrete end-users; as distinguished from broadcast or multipoint service.

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

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

Positive RA means a resolution advisory that advises the pilot either to climb or to descend (applies to ACASII).

Post spacing means angular or linear distance between two adjacent elevation points.

Potential Threat means an intruder deserving special attention either because of its close proximity to own aircraft or because successive range and altitude measurements indicate that it could be on a collision or near-collision course with own aircraft. The warning time provided against a potential threat is sufficiently small that a traffic advisory (TA) is justified but not so small that a resolution advisory (RA) would be justified.

Power Measurement Point (PMP) means a cable connects the antenna to the UAT equipment. The PMP is the end of that cable that attaches to the antenna. All power measurements are considered as being made at the PMP unless otherwise specified. The cable connecting the UAT equipment to the antenna is assumed to have 3 dB of loss.

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

Note.— In reference to geodetic surveys, precision is a degree of refinement in performance of an operation or a degree of perfection in the instruments and methods used when taking measurements.

Precision approach procedure means an instrument approach procedure utilizing azimuth and glide path information provided by ILS or PAR.

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

Prevailing visibility means the greatest visibility value, observed in accordance with the definition of "visibility", which is reached within at least half the horizon circle or within at least half of the surface of the aerodrome. These areas could comprise contiguous or non-contiguous sectors.

Note. —This value may be assessed by human observation and/or instrumented systems. When instruments are installed, they are used to obtain the best estimate of the prevailing visibility.

Pressure-altitude means an atmospheric pressure expressed in terms of altitude which corresponds to that pressure in the Standard Atmosphere.

Preventive RA: A resolution advisory that advises the pilot to avoid certain deviations from the current flight path but does not require any change in the current flight path.

Primary area means a defined area symmetrically disposed about the nominal flight track in which full obstacle clearance is provided. (See also Secondary area.)

Primary Frequency means the radiotelephony frequency assigned to an aircraft as a first choice for air-ground communication in a radiotelephony network.

Primary means of communication means the means of communication to be adopted normally by aircraft and ground stations as a first choice where alternative means of communication exist.

Printed communications means Communications which automatically provide a permanent printed record at each terminal of a circuit of all messages which pass over such circuit.

Problematic use of substances means the use of one or more psychoactive substances by aviation personnel in a way that:

(*a*) constitutes a direct hazard to the user or endangers the lives, health or welfare of others; and/or

(*b*) causes or worsens an occupational, social, mental or physical problem or disorder.

Procedure altitude/height means a specified altitude/height flown operationally at or above the minimum altitude/height and established to accommodate a stabilized descent at a prescribed descent gradient/angle in the intermediate/ final approach segment.

Procedure turn means a maneuver in which a turn is made away from a designated track followed by a turn in the opposite direction to permit the aircraft to intercept and proceed along the reciprocal of the designated track.

Note 1. —Procedure turns are designated "left" or "right" according to the direction of the initial turn.

Note 2. —Procedure turns may be designated as being made either in level flight or while descending, according to the circumstances of each individual procedure.

Prognostic chart means a forecast of a specified meteorological element(s) for a specified time or period and a specified surface or portion of airspace, depicted graphically on a chart.

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

Proportional Guidance Sector means the volume of airspace within which the angular guidance information provided by a function is directly proportional to the angular displacement of the airborne antenna with respect to the zero-angle reference.

Protected service volume means a part of the facility coverage where the facility provides a particular service in accordance with relevant SARPs and within which the facility is afforded frequency protection.

Pseudorandom Message Data Block means Several UAT requirements state that performance will be tested using pseudorandom message data blocks. Pseudorandom message data blocks should have statistical properties that are nearly indistinguishable from those of a true random selection of bits. For instance, each bit should have (nearly) equal probability of being a ONE or a ZERO, independent of its neighboring bits. There should be a large number of such pseudorandom message data blocks for each message type (Basic ADS-B, Long ADS-B or Ground Uplink) to provide sufficient independent data for statistical performance measurements. See Section 2.3 of Part I of the Manual on the Universal Access Transceiver (UAT) (Doc 9861) for an example of how to provide suitable pseudorandom message data blocks.

Pseudo-Range means the difference between the time of transmission by a satellite and reception by a GNSS receiver multiplied by the speed of light in a vacuum, including bias due to the difference between a GNSS receiver and satellite time reference.

Psychoactive substances means alcohol, opioids, cannabinoids, sedatives and hypnotics, cocaine, other psychostimulants, hallucinogens, and volatile solvents, whereas coffee and tobacco are excluded.

Pulse Amplitude means the maximum voltage of the pulse envelope.

Pulse Code means the method of differentiating between W, X, Y and Z modes and between FA and IA modes.

Pulse Decay Time means the time as measured between the 90 and 10 percent amplitude points on the trailing edge of the pulse envelope.

Pulse Duration means the time interval between the 50 percent amplitude points on leading and trailing edges of the pulse envelope.

Pulse Rise Time: The time as measured between the 10 and 90 percent amplitude points on the leading edge of the pulse envelope.

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

Note 1. —The term "quality" can be used with adjectives such as poor, good or excellent.

Note 2. — "Inherent", as opposed to "assigned", means existing in something, especially as a permanent characteristic.

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

Quality control means Part of quality management focused on fulfilling quality requirements (ISO 9000*).

Quality management means Co-ordinated activities to direct and control an organization with regard to quality (ISO 9000*).

Quality of Service (QOS) means the information relating to data transfer characteristics used by various communications protocols to achieve various levels of performance for network user

Radio Bearing means the angle between the apparent direction of a definite source of emission of electro-magnetic waves and a reference direction, as determined at a radio direction-finding station. A true radio bearing is one for which the reference direction is that of true North. A magnetic radio bearing is one for which the reference direction is that of magnetic North.

Radio Determination means the determination of the position, velocity and/or other characteristics of an object, or the obtaining of information relating to these parameters, by means of the propagation properties of radio waves.

Radio Direction Finding means radio determination using the reception of radio waves for the purpose of determining the direction of a station or object.

Radio Direction-Finding Station means a radio determination station using radio direction finding.

Radio Navigation means radio determination used for the purpose of navigation, including obstruction warning.

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

Radiotelephony means a form of radio communication primarily intended for the exchange of information in the form of speech.

Radiotelephony Network means a group of radiotelephony aeronautical stations which operate on and guard frequencies from the same family and which support each other in a defined manner.

Rated Coverage means the area surrounding an NDB within which the strength of the vertical field of the ground wave exceeds the minimum value specified for the geographical area in which the radio beacon is situated.

Readback means a procedure whereby the receiving station repeats a received message or an appropriate part thereof back to the transmitting station so as to obtain confirmation of correct reception.

Receiver means a sub system that receives GNSS signals and includes one or more sensors.

Reed-Solomon Code means an error correction code capable of correcting symbol errors. Since symbol errors are collections of bits, these codes provide good burst error correction capabilities.

Reference datum height (RDH) means the height of the extended glide path or a nominal vertical path at the runway threshold.

Regional air navigation agreement means agreement approved by the Council of ICAO normally on the advice of a regional air navigation meeting.

Regular Station means a station selected from those forming an en-route air-ground radio telephony network to communicate with or to intercept communications from aircraft in normal conditions.

Relay Installation means a tele-typewriter installation where automatic equipment is used to transfer messages from incoming to outgoing circuits.

Reliable Link Service (RLS) means a data communications service provided by the sub network which automatically provides for error control over its link through error detection and requested re transmission of signal units found to be in error.

Relief means the inequalities in elevation of the surface of the Earth represented on aeronautical charts by contours, hypsometric tints, shading or spot elevations.

Remotely piloted aircraft (RPA) means an unmanned aircraft which is piloted from a remote pilot station.

Remotely piloted aircraft system (RPAS) means a remotely piloted aircraft, its associated remote pilot station(s), the required command and control links and any other components as specified in the type design.

***Remote pilot station* means the** component of the remotely piloted aircraft system containing the equipment used to pilot the remotely piloted aircraft.

***Repetitive flight plan* (*RPL*) means a** flight plan related to a series of frequently recurring, regularly operated individual flights with identical basic features, submitted by an operator for retention and repetitive use by ATS units.

Reply Efficiency means the ratio of replies transmitted by the transponder to the total of received valid interrogations.

Reporting point means a specified (named) geographical location in relation to which the position of an aircraft can be reported.

Note. —There are three categories of reporting points: ground-based navigation aid, intersection and waypoint. In the context of this definition, intersection is a significant point expressed as radials, bearings and/or distances from ground-based navigation aids. A *reporting point can be indicated as “on request” or as “compulsory”.*

Rescue means an operation to retrieve persons in distress, provide for their initial medical or other needs, and deliver them to a place of safety.

***Rescue co-ordination center* (*RCC*) means a** unit responsible for promoting efficient organization of search and rescue services and for coordinating the conduct of search and rescue operations within a search and rescue region.

***Rescue sub-centre* (*RSC*) means a** unit subordinate to a rescue co-ordination centre, established to complement the latter according to particular provisions of the responsible authorities.

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

Required Navigation Performance (RNP) means a statement of the navigation performance necessary for operation within a defined airspace.

Note.— Navigation performance and requirements are defined for a particular RNP type and/or application.

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

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

Note 1. — “Generally implied” means that it is custom or common practice for the organization, its customers and other interested parties, that the need or expectation under consideration is implied.

Note 2. —A qualifier can be used to denote a specific type of requirement, e.g. product requirement, quality management requirement, customer requirement.

Note 3. —A specified requirement is one which is stated, for example, in a document.

Note 4. —Requirements can be generated by different interested parties.

Residual Error Rate means the ratio of incorrect, lost and duplicate subnetwork service data units (SNSDUs) to the total number of SNSDUs that were sent.

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

Resolution Advisory Complement (RAC) means Information provided by one ACAS to another via a Mode S interrogation in order to ensure complementary maneuvers by restricting the choice of maneuvers available to the ACAS receiving the RAC.

Resolution Advisory Complements Record (RAC Record) means a composite of all currently active vertical RACs (VRCs) and horizontal RACs (HRCs) that have been received by ACAS. This information is provided by one ACAS to another ACAS or to a Mode S ground station via a Mode S reply.

Resolution Advisory Strength means the magnitude of the maneuver indicated by the RA. An RA may take on several successive strengths before being can celled. Once a new RA strength is issued, the previous one automatically becomes void.

Resolution message means the message containing the resolution advisory complement (RAC).

Restricted area means 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.

Reversal procedure means a procedure designed to enable aircraft to reverse direction during the initial approach segment of an instrument approach procedure. The sequence may include procedure turns or base turns.

Reversed sense RA means a resolution advisory that has had its sense reversed.

Route Segment means a route or portion of route usually flown without an intermediate stop.

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

Routing Directory means a list in a communication centre indicating for each addressee the outgoing circuit to be used.

RPA observer means a trained and competent person designated by the operator who, by visual observation of the remotely piloted aircraft, assists the remote pilot in the safe conduct of the flight.

Runway means a defined rectangular area on a land aerodrome prepared for the landing and take-off of aircraft.

Runway-holding position means a designated position intended to protect a runway, an obstacle limitation surface, or an ILS/MLS critical/sensitive area at which taxiing aircraft and vehicles shall stop and hold, unless otherwise authorized by the aerodrome control tower.

Note. — In radiotelephony phraseologies, the expression "holding point" is used to designate the runway-holding position.

Runway strip means a defined area including the runway and stopway, if provided, intended:

(*a*) to reduce the risk of damage to aircraft running off a runway; and

(*b*) to protect aircraft flying over it during take-off or landing operations.

***Runway visual range* (*RVR*) means the** range over which the pilot of an aircraft on the center line of a runway can see the runway surface markings or the lights delineating the runway or identifying its center line.

Safety-sensitive personnel means persons who might endanger aviation safety if they perform their duties and functions improperly including, but not limited to, crew members, aircraft maintenance personnel and air traffic controllers.

Satellite-based augmentation system (SBAS) means a wide coverage augmentation system in which the user receives augmentation information from a satellite-based transmitter.

Note.— SBAS performance standards are found in Annex 10, Volume I, Chapter 3.

Search means an operation normally co-ordinated by a rescue co-ordination centre or rescue subcenter using available personnel and facilities to locate persons in distress.

Search and rescue aircraft means an aircraft provided with specialized equipment suitable for the efficient conduct of search and rescue missions.

Search and rescue facility means Any mobile resource, including designated search and rescue units, used to conduct search and rescue operations.

Search and rescue region (SRR) means an area of defined dimensions, associated with a rescue co-ordination center, within which search and rescue services are provided.

Search and rescue service means the performance of distress monitoring, communication, co-ordination and search and rescue functions, initial medical assistance or medical evacuation, through the use of public and private resources, including co-operating aircraft, vessels and other craft and installations.

Search and rescue services unit means a generic term meaning, as the case may be, rescue co-ordination center, rescue sub-center or alerting post.

Search and rescue unit means a mobile resource composed of trained personnel and provided with equipment suitable for the expeditious conduct of search and rescue operations.

Secondary area means a defined area on each side of the primary area located along the nominal flight track in which decreasing obstacle clearance is provided. (See also *Primary area.*)

Secondary Frequency means the radiotelephony frequency assigned to an aircraft as a second choice for air-ground communication in a radiotelephony network.

Secondary Surveillance Radar (SSR) means a surveillance radar system which uses transmitters/receivers (interrogators) and transponders.

Segment means a portion of a message that can be accommodated within a single MA/MB field in the case of a standard-length message, or MC/MD field in the case of an extended length message. This term is also applied to the Mode S transmissions containing these fields.

Segregated parallel operations means Simultaneous operations on parallel or near-parallel instrument runways in which one runway is used exclusively for approaches and the other runway is used exclusively for departures.

Self-Organizing Time Division Multiple Access (STDMA) means a multiple access scheme based on time-shared use of a radio frequency (RF) channel employing: (1) discrete contiguous time slots as the fundamental shared resource; and (2) a set of operating protocols that allows users to mediate access to these time slots without reliance on a master control station.

Semi-Automatic Relay Installation means a teletypewriter installation where interpretation of the relaying responsibility in respect of an incoming message and the resultant setting- up of the connections required to affect the appropriate retransmissions require the intervention of an operator but where all other normal operations of relay are carried out automatically Sensitivity Level(S). An integer defining a set of parameters used by the traffic advisory (TA) and collision avoidance algorithms to control the warning time provided by the potential threat and threat detection logic, as well as the values of parameters relevant to the RA selection logic.

Service Data Unit (SDU) means a unit of data transferred between adjacent layer entities, which is encapsulated within a protocol data unit (PDU) for transfer to a peer layer.

Service Flow means a unidirectional flow of media access control layer (MAC) service data units (SDUs) on a connection that is providing a particular quality of service (QoS).

Service Volume means a part of the facility coverage where the facility provides a particular service in accordance with relevant SARPs and within which the facility is afforded frequency protection.

Shoulder means an area adjacent to the edge of a pavement so prepared as to provide a transition between the pavement and the adjacent surface.

SIGMET information means Information issued by a meteorological watch office concerning the occurrence or expected occurrence of specified en- route weather phenomena which may affect the safety of aircraft operations.

Signal area means an area on an aerodrome used for the display of ground signals.

Significant obstacle means any natural terrain feature or man-made fixed object, permanent or temporary, which has vertical significance in relation to adjacent and surrounding features and which is considered a potential hazard to the safe passage of aircraft in the type of operation for which the individual procedure is designed.

Note.— The term “significant obstacle” is used in this document solely for the purpose of specifying the objects considered in calculations of relevant elements of the procedure and intended to be presented on an appropriate chart series.

Significant point means a specified geographical location used in defining an ATS route or the flight path of an aircraft and for other navigation and ATS purposes.

Note. —There are three categories of significant points: ground-based navigation aid, intersection and waypoint. In the context of this definition, intersection is a significant point expressed as radials, bearings and/or distances from ground-based navigation aids.

Simplex means a method in which telecommunication between two stations takes place in one direction at a time.

Note. — In application to the aeronautical mobile service, this method may be subdivided as follows:

(*a*) *single channel simplex;*

(*b*) *double channel simplex;*

(*c*) *offset frequency simplex.*

Single channel simplex means Simplex using the same frequency channel in each direction.

Slot means one of a series of consecutive time intervals of equal duration. Each burst transmission starts at the beginning of a slot.

Slotted Aloha means a random-access strategy whereby multiple users access the same communications channel independently, but each communication must be confined to a fixed time slot. The same timing slot structure is known to all users, but there is no other coordination between the users.

Smax means Maximum desired VHF data broadcast signal power at the VHF data broadcast receiver input.

SNOWTAM means a special series NOTAM given in a standard format providing a surface condition report notifying the presence or cessation of hazardous conditions due to snow, ice, slush, frost, standing water or water associated with snow, slush, ice or frost on the movement area.

Space weather centre (SWXC) means a centre designated to monitor and provide advisory information on space weather phenomena expected to affect high-frequency radio communications, communications via satellite, GNSS-based navigation and surveillance systems and/or pose a radiation risk to aircraft occupants.

Note. — A space weather centre is designated as global and/or regional.

Special VFR flight means a VFR flight cleared by air traffic control to operate within a control zone in meteorological conditions below VMC.

Spot Beam means Satellite antenna directivity whose main lobe encompasses significantly less than the earth's surface that is within line-of-sight view of the satellite. May be designed so as to improve system resource efficiency with respect to geographical distribution of user earth stations.

Squitter Protocol Data Unit (SPDU) means data packet which is broadcast every 32seconds by an HFDL ground station on each of its operating frequencies, and which contains link management information.

Standard instrument arrival (STAR) means a designated instrument flight rule (IFR) arrival route linking a significant point, normally on an ATS route, with a point from which a published instrument approach procedure can be commenced.

Standard instrument departure (SID) means a designated instrument flight rule (IFR) departure route linking the aerodrome or a specified runway of the aerodrome with a specified significant point, normally on a designated ATS route, at which the en-route phase of a flight commences.

Standard isobaric surface means an isobaric surface used on a worldwide basis for representing and analyzing the conditions in the atmosphere

Standard Length Message (SLM) means an exchange of digital data using selectively addressed Comm-A interrogations and/or Comm-B replies (see "Comm-A" and "Comm-B").

Standard Positioning Service (SPS) means the specified level of positioning, velocity and timing accuracy that is available to any global positioning system (GPS)user on a continuous, worldwide basis.

Standard UAT Receiver means a general purpose UAT receiver satisfying the minimum rejection requirements of interference from adjacent frequency distance measuring equipment (DME) (see

12.3.2.2 for further details).

State of Registry means the State on whose register the aircraft is entered.

State volcano observatory means a volcano observatory, designated by regional air navigation agreement, to monitor active or potentially active volcanoes within a State and to provide information on volcanic activity to its associated area control centre/flight information centre, meteorological watch office and volcanic ash advisory centre.

Station declination means an alignment variation between the zero-degree radial of a VOR and true north, determined at the time the VOR station is calibrated.

Stopway means a defined rectangular area on the ground at the end of take-off run available prepared as a suitable area in which an aircraft can be stopped in the case of an abandoned take-off.

Subnetwork (SN): See Network (N).

Subnetwork Connection means a long-term association between an aircraft DTE and a ground DTE using successive virtual calls to maintain context across link handoff.

Subnetwork Dependent Convergence Function (SNDCF) means a function that matches the characteristics and services of a particular subnetwork to those characteristics and services required by the internetwork facility.

Subnetwork Entity means In this document, the phrase “ground DCE” will be used for the subnetwork entity in a ground station communicating with an aircraft; the phrase “ground DTE” will be used for the subnetwork entity in a ground router communicating with an aircraft station; and, the phrase “aircraft DTE” will be used for the subnetwork entity in an aircraft communicating with the station. A subnetwork entity is a packet layer entity as defined in ISO 8208.

Subnetwork Entry Time means the time from when the mobile station starts the scanning for BS transmission, until the network link establishes the connection, and the first network user “protocol data unit” can be sent.

Subnetwork Layer means the layer that establishes, manages and terminates connections across a subnetwork.

Subnetwork Management Entity (SNME) means an entity resident within a GDLP that performs subnetwork management and communicates with peer entities in intermediate or end-systems.

Subnetwork Service Data Unit (SNSDU) means an amount of subnetwork user data, the identity of which is preserved from one end of a subnetwork connection to the other.

Subnetwork Service Data Unit (SNSDU) means an amount of subnetwork user data, the identity of which is preserved from one end of a subnetwork connection to the other.

Subnetwork means an actual implementation of a data network that employs a homogeneous protocol and addressing plan, and is under the control of a single authority.

Subscriber Station (SS) means a generalized equipment set providing connectivity between subscriber equipment and a base station (BS).

Successful Message Reception (SMR) means the function within the UAT receiver for declaring a received message as valid for passing to an application that uses received UAT messages. See Section 4 of Part I of the Manual on the Universal Access Transceiver (UAT) (Doc 9861) for a detailed description of the procedure to be used by the UAT receiver for declaring successful message reception.

Surveillance Radar means Radar equipment used to determine the position of an aircraft in range and azimuth.

Synchronous Operation means operation in which the time interval between code units is a constant.

System Efficiency means the ratio of valid replies processed by the interrogator to the total of its own interrogations.

System. A VDL-capable entity means a system comprises one or more stations and the associated VDL management entity. A system may either be an aircraft system or a ground system

Take-off run available (TORA) means the length of runway declared available and suitable for the ground run of an aeroplane taking off.
(381) Transition layer. The airspace between the transition altitude and the transition level.

Taxiing means Movement of an aircraft on the surface of an aerodrome under its own power, excluding take-off and landing.

Taxi-route means a defined path established for the movement of helicopters from one part of a heliport to another. A taxi-route includes a helicopter air or ground taxiway which is centered on the taxi-route.

Taxiway means a defined path on a land aerodrome established for the taxiing of aircraft and intended to provide a link between one part of the aerodrome and another, including:

(*a*) *Aircraft stand taxi lane*—A portion of an apron designated as a taxiway and intended to provide access to aircraft stands only.

(*b*) *Apron taxiway*—A portion of a taxiway system located on an apron and intended to provide a through taxi route across the apron.

(*c*) *Rapid exit taxiway*—A taxiway connected to a runway at an acute angle and designed to allow landing aeroplanes to turn off at higher speeds than are achieved on other exit taxiways thereby minimizing runway occupancy times.

Telecommunication means Any transmission, emission, or reception of signs, signals, writing, images and sounds or intelligence of any nature by wire, radio, optical or other electromagnetic systems.

Teletypewriter Tape means a tape on which signals are recorded in the 5-unit Start-Stop code by completely severed perforations (Chad Type) or by partially severed perforations (Chadless Type) for transmission over teletypewriter circuits.

Terminal arrival altitude (TAA) means the lowest altitude that will provide a minimum clearance of 300 m (1,000 ft) above all objects located in an arc of a circle defined by a 46 km (25 NM) radius centered on the initial approach fix (IAF), or where there is no IAF on the intermediate approach fix (IF), delimited by straight lines joining the extremity of the arc to the IF. The combined TAAs associated with an approach procedure shall account for an area of 360 degrees around the IF.

Terminal control area means a control area normally established at the confluence of ATS routes in the vicinity of one or more major aerodromes.

Terrain means 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.

Note. —In practical terms, depending on the method of data collection, terrain represents the continuous surface that exists at the bare Earth, the top of the canopy or something in-between, also known as "first reflective surface".

Threat means an intruder deserving special attention either because of its close proximity to own aircraft or because successive range and altitude measurements indicate that it could be on a collision or near-collision course with own aircraft. The warning time provided against a threat is sufficiently small that an RA is justified.

Threshold means the beginning of that portion of the runway usable for landing.

Threat means an intruder deserving special attention either because of its close proximity to own aircraft or because successive range and altitude measurements indicate that it could be on a collision or near-collision course with own aircraft. The warning time provided against a threat is sufficiently small that an RA is justified.

Time Division Duplex (TDD) means a duplex scheme where uplink and downlink transmissions occur at different times but may share the same frequency.

Time Division Multiple Access (TDMA) means a multiple access scheme based on time-shared use of an RF channel employing: (1) discrete contiguous time slots as the fundamental shared resource; and (2) a set of operating protocols that allows users to interact with a master control station to mediate access to the channel.

Time Division Multiplex (TDM) means a channel sharing strategy in which packets of information from the same source but with different destinations are sequenced in time on the same channel.

Timeout means the cancellation of a transaction after one of the participating entities has failed to provide a required response within a pre-defined period of time.

Time-to-Alert means the maximum allowable time elapsed from the onset of the navigation system being out of tolerance until the equipment enunciates the alert.

Torn-Tape Relay Installation means a teletypewriter installation where messages are received and relayed in teletypewriter tape form and where all operations of relay are performed as the result of operator intervention.

Total estimated elapsed time means for IFR flights, the estimated time required from take-off to arrive over that designated point, defined by reference to navigation aids, from which it is intended that an instrument approach procedure will be commenced, or, if no navigation aid is associated with the destination aerodrome, to arrive over the destination aerodrome. For VFR flights, the estimated time required from take-off to arrive over the destination aerodrome.

Total Voice Transfer Delay means the elapsed time commencing at the instant that speech is presented to the AES or GES and concluding at the instant that the speech enters the interconnecting network of the counterpart GES or AES. This delay includes vocoder processing time, physical layer delay, RF propagation delay and any other delays within an AMS(R)S subnetwork.

Touchdown means the point where the nominal glide path intercepts the runway.

Touchdown and lift-off area **(*TLOF*)** ***means a*** load bearing area on which a helicopter may touch down or lift off.

Touchdown zone means the portion of a runway, beyond the threshold, where it is intended landing aeroplanes first contact the runway.

Track means the projection on the earth's surface of the path of an aircraft, the direction of which path at any point is usually expressed in degrees from North (true, magnetic or grid).

Traceability means Ability to trace the history, application or location of that which is under consideration (ISO 9000*).
Note.— When considering product, traceability can relate to:
-the origin of materials and parts;
-the processing history; and
-the distribution and location of the product after delivery.

Traffic Advisory (TA) means an indication given to the flight crew that a certain intruder is a potential threat.

Traffic avoidance advice means Advice provided by an air traffic services unit specifying maneuvers to assist a pilot to avoid a collision.

Traffic information means Information issued by an air traffic services unit to alert a pilot to other known or observed air traffic which may be in proximity to the position or intended route of flight and to help the pilot avoid a collision.

Traffic Information Service: Broadcast (TIS-B) IN means a surveillance function that receives and processes surveillance data from TIS-BOUT data sources.

Traffic Information Service: Broadcast (TISB)OUT means a

function on the ground that periodically broadcasts the surveillance information made available by ground sensors in a format suitable for TIS-BIN capable receivers.

Transit Delay means In packet data systems, the elapsed time between a request to transmit an assembled data packet and an indication at the receiving end that the corresponding packet has been received and is ready to be used or forwarded.

Transition altitude means the altitude at or below which the vertical position of an aircraft is controlled by reference to altitudes.

Transition layer means the airspace between the transition altitude and the transition level.

Transition level means the lowest flight level available for use above the transition altitude.

Transmission Rate means the average number of pulse pairs transmitted from the transponder per second.

Transponder Occupancy means a state of unavailability of the transponder from the time it detects an incoming signal that appears to cause some action or from the time of a self-initiated transmission, to the time that it is capable of replying to another interrogation.

Tributary Station means an aeronautical fixed station that may receive or transmit messages and/or digital data but which does not relay except for the purpose of serving similar stations connected through it to a communication centre.

Tropical cyclone means Generic term for a non-frontal synoptic-scale cyclone originating over tropical or sub-tropical waters with organized convection and definite cyclonic surface wind circulation.

Tropical cyclone advisory centre **(*TCAC*) means a** meteorological centre designated by regional air navigation agreement to provide advisory information to meteorological watch offices, world area forecast centers and international OPMET databanks regarding the position, forecast direction and speed of movement, central pressure and maximum surface wind of tropical cyclones.

Two-Frequency Glide Path System means an ILS glide path in which coverage is achieved by the use of two independent radiation field patterns spaced on separate carrier frequencies within the particular glide path channel.

Two-Frequency Localizer System means a localizer system in which coverage is achieved by the use of two independent radiation field patterns spaced on separate carrier frequencies within the particular localizer VHF channel.

UAT ADS-B Message means a message broadcasted once per second by each aircraft to convey state vector and other information. UAT ADS-B messages can be in one of two forms depending on the amount of information to be transmitted in a given second: the Basic UAT ADS-B Message or the Long UAT ADS-B Message (see 12.4.4.1 for definition of each). UAT ground stations can support traffic information service-broadcast (TIS-B) through transmission of individual ADS-B messages in the ADS-B segment of the UAT frame.

UAT Ground Uplink Message means a message broadcasted by ground stations, within the ground segment of the UAT frame, to convey flight information such as text and graphical weather data, advisories, and other aeronautical information, to aircraft that are in the service volume of the ground station (see 12.4.4.2 for further details).

Universal Access Transceiver (UAT) means a broadcast data link operating on 978 MHz, with a modulation rate of 1.041667Mbps.

Uncertainty phase means a situation wherein uncertainty exists as to the safety of an aircraft and its occupants.

Unmanned free balloon means a non-power-driven, unmanned, lighter-than- air aircraft in free flight.

Note. —Unmanned free balloons are classified as heavy, medium or light in accordance with specifications contained in Appendix 4.

Uplink ELM (UELM) means a term referring to extended length uplink communication by means of 112-bit Mode S Comm-C interrogations, each containing the 80-bit Comm-C message field (MC).

Uplink means a term referring to the transmission of data from the ground to an aircraft. Mode S ground-to-air signals are transmitted on the 1 030 MHz interrogation frequency channel.

Upper-air chart means a meteorological chart relating to a specified upper-air surface or layer of the atmosphere.

User Group means a group of ground and/or aircraft stations which share voice and/or data connectivity. For voice communications, all members of a user group can access all communications. For data, communications include point-to-point connectivity for air-to-ground messages, and point-to-point and broadcast connectivity for ground-to-air messages.

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

VDL Management Entity (VME) means a VDL-specific entity that provides the quality of service requested by the ATN-defined SN_SME. A VME uses the LMEs (that it creates and destroys) to enquire the quality of service available from peer systems.

VDL Mode 4 Burst means a VHF digital link (VDL) Mode 4 burst is composed of a sequence of source address, burst ID, information, slot reservation and frame check sequence (FCS) fields, bracketed by opening and closing flag sequences.

VDL Mode 4 DLS system means a VDL system that implements the VDL Mode 4 DLS and subnetwork protocols to carry ATN packets or other packets.

VDL Mode 4 specific services (VSS) sublayer means the sublayer that resides above the MAC sublayer and provides VDL Mode 4 specific access protocols including reserved, random and fixed protocols.

VDL Station means an aircraft-based or ground-based physical entity, capable of VDL Mode 2, 3 or 4.

Vectoring means Provision of navigational guidance to aircraft in the form of specific headings, based on the use of an ATS surveillance system.

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

Note 1.*The term "verified" is used to designate the corresponding status.*

Note 2.*Confirmation can comprise activities such as:*

(i) performing alternative calculations;

(ii) comparing a new design specification with a similar proven design specification;

(iii) undertaking tests and demonstrations; and

(iv) reviewing documents prior to issue.

Vertical path angle (VPA) means Angle of the published final approach descent in Baro-VNAV procedures.

Vertical Speed Limit (VSL)RA means are solution advisory advising the pilot to avoid a given range of altitude rates. A VSLRA can be either corrective or preventive.

VHF Digital Link (VDL) means a constituent mobile subnetwork of the aeronautical telecommunication network (ATN), operating in the aeronautical mobile VHF frequency band. In addition, the VDL may provide non-ATN functions such as, for instance, digitized voice.

Virtual Origin means the point at which the straight line through the 30 percent and 5 percent amplitude points on the pulse leading edge intersects the 0 percent amplitude axis.

***Visibility* means** Visibility for aeronautical purposes is the greater of:

(*a*) the greatest distance at which a black object of suitable dimensions, situated near the ground, can be seen and recognized when observed against a bright background;

(*b*) the greatest distance at which lights in the vicinity of 1,000 candelas can be seen and identified against an unlit background.

Note. —The two distances have different values in air of a given extinction coefficient, and the latter (*b*) *varies with the background illumination. The former* (*a*) *is represented by the meteorological optical range* (*MOR*).

Visual approach procedure means a series of predetermined maneuvers by visual reference, from the initial approach fix, or where applicable, from the beginning of a defined arrival route to a point from which a landing can be completed and thereafter, if a landing is not completed, a go-around procedure can be carried out.

Visual line-of-sight (VLOS) operation means an operation in which the remote pilot or RPA observer maintains direct unaided visual contact with the remotely piloted aircraft.

***Visual maneuvering (circling) area* means the** area in which obstacle clearance should be taken into consideration for aircraft carrying out a circling approach.

Visual meteorological conditions means Meteorological conditions expressed in terms of visibility, distance from cloud, and ceiling, equal to or better than specified minima.

Visual segment descent angle (VSDA) means the angle between the MDA/H at the MAPt/DP and the heliport crossing height.

Visual segment design gradient (VSDG) means the gradient of the visual segment in a PinS departure procedure. The visual segment connects the heliport or landing location with the initial departure fix (IDF) minimum crossing altitude (MCA)

Vocoder means a low bit rate voice encoder/decoder.

Voice Unit means a device that provides a simplex audio and signaling interface between the user and VDL.

Voice-Automatic Terminal Information Service (Voice-ATIS) means the provision of ATIS by means of continuous and repetitive voice broadcasts.

***Volcanic ash advisory centre* (*VAAC*) means a** meteorological centre designated by regional air navigation agreement to provide advisory information to meteorological watch offices, area control centers, flight information centers, world area forecast centers and international OPMET databanks regarding the lateral and vertical extent and forecast movement of volcanic ash in the atmosphere following volcanic eruptions.

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

VSS User means a user of the VDL Mode 4 specific services. The VSS user could be higher layers in the VDL Mode 4 SARPs or an external application using VDL Mode 4.

Warning Time means the time interval between potential threat or threat detection and closest approach when neither aircraft accelerates.

Waypoint means a specified geographical location used to define an area navigation route or the flight path of an aircraft employing area navigation. Waypoints are identified as either:

Fly-by waypoint. A waypoint which requires turn anticipation to allow tangential interception of the next segment of a route or procedure; or

Flyover waypoint. A waypoint at which a turn is initiated in order to join the next segment of a route or procedure.

Waypoint distance (WD) means distance on the WGS84 ellipsoid from a defined waypoint to the aircraft RNAV receiver.

World area forecast centre **(*WAFC*)** ***means a*** meteorological centre designated to prepare and issue significant weather forecasts and upper-air forecasts in digital form on a global basis direct to States by appropriate means as part of the aeronautical fixed service.

World area forecast system **(*WAFS*)** ***means a*** worldwide system by which world area forecast centres provide aeronautical meteorological en-route forecasts in uniform standardized formats.

XDCE means a general term referring to both the ADCE and the GDCE.

XDLP means a general term referring to both the ADLP and the GDLP.

Z marker beacon means a type of radio beacon, the emissions of which radiate in a vertical cone-shaped pattern.

* ISO Standard

9000 — Quality Management Systems — Fundamentals and Vocabulary
19101 — Geographic information — Reference model
19104 — Geographic information — Terminology
19108 — Geographic information — Temporal schema
19109 — Geographic information — Rules for application schema
19110 — Geographic information — Feature cataloguing schema
19115 — Geographic information — Metadata
19117 — Geographic information — Portrayal
19131 — Geographic information — Data product specification

14.0.2.1 ABBREVIATIONS

ABBREVIATION

5LNC	Five-letter name code
A	
AC	Advisory Circular
ACAS	Airborne Collision Avoidance System
ACC	Area Control Centre or area control
ACFT	*Aircraft*
ACN	Aircraft Classification Number
ADIZ	*Air defence identification zone*
ADS	Automatic Dependent Surveillance
ADS-B	Automatic Dependent Surveillance — Broadcast
ADS-C	Automatic Dependent Surveillance---Contract
AEP	Aerodrome Emergency Plan
AFIS	Aerodrome Flight Information Service
AFS	Aeronautical Fixed Service
AFTN	Aeronautical Fixed Telecommunication Network
AGL	Above ground level
AHRS	Attitude and heading reference system
AIC	Aeronautical Information Circular
AICM	*Aeronautical information conceptual model*
AIP	Aeronautical Information Publication
APP	Approach Control
APV	Approach with Vertical guidance
AIP SUP	Aeronautical Information Publication Supplements
AIRAC	Aeronautical Information Regulation and Control
AIREP	Air report
AIRMET	Airmen's meteorological information
AIS	Aeronautical Information Services
AIM	Aeronautical Information Management
AIXM	Aeronautical Information Exchange Model
AM	Aeronautical Meteorology
AMA	Area minimum altitude
AMC	Airspace management cell
AMD	Aerodrome mapping data
AMHS	ATS message handling system
AMSL	Above mean sea level
AMSP	Aeronautical Meteorological Service Provider
ANP	Actual navigation performance
ANS	Air Navigation Service
ANS	Air Navigation Standards
ANSP	Air Navigation Service Provider
AOB	Angle of bank

APV	Approach procedures with vertical guidance
ARD	Aerodrome
ARFFS	Aerodrome Rescue and Fire Fighting Services
ARO	ATS reporting office
ARP	Aerodrome reference point
ASBU	Aviation system block upgrade
ASE	Altimeter system error
ASR	Aeronautical Search and Rescue
ATC	Air Traffic Control
ATE	Aeronautical Telecommunications
ATIS	Automatic Terminal Information Service
ATM	Air Traffic Management
ATS	Air Traffic Services
ATZ	Aerodrome traffic zone
ASE†	Altimeter system error
ATSEP	Air Traffic Safety Electronic Personnel
ATT	Along-track tolerance
AWY	Airway
AZM	Azimuth

B

BKN	Broken
BV	Buffer value

C

CAA	Civil Aviation Authority
CAP	Corrective Action Plan
CA	Course to an altitude
CAT	Category
CB	Cumulonimbus
CBT	Computer-based training
CBTA	Competency-based training and assessment
CCO	Continuous climb operation
CDFA	Continuous descent final approach
CDI	Course deviation indicator
CDM	Collaborative decision making
CDO	Continuous descent operation
CE	Critical element
CF	Course to a fix
C/L	Centre line
CNS	Communication, navigation and surveillance
CNS/ATM	Communication Navigation Surveillance/Air Traffic Management
COM	Communications
COP	Change-over point
CPA	Closest point of approach
CPDLC	Controller-pilot data link communications

CRC	Cyclic redundancy check
CRM	Collision risk model
CRM	Crew resource management
CTA	Control Area
CTR	Control Zone

D

DAIM	Digital AIM
D- ATIS	Data ATIS
DDM	Difference in the Depth of Modulation
DER	Departure end of the runway
DF	Direction finding
DME	Distance Measurement Equipment
Direct-VS	Direct visual segment
DP	Descent point
DR	Dead reckoning
DTD	Document type definition
DTGM	DAAS Technical Guidance Materials
DTT	System use accuracy
DVOR	Doppler Very High Frequency Omni- Range

E

EDA	Elevation differential area
EGM-96	Earth Gravitational Model — 1996
ENR	En-route
ESDU	Engineering Sciences Data Unit
EST	Estimate
E-TOD	Electronic Terrain and Obstacle Data
EUROCAE	European Organization for Civil Aviation Equipment

F

FAA	Federal Aviation Administration
FACF†	Final approach capture fix
FAF	Final approach fix
FAP	Final approach point
FAS	Final approach segment
FAT	Final approach track
FATO	Final approach and take-off area
FHP	Fictitious heliport point
FHPCH	Fictitious heliport point crossing height
FIC	Flight Information Centre
FIR	Flight Information Region
FL	Flight level
FM	Course from a fix to manual termination

FMC	Flight management computer
FMS	Flight management system
FPAP	Flight path alignment point
FRA	Free route airspace
FRMS	Fatigue Risk Management System
FROP	Final approach roll-out point
Ft.	Foot (feet)
FTE	Flight technical error
FTP	Fictitious threshold point
FTT	Flight technical tolerance

G

GAMET	Area forecast for low-level flights
GANP	Global Air Navigation Plan
GARP	GNSS azimuth reference point
GBAS	Ground-based augmentation system
GCE†	Glide path construction error
GEN	General
GLS	GBAS landing system
GNSS	Global Navigation Satellite System
GP	Glide path
GPA	Glide path angle
GPCE	Glide path construction error
GPIP	Glide path intercepts point
GPS	Global Positioning System
GPWS	Ground proximity warning system
GRAS	Ground-based Regional Augmentation System
GRF	Global Reporting Format

H

HA	Holding/racetrack to an altitude
HAE	Height above ellipsoid
HAL	Horizontal alarm limit
HCH	Heliport crossing height
HF	Holding/racetrack to a fix
HL	Height loss
HM	Holding/racetrack to a manual termination
HP	Helipoint
hPa	Hectopascal(s)
HPL	Horizontal protection level
HRP	Heliport reference point
HTML	Hypertext Markup Language
HVR	High vertical rate

I

IAC	Instrument Approach Chart

IAF	Initial approach fix
IAP	Instrument approach procedure
IAS	Indicated airspeed
ICAO	International Civil Aviation Organisation
ICAOPANS	International Civil Aviation Organisation Procedural Air Navigation Services
IDF	Initial departure fix
IERS	International Earth Rotation Service
IF	Intermediate approach fix
IFP	Instrument flight procedure
IFPD	Instrument flight procedure design
IFR	Instrument Flight Rules
ILS	Instrument Landing System
IMAL	Integrity monitor alarm
IMC	Instrument Meteorological Conditions
INS	Inertial navigation system
IRS	Inertial reference system
IS	Implementing Standards
ISA	International standard atmosphere
ISO	International Organisation for Standardization
IWXXM	ICAO Meteorological Information Exchange Model

J

JAA	Joint Aviation Authorities

K

Km.	Kilometre(s)
Kt.	Knots

L

LATCI	Local Air Traffic Control Instructions
LDAH	Landing distance available — helicopters
LF	Low frequency
LOC	Localizer
LORAN	Long range air navigation system
LP	Localizer performance
LTP	Landing threshold point

M

M	Metre
MA/H	Minimum altitude/height
MAHF	Missed approach holding fix
Maneuvering-VS	Maneuvering visual segment
MANFEL	Minimum Air Navigation Facility Equipment List
MAPt	Missed approach point
MATF	Missed approach turning fix

MANFEL	Minimum Air Navigation Facility Equipment List
MCA	Minimum crossing altitude
MCH	Minimum crossing height
MDA/H	Minimum descent altitude/height
MEA	Minimum en-route altitude
MEL	Minimum equipment list
MET	Meteorology/Meteorological
METAR	Aerodrome Routine Meteorological Report
MLS	Microwave landing system
MLS	Microwave Landing System
MM	Middle marker
MOC	Minimum obstacle clearance
MOCA	Minimum obstacle clearance altitude
MOO	Manual of Operations
MOPS	Minimum operational performance standards
MoU	Memorandum of Understanding
MSA	Minimum sector altitude
MSAW	Minimum Safe Altitude Warning
MSL	Mean Sea level
MSD	Minimum stabilization distance
MWO	Meteorological watch office

N

NADP	Noise abatement departure procedure
NAT	HLA North Atlantic high level airspace
NCAA	Nigeria Civil Aviation Authority
NDB	Non-Directional Beacon
NEMA	Nigerian Emergency Management Agency
NIG. CARs	Nigeria Civil Aviation Regulations
NM	Nautical mile(s)
NOF	International NOTAM Office
NOTAM	Notice to Airmen
NOZ	Normal operating zone
NPA	Non-precision approach
NSC.	No Significant Cloud
NSE	Navigational system error
NSP	Navigation System Panel
NSW	No Significant Weather
NTZ	No transgression zone

O

OB	Observable behaviour
OGC	Open Geospatial Consortium
OPMET	Operational Meteorological Information
OVC	Overcast

P

PA	Precision approach
PANS	Procedures for air navigation services
PANS-ABC	ICAO Abbreviation and Codes
PANS-ATM	Procedure for Air Navigation Air Traffic Management
PANS-OPS	Procedural Air Navigation Services Operations
PAOAS	Parallel approach obstacle assessment surface
PAPI	Precision approach path indicator
PAR	Precision approach radar
PBC	Performance Based Communication
PBCS	Performance Based Communication and Surveillance
PBN	Performance-Based Navigation
PBS	Performance Based Surveillance
PDF	Portable document format
PDG	Procedure design gradient
PERM	Permanent
PF	Pilot flying
PIB	Pre-flight Information Bulletin
PinS	Point-in-space
PM	Pilot monitoring
PNG	Portable Network Graphics
PRP	Point-in-space reference point

Q

QFE	Atmospheric pressure at aerodrome level
QMS	Quality Management System
QNH	Observed Atmospheric pressure at aerodrome elevation corrected for temperature and reduced to mean sea level using the ICAO formula

R

RA	Resolution advisory
RCC	Rescue Coordination Centre
RCR	Runway condition report
RFFS	Rescue and Fire Fighting Services
RNAV	Area navigation
RNP	Require Navigation Performance
RPAS	Remotely Piloted Aircraft System
RSR	En-route surveillance radar
RSS	Root sum square
RVR	Runway Visual Range
RVSM	Reduced Vertical Separation Minimum
RWY	Runway

S

SA	Surface Area
SADIS	Satellite Distribution System

SAR	Aeronautical search and rescue
SARPs	Standards and Recommended Practices
SBAS	Satellite-based augmentation system
SCT	System computation tolerance
SD	Standard deviation
SDF	Stepdown fix
SI	System Information
SID	Standard Instrument Departure
SIGMET	Significant Meteorological Information
SIGWX	Significant weather
SIS	Signal in space
SKC	Sky Clear
SMC	Surface Movement Control
SMGCS	Surface Movement Guidance and Control System
SMR	Surface Movement Radar
SMS	Safety management system
SOA	Service-oriented architecture
SOC	Start of climb
SOP	Standard Operating Procedure
SPECI	Aerodrome Special Meteorological Report
SPI	Special position indicator
SQM	Signals Quality Monitor
SRD	Safety Regulation Department
SRR	Aeronautical search and rescue Region
SSL	Secure sockets layer
SSR	Secondary Surveillance Radar
SST	Supersonic transport
ST	System computation tolerance
STAR	Standard Instrument Arrival
SWIM	System wide information management

T

TA	Traffic advisory
TAA	Terminal arrival altitude
TACAN UHF	Tactical air navigation aid
TAF	Terminal aerodrome forecast
TA/H	Turn at an altitude/height
TAR	Terminal area surveillance radar
TAS	True airspeed
TCAC	Tropical cyclone advisory centre
TCAS	Traffic alert and collision avoidance system
TCH	Threshold crossing height
TF	Track to a fix
TGM	Technical Guidance Materials
THR	Threshold

TIBA	Traffic Information Broadcast by Aircraft
TMA	Terminal control area
TNA/H	Turn altitude/height
TP	Turning point
TSE	Total system error
TSO	Technical Standard Order
TTT	Template tracing technique
TURB	Turbulence
TWR	Aerodrome Control Tower or Aerodrome Control
TWY	Taxiway

U

UAS	Unmanned aircraft system
UIR	Upper Flight Information Region
UTC	Universal Co-coordinated Time
UTM	UAS traffic management

V

VA	Heading to an altitude
VAACS	Volcanic Ash Advisory Centers – Satellite
VAL	Vertical alarm limit
VASIS	Visual approach slope indicator system
VDF	Very high frequency direction-finding station
VEB	Vertical error budget
VFR	Visual Flight Rules
VHF	Very high frequency
VI	Heading to an intercept
VM	Heading to a manual termination
VMC	Visual Meteorological Conditions
Vmini	Minimum instrument meteorological conditions indicated airspeed
VOR	Very High Frequency Omni directional Ranging
VPA	Vertical path angle
VPL	Vertical protection level
VS	Visual segment
VSDA	Visual segment descent angle
VSDG	Visual segment design gradient
VSS	Visual segment surface
VTF	Vector to final

W

WAFC	World Area Forecast Centre
WAFS	World Area Forecast System
WD	Waypoint distance
WGS	World geodetic system
WGS-84	World Geodetic System – 1984
WMO	World Meteorological Organisation

W3C	World Wide Web Consortium
X	
XML	Extensible Markup Language
XTT	Cross-track tolerance

14.0.3 APPROVAL OF AIR NAVIGATION SERVICE PROVIDER

(a) No person or corporate entity shall commence the provision of air navigation services without the approval of the Authority. Approval as an ANSP shall be made in the form specified in IS14.1.1(b)(1)(iv).

14.0.4 AIR NAVIGATION SERVICE PROVIDER (ANSP) CERTIFICATION

14.0.4.1 APPLICABILITY

This subpart is applicable to the provision of air navigation services as stated in Section 14.0.1.

a) **REQUIREMENT FOR CERTIFICATION / APPROVAL AS AIR NAVIGATION SERVICE PROVIDER**

1) No person or organisation, shall provide ANS in Nigerian airspace and aerodromes unless such person or organisation belongs to any of the undermentioned categories and holds a Certificate /Approval issued by the Authority in accordance with this section:

i) The organization is established as a designated ANS provider; or

ii) The person or organisation has a co-operation arrangement with a designated ANSP; or

iii) There is a commercial agreement with a designated ANSP.

2) An application for Certificate as an ANSP shall be made in the form specified in IS14.0.4.2

b) Application for Amendment or Renewal of ANSP Certificate / Approval

1) An applicant is eligible to become an ANSP if the applicant is able to comply with the requirements of these Regulations.

2) An application for the issuance of an ANSP Certificate / Approval or an amendment thereof shall be made in the manner prescribed by the Authority

and shall include:

i) a copy of the applicant's Manual of Operations;

ii) a written statement setting out the ANS that the applicant proposes to provide;

3) Enough information to identify, for each ANS:

(i) the location from which the service is proposed to be provided;

(ii) if the service is to be provided within a particular airspace allocated to the applicant by the Authority;

(iii) if the service is to be provided for an aerodrome allocated to the applicant by the Authority;

4) A written statement setting out the hours during which each ANS is proposed to be available;

i) a written statement describing the arrangements the applicant has made to comply with the requirements of these Regulations;

ii) the appropriate fee prescribed by the Authority.

(a) the holder of a Certificate / Approval shall ensure that the process for renewal is commenced at least 60 days prior to the date on which such Certificate / Approval expires.

(b) If an ANSP Certificate / Approval is subject to conditions, the provider shall comply with the conditions so specified.

c) Issuance of ANSP Certificate / Approval

1. The Authority shall issue an ANSP a Certificate / Approval to provide ANS, if the applicant complies with the requirements prescribed in these Regulations.

2) The Authority shall issue the Certificate / Approval in the appropriate form.

3) The Certificate / Approval shall authorize the provision of:

i. a single air navigation service by means of a ANS unit; or

ii. a combination of ANS by means of a network of air traffic service units.

4) A Certificate / Approval issued under this Part shall include the following information:

i. the provider's name and address of its principal place of business;

ii. a list of the air navigation services covered by the provider's Certificate / Approval; and

iii. for each air navigation service:

A. the location from which the service will be provided;

B. if the service is to be provided within a particular airspace allocated to the provider by the;

C. if the service is to be provided for an aerodrome allocated to the provider by the Authority

d) Scope and Variation of Certificate / Approval

1) The holder of a Certificate / Approval shall be entitled to provide any service or combination of services listed in its Manual of Operations.

2) If an ANS provider wants to vary its Certificate / Approval, it shall apply to the Authority under this Regulation for that purpose:

i. the application shall contain, or have with it, a copy of the proposed variation;

ii. if the Authority approves the variation, the variation shall take effect from the day proposed by the applicant;

iii. where no date is proposed by the applicant, the effective date of the variation shall be the date the Certificate / Approval notice is given to the provider.

e) Period of Validity of Approval

1) A Certificate / Approval shall be valid for a period determined by the Authority, which period shall not exceed five (5) years from the date of issuance or renewal thereof.

2) The Certificate / Approval shall remain in force until it is expired, suspended, or cancelled by the Authority.

3) The holder of a Certificate / Approval which expires shall forthwith surrender the Certificate / Approval to the Authority.

4) The holder of a Certificate / Approval, which is suspended, shall forthwith produce the Certificate / Approval to the Authority for appropriate

endorsement.

5) The holder of a Certificate / Approval, which is cancelled, shall, within seven (7) days from the date on which the Certificate / Approval is cancelled, surrender such Certificate / Approval to the Authority.

f) Transferability of an ANSP Certificate / Approval

1) An ANSP Certificate / Approval shall not be transferable.

2) A change in ownership of the holder of a Certificate / Approval shall be deemed to be a change of significance that shall be notified to the Authority.

g) Suspension Cancellation or Variation of ANSP Certificate / Approval

1) An ANSP Certificate / Approval may be suspended, cancelled or varied in the event of violation of any provision of these Regulations.

h) Notice of Recommendation for Suspension of a Certificate / Approval

1) The Authority may, by written notice given to an ANSP, suspend, cancel or vary the ANSP Certificate / Approval if there are reasonable grounds for believing that the Certificate / Approval holder:

i. has breached a condition of the Certificate / Approval; or

ii. has contravened a provision of this Part; or

iii. does not meet, or continue to meet, a requirement of this Part for getting or holding the Certificate / Approval; or

iv. has otherwise been guilty of conduct that renders the ANSP's continued holding of the Certificate / Approval likely to have an adverse effect on the safety of air navigation.

2. Before suspending, cancelling or varying an ANSP Certificate / Approval, the Authority:

i. shall give written notice to the Certificate / Approval holder of the facts or circumstances that, in the opinion of the Authority, amount to grounds for the suspension, cancellation or variation of the Certificate / Approval;

ii. shall invite the Certificate / Approval holder to show cause in writing, within 7 days after the date of the notice, why the Certificate / Approval should not be suspended, cancelled or varied; and

iii. shall take into account any written representations made, within the time allowed under paragraph (b)(2), by or on behalf of the Air Traffic Service provider explaining why the Certificate / Approval should not be cancelled.

i) Right of Appeal of Holder of Certificate / Approval

1. The holder of a Certificate/Approval who feels aggrieved by the suspension of the Certificate/Approval may appeal against such suspension to the Authority, within 7 days after such holder becomes aware of such suspension.

2. Procedure for the appeal shall be as prescribed in the NigCARs

j) Register of Certificates / Approvals

(1) The Authority shall maintain a register of all ANS Certificates/Approvals issued under this Part.

(2) The register shall contain information recorded on the ANS Certificate/ Approval and any other information required by the Authority.

(3) Persons who intend to access the register of the ANS Certificates/ Approvals for the purpose of obtaining information shall apply in writing to the Authority and shall pay the appropriate fees as may be prescribed by the Authority.

k) Display of ANSP Certificate / Approval

(1) The holder of an ANSP Certificate/Approval shall display the Certificate/ Approval in a prominent place, generally accessible to the public at the holder's principal place of business and, if a copy of the original Certificate/ Approval is displayed, it shall produce the original to the Authority's officials, if so requested.

l) Security Programme.

(1) The applicant / holder of an ANSP Certificate shall provide a plan that details what measures, both physical and procedural, that they have in place to protect the facility and the services provided from that facility. This should include a security assessment of the facilities used by the applicant. This process and procedure shall be done in accordance with the provisions of Part 17 of the Regulations

14.0.5 Responsibility of Holder of ANSP Certificate / Approval

14.0.5.1 (a) Eligibility Statement by ATS Provider for Grant of Qualification

A statement of an ATS Provider, given in accordance with procedures set out in its operations manual, that a person meets the requirements in part 2 of Nig. CARs is, in the absence of contrary evidence, sufficient evidence of that fact.

(b) Authority to use ground- based Radio Equipment.

(1) A person authorized to provide an air traffic control service shall operate, for the purpose of performing an air traffic control function, a radio-communication system used for the purpose of ensuring the safety of air navigation but not installed in or carried on an aircraft.

This paragraph in 14.0.5.1 (b)(1) above applies to the following:

i. a person who is authorized to carry out an air traffic control function in Nigeria; or

ii. a person who is engaged by an ATS provider (whether or not as an employee), and who is acting in the course of his or her duties.

(c) Agreement between an ATS provider and an agency providing Aeronautical Meteorological services.

(1) An application for the provision of Air Traffic Services shall include the agreement between the applicant and an Aeronautical Meteorological Service Provider for the provision of Aeronautical Meteorology services. The agreement shall specify the criteria for special observations and reports and the duplication of meteorological indicators concurrently in the meteorological office and the Control Tower. The agreement shall also include that the calibration of meteorological equipment used by the Air Traffic Services Provider will be in accordance with these regulations.

(d) Application of Human Factor principles.

(1) The applicant shall demonstrate that human factors principles are considered when assessing the appropriateness of equipment, systems, software, facilities, procedures, jobs, environments, training, staffing, and personnel management to produce safe, comfortable, and effective human performance.

(e) Preparation of the Manual of Operations

1. The air navigation service provider ANSP shall have manuals to be known as the Manual of Operations in respect of the service provided.

2. ANSP shall also have a Standard Operating Procedures (SOP) and a Local Manual of Instructions.

3. The Manual of Operations shall:

i. be typewritten or printed, and signed by the service provider;

ii. be in a format that is easy to revise;

iii. have a system for recording the accuracy of pages or amendments thereto, including a page for logging revisions; and

iv. be organized in a manner that will facilitate the preparation, review and acceptance/approval process.

v. SOP/Local Manual of Instructions shall comply with the contents of the Manual of Operations.

4. The ANSP shall:

i. comply with all procedures detailed in its Manual of Operations, SOP and Local Manual of Instructions;

ii. continue to comply with the appropriate requirements prescribed in these Regulations.

5. Information to be included in The Manual Of Operations

(a) An ANSP Manual of Operations shall include information to comply with the following requirements as contained in this Part, as applicable:

i. Section 14.1 for provision of Air Traffic Service (ATS);

ii. Section 14.2 for provision of Procedure Design Service (PANS-OPS);

iii. Section 14.3 for provision of Aeronautical Information Services (AIS);

iv. Section 14.4 for provision of Aeronautical Chart Service (CHARTS);

v. Section 14.5 for provision of Aeronautical Telecommunication Service (AEROTEL);

vi. Section 14.6 for provision of Aeronautical Meteorological Service (MET); and

vii. Section 14.7 for provision of Aeronautical Search And Rescue Service (SAR).

6. LOCATION OF THE MANUAL OF OPERATIONS

(a) The ANSP shall provide the Authority with a complete and current copy of the Manual of Operations and Local Manual(s) of Instructions.

i. The service provider shall keep a complete and current copy the Manual of Operations and local manual of instructions at the unit/station where the service is provided and one copy of the Manual of Operations at the service provider's principal place of business and at least one complete and current copies of the Manual of Operations, SOP and Local Manual of Instructions at the unit/station where the service is provided, if the location of the unit/station is different than the principal place of business.

ii. The service provider shall make a copy of the Manual of Operations, Standard Operations Procedures (SOP) and Local Manual of Instructions available for inspection by authorized officers of the Authority.

7. Amendment of the ANSP Manual of Operations, SOP and Local Manual of Instructions

(i) The ANSP shall alter or amend the Manual of Operations, SOP and Local Manual of Instructions whenever necessary, in order to maintain the accuracy of the information in the Manuals in accordance with the Regulation.

(ii) The ANSP shall submit in writing a proposed amendment to any of its Manuals to the Authority at least 30 days before the proposed effective date of the amendment or alteration, unless a shorter filing period is allowed by the Authority.

iii In the case of amendments initiated by the Authority, the Authority shall notify the service provider of the proposed amendment, in writing, fixing a reasonable period within which the operator may submit written information, views, and arguments on the amendment. After considering all relevant materials presented, the Authority shall notify the operator within 30 days of any amendment adopted, or rescind the notice. The amendment becomes effective not less than 30 days after the ANSP receives notice of it.

iv Notwithstanding the provisions of paragraph 14.0.5.1.(e)(7)(3) of this section, if the Authority finds there is an emergency requiring immediate action with respect to the safety of air transportation, the Authority shall issue amendment, effective without stay on the date the operator receive notice of it. In such a case, the Authority shall incorporate the findings of the emergency and a brief statement of the reason for the findings in the notice of the amendment.

8. Approval of the manual of operations, sop and local manual of instructions

The Authority shall approve the Manual of Operations, SOP and Local Manual of Instructions and any amendments thereto, provided they meet the requirement of this Part.

9. The Manuals Controller

The service provider shall appoint persons to be the Controller(s) of the Manual of Operations, SOP and Local Manual(s) of Instructions, whose functions shall include:

i keeping a record of persons who hold copies of the whole or part of the Manuals;

ii updating of information in the Manuals given to those holders referred to in (1).

14.0.6 Territorial application of the rules of the air

14.0.6.1 The rules of the air shall apply to aircraft bearing the nationality and registration marks of a Contracting, wherever they may be, to the extent that they do not conflict with the rules published by the State having jurisdiction over the territory overflown.

Note. — The Council of the International Civil Aviation Organization resolved, in adopting Annex 2 in April 1948 and Amendment 1 to the said Annex in November 1951, that the Annex constitutes Rules relating to the flight and manoeuvres of aircraft within the meaning of Article 12 of the Convention. Over the high seas, therefore, these rules apply without exception.

14.0.6.2 If, and so long as, a Contracting State has not notified the International Civil Aviation Organization to the contrary, it shall be deemed, as regards aircraft of its registration, to have agreed as follows:

For purposes of flight over those parts of the high seas where a Contracting State has accepted, pursuant to a regional air navigation agreement, the responsibility of providing air traffic services, the “appropriate ATS authority” referred to in this Annex is the relevant authority designated by the State responsible for providing those services.

Note. — The phrase "regional air navigation agreement" refers to an agreement approved by the Council of ICAO normally on the advice of a Regional Air Navigation Meeting.

14.0.6.3 Compliance with the rules of the air.

The operation of an aircraft either in flight or on the movement area of an aerodrome shall be in compliance with the general rules and, in addition, when in flight, either with:

a) the visual flight rules; or

b) the instrument flight rules.

Note 1.— Information relevant to the services provided to aircraft operating in accordance with both visual flight rules and instrument flight rules in the seven ATS airspace classes is contained in 2.6.1 and 2.6.3 of Annex 11.

Note 2. — A pilot may elect to fly in accordance with instrument flight rules in visual meteorological conditions or may be required to do so by the appropriate ATS authority.

14.0.6.4 Responsibility for compliance with the rules of the air

(a) Responsibility of pilot-in-command

The pilot-in-command of an aircraft shall, whether manipulating the controls or not, be responsible for the operation of the aircraft in accordance with the rules of the air, except that the pilot-in-command may depart from these rules in circumstances that render such departure absolutely necessary in the interests of safety.

(b) Pre-flight actions

Before beginning a flight, the pilot-in-command of an aircraft shall become familiar with all available information appropriate to the intended operation. Pre-flight action for flights away from the vicinity of an aerodrome, and for all IFR flights, shall include a careful study of available current weather reports and forecasts, taking into consideration fuel requirements and an alternative course of action if the flight cannot be completed as planned.

(c) Authority of pilot-in-command of an aircraft.

The pilot-in-command of an aircraft shall have final authority as to the disposition of the aircraft while in command.

14.0.6.5 Problematic use of psychoactive substances.

No person whose function is critical to the safety of aviation (safety-sensitive personnel) shall undertake that function while under the influence of any psychoactive substance, by reason of which human performance is impaired. No such person shall engage in any kind of problematic use of substances.

14.0.7. Adherence to current flight plan

14.0.7.1 Except as provided for in 14.0.6.8, an aircraft shall adhere to the current flight plan or the applicable portion of a current flight plan for a controlled flight within the tolerances defined in paragraphs 14.0.6.2 to 14.0.6.5 unless a request for a change has been made and clearance obtained from the appropriate air traffic control unit, or unless an emergency situation arises which necessitates immediate action by the aircraft, in which event as soon as circumstances permit, after such emergency authority is exercised, the appropriate air traffic services unit shall be notified of the action taken and that this action has been taken under emergency authority.

14.0.7.2 Unless otherwise authorized by the appropriate ATS authority, or directed by the appropriate air traffic control unit, controlled flights shall, in so far as practicable:

a) when on an established ATS route, operate along the defined center line of that route; or

b) when on any other route, operate directly between the navigation facilities and/or points defining that route.

14.0.7.3 Subject to the overriding requirement in 14.0.6.5a, an aircraft operating along an ATS route segment defined by reference to very high frequency omnidirectional radio ranges shall change over for its primary navigation guidance from the facility behind the aircraft to that ahead of it at, or as close as operationally feasible to, the changeover point, where established.

14.0.7.4 Deviation from the requirements in 14.0.6.5a shall be notified to the appropriate air traffic services unit.

14.0.7.5 Deviations from the current flight plan: - In the event that a controlled flight deviates from its current flight plan, the following action shall be taken:

a) Deviation from track: if the aircraft is off track, action shall be taken forthwith to adjust the heading of the aircraft to regain track as soon as practicable.

b) Deviation from ATC assigned Mach number/indicated airspeed: the appropriate air traffic services unit shall be informed immediately.

c) Deviation from Mach number/true airspeed: if the sustained Mach number/true airspeed at cruising level varies by plus or minus Mach 0.02 or more, or plus or minus 19 km/h (10 kt) true airspeed or more from the current flight plan, the appropriate air traffic services unit shall be so informed.

d) Change in time estimate: except where ADS-C is activated and serviceable in airspace where ADS-C services are provided, if the time estimate for the next applicable reporting point, flight information region boundary or destination aerodrome, whichever comes first, changes in excess of 2 minutes from that previously notified to air traffic services, or such other period of time as is prescribed by the appropriate ATS authority or on the basis of regional air navigation agreements, the flight crew shall notify the appropriate air traffic services unit as soon as possible.

14.0.7.6 When ADS-C services are provided and ADS-C is activated, the air traffic services unit shall be informed automatically via data link whenever changes occur beyond the threshold values stipulated by the ADS event contract.

14.0.7.7 Change Requests: - Requests for current flight plan changes shall include information as indicated hereunder:

a) Change of cruising level: aircraft identification; requested new cruising level and cruising Mach number/true airspeed at this level; revised time estimates (when applicable) at subsequent reporting points or flight information region boundaries.

b) Change of Mach number/true airspeed: aircraft identification; requested Mach number/true airspeed.

c) Change of route:

1) Destination unchanged: aircraft identification; flight rules; description of new route of flight including related flight plan data beginning with the position from which requested change of route is to commence; revised time estimates; any other pertinent information. 1

2) Destination changed: aircraft identification; flight rules; description of revised route of flight to revised destination aerodrome including related flight plan data, beginning with the position from which requested change of route is to commence; revised time estimates; alternate aerodrome(s); any other pertinent information.

14.0.7.8 Weather deterioration below the VMC: -. When it becomes evident that flight in VMC in accordance with its current flight plan will not be practicable, a VFR flight operated as a controlled flight shall:

a) request an amended clearance enabling the aircraft to continue in VMC to destination or to an alternative aerodrome, or to leave the airspace within which an ATC clearance is required; or

b) if no clearance in accordance with a) can be obtained, continue to operate in VMC and notify the appropriate ATC unit of the action being taken either to leave the airspace concerned or to land at the nearest suitable aerodrome; or

c) if operated within a control zone, request authorization to operate as a special VFR flight; or

d) request clearance to operate in accordance with the instrument flight rule

PART 14: AIR NAVIGATION SERVICES

SUB-PART: 14.1 AIR TRAFFIC MANAGEMENT

PROVISION OF AIR TRAFFIC SERVICE

14.1 Establishment of Authority

14.1.1 a) The ANSP shall arrange for ATS to be provided in accordance with the provisions of this regulation. These services shall be provided in accordance with the airspace classification established by the Authority and at the aerodromes designated as controlled aerodromes.

1) If applicable, the ANSP shall provide ATS over the high seas or the airspace of undetermined sovereignty in accordance with the provisions of this regulation.

2) The ANSP will be designated by the Authority for providing such services.

b) Requirement for Approval as ATS Providers.

1) No person or organization, shall provide air traffic services in Nigerian airspace and aerodromes unless such person or organization belongs to any of the under mentioned categories and holds a certificate issued by the Authority in accordance with this section:

(i) the organization is established as a designated ATS provider; or

(ii) the person or organization has a co-operation arrangement with a designated ATS provider; or

(iii) there is a commercial agreement with a designated ATS provider.

(iv) An application for approval as an ATS provider shall be made in the form specified in IS 14.1.1(b)(1)(iv).

c) Responsibility of Holder of Certificate for ATS.

1) The holder of an Air Traffic Services provider certificate shall:

(i) provide the services listed in its Manual of Operations, in accordance with the procedures as prescribed in these Regulations;

(ii) the service provider's Manual of Operations shall include the following information in its manual of operations:

(A) personnel requirements and the responsibilities of personnel.

(B) training and checking of staff and how that information is tracked;

(C) Quality Assurance/Safety Management System;

(D) Contingency plans developed for part or total system failure for which the organization provides the service;

(E) Security plan;

(F) Facilities and equipment and how those facilities are maintained;

(G) Fault and Defect reporting;

(H) Maintenance of documents and records;

(I) Aeronautical search and rescue responsibilities and co-ordination;

(J) procedures for aerodrome surface movement guidance and control;

(K) any other information requested by the Authority.

(iii) an approval to operate as a Service Provider shall include in its manual of operations, any letters of agreement that the service provider has entered into;

(iv) hold at least one complete and current copy of its Manual of Operations at each air traffic service unit specified in its Manual of Operations;

(v) comply with all procedures detailed in its Manual of Operations;

(vi) make each applicable part of the Manual of Operations available to the personnel who require those parts to carry out their duties;

(vii) continue to comply with the appropriate requirements prescribed in these Regulations;

(viii) keep the records of all regular internal inspections for a period of five years from the date of each inspection;

(ix) furnish the Authority with the en route facility financial data and enroute facility traffic statistics;

(x) replace or upgrade any obsolete installation;

(xi) keep the Authority informed of its plans for the development and modernization of its facilities.

d) Display of Air Traffic Services Provider Certificate.

The holder of an air traffic service provider certificate shall display the certificate in a prominent place, generally accessible to the public at such holder's principal place of business and, if a copy of the original certificate is displayed, it shall produce the original to the Authority's officials, if so requested.

e) Safety Inspections and Audits.

1) An applicant for the issuance of an Air Traffic Service Provider certificate shall permit an air traffic service inspector to carry out such safety inspections and audits as may be necessary to verify the validity of any application made in accordance with these Regulations.

2) The holder of an Air Traffic Service certificate shall permit an Air Traffic Service Inspector to carry out such safety inspections and audits as may be necessary to determine compliance with the appropriate requirements prescribed in this Part.

f) Application for Approval, Amendment or Renewal.

1) An applicant is eligible to become an ATS provider if he is able to comply with the requirements of these Regulations.

2) An application for the issuance of an ATS Provider certificate or an amendment thereof shall be made in the manner prescribed by the Authority and shall include:

i. a copy of the applicant's Manual of Operations;

ii. a written statement setting out air traffic services that the applicant proposes to provide;

iii. enough information to identify, for each air traffic service:

A. the location from which the service is proposed to be provided;

B. if the service is to be provided within a particular airspace allocated to the applicant by the airspace authority—the airspace;

C. if the service is to be provided for an aerodrome allocated to the applicant by the airspace authority—the aerodrome;

3) a written statement setting out the hours during which each aeronautical information service is proposed to be available;

4) a written statement describing the arrangements the applicant has made to comply with the requirements of these Regulations;

5) the appropriate fee prescribed by the Authority.

g) In the case of certificate renewal, the holder of a certificate shall ensure that the process for renewal is commenced at least 60 days prior to the date on which such certificate expires.

h) If an ATS provider's certificate is subject to conditions, the provider shall comply with the conditions so specified.

i) Issuance of ATS Certificate.

1) The Authority shall issue an ATS provider a certificate to provide air traffic services, if the applicant complies with the requirements prescribed in these Regulations.

2) The Authority shall issue the certificate in the appropriate form.

3) The certificate shall authorize the provision of:

i. a single air traffic service by means of a single air traffic service unit; or

ii. a combination of air traffic services by means of a network of air traffic service units.

4) A certificate issued under this Part shall include the following information:

i. the provider's name and address of its principal place of business;

ii. a list of the air traffic services covered by the provider's certificate; and

iii. for each air traffic service:

A. the location from which the service will be provided;

B. if the service is to be provided within a particular airspace allocated to the provider by the airspace authority — the airspace;

C. if the service is to be provided for an aerodrome allocated to the provider by the airspace authority — the aerodrome.

j) Scope and Variation of Certificate.

1) The holder of a certificate shall be entitled to provide any service or combination of services listed in its Manual of Operations.

2) If an ATS provider wants to vary its certificate, it shall apply to the Authority under this Regulation for that purpose:

i. the application shall contain, or have with it, a copy of the proposed variation;

ii. if the Authority approves the variation, the variation shall take effect from the day proposed by the applicant;

iii. where no date is proposed by the applicant, the effective date of the variation shall be the date the certificate notice is given to the provider.

k) Period of Validity of Certificate.

1) A certificate shall be valid for a period determined by the Authority, which period shall not exceed five years from the date of issuance or renewal thereof.

2) The certificate shall remain in force until it is expired, suspended, or cancelled by the Authority.

3) The holder of a certificate which expires shall forthwith surrender the certificate to the Authority.

4) The holder of a certificate, which is suspended, shall forthwith produce the certificate to the Authority for appropriate endorsement.

5) The holder of a certificate, which is cancelled, shall, within 7 days from the date on which the certificate is cancelled, surrender such certificate to the Authority.

l) Transferability of Certificate.

1) An ATS provider certificate shall not be transferable.

2) A change in ownership of the holder of a certificate shall be deemed to be a change of significance that shall be notified to the Authority.

m) Suspension of Certificate.

1) An Air Traffic Service Provider Certificate may be suspended in the event of violation of any provision of these Regulations.

n) Suspension, Cancellation or Variation of an Air Traffic Service Provider Certificate by the Authority.

1) The Authority may, by written notice given to an Air Traffic Service Provider, suspend, cancel or vary the air traffic service provider certificate if there are reasonable grounds for believing that the certificate holder:

i. has breached a condition of the certificate; or

ii. has contravened a provision of this Part; or

iii. does not meet, or continue to meet, a requirement of this Part for getting or holding the certificate; or

iv. has otherwise been guilty of conduct that renders the Air Traffic Service Provider's continued holding of the certificate likely to have an adverse effect on the safety of air navigation.

o) Before suspending, cancelling or varying an Air Traffic Service Provider certificate, the Authority:

1) shall give written notice to the certificate holder of the facts or circumstances that, in the opinion of the Authority, amount to grounds for the suspension, cancellation or variation of the certificate;

2) shall invite the certificate holder to show cause in writing, within 7 days after the date of the notice, why the certificate should not be suspended, cancelled or varied; and

3) shall take into account any written representations made, within the time allowed under paragraph (b), by or on behalf of the air traffic service provider explaining why the certificate should not be cancelled.

p) Right of Appeal of Holder of Certificate.

1) The holder of a certificate who feels aggrieved by the suspension of the certificate may appeal against such suspension to the Authority, within 7 days after such holder becomes aware of such suspension.

2) Procedure for the appeal shall be as prescribed in Part 1.10 of the

q) Register of Certificates.

1) The Authority shall maintain a register of all Air Traffic Service certificates issued under this Part.

2) The register shall contain information recorded on the Air Traffic Service certificate and any other information required by the Authority.

3) Persons who intend to access the register of aircraft for the purpose of obtaining information shall apply in writing to the Authority and shall pay the appropriate search fees as may be prescribed by the Authority.

r) Substitution of Air Traffic Services Provider.

1) The Authority may, when it considers it necessary in the interest of aviation safety, appoint the holder of an Air Traffic Service certificate as a substitute air traffic service provider to provide an air traffic service in respect of a certificate which has been suspended by the Authority under this Part, for the duration of such suspension.

Note: Where air traffic services are established, information shall be published in the NOTAM, AIP, AIP SUPPLEMENT and AIP AMENDMENTS and AIC as necessary to permit the utilization of such services.

s) Control Tower.

1) If the provider uses a control tower in providing an air traffic service, the provider shall ensure the control tower is designed, sited, constructed and maintained in accordance with the standards set out for its construction as detailed in IS 14.1.1(s)(1)

2) no person shall provide air traffic control service from any position except an approved control tower or an approved ATS office or unit.

t) Facilities, Equipment, Maintenance and Calibration.

1) An ATS provider shall, at all times, make available for the use by its personnel, the equipment and facilities necessary for providing air traffic services covered by its certificate.

2) The ATS provider shall include in the Operations Manual a list of facilities from which ATS will be provided as contained in IS 14.1.1(t)(2).

3) The equipment shall meet with the requirements and calibration standards specified in these Regulations.

4) All persons involved with the provision of maintenance shall be fully conversant with standards and practices, instructions, directives and relevant information as contained in these regulations.

5) The ATS provider shall describe the processes for the installation, commissioning and transition into service phases of new facilities, equipment and services, and provide evidence, for acceptance of the operational performance and the safety of the facility, equipment, procedure or service.

u) Fault and Defect Reporting.

1) The applicant shall develop and maintain a system for tracking and rectifying faults within the ATS system.

2) Procedures for the reporting and the resolution of faults and defects shall be documented in the Manual of Operations.

3) The ATS provider shall maintain a record of the number of reported equipment faults on a monthly basis.

v) Maintenance of Documents.

1) The applicant for a service provider certificate shall provide the operational documentation listed in IS 14.1.1 (x) in a location at an air traffic service unit.

2) The ATS provider shall ensure that:

i. the documentation is reviewed and authorized by appropriate personnel before issue;

ii. current issues of relevant documentation are available to personnel;

iii. obsolete documentation is removed from all points of issue or use;

iv. changes to documentation are reviewed and approved by appropriate personnel; and

v. the current version of each document can be identified to preclude the use of obsolete editions.

3) The ATS provider shall demonstrate that there is a system in place to record and retain operational data.

w) Maintenance of Records.

1) The ATS provider shall establish systems and procedures to identify, collect, store, secure, maintain, access, and dispose of, records necessary for –

i. The operational provision of air traffic services;

ii. The purpose of assisting with any accident or incident investigation;

iii. The ongoing SMS improvement process;

iv. Low visibility operations where applicable; and

v. Personnel records.

2) Where applicable, the records shall include electronic recordings of–

i. Telephone communications;

ii. Radio broadcasts and communications;

iii. Air - ground or ground – ground digital data exchanges;

iv. Radar data and information;

v. Automatic dependent surveillance data and information;

vi. Any other communication or surveillance system, and

vii. Any electronic means of providing situational awareness such as electronic flight strips.

3) The records shall also include-

i. Filed flight plans including standard and repetitive plans;

ii. Flight progress strips;

iii. Appropriate meteorological and aeronautical information, except where the information is retained for an equivalent period by Nigeria State Meteorological Agency or AIS Section;

iv. Staff duty rosters;

v. ATS logs and position logs;

vi. A record of each internal audit report, corrective and/or preventive actions taken and management review of such actions. The record shall detail the activities reviewed and any necessary follow- up corrective and preventive actions; and

vii. Unit occurrence investigation records, which shall be retained for a period of not less than 5 years.

4) The ATS provider shall establish systems and procedures to ensure that electronic records required are available when needed.

i. Include time recording, correct to 5 seconds of UTC, as determined by reference to a standard time station or GPS time standard; and

ii. Replicate the voice communications, and, if applicable, the surveillance picture, applying at the particular operating position.

5) The ATS provider shall establish systems and procedures to ensure that all records, except where replication is required are of sufficient clarity to convey the required information.

6) The ATS provider shall establish procedures to ensure that the records referred to in Subpart 14.1.1(y)(2) and 14.1.1(y)(3) are retained for 30 days from the date of entry, except for –

i. ATS logs, which shall be retained for 3 years, and

ii. Unit occurrence investigation records, which shall be retained for a period of not less than 5 years.

7) Records shall be made available to the Authority when requested.

8) Records shall be maintained on the following:

(i) regular reports and returns to the Authority as specified in these regulations;

(ii) local incidents with remedial actions;

(iii) personnel files including supervisory reports;

(iv) training files;

(v) license and medical validity details;

(vi) minutes of staff, aerodrome maintenance, bird control, emergency planning and other committee meetings;

(vii) rosters and roster keys; and

(vii) leave records.

14.1.2 Determination of the need for air traffic services

a) The need for the provision of air traffic services shall be determined by consideration of the following:

1) the types of air traffic involved;

2) the density of air traffic;

3) the meteorological conditions;

4) such other factors as may be relevant.

b) The carriage of airborne collision avoidance systems (ACAS) by aircraft in a given area shall not be a factor in determining the need for air traffic services in that area.

14.1.3 Designation of the portions of the airspace and controlled aerodromes where air traffic services will be provided

a) When it has been determined that air traffic services will be provided in particular portions of the airspace or at particular aerodromes, then those portions of the airspace or those aerodromes shall be designated in relation to the air traffic services that are to be provided. The Authority will carry out its oversight responsibilities in conjunction with AFI Regional Planning and Implementation Group (APIRG).

b) The designation of the particular portions of the airspace or the particular aerodromes shall be as follows:

14.1.3.1 Flight information regions: - Those portions of the airspace where it is determined that flight information service and alerting service will be provided shall be designated as flight information regions.

14.1.3.2 Control areas and control zones

(a) Those portions of the airspace where it is determined that air traffic control service will be provided to IFR flights shall be designated as control areas or control zones.

(b) Those portions of controlled airspace wherein it is determined that air traffic control service will also be provided to VFR flights shall be designated as Classes B, C, or D airspace.

(c) Where designated within a flight information region, control areas and control zones shall form part of that flight information region.

14.1.3.3 Controlled aerodromes. Those aerodromes where it is determined that air traffic control service will be provided to aerodrome traffic shall be designated as controlled aerodromes.

14.1.4 Airspace Classification:

a) The Authority will classify ATS airspaces using ICAO classification system for the purpose of providing air traffic services; and will publish the classification of airspace in accordance with the AIRAC cycle in the AIP, AIP SUP or NOTAM.

b) When applicable, the Authority will prescribe RNP types for designated areas of the airspace.

c) The Authority will upgrade a particular airspace of a lower cadre to a higher classification, when the need arises.

d) ATS airspaces shall be classified and designated in accordance with the following:

1) Class A. IFR flights only are permitted, all flights are provided with air traffic control service and are separated from each other.

2) Class B. IFR and VFR flights are permitted, all flights are provided with air traffic control service and are separated from each other.

3) Class C. IFR and VFR flights are permitted, all flights are provided with air traffic control service and IFR flights are separated from other IFR flights and from VFR flights. VFR flights are separated from IFR flights and receive traffic information in respect of other VFR flights.

4) Class D. IFR and VFR flights are permitted and all flights are provided with air traffic control service, IFR flights are separated from other IFR flights and receive traffic information in respect of VFR flights, VFR flights receive traffic information in respect of all other flights.

5) Class E. IFR and VFR flights are permitted, IFR flights are provided with air traffic control service and are separated from other IFR flights. All flights receive traffic information as far as is practical. Class E shall not be used for control zones.

6) Class F. IFR and VFR flights are permitted, all participating IFR flights receive an air traffic advisory service and all flights receive flight information service if requested.

Note. — Where air traffic advisory service is implemented, this is considered normally as a temporary measure only until such time as it can be replaced by air traffic control. (See also PANS-ATM, Chapter 9.)

7) Class G. IFR and VFR flights are permitted and receive flight information service if requested.

8) Class G. IFR and VFR flights are permitted and receive flight information service if requested.

Note:- The Authority will select those airspace classes appropriate to its needs.

Note:- The requirements for flights within each class of airspace shall be as shown in the table in Appendix 4.

Note. — Where the ATS airspaces adjoin vertically, i.e. one above the other, flights at a common level would comply with requirements of, and be given services applicable to, the less restrictive class of airspace. In applying these criteria, Class B airspace is therefore considered less restrictive than Class A airspace; Class C airspace less restrictive than Class B airspace, etc.

e) In Nigeria, from the base of airways to FL 145 is classified as “D”, except that a section that passes through the TMA/CTR will take the classification of that TMA/CTR.

- Above FL145 all airways are classified as “A”
- Class F Airspace is not applicable in Nigeria
- Class G Airspace in Nigeria exists only outside the controlled areas and air routes having a vertical limit of 1500ft and below.

f) The requirements for flights within each class of airspace shall be as shown in the table in Appendix 4 of ATM Regulation

Note. — Where the ATS airspaces adjoin vertically, i.e., one above the other, flights at a common level would comply with requirements of, and be given services applicable to, the less restrictive class of airspace. In applying these criteria, Class B airspace is therefore considered less restrictive than Class A airspace; Class C airspace less restrictive than Class B airspace, etc.

14.1.5 Performance-based navigation (PBN) operations

a) In applying performance-based navigation, Navigation specifications will be prescribed by Authority. When applicable, the navigation specification(s) for designated areas, tracks or ATS routes will be prescribed on the basis of regional air navigation agreements. In designating a navigation specification, limitations may apply as a result of navigation infrastructure constraints or specific navigation functionality requirements.

b) The prescribed navigation specification shall be appropriate to the level of communications, navigation and air traffic services provided in the airspace concerned.

Note.— Applicable guidance on performance-based navigation and implementation is published in the Performancebased Navigation (PBN) Manual (Doc 9613).

14.1.6 Performance-based communication (PBC) operations

a) In applying performance-based communication (PBC), RCP specifications will be prescribed by Authority. When applicable, the RCP specification(s) will be prescribed on the basis of regional air navigation agreements.

Note. — In prescribing an RCP specification, limitations may apply as a result of communication infrastructure constraints or specific communication functionality requirements.

b) The prescribed RCP specification shall be appropriate to the air traffic services provided.

Note. — Information on the performance-based communication and surveillance (PBCS) concept and guidance material on its implementation are contained in the Performance-based Communication and Surveillance (PBCS) Manual (Doc 9869).

14.1.7 Performance-based surveillance (PBS) operations

a) In applying performance-based surveillance (PBS), RSP specifications will be prescribed by Authority. When applicable, the RSP specification(s) will be prescribed on the basis of regional air navigation agreements.

Note. — In prescribing an RSP specification, limitations may apply as a result of surveillance infrastructure constraints or specific surveillance functionality requirements.

b) The prescribed RSP specification shall be appropriate to the air traffic services provided. 2.9.3 Where an RSP specification has been prescribed by States for performance-based surveillance, ATS units shall be provided with equipment capable of performance consistent with the prescribed RSP specification(s).

Note. — Information on the PBCS concept and guidance material on its implementation are contained in the Performance-based Communication and Surveillance (PBCS) Manual (Doc 9869).

14.1.8 Establishment and Identification of ATS Routes

a) Where ATS routes are established for protecting and channeling air traffic flow, a protected airspace along each ATS route and a safe spacing between adjacent ATS routes shall be provided;

b) ATS routes shall be identified by approved designators.

c) Designators for ATS routes other than standard departure and arrival routes shall be selected in accordance with the principles set forth in Appendix 1.

d) Standard departure and arrival routes and associated procedures shall be identified in accordance with the principles set forth in Appendix 3.

14.1.9 Establishment and identification of significant points

a) Significant points shall be established for the purpose of defining an ATS route or instrument approach procedure and/or in relation to the requirements of air traffic services for information regarding the progress of aircraft in flight.

b) Significant points shall be identified by designators.

c) Significant points shall be established and identified in accordance with the principles set forth in Appendix 2.

14.1.10 Coordination between operators and Air Traffic Services

a) Air traffic services units, in carrying out their objectives, shall have due regard for the requirements of the operator's consequent on their obligations as specified in Annex 6, and, if so, required by the operators, shall make available to them or their designated representatives such information as may be available to enable them or their designated representatives to carry out their responsibilities.

b) When so requested by an operator, messages (including position reports) received by air traffic services units and relating to the operation of the aircraft for which operational control service is provided by that operator shall, so far as practicable, be made available immediately to the operator or a designated representative in accordance with locally agreed procedures.

14.1.11 Coordination between military authorities and air traffic services

a) Air traffic services authorities shall establish and maintain close cooperation with military authorities responsible for activities that may affect flights of civil aircraft.

b) Coordination of activities potentially hazardous to civil aircraft shall be affected in accordance with 14.1.12

c) Arrangements shall be made to permit information relevant to the safe and expeditious conduct of flights of civil aircraft to be promptly exchanged between air traffic services units and appropriate military units.

d) Air traffic services units shall, either routinely or on request, in accordance with locally agreed procedures, provide appropriate military units with pertinent flight plan and other data concerning flights of civil aircraft. In order to eliminate or reduce the need for interceptions, air traffic services authorities shall designate any areas or routes where the requirements of Annex 2 concerning flight plans, two-way communications and position reporting apply to all flights to ensure that all pertinent data is available in appropriate air traffic services units specifically for the purpose of facilitating identification of civil aircraft.

Note. — Guidance on collaborative decision-making (CDM) processes for safety risk assessment and promulgation through NOTAM that could involve military authorities can be found in the Manual Concerning Safety Measures Relating to Military Activities Potentially Hazardous to Civil Aircraft Operations (Doc 9554).

Note. — For aircraft subjected to unlawful interference, see 14.1.17b , 14.1.18.1g and 14.1.11

e) Special procedures shall be established in order to ensure that:

1) air traffic services units are notified if a military unit observes that an aircraft which is, or might be, a civil aircraft is approaching, or has entered, any area in which interception might become necessary;

2) all possible efforts are made to confirm the identity of the aircraft and to provide it with the navigational guidance necessary to avoid the need for interception.

14.1.12 Coordination of activities potentially hazardous to civil aircraft

a) The arrangements for activities potentially hazardous to civil aircraft, whether over the territory of a State or over the high seas, shall be coordinated with the appropriate air traffic services authorities. The coordination shall be effected early enough to permit timely promulgation of information regarding the activities in accordance with Procedures for Air Navigation Services — Aeronautical Information Management (PANS-AIM, Doc 10066).

b) The objective of the coordination shall be to achieve the best arrangements which will avoid hazards to civil aircraft and minimize interference with the normal operations of such aircraft.

c) The appropriate ATS authority shall ensure that a safety risk assessment is conducted, as soon as practicable, for activities potentially hazardous to civil aircraft and that appropriate risk mitigation measures are implemented. Such risk mitigation measures may include, but would not be limited to, airspace restriction or temporary withdrawal of established ATS routes or portions thereof.

Note: - Guidance on safety risk management can be found in the Safety Management Manual (SMM) (Doc 9859)

d) States shall establish procedures to enable the organization or unit conducting or identifying activities potentially hazardous to civil aircraft to contribute to the safety risk assessment in order to facilitate consideration of all relevant safety significant factor

e) The appropriate ATS authorities shall be responsible for initiating the promulgation of information regarding the activities.

14.1.13 Coordination between meteorological and air traffic services authorities

a) To ensure that aircraft receive the most up-to-date meteorological information for aircraft operations, arrangements shall be made, where necessary, between meteorological and air traffic services authorities for air traffic services personnel:

1) in addition to using indicating instruments, to report, if observed by air traffic services personnel or communicated by aircraft, such other meteorological elements as may be agreed upon;

2) to report as soon as possible to the associated meteorological office meteorological phenomena of operational significance, if observed by air traffic services personnel or communicated by aircraft, which have not been included in the aerodrome meteorological report;

b) to report as soon as possible to the associated meteorological office pertinent information concerning pre-eruption volcanic activity, volcanic eruptions and information concerning volcanic ash cloud. In addition, area control centers and flight information centers shall report the information to the associated meteorological watch office and volcanic ash advisory centers (VAACs).

Note 1.— VAACs are designated by regional air navigation agreements in accordance with Annex 3, Chapter 3, 3.5.1.

c) Close coordination shall be maintained between area control centers, flight information centers and associated meteorological watch offices to ensure that information on volcanic ash included in NOTAM and SIGMET messages is consistent.

14.1.14 Coordination between aeronautical information services and air traffic services authorities

a) To ensure that aeronautical information services units obtain information to enable them to provide up-to-date pre-flight information and to meet the need for in-flight information, arrangements shall be made between aeronautical information services and air traffic services authorities responsible for air traffic services to report to the responsible aeronautical information services unit, with a minimum of delay:

1) information on aerodrome conditions;

2) the operational status of associated facilities, services and navigation aids within their area of responsibility;

3) the occurrence of volcanic activity observed by air traffic services personnel or reported by aircraft; and

4) any other information considered to be of operational significance.

b) Before introducing changes to the air navigation system, due account shall be taken by the services responsible for such changes of the time needed by the aeronautical information service for the preparation, production and issuance of relevant material for promulgation. To ensure timely provision of the information to the aeronautical information service, close coordination between those services concerned is therefore required.

c) Of particular importance are changes to aeronautical information that affect charts and/or computer-based navigation systems which qualify to be notified by the Aeronautical Information Regulation and Control (AIRAC) system, as specified in Annex 15, Chapter 6. The predetermined, internationally agreed AIRAC effective dates shall be observed by the responsible air traffic services when submitting the raw information/data to aeronautical information services.

Note. — Detailed specifications concerning the AIRAC system are contained in PANS-AIM (Doc 10066), Chapter 6.

d) The air traffic services responsible for the provision of raw aeronautical information/data to the aeronautical information services shall do so while taking into account accuracy and integrity requirements necessary to meet the needs of the end-user of aeronautical data.

14.1.15 Aeronautical data

a) Determination and reporting of air traffic services-related aeronautical data shall be in accordance with the accuracy and integrity classification required to meet the needs of the end-user of aeronautical data.

Note. — Specifications concerning the accuracy and integrity classification of air traffic services-related aeronautical data are contained in PANS-AIM (Doc 10066), Appendix 1.

b) Digital data error detection techniques shall be used during the transmission and/or storage of aeronautical data and digital data sets.

Note. — Detailed specifications concerning digital data error detection techniques are contained in PANS-AIM (Doc 10066).

14.1.16 Minimum flight altitudes

(a) Minimum flight altitudes will be determined and promulgated by the Authority for each ATS route and control area over Nigeria's territory. The minimum flight altitudes determined will provide a minimum clearance above the controlling obstacle located within the areas concerned.

Note. — The requirements for publication by States of minimum flight altitudes and of the criteria used to determine them are contained in PANS-AIM (Doc 10066), Appendix 2. Detailed obstacle clearance criteria are contained in PANS-OPS (Doc 8168), Volume II.

14.1.17 Service to aircraft in the event of an emergency

a) An aircraft known or believed to be in a state of emergency, including being subjected to unlawful interference, shall be given maximum consideration, assistance and priority over other aircraft as may be necessitated by the circumstances.

Note. — To indicate that it is in a state of emergency, an aircraft equipped with an appropriate data link capability and/or an SSR transponder might operate the equipment as follows:

1) on Mode A, Code 7700; or

2) on Mode A, Code 7500, to indicate specifically that it is being subjected to unlawful interference; and/or

3) activate the appropriate emergency and/or urgency capability of ADS-B or ADS-C; and/or

4) transmit the appropriate emergency message via CPDLC.

Note. - In communications between ATS units and aircraft in the event of an emergency, Human Factors principles should be observed.

Note. — Guidance material on Human Factors principles can be found in the Human Factors Training Manual

(Doc 9683).

b) When an occurrence of unlawful interference with an aircraft takes place or is suspected, ATS units shall attend promptly to requests by the aircraft. Information pertinent to the safe conduct of the flight shall continue to be transmitted and necessary action shall be taken to expedite the conduct of all phases of the flight, especially the safe landing of the aircraft.

c) When an occurrence of unlawful interference with an aircraft takes place or is suspected, ATS units shall, in accordance with locally agreed procedures, immediately inform the appropriate authority designated by the State and exchange necessary information with the operator or its designated representative.

Note 1. — A strayed or unidentified aircraft may be suspected as being the subject of unlawful interference. See 2.25.1.3.

Note 2. — Procedures relating to the handling of strayed or unidentified aircraft are contained in 2.25.1.

Note 3.— The PANS-ATM (Doc 4444), Chapter 15, 15.1.3 contains more specific procedures related to unlawful interference.

14.1.18 In-flight contingencies

14.1.18.1 Strayed or unidentified aircraft

Note 1. — The terms "strayed aircraft" and "unidentified aircraft" in this paragraph have the following meanings:

a) Strayed aircraft. An aircraft which has deviated significantly from its intended track or which reports that it is lost. Unidentified aircraft. An aircraft which has been observed or reported to be operating in a given area but whose identity has not been established.

Note 2. — An aircraft may be considered, at the same time, as a "strayed aircraft" by one unit and as an "unidentified aircraft" by another unit.

Note 3. — A strayed or unidentified aircraft may be suspected as being the subject of unlawful interference.

b) As soon as an air traffic services unit becomes aware of a strayed aircraft it shall take all necessary steps as outlined in 14.1.18.1(c) and 14.1.18.(d) to assist the aircraft and to safeguard its flight

Note. — Navigational assistance by an air traffic services unit is particularly important if the unit becomes aware of an aircraft straying, or about to stray, into an area where there is a risk of interception or other hazard to its safety.

c) If the aircraft's position is not known, the air traffic services unit shall:

1) attempt to establish two-way communication with the aircraft, unless such communication already exists;

2) use all available means to determine its position;

3) inform other ATS units into whose area the aircraft may have strayed or may stray, taking into account all the factors which may have affected the navigation of the aircraft in the circumstances;

4) inform, in accordance with locally agreed procedures, appropriate military units and provide them with pertinent flight plan and other data concerning strayed aircraft;

5) request from the units referred to in c) and d) and from other aircraft in flight every assistance in establishing communication with the aircraft and determining its position.

Note. — The requirements in d) and e) apply also to ATS units informed in accordance with c).

d) When the aircraft's position is established, the air traffic services unit shall:

1) advise the aircraft of its position and corrective action to be taken; and

2) provide, as necessary, other ATS units and appropriate military units with relevant information concerning the strayed aircraft and any advice given to that aircraft.

e) As soon as an air traffic services unit becomes aware of an unidentified aircraft in its area, it shall endeavor to establish the identity of the aircraft whenever this is necessary for the provision of air traffic services or required by the appropriate military authorities in accordance with locally agreed procedures. To this end, the air traffic services unit shall take such of the following steps as are appropriate in the circumstances:

1) attempt to establish two-way communication with the aircraft;

2) inquire of other air traffic services units within the flight information region about the flight and request their assistance in establishing two-way communication with the aircraft;

3) inquire of air traffic services units serving the adjacent flight information regions about the flight and request their assistance in establishing two-way communication with the aircraft;

4) attempt to obtain information from other aircraft in the area.

f) The air traffic services unit shall, as necessary, inform the appropriate military unit as soon as the identity of the aircraft has been established.

g) Should the ATS unit consider that a strayed or unidentified aircraft may be the subject of unlawful interference, the appropriate authority designated by the State shall immediately be informed, in accordance with locally agreed procedures.

14.1.19 Interception of civil aircraft

a) As soon as an air traffic services unit learns that an aircraft is being intercepted in its area of responsibility, it shall take such of the following steps as are appropriate in the circumstances:

1) attempt to establish two-way communication with the intercepted aircraft via any means available, including the emergency radio frequency 121.5 MHz, unless such communication already exists;

2) inform the pilot of the intercepted aircraft of the interception;

3) establish contact with the intercept control unit maintaining two-way communication with the intercepting aircraft and provide it with available information concerning the aircraft;

4) relay messages between the intercepting aircraft or the intercept control unit and the intercepted aircraft, as necessary;

5) in close coordination with the intercept control unit take all necessary steps to ensure the safety of the intercepted aircraft;

6) inform ATS units serving adjacent flight information regions if it appears that the aircraft has strayed from such adjacent flight information regions.

b) As soon as an air traffic services unit learns that an aircraft is being intercepted outside its area of responsibility, it shall take such of the following steps as are appropriate in the circumstances:

1) inform the ATS unit serving the airspace in which the interception is taking place, providing this unit with available information that will assist in identifying the aircraft and requesting it to take action in accordance with 14.1.19a;

2) relay messages between the intercepted aircraft and the appropriate ATS unit, the intercept control unit or the intercepting aircraft.

14.1.20 TIME IN AIR TRAFFIC SERVICES

a) Coordinated Universal Time (UTC) shall be used by the Air traffic services and shall be expressed in hours and minutes and when required, in seconds of the 24-hour day beginning at midnight.

b) Air traffic services units shall be equipped with clocks indicating the time in hours, minutes and seconds, clearly visible from each operating position in the unit concerned.

c) Air traffic services unit clocks and other time recording devices shall be checked as necessary to ensure correct time to within plus or minus 30 seconds of UTC. Wherever data link communications are utilized by an air traffic services unit, clocks and other time-recording devices shall be checked as necessary to ensure correct time to within 1second of UTC.

d) The correct time shall be obtained from a standard time station or, if not possible, from another unit which has obtained the correct time from such station.

e) Aerodrome control towers shall, prior to an aircraft taxiing for take-off, provide the pilot with the correct time, unless arrangements have been made for the pilot to obtain it from other sources. Air traffic services units shall, in addition, provide aircraft with the correct time on request. Time checks shall be given to the nearest half minute.

14.1.21 Fatigue management

a) Where the air traffic services provider uses prescriptive fatigue management in the provision of part or all of its air traffic control services, the provisions in Appendix 4 of this regulations shall apply:

b) Where the air traffic services provider uses Fatigue Risk Management System (FRMS) in the provision of part or all of its air traffic control services, the provisions in Appendix 5 of this regulations shall apply

c) The Authority will require that the air traffic services provider, for the purposes of managing its fatigue-related safety risks, establish one of the following:

   1) air traffic controller schedules commensurate with the service(s) provided and in compliance with the prescriptive limitation regulations established by the Authority in accordance with the provisions of Appendix 4 or

   2) an FRMS, in compliance with regulations established by the Authority in accordance with the provisions of Appendix 5, for the provision of all air traffic control services; or

3) an FRMS, in compliance with regulations established by the Authority in accordance with Appendix 5, for a defined part of its air traffic control services in conjunction with schedules in compliance with the prescriptive limitation regulations established by the Authority in accordance with Appendix 4 for the remainder of its air traffic control services.

d) Where the air traffic services provider complies with prescriptive limitation regulations in the provision of part or all of its air traffic control services in accordance with Appendix 4, the Authority :

1) will require evidence that the limitations are not exceeded and that non-duty period requirements are met;

2) will require that the air traffic services provider familiarize its personnel with the principles of fatigue management and its policies with regard to fatigue management;

3) will establish a process to allow variations from the prescriptive limitation regulations to address any additional risks associated with sudden, unforeseen operational circumstances; and

4) Will ensure that the duty hours for air traffic controllers will be limited to ensure, so far as is reasonably possible, that controller fatigue does not impair operational safety and efficiency. When reference is made to air traffic controllers in this regulation it also includes student air traffic controllers.

5) Will ensure that ATS units shall establish procedures for the management of fatigue related issues.

6) Will require that Air traffic controllers shall be responsible for obtaining sufficient rest and sleep prior to attending operational duties.

7) Will ensure that sleeping or napping at operational positions shall not be permitted.

e) may approve variations to these regulations using an established process in order to address strategic operational needs in exceptional circumstances, based on the air traffic services provider demonstrating that any associated risk is being managed to a level of safety equivalent to, or better than that achieved through the prescriptive fatigue management regulations.

Note. — Complying with the prescriptive limitations regulations does not relieve the air traffic services provider of the responsibility to manage its risks, including fatigue-related risks, using its SMS in accordance with the provisions of Annex 19.

f) Where an air traffic services provider implements an FRMS to manage fatigue-related safety risks in the provision of part or all of its air traffic control services in accordance with Appendix 5, the Authority will:

1) require the air traffic services provider to have processes to integrate FRMS functions with its other safety management functions; and

2) approve an FRMS, according to a documented process, that provides a level of safety acceptable to the authority.

Note. — Provisions on the protection of safety information, which support the continued availability of information required by an FRMS, are contained in Annex 19.

g) An air traffic controller shall not exercise the privileges of his license if he knows or suspects that he is suffering from or having regards to the circumstances of the period of duty to be undertaken is likely to suffer from such fatigue as may endanger the safety of any aircraft to which an air traffic control service is provided.

h) A person shall not when exercising the privileges of an air traffic controller's license be under the influence of alcohol or a drug to the extent as to impair his capacity to exercise such privileges.

i) At the unit level the ATS provider shall engage, employ or contract :

(1) a senior person to whom authority has been granted to ensure that all activities undertaken by the unit are carried out in accordance with the applicable requirements prescribed in this section, and who shall in addition be vested with the following powers and duties in respect of the compliance with such requirements ;

(i) unrestricted access to work performed or activities undertaken by all other persons as employees of, and other persons rendering service within the unit;

(ii) full rights of consultation with any such person(s) in respect of such compliance by him or her;

(iii) powers to order cessation of any activity where such compliance is not effected;

(iv) a duty to establish liaison mechanisms with the Authority with a view to ascertain correct manners of compliance with the said requirements, and interpretations of such requirements by the Authority, and to facilitate liaison between the Authority and the unit concerned; and

(v) powers to report directly to the management of his or her organisation, on his or her investigations and consultations generally, and in cases contemplated in sub-paragraph (iii), and with regard to the results of the liaison contemplated in sub-paragraph (iv);

14.1.22 SAFETY MANAGEMENT

(a) The Air Traffic Service Provider shall established safety management programmes in order to achieve an acceptable level of safety in the provision of Air Traffic Services.

Note.— Further guidance is contained in the Safety Management Manual (SMM) (Doc 9859) and associated procedures are contained in the PANS-ATM (Doc 4444) and Nig. CARs Part 20;

(b) Acceptable levels of safety achieved shall not be below the levels of safety as established by the Authority.

(c) An acceptable (well defined) level of safety and safety objectives related to the provision of ATS within airspaces and at airports within Nigeria shall be established and adhered to.

(d) The Air Traffic Service Provide shall, as part of its safety programme, implement an acceptable safety management system that, as a minimum:

(1) identifies safety hazards;

(2) ensures that remedial action necessary to maintain an acceptable level of safety is implemented;

(3) provides for continuous monitoring and regular assessment of the safety level achieved; and

(4) aims to make continuous improvement to the overall level of safety.

(e) The ATS Provider shall have an SMS manual approved by the Authority which will shall clearly define lines of safety accountability throughout the air traffic services provider, including a direct accountability for safety on the part of senior management.

(f) Acceptance or approval of an ANSP SMS manual will be preceded by thorough assessment of the system of operations of the ANSP to determine whether the ANSP complies with the SMS manual.

(g) Any significant safety-related changes to the ATC system, including the implementation of a reduced separation minimum or a new procedure, shall only be affected after a safety risk assessment has demonstrated that an acceptable level of safety would be met and users have been consulted. The Authority will shall ensure that adequate provision is made for post-implementation monitoring to verify that the defined level of safety continues to be met.

Note.— When, due to the nature of the change, the acceptable level of safety cannot be expressed in quantitative terms, the safety risk assessment may *rely on operational judgement.*

(h) The ANSP shall conduct safety reviews regularly on operations, processes and procedures that require such, in line with ICAO Doc 4444(PANS-ATM) chapter 2.5.

14.1.23 LANGUAGE PROFICIENCY

(a) An approved air traffic services provider shall ensure that air traffic controllers speak and understand English language used for international radiotelephony communications to ICAO Level 4 proficiency or above.

(b) Except when communications between air traffic control units are conducted in a mutually agreed language, the English language shall be used for all radiotelephony communications.

(c) ATC phraseology shall be in accordance with the provision as contained in DOC 4444 12.3.1

14.1.24 CONTINGENCY ARRANGEMENTS

14.1.24.1 Air traffic services organization shall develop and promulgate contingency plans for implementation in the event of disruption, or potential disruption, of air traffic services and related supporting services in the airspace for which they are responsible for the provision of such services. Such contingency plans shall be developed in close coordination with the air traffic services authorities responsible for the provision of services in adjacent portions of airspace and with airspace users concerned (IS 14.1.24.1)

Note 1.— Contingency plans may constitute a temporary deviation from the approved regional air navigation plans; such deviations are approved, as necessary, by the President of the ICAO Council on behalf of the Council.

14.1.24.2 The Air Traffic Services organization shall establish and implement Air Traffic Control (ATC) contingency procedures as prescribed in ICAO Doc 4444 –PANS ATM for:

(1) Radio communications contingencies;

(2) Emergency separation; and

(3) if applicable, for

(i) Short-term conflict alert (STCA);

(ii) Minimum safe altitude warning (MSAW);

(iii) aircraft equipped with ACAS

14.1.24.3 The plan shall include:

(a) the actions to be taken by the members of the provider's personnel responsible for providing the service including the notification of suspected communicable diseases, or other public health risk, on board an aircraft in accordance with IS 14.1.24.1

(b) possible alternative arrangements for providing the service; and

(c) the arrangements for resuming normal operations for the service.

(d) These plans shall be submitted as part of the Manual of Operations

14.1.25 Identification and delineation of prohibited, restricted and danger areas

a) Each prohibited area, restricted area, or danger area established by a State shall, upon initial establishment, be given an identification and full details shall be promulgated.

Note. — See PANS-AIM (Doc 10066), Appendix 2, ENR 5.1.

b) The identification so assigned shall be used to identify the area in all subsequent notifications pertaining to that area.

c) The identification shall be composed of a group of letters and figures as follows:

1) nationality letters for location indicators assigned to the State or territory which has established the airspace;

2) a letter P for prohibited area, R for restricted area and D for danger area as appropriate; and c)

3) a number, unduplicated within the State or territory concerned.

Note. — Nationality letters are those contained in Location Indicators (Doc 7910). 2.33.4 To avoid confusion, identification numbers shall not be reused for a period of at least one year after cancellation of the area to which they refer.

d) To avoid confusion, identification numbers shall not be reused for a period of at least one year after cancellation of the area to which they refer.

e) When a prohibited, restricted or danger area is established, the area shall be as small as practicable and be contained within simple geometrical limits, so as to permit ease of reference by all concerned.

14.1.26 APPLICATION OF AIR TRAFFIC CONTROL SERVICE

14.1.26.1 Application Air traffic control service shall be provided:

a) to all IFR flights in airspace Classes A, B, C, D and E;

b) to all VFR flights in airspace Classes B, C and D;

c) to all special VFR flights;

d) to all aerodrome traffic at controlled aerodromes.

14.1.26.2 The Authority will determine the portions of the Nigerian airspace and the aerodromes which shall be provided with air traffic services to:

(a) prevent collisions between aircraft;

(b) prevent collisions between aircraft on the maneuvering area of the aerodrome concerned and obstructions on such area;

(c) expedite and maintain an orderly flow of air traffic;

(d) provide advice and information useful for the safe and efficient conduct of flights; and

(e) provide aeronautical search and rescue and related support services.

14.1.26.3 Need for provision of ATS.

The need for the provision of air traffic services shall be determined after consideration of:

(a) the types of air traffic involved;

(b) the density of air traffic;

(c) the meteorological conditions; and

(d) any other factor which may be relevant.

14.1.27 Personnel Requirement.

14.1.27.1 An applicant for the provision of ATS shall provide in its Operations Manual:

(a) current unit organizational chart and written delegated responsibilities and position descriptions;

(b) staffing-levels for operational positions;

(c) designated instructors and ratings and proficiency assessment officers;

(d) staffing numbers and qualifications at unit level; and

(e) policy and procedures document for determining the capacity of the Air Traffic Services system, including the number of operational staff required to ensure the provision of an adequate Air Traffic Services system.

14.1.27.2 An ATS provider shall, at all times, maintain an appropriate organisation with a sound and effective management structure to enable it provide, in accordance with the standards set out in the Regulations, the air traffic services covered by its certificate.

14.1.27.3 An ATS provider shall have, at all times, enough suitably qualified and trained personnel to enable it provide, in accordance with the standards set out in the Regulations, the air traffic services covered by its certificate as in IS 14.1.27.3

14.1.27.4 The ATS provider shall ensure that its personnel are of sufficient numbers and experience and have been given appropriate authority to be able to discharge their allocated responsibilities.

14.1.27.5 The ATS provider shall advise the minimum qualifications required for air traffic services personnel operating positions.

14.1.27.6. An ATS provider shall arrange the work flow schedule of air traffic controllers to provide duty rest periods. A copy of the ATS providers fatigue management procedure is to be included in the Manual of Operations.

14.1. 27.7. An air traffic controller shall not exercise the privileges of his license if he knows or suspects that he is suffering from or having regards to the circumstances of the period of duty to be undertaken is likely to suffer from such fatigue as may endanger the safety of any aircraft to which an air traffic control service is provided.

14.1.27.8. A person shall not when exercising the privileges of an air traffic controller's license be under the influence of alcohol or a drug to the extent as to impair his capacity to exercise such privileges.

14.1.27.9. At the unit level the ATS provider shall engage, employ or contract:

(a) a senior person to whom authority has been granted to ensure that all activities undertaken by the unit are carried out in accordance with the applicable requirements prescribed in this section, and who shall in addition be vested with the following powers and duties in respect of the compliance with such requirements;

(i) unrestricted access to work performed or activities undertaken by all other persons as employees of, and other persons rendering service within the unit;

(ii) full rights of consultation with any such person(s) in respect of such compliance by him or her;

(iii) powers to order cessation of any activity where such compliance is not affected;

(iv) a duty to establish liaison mechanisms with the Authority with a view to ascertain correct manners of compliance with the said requirements, and interpretations of such requirements by the Authority, and to facilitate liaison between the Authority and the unit concerned; and

(v) powers to report directly to the management of his or her organisation, on his or her investigations and consultations generally, and in cases contemplated in sub-paragraph (iii), and with regard to the results of the liaison contemplated in sub-paragraph (iv) ;

(b). a person who is responsible for safety management system and quality control, and who shall have direct access to the person referred to herein on matters affecting aviation safety; and

(c) enough licensed personnel to plan, provide and supervise the services listed in its approval as a service provider, in a safe and efficient manner.

14.1.27.10 Training and Checking of ATS Personnel.

The ATS provider shall establish a procedure for initially assessing, and a procedure for maintaining the competence of the personnel required to operate and maintain the unit concerned. This shall include relevant assessment forms.

14.1.27.11 Granting of Ratings and Endorsements.

Refer to Part 2 of the Nig. CARs

14.1.27.12 Periods of Validity of Ratings and Endorsements.

Refer to Part 2 of the Nig. CARs

14.1.28 Proficiency.

14.1.28.1 As part of the quality system, the holder of an air traffic service unit certificate shall assess the air traffic service personnel in their employment.

14.1.28.2 A formal proficiency assessment shall be carried out before a validation certificate or a rating validation can be issued to assess whether the applicant has achieved the required level of competence.

14.1.28.3 At each facility the ATS provider shall nominate a person to establish and maintain unit proficiency standards; specific senior officers are to be appointed and tasked by the person responsible for the service as proficiency assessment officers for each discipline; at units where, operational staff are multi-disciplined, the person responsible for the service shall appoint and task at least one proficiency assessment officer. Proficiency assessment officers may be appointed and tasked for each discipline although it is a multi-discipline environment.

14.1.28.4 At approach and/or aerodrome units, the Air Traffic Service provider shall appoint and task the officer or air traffic controller responsible for satellite units as the proficiency assessment officer.

14.1.28.5 A person assessed as unsatisfactory shall not be permitted to continue in the assessed discipline without supervision. If after a reasonable period a person is unable to pass the proficiency check, all details pertaining to the unsatisfactory assessment shall be assembled and sent to the Authority.

14.1.28.6 Proficiency assessment officers shall prepare proficiency check rosters so that all operational staff are screened on a regular basis. Personnel shall be given advanced notice of a real time annual proficiency check so that adequate preparation, mentally and functionally, can be made.

14.1.28.7 In addition, the Authority will carry out a formal assessment at least every 12 months to determine whether all operational personnel are maintaining the required level of competence in the positions for which a valid rating is held. Routine assessments should be conducted on an on-going basis during duty assignment.

14.1.28.8 Personnel will be assessed in key elements of the performance areas detailed on an assessment form.

14.1.28.9 An assessment will be made of both the quality of work and the level of knowledge of the elements assessed.

14.1.28.10 Manual of Operations shall also include the procedures for: (a) air traffic services personnel to undertake remedial training; and (b) updating air traffic services personnel skills when introducing new equipment into service and updated communications.

14.1.28.11 Proficiency and training records shall be maintained for all air traffic services personnel.

14.1.29. ATS provider's obligation to provide currency and recency training and assessment.

14.1.29.1 An ATS provider shall set up and maintain, in accordance with 14.1.28, programmes for:

(a) continuing assessment of its employees' competency for the purposes of ensuring that they continue to satisfy the currency requirements in relation to ratings and endorsements; and

(b) familiarization, retraining and assessment of any of its employees who at any time do not satisfy the currency or recency requirement in relation to an endorsement.

14.1.29.2 The provider shall include details of the programme, including necessary training and tests of competency, in its operations manual.

14.1.30 Conduct of Practical Training.

a) An ATS provider shall ensure that practical training carried out on their behalf, for the award of an ATC license, rating, endorsement or ATC qualification, is carried out in accordance with:

(i) the standards and requirements set out in this regulations; and

(ii) the provider's operations manual.

b) Practical training conducted by the ATS Provider shall be done to ensure that:

i) controllers are adequately trained and properly licensed with valid ratings;

ii) controller competency is maintained by adequate and appropriate refresher training, including the handling of aircraft emergencies and operations under conditions with failed and degraded facilities and systems;

iii) controllers, where the ATC unit/control sector is staffed by teams, are provided relevant and adequate training in order to ensure efficient teamwork;

iv) the implementation of new or amended procedures, and new or updated communications, surveillance and other safety significant systems and equipment is preceded by appropriate training and instruction;

v) controller competency in the English language is satisfactory in relation to providing ATS to international air traffic; and

vi) standard phraseology is used.

14.1.31 Training and Checking of ATS Personnel.

The ATS provider will establish a procedure for initially assessing, and a procedure for maintaining the competence of the personnel required to operate and maintain the unit concerned. This shall include relevant assessment forms.

(a) The provider of Air Traffic Services shall establish procedures and programme for the training and assessment of the following personnel:

(1) Air traffic controllers;

(2) Flight procedure design officers;

(3) Personnel directly involved in supervision of, or immediate operational support to, personnel providing air traffic services listed in the ATS Provider's Manual.

(b) The ATS Provider shall establish procedures to ensure that personnel giving instruction in an operational environment hold an appropriate current On-the-Job Training (OJT) Instructor endorsement issued in accordance with the requirements of the Authority.

(c) The ATS Provider shall establish procedures to ensure that personnel carrying out assessment for the issue of licenses or validation of ratings, hold an appropriate current OJT Instructor or Examiner endorsement issued in accordance with the requirements of the Authority.

(d) The ATS Provider shall submit the unit training and assessment plan (UTAP) to the Authority for approval.

(e) The ATS Provider shall establish procedures and programmes for recurrent training of ATS personnel in accordance with the requirements of the authority.

14.1.32 PROVISION OF AIR TRAFFIC CONTROL SERVICE:

The parts of air traffic control service described in 14.1.26 shall be provided by the various units as follows:

a) Area control service:

1) by an area control center; or

2) by the unit providing approach control service in a control zone or in a control area of limited extent which is designated primarily for the provision of approach control service and where no area control center is established.

b) Approach control service:

1) by an aerodrome control tower or area control center when it is necessary or desirable to combine under the responsibility of one unit the functions of the approach control service with those of the aerodrome control service or the area control service;

2) by an approach control unit when it is necessary or desirable to establish a separate unit.

c) Aerodrome control service: by an aerodrome control tower.

Note. — The task of providing specified services on the apron, e.g., apron management service, may be assigned to an aerodrome control tower or to a separate unit.

14.1.33 Operation of air traffic control service

14.1.33.1 In order to provide air traffic control service, an air traffic control unit shall:

a) be provided with information on the intended movement of each aircraft, or variations therefrom, and with current information on the actual progress of each aircraft;

b) determine from the information received, the relative positions of known aircraft to each other;

c) issue clearances and information for the purpose of preventing collision between aircraft under its control and of expediting and maintaining an orderly flow of traffic;

d) coordinate clearances as necessary with other units:

1) whenever an aircraft might otherwise conflict with traffic operated under the control of such other units;

2) before transferring control of an aircraft to such other units.

14.1.33.2 Information on aircraft movements, together with a record of air traffic control clearances issued to such aircraft, shall be so displayed as to permit ready analysis in order to maintain an efficient flow of air traffic with adequate separation between aircraft.

Note. — Provisions related to the non-disclosure of recordings and transcripts of recordings from air traffic control units are contained in Annex 13, 5.12.

14.1.33.3 Clearances issued by air traffic control units shall provide separation:

a) between all flights in airspace Classes A and B;

b) between IFR flights in airspace Classes C, D and E;

c) between IFR flights and VFR flights in airspace Class C;

d) between IFR flights and special VFR flights;

e) between special VFR flights when so prescribed by the appropriate ATS authority, except that, when requested by an aircraft and if so prescribed by the appropriate ATS authority for the cases listed under b) above in airspace Classes D and E, a flight may be cleared without separation being so provided in respect of a specific portion of the flight conducted in visual meteorological conditions.

14.1.33.4 Separation by an air traffic control unit shall be obtained by at least one of the following:

a) vertical separation, obtained by assigning different levels selected from:

1) the appropriate table of cruising levels in Appendix 3 of Annex 2, or

2) a modified table of cruising levels, when so prescribed in accordance with Appendix 3 of Annex 2 for flight above FL 410, except that the correlation of levels to track as prescribed therein shall not apply whenever otherwise indicated in appropriate aeronautical information publications or air traffic control clearances;

b) horizontal separation, obtained by providing:

1) longitudinal separation, by maintaining an interval between aircraft operating along the same, converging or reciprocal tracks, expressed in time or distance; or

2) lateral separation, by maintaining aircraft on different routes or in different geographical areas;

c) composite separation, consisting of a combination of vertical separation and one of the other forms of separation contained in b) above, using minima for each which may be lower than, but not less than half of, those used for each of the combined elements when applied individually. Composite separation shall only be applied on the basis of regional air navigation agreements.

Note. — Guidance material relating to the implementation of composite lateral/vertical separation is contained in the Air Traffic Services Planning Manual (Doc 9426).

14.1.33.5 For all airspace where a reduced vertical separation minimum of 300 m (1 000 ft) is applied between FL 290 and FL 410 inclusive, a programme shall be instituted, on a regional basis, for monitoring the height-keeping performance of aircraft operating at these levels, in order to ensure that the continued application of this vertical separation minimum meets the safety objectives. The scope of regional monitoring programmes shall be adequate to conduct analyses of aircraft group performance and evaluate the stability of altimetry system error.

Note. — Guidance material relating to vertical separation and monitoring of height-keeping 8performance is contained in the Manual on a 300 m (1 000 ft) Vertical Separation Minimum Between FL 290 and FL 410 Inclusive (Doc 9574).

14.1.33.6 Where RCP/RSP specifications are applied, programmes shall be instituted for monitoring the performance of the infrastructure and the participating aircraft against the appropriate RCP and/or RSP specifications, to ensure that operations in the applicable airspace continue to meet safety objectives. The scope of monitoring programmes shall be adequate to evaluate communication and/or surveillance performance, as applicable.

Note. — Guidance material relating to RCP and RSP specifications and monitoring of communication and surveillance performance is contained in the Performance-based Communication and Surveillance (PBCS) Manual (Doc 9869).

14.1.34 Separation minima

14.1.34.1 The selection of separation minima for application within a given portion of airspace shall be as follows:

a) the separation minima shall be selected from those prescribed by the provisions of the PANS-ATM (Doc 4444) and the Regional Supplementary Procedures as applicable under the prevailing circumstances except that, where types of aids are used or circumstances prevail which are not covered by current ICAO provisions, other separation minima shall be established as necessary by:

1) the Authority, following consultation with operators, for routes or portions of routes contained within Nigeria Airspace;

2) regional air navigation agreements for routes or portions of routes contained within airspace over the high seas or over areas of undetermined sovereignty.

Note. — Details of current separation minima prescribed by ICAO are contained in the PANS-ATM (Doc 4444) and the Regional Supplementary Procedures (Doc 7030).

b) the selection of separation minima shall be made in consultation between the appropriate ATS authorities responsible for the provision of air traffic services in neighboring airspace when:

1) traffic will pass from one into the other of the neighboring airspaces;

2) routes are closer to the common boundary of the neighboring airspaces than the separation minima applicable in the circumstances.

Note. — The purpose of this provision is to ensure, in the first case, compatibility on both sides of the line of transfer of traffic, and, in the other case, adequate separation between aircraft operating on both sides of the common boundary.

14.1.34.2 Details of the selected separation minima and of their areas of application shall be notified:

a) to the ATS units concerned; and

b) to pilots and operators through aeronautical information publications, where separation is based on the use by aircraft of specified navigation aids or specified navigation techniques.

14.1.35 RESPONSIBILITY FOR CONTROL OF AIR TRAFFIC

14.1.35.1 RESPONSIBILITY FOR CONTROL OF INDIVIDUAL FLIGHTS

A controlled flight shall be under the control of only one air traffic control unit at any given time.

14.1.35.2 RESPONSIBILITY FOR CONTROL WITHIN A GIVEN BLOCK OF AIRSPACE

Responsibility for the control of all aircraft operating within a given block of airspace shall be vested in a single air traffic control unit. However, control of an aircraft or groups of aircraft may be delegated to other air traffic control units provided that the coordination between all air traffic control units concerned has been effected.

14.1.36 TRANSFER OF RESPONSIBILITY FOR CONTROL

14.1.36.1 PLACE OR TIME OF TRANSFER

a) The responsibility for the control of an aircraft shall be transferred from one air traffic control unit to another as follows:

i. BETWEEN TWO UNITS PROVIDING AREA CONTROL SERVICE

The responsibility for the control of an aircraft shall be transferred from a unit providing area control service in a control area to the unit providing area control service in an adjacent control area at the time of crossing the common control area boundary as estimated by the area control centre having control of the aircraft or at such other point or time as has been agreed between the two units.

ii. BETWEEN A UNIT PROVIDING AREA CONTROL SERVICE AND A UNIT PROVIDING APPROACH CONTROL SERVICE.

The unit providing area control service shall transfer the responsibility for the control of an aircraft to the unit providing approach control service at an agreed point or time between the two units.

iii) BETWEEN A UNIT PROVIDING APPROACH CONTROL SERVICE AND AN AERODROME CONTROL TOWER

14.1.36.2 ARRIVING AIRCRAFT.

a) The unit providing approach control service shall transfer the responsibility for the control of an arriving aircraft to the aerodrome control tower, when the aircraft:

i) is in the vicinity of the aerodrome, and:

ii) it is considered that approach and landing will be completed in visual reference to the ground, or

iii) it has reached uninterrupted visual meteorological conditions, or

iv) is at a prescribed point or level, as specified in letters of agreement or ATS unit instructions; or

v) has landed.

Note.— Even though there is an approach control unit, control of certain flights may be transferred directly from an area control centre to an aerodrome control tower and vice versa, by prior arrangement between the units concerned for the relevant part of approach control service to be provided by the area control centre or the aerodrome control tower, as applicable.

14.1.36.3 DEPARTING AIRCRAFT.

a) The responsibility for control of a departing aircraft shall be transferred from the aerodrome control tower to the unit providing approach control service:

i) when visual meteorological conditions prevail in the vicinity of the aerodrome:

1) prior to the time the aircraft leaves the vicinity of the aerodrome, or

2) prior to the aircraft entering instrument meteorological conditions, or

3) at a prescribed point or level,as specified in letters of agreement or ATS

ii) when instrument meteorological conditions prevail at the aerodrome:

1) immediately after the aircraft is airborne, or

2) at a prescribed point or level as specified in letters of agreement or ATS unit instructions.

14.1.36.5 BETWEEN CONTROL SECTORS OR POSITIONS WITHIN THE SAME AIR TRAFFIC CONTROL UNIT

a) The responsibility for control of an aircraft shall be transferred from one control sector or position to another control sector or position within the same air traffic control unit at a point, level or time, as specified in ATS unit instructions.

b) Responsibility for control of an aircraft shall not be transferred from one air traffic control unit to another without the consent of the accepting control unit, which shall be obtained in accordance with 14.1.36.5(b) (1-4).

1. The transferring control unit shall communicate to the accepting control unit the appropriate parts of the current flight plan and any control information pertinent to the transfer requested.

2. Where transfer of control is to be effected using radar data or ADS-B, the control information pertinent to the transfer shall include information regarding the position and, if required, the track and speed of the aircraft, as observed by radar or ADS-B immediately prior to the transfer.

3. Where transfer of control is to be effected using ADS-C data, the control information pertinent to the transfer shall include the four-dimensional position and other information as necessary.

4. The accepting control unit shall:

   i. indicate its ability to accept control of the aircraft on the terms specified by the transferring control unit, unless by prior agreement between the two units concerned, the absence of any such indication is understood to signify acceptance of the terms specified, or indicate any necessary changes thereto; and

   ii. specify any other information or clearance for a subsequent portion of the flight, which it requires the aircraft to have at the time of transfer.

5. The accepting control unit shall notify the transferring control unit when it has established two-way voice and/or data link communications with and assumed control of the aircraft concerned, unless otherwise specified by agreement between the two control units concerned.

6. Applicable coordination procedures, including transfer of control points, shall be specified in letters of agreement and ATS unit instructions as appropriate.

14.1.37 Air traffic control clearances

14.1.37.1 Air traffic control clearances shall be based solely on the requirements for providing air traffic control service.

Contents of clearances

a) An air traffic control clearance shall indicate:

1) aircraft identification as shown in the flight plan;

2) clearance limit;

3) route of flight;

4) level(s) of flight for the entire route or part thereof and changes of levels if required;

Note. — If the clearance for the levels covers only part of the route, it is important for the air traffic control unit to specify a point to which the part of the clearance regarding levels applies whenever necessary to ensure compliance with 3.6.5.2.2 a) of Annex 2

5) any necessary instructions or information on other matters such as approach or departure manoeuvres, communications and the time of expiry of the clearance.

Note. — The time of expiry of the clearance indicates the time after which *the* clearance will be automatically cancelled if the flight has not been commenced.

b) Standard departure and arrival routes and associated procedures shall be established when necessary to facilitate:

(1) the safe, orderly and expeditious flow of air traffic;

(2) the description of the route and procedure in air traffic control clearances.

Note.— Material relating to the establishment of standard departure and arrival routes and associated procedures is contained in the Air Traffic Services Planning Manual (Doc 9426). The design criteria are contained in PANS-OPS (Doc 8168), Volume II.

14.1.38 READ-BACK OF CLEARANCES AND SAFETY–RELATED INFORMATION.

(a) The flight crew shall read back to the air traffic controller safety-related parts of ATC clearances and instructions which are transmitted by voice. The following items shall always be read back:

(1) ATC route clearances;

(2) clearances and instructions to entering, landing on, taking off on, holding short of, crossing and backtracking on any runway; and

(3) runway-in-use, altimeter settings, SSR codes, level instructions, heading and speed instructions and, whether issued by the controller or contained in ATIS broadcasts, transition levels.

(b) Flight crew shall read back or acknowledge other clearances and instructions including conditional clearances in a manner to clearly show that they have been understood and would be complied with.

(c) Vehicle drivers operating or intending to operate on the manoeuvring area shall read back to the air traffic controller safety-related parts of instructions which are transmitted by voice, e.g. instructions to enter, hold short of, cross and operate on any operational runway or taxiway.

(d) The controller shall listen to the read-back to ascertain that the instruction has been correctly acknowledged by the vehicle driver and shall take immediate action to correct any discrepancies revealed by the read-back.

(e) The controller shall listen to the read-back to ascertain that the clearance or instruction has been correctly acknowledged by the flight crew and shall take immediate action to correct any discrepancies revealed by the read-back.

(f) Unless specified by the Authority, voice read-back of CPDLC messages shall not be required.

14.1.39 COORDINATION OF CLEARANCES

14.1.39.1 An air traffic control clearance shall be coordinated between air traffic control units to cover the entire route of an aircraft or a specified portion thereof.

14.1.39.2 An aircraft shall be cleared for the entire route to the aerodrome of first intended landing:

a) when it has been possible, prior to departure, to coordinate the clearance between all the units under whose control the aircraft will come; or

b) when there is reasonable assurance that prior coordination will be effected between those units under whose control the aircraft will subsequently come.

Note. — Where a clearance is issued covering the initial part of the flight solely as a means of expediting departing traffic, the succeeding en-route clearance will be as specified above even though the aerodrome of first intended landing is under the jurisdiction of an area control centre other than the one issuing the en-route clearance.

(c) When coordination as in 14.1.39.2(a) has not been achieved or is not anticipated, the aircraft shall be cleared only to that point where coordination is reasonably assured; prior to reaching such point, or at such point, the aircraft shall receive further clearance, holding instructions being issued as appropriate.

(d) When prescribed by the ATS Provider, aircraft shall contact a downstream air traffic control unit, for the purpose of receiving a downstream clearance prior to the transfer of control point.

(e) Aircraft shall maintain the necessary two-way communication with the current air traffic control unit whilst obtaining a downstream clearance.

(f) Downstream clearances shall be clearly indicated as such to the pilot.

(g) Unless coordinated, downstream clearances shall not affect the aircraft's original flight profile in any airspace, other than that of the air traffic control unit responsible for the delivery of the downstream clearance.

(h) Where practicable, and where data link communications are used to facilitate downstream clearance delivery, two-way voice communications between the pilot and the air traffic control unit providing the downstream clearance shall be available.

(i) When an aircraft intends to depart from an aerodrome within a control area to enter another control area within a period of thirty minutes, or such other specific period of time as has been agreed between the area control centers concerned, coordination with the subsequent area control center shall be effected prior to issuance of the departure clearance.

(j) When an aircraft intends to leave a control area for flight outside controlled airspace, and will subsequently re-enter the same or another control area, a clearance from point of departure to the aerodrome of first intended landing may be issued. Such clearance or revisions thereto shall apply only to those portions of the flight conducted within controlled airspace.

14.1.40 AIR TRAFFIC FLOW MANAGEMENT

14.1.40.1 Subject to the approval of the Authority, Air traffic flow management (ATFM) shall be implemented for airspace where air traffic demand at times exceeds, or is expected to exceed, the declared capacity of the air traffic control services concerned.

14.1.40.2 ATFM shall be implemented on the basis of regional air navigation agreements or, if appropriate, through multilateral agreements. Such agreements shall make provision for common procedures and common methods of capacity determination.

14.1.40.3 When it becomes apparent to an ATC unit that traffic additional to that already accepted cannot be accommodated within a given period of time at a particular location or in a particular area, or can only be accommodated at a given rate, that unit shall so advise the ATFM unit, when such is established, as well as, when appropriate, ATS units concerned. Flight crews of aircraft destined to the location or area in question and operators concerned shall also be advised of the delays expected or the restrictions that will be applied.

14.1.41 CONTROL OF PERSONS AND VEHICLES AT AERODROMES

14.1.41.1 The movement of persons or vehicles including towed aircraft on the maneuvering area of an aerodrome shall be controlled by the aerodrome control tower as necessary to avoid hazard to them or to aircraft landing, taxiing or taking off in conditions where low visibility procedures are in operation:

1) persons and vehicles operating on the maneuvering area of an aerodrome shall be restricted to the essential minimum, and particular regard shall be given to the requirements to protect the ILS/MLS sensitive area(s) when Category II or Category III precision instrument operations are in progress;

2) subject to the provisions in 14.1.41a, the minimum separation between vehicles and taxiing aircraft shall be as prescribed by the appropriate ATS authority taking into account the aids available;

3) when mixed ILS and MLS Category II or Category III precision instrument operations are taking place to the same runway continuously, the more restrictive ILS or MLS critical and sensitive areas shall be protected.

Note. — The period of application of low visibility procedures is determined in accordance with ATS unit instructions. Guidance on low visibility operations on an aerodrome is contained in the Manual of Surface Movement Guidance and Control Systems (SMGCS) (Doc 9476)

14.1.41.2 Emergency vehicles proceeding to the assistance of an aircraft in distress shall be afforded priority over all other surface movement traffic.

14.1.41.3 Subject to the provisions in 14.1.41.2, vehicles on the maneuvering area shall be required to comply with the following rules:

a) vehicles and vehicles towing aircraft shall give way to aircraft which are landing, taking off or taxiing;

b) vehicles shall give way to other vehicles towing aircraft;

c) vehicles shall give way to other vehicles in accordance with ATS unit instructions;

d) notwithstanding the provisions of a), b) and c), vehicles and vehicles towing aircraft shall comply with instructions issued by the aerodrome control tower.

14.1.42 PROVISION OF RADAR AND ADS-B

14.1.42.1 Radar and ADS-B ground systems shall provide for the display of safety-related alerts and warnings, including conflict alert, conflict prediction, minimum safe altitude warning and unintentionally duplicated SSR codes.

14.1.43 USE OF SURFACE MOVEMENT RADAR (SMR)

14.1.43.1 In the absence of visual observation of all or part of the maneuvering area or to supplement visual observation, surface movement radar (SMR) provided in accordance with the provisions of Part 14 volume 4 of the NigCARs or other suitable surveillance equipment, shall be utilized to:

a) Monitor the movement of aircraft and vehicles on the maneuvering area

b) provide directional information to pilots and vehicle drivers as necessary; and

c) provide advice and assistance for the safe and efficient movement of aircraft and vehicles on the maneuvering area.

Note.— See the Manual of Surface Movement Guidance and Control Systems

(SMGCS) (Doc 9476), the Advanced Surface Movement Guidance and Control Systems (A-SMGCS) Manual (Doc 9830) and the Air Traffic Services Planning Manual (Doc 9426) for guidance on the use of SMR

14.1.44 FLIGHT INFORMATION SERVICE

14.1.44.1 APPLICATION

(a) Flight information service shall be provided to all aircraft which are likely to be affected by the information and which are:

(1) provided with air traffic control service; or

(2) otherwise known to the relevant air traffic services units.

Note.— Flight information service does not relieve the pilot-in-command of an aircraft of any responsibilities and the pilot-in-command has to make the final decision regarding any suggested alteration of flight plan.

(b) Where air traffic services units provide both flight information service and air traffic control service, the provision of air traffic control service shall have precedence over the provision of flight information service whenever the provision of air traffic control service so requires.

Note.— It is recognized that in certain circumstances aircraft on final approach, landing, take-off and climb may require to receive without delay essential information other than that pertaining to the provision of air traffic control service.

14.1.44.2 SCOPE OF FLIGHT INFORMATION SERVICE

(a) Flight information service shall include the provision of pertinent:

(1) SIGMET and AIRMET information;

(2) information concerning pre-eruption volcanic activity, volcanic eruptions and volcanic ash clouds;

(3) information concerning the release into the atmosphere of radioactive materials or toxic chemicals;

(4) information on changes in the serviceability of navigation aids;

(5) information on changes in condition of aerodromes and associated facilities, including information on the state of the aerodrome movement areas when they are affected by significant depth of water;

(6) information on unmanned free balloons; and of any other information likely to affect safety.

(b) Flight information service provided to flights shall include, in addition to that outlined in 14.1.44.2(a), the provision of information concerning:

(c)

(1) weather conditions reported or forecast at departure, destination and alternate aerodromes;

(2) collision hazards, to aircraft operating in airspace Classes C, D, E, F and G;

(3) for flight over water areas, in so far as practicable and when requested by a pilot, any available information such as radio call sign, position, true track, speed, etc., of surface vessels in the area.

Note 1.— The information in b), including only known aircraft, the presence of which might constitute a collision hazard to the aircraft informed, will sometimes be incomplete and air traffic services cannot assume responsibility for its issuance at all times or for its accuracy.

Note 2.— When there is a need to supplement collision hazard information provided in compliance with b), or in case of temporary disruption of flight information service, traffic information broadcasts by aircraft may be applied in designated airspaces.

(d) ATS units shall transmit, as soon as practicable, special air-reports to other aircraft concerned, to the associated meteorological office, and to other ATS units concerned. Transmissions to aircraft shall be continued for a period to be determined by agreement between the meteorological and air traffic services authorities concerned.

(e) Flight information service provided to VFR flights shall include, in addition to that outlined in 14.1.44.2 (a) the provision of available information concerning traffic and weather conditions along the route of flight that are likely to make operation under the visual flight rules impracticable.

14.1.45 Operational Flight Information Service (OFIS) Broadcasts

14.1.45.1 Application

14.1.45.1.1 When requested by the pilot, the applicable OFIS message(s) shall be transmitted by the aappropriate ATS unit

14.1.46 Voice-automatic Terminal Information Service (Voice-ATIS)

14.1.46.1 Voice-automatic terminal information service (Voice-ATIS) broadcasts shall be provided at aerodromes where there is a requirement to reduce the communication load on the ATS VHF air-ground communication channels. When provided, they shall comprise:

a) one broadcast serving arriving aircraft; or

b) one broadcast serving departing aircraft; or

c) one broadcast serving both arriving and departing aircraft; or

d) two broadcasts serving arriving and departing aircraft respectively at those aerodromes where the length of a broadcast serving both arriving and departing aircraft would be excessively long.app

14.1.46.2 A discrete VHF frequency shall, whenever practicable, be used for Voice-ATIS broadcasts. If a discrete frequency is not available, the transmission may be made on the voice channel(s) of the most appropriate terminal navigation aid(s), preferably a VOR, provided the range and readability are adequate and the identification of the navigation aid is sequenced with the broadcast so that the latter is not obliterated.

14.1.46.3 Voice-ATIS broadcasts shall not be transmitted on the voice channel of an ILS.

14.1.46.4 Whenever Voice-ATIS is provided, the broadcast shall be continuous and repetitive.

14.1.46.5 The information contained in the current broadcast shall immediately be made known to the ATS unit(s) concerned with the provision to aircraft of information relating to approach, landing and takeoff, whenever the message has not been prepared by that (those) unit(s).

14.1.46.6 Voice-ATIS broadcasts provided at designated aerodromes for use by international air services shall be available in the English language as a minimum.

14.1.47 ALERTING SERVICE

14.1.47.1 APPLICATION

(a) Alerting service shall be provided:

(1) for all IFR flights and controlled VFR flights including SVFR flights within controlled airspace.

(2) in so far as practicable, for all other aircraft having filed a flight plan or otherwise known to the air traffic services; and

(3) for any aircraft known or believed to be the subject of unlawful interference.

(b) Flight information centers or area control centers shall collect all information relevant to a state of emergency of an aircraft operating within the flight information region or control area concerned and for forwarding such information to the appropriate rescue coordination centre.

(c) In the event of a state of emergency arising to an aircraft while it is under the control of an aerodrome control tower or approach control unit, such unit shall notify immediately the area control center responsible which shall in turn notify the rescue coordination centre, except that notification of the area control centre or rescue coordination centre shall not be required when the nature of the emergency is such that the notification would be superfluous.

(d) All the same, whenever the urgency of the situation so requires, the aerodrome control tower or approach control unit responsible shall first alert and take other necessary steps to set in motion all appropriate local rescue and emergency organizations which can give the immediate assistance required.

14.1.47.2 NOTIFICATION OF RESCUE COORDINATION CENTRES

(a) Without prejudice to any other circumstances that may render such notification advisable, air traffic services units shall, except as prescribed in 14.1.47.1 notify rescue coordination centers immediately an aircraft is considered to be in a state of emergency in accordance with the following:

(1) Uncertainty phase when:

(i) no communication has been received from an aircraft within a period of thirty minutes after the time a communication shall have been received, or from the time an unsuccessful attempt to establish communication with such aircraft was first made, whichever is the earlier, or when

(ii) an aircraft fails to arrive within thirty minutes of the estimated time of arrival last notified to or estimated by air traffic services units, whichever is the later,except when no doubt exists as to the safety of the aircraft and its occupants.

(2) Alert phase when:

(i) following the uncertainty phase, subsequent attempts to establish communication with the aircraft or inquiries to other relevant sources have failed to reveal any news of the aircraft, or when

(ii) an aircraft has been cleared to land and fails to land within five minutes of the estimated time of landing and communication has not been re-established with the aircraft, or when

(iii) information has been received which indicates that the operating efficiency of the aircraft has been impaired, but not to the extent that a forced landing is likely,

(3) except when evidence exists that would allay apprehension as to the safety of the aircraft and its occupants, or when

(i) an aircraft is known or believed to be the subject of unlawful interference.

(4) Distress phase when:

(i) following the alert phase, further unsuccessful attempts to establish communication with the aircraft and more widespread unsuccessful inquiries point to the probability that the aircraft is in distress, or when

(ii) the fuel on board is considered to be exhausted, or to be insufficient to enable the aircraft to reach safety, or when

(iii) information is received which indicates that the operating efficiency of the aircraft has been impaired to the extent that a forced landing is likely, or when

(iv) information is received or it is reasonably certain that the aircraft is about to make or has made a forced landing,

(v) except when there is reasonable certainty that the aircraft and its occupants are not endangered and as such do not require immediate assistance.

(b) The notification shall contain such of the following information as is available in the order listed:

(1) INCERFA, ALERFA or DETRESFA, as appropriate to the phase of the emergency;

(2) agency and person calling;

(3) nature of the emergency;

(4) significant information from the flight plan;

(5) unit which made last contact, time and means used;

(6) last position report and how determined;

(7) colour and distinctive marks of aircraft;

(8) dangerous goods carried as cargo;

(9) any action taken by reporting office; and

(10) other pertinent remarks.

(c) Such part of the information specified in 14.1.47(b), which is not available at the time notification is made to the rescue coordination centre, shall be sought by an air traffic services unit prior to the declaration of a distress phase, if there is every assurance that this phase will eventually occur.

(d) Further to the notification in 14.1.47(a), the rescue coordination centre shall, without delay, be furnished with:

(1) any useful additional information, especially on the development of the state of emergency through subsequent phases; or

(2) information that the emergency situation no longer exists.

14.1.47.3 USE OF COMMUNICATION FACILITIES

a) Air traffic services units shall, in as far as practicable, use all available communication facilities to ensure the establishment and maintenance of communication with aircraft in emergency, and to request news of such aircraft.

14.1.47.4 PLOTTING AIRCRAFT IN A STATE OF EMERGENCY

(a) When a state of emergency is considered to exist, the flight of the aircraft involved shall be plotted on a chart in order to determine the probable future position of the aircraft and its maximum range of action from its last known position. The flights of other aircraft known to be operating in the vicinity of the aircraft involved shall also be plotted in order to determine their probable future positions and maximum endurance.

14.1.47.5 INFORMATION TO THE OPERATOR

(a) When the area control center decides that an aircraft is in the uncertainty or the alert phase, it shall, when practicable, advise the operator prior to notifying the rescue coordination centre.

(b) All information notified to the rescue coordination centre by area control centre shall, whenever practicable, also be communicated, without delay, to the operator.

14.1.47.6 INFORMATION TO AIRCRAFT OPERATING IN THE VICINITY OF AN AIRCRAFT IN A STATE OF EMERGENCY

(a) When an air traffic services unit has been assured that an aircraft is in a state of emergency, other aircraft known to be in the vicinity of the aircraft involved shall, except as provided in 14.1.46.6(b), be informed of the nature of the emergency as soon as practicable.

(b) When an air traffic services unit knows or considers that an aircraft is being subjected to unlawful interference, no reference shall be made in ATS air-ground communications to the nature of the emergency unless it has first been referred to in communications from the aircraft involved and it is certain that such reference will not worsen the situation.

14.1.48 AIR TRAFFIC SERVICES REQUIREMENTS FOR COMMUNICATIONS

14.1.48.1 AERONAUTICAL MOBILE SERVICE (AIR-GROUND COMMUNICATIONS)

1) GENERAL

a) Radiotelephony and/or data link shall be used in air-ground communications for air traffic services purposes.

b) Where an RCP specification has been prescribed by the Authority for performance-based communication, ATS units shall, in addition to the requirements specified in 14.1.47.1 (a), be provided with communication equipment which will enable them to provide ATS in accordance with the prescribed RCP specification(s).

Note.— Information on the performance-based communication and surveillance (PBCS) concept and guidance material on its implementation are contained in the Performance-based Communication and Surveillance (PBCS) Manual (Doc 9869).

c) When direct pilot-controller two-way radiotelephony or data link communications are used for the provision of air traffic control service, recording facilities shall be provided on all such air-ground communication channels.

d) Recordings of communications channels as required in Subpart 14.1.48.1(c) shall be retained for a period of at least thirty days.

2) FOR FLIGHT INFORMATION SERVICE

a) Air-ground communication facilities shall be employed in the provision of two-way communications between the unit providing flight information service and appropriately equipped aircraft operating anywhere within the flight information region.

b) Whenever practicable, air-ground communication facilities for flight information service shall permit direct, rapid, continuous and static-free two- way communications.

3) **FOR AREA CONTROL SERVICE**

a) Air-ground communication facilities shall be employed in the provision of two-way communications between the unit providing area control service and appropriately equipped aircraft operating anywhere within the control area(s).

b) Whenever practicable, air-ground communication facilities for area control service shall permit direct, rapid, continuous and static-free two-way communications.

c) Where air-ground voice communication channels are used for area control service and are worked by air-ground communicators, suitable arrangements shall be made to permit direct pilot-controller voice communications, as and when required.

4) **FOR APPROACH CONTROL SERVICE**

a) Air-ground communication facilities shall be employed in the provision of direct, fast, uninterrupted and static-free two-way communications between the unit providing approach control service and appropriately equipped aircraft under its control.

b) The approach control unit shall be equipped with air- ground communication channels for its exclusive use.

5) **FOR AERODROME CONTROL SERVICE**

a) Air-ground communication facilities shall be employed in the provision of direct, rapid, continuous and static-free two-way communications between the aerodrome control tower and appropriately equipped aircraft operating at any distance within 45 km (25 NM) of the aerodrome concerned.

b) When conditions demand, separate communication channels shall be provided for the control of traffic operating on the manoeuvring area.

14.1.48.2 AERONAUTICAL FIXED SERVICE (GROUND-GROUND COMMUNICATIONS)

(a) GENERAL

1) Direct-speech and or data link communications shall be used in ground-ground communications for air traffic services purposes.

14.1.49 COMMUNICATIONS WITHIN A FLIGHT INFORMATION REGION

a) Communication between air traffic service units

14.1.49.1 The flight information centre shall be equipped with facilities for communicating with the following units providing services within its area of responsibility:

(1) the area control centre, unless collocated;

(2) approach control units;

(3) aerodrome control tower(s).

b) An area control centre, in addition to being connected to the flight information centre as prescribed in 14.1.48.1(a), shall be equipped with facilities for communicating with the following units providing services within its area of responsibility:

(1) approach control units;

(2) aerodrome control towers;

(3) air traffic services reporting offices, when separately established.

c) The unit providing approach control service shall, in addition to being connected to the flight information centre and the area control centre as prescribed in 14.1.48.1(a) and 14.1.48.1(b), be equipped with facilities for communicating with the associated aerodrome control tower(s) and, when separately established, the associated air traffic services reporting office(s).

d) The unit providing aerodrome control service shall, in addition to being connected to the flight information center, the area control centre and the approach control unit as prescribed in 14.1.48.1(a), 14.1.48.1(b) and 14.1.48.1(c), be equipped with facilities for communicating with the associated air traffic services reporting office, when separately established.

14.1.49.2 Communications between air traffic services units and other units

(a) The flight information centre and the area control centre shall have facilities for communicating with the under listed units providing services within their respective area of responsibility:

(1) appropriate military units;

(2) the meteorological office serving the centre;

(3) the aeronautical telecommunications station serving the centre;

(4) appropriate operator’s offices;

(5) the rescue coordination centre or, in the absence of such centre, any other appropriate emergency service;

(6) the international NOTAM office serving the centre.

(b) The approach control unit and the aerodrome control tower shall be equipped with appropriate facilities for communicating with the following units providing services within their respective area of responsibility:

(1) appropriate military units;

(2) rescue and emergency services (including ambulance, fire, etc.);

(3) the meteorological office serving the unit concerned;

(4) the aeronautical telecommunications station serving the unit concerned;

(5) the unit providing apron management service, when separately established.

(c) The communication facilities required under 14.1.40.4(a)(1) and 14.1.40.4(b)(1) shall include provisions for fast and dependable communications between the air traffic services unit concerned and the military unit(s) responsible for control of interception operations within the area of responsibility of the air traffic services unit.

14.1.49.3 Description of communication facilities

(a) The communication facilities required under 14.1.49.1, 14.1.49.2(a) and 14.1.49.2(b) and c) shall include provisions for:

(1) communications by direct speech alone, or in combination with data link communications, whereby for the purpose of transfer of control using radar or ADS-B, the communications can be established instantaneously and for other purposes the communications can normally be established within fifteen seconds; and

(2) printed communications, when a written record is required; the message transit time for such communications being no longer than five minutes.

(b) In all cases not covered by 14.1.49.1(a), the communication facilities shall include provisions for:

(1) communications by direct speech alone, or in combination with data link communications, whereby the communications can normally be established within fifteen seconds; and

(2) printed communications, when a written record is required; the message transit time for such communications being no longer than five minutes.

(c) In all cases where automatic transfer of data to and/or from air traffic services computers is required, suitable facilities for automatic recording shall be provided.

(d) The communication facilities required in accordance with 14.1.49.1 and 14.1.49.2 shall be supplemented, as and where necessary, by facilities for other forms of visual or audio communications, for example, closed circuit television or separate information processing systems.

(e) The communication facilities required under 14.1.49.2.(b) 1), 2) and 3) shall include provisions for communicating by direct speech arranged for conference communications.

(f) The communication facilities required under 14.1.49.2(b) 4) shall include provisions for communicating by direct speech arranged for conference communications, whereby the communications can normally be established within fifteen seconds.

(g) All facilities for direct-speech or data link communications between air traffic services units and between air traffic services units and other units described under 14.1.49.2(a) and 14.1.49.2(b) shall be provided with automatic recording.

(h) Recordings of data and communications as required in 14.1.49.1© and 14.1.49.1(g) shall be retained for a period of at least thirty days.

14.1.49.4 Communications between flight information regions

(a) Flight information centres and area control centers shall be equipped with facilities for communicating with all adjacent flight information centres and area control centres.

(1) These communication facilities shall in all cases include provisions for messages in a form suitable for retention as a permanent record, and delivery in accordance with transit times specified by regional air navigation agreements.

(2) Unless otherwise prescribed on the basis of regional air navigation agreements, facilities for communications between area control centres serving contiguous control areas shall, in addition, include provisions for direct speech and, where applicable, data link communications, with automatic recording, whereby for the purpose of transfer of control using radar or ADS-B or ADS-C data, the communications can be established instantaneously and for other purposes the communications can normally be established within fifteen seconds.

(3) When so required by agreement between the States concerned in order

to eliminate or reduce the need for interceptions in the event of deviations from assigned track, facilities for communications between adjacent flight information centres or area control centres other than those mentioned in 14.1.48 shall include provisions for direct speech alone, or in combination with data link communications. The communication facilities shall be provided with automatic recording.

(b) The communication facilities in 14.1.48.4(a)(3) shall permit communications to be established normally within fifteen seconds.

(c) Adjacent ATS units shall be connected in all cases where special circumstances exist.

(d) Wherever local conditions are such that it is necessary to clear aircraft into an adjacent control area prior to departure, an approach control unit and/ or aerodrome control tower shall be connected with the area control centre serving the adjacent area.

(e) The communication facilities in 14.1.49.4(b) and 14.1.49.4(c) shall include provisions for communications by direct speech alone, or in combination with data link communications, with automatic recording, whereby for the purpose of transfer of control using radar or ADS-B and ADS-C data, the communications can be established instantaneously and for other purposes the communications can normally be established within fifteen seconds.

(f) In all cases where automatic exchange of data between air traffic services computers is required, suitable facilities for automatic recording shall be provided.

14.1.49.5 Procedures for direct-speech communications

Appropriate procedures for direct speech communications shall be developed to permit immediate connections to be made for very urgent calls concerning the safety of aircraft, and the interruption, if necessary, of less urgent calls in progress at the time.

14.1.50 SURFACE MOVEMENT CONTROL SERVICE

14.1.50.1 Communications for the control of vehicles other than aircraft on maneuvering areas at controlled aerodromes

(a) Two-way radiotelephony communication facilities shall be provided for aerodrome control service for the control of vehicles on the manoeuvring area, except where communication by a system of visual signals is deemed to be adequate.

(b) Where conditions warrant, separate communication channels shall be provided for the control of vehicles on the manoeuvring area. Automatic recording facilities shall be provided on all such channels.

(c) Recordings of communications as required in 14.1.50.1 (a) and (b) shall be referred for a period of at least thirty days.

14.1.51 AERONAUTICAL RADIO NAVIGATION SERVICE

14.1.51.1 Automatic recording of surveillance data

(a) Surveillance information from primary and secondary radar equipment or other systems (e.g., ADS-B, ADS-C), used as an aid to air traffic services, shall be automatically recorded and used in accident and incident investigations, search and rescue, air traffic control and surveillance systems evaluation and training.

(b) Automatic recordings shall be retained for a period of at least thirty days. Recordings found to be pertinent to accident and incident investigations, shall be retained for longer periods until evidently no longer required.

14.1.52 APRON MANAGEMENT SERVICES.

14.1.52.1 PROVISION OF APRON MANAGEMENT SERVICES.

(a) When warranted by the volume of traffic, complexity of traffic and operating conditions, an appropriate Apron Management Services approved by the Authority shall either be provided by an Aerodrome ATS unit, or an Airports operator or by a combination of both, in order to:

(1) Control movement with the objective of preventing collisions between aircraft, between aircraft and vehicles and between aircraft and obstacles:

(2) Control entry of aircraft into, and coordinate exit of aircraft from the apron with the aerodrome control tower:

(3) Ensure safe and expeditious movements of vehicles, persons and appropriate control of other movements on the apron.

(b) When the aerodrome control tower does not participate in the apron management services, approved coordination procedures shall be established to facilitate the orderly and safe transition of aircraft between the apron management unit and the aerodrome control tower.

(c) An apron management service shall be provided with approved radiotelephony communications facilities.

(d) Where low visibility procedures are in effect, persons and vehicles operating on an apron shall be restricted to the essential minimum.

(e) An emergency vehicle responding to an emergency shall be given priority over all other surface movement traffic.

(f) A vehicle operating on an apron shall:

(1) Give way to an emergency vehicle, an aircraft taxiing, about to taxi, or being pushed or towed.

(2) Give way to other vehicles in accordance with local procedures.

(g) An aircraft stand shall be visually monitored to ensure that the established clearance distances are provided to an aircraft using the stand.

14.1.53 AERODROME VEHICLE OPERATIONS.

(a) Roads located on the movement and manoeuvring areas shall be restricted to the exclusive use of authorized personnel and that access to the public buildings by authorized personnel shall not require the use of such roads.

(b) Only radio-equipped vehicles shall be permitted to operate:

(1) On a maneuvering area only as authorized by the aerodrome control tower and;

(2) On the apron only as authorized by the appropriate designated authority.

(c) Drivers of vehicles on the manoeuvring or movement areas shall demonstrate to the Authority, proficiency in approved radiotelephony procedures and shall comply with all mandatory instructions conveyed by markings, radio, light signals and signs unless otherwise instructed by:

(1) The aerodrome control tower when on the maneuvering area or

(2) The appropriate designated authority when on the apron.

(d) Drivers of vehicles on the movement area shall comply with all mandatory instructions conveyed by light signals.

(e) Drivers of vehicles on the movement or manoeuvring areas shall undergo appropriate training approved by the Authority for the tasks to be performed and shall comply with all instructions issued by:

(1) The aerodrome control tower, when on the manoeuvring area, and

(2) The appropriate designated authority when on the apron.

(f) Drivers of radio-equipped vehicles shall establish satisfactory two-way communication with the aerodrome control tower before entering the manoeuvring area and with the appropriate designated authority before entering the apron. Drivers shall maintain a continuous listening watch on the assigned frequency when on the movement or manoeuvring areas.

14.1.54 AIR TRAFFIC SERVICES REQUIREMENTS FOR INFORMATION

14.1.54.1 METEOROLOGICAL INFORMATION

(a) GENERAL

1) Air traffic services units shall be supplied with up-to-date information on existing and forecast meteorological conditions as necessary for the performance of their respective functions. The information shall be supplied in such a form as to require a minimum of interpretation on the part of air traffic services personnel and with a frequency which satisfies the requirements of the air traffic services units concerned.

2) Meteorological offices shall be so situated as to facilitate personal consultation between meteorological personnel and personnel of units providing air traffic services. Where collocation is not practicable, the required consultation shall be achieved by other means.

3) Air traffic services units shall be supplied with available detailed information on the location, vertical extent, direction and rate of movement of meteorological phenomena in the vicinity of the aerodrome, and particularly in the climb-out and approach areas, which could be hazardous to aircraft operations.

4) When computer-processed upper air data are made available to air traffic services units in digital form for use by air traffic services computers, the contents, format and transmission arrangements shall be as agreed between the Meteorological Authority and the appropriate ATS Authority.

(b) Flight information centres and area control centres

1) The flight information centre and the area control center shall be supplied with SIGMET and AIRMET information, special air-reports, current meteorological reports and forecasts, with particular emphasis being laid on the occurrence or expected occurrence of bad weather as soon as this can be determined. Such reports and forecasts shall cover the flight information region or control area and such other areas as appropriate to be determined on the basis of regional air navigation agreements.

2) Current pressure data for setting altimeters shall be supplied to the flight information center or the area control center at appropriate intervals for locations specified by these centers.

(c) Units providing approach control service

1) Units providing approach control service shall be supplied with current meteorological reports and forecasts for the airspace and the aerodromes with which they are concerned. Special reports and amendments to forecasts shall be communicated to the units providing approach control service as soon as they are necessary in accordance with established criteria, without waiting for the next routine report or forecast. Where multiple anemometers are used, the displays to which they are related shall be clearly marked to identify the runway and section of the runway monitored by each anemometer.

2) The approach control unit shall be supplied with current pressure information for setting altimeters, for locations specified by this unit.

3) The unit providing approach control service for final approach, landing and take- off shall be equipped with surface wind display(s). The display(s) shall be related to the same location(s) of observation and be fed from the same sensor(s) as the corresponding display(s)in the aerodrome control tower and in the meteorological station, where such a station exists.

4) Units providing approach control service for final approach, landing and take- off at aerodromes where runway visual range values are assessed by instrumental means shall be equipped with display(s) permitting read-out of the current runway visual range value(s). The display(s) shall be related to the same location(s) of observation and be fed from the same sensor(s) as the corresponding displays(s) in the aerodrome control tower and in the meteorological station, where such a station exists.

5) Units providing approach control service for final approach, landing and take- off at aerodrome where the height of cloud base is assessed by instrumental means shall be equipped with display(s) permitting read-out of the current value(s) of the height of cloud base. The displays shall be related to the same location(s) of observations and be fed from the same sensor(s) as the corresponding display(s) in the aerodrome control tower and in the meteorological station, where such a station exists.

6) The unit providing approach control service for final approach, landing and take- off shall be supplied with information on wind shear which could adversely affect aircraft on the approach or take-off paths or during circling approach.

(d) Aerodrome control towers

1) Aerodrome control towers shall be supplied with current meteorological reports and forecasts for the aerodrome with which they are concerned. Special reports and amendments to forecasts shall be communicated to

the aerodrome control towers as soon as they are necessary in accordance with established criteria, without waiting for the next routine report or forecast.

2) Aerodrome control towers shall be provided with current pressure data for setting altimeters for the aerodrome concerned.

3) Aerodrome control towers shall be equipped with surface wind display(s). The display(s) shall be related to the same location(s) of observation and be fed from the same sensor(s) as the corresponding display(s) in the meteorological station, where such a station exists. Where multiple sensors are used, the indicators to which they are related shall be clearly marked to identify the runway and section of the runway monitored by each sensor.

4) Aerodrome control towers at aerodromes where runway visual range values are measured by instrumental means shall be equipped with display(s) permitting read- out of the current runway visual range value(s). The display(s) shall be related to the same location(s) of observation and be fed from the same sensor(s) as the corresponding display(s) in the meteorological station, where such a station exists.

5) Aerodrome control towers at aerodromes where the height of cloud base is assessed by instrumental means shall be equipped with display(s) permitting read-out of the current value(s) of the height of cloud base. The displays shall be related to the same locations(s) of observations and be fed from the same sensor(s) as the corresponding display(s) in the meteorological station, where such a station exists.

6) Aerodrome control towers shall be supplied with information on wind shear which could adversely affect aircraft on the approach or take-off paths or during circling approach and aircraft on the runway during the landing roll or take-off run.

7) Aerodrome control towers and or other appropriate units shall be supplied with aerodrome warnings.

(e) Communication stations

1) Where necessary for flight information purposes, current meteorological reports and forecasts shall be supplied to communication stations. A copy of such information shall be forwarded to the flight information centre or the area control centre.

14.1.54.2 INFORMATION ON AERODROME CONDITIONS AND THE OPERATIONAL STATUS OF ASSOCIATED FACILITIES

(a) Aerodrome control towers and units providing approach control service shall be kept currently informed of the operationally significant conditions of the movement area, including the existence of temporary hazards, and the operational status of any associated facilities at the aerodrome(s) with which they are concerned.

14.1.54.3 INFORMATION ON THE OPERATIONAL STATUS OF NAVIGATION SERVICES

(a) ATS units shall be kept currently informed of the operational status of non-visual navigation aids, and those visual aids essential for take-off, departure, approach and landing procedures within their area of responsibility and those radio navigational services and visual aids essential for surface movement.

(b) Information on the operational status, and any changes thereto, of radio navigational services and visual aids as referred to in 14.1.54.3 (a) shall be received by the appropriate ATS unit(s) on a timely basis consistent with the use of the service(s) and aid(s) involved.

I4.1.54.4 INFORMATION ON UNMANNED FREE BALLOONS

Operators of unmanned free balloons shall keep the appropriate air traffic services units informed of details of flights of unmanned free balloons in accordance with the provisions contained in Part 19.

14.1.54.5 INFORMATION CONCERNING VOLCANIC ACTIVITY

(a) ATS units shall be informed, in accordance with local agreement, of pre-eruption volcanic activity, volcanic eruptions and volcanic ash clouds which could affect airspace used by flights within their area of responsibility.

(b) Area Control Centers and Flight Information Centers shall be provided with volcanic ash advisory information issued by the associated VAAC.

14.1.54.6 INFORMATION CONCERNING RADIOACTIVE MATERIALS AND TOXIC CHEMICAL CLOUDS

ATS units shall be informed, in accordance with local agreement, of the release into the atmosphere of radioactive materials or toxic chemicals which could affect airspace used by flights within their area of responsibility.

14.1.54.7 INFORMATION CONCERNING SEVERE HARMATTAN CONDITIONS

(a) ATS units shall be informed, in accordance with local agreement, of anticipated severe Harmattan conditions which could affect airspace used by flights within their area of responsibility.

(b) ATS units shall be provided with advisory information issued by the authorized Meteorological Service Provider on Harmattan conditions.

14.1.54.8 INFORMATION ON SEASONAL BIRD CONCENTRATION AROUND AIRPORTS

(a) ATS units shall be informed, of the presence of bird concentration around airports which could constitute hazardous conditions for flight operations by the following:

(1) duty aerodrome controller

(2) Airports Operations

(3) Pilots

(4) any other source.

14.1.54.9 ATS SURVEILLANCE SERVICES

(a) In this regulation, the use of the word surveillance includes ADS-B and Multilateration systems as well as primary and secondary radar in accordance with PANS-ATM (ICAO Doc 4444).

(b) A safety case for the introduction of ADS-B and Multilateration systems shall be presented to the Authority (as required in 14.1.22(g), prior to such equipment being introduced to operational service.

(c) The ATS Provider shall establish procedures to ensure that, where radar or automatic dependent surveillance is used to support the provision of an air traffic service:

(1) All surveillance separations are in accordance with the requirements of PANS –ATM (ICAO Doc 4444);

(2) Mode A and or Mode S SSR code allocation shall be made by the ATC units in accordance with regional air navigation agreements;

(3) Full information is made available to pilots and aircraft operators on:

(i) the nature and extent of the surveillance services provided;

(ii) any significant limitations regarding such surveillance services;

(iii) The information displayed at individual surveillance operating positions is that required for the air traffic services to be provided, including the display of safety-related alerts and warnings; and

(iv) The surveillance system used shall be provided and maintained to have a very high level of reliability, availability, integrity and redundancy that minimizes the possibility of failure, non-availability, or significant degradation of performance.

(d) Mode C information verification by a controller shall only be required if differences in level information between that displayed to the controller and that used for control purposes are in excess of the tolerable values prescribed in PANS-ATM (ICAO Doc 4444).

(e) Determination of level occupancy: PANS-ATM (ICAO Doc 4444) shall be applicable.

(f) ADS-B may be used alone for separation of aircraft provided:

(1) Identification of ADS-B equipped aircraft is established and maintained;

(2) The integrity of the ADS-B is adequate to support the separation minima; and

(3) The sole use of ADS-B has been approved by the Authority.

(g) The display system shall provide a continuously updated presentation of the surveillance information.

(h) Position symbols may represent the raw data source of the position information, or a combined symbol.

(i) Safety related and automated coordination information shall be displayed in a clear and distinct manner to facilitate ease of recognition.

(j) Labels associated with displayed targets shall show, as a minimum, information relating to the identity of the aircraft and, if available, pressure altitude-derived information in a clear and concise manner.

(k) Labels shall be associated with the aircraft symbol in a manner precluding erroneous identification or confusion for the controller.

(l) Identification shall be established prior to the provision of any surveillance service, and the pilot informed. Identification shall be maintained until the termination of the surveillance service.

(m) Identification shall be established by one of the following methods:

(1) ADS-B:

i. direct recognition of aircraft identification in an ADS-B label; or

ii. transfer of ADS-B identification; or

iii. observance of compliance with an instruction to transmit ident.

(2) SSR:

(i) direct recognition of aircraft identification in a radar label; or

(ii) transfer of identification; or

(iii) observance of compliance with an instruction to squawk ident; or

(iv) recognition in a radar label, of an assigned discrete code which has been verified;

(v) observation of compliance with an instruction to set a specific code.

(3) PSR:

(i) by correlating a radar position indication with an aircraft reporting its position over, or as a bearing and distance from a point shown on the display, and by ascertaining that the track of the target is consistent with the aircraft's path or heading; or

(ii) by correlating an observed radar position indication with an aircraft that is known to have just departed, provided that the identification is established within 1 NM of the end of the runway used, or

(iii) by transfer of identification; or

(iv) after ascertaining the aircraft's heading, by instructing a pilot to change heading by 30 degrees or more for a period long enough, based on the aircraft's speed, to allow the track change to be identified and correlating the movements of a particular radar position symbol with the aircraft's acknowledged compliance with the instruction; or

(v) by correlating the movements of a particular position indication with movements currently reported by an aircraft.

(vi) When using methods (13)(c) (iv) and (v), the controller shall verify that only one radar position indication has carried out the manoeuvre, and that the aircraft will remain within coverage of both radar and the situation display.

(vii) Transfer of identification shall be affected by one of the following means:

A. automated designation of the position indication; or

B. notification of the aircraft's SSR code, Mode S or ADS-B identification feature; or

C. manual indication of the target where displays are adjacent or common; or

D. Designation of a position indication by reference to, or bearing and distance from a significant point or fix, together with the track of the position indication.

E. Instruction by the transferring controller to change SSR code and observation by the receiving controller of the change; or

F. Instruction by the transferring controller to squawk/ transmit ident and the observation of this response by the receiving controller.

G. The use of methods (E) and (F) above require prior coordination between the controllers.

(n) The ATS Provider shall establish procedures to ensure that, in the following circumstances, position information shall be passed to an aircraft receiving ATS surveillance service:

(1) upon identification, except when the identification is established:

(i) based on the pilot's report of the aircraft position or within one nautical mile of the runway upon departure and the observed position on the situation display is consistent with the aircraft's time of departure; or

(ii) by use of ADS-B aircraft identification, SSR Mode S aircraft identification or assigned discrete SSR codes and the location of the observed position indication is consistent with the current flight plan of the aircraft; or

(iii) by transfer of identification;

(2) when the pilot requests this information;

(3) when a pilot's estimate differs significantly from the controller's estimate based on the observed position;

(4) when the pilot is instructed to resume own navigation after vectoring if the current instructions had diverted the aircraft from a previously assigned route;

(5) immediately before termination of ATS surveillance service, if the aircraft is observed to deviate from its intended route.

(o) Position information shall be passed in one of the following forms:

(1) As a well-known geographical position; or

(2) Magnetic track and distance to a significant point, enroute or approach aid; or

(3) Compass direction and distance from a known position; or

(4) Distance to touchdown if on final approach; or

(5) Distance and direction from the centerline of an ATS route.

14.1.54.10 RADAR SEPARATION FROM AN UNIDENTIFIED CONTROLLED FLIGHT

(a) A minimum radar separation of 5 NM may be applied between an identified aircraft and an unidentified controlled flight entering or about to enter radar coverage, in accordance with the provisions of PANS-ATM (ICAO Doc 4444).

(b) Radar separation may be applied between a previously identified aircraft which has since passed out of radar coverage, and a following identified aircraft, provided the following aircraft can achieve the appropriate vertical separation at least 5 NM before the position at which the preceding aircraft passed out of radar coverage.

(c) Radar separation may be applied between aircraft on reciprocal tracks, when an identified aircraft is at least 5NM past the position at which a previously identified aircraft passed out of radar coverage.

(d) A minimum radar separation of 5NM may be applied between identified aircraft and the cleared route of an unidentified controlled VFR flight.

(e) Except when transfer of control is to be effected, aircraft shall not be vectored closer than 2.5NM or, where the minimum permissible separation is greater than 5NM, a distance equivalent to one-half of the prescribed separation minimum, from the limit of the airspace for which the controller is responsible, unless formal arrangements have been made with adjacent units or sectors to ensure that separation will exist with aircraft operating in adjoining areas.

14.1.54.11 RADAR SEPARATION FROM HOLDING AIRCRAFT

(a) In airspace where the radar separation minima is 5NM or less, a minimum of 5NM shall be applied between an identified aircraft that is not holding, and other identified aircraft that are holding notwithstanding that individual identity of the holding aircraft may be lost.

(b) In airspace with higher radar separation minima that minima shall be used between holding and non-holding aircraft.

14.1.54.12 RADAR SEPARATION FOR AIRCRAFT ON RECIPROCAL TRACKS

(a) Reciprocal tracks are as defined in PANS ATM (ICAO Doc 4444).

(b) Where confirmation has been obtained from radar derived information that aircraft on reciprocal tracks have passed, there is no requirement to ensure that minimum radar separation exists before reducing minimum vertical separation provided that:

(1) Both aircraft are properly identified;

(2) Radar label leader lines for both tracks are not crossed;

(3) The distance between the position symbols is increasing; and

(4) The position symbols are not touching or overlapping.

14.1.54.13 LOGS, POSITION LOGS AND DUTY HOUR LOGS

(a) The ATS Provider shall establish procedures to ensure that a log is kept at each ATS unit, and, where a unit has physically separate operations areas, at each such location within the unit.

(b) The log shall be used to record all significant occurrences and actions relating to operations, facilities, equipment and staff at an ATS unit including, but not limited to, such matters as:

(1) Incidents, accidents, non-compliance with Directives or ATC clearances regardless of whether an additional separate report is required;

(2) Aerodrome inspections, details of work in progress and other essential aerodrome information;

(3) Changes to the status of navigation facilities, services and procedures;

(4) Receipt of special aerodrome reports, SIGMET reports or other significant meteorological phenomena.

(c) The procedure shall ensure that:

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

(2) The log is maintained throughout the hours of watch of the ATS unit or operations room;

(3) If a logbook is used, the pages are sequentially numbered, all entries

are:

(i) in chronological order, include the time of entry in UTC;

(ii) are in ink; and without erasure, defacement, or obliteration;

(iii) corrected by drawing a single line through the erroneous information and initialing the correction;

(4) When the Log is in an electronic format, measures shall be taken to ensure that all entries made in the log are traceable and protected. The electronic format shall not permit entries to be subsequently altered or tampered with in any way;

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

(6) Reviewed by the ATC Manager, or designee, daily to note all significant entries.

(d) An air traffic controller duty hour log shall be maintained at each ATC operational position. Controllers are responsible for ensuring that the entries made in the duty hour log are complete and accurate.

(e) Unit management shall have a process in place to ensure that entries made in the duty log are complete and accurate and to oversight the controller duty hours so that, in the event that a controller will or has worked outside the duty hour restrictions, the controller shall not be permitted to continue operational duties until the duty hours' requirements can be met and if necessary, the controller has been counselled on the issue.

(f) Each duty hour log shall include unit and operational position identifiers. Air traffic controllers shall enter the following information into the log during handover procedures:

(1) The controller identifier;

(2) The date - time controller accepted handover from previous controller; and

(3) The date - time controller completed handover to on-coming controller.

14.1.54.14 TRIALS

(a) The Authority may, upon application in writing from the ATS provider, approve, subject to such conditions on that approval as the Authority considers necessary in the interests of aviation safety, the conduct of trials regarding:

(1) Reduced separation minima; or

(2) New operating procedures or routes; or

(3) Standard phraseology; or

(4) ATS surveillance procedures, or

(5) Data link procedures.

(b) The application shall include a safety assessment in accordance with ICAO PANS- ATM (ICAO Doc 4444) and ICAO Document 9859.

(c) A trial may be approved by the Authority for a single period of no longer than 6 months, and upon further application in writing by the ATS Provider, be extended by the Authority for a single period of no longer than 3 months.

(d) A trial approved under this rule may be terminated by the Authority at any time.

14.1.54.15 DENIAL OF AN ATC CLEARANCE

(a) The ATS Provider in respect of an aerodrome control service shall not deny the pilot of an aircraft an ATC clearance on the basis of non-payment of charges owed to the Authority unless: –

(1) The aircraft is on the ground; and

(2) That clearance is for entry onto the manoeuvring area.

(b) The ATS Provider shall continue to provide normal ATC service for any aircraft entering the manoeuvring area without an ATC clearance.

14.1.54.16 WATCH ROSTERS

(a) The ATS Provider shall meet the rostering limitations specified in the duty hour requirements contained in 14.1.54.16(j)

(b) The ATS Provider shall notify the Authority of formal rostering arrangements on monthly basis.

(c) The ATS Provider shall not require controllers to carry out ancillary tasks while they are providing operational air traffic control services unless this can be accomplished without negative effects on safety. An ancillary task is any task in an operational control room, which is not directly associated with the provision of an air traffic control service.

(d) The ATS Provider shall make available adequate support staff to enable controllers to carry out their duties in accordance with the Regulation and PANS-ATM (Doc 4444). The number and disposition of support staff will depend on the complexity of the unit. The ATS Provider shall arrange appropriate training and shall be responsible for the continued competency of such staff. The Authority may require to be given details of the training support staff has received.

(e) Exceptionally, where such ancillary duties are unavoidable, the ATS Provider shall satisfy the Authority that controllers will not be distracted from their primary function or placed under undue pressure. These duties and the person responsible for discharging them shall be clearly identified in the unit's Operations Manual.

(f) The ATS Provider shall ensure that adequate staff resources are provided to ensure that such operational staff are provided with suitable breaks during the work shifts, with work periods not exceeding 10 hours and a minimum of 10 hours break being provided between working shifts.

(g) Air Traffic Controllers may delegate some of their responsibilities to adequately trained support staff (such as Air Traffic Control Assistants) provided they do not include duties for which an Air Traffic Control license is required. Duties that may be delegated fall into two categories:

(1) Air Traffic Control related duties not closely associated with the safety of aircraft (e.g. Telephone messages concerning flight data and clearances). These duties and the person responsible for discharging them shall be clearly identified in the unit's Operations Manual; and

(2) Other duties of an administrative nature

(h) Adherence to these regulation and fatigue-related issues shall be taken into account before shift changes are implemented.

(i) The requirements within this regulation shall apply to air traffic controllers having, prior to commencing operational duty, performed unlicensed duties, e.g. office, administration, training, courses, seminars, workshops etc. As far as reasonably practicable, the provisions of these regulation shall also apply to air traffic control assistants interacting with air traffic controllers.

(j) Duty hour requirements shall include the following:

(1) No Period of Duty shall exceed 10 hours;

(2) There shall be an interval of not less than 10 hours between the conclusion of one Period of Duty and the commencement of the next Period of Duty. This interval may be reduced by up to 20 minutes solely for the purpose of orderly shift handover;

(3) Not more than 2 Night Duties may be worked in immediate succession. This may be allowed in the event of an unplanned call- out to cover a Night duty.

(4) Within 40 consecutive hours the aggregate of Periods of Duty shall not exceed 20 hours;

(5) Within 720 consecutive hours (30 days) the sum of hours of total Off Duty Periods shall total more than 240hrs (10 days);

(6) ATC Operational Duties shall not normally exceed 2 ½ hours. During any 3 hour period consisting of ATC Operational Duties there shall normally be at least one break not less than 30 minutes in duration immediately prior to the resumption of operational duties. Frequent break periods shall be considered during heavy or complex traffic situations and low visibility conditions for aerodrome control rated air traffic controllers.

(7) The ATC Section may, where workload, density and complexity, for any part of the day are judged to be low and the activity is sporadic rather than continuous, increase the Operational Duty period stated in (f) to a maximum of 4 hours.

14.1.54.17 STUDENT AIR TRAFFIC CONTROLLER LICENCE

14.1.54.17.1 Carrying out ATC function without the Authority's approval.

a) A person who provides an air traffic control service under supervision, towards the grant of an Air Traffic Controller License, whether first or subsequent rating, shall be required to hold a Student Air Traffic Controller Licence under the requirements of this regulation.

b) A person shall not carry out ATC function in Nigeria except he or she is a holder of a valid license issued under Part 2 of these Regulations.

c) To be granted a Student Air Traffic Controller License, the applicant shall satisfy the appropriate requirements for age, knowledge, experience, competence, skill, linguistic ability and physical and mental fitness as detailed in this section of the regulation.

d) Furthermore, the applicant shall only exercise the privileges of the Student Air Traffic Controller Licence at an air traffic service unit subject to these Regulation.

14.1.54.17.2 Before the Authority will grant a Student Air Traffic Controller License to a person not holding a Nigeria Air Traffic Controller Licence, it will require the applicant to meet the following requirements:

a) Be not more than 60 years of age on application date;

b) Successfully completed an ICAO ATC course, or equivalent, approved by the Authority for the applicable rating for which the student will undergo OJT; or

c) Has acted as a certified civilian air traffic controller performing full time operational duties for a minimum period of 3 years, in the applicable rating the student will undergo OJT, at a civil air traffic facility under the jurisdiction of an authority, whose ATC licensing system has been deemed by the Authority as meeting the requirements laid down in this regulation;

d) Demonstrates to the satisfaction of the Authority, through a test acceptable to the Authority, the ability to speak and understand the English language used for radiotelephony communications to the level specified in the ICAO language proficiency requirements and

e) Hold a current Class 3 Medical Certificate.

14.1.54.17.3 Before the Authority will grant a Student Air Traffic Controller License to a person holding a Nigerian Air Traffic Controller Licence, it will require the applicant to meet the following requirements:

a) Successfully completed an ICAO ATC course of training appropriate to additional rating/s required, or equivalent, approved by the Authority, for the applicable rating for which the student will undergo OJT, or

b) Has acted as a certified civilian air traffic Air Traffic Controller performing full time operational duties for a minimum period of 3 years, in the applicable rating the applicant will undergo OJT, at a civil air traffic facility under the jurisdiction of an authority, whose ATC licensing system has been deemed by the Authority as meeting the requirements laid down in this regulation.

14.1.54.17.4 Applicants seeking issue of ratings shall:

(a) Provide copies of their Air Traffic Controller Licence(s);

(b) Provide a Verification Letter from the Civil Aviation Authority having issued their Air Traffic Controller Licence(s);

(c) If required by the ATS unit, submit themselves for an Assessment of Previous Competence (APC) by an ATC Examiner; and

(d) Undertake and complete that part of an approved course of training which the ATC Examiner has determined is necessary and which is approved by the Authority.

(e) The APC will be based on the air traffic controller’s experience, the period of time elapsed since the air traffic controller exercised the privilege of the particular rating and the relevance of duties performed in the intervening period, or the period of time which has elapsed since a student air traffic controller completed an ATC course. The assessment is carried out to determine the amount of refresher training required to achieve a level of competence similar to that achieved through recently passing an approved course of training. The person(s) to whom responsibility for this evaluation has been delegated, shall decide on the requirement for refresher training.

14.1.54.17.5 The Authority will, at its discretion and subject to an evaluation of training plans and facilities, ATC systems, airspace structure, operating procedures, applied standards, safety management systems and general service level, from whom civil ATC competencies and qualifications will be accepted to meet the requirements of this regulation.

14.1.54.17.6 The ATS unit shall provide the following evidence for the issue of a Student Air Traffic Controller Licence:

a) Proof of the applicant's age (valid passport copy);

b) Certification that the applicant has successfully completed an ICAO ATC course, or equivalent, approved by the Authority; or Certification that the applicant has met the previous requirements stated this regulation

c) Certification that the applicant has demonstrated at least the minimum operational English Level of Proficiency.

14.1.54.17.7 It is the responsibility of the applicant to ensure that his license is valid, in that it is a current Student Air Traffic Controller Licence for the applicable rating and contains a current Class 3 medical certificate.

14.1.54.17.8 OJT Instructors shall remain responsible at all times for the safety of the air traffic control service that the student is providing under his supervision.

14.1.54.17.9 A Student Air Traffic Controller License shall not be extended beyond a total duration of 2 years. In cases where training has been interrupted due to exceptional circumstances, the Authority may, at its discretion renew, extend or re-issue a Student Air Traffic Controller Licence.

14.1.54.17.10 The holder of a Student Air Traffic Controller License who has not exercised the privileges of that license for a period of 1 year may only commence or continue OJT in that rating after assessment of previous competence as to whether the student continues to satisfy the requirements relevant to that rating, and after satisfying any training requirements that result from this assessment.

14.1.54.17.11 The Authority will not issue a Student Air Traffic Controller Licence valid for combined ratings, except when ATS units require combined training in two ratings, e.g. aerodrome control and approach control procedural.

14.1.54.18 AIR TRAFFIC CONTROLLER LICENCE

(a) A person who wishes to act as an air traffic controller in the Nigeria shall be required to hold a valid Air Traffic Controller License issued by the Authority.

(b) To be granted an Air Traffic Controller Licence, the applicant shall satisfy the appropriate requirements for age, knowledge, experience, competence, skill, linguistic, ability, physical and mental fitness as detailed in this section of the regulation.

(c) Furthermore, the applicant shall only exercise the privileges of the Air Traffic Controller License at an ATS unit (ATSU) subject to the Nigeria Civil Regulation.

(d) An applicant for initial issue of an Air Traffic Controller Licence shall meet the following requirements:

(1) Be not less than 21 years of age and not more than 60 years of age on application date;

(2) Demonstrate to the satisfaction of the Authority, the ability to speak and understand the English language, used for radiotelephony communications, to the level specified in the ICAO language proficiency requirements;

(3) Meet the applicable Minimum Experience Requirements (MER) for the entry qualifications, rating and unit as detailed in 14.1.45.20;

(4) Be assessed as being competent (as defined in paragraph 14.1.45.20), to provide a specific category of air traffic control service at a particular ATSU; and

(5) Hold a current Class 3 Medical Certificate from an approved Aero Medical Examiner;

(6) Hold a current Student Air Traffic Controller Licence.

(e) The ATS unit shall provide the following evidence for the issue of an Air Traffic Controller Licence:

(1) Certification that the applicant has successfully completed the relevant requirements of the Unit Training and Assessment Plan (UTAP); and

(2) Certification that the applicant has met the Minimum Experience Requirement (MER); and

(3) A valid Certificate of Competence (CoC) for the applicable rating.

14.1.54.19 REQUIRED KNOWLEDGE, SKILLS AND EXPERIENCE

(a) The knowledge required to be demonstrated by an air traffic controller or a student air traffic controller, shall be at an appropriate standard for a holder of an Air Traffic Controller Licence, and include at least the following subjects:

(1) Air Law;

(2) Air Traffic Control Equipment;

(3) General Aviation Knowledge;

(4) Human Factors, performance limitations, e.g. fatigue, relevant to ATC;

(5) Threat and Error Management;

(6) English Language Proficiency;

(7) Meteorology;

(8) Navigation;

(9) Air Traffic Control Procedures; and

(10) Safety Management System

(b) The experience required shall include:

(1) Experience gained while controlling under the supervision of an OJT Instructor for a required minimum period of time, known as the Minimum Experience Requirement (MER), before a CoC is issued for a rating; or

(2) Experience gained while training in accordance with an approved ATS unit training and assessment plan

(c) The skill and competence required shall be demonstrated by:

(1) Successful completion of an ICAO ATC training course, or equivalent, approved by the Authority; and

(2) Being assessed as competent (as defined in 14.1.53.20), to provide a specific category of air traffic control service at a particular air traffic services unit (ATSU).

(d) The ICAO English language proficiency requirements shall be met.

(e) The physical and mental fitness requirements shall be met by the issuance of a ICAO Class 3 Medical Certificate.

(f) The Authority may grant a license subject to such conditions as deemed appropriate to a person to act as an Air Traffic Controller, or as a Student Air Traffic Controller, upon being satisfied that the applicant is a fit person to hold the licence and is qualified by reasons of knowledge, experience, competence, skills, physical and mental fitness, and attitude to so act. For that purpose, the applicant shall, at his expense, furnish such evidence and undergo such training, examinations and tests (including medical examinations) as the Authority may require.

14.1.54.20 LICENCE AND CERTIFICATE MAINTENANCE AND RETURN

(a) An Air Traffic Controller Licence is valid for a period of 10 years.

(b) For an Air Traffic Controller to take responsibility of an ATC operational position he shall:

(1) Hold a valid Air Traffic Controller Licence for the relevant ATC rating;

(2) Hold a valid Certificate of Competence (CoC) for the relevant rating and sector(s);

(3) Hold a valid Class 3 Medical Certificate; and

(4) Hold a valid English Language Proficiency Certificate of Level 4 or greater.

(c) For a Student Air Traffic Controller to undertake OJT in an ATC operational position, under the supervision of an OJT Instructor endorsed by the Authority, he shall:

(1) Hold a valid Student Air Traffic Controller Licence for the relevant ATC rating;

(2) Hold a valid Class 3 Medical Certificate; and

(3) Hold a valid English Language Proficiency Certificate of Level 4 or greater.

(d) For an Air Traffic Controller to hold a valid Endorsement he shall hold a current Air Traffic Controller Licence.

(e) A holder of an Air Traffic Control Licence shall not be entitled to exercise the privileges of a rating contained in that licence unless he holds a current CoC specific to the unit or sector, at which the air traffic control service is to be provided.

(f) For the Air Traffic Controller Licence or Student Air Traffic Controller Licence to remain current the holder shall inform the ATS unit of any conditions or limitations applicable to the Licence including any conditions or limitations to the Medical certificate which may affect the holder's ability to perform air traffic control duties safely and efficiently. Air Traffic Controllers are reminded that it is their responsibility, as Air Traffic Controller Licence holders, to ensure compliance with the requirements stated in Part 2 of this regulations.

(g) An air traffic controller who does not exercise the privileges of a rating, for which a CoC has been issued, for a period likely to impair the air controller's performance through lack of routine, shall not exercise the privileges of the rating in question until an agreed upon period of training under supervision has been completed.

(h) To remain current, the air traffic controller shall perform the minimum number of hours of operational duty, as listed below, during the previous calendar month:

(1) 12 hours for an air traffic controller holding currency in one rating discipline; or

(2) 12 hours for an air traffic controller holding currency in more than one rating discipline, where the rating disciplines are normally combined during low traffic periods; or

(3) 8 hours for each rating discipline held, for air traffic controllers holding currency in more than one rating discipline, where the rating disciplines are not normally combined.

(i) These minimum total duty periods shall be conducted on ATC control positions appropriate to the rating and be performed without supervision and without OJT Instructor or Examiner duties.

(j) The minimum hour rule above and the associated remedial measures stipulated in (g) and (h) represent the minimum direct exposure to handling of air traffic necessary to maintain adequate routine and currency. Individual needs for practice may be higher, owing to local conditions, personal traits, variability in traffic etc. The rules formulated to strike a balance between the need for frequent practice and ease of administration and application do not relieve the air traffic controller from duty of care with respect to personal performance. ATS management shall have the option to institute higher minimum hour requirements.

(k) For air traffic controllers failing to satisfy the currency requirement stipulated in (h) above, competence may be ascertained by the following methods:

(1) Perform a Currency Check under the supervision of an OJT Instructor endorsed by the Authority lasting not less than 2 hours under traffic conditions permitting an evaluation of performance, at the discretion of the ATS unit. The OJT Instructor conducting the supervision is the responsible air traffic controller; or

(2) By a Certificate of Competence (CoC) examination, including the components of written, practical and oral examinations, conducted by an ATC Examiner (ATCE) endorsed by the Authority.

(l) For an air traffic controller who does not exercise the privileges of a rating for a period greater than one (1) calendar month, but less or equal to three (3) calendar months, competency shall be ascertained by performing a Currency Check under the supervision of an OJT Instructor endorsed by the Authority lasting not less than 25 hours under traffic conditions permitting an evaluation of performance, at the discretion of the ATS unit. The OJT Instructor conducting the supervision is the responsible air traffic controller.

(m) For an air traffic controller who does not exercise the privileges of a rating for a period greater than three (3) calendar months, but less than six (6) calendar months, competency may be ascertained by performing a Currency Check under the supervision of an OJT Instructor endorsed by the Authority lasting not less than 36 hours under traffic conditions permitting an evaluation of performance, at the discretion of the ATS unit. The OJT Instructor conducting the supervision is the responsible air traffic controller.

(n) Notwithstanding the alternative (remedial) actions detailed in (l) and (m), the Authority may require a complete CoC examination.

(o) The validity of a CoC shall lapse after an air traffic controller fails to exercise the operational privileges of an ATC rating for a period greater than 180 days, or after failing to satisfy the means of compliance in paragraphs (h), (k), (l) and (m).

(p) Air traffic controllers failing to meet the requirements detailed above shall inform the ATS unit that his competence has lapsed.

(q) Where a CoC ceases to be valid for one rating, an air traffic controller may continue to exercise the privileges of any other rating for which he holds a valid CoC.

(r) Active simulator practice (not instructional duties) may be substituted for up to 50 percent of the minimum operational hours requirement. Simulator hours which are credited towards minimum operational duty requirements, shall only include exercises which accurately represent the airspace, traffic pattern and operational environment of the operational position for which the hours are credited.

(s) ATS units shall have a process in place to ensure that Air Traffic Controller Licenses, Student Air Traffic Controller Licenses, Certificates of Competence and Class 3 Medical Certificates are signed by the holder and securely filed within the ATS unit.

(t) The ATS unit shall retain ATC Licenses and Class 3 Medical Certificates and have a process in place to monitor the renewal and currency requirements for each Licence and Class 3 Medical Certificate.

(u) An Air Traffic Controller Licence is not required by persons who pass instructions or advice on behalf of an air traffic controller by the use of radiotelephony (RTF) or telecommunication lines.

(v) An ATS unit which wishes to utilize such persons shall:

(1) Submit proposal to the Authority for approval;

(2) Such proposal shall indicate the types of messages that will be passed and the safety implications of using such a procedure;

(3) Submit training and assessments plans to ensure that those who will

pass instructions and or advice on the air traffic controller's behalf are competent to do so and are assessed annually to ensure they remain competent.

(w) An Air Traffic Controller Licence, complete with the Rating and Endorsement Record and the Class 3 Medical Certificate may be kept by the ATS unit or air traffic controller when the holder ceases operational duties permanently, unless the licence has been revoked in which case it shall be returned to the Authority.

14.1.54.21 AIR TRAFFIC CONTROLLER RATINGS

(a) Ratings of the classes outlined below may be included in an Air Traffic Controller Licence subject to the provisions of these regulation. The inclusion of a rating in a licence shall confer the privileges as set out below.

(b) The following ratings, indicating the type of air traffic control service, which the holder is authorised to provide, shall be included in an Air Traffic Controller Licence:

(1) Aerodrome Control (ADC): To provide or to supervise the provision of aerodrome control service for the aerodrome for which the licence holder is rated.

(2) Approach Control Procedural (APP): To provide or to supervise the provision of approach control service for the aerodrome or aerodromes for which the licence holder is rated, within the airspace or portion thereof, under the jurisdiction of the unit providing approach control service.

(3) Approach Control Surveillance (APS): To provide or to supervise the provision of approach control service with the use of applicable ATS surveillance systems for the aerodrome or aerodromes for which the licence holder is rated, within the airspace or portion thereof, under the jurisdiction of the unit providing approach control service.

(4) Area Control Procedural (ACP): To provide or to supervise the provision of area control service within the control area or portion thereof, for which the licence holder is rated.

(5) Area Control Surveillance (ACS): To provide or to supervise the provision of area control service with the use of an ATS surveillance system, within the control area or portion thereof, for which the licence holder is rated.

14.1.54.22 AIR TRAFFIC CONTROLLER ENDORSEMENTS

(a) Application for the endorsements listed below shall be made using NIGERIA

ATS 001 specified in Nig. CARs Part 2.

(1) ATC Examiner (ATCE): The ATCE endorsement shall entitle the holder of a license to conduct examinations for the issuance and renewal of Certificates of Competence, at operational positions or sectors on which the holder is currently competent.

(2) OJT Instructor (OJTI): The OJTI endorsement shall entitle the holder of a license to conduct On-the-Job training in simulators or at operational positions or sectors on which the holder is currently competent.

(b) The holder of a license shall not simultaneously perform the functions of more than one rating except at ATS units where it has been determined by the ATS unit through a safety assessment that this can be achieved safely for the following ratings:

(1) The aerodrome control and approach control procedural ratings; or

(2) The approach control procedural and the approach control surveillance ratings; or

(3) The approach control procedural and the area control procedural ratings; or

(4) The area control procedural and the area control surveillance ratings;

(c) ATS units shall ensure that the validation of ratings is conducted by an appropriate examiner approved by the Authority whose endorsement is recorded in his Air Traffic Controller Licence.

(d) An air traffic controller may be endorsed as an ATC Examiner at the discretion of the Authority, provided:

(1) He has at least 5 years full time operational ATC experience in the rating for which the examinations will be conducted;

(2) He maintains and has held for a minimum period of 2 years, Certificates of Competence for the sectors or operational positions for which examinations will be conducted;

(3) He currently holds an OJT Instructor endorsement, which has been held for at least 1 year, at the unit for which the examinations will be conducted;

(4) He has completed an examiner course acceptable to the Authority; and

(5) He has conducted at least 2 initial or subsequent issues of CoC examinations under the supervision of an ATC Examiner.

(e) An air traffic controller may be endorsed as an OJT Instructor, at the discretion of the Authority, provided:

(1) He/She has at least 4 years full time operational experience in the rating for which instruction will be conducted;

(2) He/She maintains, and has held for a minimum period of 1 year, Certificates of Competence for the sectors or operational positions for which instruction will be conducted;

(3) He/She has completed an OJT Instructor course acceptable to the Authority; and

(4) He/She has completed unit specified training on the conduct of the UTAP scheme.

(f) The ATS unit shall provide the following evidence for the issue of a rating:

1. Certification that the applicant has successfully completed an approved ATC course for the applicable rating; or

2. Evidence that the applicant has acted as a certified civilian air traffic controller performing full time operational duties for a minimum period of 3 years, in the applicable rating, at a civilian air traffic facility under the jurisdiction of an authority, whose ATC licensing system has been deemed by the Authority as meeting the requirements laid down in these regulation; and

3. Certification that the applicant has met the Minimum Experience Requirements (MER) associated with that rating; or

4. Certification that the applicant has successfully completed the UTAP associated with that rating; and

5. A valid CoC for the applicable rating.

(g) Where the aerodrome control function is divided into specialist operational positions, an air traffic controller shall be competent on all positions, before a CoC relating to the Aerodrome Control rating will be issued.

(h) A specialist operational position in aerodrome control refers to ground movement control, aerodrome control and planner etc.

(i) ATS units shall seek advice from the Authority to determine if their air traffic controllers are required to hold both an approach control procedural rating and an approach control surveillance rating and, area control procedural rating and an area control surveillance rating.

(j) At units where ATS surveillance systems are the primary controlling aid, air traffic controllers may not be required to hold a separate procedural rating provided that:

(1) Surveillance derived information is continuously available during the

notified period of the provision of an ATS surveillance service;

(2) Contingency measures and the procedures to be used in the event of a surveillance failure are published in the unit ATS Operations Manual, e.g. LATCI;

(3) The surveillance used to provide the ATS surveillance service is a surveillance radar;

(4) The ATS unit provides such additional procedural training as is appropriate to unit procedures. This training may be undertaken either at the unit or at an ATS Training Organisation providing the training under a programme acceptable to the Authority;

(5) Procedures for ATS surveillance service contingencies are assessed as part of CoC examinations.

14.1.54.23 CERTIFICATION OF SPECIAL AIR TRAFFIC CONTROL RELATED FUNCTIONS

(a) ATS Supervisors, ATS Safety Investigators and ATS Training Instructors are required to be certified by the ATS unit prior to commencing duties related to these job functions.

(b) The ATS unit shall ensure that procedures and processes are established for the certification of ATS Supervisors, ATS Safety Investigators and ATS Training Instructors, which shall meet the following qualifications, experience and competency requirements:

(1) ATS Supervisor:

(i) Hold or have held an ATC Licence in a rating where supervision will be conducted for a minimum of 5 years, of which 2 years have been at the ATS Unit;

(ii) Possess good skills in leadership, decision making, team work and overall ATC knowledge;

(iii) Possess a high level of written and verbal English communications skills;

(iv) Have successfully completed a supervisory management course or similar;

(v) Have demonstrated the competency to conduct supervisory duties to the satisfaction of the Head of ATC Training;

(2) ATS Safety Investigator:

(i) Hold or have held an ATC rating in which investigation will be conducted for a minimum of 5 years;

(ii) Possess a high level of written and verbal English communications skills;

(iii) Have successfully completed an Incident Investigation course;

(iv) Have successfully completed a mandatory Safety Investigation Training Workshop conducted by the Authority;

(v) Have demonstrated to the satisfaction of the Safety Management post holder the competency to conduct Investigator duties to the expected ATS Unit standard.

(3) ATS Training Instructor:

i) Hold or have held an ATC Licence in a rating for which unit ATC theoretical rating training or academic ATC theoretical and simulator training will be conducted, for a minimum of 5 years;

ii) Hold or have held an OJT Instructor endorsement for minimum 1 year in a rating for which training will be conducted;

iii) For unit training, hold or have held a Certificate of Competence for a minimum of 2 years at the ATS unit in a rating for which unit ATC theoretical rating training will be conducted;

iv) Possess a high level of written and verbal English communications skills;

v) Have successfully completed a classroom/presentation instructional techniques course;

vi) Have successfully demonstrated competence in the conduct of classroom instruction acceptable to the Head of ATC Training or Academy Manager of an ATS Training Organisation.

(c) In addition to the provisions in 14.1.54.23 (a) and 14.1.54.23(b)(3), an ATS Training Instructor shall apply for endorsement by the Authority using NCAA 001 specified in Nig. CARs Part 2.

14.1.54.24 RELIEF FROM DUTY

a) When an air traffic controller's action may have been a contributing factor in an ATS occurrence such as an accident, AIRPROX, serious incident, loss of separation or hazardous situation where the safety of an aircraft was or may have been jeopardized, he shall be relieved as soon as reasonably practicable from all operational duties pending a unit investigation.

b) There shall be no partial removal from duty.

c) The controller's relief from duty should not be taken as a suspicion of guilt but purely to protect the controller and the unit in the following ways:

(1) To ensure a potentially unsettled controller does not make post occurrence errors;

(2) To allow the controller to be available to write a statement and assist in the initial investigation;

(3) To allow the controller time for recovery and be offered post- incident stress counselling, i.e. critical incident stress management (CISM); and

(4) To give the unit protection if in fact some actions are required to raise the controller's competence to the required standard.

d) Following an accident or serious incident, an ATCO relieved from duty shall not be returned to operational duties without approval from the Authority.

e) If during or after the ATS unit investigation of an ATS occurrence other than an accident or serious incident, it is found that the controller's actions were correct and did not contribute to the occurrence, an ATS unit may return the controller to operational duties. The ATS unit shall notify the Authority accordingly.

f) If during or after the ATS unit investigation of an ATS occurrence other than an accident or serious incident, it is found that the controller's actions did or may have contributed to the occurrence, the controller shall remain relieved of all operational duties until successfully completing remedial actions.

g) The Head of ATC shall determine, after consultation with ATC operational management, the remedial actions required to ensure that a controller relieved of duty has the required knowledge and competence to return to duty. The remedial actions shall be documented, dated and signed by all parties and kept on the concerned controller's file for a minimum 3 years after the occurrence.

h) Where it is determined that remedial training is required, the controller's CoC for the affected rating/s shall be withdrawn and the Authority be notified. A CoC shall only be reissued after the successful completion of a full CoC examination (written, practical and oral examination) and the Licensing Department is to be informed when the CoC has been re-issued.

i) When ATS remedial training is required, the controller involved shall first be counselled with the objective of ensuring that he understands what errors were made, accepts ownership of his actions, and will be receptive to training. This shall be documented, dated and signed by all parties and kept on the concerned controller's file for a minimum 3 years after the occurrence.

j) In cases where remedial training is required, a training needs analysis shall be carried out by the ATS unit and documented to determine specific training requirements

14.1. 54.25 INCIDENTS INVOLVING AIRLINE OPERATORS

(a) Following an aviation incident, controllers shall ensure that pilots involved in the incident are aware that the incident has occurred and that reporting action is being taken.

(b) In the event of a serious incident, the pilot involved shall, when possible, be interviewed by an ATS unit officer to ascertain relevant details, which may assist in the unit investigation. The interview shall be conducted at an appropriate time, and on an appropriate recorded private frequency or communication line. The interview shall be documented for inclusion in the ATS unit investigation.

14.1. 54.25 CATEGORY AND DESCRIPTION OF OCCURRENCE

(a) ACAS Event: An incident where a resolution advisory event (RA) did or may have occurred.

(b) Accident: An occurrence meeting the definition of an accident contained in Part 14.0.2

(c) AIRPROX: A situation in which, in the opinion of a pilot or air traffic services personnel, the distance between aircraft as well as their relative positions and speed have been such that the safety of the aircraft involved may have been compromised.

(d) Risk of collision: The risk classification of an aircraft proximity in which serious risk of collision has existed.

(e) Safety not assured: The risk classification of an aircraft proximity in which the safety of the aircraft may have been compromised.

(f) No risk of collision: The risk classification of an aircraft proximity in which no risk of collision has existed.

(g) Risk not determined: The risk classification of an aircraft proximity in which insufficient information was available to determine the risk involved, or inconclusive or conflicting evidence precluded such determination.

(h) ASMI Category A: An incident in which a reduction in required ATC separation occurs where the separation remaining is 25% or less of the required minimum, regardless of whether or not corrective action or an evasive response to avoid a collision was taken. (ASMI: Airborne Separation Minima Infringement).

(i) ASMI Category B: An incident in which a reduction in required ATC separation occurs where the separation remaining is 26% up to and including 50% of the required minimum and no ATC action is taken, or the initial action to resolve the situation was determined by the pilot or ACAS.

(j) ASMI Category C: An incident in which a reduction in required separation occurs where:

(1) The separation remaining is 26% up to and including 50% of the required minimum and ATC resolved the situation; or

(2) The separation remaining is 51% up to and including 75% of the required minimum and no ATC action is taken, or the initial action to resolve the situation was determined by the pilot or ACAS

(k) ASMI Category D: An incident in which a reduction in required separation occurs where:

(1) The separation remaining is 51% up to but not including 90% of the required minimum and ATC resolved the situation; or

(2) The separation remaining is 76% or more and no ATC action is taken, or the pilot or ACAS resolved the situation.

(l) ASMI Category E: An incident in which a reduction in required separation occurs where the separation remaining is 90% or more of the required minimum and ATC resolved the situation.

(m) Airspace Penetration (CTA/CTR/SUA) without clearance or approval: An incident where an aircraft enters civil or military controlled airspace or SUA without clearance or proper authorisation.

(n) Apron Incident: An incident reported to ATC where the flight safety of an aircraft was or may have been affected on the apron area.

(o) ATC Co-ordination Error: An incident where the coordination between ATC Sectors or units is not completed correctly, where the ATC coordination failure affected flight safety.

(p) ATC Operational issue: An incident, not resulting in any other category, where incorrect ATCO actions or ATC procedures affected, may have affected flight safety.

(q) ATS or Aerodrome Equipment failure: An incident where there is a failure or irregularity of ATS or Aerodrome communication, navigation or surveillance systems or any other safety significant systems or equipment which could adversely affect the safety or efficiency of flight operations and or the provision of an air traffic control service.

(r) Communications failure: An incident where an aircraft experiences a total or partial communications failure.

(s) Deviations from ATC Clearance (not including a level bust): An incident where an aircraft fails to comply with any component of an ATC clearance, excluding a cleared altitude or flight level.

(t) Emergency (other than engine failure or fuel shortage): An incident, excluding an accident, security event, engine failure, fuel emergency or medical emergency, where a pilot declares an emergency, Mayday or Pan.

(u) Engine failure: An incident where a pilot reports he has experienced an engine failure during take-off, in flight or landing, or reports that he has shut down an engine due to a technical problem.

(v) Flight planning error: An incident where a flight planning error has been reported which may affect the safety of a flight.

(w) FOD: An incident involving FOD detected on a runway including reported tyre bursts from aircraft which have recently operated on a runway.

(1) Category A: FOD which is likely to cause damage to an aircraft on a runway or runway shoulder;

(2) Category B: FOD which is likely to cause damage to an aircraft found within runway strip or RESA (Runway End Safety Area);

(3) Category C: FOD which is likely to cause damage to an aircraft on taxiways or taxiway shoulders;

(4) Category D: FOD which is likely to cause damage to an aircraft found on the taxiway strips, apron areas or elsewhere on the airfield.

(x) Fuel emergency: An incident where a pilot reports he is experiencing a minimum fuel situation which requires an emergency declaration.

(y) Go-around event: Any go- around event, except where an aircraft intentionally goes around for training purposes.

(z) Level Bust Category A: An incident where an aircraft deviates from an assigned level by 800 feet or more, and there was no loss of separation.

(aa) Level Bust Category B: An incident where an aircraft deviates from an assigned level by 600 or 700 feet and there was no loss of separation.

(bb) Level Bust Category C: An incident where an aircraft deviates from an assigned level by 400 or 500 feet, and there was no loss of separation.

(cc) Level Bust Category D: An incident where an aircraft deviates from an assigned level by 300 feet or less and there was no loss of separation.

(dd) Loss of Runway Separation Category A: An incident in which a reduction in required runway separation occurs where:

(1) A collision is narrowly avoided; or

(2) The separation remaining is 25% or less of the required minimum, regardless of whether or not corrective action or an evasive response to avoid a collision was taken.

(ee) Loss of Runway Separation Category B: An incident in which a reduction in required runway separation occurs where:

(1) A significant potential for collision which may result in a time-critical corrective evasive response to avoid a collision; or

(2) The separation remaining is 26% up to and including 50% of the required minimum, and no ATC action is taken, or the initial action to resolve the situation was determined by the pilot.

(ff) Loss of Runway Separation Category C: An incident in which a reduction in required runway separation occurs where:

(1) There is ample time or distance to avoid a potential collision; or

(2) The separation remaining is 26% up to and including 50% of the required minimum, and ATC resolved the situation; or

(3) The separation remaining is 51% or more of the required minimum and no ATC action is taken, or the initial action to resolve the situation was determined by the pilot.

(gg) Loss of Runway Separation Category D: An incident in which a reduction in required runway separation occurs where:

(1) The separation remaining is 51% or more of the required minimum and ATC resolved the situation; or

(2) An aircraft is in receipt of a landing or take-off clearance, while another aircraft is on the runway, and the initial action to resolve the situation was determined by the pilot.

(hh) LVP Violations: An incident where an aircraft conducts an operation when RVR, Met visibility and/or cloud-base conditions are below the required approach minima or the aerodrome operator minima.

(i) Manoeuvring Area Excursion:

(1) Category A: An incident in which an aircraft has an excursion from a runway – i.e. overruns, excursion off the side of the runway – resulting in damage to aircraft.

(2) Category B: An incident in which an aircraft has an excursion from a taxiway – excursion off the side of the taxiway – resulting in

damage to aircraft.

(3) Category C: An incident in which an aircraft has an excursion from a runway – i.e. overruns, excursion off the side of the runway – resulting in no damage to aircraft.

(4) Category D: An incident in which an aircraft has an excursion from a taxiway- excursion off the side of the taxiway – resulting in no damage to aircraft.

(jj) Medical emergency: An incident where a pilot reports a medical emergency requiring a diversion or priority track or landing due to a sick or injured passenger or crew member.

(kk) Runway incursion category A: A serious incident in which a collision is narrowly avoided.

(ll) Runway incursion Category B: A runway incursion in which the separation decreases and there is a significant potential for collision, which may result in a time-critical corrective or evasive response to avoid a collision. This includes a runway incursion occurring while a departing aircraft has commenced its take-off roll or an arriving aircraft has crossed the threshold.

(mm) Runway incursion Category C: A runway incursion characterised by ample time and or distance to avoid a collision, including a runway incursion occurring while a departing aircraft has been cleared to line up, or cleared for take-off or an arriving aircraft has been cleared to land but has not crossed the threshold.

(nn) Runway incursion Category D: A runway incursion that meets the definition of a runway incursion such as the incorrect presence of a vehicle, person or aircraft on the protected area of a surface designated for the landing and take-off of aircraft but with no immediate safety consequences.

(oo) Runway incursion category E: Insufficient information or inconclusive or conflicting evidence precludes a severity assessment.

(pp) Runway operation incident: An incident occurring on a runway, where operational safety was or may have been affected, excluding a runway incursion, such as: An aircraft conducts an operation on a runway without proper authority, e.g. conducting a take-off or landing on an operational or closed runway without a clearance; or Attempting a take-off from, or landing on a taxiway not approved for such an operation.

(qq) Security event: An incident involving a security event relating to an aircraft, which may adversely affect flight safety, such as a Hijack, Bomb Warning or an unruly passenger, which results in a request for a priority diversion or landing, or the attendance to an aircraft by security personnel.

(rr) Technical problem: An incident excluding a declared emergency where a pilot reports an aircraft technical problem.

(ss) Visual hazard report: An incident where a pilot or ATS Unit becomes aware of a situation involving a light source, including laser, spotlights or pyrotechnics, where flight safety was or may have been compromised

14.1.55 LOW VISIBILITY OPERATIONS

14.1. 55 .1 INTRODUCTION

(a) The Low Visibility Directives contained herein address the safety and regularity issues related to:

(1) Approaches and landings in Category I and Category II meteorological conditions;

(2) Take offs in RVR not less than 550 metres (for CAT I) and 350 metres (for CAT II);

(3) Control of surface movements in meteorological conditions not permitting ATS to be carried out with visual reference.

(b) These authorizations prescribe the circumstances in which Low Visibility Procedures (LVP) are required as well as the requirements to be addressed by these procedures.

(c) The additional measures required to support safe operations at an airport in Low Visibility Conditions (LVC) shall be specified in local procedures as "Low Visibility Procedures" (LVP).

(d) LVPs shall be established to:

(1) Prevent collisions between aircraft on the ground;

(2) Prevent collisions between aircraft and vehicles;

(3) Prevent runway incursions;

(4) Protect and extend the integrity of ground based navigation equipment;

(5) Extend protection from obstacles and confusing lighting effects;

(6) Maintain continuity of service of visual and non-visual aids;

(7) Extend ability to give adequate guidance to rescue and firefighting services;

(8) Extend meteorological services; and

(9) Provide reporting for enforcement and monitoring of safety levels

14.1.55.2 AIR TRAFFIC MANAGEMENT PROCEDURES

(a) The actual LVP required at an airport will depend on the type of operations conducted. Low Visibility Procedures established by the ATS Provider shall be approved by the Authority.

(b) The general provisions in ICAO Doc 4444, Pans ATM shall apply.

(c) Local ATC Instructions (LATCI) shall specify types of approved LVO along with associated procedures.

(d) The LATCI shall contain detailed procedures for the following:

(1) The RVR values at which the LVP shall be implemented;

(2) Minimum ILS equipment requirements for Category I or II operations;

(3) Other facilities and aids, such as lighting, required for category I or II operations;

(4) Runway holding positions to be used;

(5) Minimum spacing between an arriving and a departing aircraft to ensure protection of the sensitive and critical areas;

(6) Minimum spacing between successive approaching aircraft;

(7) Procedures to verify that aircraft and vehicles have vacated the runway and sensitive areas for ILS components;

(8) Procedures applicable to separation of aircraft on the manoeuvring area;

(9) Procedures applicable to separation of aircraft and vehicles;

(10) Low visibility taxi routes;

(11) Staffing of operational positions.

(e) A formal agreement between ATC and the Apron Management Service, shall define the LVP to be used and clearly state the tasks and responsibilities of each party in LVC, in particular including provisions for the movement of vehicles on the apron. Except as required for essential operational reasons, vehicles shall not be permitted on the manoeuvring area in LVC.

14.1.55.3 INITIATION AND CANCELLATION OF ATS LOW VISIBILITY PROCEDURES

(a) The conduct of LVO depends on the existence of suitable runway protection measures, surface movement guidance and control, emergency procedures and apron management.

(b) LVO shall be initiated by the aerodrome control tower, once the aerodrome operator has advised that all measures required to protect aircraft operations in poor weather conditions are in place.

(c) The aerodrome control tower shall inform the approach control unit concerned when procedures for precision approach category I or II and low visibility operations will be applied and also when such procedures are discontinued.

(d) Criteria for Category I or II status shall be clearly established. Procedures shall be established to manage full or partial failure of the overall system, to enable one of the following to occur:

(1) Downgrade LVO for all aircraft movements;

(2) Continue LVO for specified types or categories of movements;

(3) Continue LVO without restrictions.

(e) Based on the defined and approved criteria, ATC shall communicate the low visibility status of the airport or runway to pilots.

14.1.55.4 RUNWAY RESTRICTIONS AND PROTECTION

(a) The following shall not be permitted in LVC:

(1) Intersection take-offs;

(2) Use of operational runways as taxi routes.

(b) Critical and Sensitive areas shall be clearly identified to the aerodrome controller(s) on radar maps or charts on display.

(c) For Category I and II operations, the sensitive areas shall be protected when aircraft are close to the runways during take-off and landing operations.

(d) When take-off is carried out on a runway with a radiating localizer, the critical and sensitive areas for the localizer shall be kept clear of all vehicles, aircraft or mobile objects.

(e) A Surface Movement Guidance and Control System (SMGCS) or Advanced Surface Movement Guidance and Control System (ASMGCS) required for operations in LVC shall be used to assist in prevention of incursions of aircraft and vehicles on active runways and associated critical and sensitive areas for ILS components.

14.1.55.5 LOW VISIBILITY TAXI ROUTES

(a) LVP taxi routes shall be established and enforced in LVC to facilitate navigation, reduce traffic complexity and minimise risk of runway incursions.

(b) LVP taxi routes shall minimise manoeuvring between runway and apron.

(c) SMGCS and signs shall support standard LVP taxi routes.

(d) LVP taxi routes shall be indicated on charts.

14.1.55.7 SURFACE MOVEMENT SURVEILLANCE

(a) A Surface Movement Surveillance system shall be provided for the manoeuvring area:

(1) At airports intended for use in RVR conditions less than 300 metres;

(2) Where airport layout is complex and or visual guidance makes surveillance required to protect the runway(s) and sensitive areas from incursions;

(3) Where traffic density and operating conditions are such that regularity of traffic flow cannot be maintained by alternative procedures and facilities.

(b) Surveillance can be used for:

(1) Confirmation that the runway and associated critical and sensitive areas are clear of aircraft, vehicles and other obstructions prior to a departure or landing;

(2) Ensuring that a departing aircraft is lined up on the correct runway;

(3) Ascertaining that a departing aircraft has commenced take-off run;

(4) Guiding and monitoring aircraft and vehicles on the manoeuvring area as required;

(5) Expediting surface traffic flows by directing along optimum routings;

(6) Providing guidance to emergency vehicles;

(7) Ensuring pushback will not conflict with traffic on the manoeuvring area.

14.1.55.8 LVO CONTINGENCY PROCEDURES

(a) Detailed LVO contingency procedures shall be established by the ATS Provider to address failures of essential components of the SMGCS.

(b) These contingency procedures shall be approved by the Authority.

14.1.55.9 TRAINING

(a) ATS staff involved in LVO shall be trained in knowledge and application of the approved procedures. Understanding and skills shall be demonstrated as part of periodic competency checking.

(b) The training syllabus shall include handling of failures and emergency situations.

14.1.55.10 AUTOMATIC TERMINAL INFORMATION SERVICE (ATIS)

(a) Availability of low visibility facilities shall be communicated to pilots by means of the ATIS broadcast, where available, except for short notice changes which shall be passed by radio.

(b) The following standard phraseology shall be used in ATIS broadcasts:

"Low Visibility Procedures...(CAT I or II) in operation"

(1) Additionally, when local conditions require specific holding positions to be used the following message shall be used if necessary:

"Use Category XX Holding Positions"

Where "XX" is replaced by the relevant category of operation (I or II) as appropriate.

(2) When LVP are terminated, the ATIS shall be updated by removing the "Low Visibility Procedures(CAT I or CAT II) in operation" message.

14.1.56. Local Air Traffic Control Instructions (LATCI) Manual.

14.1.56.1. The holder of an air traffic services provider certificate shall provide each air traffic services unit listed in its Manual of Operations, a local air traffic control manual which :

(a) sets out the procedures for the operation of the air traffic services unit concerned ; and

(b) contains the information as prescribed in the Requirements of these Regulations. For contents of LATCI see IS 14.1.56.1.

14.1.56.2. The local air traffic control instructions manual shall not be seen in isolation but rather as the document necessary to provide the interface between peculiarities of a particular unit and the various source documents, and does not relieve air traffic service personnel from the responsibility of being familiar with and the application of procedures laid down in the following documents:

(a) Aeronautical Information Publication, AIP supplements, AIC and NOTAMs;

(b) Civil Aviation Act 2022;

(c) Nigeria Civil Aviation Regulations; and

(d) Relevant ATM documents.

14.1.56.3 Amendments to LATCI.

Amendments to the LATCI manual shall be done as prescribed in IS 14.1.56 and recorded in the document and brought to the attention of all concerned.

14.1.57 Free Route Airspace

14.1.57.1 In the implementation of FRA, the ANSP shall ensure

a) all airspace reservations remain;

b) all airspace users have equal access;

c) Civil/Military Coordination are taken into account in order to have harmonized procedures and service provision for the benefit of all the airspace users

14.1.57.2 Applicable Airspace

FRA concept shall be applicable to any area where FRA is implemented within the Nigerian airspace

14.1.57.3 The ANSP shall ensure the Vertical and Horizontal limits of the FRA are published in AIS Publications

14.1.57.4 The implementation of FRA shall be in accordance with the provisions and specifications in accordance with relevant ICAO documents

14.1.57.5 FRA Contingency

14.1.57.6 FRA operations within the Kano FIR shall be suspended;

a) In the event of total failure of surveillance system

b) In the event of total or partial failure of communication system within the designated FRA portion of thereof:

c) In the event of severe weather conditions that may not permit flight over direct route as planned:

d) During ATM contingency that may affect the safety and efficiency of flight operations on such direct routes

Note: The requirements for RPAS operations within Nigerian Airspace are specified in Part 21 of The Nigeria Civil Aviation Regulations

14.1.58 RPAS ATC Communications

14.1.58.1 The general requirements for ATC communications, to and from a remote pilot, shall be the same as for manned aviation operating in the same airspace.

14.1.58.2 RPAS communication with ATC shall be through a very high frequency (VHF) voice, which may include the requirement to support ATC data link.

14.1.58.3 ATC communications function shall meet the RCP specified for the airspace in which the RPA is operating

14.1.58.4 RPAS ANSP SMS

The ANSPs shall have a SMS that includes RPAS operations by including a hazard identification and risk management assessment associated with the types of operations specified under these regulations.

14.1.58.5 The RPAS operator shall determine the meteorological conditions in which the RPA is operating during the take-off and landing phases to ensure operations in accordance with applicable flight rules

14.1.59 Reserved RPAS ATM/UTM Procedures

14.1.60 (Reserved) RPAS ATM Concept of Operation

14.1.61 Contingency provisions:

Reserved

14.1.62. Approval of Area for Operation of RPAS

14.1.62.1 A person may apply to the ATS Provider for the approval of an area as an area for the operation of RPA generally, or a particular category of RPA

14.1.62.2 A RPAS operator wishing to operate within an area shall forward such request to the ATS provider giving details of:

a) Coordinates of the area

b) Altitudes of operations

c) Date, time and intended duration of operations

d) Operational Risk assessment and Mitigation measures

e) Copies of Certification, Approvals and Authorizations of the operator issued by the Authority

f) Copies of licenses of crew issued by the Authority

g) Any other relevant details of the operations

14.1.62.3 The ATS provider may grant the request subject to conditions prescribed in Part 21 (21.9.6.30) of this regulation

14.1.62.4 The ATS Provider shall provide the Authority the application and any approval issued

14.1.62.4.1 An approval has effect from the time written notice is issued to the applicant, or a later day, or day and time stated in the approval.

14.1.62.4.2 An approval may be expressed to have effect for a particular period (including a period of less than 1 day) or indefinitely.

14.1.62.5 The ATS Provider may impose conditions on the approval in the interest of safety of air navigation

14.1.62.6 If the ATS provider approves an area under (14.1.60.3), it shall publish details of the approval (including any condition) in a NOTAM and/or on an aeronautical chart.

14.1.63 Revocation of Area of Operation

14.1.63.1 The ATS Provider may revoke the approval of an area, or change the conditions that apply to such an approval in the interest of the safety of air navigation;

14.1.63.2 ATS Provider shall publish details of any revocation or change in NOTAM or an aeronautical chart;

14.1.63.3 ATS Provider shall give written notice of the revocation or change;

(a) to the person who applied for the approval of the area; or

(b) if the person applied for that approval as an officer of an organization concerned with RPA and no longer holds that office, to the person who now holds the office

APPENDIX 1. PRINCIPLES GOVERNING THE IDENTIFICATION OF NAVIGATION SPECIFICATIONS AND THE IDENTIFICATION OF ATS ROUTES OTHER THAN STANDARD DEPARTURE AND ARRIVAL ROUTES

Note.— See Appendix 3 concerning the identification of standard departure and arrival routes and associated procedures. Guidance material on the establishment of these routes and procedures is contained in the Air Traffic Services Planning Manual (Doc 9426).

1. Designators for ATS routes and navigation specifications

1.1 The purpose of a system of route designators and navigation specification(s) applicable to specified ATS route segment(s), route(s) or area is to allow both pilots and ATS, taking into account automation requirements:

a) to make unambiguous reference to any ATS route without the need to resort to the use of geographical coordinates or other means in order to describe it;

b) to relate an ATS route to a specific vertical structure of the airspace, as applicable;

c) to indicate a required level of navigation performance accuracy, when operating along an ATS route or within a specified area; and

d) to indicate that a route is used primarily or exclusively by certain types of aircraft.

Note 1.— Specifications concerning the publication of navigation specifications are given in Annex 4, Chapter 7, and PANS-AIM (Doc 10066), Appendix 2.

Note 2.— In relation to this appendix and for flight planning purposes, a prescribed navigation specification is not considered an integral part of the ATS route designator.

1.2 In order to meet this purpose, the designation system shall:

a) permit the identification of any ATS route in a simple and unique manner;

b) avoid redundancy;

c) be usable by both ground and airborne automation systems;

d) permit utmost brevity in operational use; and

e) provide sufficient possibility of extension to cater for any future requirements without the need for fundamental changes.

1.3 Controlled, advisory and uncontrolled ATS routes, with the exception of standard arrival and departure routes, shall therefore be identified as specified hereafter.

2. Composition of designator

2.1 The ATS route designator shall consist of a basic designator supplemented, if necessary, by:

a) one prefix as prescribed in 2.3; and

b) one additional letter as prescribed in 2.4.

2.1.1 The number of characters required to compose the designator shall not exceed six characters.

2.1.2 The number of characters required to compose the designator should, whenever possible, be kept to a maximum of five characters.

2.2 The basic designator shall consist of one letter of the alphabet followed by a number from 1 to 999.

2.2.1 Selection of the letter shall be made from those listed hereunder:

a) A, B, G, R for routes which form part of the regional networks of ATS routes and are not area navigation routes;

b) L, M, N, P for area navigation routes which form part of the regional networks of ATS routes;

c) H, J, V, W for routes which do not form part of the regional networks of ATS routes and are not area navigation routes;

d) Q, T, Y, Z for area navigation routes which do not form part of the regional networks of ATS routes.

2.3 Where applicable, one supplementary letter shall be added as a prefix to the basic designator in accordance with the following:

a) K to indicate a low-level route established for use primarily by helicopters;

b) U to indicate that the route or portion thereof is established in the upper airspace;

c) S to indicate a route established exclusively for use by supersonic aircraft during acceleration, deceleration and while in supersonic flight.

2.4 When prescribed by the appropriate ATS authority or on the basis of regional air navigation agreements, a supplementary letter may be added after the basic designator of the ATS route in question in order to indicate the type of service provided in accordance with the following:

a) the letter F to indicate that on the route or portion thereof advisory service only is provided;

b) the letter G to indicate that on the route or portion thereof flight information service only is provided.

Note 1.— Due to limitations in the display equipment on board aircraft, the supplementary letters "F" or "G" may not be displayed to the pilot.

Note 2.— Implementation of a route or a portion thereof as controlled route, advisory route or flight information route is indicated in aeronautical charts and aeronautical information publications in accordance with the provisions in Annexes 4 and 15.

3. Assignment of basic designators

3.1 Basic ATS route designators shall be assigned in accordance with the following principles.

3.1.1 The same basic designator shall be assigned to a main trunk route throughout its entire length, irrespective of terminal control areas, States or regions traversed.

Note.— This is of particular importance where automated ATS data processing and computerized airborne navigation equipment is used.

3.1.2 Where two or more trunk routes have a common segment, the segment in question shall be assigned each of the designators of the routes concerned, except where this would present difficulties in the provision of air traffic service, in which case, by common agreement, one designator only shall be assigned.

3.1.3 A basic designator assigned to one route shall not be assigned to any other route.

3.1.4 States' requirements for designators shall be notified to the Regional Offices of ICAO for coordination.

4. Use of designators in communications

4.1 In printed communications, the designator shall be expressed at all times by not less than two and not more than six characters.

4.2 In voice communications, the basic letter of a designator shall be spoken in accordance with the ICAO spelling alphabet.

4.3 Where the prefixes K, U or S specified in 2.3 are used, they shall, in voice communications, be spoken as follows:

K — KOPTER
U — UPPER

S — SUPERSONIC

The word “kopter” shall be pronounced as in the word “helicopter” and the words “upper” and “supersonic” as in the English language.

4.4 Where the letters “F” or “G” specified in 2.4 are used, the flight crew should not be required to use them in voice communications.

APPENDIX 2.

PRINCIPLES GOVERNING THE ESTABLISHMENT AND IDENTIFICATION OF SIGNIFICANT POINTS

1. Establishment of significant points

1.1 Significant points should, whenever possible, be established with reference to ground-based or space-based radio navigation aids, preferably VHF or higher frequency aids.

1.2 Where such ground-based or space-based radio navigation aids do not exist, significant points shall be established at locations which can be determined by self-contained airborne navigation aids, or, where navigation by visual reference to the ground is to be effected, by visual observation. Specific points may be designated as ‘‘transfer of control’’ points by agreement between adjacent air traffic control units or control positions concerned.

2. Designators for significant points marked by the site of a radio navigation aid

2.1 Plain language name for significant points marked by the site of a radio navigation aid

2.1.1 Whenever practicable, significant points shall be named with reference to an identifiable and preferably prominent geographical location.

2.1.2 In selecting a name for the significant point, care shall be taken to ensure that the following conditions are met:

a) the name shall not create difficulties in pronunciation for pilots or ATS personnel when speaking in the language used in ATS communications. Where the name of a geographical location in the national language selected for designating a significant point gives rise to difficulties in pronunciation, an abbreviated or contracted version of this name, which retains as much of its geographical significance as possible, shall be selected;

Example: FUERSTENFELDBRUCK = FURSTY

b) the name shall be easily recognizable in voice communications and shall be free of ambiguity with those of other significant points in the same general area. In addition, the name shall not create confusion with respect to other communications exchanged between air traffic services and pilots;

c) the name should, if possible, consist of at least six letters and form two syllables and preferably not more than three;

d) the selected name shall be the same for both the significant point and the radio navigation aid marking it.

2.2 Composition of coded designators for significant points marked by the site of a radio navigation aid

2.2.1 The coded designator shall be the same as the radio identification of the radio navigation aid. It shall be so composed, if possible, as to facilitate association with the name of the point in plain language.

2.2.2 Coded designators shall not be duplicated within 1 100 km (600 NM) of the location of the radio navigation aid concerned, except as noted hereunder.

Note. — When two radio navigation aids operating in different bands of the frequency spectrum are situated at the same location, their radio identifications are normally the same.

2.3 States' requirements for coded designators shall be notified to the Regional Offices of ICAO for coordination.

3. Designators for significant points not marked by the site of a radio navigation aid

3.1 Where a significant point is required at a position not marked by the site of a radio navigation aid, and is used for ATC purposes, it shall be designated by a unique five-letter pronounceable "name-code". This name-code designator then serves as the name as well as the coded designator of the significant point.

Note. — The principles governing the use of alphanumeric name-codes in support of RNAV SIDs, STARs and instrument approach procedures are detailed in the PANS-OPS (Doc 8168).

3.2 The name-code designator shall be selected so as to avoid any difficulties in pronunciation by pilots or ATS personnel when speaking in the language used in ATS communications.

Examples: ADOLA, KODAP

3.3 The name-code designator shall be easily recognizable in voice communications and shall be free of ambiguity with those used for other significant points in the same general area.

3.4 The unique five-letter pronounceable name-code designator assigned to a significant point shall not be assigned to any other significant point. When there is a need to relocate a significant point, a new name-code designator shall be chosen. In cases when a State wishes to keep the allocation of specific name-codes for reuse at a different location, such name-codes shall not be used until after a period of at least six months.

3.5 States' requirements for unique five-letter pronounceable name-code designators shall be notified to the Regional Offices of ICAO for coordination.

3.6 In areas where no system of fixed routes is established or where the routes followed by aircraft vary depending on operational considerations, significant points shall be determined and reported in terms of World Geodetic System — 1984 (WGS-84) geographical coordinates, except that permanently established significant points serving as exit and/or entry points into such areas shall be designated in accordance with the applicable provisions in 2 or 3.

8/11

4. Use of designators in communications

4.1 Normally the name selected in accordance with 2 or 3 shall be used to refer to the significant point in voice communications. If the plain language name for a significant point marked by the site of a radio navigation aid selected in accordance with 2.1 is not used, it shall be replaced by the coded designator which, in voice communications, shall be spoken in accordance with the ICAO spelling alphabet.

4.2 In printed and coded communications, only the coded designator or the selected name-code shall be used to refer to a significant point.

5. Significant points used for reporting purposes

5.1 In order to permit ATS to obtain information regarding the progress of aircraft in flight, selected significant points may need to be designated as reporting points.

5.2 In establishing such points, consideration shall be given to the following factors:

a) the type of air traffic services provided;

b) the amount of traffic normally encountered;

c) the accuracy with which aircraft are capable of adhering to the current flight plan;

d) the speed of the aircraft;

e) the separation minima applied;

f) the complexity of the airspace structure;

g) the control method(s) employed;

h) the start or end of significant phases of a flight (climb, descent, change of direction, etc.);

i) transfer of control procedures;

j) safety and search and rescue aspects;

k) the cockpit and air-ground communication workload.

5.3 Reporting points shall be established either as “compulsory” or as “on-request”.

5.4 In establishing “compulsory” reporting points, the following principles shall apply:

a) compulsory reporting points shall be limited to the minimum necessary for the routine provision of information to air traffic services units on the progress of aircraft in flight, bearing in mind the need to keep cockpit and controller workload and air-ground communications load to a minimum;

b) the availability of a radio navigation aid at a location should not necessarily determine its designation as a compulsory reporting point;

c) compulsory reporting points should not necessarily be established at flight information region or control area boundaries.

5.5 “On-request” reporting points may be established in relation to the requirements of air traffic services for additional position reports when traffic conditions so demand.

5.6 The designation of compulsory and on-request reporting points shall be reviewed regularly with a view to keeping the requirements for routine position reporting to the minimum necessary to ensure efficient air traffic services.

5.7 Routine reporting over compulsory reporting points should not systematically be made mandatory for all flights in all circumstances. In applying this principle, particular attention shall be given to the following:

a) high-speed, high-flying aircraft should not be required to make routine position reports over all reporting points established as compulsory for low-speed, low-flying aircraft;

b) aircraft transiting through a terminal control area should not be required to make routine position reports as frequently as arriving and departing aircraft.

5.8 In areas where the above principles regarding the establishment of reporting points would not be practicable, a reporting system with reference to meridians of longitude or parallels of latitude expressed in whole degrees may be established.

APPENDIX 3. PRINCIPLES GOVERNING THE IDENTIFICATION OF STANDARD DEPARTURE AND ARRIVAL ROUTES AND ASSOCIATED PROCEDURES

Note. — Material relating to the establishment of standard departure and arrival routes and associated procedures is contained in the Air Traffic Services Planning Manual (Doc 9426).

1. Designators for standard departure and arrival routes and associated procedures

Note. — In the following text, the term "route" is used in the meaning of "route and associated procedures".

1.1 The system of designators shall:

a) permit the identification of each route in a simple and unambiguous manner;

b) make a clear distinction between:

— departure routes and arrival routes;

—departure or arrival routes and other ATS routes;

— routes requiring navigation by reference to ground-based radio aids or self-contained airborne aids, and routes requiring navigation by visual reference to the ground;

c) be compatible with ATS and aircraft data processing and display requirements;

d) be of utmost brevity in its operational application;

e) avoid redundancy;

f) provide sufficient possibility for extension to cater for any future requirements without the need for fundamental changes.

1.2 Each route shall be identified by a plain language designator and a corresponding coded designator.

1.3 The designators shall, in voice communications, be easily recognizable as relating to a standard departure or arrival route and shall not create any difficulties in pronunciation for pilots and ATS personnel.

2. Composition of designators

2.1 Plain language designator

2.1.1 The plain language designator of a standard departure or arrival route shall consist of:

a) a basic indicator; followed by

b) a validity indicator; followed by

c) a route indicator, where required; followed by d) the word “departure” or “arrival”; followed by

e) the word “visual”, if the route has been established for use by aircraft operating in accordance with the visual flight rules (VFR).

2.1.2 The basic indicator shall be the name or name-code of the significant point where a standard departure route terminates or a standard arrival route begins.

2.1.3 The validity indicator shall be a number from 1 to 9.

2.1.4 The route indicator shall be one letter of the alphabet. The letters “I” and “O” shall not be used.

2.2 Coded designator

The coded designator of a standard departure or arrival route, instrument or visual, shall consist of:

a) the coded designator or name-code of the significant point described in 2.1.1 a); followed by

b) the validity indicator in 2.1.1 b); followed by

c) the route indicator in 2.1.1 c), where required.

Note. — Limitations in the display equipment on board aircraft may require shortening of the basic indicator, if that indicator is a five-letter name-code, e.g. KODAP. The manner in which such an indicator is shortened is left to the discretion of operators.

3. Assignment of designators

3.1 Each route shall be assigned a separate designator.

3.2 To distinguish between two or more routes which relate to the same significant point (and therefore are assigned the same basic indicator), a separate route indicator as described in 2.1.4 shall be assigned to each route.

4. Assignment of validity indicators

4.1 A validity indicator shall be assigned to each route to identify the route which is currently in effect.

4.2 The first validity indicator to be assigned shall be the number “1”.

4.3 Whenever a route is amended, a new validity indicator, consisting of the next higher number, shall be assigned. The number “9” shall be followed by the number “1”.

5. Examples of plain language and coded designators

5.1 Example 1: Standard departure route — instrument:

a) Plain language designator: BRECON ONE DEPARTURE

b) Coded designator: BCN 1

5.1.1 Meaning: The designator identifies a standard instrument departure route which terminates at the significant point BRECON (basic indicator). BRECON is a radio navigation facility with the identification BCN (basic indicator of the coded designator). The validity indicator ONE (1 in the coded designator) signifies either that the original version of the route is still in effect or that a change has been made from the previous version NINE (9) to the now effective version ONE (1) (see 4.3). The absence of a route indicator (see 2.1.4 and 3.2) signifies that only one route, in this case a departure route, has been established with reference to BRECON.

5.2 Example 2: Standard arrival route — instrument:

a) Plain language designator: KODAP TWO ALPHA ARRIVAL

b) Coded designator: KODAP 2 A

5.2.1 Meaning: This designator identifies a standard instrument arrival route which begins at the significant point KODAP (basic indicator). KODAP is a significant point not marked by the site of a radio navigation facility and therefore assigned a five-letter name-code in accordance with Appendix 2. The validity indicator TWO (2) signifies that a change has been made from the previous version ONE (1) to the now effective version TWO (2). The route indicator ALPHA (A) identifies one of several routes established with reference to KODAP and is a specific character assigned to this route.

5.3 Example 3: Standard departure route — visual:

a) Plain language designator: ADOLA FIVE BRAVO DEPARTURE VISUAL

b) Coded designator: ADOLA 5 B

5.3.1 Meaning: This designator identifies a standard departure route for controlled VFR flights which terminates at ADOLA, a significant point not marked by the site of a radio navigation facility. The validity indicator FIVE (5) signifies that a change has been made from the previous version FOUR (4) to the now effective version FIVE (5). The route indicator BRAVO (B) identifies one of several routes established with reference to ADOLA.

6. Composition of designators for MLS/RNAV approach procedures

6.1 Plain language designator

6.1.1 The plain language designator of an MLS/RNAV approach procedure shall consist of:

a) "MLS"; followed by

b) a basic indicator; followed by

c) a validity indicator; followed by d) a route indicator; followed by

e) the word "approach"; followed by

d) the designator of the runway for which the procedure is designed.

6.1.2 The basic indicator shall be the name or name-code of the significant point where the approach procedure begins.

6.1.3 The validity indicator shall be a number from 1 to 9.

6.1.4 The route indicator shall be one letter of the alphabet. The letters "I" and "O" shall not be used.

6.1.5 The designator of the runway shall be in accordance with Annex 14, Volume I, and 5.2.2.

6.2 Coded designator

6.2.1 The coded designator of an MLS/RNAV approach procedure shall consist of:

a) "MLS"; followed by

b) the coded designator or name-code of the significant point described in 6.1.1 b); followed by

c) the validity indicator in 6.1.1 c); followed by

d) the route indicator in 6.1.1 d); followed by

e) the runway designator in 6.1.1 f).

6.3 Assignment of designators

6.3.1 The assignment of designators for MLS/RNAV approach procedures shall be in accordance with paragraph 3. Procedures having identical tracks but different flight profiles shall be assigned separate route indicators.

6.3.2 The route indicator letter for MLS/RNAV approach procedures shall be assigned uniquely to all approaches at an airport until all the letters have been used. Only then shall the route indicator letter be repeated. The use of the same route indicator for two routes using the same MLS ground facility shall not be permitted.

6.3.3 The assignment of validity indicator for approach procedures shall be in accordance with paragraph 4.

6.4 Example of plain language and coded designators

6.4.1 Example:

a) Plain language designator: MLS HAPPY ONE ALPHA APPROACH RUNWAY ONE EIGHT LEFT

b) Coded designator: MLS HAPPY 1 An 18L

6.4.2 Meaning: The designator identifies an MLS/RNAV approach procedure which begins at the significant point HAPPY (basic indicator). HAPPY is a significant point not marked by the site of a radio navigation facility and therefore assigned a five-letter name-code in accordance with Appendix 2. The validity indicator ONE (1) signifies that either the original version of the route is still in effect or a change has been made from the previous version NINE (9) to the now effective version ONE (1). The route indicator ALPHA (A) identifies one of several routes established with reference to HAPPY and is a specific character assigned to this route.

7. Use of designators in communications

7.1 In voice communications, only the plain language designator shall be used.

Note. — For the purpose of identification of routes, the words “departure”, “arrival” and “visual” described in 2.1.1 d) and 2.1.1 e) are considered to be an integral element of the plain language designator.

7.2 In printed or coded communications, only the coded designator shall be used.

8. Display of routes and procedures to air traffic control

8.1 A detailed description of each currently effective standard departure and/or arrival route/approach procedure, including the plain language designator and the coded designator, shall be displayed at the working positions at which the routes/procedures are assigned to aircraft as part of an ATC clearance, or are otherwise of relevance in the provision of air traffic control services.

8.2 Whenever possible, a graphic portrayal of the routes/procedures shall also be displayed.

APPENDIX 4. PRESCRIPTIVE FATIGUE MANAGEMENT REGULATIONS

Note.— Guidance on the development and implementation of prescriptive fatigue management regulations is contained in the Manual for the Oversight of Fatigue Management Approaches (Doc 9966)

.

1. The ANSP shall establish prescriptive limitation provisions in it Manual of Operations that take into account acute and cumulative fatigue, circadian factors and the type of work being undertaken. These provisions shall identify:

   a) the maximum:

      i) number of hours in any duty period;

      ii) number of consecutive work days;

      iii) number of hours worked in a defined period; and

      iv) time-in-position;

   b) the minimum:

      i) duration of non-duty periods;

      ii) number of non-duty days required in a defined period; and

      iii) duration of breaks between periods of time-in-position in a duty period.

2. The air traffic services provider shall identify a process for assigning unscheduled duties that allows air traffic controllers to avoid extended periods of being awake.

3. The processes established by States in accordance with above shall include the provision of:

   a) the reason for the need to deviate;

   b) the extent of the deviation;

   c) the date and time of enactment of the deviation; and

   d) a safety case, outlining mitigations, to support the deviation.

APPENDIX 5. FATIGUE RISK MANAGEMENT SYSTEM (FRMS) REQUIREMENTS

Note.— Guidance on the development and implementation of FRMS regulations is contained in the Manual for the Oversight of Fatigue Management Approaches (Doc 9966).

The ATS Providers shall ensure that an FRMS contain, at a minimum:

1. FRMS policy and documentation

1.1 FRMS policy

1.1.1 The air traffic services provider shall define its FRMS policy, with all elements of the FRMS clearly identified.

1.1.2 The policy shall:

a) define the scope of FRMS operations;

b) reflect the shared responsibility of management, air traffic controllers, and other involved personnel;

c) clearly state the safety objectives of the FRMS;

d) be signed by the accountable executive of the organization;

e) be communicated, with visible endorsement, to all the relevant areas and levels of the organization;

f) declare management commitment to effective safety reporting;

g) declare management commitment to the provision of adequate resources for the FRMS;

h) declare management commitment to continuous improvement of the FRMS;

i) require that clear lines of accountability for management, air traffic controllers, and all other involved personnel are identified; and

j) require periodic reviews to ensure it remains relevant and appropriate.

Note.— Effective safety reporting is described in the Safety Management Manual (SMM) (Doc 9859).

1. FRMS documentation

An air traffic services provider shall develop and keep current FRMS documentation that describes and records:

a) FRMS policy and objectives;

b) FRMS processes and procedures;

c) accountabilities, responsibilities and authorities for these processes and procedures;

d) mechanisms for ongoing involvement of management, air traffic controllers, and all other involved personnel;

e) FRMS training programmes, training requirements and attendance records;

f) scheduled and actual duty and non-duty periods and break periods between periods of time-in-position in a duty period with significant deviations and reasons for deviations noted; and

Note.— Significant deviations are described in the Manual for the Oversight of Fatigue Management Approaches (Doc 9966).

g) FRMS outputs including findings from collected data, recommendations, and actions taken.

2. Fatigue risk management processes

2.1 Identification of fatigue-related hazards

Note.— Provisions on the protection of safety information are contained in Annex 19. An air traffic services provider shall develop and maintain three fundamental and documented processes for fatigue hazard identification:

2.1.1 Predictive. The predictive process shall identify fatigue hazards by examining air traffic controller scheduling and taking into account factors known to affect sleep and fatigue and their effects on performance. Methods of examination may include, but are not limited to:

a) air traffic services or industry operational experience and data collected on similar types of operations or from other industries with shift work or 24-hour operations;

b) evidence-based scheduling practices; and

c) bio-mathematical models.

2.1.2 Proactive. The proactive process shall identify fatigue hazards within current air traffic services operations. Methods of examination may include, but are not limited to:

a) self-reporting of fatigue risks;

b) fatigue surveys;

c) relevant air traffic controller performance data;

d) available safety databases and scientific studies;

e) tracking and analysis of differences in planned and actual worked times; and

f) observations during normal operations or special evaluations.

2.1.3 Reactive. The reactive process shall identify the contribution of fatigue hazards to reports and events associated with potential negative safety consequences in order to determine how the impact of fatigue could have been minimized. At a minimum, the process may be triggered by any of the following:

a) fatigue reports;

b) confidential reports;

c) audit reports; and

d) incidents.

2.2 Fatigue-related risk assessment

2.2.1 An air traffic services provider shall develop and implement risk assessment procedures that determine when the associated risks require mitigation.

2.2.2 The risk assessment procedures shall review identified fatigue hazards and link them to:

a) operational processes;

b) their probability;

c) possible consequences; and

d) the effectiveness of existing preventive controls and recovery measures.

2.3 Risk mitigation

2.3.1 An air traffic services provider shall develop and implement fatigue risk mitigation procedures that:

a) select the appropriate mitigation strategies;

b) implement the mitigation strategies; and

c) monitor the strategies' implementation and effectiveness

3. FRMS safety assurance processes

The air traffic services provider shall develop and maintain FRMS safety assurance processes to:

a) provide for continuous FRMS performance monitoring, analysis of trends, and measurement to validate the effectiveness of the fatigue safety risk controls. The sources of data may include, but are not limited to:

1) hazard reporting and investigations;

2) audits and surveys; and

3) reviews and fatigue studies (both internal and external);

b) provide a formal process for the management of change. This shall include, but is not limited to:

1) identification of changes in the operational environment that may affect the FRMS;

2) identification of changes within the organization that may affect the FRMS; and

3) consideration of available tools which could be used to maintain or improve FRMS performance prior to implementing changes; and

c) provide for the continuous improvement of the FRMS. This shall include, but is not limited to:

1) the elimination and/or modification of preventive controls and recovery measures that have had unintended consequences or that are no longer needed due to changes in the operational or organizational environment;

2) routine evaluations of facilities, equipment, documentation and procedures; and

3) the determination of the need to introduce new processes and procedures to mitigate emerging fatigue-related risks.

4.FRMS promotion processes

4.1 FRMS promotion processes support the ongoing development of the FRMS, the continuous improvement of its overall performance, and attainment of optimum safety levels. The following shall be established and implemented by the air traffic service provider as part of its FRMS:

a) training programmes to ensure competency commensurate with the roles and responsibilities of management, air traffic controllers, and all other involved personnel under the planned FRMS; and

b) an effective FRMS communication plan that:

1) explains FRMS policies, procedures and responsibilities to all relevant stakeholders; and

2) describes communication channels used to gather and disseminate FRMS-related

PART 14: AIR NAVIGATION SERVICES

SUB-PART: 14.2 PANS-OPS

14.2. Provision of Procedures Design (PANS- OPS).

Part 14.2 Procedure for Air Navigation Services – Aircraft Operations (PANS – OPS)

14.2.1 INTRODUCTION

Part 14 Sub-part 2 of this regulation contains the latest edition of Procedure for Air Navigation services – Aircraft Operations (PANS – OPS). ICAO Doc 8168, Volume I – Aircraft Operations, six edition 2018, amendment 10; Volume II – Construction of Visual and instrument Flight Procedures, seventh edition, amendment 1 to 9 incorporated; and Volume III – Aircraft Operating Procedures, First edition, 2018, amendment 2. The procedures referred to in these regulations include conventional non – precision/precision approaches, including RNAV/RNP/GNSS approaches and PBN procedures, Helicopters` PBN procedures.

14.2.2 Applicability

These Regulations shall apply to:-

(a) a person providing a Flight Procedure Design Services within control areas and at aerodromes for civil aviation purposes.

(b) a person providing an Instrument Flight Procedure Design Services that encompasses conventional non – precision/precision approaches including RNP approach and PBN procedures, Helicopter`s PBN procedures.

(c) the design, validation, operation, continuous maintenance and periodic review of visual and instrument flight procedures.

14.2.3 REQUIREMENT FOR THE PROVISION OF INSTRUMENT FLIGHT PROCEDURE DESIGN (IFPD)

14.2.3.1

(a) Instrument flight procedures shall be provided by a certified designer in accordance with the provisions of these regulations.

(b) The Instrument flight procedures service provider shall ensure that the quality and safety of the products are assured through review, verification, coordination and validation of the procedures at every point in the design processes.

(c) The Instrument flight procedures service provider shall ensure that its products complies with the Standard for the design, Construction and updating of procedures as set out in PANS-OPS, ICAO Doc 8168, Vol I, II, and III, including helicopter`s PBN procedures.

(c) The instrument flight procedure service provider shall specify the need for and periodicity of revision of published flight procedures.

(e) The instrument flight procedure service provider shall describe workflow chart.

(f) The instrument flight procedure service provider shall outline applicable quality assurance practices.

14.2.3.2

(a) The IFPD service provider shall maintain an appropriate instrument design office equipped adequately with ICAO certified software workstation;

(b) The IFPD service provider shall provide the Instrument Flight Procedure designer(s) a comfortable working environment.

14.2.4 Procedure Design Certificate

14.2.4.1 A procedure design certificate is a certificate that:

(a) is granted by the Authority to a person under this Part; and

(b) certifies that the person is authorised to carry on design work on a terminal instrument flight procedure of a type covered by the certificate subject to any conditions set out in the certificate.

(c) this subpart of the regulations shall be applicable to Non-precision, precision approaches and all PBN procedures, including Helicopter`s PBN procedures.

14.2.5 Privileges of a Procedures Design Certificate Holder.

14.2.5.1 A certificate for procedures design for air navigation issued under these regulations authorises the person or organisation to carry out any of the following activities subject to any conditions set out in the certificate to the person or organisation :

(a) review or amend an instrument flight procedure that is of a type covered by the authorisation and is for use by any aircraft operating under the IFR at, or in the vicinity of, an aerodrome and heliport in Nigeria ;

(b) carry out design work on a instrument flight procedure that is of a type covered by the authorisation and is for use by any aircraft operating under the IFR at, or in the vicinity of, an off-shore installation located no closer than 30 nm from the nearest land.

14.2.6 Requirement for Procedures Design Certificate.

14.2.6.1 No person or organisation, shall design procedures for air navigation services or publish such procedures for air navigation services in Nigerian airspace and aerodromes unless such person or organization belongs to any of the under mentioned categories and holds a certificate issued by the Authority in accordance with this section:

(a) the person or organisation is established as a procedure designer; or

(b) the person or organisation has a co-operation arrangement with a designated procedure designer for air navigation services; or

(c) there is a commercial agreement with a designated procedure designer for air navigation services.

14.2.7 INSTRUMENT FLIGHT PROCEDURE (IFP) DESIGNER QUALIFICATIONS, TRAINING AND COMPETENCY

14.2.7.1 The Instrument flight procedures service provider shall ensure that a person designing or amending instrument flight procedure, demonstrates the required competency level for the designing of the procedures, and have acquired and maintained such competency through training and supervised on-the-job (OJT) training.

14.2.7.2 The Instrument flight procedures service provider shall ensure the competency of its personnel by the implementation of a training programme consisting of initial, advanced and recurrent training in PANS – OPS Vol. I, II & III and as outlined in ICAO Doc 9906 — Quality Assurance Manual for Flight Procedure Design, Volume 2 and 5; or any other document acceptable to the Authority.

14.2.8 PROCEDURE DESIGN INFORMATION ACQUISITION

14.2.8.1 The IFPD service provider shall ensure that the survey and subsequent IFP design activities are controlled and monitored by a person(s) trained in procedure design.

14.2.8.2 The obstacles surveyed for procedure design shall include:

(a) trees and heights of tall buildings;

(b) airport infrastructure e.g. runway characteristics

(c) the accuracy of the vertical and horizontal data obtained shall be adjusted by adding an amount equal to the specified survey error to the height of all measured obstructions and making a corresponding adjustment for specified horizontal error.

14.2.8.3 The acquisition of procedure design information shall be coordinated with other relevant stakeholders, in compliance with Part 14.2 of these regulations. The stakeholders include but not limited to:

(a) airport or aerodrome operators

(b) personnel in charge of navigation aids;

(c) airspace users;

(d) air traffic control service provider;

(e) environmental consideration; and

(f) any other issue associated with the procedures in as prescribed in these regulations.

14.2.9 Instrument Flight Procedure Design Criteria

14.2.9.1

(a) Procedures shall be designed in accordance with the PANS-OPS criteria prescribed in ICAO Doc 8168, Vol I, 11 & 111 and other supporting documents.

(b) Coordination with all concerned parties shall continue throughout the procedure design and validation process to ensure that the procedure meets the needs of the users.

(c) Each new or revised procedure shall be verified by a qualified procedure designer other than the one who designed the procedure, to ensure compliance with applicable criteria.

(d) Published procedures shall be subjected to periodic review to ensure compliance with changing criteria, to meet user requirements. The maximum interval for this review shall be five (5) years.

14.2.9.2 All calculations and results of calculations shall be presented in a manner that enables the reader to follow and trace the logic and resultant output.

14.2.9.3 A record of all calculations shall be kept in order to prove compliance with or variation from, the standard criteria.

14.2.9.4 Formulae used during calculation shall be the standard formulae as stated in the PANS-OPS.

14.2.9.5 Units of measurement and conversion factors between such units shall be in accordance with Part 1.9 of these regulations and other relevant documents.

14.2.9.6 Rounding up of results shall follow the standard guidelines in the PANS-OPS Doc.8168 and any other related ICAO Document used in the design of the procedures.

14.2.9.7 Rounding shall only be made at the publication stage to facilitate usable figures on maps and charts.

14.2.9.8 All documentation shall undergo a final verification for accuracy and completeness prior to validation and publication.

14.2.9.9 All documentation shall be retained to assist in recreating the procedure in the future in the case of incidents and for periodic review and maintenance.

14.2.9.10 The periodic retention shall not be less than the operational lifetime of the procedure.

14.2.9.11 The IFPD provider shall established specific operating minima (e.g visibility, minimum descent altitude/height (MDA/H), decision altitude/height (DA/H) for the IFDs developed at the aerodrome.

14.2.9.12 The IFPD provider shall designate an experienced specialist to administer both OJT and proficiency checks of the staff.

14.2.10 REVISION OF PROCEDURES

14.2.10.1 Each procedure published in AIP shall be revised:

(a) When a significant change to the obstacle environment occurs requiring an amendment of procedural minimum altitudes.

(b) When a published bearing, track or radial would fall into error by 10 degrees, consequent on a change to magnetic variation or station declination;

(c) To improve safety or operational efficiency, as identified by any interested party;

(d) To accommodate changes to aircraft category or characteristics.

(e) To accommodate route connectivity or airspace organization

(f) Necessitated by changes to the supporting navigation facility environment

(g) To comply with amendments to applicable ICAO provision and other international and national standards and recommended practices

(h) Where a change in procedural altitude is required.

(i) When a significant change occur to aerodrome physical characteristics such as runway

(j) When any other significant change occurs to aeronautical, cultural and to pographical data.

(k) To comply with amendments to applicable Nig. CARs, ICAO provisions and other international and national standards and recommended practices;

(l) To accommodate proposed initiatives or new technologies

14.2.10.2 Without prejudice to the above requirements, the procedures published in the AIP shall be reviewed at least every five (5) years

14.2.11 Design Procedures Manual

14.2.11.1 The IFPD service provider design process shall provide a detailed information of Procedures Design processes in its Manual of Operations in accordance to PANS OPS Doc. 8168 Volume I, II & III.

The information to be provided in the Manual include"

(a) Methods of collation, research and review of all relevant data.

(b) The type(s) of computer Aided Design (CAD) platforms for the constructions and analysis routines of the procedures

(c) Means of ensuring a realistic level of accuracy in the use of the new "datasets" obtained under the ICAO WGS-84 programme and to respond to the urgency of the ATM domain

.

(d) The type of specialised software to be used in the design procedures to ensure the highest level of accuracy, efficiency and repeatability.

(e) The documentation process of all calculations, measurements and resulting procedures.

(f) When working in a CAD environment, the recording and audit trial method as prescribed in these regulations

14.2.12 PROFICIENCY FOR INSTRUMENT FLIGHT PROCEDURE DESIGNER

14.2.12.1 Proficiency for IFP designer include:

(a) Overview of ICAO SARP, Nig. CARs relating to IFP design and promulgation;

(b) Knowledge of information contained in ICAO Doc 8168 –PANSOPS, Nig. CARs and other related ICAO provisions relevant to procedure designs;

(c) General criteria in IFP designing;

(d) Non-precision approach design;

(e) Precision approach design;

(f) Instrument departure designs;

(g) Criteria for PBN procedures;

(h) CCO and CDO procedures and

(i) Practical exercises in the design of procedures

14.2.13 Periodic recurrent training for IFPD

14.213.1. Periodic recurrent training for IFPD shall include:

(a) Knowledge about updates in ICAO provisions, Nig. CARs and other provisions pertaining to procedure design;

(b) Maintenance and enhancement of knowledge and skills in the design of procedures;

(c) A minimum of five years aviation experience as a pilot or air traffic controller;

(d) Completion of a minimum of two approved flight procedures designs under the supervision of a competent procedure designer

14.2.14 Responsibilities of Procedures Design Certificate Holder.

14.2.14.1 The holder of a procedures design certificate shall :

(a) provide the services listed in its Manual of Operations, in accordance with the procedures as prescribed in these Regulations ;

(b) Submit Manual of Operations which shall include the following information :

(i) personnel requirements and the responsibilities of personnel as specified in IS. 14.2.14.1.

(ii) training and checking of staff and how that information is tracked ;

(iii) quality assurance and safety management system ;

(iv) contingency plans developed for part or total system failure for which the organisation proves a service ;
(v) security plan ;
(vi) facilities and equipment and how those facilities are maintained ;
(vii) fault and defect reporting ;
(viii) maintenance of documents and records ;
(ix) conduct system verification prior to implementation ;
(x) ensure continuous monitoring and periodic assessment of any new system related to ATM , and
(xi) any other information requested by the Authority.

(c) comply with all procedures detailed in its Manual of Operations, these regulations as prescribed by the Authority, in the provision of procedures design for air navigation services ;

(d) make each applicable part of the Manual of Operations available to the personnel who require those parts to carry out their duties ;

(e) continue to comply with the appropriate requirements prescribed in these Regulations ;

(f) keep the records of all regular internal inspections for a period of one years from the date of each inspection ;IS 14.2.14

14.2.15 Safety Inspections and Audit.

14.2.15.1 The IFPD service provider shall permit an inspector to carry out such safety inspections and audits as may be necessary to verify the validity of any application made in accordance with these Regulations.

14.2.15.2. The procedures design service provider certificate holder shall permit a procedures design inspector to carry out such safety inspections and audits as may be necessary to determine compliance with the appropriate requirements prescribed in this Part.

14.2.16 Verification of Flight Procedures

14.2.16.1 The instrument flight procedure design service provider shall establish procedures for verifying flight procedures that it is authorised to design under the designer's procedure design certificate or on which the designer is authorised to carry on design work.

14.2.16.2 The verification procedures shall :

(a) provide for 2 qualified designers to check independently the design of each flight procedure designed, or on which design work is carried on, under the Procedures Design Certificate.

(b) provide for one of those checks to be made by a qualified designer who did not carry on the design work concerned.

14.2.16.3 The process of verifying a flight procedure shall include checking the procedure (all data, computations and drawings) in accordance with IS14.2.16.

14.2.17 Validation of Flight Procedures.

14.2.17.1 The instrument flight procedure design service provider shall ensure that each flight procedure designed under the designer's certificate is validated by the Authority in accordance with IS 14.2.17 (a) to (d).

14.2.18 Design approval and Publication of Flight Procedures.

14.2.18.1. Instrument flight procedure service provider shall ensure that each flight procedure designed under the designer's certificate is given to the AIS for publication in the AIP to the effect that the procedure is designed and validated in accordance with a procedure prescribed in these regulations.

14.2.18.2 The IFPD service provider shall submit designed procedures/charts to the Authority for approval after independent verification by a certified designer.

14.2.18.3 The IFP design shall be accompanied by a narrative, which describes the procedure in textual format.

14.2.18.4 The intended effective date for operational use of the IFP design shall be included in the document narrative.

14.2.18.5 The IFPD service provider shall submit the designed procedures/charts to the Aeronautical Information Service (AIS) office for publication in the AIP after approval by the authority

14.2.19 Radio Navigation Aids.

14.2.19.1 The instrument flight procedure service provider shall ensure that a flight procedure designed under the designer's certificate does not require the use of a ground-based radio-navigation aid other than one that is operated and maintained by a person certificated to do so under these Regulations.

14.2.20 Maintenance of Instrument Flight Procedures.

14.2.20.1 The instrument flight procedure service provider shall be responsible for maintaining Instrument Flight Procedures in accordance with the standards acceptable to the Authority.

14.2.20.2. The Procedures Design Certificate Holder shall cease to be responsible for the maintenance of the procedures if :

(a) the Procedures Design Certificate Holder's responsibility for the maintenance of the procedure is transferred to another Procedures Design Certificate Holder on the day when the responsibility is transferred; or

(b) the Procedures Design Certificate Holder has notified the Authority that the designer has ceased to design the type of flight procedures concerned and the Authority will withdraw the flight procedure from use ; or

(c) the Procedures Design Certificate is cancelled or varied to exclude that type of procedures and there is no responsible Design certificate holder for the flight procedure, Authority will withdraw the flight procedure from use

14.2.21 Application of Human Factor principles.

14.2.21.1 The Certificate holder shall demonstrate that human factor principles are applied when assessing the appropriateness of equipment, systems, software, facilities, procedures, tasks, environment, training, staffing, and personnel management.

14.2.21.2 The Certificate holder shall ensure the application of human factor principles in the performance of his duties under these Regulations.

14.2.22 Reserved

14.2.23.1 Facilities, Equipment, Maintenance and Calibration.

14.2.23.1 A Procedures Design Certificate Holder shall provide and maintain adequate facilities for carrying on design work on flight procedures under the designer's procedure design certificate, including:

(a) providing premises and equipment appropriate for the Procedures Design Cerificate Holder's employees to carry on the design work ;

(b) ensuring that those personnel have access to all necessary data for designing the procedures including :

(i) accurate and current databases or charts detailing terrain and obstacle information ; and

(ii) accurate and current navigation aid co-ordinate data ;

(iii) accurate and current aerodrome reference point and threshold data, and

(iv) acceptable software and topographical map of the area with an appropriate scale.

14.2.24 Supporting Documentations

14.2.24.1 The IFPD service provider shall include the following documents when submitting designed instrument flight procedures for approval:

(a) Obstacle survey data including dates of last full and updated surveys;

(b) Airfield and navigation facility data;

(c) Diagram of each segment and holding areas showing dominant obstacles;

(d) Procedural and minimum obstacle clearance altitude/height for each segment;

(e) Track guidance;

(f) Chart depicting the procedure;

(g) Textual or abbreviated description and path terminators where applicable;

(h) Associated positional data e.g. co-ordinates, bearings, distances;

(i) Description of methodology and options considered;

(j) Sufficient detail of significant calculation and design data to enable the proposal to be validated;

(k) Other information considered relevant in support of the request for approval

14.2.25. Maintenance of Documents and Records.

14.2.25.1 A Procedures Design Certificate Holder shall maintain reference materials of the kinds specified by the Authority.

14.2.25.2. A Procedures Design Certificate Holder shall keep the reference materials up-to-date and in a readily accessible form.

14.2.25.3. Each personnel of the Procedures Design Certificate Holder who carries out design work on flight procedures under the holder's design certificate shall have ready access to the reference materials.

14.2.25.4. A Procedures Design Certificate Holder shall keep documents and records of the kinds specified by the Authority.

14.2.25.5. The Certificate Holder shall demonstrate that there is a system in place to record and retain operational data

14.2.25.6. The designer shall, at the Authority's request, make the documents and records, or copies of them or extracts from them, available for inspection by the Authority.

14.2.25.7. A Procedures Design Certificate Holder shall establish, and put into effect, a system for controlling documents and records relating to the instrument flight procedures on which the designer carries on design work including the policies and procedures for making, amending, preserving and disposing of those documents and records.

14.2.25.8. The system shall be in accordance with the standards set out in the Manual of Operation.

14.2.25.9. The Procedures Design Certificate Holder shall ensure that :

(a) the documentation is reviewed and authorised by appropriate personnel before issue ;

(b) current issues of relevant documentation are available to personnel ;

(c) obsolete documentation is removed from all points of issue or use ;

(d) changes to documentation are reviewed and approved by appropriate personnel ; and

(e) current version of each document can be identified to preclude the use of obsolete documents.

14.2.26 PROCEDURE DESIGN AUTOMATION

14.2.26.1 The Authority shall ensure that the software packages used by the IFPD service provider in the design of procedures is ICAO certified and validated software.

14.2.26.2 Validation of the software shall be in accordance with the requirements of ICAO Doc 9906, Volume 3 — Flight Procedure Design Software Validation.

14.2.27. Training and Checking of Procedures Design Certificate Holder's Personnel.

14.2.27.1 A Procedures Design Certificate Holder shall provide training and checking program that is of an adequate standard to ensure that the employees of the designer maintain their competence and are provided with ongoing training appropriate to their duties.

14.2.27.2. Training and checking records shall be maintained for all personnel.

14.2.28 DOCUMENTATION AND REFERENCE MATERIALS

14.2.28.1 REFERENCE MATERIALS

14.2.28.2 The following documents, as applicable, are required for the design of instrument flight procedures and management of the design process:

(a) The Nig.CARs 14

(b) ICAO Procedures for Air Navigation — Air Operations, Doc 8168-OPS/611, Volume II — Construction of Visual and Instrument Flight Procedures;

(c) ICAO Instrument Flight Procedures Construction Manual, Doc 9368- AN/911;

(d) ICAO Template Manual for Holding, Reversal and Racetrack Procedures, Doc 9371-AN/912/2;

(e) ICAO Required Navigation Performance Authorization Required Procedure Design Manual, Doc 9905-AN/471;

(f) ICAO Quality Assurance Manual for Flight Procedures Design, Doc 9906-AN/472, Volume 1 — Flight Procedures Design Quality Assurance System;

(g) ICAO Quality Assurance Manual for Flight Procedures Design, Doc 9906-AN/472, Volume 2 — Flight Procedure Designer Training (Development of a

Flight Procedures Designer Training Programme);

(h) ICAO Quality Assurance Manual for Flight Procedures Design, Doc 9906-AN/472, Volume 3 — Flight Procedure Design Software Validation;

(i) ICAO Quality Assurance Manual for Flight Procedures Design, Doc 9906, Volume 5 — Validation of Instrument Flight Procedures;

(j) ICAO Performance Based Navigation (PBN) Manual, Doc 9613-AN/937.

(k) ICAO Doc 9365 – All Weather Operation manual

(l) ICAO Doc 10068 – Manual on the development of regulatory framework for IFPD services.

(m) Annex 11 – Air Traffic Services

(n) ICAO CONOPS, Free Route Airspace in ICAO EUR Region, Concept, Publication and Implementation.

CERTIFICATION

The specified altitudes of the above instrument procedures have been checked and the procedures are acceptable subject to the above- mentioned changes (if any) being incorporated.

The specified altitudes of the GPS Arrival Sector A have been checked and the procedure is acceptable subject to the above-mentioned changes (if any) being incorporated.

The aerodrome is currently certified/registered/other.

The WDIs are suitable for straight-in approaches to runways

…………………… and unsuitable for straight-in approaches to runways

………………… . The suitable WDIs are/are not illuminated.

The approach procedures were/were not found to be operationally suitable for straight-inminima.

(Signature of validation pilot)

.

PART 14 – AIR NAVIGATION SERVICES

SUB-PART 14 . 3 : SEARCH AND RESCUE

14.3.0 General

a) The provision of these regulations is the means the Authority uses to meet its responsibilities under the Civil Aviation Act, 2022 for promulgating aviation safety standards. The regulations prescribe the detailed technical material (Aviation Safety Standard) necessary for air navigation. This regulation has been revised in line with ICAO Annex 12, Amendment No. 18 dated 22nd November, 2007; Annex 2, Amendment No.46 dated 8th November, 2018; and ICAO Doc 4444 Amendment 11 dated 3rd November, 2022.

b) References should be made to the applicable provision of Civil Aviation Act and together with these regulations to ascertain the requirements of and the obligations imposed by or under the civil aviation legislation.

c) These standards should be read in conjunction with:

1. Section 9(h) and 40(c)of the Civil Aviation Act, 2022;
2. ICAO Annex 12 – Search and Rescue
3. ICAO Annex 2 – Rules of the Air;
4. ICAO Air Traffic Management Planning Manual (ICAO Doc.9426);
5. ICAO Procedures for Air Navigation Services – Air Traffic Management (PANS/ATM) ICAO Doc 4444);
6. ICAO Regional Supplementary Procedures (ICAO Doc 7030);
7. AIP Nigeria;
8. AIP Nigeria Supplement; and
9. Relevant NCAA circulars.

d) In transposing ICAO Annex 12 to develop these regulations, Amendments 1-18 have been considered.

14.3.0.1 Definitions

When the following terms are used in this Regulation for aeronautical search and rescue, they have the following meanings:

Aeronautical Search and Rescue Service Provider means the agency/organisation providing or arranging for the provision of aeronautical search and rescue service for air navigation on behalf of the State

Alerting post means any facility intended to serve as an intermediary between a person reporting an emergency and a rescue coordination centre or rescue sub-centre.

Alert phase means a situation wherein apprehension exists as to the safety of an aircraft and its occupants.

Distress phase means a situation wherein there is a reasonable certainty that an aircraft and its occupants are threatened by grave and imminent danger and require immediate assistance.

Ditching means the forced landing of an aircraft on water.

Emergency phase means a generic term meaning, as the case may be, uncertainty phase, alert phase or distress phase.

Joint rescue coordination centre (JRCC) means a rescue coordination centre responsible for both aeronautical and maritime search and rescue operations.

Operator means a person, organization or enterprise engaged in or offering to engage in an aircraft operation.

Pilot-in-command means the pilot designated by the operator, or in the case of general aviation, the owner, as being in command and charged with the safe conduct of a flight.

Rescue means an operation to retrieve persons in distress, provide for their initial medical or other needs, and deliver them to a place of safety.

Rescue coordination centre (RCC) means a unit responsible for promoting efficient organization of search and rescue services and for coordinating the conduct of search and rescue operations within a search and rescue region.

Rescue sub-centre (RSC) means a unit subordinate to a rescue coordination centre, established to complement the latter according to particular provisions of the responsible authorities.

Search means an operation normally coordinated by a rescue coordination centre or rescue sub-centre using available personnel and facilities to locate persons in distress.

Search and rescue aircraft means an aircraft provided with specialized equipment suitable for the efficient conduct of search and rescue missions.

Search and rescue facility means any mobile resource, including designated search and rescue units, used to conduct search and rescue operations.

Search and rescue service means the performance of distress monitoring, communication, coordination and search and rescue functions, initial medical assistance or medical evacuation, through the use of public and private resources, including cooperating aircraft, vessels and other craft and installations.

Search and rescue region (SRR) means an area of defined dimensions, associated with a rescue coordination centre, within which search and rescue services are provided.

Search and rescue unit means a mobile resource composed of trained personnel and provided with equipment suitable for the expeditious conduct of search and rescue operations.

State of Registry means the State on whose register the aircraft is entered.

Uncertainty phase means a situation wherein uncertainty exists as to the safety of an aircraft and its occupants.

14.3.1 Organisation

a) The Authority shall designate the Aeronautical Search and Rescue Service Provider responsible for the coordination of Aeronautical search and rescue Services within the Nigerian Airspace;

b) The Aeronautical Search and Rescue Service Provider shall, individually or in cooperation with other States, arrange for the establishment and prompt provision of aeronautical search and rescue services within Nigerian territory to ensure that assistance is rendered to persons in distress. Such services shall be provided on a 24-hour basis.

c) The portions of the high seas or areas for which aeronautical search and rescue services will be established shall also be covered fully. The Aeronautical Search and Rescue Service Provider shall solely or in cooperation with other States, arrange for the services to be established and provided in accordance with the provisions of these Regulations.

d) The basic elements of aeronautical search and rescue services shall include a legal framework, a responsible authority, organized available resources, communication facilities and a workforce skilled in coordination and operational functions.

e) The Aeronautical Search and Rescue Service Provider shall establish processes to improve service provision, including the aspects of planning, domestic and international cooperative arrangements and training.

f) In providing assistance to aircraft in distress and to survivors of aircraft accidents, the Aeronautical Search and Rescue Service Provider shall do so regardless of the nationality or status of the persons or the circumstances in which the persons are found.

g) The Aeronautical Search and Rescue Service Provider shall use aeronautical search and rescue units and other available facilities to assist aircraft or its occupants that are or appear to be in a state of emergency.

h) Where separate aeronautical and maritime rescue coordination centres serve the same area the Aeronautical Search and Rescue Service Provider shall ensure the closest practicable coordination between the centres.

i) The Aeronautical Search and Rescue Service Provider shall facilitate consistency and cooperation with the maritime search and rescue services.

j) Where practical, the Aeronautical Search and Rescue Service Provider shall establish joint rescue coordination centres to coordinate aeronautical and maritime aeronautical search and rescue operations.

14.3.2 Aeronautical search and rescue regions

a) The Aeronautical Search and Rescue Service Provider shall delineate the aeronautical search and rescue regions within which they will provide aeronautical search and rescue services. Such regions shall not overlap and neighboring regions shall be contiguous.

b) Aeronautical search and rescue regions shall, in so far as practicable, be coincident with corresponding flight information regions and, with respect to those areas over the high seas, maritime aeronautical search and rescue regions.

c) Where all or part of the airspace of Nigeria is included within an aeronautical search and rescue region associated with a rescue coordination centre in another Contracting State, the Aeronautical Search and Rescue Service Provider shall establish a rescue sub centre subordinate to the rescue coordination centre wherever this would improve the efficiency of aeronautical search and rescue services within its territory.

d) The Aeronautical Search and Rescue Service Provider shall ensure that personnel engaged in SAR operations is sufficient in number and adequately trained to ensuring participation in annual mock SAR exercises.

1. The Aeronautical Search and Rescue Service Provider shall adequately define the functions and responsibilities of SAR personnel and job descriptions;

2. Training records of SAR personnel shall be properly maintained.

3. The Aeronautical Search and Rescue Service Provider shall ensure that rescue co-ordination centre personnel are proficient in the use of English Language as contained in Nigeria CARs, Part 2.

e) The Authority will monitor the exercise and assess the level of preparedness for aeronautical search and rescue operations.

f) The Aeronautical Search and Rescue Service Provider shall ensure that qualified personnel are deployed to coordinate aeronautical search and rescue operations at the scene of an accident.

g) Aeronautical search and rescue action shall be undertaken in accordance with the National Aeronautical Search and Rescue Plan, National Disaster Response Plan issued by the National Emergency Management Agency and the Aeronautical SAR Operations Manual of Service Provider as approved by the Authority.

h) The Aeronautical Search and Rescue Service Provider shall develop and maintain a search and rescue operations manual. The operation manual shall serve to demonstrate how the Aeronautical Search and Rescue Service Provider will comply with the requirements set out in this Regulations.

14.3.3 Rescue Co-ordination Centers (RCC) and Sub-centers

a) The Aeronautical Search and Rescue Provider shall establish a rescue coordination center within its search and rescue region.

b) Each rescue coordination centre and, as appropriate, rescue sub-center, shall be staffed 24 hours a day by trained personnel proficient in the use of the language used for radiotelephony

c) RCC personnel involved in the conduct of radiotelephony communications shall be proficient in the use of the English language.

d) Each Control Tower shall be equipped with a reliable alerting device for alerting the fire and safety services and other relevant agencies.

e) The Aeronautical Search and Rescue Service Provider shall issue guidelines for the establishment of Rescue Co-ordination Centres and Rescue sub-centres including Personnel and Equipment requirements and also guidelines for Aerodrome emergencies of Air Traffic Services at each Aerodrome.

f) Rescue Co-ordination Centres and sub centers shall be provided with facilities and equipment for locating scenes of the incident/accident promptly.

g) In areas where public telecommunications facilities would not permit persons observing an aircraft in emergency to notify the rescue coordination centre concerned directly and promptly, the Aeronautical Search and Rescue Provider shall designate suitable units of public or private services as alerting posts.

14.3.4. Aeronautical search and rescue communications

a) Each rescue coordination centre shall have means of rapid and reliable two way communication with:

1. associated air traffic services units;
2. associated rescue subcentres;
3. appropriate direction-finding and position-fixing stations;
4. where appropriate, coastal radio stations capable of alerting and communicating with surface vessels in the region;
5. the headquarters of aeronautical search and rescue units in the region;

6. all maritime rescue coordination centres in the region and aeronautical, maritime or joint rescue coordination centres in adjacent regions;

7. a designated meteorological office or meteorological watch office;

8. aeronautical search and rescue units;

9. alerting posts; and

10. the Cospas-Sarsat Mission Control Centre servicing the aeronautical search and rescue region.

b) Each rescue subcentre shall have a means of rapid and reliable two-way communication with:

1) adjacent rescue subcentres;

2) a meteorological office or meteorological watch office;

3) aeronautical search and rescue units; and

4) alerting posts.

c) The Aeronautical Search and Rescue Service Provider shall provide, when necessary, assistance to other Rescue Co-ordination Centres, including assistance in the form of aircraft, vessels, persons or equipment.

14.3.5 Aeronautical search and rescue units

a) The Aeronautical Search and Rescue Service Provider shall designate as aeronautical search and rescue units elements of public or private services suitably located and equipped for aeronautical search and rescue operations.

b) The Aeronautical Search and Rescue Service Provider shall designate as parts of the aeronautical search and rescue plan of operation, elements of public or private services that do not qualify as aeronautical search and rescue units but are nevertheless able to participate in aeronautical search and rescue operations.

c) Each aeronautical search and rescue unit shall:

1) be cognizant of all parts of the plans of operation prescribed in 14.3.11 that are necessary for the effective conduct of its duties; and

2) keep the rescue coordination centre informed of its preparedness.

d) The Aeronautical Search and Rescue Service Provider shall:

1. maintain in readiness the required number of aeronautical search and rescue facilities; and

2. maintain adequate supplies of rations, medical stores, signalling devices and other survival and rescue equipment.

14.3.6 Aeronautical search and rescue equipment

a) Aeronautical search and rescue units shall be provided with equipment for locating promptly, and for providing adequate assistance at, the scene of an accident.

b) Each aeronautical search and rescue unit shall have means of rapid and reliable two-way communication with other aeronautical search and rescue facilities engaged in the same operation.

c) Each aeronautical search and rescue aircraft shall be equipped to be able to communicate on the aeronautical distress and on-scene frequencies and on such other frequencies as may be prescribed.

d) Each aeronautical search and rescue aircraft shall be equipped with a device for homing on distress frequencies.

e) Each aeronautical search and rescue aircraft, when used for aeronautical search and rescue over maritime areas, shall be equipped to be able to communicate with vessels.

f) Each aeronautical search and rescue aircraft, when used for aeronautical search and rescue over maritime areas shall carry a copy of the International Code of Signals to enable it to overcome language difficulties that may be experienced in communicating with ships.

g) Unless it is known that there is no need to provide supplies to survivors by air, at least one of the aircraft participating in an aeronautical search and rescue operation shall carry droppable survival equipment.

h) The Aeronautical Search and Rescue Service Provider shall locate, at appropriate aerodromes, survival equipment suitably packed for dropping by aircraft.

14.3.7 Cooperation between States

a) The Aeronautical Search and Rescue Service Provider shall coordinate its aeronautical search and rescue organization with those of neighbouring States.

b) The Aeronautical Search and Rescue Service Provider shall, whenever necessary, coordinate its aeronautical search and rescue operations with those of neighbouring States especially when these operations are proximate to adjacent aeronautical search and rescue regions.

c) The Aeronautical Search and Rescue Service Provider shall, in so far as practicable, develop common aeronautical search and rescue plans and procedures to facilitate coordination of aeronautical search and rescue operations with those of neighbouring States.

d) Subject to such conditions as may be prescribed by the Authority, the Aeronautical Search and Rescue Service Provider shall permit immediate entry into its territory of aeronautical search and rescue units of other States for the purpose of searching for the site of aircraft accidents and rescuing survivors of the accidents.

e) Any foreign or neighbouring Air Traffic Services Provider who wishes its aeronautical search and rescue units to enter the territory of Nigeria for aeronautical search and rescue purposes shall transmit a request, through the Aeronautical Search and Rescue Service Provider to the Authority, giving full details of the projected mission and the need for it.

f) The Authority will:

1. immediately acknowledge the receipt of a request, and

2. as soon as possible, indicate the conditions, if any, under which the projected mission may be undertaken.

3. liaise with the Aeronautical Search and Rescue Service Provider to take immediate action.

g) The Aeronautical Search and Rescue Service Provider shall enter into agreements with neighbouring States to strengthen aeronautical search and rescue cooperation and coordination, setting forth the conditions for entry of each other's aeronautical search and rescue units into their respective territories. These agreements shall also provide for expediting entry of such units with the least possible formalities.

h) The Aeronautical Search and Rescue Service Provider shall authorize its rescue coordination centres to:

1. request assistance from other rescue coordination centres, including aircraft, vessels, persons or equipment, as may be needed;

2) grant necessary permission for the entry of aircraft, vessels, persons or equipment into its territory; and

3) make the necessary arrangements with the appropriate customs, immigration or other authorities with a view to expediting such entry.

i) The Aeronautical Search and Rescue Service Provider shall authorize its rescue coordination centres to provide, when requested, assistance to other rescue coordination centres, including assistance in the form of aircraft, vessels, persons or equipment.

j) The Aeronautical Search and Rescue Service Provider shall make arrangements for joint training exercises involving its aeronautical search and rescue units, those of other States and operators, in order to promote aeronautical search and rescue efficiency.

k) The Aeronautical Search and Rescue Service Provider shall make arrangements for periodic liaison visits by personnel of their rescue coordination centres and sub centres to the centres of neighbouring States.

14.3.8 Cooperation with other services

a) The Aeronautical Search and Rescue Service Provider shall arrange for all aircraft, vessels and local services and facilities which do not form part of the aeronautical search and rescue organization to cooperate fully with the latter in aeronautical search and rescue and to extend any possible assistance to the survivors of aircraft accidents.

b) The Aeronautical Search and Rescue Service Provider shall ensure the closest practicable coordination between its aeronautical search and rescue unit and maritime authorities to provide for the most effective and efficient aeronautical search and rescue services.

c) The Aeronautical Search and Rescue Service Provider shall ensure that its aeronautical search and rescue unit cooperate with the agency responsible for aircraft accident investigation and with those responsible for the care of those who suffered from the accident.

d) The Aeronautical Search and Rescue Service Provider, in order to facilitate accident investigation, shall ensure that rescue units, when practicable, be accompanied by persons qualified in the conduct of aircraft accident investigations.

e) The Aeronautical Search and Rescue Service Provider shall designate an aeronautical search and rescue point of contact for the receipt of Cospas-Sarsat distress data.

f) The Aeronautical Search and Rescue Service Provider shall:

1. maintain and ensure continuous liaison with NEMA and other agencies relevant for Aeronautical search and rescue operations.

2. maintain a database and/or schedule of supporting organizations, agencies and companies, together with available equipment and personnel for deployment to aeronautical search and rescue operations.

3. ensure the closest practicable coordination and co-operation with the Maritime Coordination Centre.

4. designate the RCC responsible for each SRR to prepare and review a comprehensive plan of operations for the conduct of aeronautical search

and rescue operations.

14.3.9 Dissemination of information

a) The Aeronautical Search and Rescue Service Provider shall publish and disseminate all information necessary for the entry of aeronautical search and rescue units of other States into its territory or, alternatively, include this information in aeronautical search and rescue service arrangements.

b) When such information could benefit the provision of aeronautical search and rescue services, the Aeronautical Search and Rescue Service Provider shall make available, through the rescue coordination centres or other agencies, information regarding their aeronautical search and rescue plans of operation.

c) The Aeronautical Search and Rescue Service Provider shall, to the extent desirable and practicable, disseminate information to the general public and emergency response authorities regarding actions to be taken when there is a reason to believe that an aircraft's emergency situation may become cause for public concern or require a general emergency response.

14.3.10 Preparatory information

a) Each rescue coordination centre shall have at all times up-to-date information concerning the following in respect of its aeronautical search and rescue region:

1. aeronautical search and rescue units, rescue sub centres and alerting posts;

2. air traffic services units;

3. means of communication that may be used in aeronautical search and rescue operations;

4. addresses and telephone numbers of all operators, or their designated representatives, engaged in operations in the region; and any other public and private resources including medical and transportation facilities that are likely to be useful in aeronautical search and rescue.

b) Each rescue coordination centre of the Aeronautical Search and Rescue Service Provider shall have readily available all other information of interest to aeronautical search and rescue, including information regarding:

1. the locations, call signs, hours of watch, and frequencies of all radio stations likely to be employed in support of aeronautical search and rescue operations;

2. the locations and hours of watch of services keeping radio watch, and the frequencies guarded;

3. locations where supplies of droppable emergency and survival equipment are stored; and

4. objects which it is known might be mistaken for unlocated or unreported wreckage, particularly if viewed from the air.

c) Each rescue coordination centre of the Aeronautical Search and Rescue Service Provider whose aeronautical search and rescue region includes maritime areas shall have ready access to information regarding the position, course and speed of ships within such areas that may be able to provide assistance to aircraft in distress and information on how to contact them.

d) The Aeronautical Search and Rescue Service Provider shall, individually or in cooperation with other States, either establish ship reporting systems in cooperation with maritime authorities or arrange communication links with Amver or regional ship reporting systems to facilitate aeronautical search and rescue operations at sea.

14.3.11 Plans of operation

a) Each rescue coordination centre shall prepare detailed plans of operation for the conduct of aeronautical search and rescue operations within its aeronautical search and rescue region.

b) Aeronautical search and rescue plans of operations shall be developed jointly with representatives of the operators and other public or private services that may assist in providing aeronautical search and rescue services or benefit from them, taking into account that the number of survivors could be large.

c) The plans of operation shall specify arrangements for the servicing and refueling, to the extent possible, of aircraft, vessels and vehicles employed in aeronautical search and rescue operations, including those made available by other States.

d) The aeronautical search and rescue plans of operation shall contain details regarding actions to be taken by those persons engaged in aeronautical search and rescue, including:

1. the manner in which aeronautical search and rescue operations are to be conducted in the aeronautical search and rescue region;

2. the use of available communication systems and facilities;

3. the actions to be taken jointly with other rescue coordination centres;

4. the methods of alerting en-route aircraft and ships at sea;

5. the duties and prerogatives of persons assigned to aeronautical search and rescue;

6. the possible redeployment of equipment that may be necessitated by meteorological or other conditions;
7. the methods for obtaining essential information relevant to search and rescue operations, such as weather reports and forecasts, appropriate NOTAM etc;
8. the methods for obtaining ,from other rescue coordination centres, such assistance, including aircraft, vessels, persons or equipment, as may be needed;
9. the methods for assisting distressed aircraft being compelled to ditch to rendezvous with surface craft;
10. the methods for assisting search and rescue or other aircraft to proceed to aircraft in distress; and
11. cooperative actions to be taken in conjunction with air traffic services units and other authorities concerned to assist aircraft known or believed to be subject to unlawful interference

e) Aeronautical search and rescue plans of operation shall be integrated with airport emergency plans to provide for rescue services in the vicinity of aerodromes including, for coastal aerodromes, areas of water.

14.3.12 Training and exercises

To achieve and maintain maximum efficiency in aeronautical search and rescue, the Aeronautical Search and Rescue Service Provider shall provide for regular training of their aeronautical search and rescue personnel and arrange appropriate aeronautical search and rescue exercises to achieve and maintain maximum efficiency in aeronautical search and rescue.

14.3.13 Wreckage

The Aeronautical Search and Rescue Service Provider shall ensure that wreckage resulting from aircraft accidents within its territory or, in the case of accidents on the high seas or in areas of undetermined sovereignty, within the aeronautical search and rescue regions for which it is responsible, is removed, obliterated or charted following completion of the accident investigation, if its presence might constitute a hazard or confuse subsequent aeronautical search and rescue operations.

14.3.14 Information concerning emergencies

a) A person or element of the aeronautical search and rescue organization having reason to believe that an aircraft is in an emergency shall give immediately all available information to the rescue coordination centre concerned.

b) Rescue coordination centres shall, immediately on receipt of information concerning aircraft in emergency, evaluate the information and assess the extent of the operation required.

c) When information concerning aircraft in emergency is received from other sources than air traffic services units, the rescue coordination centre shall determine to which emergency phase the situation corresponds and shall apply the procedures applicable to that phase.

14.3.15 Procedures for rescue coordination centres during emergency phases

14.3.15.1 Uncertainty phase

On the occurrence of an uncertainty phase, the rescue coordination centre shall cooperate to the utmost with air traffic services units and other appropriate agencies and services in order that incoming reports may be speedily evaluated.

14.3.15.2 Alert phase

On the occurrence of an alert phase the rescue coordination centre shall immediately alert aeronautical search and rescue units and initiate any necessary action.

14.3.15.3 Distress phase

a) On the occurrence of a distress phase, the rescue coordination centre shall:

   1. immediately initiate action by aeronautical search and rescue units in accordance with the appropriate plan of operation;

   2. ascertain the position of the aircraft, estimate the degree of uncertainty of this position, and, on the basis of this information and the circumstances, determine the extent of the area to be searched;

   3. notify the operator, where possible, and keep the operator informed of developments;

   4. notify other rescue coordination centres, the help of which seems likely to be required, or which may be concerned in the operation;

   5. notify the associated air traffic services unit, when the information on the emergency has been received from another source;

   6. request at an early stage aircraft, vessels, coastal stations and other services not specifically included in the appropriate plan of operation and able to assist to:

      i. maintain a listening watch for transmissions from the aircraft in distress, survival radio equipment or an ELT;

      ii. assist the aircraft in distress as far as practicable; and

      iii. inform the rescue coordination centre of any developments;

b) from the information available, draw up a detailed plan of action for the conduct of the search and/or rescue operation required and communicate the plan for the guidance of the authorities immediately directing the conduct of the operation;

c) amend as necessary, in the light of evolving circumstances, the detailed plan of action;

d) notify the appropriate accident investigation authorities; and

e) notify the State of Registry of the aircraft.

(f) The order in which these actions are described shall be followed unless circumstances dictate otherwise.

14.3.16 Initiation of search and rescue action in respect of an aircraft whose position is unknown

a) In the event that an emergency phase is declared in respect of an aircraft whose position is unknown and may be in one of two or more aeronautical search and rescue regions, the following shall apply:

1. When a rescue coordination centre is notified of the existence of an emergency phase and is unaware of other centres taking appropriate action, it shall assume responsibility for initiating suitable action in accordance with 14.3.15 and confer with neighbouring rescue coordination centres with the objective of designating one rescue coordination centre to assume responsibility forthwith.

2. Unless otherwise decided by common agreement of the rescue coordination centres concerned, the rescue coordination centre to coordinate search and rescue action shall be the centre responsible for:

i. the region in which the aircraft last reported its position; or

ii. the region to which the aircraft was proceeding when its last reported position was on the line separating two aeronautical search and rescue regions; or

iii. the region to which the aircraft was destined when it was not equipped with suitable two-way radio communication or not under obligation to maintain radio communication; or

iv. the region in which the distress site is located as identified by the Cospas-Sarsat system.

v. After declaration of the distress phase, the rescue coordination centre with overall coordination responsibility shall inform all rescue coordination centres that may become involved in the operation of all the circum-stances of the emergency and subsequent developments.

vi. Likewise, all rescue coordination centres becoming aware of an information pertaining to the emergency shall inform the rescue coordination centre that has overall responsibility.

vii. Whenever applicable, the rescue coordination centre responsible for aeronautical search and rescue action shall forward to the air traffic services unit serving the flight information region in which the aircraft is operating, information of the aeronautical search and rescue action initiated, in order that the information can be passed to the aircraft.

14.3.17 Procedures where responsibility for operations extends to two or more Contracting States

(a) Where the conduct of operations over the entire aeronautical search and rescue region is the responsibility of more than one Contracting State, each involved State shall take action in accordance with the relevant plan of operations when so requested by the rescue coordination centre of the region.

14.3.18 Procedures for SAR authorities in the field

a) The authorities immediately directing the conduct of operations or a part thereof shall:

1. give instructions to the units under their direction and inform the rescue coordination centre of the instructions; and

2. keep the rescue coordination centre informed of developments.

14.3.19 Procedures for rescue coordination centres — termination and suspension of operations

a) Aeronautical search and rescue operations shall continue, when practicable, until all survivors are delivered to a place of safety or until all reasonable hope of rescuing survivors has passed.

b) The responsible rescue coordination centre shall normally be responsible for determining when to discontinue aeronautical search and rescue operations.

c) When an aeronautical search and rescue operation has been successful or when a rescue coordination centre considers, or is informed, that an emergency no longer exists, the emergency phase shall be cancelled, the aeronautical search and rescue operation shall be terminated and any authority, facility or service that has been activated or notified shall be promptly informed.

d) If an aeronautical search and rescue operation becomes impracticable and the rescue coordination centre concludes that there might still be survivors, the centre shall temporarily suspend on-scene activities pending further developments and shall promptly inform any authority, facility or service which has been activated or notified. Relevant information subsequently received shall be evaluated and aeronautical search and rescue operations resumed when justified and practicable.

14.3.20 Procedures at the scene of an accident

a) When multiple facilities are engaged in aeronautical search and rescue operations on-scene, the rescue coordination centre or rescue sub centre shall designate one or more units on-scene to coordinate all actions to help ensure the safety and effectiveness of air and surface operations, taking into account facility capabilities and operational requirements.

b) When a pilot-in-command observes that either another aircraft or a surface craft is in distress, the pilot shall, if possible and unless considered unreasonable or unnecessary:

1. keep the craft in distress in sight until compelled to leave the scene or advised by the rescue coordination centre that it is no longer necessary;

2. determine the position of the craft in distress;

3. as appropriate, report to the rescue coordination centre or air traffic services unit as much of the following information as possible:

   - type of craft in distress, its identification and condition;

   - its position, expressed in geographical or grid coordinates or in distance and true bearing from a distinctive landmark or from a radio navigation aid;

   - time of observation expressed in hours and minutes Coordinated Universal Time (UTC);

   - number of persons observed;

   - whether persons have been seen to abandon the craft in distress;

   - on-scene weather conditions;

   - apparent physical conditions of survivors;

   - apparent best ground access route to the distress site; and

4. act as instructed by the rescue coordination centre or the air traffic services unit.

c) If the first aircraft to reach the scene of an accident is not an aeronautical search and rescue aircraft, it shall take charge of on-scene activities of all other aircraft subsequently arriving until the first aeronautical search and rescue aircraft reaches the scene of the accident. If, in the meantime, such aircraft is unable to establish communication with the appropriate rescue coordination centre or air traffic services unit, it shall, by mutual agreement, hand over to an aircraft capable of establishing and maintaining such communications until the arrival of the first aeronautical search and rescue aircraft.

d) When it is necessary for an aircraft to convey information to survivors or surface rescue units, and two-way communication is not available, it shall, if practicable, drop communication equipment that would enable direct contact to be established, or convey the information by dropping a hard copy message.

e) When a ground signal has been displayed, the aircraft shall indicate whether the signal has been understood or not by the means described in 14.3.20(d) or, if this is not practicable, by making the appropriate visual signal.

f) When it is necessary for an aircraft to direct a surface craft to the place where an aircraft or surface craft is in distress, the aircraft shall do so by transmitting precise instructions by a means at its disposal. If no radio communication can be established, the aircraft shall make the appropriate visual signal.

14.3.20.1 Procedures for a pilot-in-command intercepting a distress transmission

a) Whenever a distress transmission is intercepted by a pilot-in command of an aircraft, the pilot shall, if feasible:

1. acknowledge the distress transmission;
2. record the position of the craft in distress if given;
3. take a bearing on the transmission;
4. inform the appropriate rescue coordination centre or air traffic services unit of the distress transmission, giving all available information; and
5. at the pilot's discretion, while awaiting instructions, proceed to the position given in the transmission

14.3.21 Aeronautical search and rescue signals

a) The air-to-surface and surface-to-air visual signals in the 14.3.23 shall, when used, have the meaning indicated therein. They shall be used only for the purpose indicated and no other signals likely to be confused with them shall be used.

b) On observing any of the signals in 14.3.23, aircraft shall take such action as may be required by the interpretation of the signal given in 14.3.23

14.3.22 Maintenance of records

a) Each rescue coordination centre shall keep a record of the operational efficiency of the aeronautical search and rescue organization in its region.

b) Each rescue coordination centre shall prepare appraisals of actual aeronautical search and rescue operations in its region. These appraisals shall comprise any pertinent remarks on the procedures used and, on the emergency, and survival equipment, and any suggestions for improvement of those procedures and equipment. Those appraisals which are likely to be of interest to other States shall be submitted to the Authority for information and dissemination as appropriate.

14.3.23 Search and Rescue Signals

14.3.23.1 Signals with surface crafts:

a) The following manoeuvres performed in sequence by an aircraft mean that the aircraft wishes to direct a surface craft towards an aircraft or a surface craft in distress:

1. circling the surface craft at least once;

2. crossing the projected course of the surface craft close ahead at low altitude and:

   i. rocking the wings; or
   ii. opening and closing the throttle; or
   iii. changing the propeller pitch.
   iv. heading in the direction in which the surface craft is to be directed.
   v. repetition of such maneuvers has the same meaning.

Note.— Due to high noise level on board surface craft, the sound signals in (ii) and (iii) may be less effective than the visual signal in (i) and are regarded as alternative means of attracting attention.

14.3.23.2

a) The following manoeuvres by an aircraft means that the assistance of the surface craft to which the signal is directed is no longer required:

1. crossing the wake of the surface craft close astern at a low altitude and:
2. rocking the wings; or
3. opening and closing the throttle; or
4. changing the propeller pitch.

b) The following replies may be made by surface craft to the signal in 14.3.23.3 for acknowledging receipt of signals:

1. the hoisting of the “code pennant” (vertical red and white stripes) close up (meaning understood);

2. the flashing of a succession of “T’s” by signal lamp in the Morse code;

3. the changing of heading to follow the aircraft. for indicating inability to comply:

4. the hoisting of the international flag “N” (a blue and white checkered square);

5. the flashing of a succession of “N’s” in the Morse code.

14.3.23.3. Ground-air visual signal code

a) Ground-air visual signal code for use by survivors

No.	Message	Code Symbol
1	Require assistance	V
2	Require medical assistance	X
3	No or Negative	N
4	Yes or Affirmative	Y
5	Proceeding in this direction	↑

b) Ground-air visual signal code for use by rescue units

No	Message	Code Symbol
1	Operation completed	LLL
2	We have found all personnel	LL
3	We have found only some personnel	++
4	We are not able to continue. Returning to base	XX
5	Have divided into two groups. Each proceeding in direction indicated	
6	Information received that aircraft is in this direction	→ →
7	Nothing found. Will continue to search	NN

c) Symbols shall be at least 2.5 meters (8 feet) long and shall be made as conspicuous as possible.

Note 1.— Symbols may be formed by any means such as: strips of fabric, parachute material, pieces of wood, stones or such like material; marking the surface by tramping, or staining with oil.

Note 2.— Attention to the above signals may be attracted by other means such as radio, flares, smoke and reflected light.

14.3.23.4. Air-to-ground signals

a) The following signals by aircraft mean that the ground signals have been understood:

1. during the hours of daylight: by rocking the aircraft's wings;
2. during the hours of darkness:

3. flashing on and off twice the aircraft's landing lights or, if not so equipped, by switching on and off twice its navigation lights.

b) Lack of the above signal indicates that the ground signal is not understood.

No	Message	Code Symbol
1	Operation completed	
2	We have found all personnel	
3	We have found only some personnel	
4	We are not able to continue. Returning to base	
5	Have divided into two groups. Each proceeding in direction indicated	
6	Information received that aircraft is in this direction	
7	Nothing found. Will continue to search	

c) Symbols shall be at least 2.5 meters (8 feet) long and shall be made as conspicuous as possible.

Note 1.— Symbols may be formed by any means such as: strips of fabric, parachute material, pieces of wood, stones or such like material; marking the surface by tramping, or staining with oil.

Note 2.— Attention to the above signals may be attracted by other means such as radio, flares, smoke and reflected light.

PART 14: AIR NAVIGATION SERVICES

SUB-PART: 14.4 AERONAUTICAL INFORMATION SERVICE

14.4.1 PRELIMINARY PROVISIONS

14.4.1.1 CITATION

These Sections of the Regulations may be cited as the subpart 4 of part 14, Civil Aviation Regulations 2023. (Aeronautical Information Services)

14.4.1.2 APPLICABILITY

This subpart is applicable to the provision of Aeronautical Information Service (AIS) and Aeronautical Information Management (AIM).

14.4.1.3 PROVISION OF AN AERONAUTICAL INFORMATION SERVICES

a) No Aeronautical Information Services Provider shall provide aeronautical information services at aerodromes in Nigeria except under the authority of, and in accordance with the provisions contained in this regulation

b) No personnel may provide aeronautical information service unless is in accordance with the requirements contained in this Regulation.

c) A person shall not provide an aeronautical information service other than when under supervision unless he is a holder of an appropriate instrument of Authority in the form of a certificate of competency with endorsement type equivalent to the function being undertaken;

d) A person shall not provide an aeronautical information service when under the influence of alcohol, drug or narcotic substance.

14.4.1.4 Common reference systems for air navigation

a) Horizontal reference system

The Aeronautical Information Service Provider ensures that:

1. The World Geodetic System — 1984 (WGS-84) shall be used as the horizontal (geodetic) reference system for international air navigation.

2. published aeronautical geographical coordinates (indicating latitude and longitude) shall be expressed in terms of the WGS-84 geodetic reference datum.

Note 1.— Comprehensive guidance material concerning WGS-84 is contained in the World Geodetic System — 1984 (WGS-84) Manual (Doc 9674).

b) Vertical reference system

The Aeronautical Information Service Provider ensures that:

1. Mean sea level (MSL) datum shall be used 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. At those geographical positions where the accuracy of EGM-96 does not meet the accuracy requirements for elevation and geoid undulation on the basis of EGM-96 data, regional, national or local geoid models containing high resolution (short wavelength) gravity field data shall be 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).

   Note.— Specifications concerning determination and reporting (accuracy of field work and data integrity) of elevation and geoid undulation at specific positions at aerodromes/heliports are given in the PANS-AIM (Doc 10066), Appendix 1.

c) Temporal reference system

The Aeronautical Information Service Provider ensures that:

1) the Gregorian calendar and Coordinated Universal Time (UTC) shall be used as the temporal reference system for 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.— 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, shall include either a

description of that system or a citation for a document that describes that temporal reference system.

Note.— ISO Standard 19108, Annex D, describes some aspects of calendars that may have to be considered in the description.*

14.4.1.5 Miscellaneous specifications

The Aeronautical Information Service Provider ensures that:

a) Aeronautical information products intended for international distribution shall include English text for those parts expressed in plain language.

b) Place names shall be spelt in conformity with local usage, transliterated, when necessary, into the ISO-Basic Latin alphabet.

c) Units of measurement used in the origination, processing and distribution of aeronautical data and aeronautical information shall be consistent with the decision taken by Nigeria in respect of the use of the tables contained in Nig.CARs 1.9 of these Regulation.

d) ICAO abbreviations shall be used in aeronautical information products whenever they are appropriate and their use will facilitate distribution of aeronautical data and aeronautical information.

14.4.1.6 Aeronautical survey requirement

a) No one shall carry out aeronautical survey except in accordance in with ICAO Doc.9674 (WGS-84 MANUAL)- requirements.

b) The Surveyor shall provide his profile in the metadata to the Authority to be verified.

c) The Surveyor shall ensure that aeronautical data collected in accordance with 14.4.1.4(a) complies with data quality requirement.

d) The Surveyor shall provide the report of the survey in accordance with the requirement of these Regulations.

e) The surveyor involved shall verify the existing control and make available report of the control to the Authority.

f) When it is established that there were no survey control network, the surveyor in question shall establish the control network and report as appropriate to the Authority.

g) The established control shall be observed in the static mode of at least eight (8) hours on the base station.

h) The network shall not be less than four including the threshold with each having two witnesses

i) Where the survey control is established from COR STATION, the detail report shall be provided .

j) The processing report shall submitted with the survey report.

k) the Authority will carry out field verification of the data collected in accordance with this regulation to ensure they are fit for use in the aeronautical charts and Instrument Flight Procedure Design.

14.4.1.7 Survey Reporting Requirements

a) The surveyor involved in aeronautical survey shall present the survey report in the format indicating the type of survey from the list

1) Geodetic survey,
2) En-route survey,
3) Aerodrome/heliport survey.
4) Obstacle Survey

b) Common reporting elements. The data originator shall present the survey report noting the following element for whatsoever format of report from (a)

1) Historical data shall describe the general survey information as follows:

i. the purpose,
ii. the date, and
iii. the surveyors' names and the company.

2) Survey method used shall be provided with the actual way the survey was carried out, not a description of the theory behind the technique used.

3) Diagrams: the data originator shall include the diagrams for station descriptions, control networks and threshold descriptions.

4) The quality control report shall be provided to include the information on the equipment calibrations carried out.

i) It shall also describe the methods used to check the survey and, in particular, show evidence that the required accuracy for the particular data type has been achieved.

5) Observations: Records of the actual observations shall be provided in a separate volume. Cross-references shall be made to the survey report.

c) Aerodrome/Heliport survey report format. The survey report shall include the following lists for a complete reporting format for an aerodrome/heliport survey.

1. A receipt note signed on behalf of the commissioning authority, indicating the date of receipt of the survey and the number of copies of the report.

2. Historical data giving the dates and purpose of the survey, the survey company names and personnel.

3. Description of the method of the survey.

4. Details of the observations made with cross- references to the control survey.

5. A facility survey plan with cross-referenced witness diagrams (where necessary).

6. Schedule of the points surveyed giving the coordinates and the date surveyed.

7. Quality Control report giving equipment calibration details and describing the methods used to check the survey. In addition, evidence shall be provided to show that the accuracy requirements have been met.

8. Actual observations (provided in a separate volume), indexed so that cross-references can be included in the report.

14.4.2. GENERAL PROVISIONS

14.4.2.1 Local Operating Procedures

a) The Aeronautical Information Services Provider shall:

1) develop local operating procedures for the collection and dissemination of relevant data in AIS Aerodrome units.

2) consider the availability and reliability of external data sources required to provide an Aeronautical Information Service.

3) Include the provider, the data source and means of receipt, display and maintain the integrity of the information of aerodrome/Heliport conditions and the operational status of facilities and navigation aids.

4) Liaise with the heliport personnel within its environment for the provision of aeronautical information service as may be required.

5) Provide Aerodrome works hour and administration ;

6) The Aeronautical Information Service Provider shall include procedures to ensure that it can, and will continue to be able to provide reliable information in relation to its Aeronautical Information Services to other organisations whose functions reasonably require that information (e.g.

ATS units and centres).

7) Data recipients may include:

i. ATS providers;
ii. Briefing offices;
iii. Airline offices;
iv. Heliports
v. Pilots;
vi. Other AIS providers;
vii. Military;
viii. The Aeronautical Telecommunications provider; and
ix. Other Government agencies.
x. Airspace planning /Flight procedure designer

Approvals

14.4.2.2 Aeronautical Information Services Provider shall ensure that:

a) Copies of an aeronautical information product to be published be approved by the Authority before publication.

b) Where the aeronautical information product in paragraph (a) is NOTAM that requires urgency, the promulgation shall be carried out immediately to meet the need and the Authority shall be informed thereafter.

c) Where the information to be notify by NOTAM is pre-planned and of long duration, the AIS Provider shall request for approved work plan before promulgation.

14.4.2.3 search and Rescue Responsibilities and Co- ordinations

a) The Aeronautical Information Services Provider shall provide the assistance as may be requested from the authority responsible for conducting SAR activities.

b) An adequate search and rescue charts showing Rescue Co-ordination Centre, (RCC) Rescue-sub Centre (RSC), and Search and Rescue Region shall publish in the AIP.

14.4.2.4. Establishment of Crew Briefing Offices

a) Subject to the provisions of this Regulations, the Aeronautical Information Service Provider shall establish and operationalize Crew briefing offices as appropriate for the purpose of reception and management of flight plans.

b) The Aeronautical Information Service Provider shall ensure that at all aerodromes/Heliports, briefing is made to the pilots to facilitate pre-flight information required for a flight, information shall be presented in such a manner to facilitate self-briefing in order to save the crews' time.

c) In line with Sub regulation (14.4.2.4. b), the Aeronautical Information Service Provider shall consider the following:

1) the physical layout of the briefing room;

2) the format of the Pre-flight Information Bulletin (PIB);

3) an adequate wall display;

4) easy access to basic information;

5) adequate signages

6) requirements stated in this Regulation and Part 8.6 of these Regulations.

d) The established Crew briefing offices in sub regulation (14.4.2.5(a) shall be adequately equipped and staffed with personnel sufficient for the effective execution of the function;

e) A person shall not provide crew briefing office service other than when under supervision unless he is a holder of an appropriate instrument of Authority in the form of a certificate of competency with endorsement type equivalent to the function being undertaken;

f) The certificate of competency required in sub regulation (e) will be issued by the Authority.

14.4.2.5 Aeronautical Information Service Crew Briefing Offices Personnel Requirements.

Aeronautical Information Service Provider shall appoint –

a) an accountable officer for aeronautical information service to whom authority has been granted to ensure that all activities undertaken are carried out in accordance with the applicable requirements in this regulation;

b) a Standards and Quality Assurance officer who shall be responsible for quality control and implementation of the Authority's requirements on QMS and SMS and who has direct access to the accountable manager referred to in sub regulation (a);

c) adequately trained and certified personnel to−

1) plan, provide and supervise the approved services listed in the air navigation Aeronautical Information Service Provider certificate and the unit's manual of operations, in a safe and efficient manner;

2) receive, collate or assemble, edit, format, publish/store and distribute

aeronautical data and aeronautical information;

3) facilitate flight planning, provide pre-flight information, and receive post flight information as necessary; and

4) facilitate the development, maintenance and promulgation of aeronautical charts.

14.4.2.6. Aeronautical Information Service Crew Briefing Offices Personnel Competency Requirements.

The Aeronautical Information Service Provider shall−

a) develop and implement a policy to guide the identification of required competencies and endorsements to undertake specific tasks and or functions;

b) identify the competencies and the associated knowledge, skills and abilities required for each function and ensure that personnel possess the competencies required to perform the specific assigned functions;

c) establish initial and periodic assessments that require personnel to demonstrate the required competencies;

d) appropriately train personnel assigned to perform specific functions;

e) establish procedures to maintain currency of the competence of the personnel; and

e) maintain sufficient numbers of personnel, with the requisite experience and give them appropriate authority to be able to discharge their duties.

14.4.2.7 EXEMPTION

a) Requirements for application for exemption.

1. The requirement for exemption shall be in accordance with the provision contained in Nig.CARs part 1.4

14.4.3 RESPONSIBILITIES AND FUNCTIONS

14.4.3.1. Aeronautical Information Service Provider Responsibility and Functions.

a) The Aeronautical Information Service Provider shall:

1. provide an aeronautical information service (AIS); or

2. agree with one or more other Contracting State(s) for the provision of a joint service; or

3. delegate the authority for the provision of the service to a non-governmental agency, provided the Standards of this Regulations are

adequately met.

b) The Aeronautical Information Service Provider shall ensure that the provision of aeronautical data and aeronautical information covers Kano FIR and those areas over the high seas for which it is responsible for the provision of air traffic services (ATS).

c) The Aeronautical Information Service Provider concerned shall remain responsible for the aeronautical data and aeronautical information provided in accordance with Regulation 14.4.3.1(b). Aeronautical data and aeronautical information provided for and on behalf of a State shall clearly indicate that they are provided under the authority of that State, irrespective of the format in which they are provided.

d) The Aeronautical Information Service Provider shall ensure that the aeronautical data and aeronautical information provided are of required quality in accordance with 14.4.4.2.

e) The Aeronautical Information Service Provider 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 14.4.5.

14.4.3.2 Aeronautical Information Services (AIS) Responsibilities and Functions.

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

1. those involved in flight operations, including flight crews, flight planning and flight simulators; and

2. the ATS 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).

b) An AIS shall receive, collate or assemble, edit, format, publish/store and distribute aeronautical data and aeronautical information concerning the entire territory of the State as well as those areas over the high seas for which the State is responsible for the provision of ATS. Aeronautical data and aeronautical information shall be provided as aeronautical information products.

Note.— An AIS may include origination functions.

c) Where 24-hour service is not provided, service shall be available during the whole period an aircraft is in flight in the area of responsibility of the AIS, plus a period of at least two hours before and after a period. Service shall also be available at the other time as may be requested by an appropriate ground organization.

d) An AIS shall, in addition, obtain aeronautical data and aeronautical information to enable it to provide pre-flight information service and to meet the need for in-flight information:

1. from the AIS of other States; and
2. from other sources that may be available.

Note.— One such source is the subject of a provision in 14.4.6.5

e) Aeronautical data and aeronautical information obtained under 14.4.3.2(d)) shall, when distributed, be clearly identified as having the authority of the originating State.

f) Aeronautical data and aeronautical information obtained under 14.4.3.2(d)(2) shall, if possible, be verified before distribution and if not verified shall, when distributed, be clearly identified as unverified.

g) An AIS shall promptly make available to the AIS of other States aeronautical data and aeronautical information necessary for the safety, regularity or efficiency of air navigation required by them, to enable them to comply with 14.4.3.1(b).

14.4.3.3 Exchange of aeronautical data and aeronautical information.

The Aeronautical Information Service Providers shall ensure that

a). it designates the office to which all elements of aeronautical information products provided by other States shall be addressed. Such an office shall be qualified to deal with requests for aeronautical data and aeronautical information provided by other States.

b). Formal arrangements shall be established between those parties providing aeronautical data and aeronautical information on behalf of the States and their users in relation to the provision of the service.

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

c) Where more than one international NOTAM office is designated within Nigeria, the extent of responsibility and the territory covered by each office shall be defined.

d) An Aeronautical Information Aeronautical Information Service Provider shall arrange, as necessary, to satisfy operational requirements for the issuance and receipt of NOTAM distributed by telecommunication.

e) Wherever practicable, direct contact between AIS shall be established in order to facilitate the international exchange of aeronautical data and aeronautical information.

f) Except as provided in 14.4.3.3(h) 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:

i. Aeronautical Information Publication (AIP), including Amendments and Supplements;

ii. Aeronautical Information Circulars (AIC);

iii. NOTAM; and

iv. aeronautical charts.

g). The exchange of more than one copy of the elements of aeronautical information products, and other air navigation documents, including those containing air navigation legislation and regulations, shall be subject to bilateral agreement between the participating Contracting States and entities.

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

i). The procurement of aeronautical data and aeronautical information, including the elements of aeronautical information products, and other air navigation documents, including those containing air navigation legislation and regulations, by States other than Contracting States and by other entities shall hbould be subject to separate agreement between the participating States and entities.

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

Note 1.— Specifications concerning globally interoperable aeronautical data and aeronautical information exchange models are contained in the Procedures for Air Navigation Services — Aeronautical Information Management (PANS-AIM, Doc 10066).

Note 2.— Guidance material on globally interoperable aeronautical data and aeronautical information exchange models is contained in Doc 8126.

14.4.3.4 Copyright

Note.— In order to protect the investment in the products of a State's AIS as well as to ensure better control of their use, States may wish to apply copyright to those products in accordance with their national laws.

a) Any aeronautical information product which has been granted copyright protection by Nigeria and provided to another State in accordance with 14.4.3.3 shall only be made available to a third party on the condition that:

   i. the third party is made aware that the product is copyright protected; and

   ii. provided that it is appropriately annotated that the product is subject to copyright by Nigeria.

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

14.4.3.5 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.

14.4.4. AERONAUTICAL INFORMATION MANAGEMENT

14.4.4.1. Information management requirements

The information management resources and processes established by an aeronautical information service (AIS) 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.

14.4.4.2 Data quality specifications

a) Data accuracy

   (1) The order of accuracy for aeronautical data shall be in accordance with its intended use.

   Note: Specifications concerning the order of accuracy (including confidence *level) for aeronautical data are contained in PANS-AIM (Doc 10066), Appendix 1.*

NOTAM

b) Data resolution

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

Note: (1) The Specifications concerning the resolution of aeronautical data are contained in the PANS-AIM (Doc 10066), Appendix 1.

NOTAM

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

c) Data integrity

(1) The Aeronautical Information Service Provider shall ensure the integrity of aeronautical data shall be maintained throughout the data chain from origination to distribution to the next intended user.

Note.— Specifications concerning the integrity classification related to aeronautical data are contained PANS-AIM (Doc 10066), Appendix 1.

NOTAM

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

i. avoid corruption throughout the processing of the data, for routine data:

ii. assure corruption does not occur at a 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, for essential data: and

iii. assure corruption does not occur in 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, for critical data.

d) Data traceability

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

e) Data timeliness

Timeliness of aeronautical data shall be ensured 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.

f) Data completeness

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

g) 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.

14.4.4.3. **Aeronautical data and aeronautical information verification and validation**

The Aeronautical Information Service Provider shall ensure that:

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

b) An AIS shall establish verification and validation procedures which ensure that on receipt of aeronautical data and aeronautical information, quality requirements are met.

14.4.4.4 Data error detection

a) Digital data error detection techniques shall be used during the transmission and/or storage of aeronautical data and digital data sets.

b) Digital data error detection techniques shall be used in order to maintain the integrity levels as specified in sub-section 14.4.4.2(c)

Note.— Detailed specifications concerning digital data error detection techniques are contained in the PANS-AIM (Doc 10066).

14.4.4.5 Use of automation

a) Automation shall be applied 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.

b) Due consideration to the integrity of data and information shall be given 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 behaviour .

c) In order to meet the data quality requirements, automation shall:

1. enable digital aeronautical data exchange between the parties involved in the data processing chain; and

2. use aeronautical information exchange models and data exchange models designed to be globally interoperable.

14.4.4.6 Quality management system

a) the Aeronautical Information Service Provider shall ensure that:

1. Quality management systems is implemented and maintained encompassing all functions of an AIS, as outlined in 14.4.3.2.

2. The execution of the 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 2022).

3. Quality management shall be applicable to the whole aeronautical data chain from data origination to distribution to the next intended user, taking into consideration the intended use of data.

4. The quality management system established in accordance with 14.4.4.6 shall follow the ISO 9000 series of quality assurance standards and be certified by an accredited certification body.

b) The Aeronautical Information Service Provider shall ensure that:

1. Within the context of the established quality management system, the competencies and the associated knowledge, skills and abilities required for each function are identified,

2. personnel assigned to perform those functions shall be appropriately trained.;

3. Processes shall be in place to ensure that personnel possess the competencies required to perform specific assigned functions;

4. Appropriate records shall be maintained so that the qualifications of personnel can be confirmed;

5. Initial and periodic assessments shall be established that require personnel to demonstrate the required competencies.

6. Periodic assessments of personnel shall be used as a means to detect and correct shortfalls in knowledge, skills and abilities.

c) The Aeronautical Information Service Provider shall ensure that quality management system shall include:

1. 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 data anomalies or errors detected in use to be identified by root cause, corrected and communicated to affected users.

d) 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.

e) All necessary measures shall be taken to monitor compliance with the quality management system in place.

f) Demonstration of compliance of the quality management system applied shall be by audit. If nonconformity is identified;

1. initiating action to correct its cause shall be determined and taken without undue delay.

2. Audit observations and remedial actions shall be evidenced and properly documented.

14.4.4.7 Human factors considerations

a) The Aeronautical Information Service Provider shall ensure that organisation of an AIS as well as the design, contents, processing and distribution of aeronautical data and aeronautical information shall take into consideration human factors principles which facilitate their optimum utilization.

b) Due consideration shall be given to the integrity of information where human interaction is required and mitigating steps taken where risks are identified.

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

14.4.5 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.

14.4.5.1 Scope of Aeronautical Data and Aeronautical Information

The Aeronautical Information Service Provider shall ensure that:

a) 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:

1) national regulations, rules and procedures;

2) aerodromes and heliports;

3) airspace;

4) air traffic services (ATS) routes;

5) instrument flight procedures;

6) radio navigation aids/systems;

7) obstacles;

8) terrain; and

9) geographic information.

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

Note 2.— Aeronautical data and aeronautical information in each sub-domain may be originated by more than one organization or authority.

b) 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.

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

NOTAM

14.4.5.2 Metadata

a) Metadata shall be collected for aeronautical data processes and exchange points.

b) Metadata collection shall be applied throughout the aeronautical information data chain, from origination to distribution to the next intended user.

14.4.6. AERONAUTICAL INFORMATION PRODUCTS AND SERVICES

14.4.6.1 General

Aeronautical Information Service Provider shall:

a. Ensure that aeronautical information is provided in the form of aeronautical information products and associated services.

Note. — 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.

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

14.4.6.2 Aeronautical information in a standardized presentation

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

Note 1.— 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).

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

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

b) Aeronautical Information Publication

1) An Aeronautical Information Publication shall contain, in three parts; (Part 1-General (GEN), Part 2-En-route (ENR), Part 3-Aerodromes (AD) sections and subsections uniformly referenced to allow for standardized electronic data storage and retrieval.

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.

2) Aeronautical Information Publication shall include:

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

ii. the general conditions under which the services or facilities are available for international use;

iii. a list of significant differences between the national regulations and practices of the State 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 Nigeria and the related ICAO provisions;

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

3) Specifications for AIP amendments

The Aeronautical Information Service Provider shall ensure that:

i. The AIP Amendment regular interval shall be specified in the AIP, Part 1 — General (GEN).

ii. When an AIP Amendment will not be published at the established interval or publication date, a NIL notification shall be originated and distributed by the NOTAM checklist.

iii. Recourse to hand amendments or annotations shall be kept to a minimum.

iv. When the AIP is provided in more than one volume, each volume should include separate amendment services.

c) AIP Supplement

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

2. Specifications for AIP Supplements When an error occurs in an AIP Supplement or when the period of validity of an AIP Supplement is changed, a new AIP Supplement shall be published as a replacement.

d) Aeronautical Information Circulars

1. An AIC shall be used to provide:

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

ii. information of a purely explanatory or advisory nature liable to affect flight safety; or

iii. 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.

e) Aeronautical charts

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:

i. Aerodrome/Heliport Chart — ICAO;

ii. Aerodrome Ground Movement Chart — ICAO;

iii. Aerodrome Obstacle Chart — ICAO Type A;

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

v. Aerodrome Terrain and Obstacle Chart — ICAO (Electronic);

vi. Aircraft Parking/Docking Chart — ICAO;

vii. Area Chart — ICAO;

viii. ATC Surveillance Minimum Altitude Chart — ICAO;

ix. Instrument Approach Chart — ICAO;

x. Precision Approach Terrain Chart — ICAO;

xi. Standard Arrival Chart — Instrument (STAR) — ICAO;

xii. Standard Departure Chart — Instrument (SID) — ICAO; and m)

xiii. 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:

   i. World Aeronautical Chart — ICAO 1:1 000 000;

   ii. Aeronautical Chart — ICAO 1:500 000;

   iii. Aeronautical Navigation Chart — ICAO Small Scale; and

   iv. Plotting Chart — ICAO chart.

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

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

   Note.— Specifications concerning the chart resolution for aeronautical data are contained in the PANS-AIM (Doc 10066), Appendix 1.

NOTAM

   Note - Detailed specifications for NOTAM, including formats for SNOWTAM and ASHTAM, are contained in the PANS-AIM (Doc 10066)

1. A checklist of valid NOTAM shall be regularly provided.

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

14.4.6.3 Digital data sets

a). General

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

   i. AIP data set;

   ii. terrain data sets;

   iii. obstacle data sets;

   iv. aerodrome mapping data sets; and

   v. instrument flight procedure data sets.

   Note.— Detailed specifications concerning the content of the digital data sets are contained in the PANS-AIM (Doc 10066)

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

vii A checklist of valid data sets shall be regularly provided.

b). AIP data set

1. An AIP data set should 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 should 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.

c) Terrain and obstacle data sets

Note 1.— Numerical requirements for terrain and obstacle data sets are contained in the PANS AIM (Doc 10066), Appendices 1 and 8.

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

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

i. Area 1: the entire territory of a State;

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

A. Area 2a: a rectangular area around a runway that comprises the runway strip and clearway that exists;

Note. — See Annex 14, Volume I, Chapter 3, for dimensions for runway strips.

B. 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;

C. 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

D. 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;

iii. 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

iv. 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.

v. 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 should be extended to a distance not exceeding 2 000 m (6 500 ft) from the runway threshold.

2). Terrain data sets

i. 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.

ii. Terrain data shall be provided for Area 1.

iii. 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.

iv. For aerodromes regularly used by international civil aviation, additional terrain data should 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.

v. Arrangements should 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.

vi. For those aerodromes located near territorial boundaries, arrangements should be made among States concerned to share terrain data.

vii. For aerodromes regularly used by international civil aviation, terrain data should be provided for Area 3.

viii. 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.

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

3) Obstacle data sets

i. Obstacle data sets shall contain the digital representation of the vertical and horizontal extent of obstacles.

ii. Obstacle data shall not be included in terrain data sets.

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

iv. 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.

v. 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 and 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 Nig.CARs 14.5.4.8(b). Aerodrome obstacle limitation surfaces are specified in Nig. CARs 12.2.4.

vi. 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.

vii. Arrangements should 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.

viii. For those aerodromes located near territorial boundaries, arrangements should be made among States concerned to share obstacle data.

ix. 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.

x. 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.

xi. Where additional obstacle data is collected to meet other aeronautical requirements, the obstacle data sets should be expanded to include this additional data.

a 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.

4) Aerodrome mapping data sets

i. 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.

ii. Aerodrome mapping data sets should be made available for aerodromes regularly used by international civil aviation.

5) Instrument flight procedure data sets

i. Instrument flight procedure data sets shall contain the digital representation of instrument flight procedures.

ii. Instrument flight procedure data sets should be made available for aerodromes regularly used by international civil aviation.

14.4.6.4 Distribution services

a) The Aeronautical Information Service Provider ensures that:

1) Aeronautical information products are distributed to authorized users who request them.

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

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

b) 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 the ICAO 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:

   i. a six-digit date-time group indicating the date and time of NOTAM origination, and the identification of the originator shall be used,

   ii. preceding the text. The originating Aeronautical Information Service Provider 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 Aeronautical Information Service Provider shall, on request, grant distribution of NOTAM series other than those distributed internationally.

7) Selective distribution lists should be used when practicable.

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

14.4.6.5 Pre-Flight Information Service.

a) The Aeronautical Information Service Provider shall ensure that:

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

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

b). 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.

14.4.6.6 Post-Flight Information Service.

a) For an 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.

b) The arrangements specified in 14.4.6.6(a) shall ensure that information is made available to the aeronautical information service (AIS) for distribution as the circumstances necessitate.

c) 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.

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

Note.— See Nig.CARs12.2.9.4.

14.4.7 AERONAUTICAL INFORMATION UPDATES

14.4.7.1 General specifications

The Aeronautical Information Service Provider ensures that Aeronautical data and aeronautical information shall be kept up to date.

14.4.7.2 Aeronautical information regulation and control (AIRAC)

The Aeronautical Information Service Provider ensures that:

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

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

i. flight information regions;

ii. control areas;

iii. control zones;

iv. advisory areas;

v. air traffic services (ATS) routes;

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

vii. permanent areas or routes or portions thereof where the possibility of interception exists;

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

B. holding and approach procedures, arrival and departure procedures, noise abatement procedures and other pertinent ATS procedures;

C. transition levels, transition altitudes and minimum sector altitudes;

D. meteorological facilities (including broadcasts) and procedures;

E. runways and stopways;

F. taxiways and aprons;

G. aerodrome ground operating procedures (including low visibility procedures);

H. approach and runway lighting; and

I. aerodrome operating minima if published by a State.

b) 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.

c) 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.

d) 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.

e) 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.

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

1) position, height and lighting of navigational obstacles;

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

3) customs, immigration and health services;

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

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

g) Whenever major changes are planned and where advance notice is desirable and practicable, information should 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:

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

2) new runways for IFR operations at international aerodromes;

3) design and structure of the ATS route network;

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

5) 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).

14.4.7.3 Aeronautical information product updates

The Aeronautical Information Service Provider shall ensure to-date of the aeronautical products as follows;

a) Aaeronautical Iinformation Publication (AIP) updates

1. The aeronautical information publication (AIP) shall be amended or reissued at a 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.

b) NOTAM

Aeronautical Information Service Provider shall:

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

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

2. Ensure NOTAM is originated and issued promptly:

   i. whenever the information to be distributed is of a temporary nature and of short duration; or

   ii. when operationally significant permanent changes or temporary changes of long duration are made at short notice, except for extensive text and/or graphics.

3. A NOTAM shall be originated and issued concerning the following information:

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

   ii. 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.);

   iii. establishment, withdrawal or significant changes in operational capability of radio navigation and air-ground communication services. This includes:

      A. interruption or return to operation,

      B. change of frequencies,

      C. change in notified hours of service,

      D. change of identification,

      E. change of orientation (directional aids),

      F. change of location,

      G. power increase or decrease amounting to 50 per cent or more,

H. change in broadcast schedules or contents, or

I. irregularity or unreliability of operation of a radio navigation and air-ground communication services or limitations of relay stations including operational impact,

J. affected service, frequency and area;

iv. unavailability of back-up and secondary systems, having a direct operational impact;

v. establishment, withdrawal or significant changes to visual aids;

vi. interruption of or return to operation of major components of aerodrome lighting systems;

vii. establishment, withdrawal or significant changes to procedures for air navigation services;

viii. occurrence or correction of major defects or impediments in the manoeuvring area;

ix. changes to and limitations on availability of fuel, oil and oxygen;

x. major changes to search and rescue facilities and services available;

xi. establishment, withdrawal or return to operation of hazard beacons marking obstacles to air navigation;

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

xiii. presence of hazards not otherwise promulgated, which affect air navigation (including obstacles, military exercises and operations, intentional and unintentional radio frequency interferences, rocket launches, displays, fireworks, sky lanterns, rocket debris, races and major parachuting events);

xiv. conflict zones which affect air navigation (to include information that is as specific as possible regarding the nature and extent of threats of that conflict and its consequences for civil aviation);

Note.— Guidance related to conflict zones is contained in the Risk Assessment Manual for Civil Aircraft Operations Over or Near Conflict Zones (Doc 10084).

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

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

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

xviii. 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;

xix. allocation, cancellation or change of location indicators;

xx. changes in aerodrome/heliport rescue and firefighting category provided in Nig.CARs 12.2.9.4.

xxi. 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;

xxii. outbreaks of epidemics necessitating changes in notified requirements for inoculations and quarantine measures;

xxiii. 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;

xxiv. 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;

xxv. 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;

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

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

Note.— See Anne11, 2.31 and Attachment C to that Annex.

Note.— Specifications concerning the timely promulgation of information by NOTAM are contained in Chapter 6 of the Procedures for Air Navigation Services — Aeronautical Information Management (PANS-AIM, Doc 10066).

4. The following information shall not be notified by NOTAM:

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

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

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

iv. partial failure of aerodrome/heliport lighting facilities where the failure does not directly affect aircraft operations;

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

vi. the lack of apron marshalling services and road traffic control;

vii. the unserviceability of location, destination or other instruction signs on the aerodrome movement area;

viii. parachuting when in uncontrolled airspace under VFR (see 14.4.7.3b),3,xiii), when controlled, at promulgated sites or within danger or prohibited areas;

ix. training activities by ground units;

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

xi. limitations to airport facilities or general services with no operational impact;

xii. national regulations not affecting general aviation;

xiii. announcement or warnings about possible/potential limitations, without an operational impact;

xiv. general reminders on already published information;

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

xvi. information about laser emissions without an operational impact and fireworks below minimum flying heights;

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

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

xix. 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.

c) Data set updates

1. Data sets shall be amended or reissued at 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.

   i. When made available as a completely reissued data set, the differences from the previously issued complete data set should be indicated.

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

3. Updates to AIP and digital data sets shall be synchronized.

14.4.8 PERSONNEL REQUIREMENTS

14.4.8.1 Responsibilities

The Aeronautical Information Service Provider shall:

a) apply a methodology to determine its staffing needs for personnel performing aeronautical Information Services job, taking into account the size and complexity of the activities at the administration, operations, and aerodrome level.

b) establishment of minimum qualification requirements for the aeronautical information services personnel performing aeronautical information service and aeronautical information management functions;

c) Provides of appropriate initial and recurrent training to maintain and enhance their competence at the desired level, and shall implement a system for the maintenance of training records for AIS personnel.

d) put in place appropriate recruitment policies, terms of employment same as other ATS practices in place to ensure qualified personnel are engaged.

e) Ensure that the personnel hold at least one complete and current copy of its Manual of Operations and Nigeria Civil Aviation Regulations;

f) comply with all procedures detailed in its Manual of Operations;

g) Comply with these Regulations;

h) ensure that there are adequately trained technical personnel to carry out the task that may be assign to them.

i) Aeronautical Information Service Provider shall ensure that job descriptions, training programs, training plans and training records are developed, maintain and continuously improved based on the ICAO competency framework.

j) AIS officer can only be authorized to perform the duties in the area or subject where the staff member has satisfactorily completed the required training and maintains the required competence

k) establish a procedure for initially assessing, and a procedure for maintaining, the competence of the personnel required to operate and maintain the unit concerned

l) As part of the quality system, the Aeronautical Information Service personnel shall be assed by the Authority based on the competency level in line with ICAO DOC 8126.

m) Ensure the scope of the competency level be in accordance with the training level in the order of Initial, OJT, Specialized and developmental

n) The Aeronautical Information Service Provider shall develop the OJT procedure to be implemented for its technical personnel.

14.4.8.2 Personnel Training Requirements

a) The Aeronautical Information Service Provider shall ensure that AIS personnel receive the required training in an effective manner and maintain their competency with an adequate training system to be established and implemented, which shall be based on a documented training policy established and signed at the management level.

b) The training policy shall commit to provide all necessary training to all AIS personnel in all areas, including initial training (e.g. induction and basic training), on-the-job training (OJT), recurrent training and specialized or advanced training.

c) the training policy shall require the establishment of a training programme for each AIS personnel position and training plans for each technical staff member including the financial resources and time for their technical personnel to receive the required training.

d) The training programme should include all the training required for the incumbent of the position to acquire and maintain the necessary competencies for the position as well as to effectively perform the assigned activities.

e) The required training includes initial training, OJT, recurrent training and all the specialized training necessary for that technical position, with the minimum content for each type of training, as applicable.

f) For each AIS staff member, a periodic training plan shall be developed based on the training programme established for the staff member's position.

g) The training plan shall detail the type of training to be provided during a specified timeframe as well as the training priorities in line with the training program.

h) The Aeronautical Information Service Provider shall maintain individual training records for each of its staff, which shall include details of the courses completed by each staff as well as the time-frame for attending future courses as required under the training plan.

i) The Aeronautical Information Service Provider shall conduct a yearly review of the training plan for each staff before the beginning of the financial year to identify gaps in competency, changes in training requirement and prioritize the type of training required for the subsequent years.

j) The Aeronautical Information Service Provider shall comply with the competency frame work prescribed by the Authority

PART 14: AIR NAVIGATION SERVICES

SUB-PART: 14.5: AERONAUTICAL CHARTS

14.5. AERONAUTICAL CHARTS

14.5.1 Applicability

This subpart is applicable to the provision of Aeronautical Charts.

14.5.2 Provision of Aeronautical Charts.

14.5.2.1 No person shall provide Aeronautical Charts in Nigeria except with the Approval of the Authority and in accordance with the provision of these regulations.

14.5.2.2 Responsibilities of an Aeronautical Charts Provider.

(a) An Aeronautical Charts Provider issued with a Certificate under these Regulations shall:

1) be responsible for the provision of Aeronautical Charts to ensure that the information necessary for the safety, regularity and efficiency of air navigation is available in the form suitable for the operational requirements of:

(i) flight operations personnel including flight crew and the personnel responsible for the provision of pre-flight information; and

(ii) its associated Air Traffic Service Unit;

2) collect, collate, edit and disseminate aeronautical charts information concerning the entire territory of Nigeria;

3) take all reasonable steps to ensure that the information it provides and the aeronautical charts made available are adequate, accurate and that they are maintained up to date by an adequate revision service;

4) produce the chart or sheet itself for any chart or single sheet of chart series entirely contained within the territory of Nigeria.

14.5.2.3 Local Operating Procedures.

(a) The Aeronautical Charts Provider shall develop local operating procedures for the collection and dissemination of relevant data.

14.5.2.4 Co-ordination.

(a) Where applicable, the Aeronautical Charts provider shall establish systems and procedures to ensure co-ordination with the agencies and other service providers listed below:

1) Air Traffic Service Provider;

2) The Aeronautical Meteorological Service Provider;

3) The Nigerian Military;

4) Aircraft Operators;

5) Instrument Flight Procedure Designer

6) Search and Rescue units;

7) Office of the Surveyor-General of the Federation

8) Aerodrome AIS Units: and

9) Other Government Agencies that may have safety related functions with aviation.

(b) The applicant shall provide systems and procedures to facilitate communications between the units having an operational requirement with each other.

14.5.2.5 Provision of required information/data for aeronautical charts.

(a) An Aeronautical Charts Provider shall establish procedures to collect and collate the information required for the activities listed in its Manual of Operations.

(b) The procedures shall ensure that:

1) Applicable information is obtained from organization that provide services in support of the Nigeria air navigation system;

2) Arrangements for the timely provision of information are made with the information originators.

3) Information received from the originators is certified as accurate by a person identified by the originator to be responsible for the accuracy of that information.

14.5.2.6 Availability of Charts

(a) The Aeronautical Chart Provider shall on the request of another State provide information relating to Nigeria and the area of jurisdiction for the provision of air traffic services;

(b) The Aeronautical Chart Provider shall, when so specified, ensure the availability of charts in whichever of the following ways is appropriate for a particular chart or single sheet of a chart series, the availability of charts includes specified electronic charts;

(c) for any chart or single sheet of a chart series entirely contained within the Kano – FIR shall either−

1) produce the chart or sheet itself; or

2) arrange for the production of the chart or sheet by another State or by an agency; or

3) provide another State prepared to accept an obligation to produce the chart or sheet with the data necessary for its production;

(d) for a chart or single sheet of a chart series which includes the territory of a Contracting State, in consultation with that state having jurisdiction over the territory concerned determine the manner in which the chart or sheet will be made available.

(e) take reasonable measures to ensure that the information provided and the aeronautical charts made available are adequate and accurate and that aeronautical charts are maintained up to date by an adequate revision service.

(f) for a chart or single sheet of a chart series which includes the territory of Nigeria and other Contracting States, the States having jurisdiction over the territory so included shall determine the manner in which the chart or sheet will be made available. This determination shall be made with due regard being given to regional air navigation agreements and to the programme of allocation established by the Council of ICAO.

Note. — The phrase “regional air navigation agreements” refers to the agreements approved by the Council of ICAO normally on the advice of regional air navigation meetings.

(g) The Aeronautical Chart Provider shall take 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.

14.5.2.7 Categorizations of charts

a) For aerodromes used by international civil aviation, the charts are categorize as follows;

1) Mandatory Charts.

2). Non-Mandatory Charts.

3) Conditionally Required Charts.

b) The Service Provider shall provide the following Mandatory Charts for all aerodromes used by international civil aviation.

1) Aerodrome/Heliport Chart — ICAO;

2) the Aerodrome Obstacle Chart — ICAO Type A;

3) Precision Approach Terrain Chart — ICAO;
4) En-route Chart — ICAO;

5) Instrument Approach Chart — ICAO; and

6) The World Aeronautical Chart — ICAO, 1:1 000 000.

(c) The Non-Mandatory Charts

The charts, which are listed below, are considered “non-mandatory” charts, the Service Provider may be require to produced it only if, in the opinion of the Authority, the availability of these charts would contribute to the safety, regularity and efficiency of aircraft operations.

1) The Aerodrome Obstacle Chart — ICAO Type B

2) The Aerodrome Ground Movement Chart — ICAO

3) The Aircraft Parking/Docking Chart — ICAO

4) The Aeronautical Chart — ICAO 1:500 000

5) the Aeronautical Navigation Chart — Small Scale

6) Plotting Chart — ICAO.

(d) Conditionally Required Charts

The requirement for provision of the four charts listed below is “conditional”, which means that the availability of these charts is required only if certain conditions/circumstances prevail as may be determined by the Authority.

1) The Area Chart — ICAO

2) The Standard Departure Chart — Instrument (SID) — ICAO

3) The Standard Arrival Chart —Instrument (STAR) — ICAO

4) The Visual Approach Chart — ICAO

14.5.2.8 Information related to heliport

(a) The service provider shall ensure that there is adequate arrangement for the provision of aeronautical product for effective and efficient air navigation in accordance with Part 14.4.6.

(b) The requirement for charts related to a heliport to be provided shall include the following in the order:

1) Aerodrome/Heliport Chart — ICAO;

2) Area Chart — ICAO (departure and transit routes);

3) Standard Departure Chart — Instrument — ICAO;

4) Area Chart — ICAO (arrival and transit routes);

5) Standard Arrival Chart — Instrument — ICAO;

6) ATC Surveillance Minimum Altitude Chart — ICAO;

7) Instrument Approach Chart — ICAO (for each procedure type);

8) Visual Approach Chart — ICAO; and

9) bird concentrations in the vicinity of heliport.

14.5.2.9 Relevant Documents

(a) The standards and procedures under which any Aeronautical charts is to be provided shall be in accordance with these Regulations including the following supporting documents:

1) ICAO Doc 8697 – Aeronautical Chart Manual;

2) ICAO Doc 8168 – Aircraft Operations volume (i) & (ii);

3) ICAO Doc 9368 – Aircraft Operations volume (i) & (ii);

4) ICAO DOC 8400- ICAO Abbreviations and Codes

5) AIP Nigeria;

6) Relevant NCAA circulars and Documents;

14.5.2.10 Quality Management System (QMS)

a) The aeronautical charts provide shall put in place the quality Management system in line with the provison contain in Nig.CARs 14.4.4.6.

b) The quality system shall demonstrate that the aeronautical data and aeronautical information use in the flight procedure design to aeronautical charts production are controlled and assured.

14.5.2.11 Aeronautical Charts Personnel Requirements and training the service shall:

a) apply a methodology to determine its staffing needs for personnel performing aeronautical chart services task taking into account the size and complexity of the activities at the administration, data provision and analysis, database and cartographic requirements.

b) Comply with the provision of the Nig.CARs 14.4.8.1 (a)-(h)

c) The Aeronautical Charts Provider shall ensure that personnel receive the required training in an effective manner and maintain their competency with an adequate training system to be established and implemented, which shall be based on a documented training policy established and signed at the management level in line with Nig.CARs 14.4.8.3.

14.5.3 GENERAL SPECIFICATIONS

14.5.3.1 Operational requirements for charts

(a) Aeronautical Charts provider shall ensure that each type of chart provides information−

1) relevant to the function of the chart and the design of the chart observes Human Factors principles to facilitate its optimum use;

Note. — Guidance material on the application of Human Factors principles can be found in the Human Factors Training Manual (Doc 9683).

2) for the safe and expeditious operation of the aircraft the service provider shall provide aeronautical charts appropriate to the phase of flight:

Phase 1- Taxi from aircraft stand to take off;

i. Phase 2 - Take off and climb to en-route air traffic services route structure;

ii. Phase 3 - Enroute air traffic services route structure;

iii. Phase 4 - Descent to approach

iv. Phase 5 - Approach to land and missed approach

v. Phase 6 - Landing and taxi to aircraft stand.

(b) The presentation of information shall be accurate, free from distortion and clutter, unambiguous, and be readable under all normal operating conditions.

(c) Colours or tints and type size used shall be such that the chart can be easily read and interpreted by the pilot in varying conditions of natural and artificial light.

(d) The information shall be in a form which enables the pilot to acquire it in a reasonable time consistent with workload and operating conditions.

(e) The presentation of information provided on each type of chart shall permit smooth transition from chart to chart as appropriate to the phase of flight.

(f) The charts shall be True North orientated.

(g) The basic sheet size of the charts shall be 210 × 148 mm (8.27 × 5.82 in) (A5).

14.5.3.2 Title of Chart

An Aeronautical Charts provider shall ensure that the title of a chart or chart series prepared in accordance with the specifications contained in these regulations intended to satisfy the function of the chart shall be that of the relevant chapter heading as modified by application of any Standard contained therein, except that such title shall not include “ICAO” unless the chart conforms with all Standards specified in 14.5.3 and other specified for the particular chart.

14.5.3.3 Miscellaneous information

(a) The marginal note layout shall be as given in Appendix 1, except as otherwise specified for a particular chart.

(b) The following information shall be shown on the face of each chart unless otherwise stated in the specification of the chart concerned:

1) designation or title of the chart series, the title may be abbreviated;

2) name and reference of the sheet;

3) on each margin an indication of the adjoining sheet (when applicable).

(c) A legend to the symbols and abbreviations used shall be provided. The legend shall be on the face or reverse of each chart except that, where it is impracticable for reasons of space, a legend may be published separately.

(d) The name and adequate address of the producing agency shall be shown in the margin of the chart except that, where the chart is published as part of an aeronautical document, this information may be placed in the front of that document.

14.5.3.4 Symbols

(a) Symbols used shall conform to those shown in Appendix 2 — ICAO Chart Symbols except that where it is desired to show on an aeronautical chart special features or items of importance to civil aviation for which no ICAO symbol is at present provided, an appropriate symbol may be chosen for this purpose, provided that it does not cause confusion with existing ICAO chart symbol or impair the legibility of the chart.

(b) The size and prominence of symbols and the thickness and spacing of lines may be varied according to the scale and functions of the chart, with due regard to the importance of the information they convey.

(c) To represent ground-based navigation aids, intersections and waypoints, the same basic symbol shall be used on all charts on which they appear, regardless of chart purpose.

(d) The symbol used for significant points shall be based on a hierarchy of symbols and selected in the following order: ground-based navigation aid, intersection, waypoint symbol. A waypoint symbol shall be used only when a particular significant point does not already exist as either a ground-based navigation aid or intersection.

(e) Aeronautical chart service provider shall ensure that symbols are shown in the manner specified in 14.5.3.4(c), 14.5.3.4(d) and Appendix 2 — ICAO Chart Symbols, symbol number 121.

14.5.3.5 Units of measurement

(a) Distances shall be derived as geodesic distances.

(b) Distances shall be expressed in either kilometres or nautical miles or both, provided the units are clearly differentiated.

(c) Altitudes, elevations and heights shall be expressed in either metres or feet or both, provided the units are clearly differentiated.

(d) Linear dimensions on aerodromes and short distances shall be expressed in metres.

(e) The order of resolution of distances, dimensions, elevations and heights shall be that as specified for a particular chart.

(f) The units of measurement used to express distances, altitudes, elevations and heights shall be conspicuously stated on the face of each chart.

(g) Conversion scales (kilometres/nautical miles, metres/feet) shall be provided on each chart on which distances, elevations or altitudes are shown. The conversion scales shall be placed on the face of each chart.

14.5.3.6 Scale and projection

(a) An Aeronautical Charts provider shall ensure that –

1) for charts of large areas, the name and basic parameters and scale of the projection is indicated; and

2) for charts of small areas, a linear scale only is indicated.

14.5.3.7 Date of validity of aeronautical information

(a) The date of validity of aeronautical information shall be clearly indicated on the face of each chart.

14.5.3.8 Spelling of geographical names

(a) The symbols of the Roman alphabet shall be used for all writing.

(b) The names of places and of geographical features in countries which officially use varieties of the Roman alphabet shall be accepted in their official spelling, including the accents and diacritical marks used in the respective alphabets.

(c) Where a geographical term such as “cape”, “point”, “gulf”, “river” is abbreviated on a particular chart, that word shall be spelt out in full in the language used by the publishing agency, in respect of the most important example of each type. Punctuation marks shall not be used in abbreviations within the body of a chart.

(d) In areas where romanized names have not been officially produced or adopted, and outside the territory of Contracting States, names shall be transliterated from the non-Roman alphabet form by the system generally used by the producing agency.

14.5.3.9 Abbreviations

(a) Abbreviations shall be used on aeronautical charts whenever they are appropriate.

(b) Where applicable, abbreviations shall be selected from the Procedures for Air Navigation Services — ICAO Abbreviations and Codes (Doc 8400).

14.5.3.10 Political boundaries

(a) International boundaries shall be shown, but may be interrupted if data are more important to the use of the chart would be obscured.

(b) Where the territory of more than one State appears on a chart, the names identifying the countries shall be indicated.

(c) In the case of a dependent territory, the name of the sovereign State may be added in brackets.

14.5.3.11 Colours

Colours used on charts shall conform to Appendix 3 — Colour Guide.

14.5.3.12 Relief

(a) Relief, where shown, shall be portrayed in a manner that will satisfy the chart users’ need for:

1) orientation and identification;

2) safe terrain clearance;

3) clarity of aeronautical information when shown;

4) planning.

(b) Relief shall be portrayed by combinations of contours, hypsometric tints, spot elevations and hill shading, the choice of method being affected by the nature and scale of the chart and its intended use.

(c) Where relief is shown by hypsometric tints, the tints used shall be based on those shown in the Hypsometric Tint Guide in Appendix 4.

(d) Where spot elevations are used, they shall be shown for selected critical points.

(e) The value of spot elevations of doubtful accuracy shall be followed by the sign ±.

14.5.3.13 Prohibited, restricted and danger areas

When prohibited, restricted or danger areas are shown, the reference or other identification shall be included, except that the nationality letters may be omitted.

Note.— Nationality letters are those contained in Doc 7910 — Location Indicators.
14.5.3.14 Air traffic services airspaces.

(a) When ATS airspace is shown on a chart, the following shall be shown;

1. the class of airspace;

2. the type,

3. name or call sign,

4. the vertical limits

5. and the radio frequency(ies) to be used are indicated and

6. the horizontal limits depicted in accordance with Appendix 2 — ICAO Chart Symbols.

(b) On charts used for visual flight, those parts of the ATS Airspace Classes table (Appendix 4) in Part 14.1 applicable to the airspace depicted on the chart shall be on the face or reverse of each chart.

14.5.3.15 Magnetic variation

The service provider shall ensure that:

(a) True North and magnetic variation are indicated.

(b) The order of resolution of magnetic variation shall be that as specified for a particular chart.

(c) When magnetic variation is shown on a chart, the values shown shall be those for the year nearest to the date of publication that is divisible by 5, i.e. 1980, 1985, etc.

(d) In exceptional cases where the current value would be more than one degree different, after applying the calculation for annual change, an interim date and value shall be quoted. The date and the annual change may be shown.

(e) For instrument procedure charts, the publication of a magnetic variation change shall be completed within a maximum of six AIRAC cycles.

(f) In large terminal areas with multiple aerodromes, a single rounded value of magnetic variation shall be applied so that the procedures that service multiple aerodromes use a single, common variation value.

14.5.3.16 Typography

Samples of type suitable for use on aeronautical charts are included in the Aeronautical Chart Manual (Doc 8697).

14.5.3.17 Aeronautical data

(a) Aeronautical Chart provider shall take necessary measures to introduce a properly organized quality system containing procedures, processes and resources necessary to implement quality management at each function stage as outlined in Part 14.4.4.2, 14.4.4.2, 14.4.4.3, 14.4.4.5 and 14.4.4.6.

(b) The execution of such quality management shall be made demonstrable for each function stage, when required.

(c) the aeronautical chart provider shall ensure that established procedures exist in order that aeronautical data at each moment is traceable to its origin so as to allow data anomalies or errors, detected during the production/maintenance phases or in the operational use, to be corrected.

Note. — Specifications governing the quality system are given in Part 14.4.

(d) Aeronautical chart provider shall ensure that the chart resolution of aeronautical data is as specified for a particular chart.

Note. — Specifications concerning the chart resolution for aeronautical data are contained in Part 14.4

(e) Aeronautical chart provider shall ensure that integrity of aeronautical data is maintained throughout the data process from origination to distribution to the next intended user. Specifications concerning the integrity classification related to aeronautical data are provided in Part 14.4.

(f) Digital data error detection techniques shall be used during the transmission and storage of aeronautical data and digital data sets. Detailed specifications concerning digital data error detection techniques are contained in Part 14.4.

14.5.3.18 Common reference systems

(a) Horizontal reference system

1) World Geodetic System — 1984 (WGS-84) shall be used as the horizontal (geodetic) reference system. 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) Geographical coordinates which have been transformed into WGS-84

coordinates but whose accuracy of original field work does not meet the requirements in Part 14.1, shall be identified by an asterisk.

3) The chart resolution of geographical coordinates shall be that specified for a particular chart series

Note 1.— Specifications concerning the determination and reporting (accuracy of field work and data integrity) of WGS-84-related aeronautical coordinates for geographical positions established by air traffic services are given in Part 14.1; and for aerodrome/heliport-related positions, in Part 12, Volumes I and II.

Note 2.— Specifications concerning the accuracy and integrity classification of WGS-84-related aeronautical data are contained in Part 14.4.

(b) Vertical reference system

1) Mean sea level (MSL) datum, which gives the relationship of gravity-related height (elevation) to a surface known as the geoid, shall be used as the vertical reference system.

Note 1.— The geoid globally most closely approximates MSL. It is defined as the equipotential surface in the gravity field of the Earth that 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) In addition to the elevations referenced to MSL, for the specific surveyed ground positions, geoid undulation (referenced to the WGS-84 ellipsoid) for those positions shall also be published as specified for a particular chart.

Note 1.— Specifications concerning the determination and reporting (accuracy of field work and data integrity) of elevation and geoid undulation at specific positions at aerodromes/heliports are given in Part 12, Volumes I and II.

Note 2.— Specifications concerning the accuracy and integrity classification of elevation and geoid undulation at specific positions at aerodromes/heliports are contained in 14.4.

3) The chart resolution of elevation and geoid undulation shall be that specified for a particular chart series

Note.— Specifications concerning the chart resolution of elevation and geoid undulation are contained 14.4.

(c) Temporal reference system

1) The Gregorian calendar and Coordinated Universal Time (UTC) shall be used as the temporal reference system.

2) When a different temporal reference system is used for charting, this shall be indicated in GEN 2.1.2 of the Aeronautical Information Publication (AIP).

14.5.4 AERODROME OBSTACLE CHART — ICAO TYPE A (OPERATING LIMITATIONS)

14.5.4.1 Function

An Aeronautical Charts service provider shall ensure that the Aerodrome Obstacle chart as prescribed by the Authority, in combination with the relevant Aeronautical Chart information published in the Aeronautical Information Publication, provides the data necessary to enable an operator to comply with the operating limitations of the Civil Aviation (Operations of Aircraft) Regulations.

14.5.4.2 Availability

(a) Aerodrome Obstacle Charts — ICAO Type A (Operating Limitations) shall be made available in the manner prescribed in 14.5.2.6(b) for all aerodromes regularly used by international civil aviation, except for those aerodromes where there are no obstacles in the take-off flight path areas or where the Aerodrome Terrain and Obstacle Chart — ICAO (Electronic) is provided in to this regulation.

(b) Where a chart is not required because no obstacles exist in the take-off flight path area, a notification to this effect shall be published in the AIP.

14.5.4.3 Units of measurement

(a) Elevations shall be shown to the nearest half-metre or to the nearest foot.

(b) Linear dimensions shall be shown to the nearest half-metre.

14.5.4.4 Coverage and scale

(a) The extent of each plan shall be sufficient to cover all obstacles.

Note.— Isolated distant obstacles that would unnecessarily increase the sheet size may be indicated by the appropriate symbol and an arrow, provided that the distance and bearing from the end of the runway farthest removed and the elevation are given.

(b) The horizontal scale shall be within the range of 1:10 000 to 1:15 000.

(c) The horizontal scale should be 1:10 000.

Note.— When the production of the charts would be expedited thereby, a scale of 1:20 000 may be used.

(d) The vertical scale shall be ten times the horizontal scale.

(e) Linear scales. Horizontal and vertical linear scales showing both metres and feet shall be included in the charts.

14.5.4.5 Format

(a) The charts shall depict a plan and profile of each runway, any associated stopway or clearway, the take-off flight path area and obstacles.

(b) The profile for each runway, stopway, clearway and the obstacles in the take-off flight path area shall be shown above its corresponding plan. The profile of an alternative take-off flight path area shall comprise a linear projection of the full take-off flight path and shall be disposed above its corresponding plan in the manner most suited to the ready interpretation of the information.

(c) A profile grid shall be ruled over the entire profile area exclusive of the runway. The zero for vertical coordinates shall be mean sea level. The zero for horizontal coordinates shall be the end of the runway furthest from the take-off flight path area concerned. Graduation marks indicating the sub-divisions of intervals shall be shown along the base of the grid and along the vertical margins.

(d) The vertical grid shall have intervals of 30 m (100 ft) and the horizontal grid shall have intervals of 300 m (1 000 ft).

(e) The chart shall include:

1) a box for recording the operational data specified in 14.5.4.8(c);

2) a box for recording amendments and dates thereof.

14.5.4.6 Identification

The chart shall be identified by the name of the country in which the aerodrome is located, the name of the city or town or area which the aerodrome serves, the name of the aerodrome and the designator(s) of the runway(s).

14.5.4.7 Magnetic variation

The magnetic variation to the nearest degree and date of information shall be indicated.

14.5.4.8 Aeronautical data

(a) Obstacles

1) 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 shall be regarded as obstacles, except those obstacles lying wholly below the shadow of other obstacles as defined in 14.5.4.8.(b) need not be shown. Mobile objects such as boats, trains and trucks, which may project above the 1.2 per cent plane, shall be considered obstacles but shall not be considered as being capable of creating a shadow.

2) The shadow of an obstacle is considered to be a plane surface originating at a horizontal line passing through the top of the obstacle at right angles to the centre line of the take-off flight path area. The plane covers the complete width of the take-off flight path area and extends to the plane defined in

14.5.4.8(a) or to the next higher obstacle if it occurs first. For the first 300 m (1 000 ft) of the take-off flight path area, the shadow planes are horizontal and beyond this point such planes have an upward slope of 1.2 per cent.

3) If the obstacle creating a shadow is likely to be removed, objects that would become obstacles by its removal shall be shown.

(b) Take-off flight path area

1) The take-off flight path area consists of a quadrilateral area on the surface of the earth lying directly below, and symmetrically disposed about, the take-off flight path. This area has the following characteristics:

i. it commences at the end of the area declared suitable for take-off (i.e. at the end of the runway or clearway as appropriate);

ii. its width at the point of origin is 180 m (600 ft) and this width increases at the rate of 0.25D to a maximum of 1 800 m (6 000 ft), where D is the distance from the point of origin;

iii. it extends to the point beyond which no obstacles exist or to a distance of 10.0 km (5.4 NM), whichever is the lesser.

2) For runways serving aircraft having operating limitations which do not preclude the use of a take-off flight path gradient of less than 1.2 per cent, the extent of the take-off flight path area specified in 14.5.4.8(b) (1) (iii) shall be increased to not less than 12.0 km (6.5 NM) and the slope of the plane surface specified in 14.5.4.8(a) and 14.5.4.8(b) shall be reduced to 1.0 per cent or less.

Note.— When a 1.0 per cent survey plane touches no obstacles, this plane may be lowered until it touches the first obstacle.

(c) Declared distances

1) The following information for each direction of each runway shall be entered in the space provided:

i. take-off run available;

ii. accelerate-stop distance available;

iii. take-off distance available;

iv. landing distance available.

Note.— In Part 12, Volume I, guidance is given on declared distances.

2) Where a declared distance is not provided because a runway is usable in one direction only, that runway shall be identified as “not usable for take-off, landing or both”.

(d) Plan and profile views

1) The plan view shall show:

i. the outline of the runways by a solid line, including the length and width, the magnetic bearing to the nearest degree, and the runway number;

ii. the outline of the clearways by a broken line, including the length and identification as such;

iii. take-off flight path areas by a dashed line and the centre line by a fine line consisting of short and long dashes;

iv. alternative take-off flight path areas. When alternative take-off flight path areas not centred on the extension of the runway centre line are shown, notes shall be provided explaining the significance of such areas;

v. obstacles, including:

A. the exact location of each obstacle together with a symbol indicative of its type;

B. the elevation and identification of each obstacle;

C. the limits of penetration of obstacles of large extent in a distinctive manner identified in the legend.

Note.— This does not exclude the necessity for indicating critical spot elevations within the take-off flight path area.

vi. The nature of the runway and stopway surfaces shall be indicated.

vii. Stopways shall be identified as such and shall be shown by a broken line.

viii. When stopways are shown, the length of each stopway shall be indicated.

2) The profile view shall show:

i. the profile of the centre line of the runway by a solid line and the profile of the centre line of any associated stopways and clearways by a broken line;

ii. the elevation of the runway centre line at each end of the runway, at the stopway and at the origin of each take- off flight path area, and at each significant change in slope of runway and stopway;

iii. obstacles, including:

A. each obstacle by a solid vertical line extending from a convenient grid line over at least one other grid line to the elevation of the top of the obstacle;

B. identification of each obstacle;

C. the limits of penetration of obstacles of large extent in a distinctive manner identified in the legend.

Note.— An obstacle profile consisting of a line joining the tops of each obstacle and representing the shadow created by successive obstacles may be shown.

14.5.4.9 Accuracy

(a) The order of accuracy attained shall be shown on the chart.

(b) The horizontal dimensions and the elevations of the runway, stopway and clearway to be printed on the chart shall be determined to the nearest 0.5 m (1 ft).

(c) The order of accuracy of the field work and the precision of chart production shall be such that measurements in the take-off flight path areas can be taken from the chart within the following maximum deviations:

1) horizontal distances: 5 m (15 ft) at a point of origin increasing at a rate of 1 per 500;

2) vertical distances: 0.5 m (1.5 ft) in the first 300 m (1 000ft) and increasing at a rate of 1 per 1 000.

(d) Datum. Where no accurate datum for vertical reference is available, the elevation of the datum used shall be stated and shall be identified as assumed.

14.5.5 AERODROME OBSTACLE CHART — ICAO TYPE B

14.5.5.1 Function

a) the Aeronautical charts provider shall produce this chart to provide information to satisfy the following functions:

1. the determination of minimum safe altitudes/heights including those for circling procedures;

2. the determination of procedures for use in the event of an emergency during take-off or landing;

3. the application of obstacle clearing and marking criteria; and

4. the provision of source material for aeronautical charts.

14.5.5.2 Availability

(a) The Service Provider may be required by the Authority, to make available charts that would contribute to the safety, regularity and efficiency of aircraft operations.

(b) Aerodrome Obstacle Charts — ICAO Type B should be made available, in the manner prescribed in 14.5.2.6(b), for all aerodromes regularly used by international civil aviation except for those aerodromes where the Aerodrome Terrain and Obstacle Chart — ICAO (Electronic) is provided in accordance with this regulation.

(c) When a chart combining the specifications of Aerodrome Obstacle Chart – ICAO Type A (Operating Limitations) and Aerodrome Obstacle Chart – ICAO Type B is made available, it shall be called the Aerodrome Obstacle Chart — ICAO (Comprehensive).

14.5.5.3 Units of measurement

a) Elevations shall be shown to the nearest half-metre or to the nearest foot.

b) Linear dimensions shall be shown to the nearest half-metre.

14.5.5.4 Coverage and scale

a) The extent of each plan shall be sufficient to cover all obstacles.

Note. — Isolated distant obstacles that would unnecessarily increase the sheet size may be indicated by the appropriate symbol and an arrow, provided that the distance and bearing from the aerodrome reference point and elevation are given.

b) The horizontal scale shall be within the range of 1:10 000 to 1:20 000.

c) A horizontal linear scale showing both metres and feet shall be included in the chart. When necessary, a linear scale for kilometres and a linear scale for nautical miles shall also be shown.

14.5.5.5 Format

a) The charts shall include:

1. any necessary explanation of the projection used;

2. any necessary identification of the grid used;

3. a notation indicating that obstacles are those which penetrate the surfaces specified in Part 12, Volume I;

4. a box for recording amendments and dates thereof; and

5. outside the neat line, every minute of latitude and longitude marked in

degrees and minutes.

Note. — Lines of latitude and longitude may be shown across the face of the chart.

14.5.5.6 Identification

a) The chart shall be identified by the name of the country in which the aerodrome is located, the name of the city or town or area which the aerodrome serves, and the name of the aerodrome.

14.5.5.7 Culture and topography

a) Drainage and hydrographic details shall be kept to a minimum.

b) Buildings and other salient features associated with the aerodrome shall be shown. Wherever possible, they shall be shown to scale.

c) All objects, either cultural or natural, that project above the take-off and approach surfaces specified in 14.5.5.9 or the clearing and marking surfaces specified in Part 12, Volume I, shall be shown.

d) Roads and railroads within the take-off and approach area, and less than 600 m (2 000 ft) from the end of the runway or runway extensions, shall be shown.

Note. — Geographical names of features may be shown if of significance.

14.5.5.8 Magnetic variation

a) The chart shall show a compass rose orientated to the True North, or a North point, showing the magnetic variation to the nearest degree with the date of magnetic information and annual change.

14.5.5.9 Aeronautical data

a) The charts shall show:

1. the aerodrome reference point and its geographical coordinates in degrees, minutes and seconds;

2. the outline of the runways by a solid line;

3. the length and width of the runway;

4. the magnetic bearing to the nearest degree of the runway and the runway number;

5. the elevation of the runway centre line at each end of the runway, at the stopway, at the origin of each take-off and approach area, and at each significant change of slope of runway and stopway;

6. taxiways, aprons and parking areas identified as such, and the outlines by a solid line;

7. stopways identified as such and depicted by a broken line;

8. the length of each stopway;

9. clearways identified as such and depicted by a broken line;

10. the length of each clearway;

11. take-off and approach surfaces identified as such and depicted by a broken line;

12. take-off and approach areas;

Note.— The take-off area is described in 14.5.4.8(b)1). The approach area consists of an area on the surface of the earth lying directly below the approach surface as specified in Part 12, Volume I.

13. obstacles at their exact location, including:

    i. a symbol indicative of their type;

    ii. elevation;

    iii. identification;

    iv. limits of penetration of large extent in a distinctive manner identified in the legend;

    Note.— This does not exclude the necessity for indicating critical spot elevations within the take-off and approach areas.

14. any additional obstacles, as determined by 14.5.4.8(a)2) including the obstacles in the shadow of an obstacle, which would otherwise be exempted.

Note.— The specifications in Part 12, Volume I, are minimum requirements. Where the competent authority has established lower surfaces, they may be used in the determination of obstacles.

b) The nature of the runway and stopway surfaces shall be given.

c) Wherever practicable, the highest object or obstacle between adjacent approach areas within a radius of 5 000 m (15 000 ft) from the aerodrome reference point shall be indicated in a prominent manner.

d) The extent of tree areas and relief features, part of which constitute obstacles, shall be shown.

14.5.5.10 Accuracy

a) The order of accuracy attained shall be shown on the chart.

b) The horizontal dimensions and the elevations of the movement area, stopways and clearways to be printed on the chart shall be determined to the nearest 0.5 m (1 ft).

c) The order of accuracy of the field work and the precision of chart production shall be such that the resulting data will be within the maximum deviations indicated herein:

1) Take-off and approach areas:

i. horizontal distances: 5 m (15 ft) at point of origin increasing at a rate of 1 per 500;

ii. vertical distances: 0.5 m (1.5 ft) in the first 300 m (1 000 ft) and increasing at a rate of 1 per 1 000.

2) Other areas:

i. horizontal distances: 5 m (15 ft) within 5 000 m (15 000 ft) of the aerodrome reference point and 12 m (40 ft) beyond that area;

ii. vertical distances: 1 m (3 ft) within 1 500 m (5 000 ft) of the aerodrome reference point increasing at a rate of 1 per 1 000.

d) Datum. Where no accurate datum for vertical reference is available, the elevation of the datum used shall be stated and identified as assumed.

14.5.6 AERODROME TERRAIN AND OBSTACLE CHART — ICAO (ELECTRONIC)

14.5.6.1 Function

(a) This electronic chart shall portray the terrain and obstacle data in combination with aeronautical data, as appropriate, necessary to:

1) enable an operator to comply with the operating limitations of the Nigeria Civil Aviation (operation of aircraft) Regulations, by developing contingency procedures for use in the event of an emergency during a missed approach or take-off, and by performing aircraft operating limitations analysis; and

2) support the following air navigation applications:

i. instrument procedure design (including circling procedure);

ii. aerodrome obstacle restriction and removal; and

iii. provision of source data for the production of other aeronautical charts.

14.5.6.2 Availability

(a) The Service Provider may require to provide it only if, in the opinion of the Authority, the availability of these charts would contribute to the safety, regularity and efficiency of aircraft operations.

(b) From 12 November 2015, Aerodrome Terrain and Obstacle Charts — ICAO (Electronic) shall be made available in the manner prescribed in 14.5.2.6(b) for aerodromes regularly used by international civil aviation.

Note 1.— Where the Aerodrome Terrain and Obstacle Chart — ICAO (Electronic) is made available, the Aerodrome Obstacle Chart — ICAO Type A (Operating Limitations) and the Aerodrome Obstacle Chart — ICAO Type B are not required (see 14.5.4.2(a) and 14.5.5.2(b).

Note 2.— The information required by the Precision Approach Terrain Chart — ICAO may be provided in the Aerodrome Terrain and Obstacle Chart — ICAO (Electronic). Where this occurs, the Precision Approach Terrain Chart — ICAO is not required (see14.5.7.2.(a)).

(c) Aerodrome Terrain and Obstacle Charts — ICAO (Electronic) shall be made available in the manner prescribed in 14.5.2.6(b) for all aerodromes regularly used by international civil aviation.

(d) The Aerodrome Terrain and Obstacle Chart — ICAO (Electronic) shall also be made available in hard copy format upon request.

Note.— For specifications regarding hard copy printed output, see 14.5.6.7(g)

(e) The ISO 19100 series of standards for geographic information shall be used as a general data modelling framework.

Note.— The use of the ISO 19100 series of standards for geographic information supports the interchange and use of the Aerodrome Terrain and Obstacle Chart — ICAO (Electronic) among different users.

14.5.6.3 Identification

Electronic charts shall be identified by the name of the country in which the aerodrome is located, the name of the city or town which the aerodrome serves, and the name of the aerodrome.

14.5.6.4 Chart coverage

The extent of each chart shall be sufficient to cover Area 2 as specified in Part 14.4 of these Regulations.

14.5.6.5 Chart content

(a) General

(1)

(i) When developing computer graphic applications that are used to portray features on the chart, the relationships between features, feature attributes, and the underlying spatial geometry and associated topological relationships shall be specified by an application schema.

ii) Portrayed information shall be provided on the basis of portrayal specifications applied according to defined portrayal rules. Portrayal specifications and portrayal rules shall not be part of the data set. Portrayal rules shall be stored in a portrayal catalogue which shall make reference to separately stored portrayal specifications.

Note.— ISO Standard 19117 contains a definition of the schema describing the portrayal mechanism of feature-based geographic information, while ISO Standard 19109 contains rules for application schema. Spatial geometry and associated topological relationships are defined in ISO Standard 19107.

2) Symbols used to portray features shall be in accordance with 14.5.3.4 and Appendix 2 — ICAO Chart Symbols.

(b) Terrain feature

1) The terrain feature, and associated attributes, to be portrayed and database-linked to the chart shall be based on the terrain data sets which satisfy the requirements of Nigeria Civil Aviation (Aeronautical Information Services) Regulation.

Note.— Specifications concerning terrain data sets are contained in Part 14.4.6.3(c)(2).

2) The terrain feature shall be portrayed in a manner that provides an effective general impression of a terrain. This shall be a representation of terrain surface by continuous elevation values at all intersections of the defined grid, also known as the Digital Elevation Model (DEM).

Note.— In accordance with Part 14.46.3(c)(1), the Digital Elevation Model (DEM) for Area 2 post spacing (grid) is specified at 1 arc second (approximately 30 m).

3) Representation of terrain surface shall be provided as a selectable layer of contour lines in addition to the DEM.

4) An ortho-rectified image which matches the features on the DEM with features on the overlying image shall be used to enhance the DEM. The image should be provided as a separate selectable layer.

5) The portrayed terrain feature shall be linked to the following associated

attributes in the database(s):

i. horizontal positions of grid points in geographic coordinates and elevations of the points;

ii. surface type;

iii. contour line values, if provided; and

iv. names of cities, towns and other prominent topographic features.

6) Additional terrain attributes provided in the database(s) should be linked to the portrayed terrain feature.

(c) Obstacle features

1) Obstacle features, and associated attributes, portrayed or database-linked to the chart shall be based on obstacle data sets which satisfy the requirements of Part 14.4 of these Regulations.

2) Each obstacle shall be portrayed by an appropriate symbol and obstacle identifier.

3) The portrayed obstacle feature shall be linked to the following associated attributes in the database(s):

i. horizontal position in geographic coordinates and associated elevation;

ii. obstacle type; and

iii. obstacle extent, if appropriate.

4) Additional obstacle attributes provided in the database(s) shall be linked to the portrayed obstacle feature.

(d) Aerodrome features

1) Aerodrome features, and associated attributes, portrayed and database-linked to the chart shall be based on aerodrome data which satisfy the requirements of Part 14.4 of these Regulations.

2) The following aerodrome features shall be portrayed by an appropriate symbol:

i. aerodrome reference point;

ii. runway(s), with designation numbers, and if available, stopway(s) and clearway(s); and

iii. taxiways, aprons, large buildings and other prominent aerodrome features.

3) The portrayed aerodrome feature shall be linked to the following associated

attributes in the database(s):

i. geographical coordinates of the aerodrome reference point;

ii. aerodrome magnetic variation, year of information and annual change;

Note.— Magnetic variation may be database-linked to the aerodrome reference point.

iii. length and width of runway(s), stopway(s) and clearway(s);

iv. type of surface of runway(s) and stopway(s);

v. magnetic bearings of the runway(s) to the nearest degree;

vi. elevations at each end of runway(s), stopway(s) and clearway(s), and at each significant change in slope of runway(s) and stopway(s);

vii. declared distances for each runway direction, or the abbreviation "NU" where a runway direction cannot be used for take-off or landing or both.

(e) Radio navigation aid features

1) Each radio navigation aid feature located within the chart coverage shall be portrayed by an appropriate symbol.

Note.— Navigation aid feature attributes may be linked to the portrayed navigation aid features in the database(s).

14.5.6.6 Accuracy and resolution

(a) The order of accuracy of aeronautical, terrain and obstacle data shall be in accordance with its intended use. Specifications concerning the accuracy of aeronautical, terrain and obstacle data are contained in the Part 14.4 of these Regulations.

(b) The aeronautical, terrain and obstacle data resolution shall be commensurate with the actual data accuracy. Specifications concerning the order of resolution for aeronautical, terrain and obstacle data are provided in the Part 14.4 of these Regulations.

14.5.6.7 Electronic functionality

(a) It shall be possible to vary the scale at which the chart is viewed. Symbols and text size shall vary with chart scale to enhance readability.

(b) Information on the chart shall be geo-referenced, and it shall be possible to determine cursor position to at least the nearest second.

(c) The chart shall be compatible with widely available desktop computer hardware, software and media.

(d) The chart shall include its own “reader” software.

(e) It shall not be possible to remove information from the chart without an authorized update.

(f) When, due to congestion of information, the details necessary to support the function of the chart cannot be shown with sufficient clarity on a single comprehensive chart view, selectable information layers shall be provided to allow for the customized combination of information.

Note.— An electronic chart format with user-selectable information layers is the preferred method of presentation for most aerodrome features.

(g) It shall be possible to print the chart in hard copy format according to the content specifications and scale determined by the user.

Note 1.— Printed output may consist of “tiled” sheets or specific selected areas according to user requirements.

Note 2.— Feature attribute information available through database link may be supplied separately on appropriately referenced sheets.

14.5.6.8 Chart data product specifications

(a) A comprehensive statement of the data sets comprising the chart shall be provided in the form of data product specifications on which basis air navigation users will be able to evaluate the chart data product and determine whether it fulfils the requirements for its intended use (application).

(b) The chart data product specifications shall include an overview, a specification scope, a data product identification, data content information, the reference systems used, the data quality requirements, and information on data capture, data maintenance, data portrayal, data product delivery, as well as any additional information available, and metadata.

Note.— ISO Standard 19131 specifies the requirements and outline of data product specifications for geographic information.

(c) The overview of the chart data product specifications shall provide an informal description of the product and shall contain general information about the data product. The specification scope of the chart data product specifications shall contain the spatial (horizontal) extent of the chart coverage. The chart data product identification shall include the title of the product, a brief narrative summary of the content and purpose, and a description of the geographic area covered by the chart.

(d) The data content of the chart data product specifications shall clearly identify the type of coverage and/or imagery and shall provide a narrative description of each.

Note.— ISO Standard 19123 contains schema for coverage geometry and *functions.*

(e) The chart data product specifications shall include information that defines the reference systems used. This shall include the spatial reference system (horizontal and vertical) and, if appropriate, temporal reference system. The chart data product specifications shall identify the data quality requirements. This shall include a statement on acceptable conformance quality levels and corresponding data quality measures. This statement shall cover all the data quality elements and data quality sub-elements, even if only to state that a specific data quality element or sub-element is not applicable.

Note.— ISO Standard 19113 contains quality principles for geographic information while ISO Standard 19114 covers quality evaluation procedures.

(f) The chart data product specifications shall include a data capture statement which shall be a general description of the sources and of processes applied for the capture of chart data. The principles and criteria applied in the maintenance of the chart shall also be provided in the chart data product specifications, including the frequency with which the chart product is updated. Of particular importance shall be the maintenance information of obstacle data sets included on the chart and an indication of the principles, methods and criteria applied for obstacle data maintenance.

(g) The chart data product specifications shall contain information on how data are portrayed on the chart, as detailed in 14.5.6.7(a)1). The chart data product specifications shall also contain data product delivery information which shall include delivery formats and delivery medium information.

(h) The core chart metadata elements shall be included in the chart data product specifications. Any additional metadata items required to be supplied shall be stated in the product specifications together with the format and encoding of the metadata.

Note 1.— ISO Standard 19115 specifies requirements for geographic information metadata.

Note 2.— The chart data product specifications document the chart data product which is implemented as data set. Those data sets are described by metadata.

14.5.7 PRECISION APPROACH TERRAIN CHART — ICAO

14.5.7.1 Function

The Aeronautical chart provider shall provide detailed terrain profile information within a defined portion of the final approach so as to enable aircraft operating agencies to assess the effect of the terrain on decision height determination by the use of radio altimeters.

14.5.7.2 Availability

(a) The Precision Approach Terrain Chart — ICAO shall be made available for all precision approach runways Categories II and III at aerodromes used by international civil aviation, except where the requisite information is provided in the Aerodrome Terrain and Obstacle Chart — ICAO (Electronic) in accordance with this regulation.

(b) The Precision Approach Terrain Chart — ICAO shall be revised whenever any significant change occurs.

14.5.7.3 Scale

(a) The horizontal scale shall be 1:2 500, and the vertical scale 1:500.

(b) When the chart includes a profile of the terrain to a distance greater than 900 m (3 000 ft) from the runway threshold, the horizontal scale shall be 1:5 000.

14.5.7.4 Identification

The chart shall be identified by the name of the country in which the aerodrome is located, the name of the city or town or area which the aerodrome serves, the name of the aerodrome and the designator of the runway.

14.5.7.5 Plan and profile information

(a) The chart shall include:

1) a plan showing contours at 1 m (3 ft) intervals in the area 60 m (200 ft) on either side of the extended centre line of the runway, to the same distance as the profile, the contours to be related to the runway threshold;

2) an indication where the terrain or any object thereon, within the plan defined in a), differs by ±3 m (10 ft) in height from the centre line profile and is likely to affect a radio altimeter;

3) a profile of the terrain to a distance of 900 m (3 000 ft) from the threshold along the extended centre line of the runway.

(b) Where the terrain at a distance greater than 900 m (3 000 ft) from the runway threshold is mountainous or otherwise significant to users of the chart, the profile of the terrain should be shown to a distance not exceeding 2 000 m (6 500 ft) from the runway threshold.

(c) The ILS reference datum height should be shown to the nearest half metre or foot.

14.5.8 ENROUTE CHART — ICAO

14.5.8.1 Function

This chart shall provide flight crews with information to facilitate navigation along ATS routes in compliance with air traffic services procedures.

Note.— Simplified versions of these charts are appropriate for inclusion in

Aeronautical Information Publications to complement the tabulation of communication and navigation facilities.

14.5.8.2 Availability

(a) The Enroute Chart — ICAO shall be made available in the manner prescribed in 14.5.2.6(b) for all areas where flight information regions have been established

Note: Under certain conditions, an Area Chart — ICAO may have to be provided.

(b) Where different air traffic services routes, position reporting requirements or lateral limits of flight information regions or control areas exist in different layers of airspace and cannot be shown with sufficient clarity on one chart, separate charts shall be provided.

14.5.8.3 Coverage and scale

Note 1--A uniform scale for charts of this type cannot be specified due to the varying degree of congestion of information in certain areas.

Note 2. — A linear scale based on the mean scale of the chart may be shown.

(a) Layout of sheet lines shall be determined by the density and pattern of the ATS route structure.

(b) Large variations of scale between adjacent charts showing a continuous route structure shall be avoided.

(c) An adequate overlap of charts shall be provided to ensure continuity of navigation.

14.5.8.4 Projection

(a) A conformal projection on which a straight line approximates a great circle shall be used.

(b) Parallels and meridians shall be shown at suitable intervals.

(c) Graduation marks shall be placed at consistent intervals along selected parallels and meridians.

14.5.8.5 Identification

Each sheet shall be identified by chart series and number.

14.5.8.6 Culture and topography

(a) Generalized shore lines of all open water areas, large lakes and rivers shall be shown except where they conflict with data more applicable to the function of the chart.

(b) Within each quadrilateral formed by the parallels and meridians, the area minimum altitude shall be shown, except as provided for in 14.5.8.6(c).

Note 1.— Quadrilaterals formed by the parallels and meridians normally correspond to the whole degree of latitude and longitude. Regardless of the chart scale being used, the area minimum altitude relates to the consequent quadrilateral.

Note 2. — Refer to the Procedures for Air Navigation — Aircraft Operations (PANS OPS, Doc 8168), Volume II, Part I, Section 2, Chapter 1, 1.8, for method for determination of area minimum altitude.

(c) Where charts are not True North orientated, this fact and the selected orientation used shall be clearly indicated.

14.5.8.7 Magnetic variation

Isogonals shall be indicated and the date of the isogonic information given.

14.5.8.8 Bearings, tracks and radials

(a) Bearings, tracks and radials shall be magnetic, except as provided for in 14.5.8.8(b). Where bearings and tracks are additionally provided as true values for RNAV segments, they shall be shown in parentheses to the nearest tenth of a degree, e.g. 290° (294.9°T).

(b) Where bearings, tracks or radials are given with reference to True North or Grid North, this shall be clearly indicated. When Grid North is used, its reference grid meridian shall be identified.

14.5.8.9 Aeronautical data

(a) Aerodromes
All aerodromes used by international civil aviation to which an instrument approach can be made shall be shown.

(b) Prohibited, restricted and danger areas
Prohibited, restricted and danger areas relevant to the layer of airspace shall be depicted with their identification and vertical limits.

(c) Air traffic services system

i) Where appropriate, the components of the established air traffic services system shall be shown.

ii). The components shall include the following:

A. the radio navigation aids associated with the air traffic services system together with their names, identifications, frequencies and geographical coordinates in degrees, minutes and seconds;

B. in respect of DME, additionally the elevation of the transmitting antenna of the DME to the nearest 30 m (100 ft);

C. an indication of all designated airspace, including lateral and vertical limits and the appropriate class of airspace;

D. All ATS routes for en-route flight including route designators, the track to the nearest degree in both directions along each segment of the routes and, where established, the designation of the navigation specification(s) including any limitations and the direction of traffic flow;

Note.— Guidance material on the organization of ATS routes for en-route flight publication which may be used to facilitate charting is contained in the Aeronautical Information Services Manual (Doc 8126).

E. all significant points which define the ATS routes and are not marked by the position of a radio navigation aid, together with their name-codes and geographical coordinates in degrees, minutes and seconds;

F. in respect of waypoints defining VOR/DME area navigation routes, additionally,

   A. the station identification and radio frequency of the reference VOR/DME;

   B. the bearing to the nearest tenth of a degree and the distance to the nearest two-tenths of a kilometre (tenth of a nautical mile) from the reference VOR/ DME, if the waypoint is not collocated with it;

G. an indication of all compulsory and “on-request” reporting points and ATS/MET reporting points;

H. the distances to the nearest kilometre or nautical mile between significant points constituting turning points or reporting points;

Note.— Overall distances between radio navigation aids may also be shown.

I. change-over points on route segments defined by reference to very high frequency omnidirectional radio ranges, indicating the distances to the nearest kilometre or nautical mile to the navigation aids;

Note-.— Change-over points established at the mid-point between two aids, or at the intersection of two radials in the case of a route which changes direction between the aids, need not be shown for each route segment if a general statement regarding their existence is made.

J. minimum en-route altitudes and minimum obstacle clearance altitudes, on ATS routes to the nearest higher 50 metres or 100 feet;

K. communication facilities listed with their channels and, if applicable, logon address and satellite voice communications (SATVOICE) number; and

L. air defence identification zone (ADIZ) properly identified.

(d) Supplementary information

1) Details of departure and arrival routes and associated holding patterns in terminal areas shall be shown unless they are shown on an Area Chart, a Standard Departure Chart — Instrument (SID) — ICAO or a Standard Arrival Chart — Instrument (STAR) — ICAO.

Note.— Departure routes normally originate at the end of a runway; arrival routes normally terminate at the point where an instrument approach is initiated.

2) Where established, altimeter setting regions shall be shown and identified.

14.5.9 AREA CHART — ICAO

14.5.9.1 Function

This chart shall provide the flight crew with information to facilitate the following phases of instrument flight:

(a) the transition between the en-route phase and approach to an aerodrome;

(b) the transition between take-off/missed approach and en-route phase of flight; and

(c) flights through areas of complex ATS routes or airspace structure.

Note.— The function described in 14.5.9.1(c) may be satisfied by a separate chart or an inset on an Enroute Chart — ICAO.

14.5.9.2 Availability

(a) The Area Chart — ICAO shall be made available in the manner prescribed in 14.5.2.6(b) where the air traffic services routes or position reporting requirements are complex and cannot be adequately shown on an Enroute Chart — ICAO.

(b) Where air traffic services routes or position reporting requirements are different for arrivals and for departures, and these cannot be shown with sufficient clarity on one chart, separate charts shall be provided.

Note.— Under certain conditions, a Standard Departure Chart — Instrument (SID) — ICAO and a Standard Arrival Chart — Instrument (STAR) — ICAO may have to be provided.

14.5.9.3 Coverage and scale

(a) The coverage of each chart shall extend to points that effectively show departure and arrival routes.

(b) The chart shall be drawn to scale and a scale-bar shown.

14.5.9.4 Projection

(a) A conformal projection on which a straight line approximates a great circle shall be used.

(b) Parallels and meridians shall be shown at suitable intervals.

(c) Graduation marks shall be placed at consistent intervals along the neat lines, as appropriate.

14.5.9.5 Identification

The chart shall be identified by a name associated with the airspace portrayed.

Note.— The name may be that of the air traffic services centre, the name of the largest city or town situated in the area covered by the chart or the name of the city that the aerodrome serves. Where more than one aerodrome serves the city or town, the name of the aerodrome on which the procedures are based shall be added.

14.5.9.6 Culture and topography

(a) Generalized shorelines of all open water areas, large lakes and rivers shall be shown except where they conflict with data more applicable to the function of the chart.

(b) To improve situational awareness in areas where significant relief exists, all relief exceeding 300 m (1 000 ft) above the elevation of the primary aerodrome shall be shown by smoothed contour lines, contour values and layer tints printed in brown. Appropriate spot elevations, including the highest elevation within each top contour line, should be shown printed in black. Obstacles shall also be shown.

Note 1.— The next higher suitable contour line appearing on base topographic maps exceeding 300 m (1 000 ft) above the elevation of the primary aerodrome may be selected to start layer tinting.

Note 2.— An appropriate brown colour, on which half-tone layer tinting is to be based, is specified in Appendix 3 — Colour Guide for contours and topographic features.

Note 3.— Appropriate spot elevations and obstacles are those provided by the procedures specialist.

14.5.9.7 Magnetic variation

The average magnetic variation of the area covered by the chart shall be shown to the nearest degree.

14.5.9.8 Bearings, tracks and radials

(a) Bearings, tracks and radials shall be magnetic, except as provided for in 14.5.8.8(b). Where bearings and tracks are additionally provided as true values for

RNAV segments, they shall be shown in parentheses to the nearest tenth of a degree, e.g. 290° (294.9°T).

(b) In areas of high latitude, where it is determined by the Aauthority that reference to Magnetic North is impractical, another suitable reference, i.e. True North or Grid North, shall be used.

(c) Where bearings, tracks or radials are given with reference to True North or Grid North, this shall be clearly indicated. When Grid North is used, its reference grid meridian shall be identified.

14.5.9.9 Aeronautical data

(a) Aerodromes

All aerodromes which affect the terminal routings shall be shown. Where appropriate, a runway pattern symbol shall be used.

(b) Prohibited, restricted and danger areas
Prohibited, restricted and danger areas shall be depicted with their identification and vertical limits.

(c) Area minimum altitudes

Area minimum altitudes shall be shown within quadrilaterals formed by the parallels and meridians.

Note 1.— Quadrilaterals formed by the parallels and meridians normally correspond to the whole degree of latitude and longitude. Regardless of the chart scale being used, the area minimum altitude relates to the consequent quadrilateral.

Note 2.— Refer to the Procedures for Air Navigation — Aircraft Operations (PANS OPS, Doc 8168), Volume II, Part I, Section 2, Chapter 1, 1.8, for method for determination of area minimum altitude.

(d) Air traffic services system

1) The components of the established relevant air traffic services system shall be shown.

i. The components shall include the following:

A. the radio navigation aids associated with the air traffic services system, together with their names, identifications, frequencies and geographical coordinates in degrees, minutes and seconds;

B. in respect of DME, additionally the elevation of the transmitting antenna of the DME to the nearest 30 m (100 ft);

C. terminal radio aids which are required for outbound and inbound traffic and for holding patterns;

D. the lateral and vertical limits of all designated airspace and the appropriate class of airspace;

E. the designation of the navigation specification(s) including any limitations, where established;

F. holding patterns and terminal routings, together with the route designators, and the track to the nearest degree along each segment of the prescribed airways and terminal routings;

G. all significant points which define the terminal routings and are not marked by the position of a radio navigation aid, together with their name-codes and geographical coordinates in degrees, minutes and seconds;

H. in respect of waypoints defining VOR/DME area navigation routes, additionally,

1) the station identification and radio frequency of the reference VOR/DME;

2) the bearing to the nearest tenth of a degree and the distance to the nearest two-tenths of a kilometre (tenth of a nautical mile) from the reference VOR/DME, if the waypoint is not collocated with it;

I. an indication of all compulsory and "on-request" reporting points;

J. the distances to the nearest kilometre or nautical mile between significant points constituting turning points or reporting points;

Note.— Overall distances between radio navigation aids may also be shown.

K. change-over points on route segments defined by reference to very high frequency omnidirectional radio ranges, indicating the distances to the nearest kilometre or nautical mile to the radio navigation aids;

Note.— Change-over points established at midpoint between two aids, or at the intersection of two radials in the case of a route which changes direction between the aids, need not be shown for each route segment if a general statement regarding their existence is made.

L. minimum en-route altitudes and minimum obstacle clearance altitudes, on ATS routes to the nearest higher 50 metres or 100 feet`;

M. established minimum vectoring altitudes to the nearest higher 50 m or 100 ft, clearly identified;

Note 1.— Where ATS surveillance systems are used to vector *aircraft to or from significant points on a published standard departure or arrival route or to issue clearance for descent below the minimum sector altitude during arrival, the relevant procedures may be shown on the Area Chart — ICAO unless excessive chart clutter will result.*

Note 2.— Where excessive chart clutter will result, an ATC Surveillance Minimum Altitude Chart — ICAO may be provided in which case the elements indicated by 14.5.9.9(d)(1)(L), need not be duplicated on the Area Chart — ICAO.

N. area speed and level/altitude restrictions where established;

O. communication facilities listed with their channels and, if applicable, logon address and SATVOICE number; and

P. an indication of “flyover” significant points.

14.5.10 STANDARD DEPARTURE CHART — INSTRUMENT (SID) — ICAO

14.5.10.1 Function

This chart shall provide the flight crew with information to enable it to comply with the designated standard departure route — instrument from take-off phase to the en-route phase.

Note 1.— Provisions governing the identification of standard departure routes are in Part 14.1; guidance material relating to the establishment of such routes is contained in the Air Traffic Services Planning Manual (Doc 9426).

Note 2.— Provisions governing obstacle clearance criteria and details of the minimum information to be published are contained in the Procedures for Air Navigation Services — Aircraft Operations (PANS-OPS, Doc 8168), Volume II, Part II.

14.5.10.2 Availability

The Standard Departure Chart — Instrument (SID) — ICAO shall be made available wherever a standard departure route — instrument has been established and cannot be shown with sufficient clarity on the Area Chart — ICAO.

14.5.10.3 Coverage and scale

(a) The coverage of the chart shall be sufficient to indicate the point where the departure route begins and the specified significant point at which the en-route phase of flight along a designated air traffic services route can be commenced.

Note.— The departure route normally originates at the end of a runway.

(b) The chart shall be drawn to scale.

(c) If the chart is drawn to scale, a scale-bar shall be shown.

(d) When the chart is not drawn to scale, the annotation “NOT TO SCALE” shall be shown and the symbol for scale- break shall be used on tracks and other aspects of the chart which are too large to be drawn to scale.

14.5.10.4 Projection

(a) A conformal projection on which a straight line approximates a great circle shall be used.

(b) When the chart is drawn to scale, parallels and meridians shall be shown at suitable intervals.

(c) Graduation marks shall be placed at consistent intervals along the neat lines.

14.5.10.5 Identification

The chart shall be identified by the name of the city or town or area which the aerodrome serves, the name of the aerodrome and the identification of the standard departure route(s) — instrument as established in accordance with the Procedures for Air Navigation Services — Aircraft Operations (PANS-OPS, Doc 8168), Volume II, Part I, Section 3, Chapter 5.

Note.— The identification of the standard departure route(s) — instrument is provided by the procedures specialist.

14.5.10.6 Culture and topography

(a) Where the chart is drawn to scale, generalized shore lines of all open water areas, large lakes and rivers shall be shown except where they conflict with data more applicable to the function of the chart.

(b) To improve situational awareness in areas where significant relief exists, the chart shall be drawn to scale and all relief exceeding 300 m (1 000 ft) above the aerodrome elevation shall be shown by smoothed contour lines, contour values and layer tints printed in brown. Appropriate spot elevations, including the highest elevation within each top contour line, shall be shown printed in black. Obstacles shall also be shown.

Note 1.— The next higher suitable contour line appearing on base topographic maps exceeding 300 m (1 000 ft) above the aerodrome elevation may be selected to start layer tinting.

Note 2.— An appropriate brown colour, on which half-tone layer tinting is to be based, is specified in Appendix 3 — Colour Guide for contours and topographic features.

Note 3.— Appropriate spot elevations and obstacles are those provided by the procedures specialist.

14.5.10.7 Magnetic variation

Magnetic variation used in determining the magnetic bearings, tracks and radials shall be shown to the nearest degree.

14.5.10.8 Bearings, tracks and radials

(a) Bearings, tracks and radials shall be magnetic, except as provided for in 14.5.10.8.(b). Where bearings and tracks are additionally provided as true values for RNAV segments, they shall be shown in parentheses to the nearest tenth of a degree, e.g. 290° (294.9°T).

Note.— A note to this effect may be included on the chart.

(b) In areas of high latitude, where it is determined by the appropriate authority that reference to Magnetic North is impractical, another suitable reference, i.e. True North or Grid North, shall be used.

(c) Where bearings, tracks or radials are given with reference to True North or Grid North, this shall be clearly indicated. When Grid North is used, its reference grid meridian shall be identified.

14.5.10.9 Aeronautical data

(a) Aerodromes

1) The aerodrome of departure shall be shown by the runway pattern.

2) All aerodromes which affect the designated standard departure route — instrument shall be shown and identified. Where appropriate, the aerodrome runway patterns shall be shown.

(b) Prohibited, restricted and danger areas

Prohibited, restricted and danger areas which may affect the execution of the procedures shall be shown with their identification and vertical limits.

(c) Minimum sector altitude

1) The established minimum sector altitude shall be shown with a clear indication of the sector to which it applies.

2) Where the minimum sector altitude has not been established, the chart shall be drawn to scale and area minimum altitudes shall be shown within quadrilaterals formed by the parallels and meridians. Area minimum altitudes shall also be shown in those parts of the chart not covered by the minimum sector altitude.

Note 1.— Quadrilaterals formed by the parallels and meridians normally correspond to the half degree of latitude and longitude. Regardless of the chart scale being used, the area minimum altitude relates to the consequent *quadrilateral.*

Note 2.— Refer to the Procedures for Air Navigation — Aircraft Operations (PANS OPS, Doc 8168), Volume II, Part I, Section 2, Chapter 1, 1.8, for method for determination of area minimum altitude.

d). Air traffic services system

1 The components of the established relevant air traffic services system shall be shown.

i) The components shall comprise the following:

A a graphic portrayal of each standard departure route — instrument, including:

1) for departure procedures designed specifically for helicopters, the term "CAT H" shall be depicted in the departure chart plan view;

2) route designator;

3) significant points defining the route;

4) track or radial to the nearest degree along each segment of the route;

5) distances to the nearest kilometre or nautical mile between significant points;

6) minimum obstacle clearance altitudes, along the route or route segments and altitudes required by the procedure to the nearest higher 50 m or 100 ft and flight level restrictions where established;

7) where the chart is drawn to scale and vectoring on departure is provided, established minimum vectoring altitudes to the nearest higher 50 m or 100 ft, clearly identified;

Note 1.— Where ATS surveillance systems are used to vector aircraft to or from significant points on a published standard departure route, the relevant procedures may be shown on the Standard Departure Chart — Instrument (SID) — ICAO unless excessive chart clutter will result.

Note 2.— Where excessive chart clutter will result, an ATC Surveillance Minimum Altitude Chart — ICAO may be provided (see Chapter 21), in which case the elements indicated by 9.9.4.1.1, a) 6), need not be duplicated on the Standard Departure Chart — Instrument (SID) — ICAO.

B the radio navigation aid(s) associated with the route(s) including:

1) when the radio navigation aid is used for conventional navigation:

i) plain language name;

ii) identification;

iii) Morse code;

iv) frequency;

v) geographical coordinates in degrees, minutes and seconds; and

vi) for DME, the channel and the elevation of the transmitting antenna of the DME to the nearest 30 m (100 ft);

2) when the radio navigation aid is used as a significant point for area navigation:

i) plain language name; and

ii) identification;

C significant points not marked by the position of a radio navigation aid including:

1) when the significant point is used for conventional navigation:

i) name-code;

ii) geographical coordinates in degrees, minutes and seconds;

iii) bearing to the nearest tenth of a degree from the reference radio navigation aid;

iv) distance to the nearest two-tenths of a kilometre (tenth of a nautical mile) from the reference radio navigation aid; and

v) identification of the reference radio navigation aid;

2) when the significant point is used for area navigation:

i) name-code;

D applicable holding patterns;

E transition altitude/height to the nearest higher 300 m or 1 000 ft;

F the position and height of close-in obstacles which penetrate the obstacle identification surface (OIS). A note shall be included whenever close-in obstacles penetrating the OIS exist but which were not considered for the published procedure design gradient;

Note.— In accordance with PANS-OPS, Volume II, information on close-in obstacles is provided by the procedures specialist.

G area speed restrictions, where established;

H the designation of the navigation specification(s) including any limitations, where established;

I all compulsory and “on-request” reporting points;

J radio communication procedures, including:

1) call sign(s) of ATS unit(s);

2) frequency and, if applicable, SATVOICE number;

3) transponder setting, where appropriate;

K an indication of “flyover” significant points.

2 A textual description of standard departure route(s) — instrument (SID) and relevant communication failure procedures shall be provided and should, whenever feasible, be shown on the chart or on the same page which contains the chart.

3. Aeronautical database requirements

i. Appropriate data to support navigation database coding shall be published in accordance with the Procedures for Air Navigation Services — Aircraft Operations (PANS-OPS, Doc 8168), Volume II, Part III, Section 5, Chapter 2, 2.1, on the verso of the chart or as a separate, properly referenced sheet.

Note.— Appropriate data are those provided by the procedures specialist.

14.5.11 STANDARD ARRIVAL CHART — INSTRUMENT (STAR) — ICAO

14.5.11.1 Function

This chart shall provide the flight crew with information to enable it to comply with the designated standard arrival route— instrument from the en-route phase to the approach phase.

Note 1.— Standard arrival routes — instrument are to be interpreted as including "standard descent profiles", "continuous descent approach", and other non-standard descriptions. In the case of a standard descent profile, the depiction of a cross-section is not required.

Note 2.— Provisions governing the identification of standard arrival routes are in Air Traffic Management Regulation; guidance material relating to the establishment of such routes is contained in the Air Traffic Services Planning Manual (Doc 9426).

14.5.11.2 Availability

The Standard Arrival Chart — Instrument (STAR) — ICAO shall be made available wherever a standard arrival route — instrument has been established and cannot be shown with sufficient clarity on the Area Chart.

14.5.11.3 Coverage and scale

(a) The coverage of the chart shall be sufficient to indicate the points where the en-route phase ends and the approach phase begins.

(b) The chart should be drawn to scale.

(c) If the chart is drawn to scale, a scale-bar shall be shown.

(d) When the chart is not drawn to scale, the annotation "NOT TO SCALE" shall be shown and the symbol for scale break shall be used on tracks and other aspects of the chart which are too large to be drawn to scale.

14.5.11.4 Projection

(a) A conformal projection on which a straight line approximates a great circle should be used.

(b) When the chart is drawn to scale, parallels and meridians should be shown at suitable intervals.

(c) Graduation marks shall be placed at consistent intervals along the neat lines.

14.5.11.5 Identification

The chart shall be identified by the name of the city or town or area which the aerodrome serves, the name of the aerodrome, and the identification of the standard arrival route(s) — instrument as established in accordance with the Procedures for Air Navigation Services — Aircraft Operations (PANS-OPS, Doc 8168), Volume II, Part I, Section 4, Chapter 2.

Note.— The identification of the standard arrival route(s) — instrument is provided by the procedures specialist.

14.5.11.6 Culture and topography

(a) Where the chart is drawn to scale, generalized shore lines of all open water areas, large lakes and rivers shall be shown except where they conflict with data more applicable to the function of the chart.

(b) To improve situational awareness in areas where significant relief exists, the chart should be drawn to scale and all relief exceeding 300 m (1 000 ft) above the aerodrome elevation shall be shown by smoothed contour lines, contour values and layer tints printed in brown. Appropriate spot elevations, including the highest elevation within each top contour line, shall be shown printed in black. Obstacles shall also be shown.

Note 1.— The next higher suitable contour line appearing on base topographic maps exceeding 300 m (1 000 ft) above the aerodrome elevation may be selected to start layer tinting.

Note 2.— An appropriate brown colour, on which half-tone layer tinting is to be based, is specified in Appendix 3 — Colour Guide for contours and topographic features.

Note 3.— Appropriate spot elevations and obstacles are those provided by the procedures specialist.

14.5.11.7 Magnetic variation

Magnetic variation used in determining the magnetic bearings, tracks and radials shall be shown to the nearest degree.

14.5.11.8 Bearings, tracks and radials

(a) Bearings, tracks and radials shall be magnetic, except as provided for in 14.5.11.8(b). Where bearings and tracks are additionally provided as true values for RNAV segments, they shall be shown in parentheses to the nearest tenth of a degree, e.g. 290° (294.9°T).

Note.— A note to this effect may be included on the chart.

(b) In areas of high latitude, where it is determined by the appropriate authority that reference to Magnetic North is impractical, another suitable reference, i.e. True North or Grid North, should be used.

(c) Where bearings, tracks or radials are given with reference to True North or Grid North, this shall be clearly indicated. When Grid North is used, its reference grid

meridian shall be identified.

14.5.11.9 Aeronautical data

The aeronautical chart provider shall show as appropriate the following aeronautical data on the charts

(a) Aerodromes

1) The aerodrome of landing shall be shown by the runway pattern.

2) All aerodromes which affect the designated standard arrival route — instrument shall be shown and identified. Where appropriate, the aerodrome runway patterns shall be shown.

(b) Prohibited, restricted and danger areas
Prohibited, restricted and danger areas which may affect the execution of the procedures shall be shown with their identification and vertical limits.

(c) Minimum sector altitude

1) The established minimum sector altitude shall be shown with a clear indication of the sector to which it applies.

2) Where the minimum sector altitude has not been established, the chart shall be drawn to scale and area minimum altitudes shall be shown within quadrilaterals formed by the parallels and meridians. Area minimum altitudes shall also be shown in those parts of the chart not covered by the minimum sector altitude.

Note 1.— Quadrilaterals formed by the parallels and meridians normally correspond to the half degree of latitude and longitude. Regardless of the chart scale being used, the area minimum altitude relates to the consequent quadrilateral.

Note 2.— Refer to the Procedures for Air Navigation Services — Aircraft Operations (PANS-OPS, Doc 8168), Volume II, Part I, Section 2, Chapter 1, 1.8, for method for determination of area minimum altitude.

d) Air traffic services system

1 The components of the established relevant air traffic services system shall be shown.

i) The components shall comprise the following:

A. a graphic portrayal of each standard arrival route — instrument, including:

1) route designator;

2) significant points defining the route;

3) track or radial to the nearest degree along each segment of the route;

4) distances to the nearest kilometre or nautical mile between significant points;

5) minimum obstacle clearance altitudes, along the route or route segments and altitudes required by the procedure to the nearest higher 50 m or 100 ft and flight level restrictions where established;

6) where the chart is drawn to scale and vectoring on arrival is provided, established minimum vectoring altitudes to the nearest higher 50 m or 100 ft, clearly identified;

Note 1.— Where ATS surveillance systems are used to vector aircraft to or from significant points on a published standard arrival route or to issue clearance for descent below the minimum sector altitude during arrival, the relevant procedures may be shown on the Standard Arrival Chart — Instrument (STAR) — ICAO unless excessive chart clutter will result.

Note 2.— Where excessive chart clutter will result, an ATC Surveillance Minimum Altitude Chart — ICAO may be provided (see Chapter 21), in which case the elements indicated by 10.9.4.1.1, a) 6), need not be duplicated on the Standard Arrival Chart — Instrument (STAR) — ICAO.

B. the radio navigation aid(s) associated with the route(s) including:

1) when the radio navigation aid is used for conventional navigation:

i) plain language name;

ii) identification;

iii) Morse code;

iv) frequency;

v) geographical coordinates in degrees, minutes and seconds; and

vi) for DME, the channel and the elevation of the transmitting antenna of the DME to the nearest 30 m (100 ft);

2) when the radio navigation aid is used as a significant point for area navigation:

i) plain language name; and

ii) identification;

C. significant points not marked by the position of a radio navigation aid including:

1) when the significant point is used for conventional navigation:

i) name-code;

ii) geographical coordinates in degrees, minutes and seconds;

iii) bearing to the nearest tenth of a degree from the reference radio navigation aid;

iv) distance to the nearest two-tenths of a kilometre (tenth of a nautical mile) from the reference radio navigation aid;

v) identification of the reference radio navigation aid;

2) when the significant point is used for area navigation:

i) name-code;

D. applicable holding patterns;

E. transition altitude/height to the nearest higher 300 m or 1 000 ft;

F. area speed restrictions, where established;

G. the designation of the navigation specification(s) including any limitations, where established;

H. all compulsory and “on-request” reporting points;

I. radio communication procedures, including:

1) call sign(s) of ATS unit(s);

2) frequency and, if applicable, SATVOICE number;

3) transponder setting, where appropriate;

J. an indication of “flyover” significant waypoints; and

K. for arrival procedures to an instrument approach designed specifically for helicopters, the term “CAT H” shall be depicted in the arrival chart plan view.

1) A textual description of standard arrival route(s) — instrument (STAR) and relevant communication failure procedures should be provided and should, whenever feasible, be shown on the chart or on the same page which contains the chart.

2) Aeronautical database requirements

i) Appropriate data to support navigation database coding shall be published in accordance with the Procedures for Air Navigation Services — Aircraft Operations (PANS-OPS, Doc 8168), Volume II, Part III, Section 5, Chapter 2, 2.2, on the verso of the chart or as a separate, properly referenced sheet.

Note.— Appropriate data are those provided by the procedures specialist.

14.5.12 INSTRUMENT APPROACH CHART — ICAO

14.5.12.1 Function

This chart shall provide flight crews with information which will enable them to perform an approved instrument approach procedure to the runway of intended landing including the missed approach procedure and, where applicable, associated holding patterns.

Note.— Detailed criteria for the establishment of instrument approach procedures and the resolutions of associated altitudes/heights are contained in the Procedures for Air Navigation Services — Aircraft Operations (PANS-OPS, Doc 8168).

14.5.12.2 Availability

(a) Instrument Approach Charts — ICAO shall be made available for all aerodromes used by international civil aviation where instrument approach procedures have been established by the State concerned.

(b) A separate Instrument Approach Chart — ICAO shall normally be provided for each precision approach procedure established by the State.

(c) A separate Instrument Approach Chart — ICAO shall normally be provided for each non-precision approach procedure established by the State.

Note. — A single precision or non-precision approach procedure chart may be provided to portray more than one approach procedure when the procedures for the intermediate approach, final approach and missed approach segments are identical.

(d) When the values for track, time or altitude differ between categories of aircraft on other than the final approach segment of the instrument approach procedures and the listing of these differences on a single chart could cause clutter or confusion, more than one chart shall be provided.

Note. — For categories of aircraft, see Procedures for Air Navigation Services — Aircraft Operations (PANS-OPS, Doc 8168), Volume II, Part I, Section 4, Chapter 9.

(e) Instrument Approach Charts — ICAO shall be revised whenever information essential to safe operation becomes out of date.

14.5.12.3 Coverage and scale

(a) The coverage of the chart shall be sufficient to include all segments of the instrument approach procedure and such additional areas as may be necessary for the type of approach intended.

(b) The scale selected shall ensure optimum legibility consistent with:

1) the procedure shown on the chart;

2) sheet size.

(c) A scale indication shall be given.

1) Except where this is not practicable, a distance circle with a radius of 20 km (10 NM) centred on a DME located on or close to the aerodrome, or on the aerodrome reference point where no suitable DME is available, shall be shown; its radius shall be indicated on the circumference.

2) A distance scale shall be shown directly below the profile.

14.5.12.4 Format

The sheet size should be 210× 148 mm (8.27 × 5.82 in).

14.5.12.5 Projection

(a) A conformal projection on which a straight line approximates a great circle shall be used.

(b) Graduation marks should be placed at consistent intervals along the neat lines.

14.5.12.6 Identification

The chart shall be identified by the name of the city or town or area which the aerodrome serves, the name of the aerodrome and the identification of the instrument approach procedure as established in accordance with the Procedures for Air Navigation Services — Aircraft Operations (PANS-OPS, Doc 8168), Volume II, Part I, Section 4, Chapter 9.

Note.— The identification of the instrument approach procedure is provided by the procedures specialist.

14.5.12.7 Culture and topography

(a) Culture and topographic information pertinent to the safe execution of the instrument approach procedure, including the missed approach procedure, associated holding procedures and visual manoeuvring (circling) procedure when established, shall be shown. Topographic information shall be named, only when necessary, to facilitate the understanding of such information, and the minimum shall be a delineation of land masses and significant lakes and rivers.

(b) Relief shall be shown in a manner best suited to the particular elevation characteristics of the area. In areas where relief exceeds 1 200 m (4 000 ft) above the aerodrome elevation within the coverage of the chart or 600 m (2 000 ft) within 11 km (6 NM) of the aerodrome reference point or when final approach or missed approach procedure gradient is steeper than optimal due to terrain, all relief exceeding 150 m (500 ft) above the aerodrome elevation shall be shown by smoothed contour lines, contour values and layer tints printed in brown. Appropriate spot elevations, including the highest elevation within each top contour line, shall also be shown printed in black.

Note 1.— The next higher suitable contour line appearing on base topographic maps exceeding 150 m (500 ft) above the aerodrome elevation may be selected to start layer tinting.

Note 2.— An appropriate brown colour, on which half-tone layer tinting is to be based, is specified in Appendix 3 — Colour Guide for contours and topographic features.

Note 3.— Appropriate spot elevations are those provided by the procedures specialist.

(c) In areas where relief is lower than specified in 14.5.12.7(b), all relief exceeding 150 m (500 ft) above the aerodrome elevation should be shown by smoothed contour lines, contour values and layer tints printed in brown. Appropriate spot elevations, including the highest elevation within each top contour line, should also be shown printed in black.

Note 1.— The next higher suitable contour line appearing on base topographic maps exceeding 150 m (500 ft) above the aerodrome elevation may be selected to start layer tinting.

Note 2.— An appropriate brown colour, on which half-tone layer tinting is to be based, is specified in Appendix 3 — Colour Guide for contours and topographic features.

Note 3.— Appropriate spot elevations are those provided by the procedures specialist.

14.5.12.8 Magnetic variation

(a) The magnetic variation should be shown.

(b) When shown, the value of the variation, indicated to the nearest degree, shall agree with that used in determining magnetic bearings, tracks and radials.

14.5.12.9 Bearings, tracks and radials

(a) Bearings, tracks and radials shall be magnetic, except as provided for in 14.5.12.9(b) Where bearings and tracks are additionally provided as true values for RNAV segments, they shall be shown in parentheses to the nearest tenth of a degree, e.g. 290° (294.9°T).

Note.— A note to this effect may be included on the chart.

(b) In areas of high latitude, where it is determined by the appropriate authority that reference to Magnetic North is impractical, another suitable reference, i.e. True North or Grid North, should be used.

(c) Where bearings, tracks or radials are given with reference to True North or Grid North, this shall be clearly indicated. When Grid North is used, its reference grid meridian shall be identified.

14.5.12.10 Aeronautical data

(a) The aeronautical charts provider shall show the following aeronautical data as appropriate on the charts

1. Aerodromes

i. All aerodromes which show a distinctive pattern from the air shall be shown by the appropriate symbol. Abandoned aerodromes shall be identified as abandoned.

ii. The runway pattern, at a scale sufficiently large to show it clearly, shall be shown for:

A. the aerodrome on which the procedure is based;

B. aerodromes affecting the traffic pattern or so situated as to be likely, under adverse weather conditions, to be mistaken for the aerodrome of intended landing.

iii. The aerodrome elevation shall be shown to the nearest metre or foot in a prominent position on the chart.

iv. The threshold elevation or, where applicable, the highest elevation of the touchdown zone shall be shown to the nearest metre or foot.

2. Obstacles

i. Obstacles shall be shown on the plan view of the chart.

Note.— Appropriate obstacles are those provided by the procedures specialist.

ii. If one or more obstacles are the determining factor of an obstacle clearance altitude/height, those obstacles should be identified.

iii. The elevation of the top of obstacles shall be shown to the nearest (next higher) metre or foot.

iv. The heights of obstacles above a datum other than mean sea level (see 14.5.12.10(b),3) should be shown. When shown, they should be given in parentheses on the chart.

v. When the heights of obstacles above a datum other than mean sea level are shown, the datum shall be the aerodrome elevation except that, at aerodromes having an instrument runway (or runways) with a threshold elevation more than 2 m (7 ft) below the aerodrome elevation, the chart datum shall be the threshold elevation of the runway to which the instrument approach is related.

vi. Where a datum other than mean sea level is used, it shall be stated in a prominent position on the chart.

vii. Where an obstacle free zone has not been established for a precision approach runway Category I, this shall be indicated.

3. Prohibited, restricted and danger areas

The aeronautical charts provider shall show as appropriate on the charts the Prohibited areas, restricted areas, and danger areas which may affect the execution of the procedures shall be shown with their identification and vertical limits.

4. Radio communication facilities and navigation aids

i. Radio navigation aids required for the procedures together with their frequencies, identifications and track-defining characteristics, if any, shall be shown. In the case of a procedure in which more than one station is located on the final approach track, the facility to be used for track guidance for final approach shall be clearly identified. In addition, consideration shall be given to the elimination from the approach chart of those facilities that are not used by the procedure.

A. When a radio navigation aid is used as a significant point for area navigation, only its plain language name and identification shall be shown.

B. The initial approach fix (IAF), the intermediate approach fix (IF), the final approach fix (FAF) (or final approach point (FAP) for an ILS approach procedure), the missed approach point (MAPt), where established, and other essential fixes or points comprising the procedure shall be shown and identified.

C. When the final approach fix is used for conventional navigation (or final approach point for an ILS approach procedure), it should be identified with its geographical coordinates in degrees, minutes and seconds.

D. Radio navigation aids that might be used in diversionary procedures together with their track-defining characteristics, if any, shall be shown or indicated on the chart.

E. Radio communication frequencies, including call signs, that are required for the execution of the procedures shall be shown.

F. When required by the procedures, the distance to the aerodrome from each radio navigation aid concerned with the final approach shall be shown to the nearest kilometre or nautical mile. When no track-defining aid indicates the bearing of the aerodrome, the bearing shall also be shown to the nearest degree.

5. Minimum sector altitude or terminal arrival altitude

The minimum sector altitude or terminal arrival altitude established by the competent authority shall be shown, with a clear indication of the sector to which it applies.

6. Portrayal of procedure tracks

i. The plan view shall show the following information in the manner indicated:

A. the approach procedure track by an arrowed continuous line indicating the direction of flight;

B. the missed approach procedure track by an arrowed broken line;

C. any additional procedure track, other than those specified in a) and b), by an arrowed dotted line;

D. bearings, tracks, radials to the nearest degree and distances to the nearest two-tenths of a kilometre or tenth of a nautical mile or times required for the procedure;

E. where no track-defining aid is available, the magnetic bearing to the nearest degree to the aerodrome from the radio navigation aids concerned with the final approach;

F. the boundaries of any sector in which visual manoeuvring (circling) is prohibited;

G. where specified, the holding pattern and minimum holding altitude/height associated with the approach and missed approach;

H. caution notes where required, prominently displayed on the face of the chart;

I. an indication of “flyover” significant points.

ii. The plan view should show the distance to the aerodrome from each radio navigation aid concerned with the final approach.

iii. A profile shall be provided normally below the plan view showing the following data:

A. the aerodrome by a solid block at aerodrome elevation;

B. the profile of the approach procedure segments by an arrowed continuous line indicating the direction of flight;

C. the profile of the missed approach procedure segment by an arrowed broken line and a description of the procedure;

D. the profile of any additional procedure segment, other than those specified in b) and c), by an arrowed dotted line;

E. bearings, tracks, radials to the nearest degree and distances to the nearest two-tenths of a kilometre or tenth of a nautical mile or times required for the procedure;

F. altitudes/heights required by the procedures, including transition altitude, procedure altitudes/heights and heliport crossing height (HCH), where established;

G. limiting distance to the nearest kilometre or nautical mile on procedure turn, when specified;

H. the intermediate approach fix or point, on procedures where no course reversal is authorized;

I. a line representing the aerodrome elevation or threshold elevation, as appropriate, extended across the width of the chart including a distance scale with its origin at the runway threshold.

iv. Heights required by procedures should be shown in parentheses, using the height datum selected in accordance with 14.5.12.10(b)5).

v. The profile view should include a ground profile or a minimum altitude/height portrayal as follows:

A. a ground profile shown by a solid line depicting the highest elevations of the relief occurring within the primary area of the final approach segment. The highest elevations of the relief occurring in the secondary areas of the final approach segment shown by a dashed line; or

B. minimum altitudes/heights in the intermediate and final approach segments indicated within bounded shaded blocks. Note 1.— For the ground profile portrayal, actual templates of the primary and secondary areas of the final approach segment are provided to the cartographer by the procedures specialist.

Note 2.— The minimum altitude/height portrayal is intended for use on charts depicting non-precision approaches with a final approach fix.

7. Aerodrome operating minima

   i. Aerodrome operating minima when established by the State shall be shown.

   ii. The obstacle clearance altitudes/heights for the aircraft categories for which the procedure is designed shall be shown; for precision approach procedures, additional OCA/H for Cat DL aircraft (wing span between 65 m and 80 m and/or vertical distance between the flight path of the wheels and the glide path antenna between 7 m and 8 m) shall be published, when necessary.

8. Supplementary information

   i. When the missed approach point is defined by:

      — a distance from the final approach fix, or

      — a facility or a fix and the corresponding distance from the final approach fix,

      the distance to the nearest two-tenths of a kilometre or tenth of a nautical mile and a table showing ground speeds and times from the final approach fix to the missed approach point shall be shown.

   ii. When DME is required for use in the final approach segment, a table showing altitudes/heights for each 2 km or 1 NM, as appropriate, shall be shown. The table shall not include distances which would correspond to altitudes/heights below the OCA/H.

   iii. For procedures in which DME is not required for use in the final approach segment but where a suitably located DME is available to provide advisory descent profile information, a table showing the altitudes/heights should be included.

   iv. A rate of descent table should be shown.

   v. For non-precision approach procedures with a final approach fix, the final approach descent gradient to the nearest one-tenth of a per cent and, in parentheses, descent angle to the nearest one-tenth of a degree shall be shown.

   vi. For precision approach procedures and approach procedures with vertical guidance, the reference datum height to the nearest half metre or foot and the glide path/elevation/vertical path angle to the nearest one-tenth of a degree shall be shown.

vii. When a final approach fix is specified at the final approach point for ILS, a clear indication shall be given whether it applies to the ILS, the associated ILS localizer only procedure, or both. In the case of MLS, a clear indication shall be given when an FAF has been specified at the final approach point.

viii. If the final approach descent gradient/angle for any type of instrument approach procedure exceeds the maximum value specified in the Procedures for Air Navigation Services — Aircraft Operations (PANS-OPS, Doc 8168), Volume II, a cautionary note shall be included.

ix. A note shall be included on the chart indicating the approach procedures that are authorized for simultaneous independent or dependent operations. The note shall include the runway(s) involved and if they are closely spaced.

9. Aeronautical database requirements

Appropriate data to support navigation database coding shall be published in accordance with the Procedures for Air Navigation Services — Aircraft Operations (PANS-OPS, Doc 8168), Volume II, Part III, Section 5, Chapter 2, 2.3, for RNAV procedures and Volume II, Part I, Section 4, Chapter 9, 9.4.1.3, for non-RNAV procedures, on the verso of the chart or as a separate, properly referenced sheet.

Note.— Appropriate data are those provided by the procedures specialist.

14.5.13 VISUAL APPROACH CHART — ICAO

14.5.13.1 Function

This chart shall provide flight crews with information which will enable them to transit from the en-route/descent to approach phases of flight to the runway of intended landing by means of visual reference.

14.5.13.2 Availability

The Visual Approach Chart — ICAO shall be made available in the manner prescribed in 14.5.2.6(b) for all aerodromes used by international civil aviation where:

(a) only limited navigation facilities are available; or

(b) radio communication facilities are not available; or

(c) no adequate aeronautical charts of the aerodrome and its surroundings at 1:500 000 or greater scale are available; or

(d) visual approach procedures have been established.

14.5.13.3 Scale

(a) The scale shall be sufficiently large to permit depiction of significant features and indication of the aerodrome layout.

(b) The scale should not be smaller than 1:500 000. Note.— A scale of 1:250 000 or 1:200 000 is preferred.

(c) When an Instrument Approach Chart is available for a given aerodrome, the Visual Approach Chart should be drawn to the same scale.

14.5.13.4 Format

The sheet size should be 210 × 148 mm (8.27 × 5.82 in).

Note.— It would be advantageous to print the charts in several colours, selected to provide maximum legibility in varying degrees and kinds of light.

14.5.13.5 Projection

(a) A conformal projection on which a straight line approximates a great circle shall be used.

(b) Graduation marks should be placed at consistent intervals along the neat lines.

14.5.13.6 Identification

The chart shall be identified by the name of the city or town which the aerodrome serves and the name of the aerodrome.

14.5.13.7 Culture and topography

(a)

1) Natural and cultural landmarks shall be shown (e.g. bluffs, cliffs, sand dunes, cities, towns, roads, railroads, isolated lighthouses).

2). Geographical place names should be included only when they are required to avoid confusion or ambiguity.

(b) Shore lines, lakes, rivers and streams shall be shown.

(c) Relief shall be shown in a manner best suited to the particular elevation and obstacle characteristics of the area covered by the chart.

(d) When shown spot elevations should be carefully selected.

Note.— The value of certain spot elevations/heights in relation to both mean sea level and aerodrome elevation may be given.

(e) The figures relating to different reference levels shall be clearly differentiated in their presentation.

14.5.13.8 Magnetic variation

The magnetic variation shall be shown.

14.5.13.9 Bearings, tracks and radials

(a) Bearings, tracks and radials shall be magnetic except as provided for in 14.5.13.9(b).

(b) In areas of high latitude, where it is determined by the appropriate authority that reference to Magnetic North is impractical, another suitable reference, i.e. True North or Grid North, should be used.

(c) Where bearings, tracks or radials are given with reference to True North or Grid North, this shall be clearly indicated. When Grid North is used, its reference grid meridian shall be identified.

14.5.13.10 Aeronautical data

(a) Aerodromes

1) All aerodromes shall be shown by the runway pattern. Restrictions on the use of any landing direction shall be indicated. Where there is any risk of confusion between two neighbouring aerodromes, this shall be indicated. Abandoned aerodromes shall be identified as abandoned.

2) The aerodrome elevation shall be shown in a prominent position on the chart.

(b) Obstacles

1) Obstacles shall be shown and identified.

2) The elevation of the top of obstacles shall be shown to the nearest (next higher) metre or foot.

3) (A) The heights of obstacles above the aerodrome elevation should be shown.

(B) When the heights of obstacles are shown, the height datum shall be stated in a prominent position on the chart and the heights shall be given in parentheses on the chart.

(c) Prohibited, restricted and danger areas

Prohibited areas, restricted areas, and danger areas shall be depicted with their identification and vertical limits.

(d) Designated airspace

Where applicable, control zones and aerodrome traffic zones shall be depicted with their vertical limits and the appropriate class of airspace.

(e) Visual approach information

1) Visual approach procedures shall be shown where applicable.

2) Visual aids for navigation shall be shown as appropriate.

3) Location and type of the visual approach slope indicator systems with their nominal approach slope angle(s), minimum eye height(s) over the threshold of the on-slope signal(s), and where the axis of the system is not parallel to the runway centre line, the angle and direction of displacement, i.e. left or right, shall be shown.

(f) Supplementary information

1) Radio navigation aids together with their frequencies and identifications shall be shown as appropriate.

2) Radio communication facilities with their frequencies shall be shown as appropriate.

14.5.14 AERODROME / HELIPORT CHART— ICAO

14.5.14.1 Function

(a)

(1) This chart shall provide flight crews with information which will facilitate the ground movement of aircraft:

i. from the aircraft stand to the runway; and

ii. from the runway to the aircraft stand;

(2) and helicopter movement:

i. from the helicopter stand to the touchdown and lift-off area and to the final approach and take-off area;

ii. from the final approach and take-off area to the touchdown and lift-off area and to the helicopter stand;

iii. along helicopter ground and air taxiways; and

iv. along air transit routes;

it shall also provide essential operational information at the ae rodrome/heliport.

14.5.14.2 Availability

(a) The Aerodrome/Heliport Chart — ICAO shall be made available in the manner prescribed in 14.5.2.6(b) for all aerodromes/heliports regularly used by international civil aviation.

(b) The Aerodrome/Heliport Chart — ICAO should be made available also, in the manner prescribed in 14.5.2.6(b), for all other aerodromes/heliports available for use by international civil aviation.

Note.— Under certain conditions, an Aerodrome Ground Movement Chart — ICAO and an Aircraft Parking/Docking Chart — ICAO may have to be provided (see 14.5.15 and 14.5.16); in which case, the elements portrayed on these supplementary charts need not be duplicated on the Aerodrome/Heliport Chart — ICAO.

14.5.14.3 Coverage and scale

(a) The coverage and scale shall be sufficiently large to show clearly all the elements listed in 14.5.14.6(a).

(b) A linear scale shall be shown.

14.5.14.4 Identification

The chart shall be identified by the name of the city or town or area which the aerodrome/heliport serves and the name of the aerodrome/heliport.

14.5.14.5 Magnetic variation

True and Magnetic North arrows and magnetic variation to the nearest degree and annual change of the magnetic variation shall be shown.

14.5.14.6 Aerodrome/heliport data

(a) This chart shall show:

1) geographical coordinates in degrees, minutes and seconds for the aerodrome/heliport reference point;

2) elevations, to the nearest metre or foot, of the aerodrome/heliport and apron (altimeter checkpoint locations) where applicable; and for non-precision approaches, elevations and geoid undulations of runway thresholds and the geometric centre of the touchdown and lift-off area;

3) elevations and geoid undulations, to the nearest half-metre or foot, of the precision approach runway threshold, the geometric centre of the touchdown and lift-off area, and at the highest elevation of the touchdown zone of a precision approach runway;

4) all runways including those under construction with designation number, length and width to the nearest metre, bearing strength, displaced thresholds, stopways, clearways, runway directions to the nearest degree magnetic, type of surface and runway markings;

Note.— Bearing strengths may be shown in tabular form on the face or verso of the chart.

5) all aprons, with aircraft/helicopter stands, lighting, markings and other visual guidance and control aids, where applicable, including location and type of visual docking guidance systems, type of surface for heliports, and bearing strengths or aircraft type restrictions where the bearing strength is less than that of the associated runways;

Note.— Bearing strengths or aircraft type restrictions may be shown in tabular form on the face or verso of the chart.

6) geographical coordinates in degrees, minutes and seconds for thresholds, geometric centre of touchdown and lift-off area and/or thresholds of the final approach and take-off area (where appropriate);

7) all taxiways, helicopter air and ground taxiways with type of surface, helicopter air transit routes, with designations, width, lighting, markings (including runway-holding positions and, where established, intermediate holding positions), stop bars, other visual guidance and control aids, and bearing strength or aircraft type restrictions where the bearing strength is less than that of the associated runways;

Note.— Bearing strengths or aircraft type restrictions may be shown in tabular form on the face or verso of the chart.

8) where established, hot spot locations with additional information properly annotated;

Note.— Additional information regarding hot spots may be shown in tabular form on the face or verso of the chart.

9) geographical coordinates in degrees, minutes, seconds and hundredths of seconds for appropriate taxiway centre line points and aircraft stands;

10) where established, standard routes for taxiing aircraft with their designators;

11) the boundaries of the air traffic control service;

12) position of runway visual range (RVR) observation sites;

13) approach and runway lighting;

14) location and type of the visual approach slope indicator systems with their nominal approach slope angle(s), minimum eye height(s) over the threshold of the on-slope signal(s), and where the axis of the system is not parallel to the runway centre line, the angle and direction of the displacement, i.e. left or right;

15) relevant communication facilities listed with their channels and, if applicable, logon address and SATVOICE number;

16) obstacles to taxiing;

17) aircraft servicing areas and buildings of operational significance;

18) VOR checkpoint and radio frequency of the aid concerned;

19) any part of the depicted movement area permanently unsuitable for aircraft, clearly identified as such.

(b) For aerodromes accommodating aeroplanes with folding wing tips, the location where the wing tips may be safely extended should be shown on the chart.

(c) In addition to the items in 14.5.14.6(a) relating to heliports, the chart shall show:

1) heliport type;

Note.— Heliport types are identified in Aerodromes Regulations, Volume II, as surface-level, elevated or helideck.

2) touchdown and lift-off area including dimensions to the nearest metre, slope, type of surface and bearing strength in tonnes;

3) final approach and take-off area including type, true bearing to the nearest degree, designation number (where appropriate), length and width to the nearest metre, slope and type of surface;

4) safety area including length, width and type of surface;

5) helicopter clearway including length and ground profile;

6) obstacles including type and elevation of the top of the obstacles to the nearest (next higher) metre or foot;

7) visual aids for approach procedures, marking and lighting of final approach and take-off area, and of touchdown and lift-off area;

8) declared distances to the nearest metre for heliports, where relevant, including:

i. take-off distance available;

ii. rejected take-off distance available;

iii. landing distance available.

14.5.15. AERODROME GROUND MOVEMENT CHART — ICAO

14.5.15.1 Function

This supplementary chart shall provide flight crews with detailed information to facilitate the ground movement of aircraft to and from the aircraft stands and the parking/docking of aircraft.

14.5.15.2 Availability

The Aerodrome Ground Movement Chart — ICAO should be made available in the manner prescribed in 14.5.2.6(b) where, due to congestion of information, details necessary for the ground movement of aircraft along the taxiways to and from the aircraft stands cannot be shown with sufficient clarity on the Aerodrome/Heliport Chart — ICAO.

14.5.15.3 Coverage and scale

(a) The coverage and scale shall be sufficiently large to show clearly all the elements listed in 14.5.15.6.

(b) A linear scale shall be shown.

14.5.15.4 Identification

The chart shall be identified by the name of the city or town or area which the aerodrome serves and the name of the aerodrome.

14.5.15.5 Magnetic variation

(a) A True North arrow shall be shown.

(b) Magnetic variation to the nearest degree and its annual change should be shown.

Note.— This chart need not be True North orientated.

14.5.15.6 Aerodrome data

(a) This chart shall show in a similar manner all the information on the Aerodrome/Heliport Chart — ICAO relevant to the area depicted, including:

1) apron elevation to the nearest metre or foot;

2) aprons with aircraft stands, bearing strengths or aircraft type restrictions, lighting, marking and other visual guidance and control aids, where applicable, including location and type of visual docking guidance systems;

3) geographical coordinates in degrees, minutes, seconds and hundredths of seconds for aircraft stands;

4) taxiways with designations, width to the nearest metre, bearing strength or aircraft type restrictions where applicable, lighting, markings (including runway-holding positions and, where established, intermediate holding positions), stop bars, and other visual guidance and control aids;

5) where established, hot spot locations with additional information properly annotated;

Note.— Additional information regarding hot spots may be shown in tabular form on the face or verso of the chart.

6) where established, standard routes for taxiing aircraft, with their designators;

7) geographical coordinates in degrees, minutes, seconds and hundredths of seconds for appropriate taxiway centre line points;

8) the boundaries of the air traffic control service;

9) relevant communication facilities listed with their channels and, if applicable, logon address;

10) obstacles to taxiing;

11) aircraft servicing areas and buildings of operational significance;

12) VOR checkpoint and radio frequency of the aid concerned;

13) any part of the depicted movement area permanently unsuitable for aircraft, clearly identified as such.

(b) For aerodromes accommodating aeroplanes with folding wing tips, the location where the wing tips may be safely extended should be shown on the chart.

14.5.16. AIRCRAFT PARKING/DOCKING CHART — ICAO

14.5.16.1 Function

This supplementary chart shall provide flight crews with detailed information to facilitate the ground movement of aircraft between the taxiways and the aircraft stands and the parking/docking of aircraft.

14.5.16.2 Availability

(a) The Service Provider may require to provide it only if, in the opinion of the Authority, the availability of these charts would contribute to the safety, regularity and efficiency of aircraft operations.

(b) The Aircraft Parking/Docking Chart — ICAO should be made available in the manner prescribed in 14.5.2.6(b) where, due to the complexity of the terminal facilities, the information cannot be shown with sufficient clarity on the Aerodrome/Heliport Chart — ICAO or on the Aerodrome Ground Movement Chart — ICAO.

14.5.16.3 Coverage and scale

(a) The coverage and scale shall be sufficiently large to show clearly all the elements listed in 14.5.16.6.

(b) A linear scale should be shown.

14.5.15.4 Identification

The chart shall be identified by the name of the city or town or area which the aerodrome serves and the name of the aerodrome.

14.5.16.5 Magnetic variation

(a) A True North arrow shall be shown.

(b) Magnetic variation to the nearest degree and its annual change should be shown.

Note.— This chart need not be True North orientated.

14.5.16.6 Aerodrome data

a). This chart shall show in a similar manner all the information on the Aerodrome/Heliport Chart — ICAO and the Aerodrome Ground Movement Chart — ICAO relevant to the area depicted, including:

1. apron elevation to the nearest metre or foot;

2. aprons with aircraft stands, bearing strengths or aircraft type restrictions, lighting, marking and other visual guidance and control aids, where applicable, including location and type of visual docking guidance systems;

3. geographical coordinates in degrees, minutes, seconds and hundredths of seconds for aircraft stands;

4. taxiway entries with designations, including runway-holding positions and, where established, intermediate holding positions, and stop bars;

5. where established, hot spot locations with additional information properly annotated;

   Note.— Additional information regarding hot spots may be shown in tabular form on the face or verso of the chart.

6. geographical coordinates in degrees, minutes, seconds and hundredths of seconds for appropriate taxiway centre line points;

7. the boundaries of the air traffic control service;

8. relevant communication facilities listed with their channels and, if applicable, logon address;

9. obstacles to taxiing;

10. aircraft servicing areas and buildings of operational significance;

11. VOR checkpoint and radio frequency of the aid concerned;

12. any part of the depicted movement area permanently unsuitable for aircraft, clearly identified as such.

14.5.17 WORLD AERONAUTICAL CHART — ICAO 1:1 000 000

14.5.17.1 Function

a). This chart shall provide information to satisfy the requirements of visual air navigation.

Note.— This chart may also serve:

1. as a basic aeronautical chart:

   i. when highly specialized charts lacking visual information do not provide essential data;

   ii. to provide complete world coverage at a constant scale with a uniform presentation of planimetric data;

   iii. in the production of other charts required by international civil aviation;

2. as a pre-flight planning chart.

14.5.17.2 Availability

(a) The World Aeronautical Chart — ICAO 1:1 000 000 shall be made available in the manner prescribed in 14.5.2.6(b) for all areas delineated in Appendix 5.

Note.— When operational or chart production considerations indicate that operational requirements can be effectively satisfied by Aeronautical Charts — ICAO 1:500 000 or Aeronautical Navigation Charts — ICAO Small Scale, either of these charts may be made available instead of the basic 1:1 000 000 chart.

(b) To ensure complete coverage of all land areas and adequate continuity in any one coordinated series, the selection of a scale of other than 1:1 000 000 should be determined by regional agreement.

14.5.17.3 Scales

(a) Linear scales for kilometres and nautical miles arranged in the following order:

— kilometres,

— nautical miles,

with their zero points in the same vertical line shall be shown in the margin.

(b) The length of the linear scales should represent at least 200 km (110 NM).

(c) A conversion scale (metres/feet) shall be shown in the margin.

14.5.17.4 Format

(a) The title and marginal notes should be in one of the working languages of ICAO. Note.— The language of the publishing country may be used in addition to the ICAO working language.

(b) The information regarding the number of the adjoining sheets and the unit of measurement to express elevations shall be so located as to be clearly visible when the sheet is folded.

(c) The method of folding should be as follows:

Fold the chart on the long axis near the mid-parallel of latitude, face out, with the bottom part of the chart face upward. Fold inward near the meridian, and fold both halves backward in accordion folds.

(d) Whenever practicable, the sheet lines should conform with those shown in the index in Appendix 5.

Note 1.— The area covered by a sheet may vary from the lines shown to satisfy particular requirements.

Note 2.— The value of adopting identical sheet lines for ICAO 1:1 000 000 Charts and the corresponding sheet of the International Map of the World (IMW), provided aeronautical requirements are not compromised, is recognized.

(e) Overlaps should be provided by extending the chart area on the top and right side beyond the area given on the index. This overlap area should contain all aeronautical, topographical, hydrographical and cultural information. The overlap should extend up to 28 km (15 NM), if possible, but in any case from the limiting parallels and meridians of each chart to the neat line.

14.5.17.5 Projection

(a) The projections shall be as follows:

1) between the Equator and 80° latitude: the Lambert conformal conic projection, in separate bands for each tier of charts. The standard parallels for each 4° band shall be 40′ south of the northern parallel and 40′ north of the southern parallel;

2) between 80° and 90° latitude: the Polar stereographic projection with scale matching that of the Lambert conformal conic projection at latitude 80°, except that in the northern hemisphere the Lambert conformal conic projection may be used between 80° and 84° latitude and the Polar

stereographic projection between 84° and 90° with the scales matching at 84° North.

(b) Graticules and graduations shall be shown as follows:

1. Parallels:

Latitude	*Distance between parallels*	*Graduations on parallels*
0° to 72°	30′	1′
72° to 84°	30′	5′
84° to 89°	30′	1°
89° to 90°	30′	5° (Only on degree parallels from 72° to 89°)

b) Meridians:

2. Meridians

Latitude	*Interval between meridians*	*Graduations on meridians*
0° to 52°	30′	1′
52° to 72°	30′	1′ (Only on even numbered meridians)
72° to 84°	1°	1′
84° to 89°	5°	1′
89° to 90°	15°	1′ (Only on every fourth meridian)

(c)

(1). The graduation marks at 1′ and 5′ intervals shall extend away from the Greenwich Meridian and from the Equator. Each 10′ interval shall be shown by a mark on both sides of the graticule line.

(2) The length of the graduation marks should be approximately 1.3 mm (0.05 in) afor the 1′ intervals, and 2 mm (0.08 in) for the 5′ intervals and 2 mm (0.08 in) extending on both sides of the graticule line for the 10′ intervals.

(d) All meridians and parallels shown shall be numbered in the borders of the chart. In addition, each parallel shall be numbered within the body of the chart in such a manner that the parallel can be readily identified when the chart is folded.

Note.— Meridians may be numbered within the body of the chart.

(e) The name and basic parameters of the projection shall be indicated in the margin.

14.5.17.6 Identification

Sheet numbering shall be in conformity with the index in Appendix 5.

Note.— The corresponding International Map of the World (IMW) sheet number may also be shown.

14.5.17.7 Culture and topography

(a) Built-up areas

1) Cities, towns and villages shall be selected and shown according to their relative importance to visual air navigation.

2) Cities and towns of sufficient size shall be indicated by the outline of their built-up areas and not of their established city limits.

(b) Railroads

1) All railroads having landmark value shall be shown.

Note 1.— In congested areas, some railroads may be omitted in the interest of legibility.

Note 2.— Railroads may be named where space permits.

2) Important tunnels should be shown. A descriptive note may be added.

(c) Highways and roads

1) Road systems shall be shown in sufficient detail to indicate significant patterns from the air.

2) Roads should not be shown in built-up areas unless they can be distinguished from the air as definite landmarks.

Note.— The numbers or names of important highways may be shown.

(d) Landmarks

Natural and cultural landmarks, such as bridges, prominent transmission lines, permanent cable car installations, wind turbines, mine structures, forts, ruins, levees, pipelines, rocks, bluffs, cliffs, sand dunes, isolated lighthouses and lightships, when considered to be of importance for visual air navigation, should be shown.

Note.— Descriptive notes may be added.

(e) Political boundaries

International boundaries shall be shown. Undemarcated and undefined boundaries shall be distinguished by descriptive notes.

(f) Hydrography

1) All water features compatible with the scale of the chart comprising shore lines, lakes, rivers and streams

2) (including those non-perennial in nature), salt lakes, glaciers and ice caps shall be shown.

3) The tint covering large open water areas should be kept very light. Note.— A narrow band of darker tone may be used along the shore line to emphasize this feature.

4) Reefs and shoals, including rocky ledges, tidal flats, isolated rocks, sand, gravel, stone and all similar areas, should be shown by symbols when of significant landmark value.

Note.— Groups of rocks may be shown by a few representative rock symbols within the area.

(g) Contours

1) Contours shall be shown. The selection of intervals shall be governed by the requirement to depict clearly the relief features required in air navigation.

2) The values of the contours used shall be shown.

(h) Hypsometric tints

1) When hypsometric tints are used, the range of elevations for the tints shall be shown.

2) The scale of the hypsometric tints used on the chart shall be shown in the margin.

(i) Spot elevations

1) Spot elevations shall be shown at selected critical points. The elevations

selected shall always be the highest in the immediate vicinity and shall generally indicate the top of a peak, ridge, etc. Elevations in valleys and at lake surface levels which are of special value to the aviator shall be shown. The position of each selected elevation shall be indicated by a dot.

2) The elevation (in metres or feet) of the highest point on the chart and its geographical position to the nearest five minutes shall be indicated in the margin.

3) The spot elevation of the highest point in any sheet should be cleared of hypsometric tinting.

(j) Incomplete or unreliable relief

1) Areas that have not been surveyed for contour information shall be labelled "Relief data incomplete".

2) Charts on which spot elevations are generally unreliable shall bear a warning note prominently displayed on the face of the chart in the colour used for aeronautical information, as follows:

"Warning — The reliability of relief information on this chart is doubtful and elevations should be used with caution."

(k) Escarpments

Escarpments should be shown when they are prominent landmarks or when cultural detail is very sparse.

(l) Wooded areas

1) Wooded areas should be shown.

Note.— On high latitude charts, the approximate extreme northern or southern limits of tree growth may be shown.

2) Where shown, the approximate extreme northern or southern limits of tree growth shall be indicated by a dashed black line and shall be appropriately labelled.

(m) Date of topographic information

The date of latest information shown on the topographic base shall be indicated in the margin.

14.5.17.8 Magnetic variation

(a) Isogonic lines shall be shown.

(b) The date of the isogonic information shall be indicated in the margin.

14.5.17.9 Aeronautical data

(a) General
Aeronautical data shown shall be kept to a minimum consistent with the use of the chart for visual navigation and the revision cycle (see 14.5.17.9(f)).

(b) Aerodromes

1) Land and water aerodromes and heliports shall be shown with their names, to the extent that they do not produce undesirable congestion on the chart, priority being given to those of greatest aeronautical significance.

2) The aerodrome elevation, the lighting available, the type of runway surface and the length of the longest runway or channel, shown in abbreviated form for each aerodrome in conformity with the example given in Appendix 2, provided they do not cause undesirable clutter on the chart, shall be indicated.

3) Abandoned aerodromes which are still recognizable as aerodromes from the air shall be shown and identified as abandoned.

(c) Obstacles

1) Obstacles shall be shown.

Note.— Objects of a height of 100 m (300 ft) or more above ground are normally regarded as obstacles.

2) When considered of importance to visual flight, prominent transmission lines, permanent cable car installations and wind turbines, which are obstacles, shall be shown.

(d) Prohibited, restricted and danger areas

Prohibited, restricted and danger areas shall be shown.

(e) Air traffic services system

1) Significant elements of the air traffic services system including, where practicable, control zones, aerodrome traffic zones, control areas, flight information regions and other airspaces in which VFR flights operate shall be shown together with the appropriate class of airspace.

2) Where appropriate, the air defence identification zone (ADIZ) shall be shown and properly identified.

Note.— ADIZ procedures may be described in the chart legend.

(f) Radio navigation aids

Radio navigation aids shall be shown by the appropriate symbol and named, but excluding their frequencies, coded designators, times of operation and other characteristics unless any or all of this information which is shown is kept up to date by means of new editions of the chart.

(g) Supplementary information

1) Aeronautical ground lights together with their characteristics or their identifications or both shall be shown.

2) Marine lights on outer prominent coastal or isolated features of not less than 28 km (15 NM) visibility range shall be shown:

i. where they are not less distinguishable than more powerful marine lights in the vicinity;

ii. where they are readily distinguishable from other marine or other types of lights in the vicinity of built-up coastal areas;

iii. where they are the only lights of significance available.

14.5.18 AERONAUTICAL CHART — ICAO 1:500 000

14.5.18.1 Function

This chart shall provide information to satisfy the requirements of visual air navigation for low speed, short- or medium-range operations at low and intermediate altitudes.

Note 1.— This chart may be used:

(a) to serve as a basic aeronautical chart;

(b) to provide a suitable medium for basic pilot and navigation training;

(c) to supplement highly specialized charts which do not provide essential visual information;

(d) in pre-flight planning.

Note 2.— It is intended that these charts be provided for land areas where charts of this scale are required for civil air operations employing visual air navigation independently or in support of other forms of air navigation.

Note 3.— Where States produce charts of this series covering their national territories, the entire area being portrayed is usually treated on a regional basis.

14.5.18.2 Availability

(a) The Service Provider may be require to provide it only if, in the opinion of the Authority, the availability of these charts would contribute to the safety, regularity and efficiency of aircraft operations.

(b) The Aeronautical Chart — ICAO 1:500 000 should be made available in the manner prescribed in 14.5.2.6(b) for all areas delineated in Appendix 5.

Note.— The selection of this scale as an alternative to the World Aeronautical Chart — ICAO 1:1 000 000 is covered by 14.5.17.2(a) and 14.5.17.2(b).

14.5.18.3 Scales

(a) Linear scales for kilometres and nautical miles arranged in the following order:

— kilometres,
— nautical miles,
with their zero points in the same vertical line shall be shown in the margin.

(b)
(1) The length of the linear scale shall be not less than 200 mm (8 in).

(2) A conversion scale (metres/feet) shall be shown in the margin.

14.5.18.4 Format

(a) The title and marginal notes shall be in one of the working languages of ICAO.

Note. — The language of the publishing country or any other language may be used in addition to the ICAO working language.

(b) The information regarding the number of the adjoining sheets and the unit of measurement used to express elevation shall be so located as to be clearly visible when the sheet is folded.

(c) The method of folding should be as follows:

Fold the chart on the long axis near the mid-parallel of latitude, face out, with the bottom part of the chart face upward. Fold inward near the meridian, and fold both halves backward in accordion folds.

(d) Whenever practicable, sheets should be quarter sheets of the World Aeronautical Chart — ICAO 1:1 000 000. An appropriate index to adjacent sheets, showing the relationship between the two-chart series, should be included on the face of the chart or on the reverse side.

Note. — Sheet lines may be varied to satisfy particular requirements.

(e) Overlaps should be provided by extending the chart area on the top and right side beyond the area given on the index. This overlap area should contain all aeronautical, topographical, hydrographical and cultural information. The overlap should extend up to 15 km (8 NM), if possible, but in any case, from the limiting parallels and meridians of each chart to the neat line.

14.5.18.5 Projection

(a) A conformal (orthomorphic) projection shall be used.

(b) The projection of the World Aeronautical Chart — ICAO 1:1 000 000 should be used.

(c)

(1) Parallels shall be shown at intervals of 30′.

(2) Meridians shall normally be shown at intervals of 30′.

Note.— At high latitudes, this interval may be increased.

(d)

(1) Graduation marks shall be shown at 1′ intervals along each whole degree meridian and parallel, extending away from the Greenwich Meridian and from the Equator. Each 10′ interval shall be shown by a mark on both sides of the graticule line.

(2) The length of the graduation marks should be approximately 1.3 mm (0.05 in) for the 1′ intervals, and 2 mm (0.08 in) for the 5′ intervals and 2 mm (0.08 in) extending on both sides of the graticule line for the 10′ intervals.

(e)

(1) All meridians and parallels shown shall be numbered in the borders of the chart.

(2) Each meridian and parallel should be numbered within the body of the chart whenever this data is required operationally.

(f) The name and basic parameters of the projection shall be indicated in the margin.

14.5.18.6 Identification

(a) Each sheet shall be identified by a name which should be that of the principal town or of a main geographical feature appearing on the sheet.

Where applicable, sheets should also be identified by the reference number of the corresponding World Aeronautical Chart — ICAO 1:1 000 000, with the addition of one or more of the following letter suffixes indicating the quadrant or quadrants:

Letter	Chart quadrant
A	North-West
B	North-East
C	South-East
D	South-West

14.5.18.7 Culture and topography

(a) Built-up areas

1) Cities, towns and villages shall be selected and shown according to their relative importance to visual air navigation.

2) Cities and towns of sufficient size should be indicated by the outline of their built-up areas and not of their established city limits.

(b) Railroads

1) All railroads having landmark value shall be shown.

Note 1.— In congested areas, some railroads may be omitted in the interest of legibility.

Note 2.— Railroads may be named.

Note 3.— Rail stations may be shown.

2) Tunnels shall be shown when they serve as prominent landmarks.

Note.— A descriptive note may be added, if necessary, to accentuate this feature.

(c) Highways and roads

1) Road systems shall be shown in sufficient detail to indicate significant patterns from the air.

Note.— Roads under construction may be shown.

2) Roads should not be shown in built-up areas unless they can be distinguished from the air as definite landmarks.

Note.— The numbers or names of important highways may be shown.

(d) Landmarks

Natural and cultural landmarks, such as bridges, prominent transmission lines, permanent cable car installations, wind turbines, mine structures, lookout towers, forts, ruins, levees, pipelines, rocks, bluffs, cliffs, sand dunes, isolated lighthouses and lightships, when considered to be of importance for visual air navigation, should be shown.

Note.— Descriptive notes may be added.

(e) Political boundaries

International boundaries shall be shown. Undemarcated and undefined boundaries shall be distinguished by descriptive notes.

Note.— Other boundaries may be shown.

(f) Hydrography

1) All water features compatible with the scale of the chart comprising shore lines, lakes, rivers and streams (including those non-perennial in nature), salt lakes, glaciers and ice caps shall be shown.

2) The tint covering large open water areas should be kept very light. Note.— A narrow band of darker tone may be used along the shore line to emphasize this feature.

3) Reefs and shoals, including rocky ledges, tidal flats, isolated rocks, sand, gravel, stone and all similar areas, should be shown by symbols when of significant landmark value.

Note.— Groups of rocks may be shown by a few representative rock symbols within the area.

(g) Contours

1) Contours shall be shown. The selection of intervals shall be governed by the requirement to depict clearly the relief features required in air navigation.

2) The values of the contours used shall be shown.

(h) Hypsometric tints

1) When hypsometric tints are used, the range of elevations for the tints shall be shown.

2) The scale of the hypsometric tints used on the chart shall be shown in the margin.

(i) Spot elevations

1) Spot elevations shall be shown at selected critical points. The elevations selected shall always be the highest in the immediate vicinity and shall generally indicate the top of a peak, ridge, etc. Elevations in valleys and at lake surface levels which are of navigational value shall be shown. The position of each selected elevation shall be indicated by a dot.

2) The elevation (in metres or feet) of the highest point on the chart and its

geographical position to the nearest five minutes shall be indicated in the margin.

3) The spot elevation of the highest point on any sheet should be cleared of hypsometric tinting.

(j) Incomplete or unreliable relief

1) Areas that have not been surveyed for contour information shall be labelled “Relief data incomplete”.

2) Charts on which spot elevations are generally unreliable shall bear a warning note prominently displayed on the face of the chart in the colour used for aeronautical information, as follows:

“Warning — The reliability of relief information on this chart is doubtful and elevations should be used with caution.”

(k) Escarpments

Escarpments should be shown when they are prominent landmarks or when cultural detail is very sparse.

(l) Wooded areas

1) Wooded areas should be shown.

Note.— On high latitude charts, the approximate extreme northern or southern limits of tree growth may be shown.

2) Where shown, the approximate northern or southern limits of tree growth shall be indicated by a dashed black line and shall be appropriately labelled.

(m) Date of topographic information

The date of latest information shown on the topographic base shall be indicated in the margin.

14.5.18.8 Magnetic variation

(a) Isogonic lines shall be shown.

(b) The date of the isogonic information shall be indicated in the margin.

14.5.18.9 Aeronautical data

(a) General

Aeronautical information shall be shown consistent with the use of the chart and the revision cycle.

(b) Aerodromes

1) Land and water aerodromes and heliports shall be shown with their names, to the extent that they do not produce undesirable congestion on the chart, priority being given to those of greatest aeronautical significance.

2) The aerodrome elevation, the lighting available, the type of runway surface and the length of the longest runway or channel, shown in abbreviated form for each aerodrome in conformity with the example given in Appendix 2, provided they do not cause undesirable clutter on the chart, shall be indicated.

3) Abandoned aerodromes which are still recognizable as aerodromes from the air shall be shown and identified as abandoned.

(c) Obstacles

1) Obstacles shall be shown.

Note.— Objects of a height of 100 m (300 ft) or more above ground are normally regarded as obstacles.

2) When considered of importance to visual flight, prominent transmission lines, permanent cable car installations and wind turbines, which are obstacles, shall be shown.

(d) Prohibited, restricted and danger areas

Prohibited, restricted and danger areas shall be shown.

(e) Air traffic services system

1) Significant elements of the air traffic services system including, where practicable, control zones, aerodrome traffic zones, control areas, flight information regions and other airspaces in which VFR flights operate shall be shown together with the appropriate class of airspace.

2) Where appropriate, the air defence identification zone (ADIZ) shall be shown and properly identified.

Note.— ADIZ procedures may be described in the chart legend.

(f) Radio navigation aids

Radio navigation aids shall be shown by the appropriate symbol and named, but excluding their frequencies, coded designators, times of operation and other characteristics unless any or all of this information which is shown is kept up to date by means of new editions of the chart.

(g) Supplementary information

1) Aeronautical ground lights together with their characteristics or their identifications or both shall be shown.

2) Marine lights on outer prominent coastal or isolated features of not less than 28 km (15 NM) visibility range shall be shown:

i. where they are not less distinguishable than more powerful marine lights in the vicinity;

ii. where they are readily distinguishable from other marine or other types of lights in the vicinity of built-up coastal areas;

iii. where they are the only lights of significance available.

14.5.19 AERONAUTICAL NAVIGATION CHART — ICAO SMALL SCALE

14.5.19.1 Function

(a) This chart shall:

1. serve as an air navigation aid for flight crews of long-range aircraft at high altitudes;

2. provide selective checkpoints over extensive ranges for identification at high altitudes and speeds, which are required for visual confirmation of position;

3. provide for continuous visual reference to the ground during long-range flights over areas lacking radio or other electronic navigation aids, or over areas where visual navigation is preferred or becomes necessary;

4. provide a general purpose chart series for long-range flight planning and plotting.

14.5.19.2 Availability

(a) The Service Provider may require to provide it only if, in the opinion of the Authority, the availability of these charts would contribute to the safety, regularity and efficiency of aircraft operations.

(b) The Aeronautical Navigation Chart — ICAO Small Scale should be made available in the manner prescribed in 14.5.2.6(b) for all areas delineated in Appendix 5.

Note.— The selection of this scale as an alternative to the World Aeronautical Chart — ICAO 1:1 000 000 is covered by 14.5.17.2(a) and 14.5.17.2(b).

14.5.19.3 Coverage and scale

(a) The Aeronautical Navigation Chart — ICAO Small Scale should provide, as a minimum, complete coverage of the major land masses of the world.

Note 1.— A sheet layout for this series is contained in the Aeronautical Chart Manual (Doc 8697).

Note 2.— The sheet size may represent the maximum press size available to the producing agency.

(b) The scale shall be in the range of 1:2 000 000 to 1:5 000 000.

(c) The scale of the chart shall be substituted in the title for the words “Small Scale”.

(d) Linear scales for kilometres and nautical miles arranged in the following order:

— kilometres,

— nautical miles,

with their zero points in the same vertical line shall be shown in the margin.

(e) The length of the linear scale should be not less than 200 mm (8 in).

(f) A conversion scale (metres/feet) shall be shown in the margin.

14.5.19.4 Format

(a) The title and marginal notes shall be in one of the working languages of ICAO.

Note.— The language of the publishing country or any other language may be used in addition to the ICAO working language.

(b) The information regarding the number of the adjoining sheets and the unit of measurement to express elevations shall be so located as to be clearly visible when the sheet is folded.

Note.— There is no internationally agreed sheet numbering.

14.5.19.5 Projection

(a)

(1) A conformal (orthomorphic) projection shall be used.

(2) The name and basic parameters of the projection shall be shown in the margin.

(b) Parallels shall be shown at intervals of 1°.

(1) Graduations on the parallels shall be shown at sufficiently close intervals compatible with the latitude and the scale of the chart.

(c) Meridians shall be shown at intervals compatible with the latitude and the scale of the chart.

(1) Graduations on the meridians shall be shown at intervals not exceeding 5′.

(d) The graduation marks shall extend away from the Greenwich Meridian and from the Equator.

(e) All meridians and parallels shown shall be numbered in the borders of the chart. In addition, when required, meridians and parallels shall be numbered within the body of the chart in such a manner that they can be readily identified when the chart is folded.

14.5.19.6 Culture and topography

(a) Built-up areas

1) Cities, towns and villages shall be selected and shown according to their relative importance to visual air navigation.

2) Cities and towns of sufficient size should be indicated by the outline of their built-up areas and not of their established city limits.

(b) Railroads

1) All railroads having landmark value shall be shown.

Note.— In congested areas, some railroads may be omitted in the interest of legibility.

2) Important tunnels should be shown.

Note.— A descriptive note may be added.

(c) Highways and roads

1) Road systems shall be shown in sufficient detail to indicate significant patterns from the air.

2) Roads should not be shown in built-up areas unless they can be distinguished from the air as definite landmarks.

(d) Landmarks

Natural and cultural landmarks, such as bridges, prominent transmission lines, permanent cable car installations, mine structures, forts, ruins, levees, pipelines, rocks, bluffs, cliffs, sand dunes, isolated lighthouses and lightships, when considered to be of importance for visual air navigation, should be shown.

Note.— Descriptive notes may be added.

(e) Political boundaries

International boundaries shall be shown. Undemarcated and undefined boundaries shall be distinguished by descriptive notes.

(f) Hydrography

1) All water features compatible with the scale of the chart comprising shore lines, lakes, rivers and streams (including those non-perennial in nature), salt lakes, glaciers and ice caps shall be shown.

2) The tint covering large open water areas should be kept very light.

Note.— A narrow band of darker tone may be used along the shore line to emphasize this feature.

3) Reefs and shoals, including rocky ledges, tidal flats, isolated rocks, sand, gravel, stone and all similar areas, should be shown by symbols when of significant landmark value.

(g) Contours

1) Contours shall be shown. The selection of intervals shall be governed by the requirement to depict clearly the relief features required in air navigation.

2) The values of the contours used shall be shown.

(h) Hypsometric tints

1) When hypsometric tints are used, the range of elevations for the tints shall be shown.

2) The scale of the hypsometric tints used on the chart shall be shown in the margin.

(i) Spot elevations

1) Spot elevations shall be shown at selected critical points. The elevations selected shall always be the highest in the immediate vicinity and shall generally indicate the top of a peak, ridge, etc. Elevations in valleys and at lake surface levels which are of value to visual air navigation shall be shown. The position of each selected elevation shall be indicated by a dot.

2) The elevation (in metres or feet) of the highest point on the chart and its geographical position to the nearest five minutes shall be indicated in the margin.

3) The spot elevation of the highest point in any sheet should be cleared of hypsometric tinting.

(j) Incomplete or unreliable relief

1) Areas that have not been surveyed for contour information shall be labelled "Relief data incomplete".

2) Charts on which spot elevations are generally unreliable shall bear a warning note prominently displayed on the face of the chart in the colour used for aeronautical information, as follows:

"Warning — The reliability of relief information on this chart is doubtful and elevations should be used with caution."

(k) Escarpments

Escarpments should be shown when they are prominent landmarks or when cultural detail is very sparse.

(l) Wooded areas

Wooded areas of large extent should be shown.

(m) Date of topographic information

The date of latest information shown on the topographic base shall be indicated in the margin.

(n) Colours

1) Subdued colours should be used for the chart background to facilitate plotting.

2) Good colour contrast should be ensured to emphasize features important to visual air navigation.

14.5.19.7 Magnetic variation

(a) Isogonic lines shall be shown.

(b) The date of isogonic information shall be indicated in the margin.

14.5.19.8 Aeronautical data

(a) Aerodromes

(1) Land and water aerodromes and heliports shall be shown with their names, to the extent that they do not produce undesirable congestion on the chart, priority being given to those of greatest aeronautical significance.

(b) Obstacles

Obstacles shall be shown.

(c) Prohibited, restricted and danger areas

Prohibited, restricted and danger areas should be shown when considered to be of importance to air navigation.

(d) Air traffic services system

1) Significant elements of the air traffic services system should be shown when considered to be of importance to air navigation.

2) Where appropriate, the air defence identification zone (ADIZ) should be shown and properly identified.

Note.— ADIZ procedures may be described in the chart legend.

(e) Radio navigation aids

Note.— Radio aids to navigation may be shown by the appropriate symbol and named.

14.5.20 PLOTTING CHART — ICAO

14.5.20.1 Function

This chart shall provide a means of maintaining a continuous flight record of the aircraft position by various fixing methods and dead reckoning in order to maintain an intended flight path.

14.5.20.2 Availability

(a) The Service Provider may require to provide it only if, in the opinion of the Authority, the availability of these charts would contribute to the safety, regularity and efficiency of aircraft operations.

(b) This chart shall be made available, in the manner prescribed in 14.5.2.6(b), to cover major air routes over oceanic areas and sparsely settled areas used by international civil aviation.

Note.— In areas where the Enroute Chart — ICAO is provided, there may be no requirement for a plotting chart.

14.5.20.3 Coverage and scale

(a) Where practicable, the chart for a particular region should cover major air routes and their terminals on a single sheet.

(b) The scale should be governed by the area to be covered.

Note.— Normally the scale will range from 1:3 000 000 to 1:7 500 000.

14.5.20.4 Format

The sheet shall be of a size that can be adapted for use on a navigator’s plotting table.

14.5.20.5 Projection

(a) A conformal projection on which a straight line approximates a great circle should be used.

(b) Parallels and meridians shall be shown.

1) The intervals should be arranged to permit accurate plotting to be carried out with a minimum of time and effort.

2) Graduation marks shall be shown at consistent intervals along an appropriate number of parallels and meridians. The interval selected shall, regardless of scale, minimize the amount of interpolation required for accurate plotting.

(c) Parallels and meridians should be numbered so that a number appears at least once every 15 cm (6 in) on the face of the chart.

(d) If a navigational grid is shown on charts covering the higher latitudes, it shall comprise lines parallel to the Meridian or anti-Meridian of Greenwich.

14.5.20.6 Identification

Each sheet shall be identified by chart series and number.

14.5.20.7 Culture and topography

(a) Generalized shore lines of all open water areas, large lakes and rivers shall be shown.

(b) Spot elevations for selected features constituting a hazard to air navigation shall be shown.

(c) Particularly hazardous or prominent relief features should be emphasized.

Note.— Large cities and towns may be shown.

14.5.20.8 Magnetic variation

(a) Isogonals or, in higher latitudes, isogrivs, or both, shall be shown at consistent intervals throughout the chart. The interval selected shall, regardless of scale, minimize the amount of interpolation required.

(b) The date of the isogonic information shall be shown.

14.5.20.9 Aeronautical data

(a) The following aeronautical data shall be shown:

1) aerodromes regularly used by international commercial air transport together with their names;

2) selected radio aids to navigation that will contribute to position-finding together with their names and identifications;

3) lattices of long-range electronic aids to navigation, as required;

4) boundaries of flight information regions, control areas and control zones necessary to the function of the chart;

5) designated reporting points necessary to the function of the chart;

6) ocean station vessels.

Note.— Other aeronautical data may be shown provided that they do not detract from the legibility of essential information.

(b) Aeronautical ground lights and marine lights useful for air navigation should be shown where other means of navigation are non-existent.

14.5.21 ELECTRONIC AERONAUTICAL CHART DISPLAY — ICAO

14.5.21.1 Function

The Electronic Aeronautical Chart Display — ICAO, with adequate back-up arrangements and in compliance with the requirements of Operations regulation for charts, shall enable flight crews to execute, in a convenient and timely manner, route planning, route monitoring and navigation by displaying required information.

14.5.21.2 Information available for display

(a) The Electronic Aeronautical Chart Display — ICAO shall be capable of displaying all aeronautical, cultural and topographic information required by 14.5.6 and 14.5.8 through 14.5.20.

(b) The Electronic Aeronautical Chart Display — ICAO should be capable of displaying all aeronautical, cultural and topographic information recommended by 14.5.6 and 14.5.8 through 14.5.20.

Note.— The Electronic Aeronautical Chart Display — ICAO may display supplementary information, in addition to that required for the equivalent paper chart, which may be considered useful for safe navigation.

14.5.21.3 Display requirements

(a) Display categories

1) Information available for display shall be subdivided into the following categories:

i. basic display information, permanently retained on the display and consisting of the minimum information essential for the safe conduct of flight; and

ii. other display information, which may be removed from the display or displayed individually on demand, and consisting of information not considered essential for the safe conduct of flight.

2) It shall be a simple function to add or remove other display information but shall not be possible to remove information contained in the basic display.

(b) Display mode and generation of neighbouring area

1) The Electronic Aeronautical Chart Display — ICAO shall be capable of continuously plotting the aircraft's position in a true motion mode where reset and generation of the surrounding area shall take place automatically.

Note.— Other modes, such as static chart displays, may be available.

2) It shall be possible manually to change the chart area and the position of the aircraft relative to the edge of the display.

(c) Scale

It shall be possible to vary the scale at which a chart is displayed.

(d) Symbols

Symbols used shall conform to those specified for electronic charts in Appendix 2

— ICAO Chart Symbols except where it is desired to show items for which no ICAO chart symbol is provided. In these cases, electronic chart symbols shall be chosen which:

1) employ a minimum use of lines, arcs and area fills;

2) do not cause confusion with any existing aeronautical chart symbol;

3) do not impair the legibility of the display.

Note.— Additional details for each symbol may be added according to the resolution of the output media, but any enhancements may not change the basic recognizability of the symbol.

(e) Display hardware

1) The effective size of the chart presentation shall be sufficient to display the information required by 14.5.21.2 without excessive scrolling.

2) The display shall have the capabilities required to accurately portray required elements of Appendix 2 — ICAO Chart Symbols.

3) The method of presentation shall ensure that the displayed information is clearly visible to the observer in the conditions of natural and artificial light experienced in the cockpit.

4) The display luminance shall be adjustable by the flight crew.

14.5.21.4 Provision and updating of data

(a) The provision and updating of data for use by the display shall be in conformance with the aeronautical data quality system requirements.

Note.— For aeronautical data quality system requirements, see 14.5.3, 14.5.3.17, and Part 14.4.

(b) The display shall be capable of automatically accepting authorized updates to existing data. A means of ensuring that authorized data and all relevant updates to that data have been correctly loaded into the display shall be provided.

(c) The display shall be capable of accepting updates to authorized data entered manually with simple means for verification prior to final acceptance of the data. Updates entered manually shall be distinguishable on the display from authorized data and its authorized updates and shall not affect display legibility.

(d) A record shall be kept of all updates, including date and time of application.

(e) The display shall allow the flight crew to display updates so that the flight crew may review the contents of the updates and determine that they have been included in the system.

14.5.21.5 Performance tests, malfunction alarms and indications

(a) A means shall be provided for carrying out on-board tests of major functions. In case of a failure, the test shall display information to indicate which part of the system is at fault.

(b) A suitable alarm or indication of system malfunction shall be provided.

14.5.21.6 Back-up arrangements

To ensure safe navigation in case of a failure of the Electronic Aeronautical Chart Display — ICAO, the provision of adequate back-up arrangements shall include:

(a) facilities enabling a safe takeover of display functions in order to ensure that a failure does not result in a critical situation; and

(b) a back-up arrangement facilitating the means for safe navigation of the remaining part of the flight.

Note.— A suitable back-up system may include the carriage of paper charts.

14.5.22 ATC SURVEILLANCE MINIMUM ALTITUDE CHART — ICAO

14.5.22.1 Function

(a) This supplementary chart shall provide information that will enable flight crews to monitor and cross-check altitudes assigned by a controller using an ATS surveillance system.

Note.— The objectives of the air traffic control service as prescribed in Part 14.1 do not include prevention of collision with terrain. The procedures prescribed in the Procedures for Air Navigation Services — Air Traffic Management (PANS-ATM, Doc 4444) do not relieve pilots of their responsibility to ensure that any clearances issued by air traffic control units are safe in this respect. When an IFR flight is vectored or is given a direct routing which takes the aircraft off an ATS route, the PANS-ATM, Chapter 8, 8.6.5.2, applies.

(b) A note indicating that the chart may only be used for cross-checking of altitudes assigned while the aircraft is identified shall be prominently displayed on the face of the chart.

14.5.22.2 Availability

(a) The Service Provider may require to provide it only if, in the opinion of the Authority, the availability of these charts would contribute to the safety, regularity and efficiency of aircraft operations.

(b) The ATC Surveillance Minimum Altitude Chart — ICAO should be made available, in the manner prescribed in 14.5.2.6(b), where vectoring procedures are established and minimum vectoring altitudes cannot be shown adequately on the Area Chart — ICAO, Standard Departure Chart — Instrument (SID) — ICAO or Standard Arrival Chart — Instrument (STAR) — ICAO.

14.5.22.3 Coverage and scale

(a) The coverage of the chart shall be sufficient to effectively show the information associated with vectoring procedures.

(b) The chart shall be drawn to scale.

(c) The chart should be drawn to the same scale as the associated Area Chart — ICAO.

14.5.22.4 Projection

(a) A conformal projection on which a straight line approximates a geodesic line should be used.

(b) Graduation marks should be placed at consistent intervals along the neat lines, as appropriate.

14.5.22.5 Identification

The chart shall be identified by the name of the aerodrome for which the vectoring procedures are established or, when procedures apply to more than one aerodrome, the name associated with the airspace portrayed.

Note.— The name may be that of the city which the aerodrome serves or, when the procedures apply to more than one aerodrome, that of the air traffic services centre or the largest city or town situated in the area covered by the chart.

14.5.22.6 Culture and topography

(a) Generalized shorelines of all open water areas, large lakes and rivers shall be shown except where they conflict with data more applicable to the function of the chart.

(b) Appropriate spot elevations and obstacles shall be shown.

Note.— Appropriate spot elevations and obstacles are those provided by the procedures specialist.

14.5.22.7 Magnetic variation

The average magnetic variation of the area covered by the chart shall be shown to the nearest degree.

14.5.22.8 Bearings, tracks and radials

(a) Bearings, tracks and radials shall be magnetic, except as provided for in 14.5.22.8(b).

(b) In areas of high latitude, where it is determined by the appropriate authority that reference to Magnetic North is impractical, another suitable reference, i.e. True North or Grid North, should be used.

(c) Where bearings, tracks or radials are given with reference to True North or Grid North, this shall be clearly indicated. When Grid North is used, its reference grid meridian shall be identified.

14.5.22.9 Aeronautical data

(a) Aerodromes

1) All aerodromes that affect the terminal routings shall be shown. Where

appropriate, a runway pattern symbol shall be used.

2) The elevation of the primary aerodrome to the nearest metre or foot shall be shown.

(b) Prohibited, restricted and danger areas

Prohibited, restricted and danger areas shall be depicted with their identification.

(c) Air traffic services system

1) The chart shall show components of the established air traffic services system including:

i. relevant radio navigation aids together with their identifications;

ii. lateral limits of relevant designated airspace;

iii. relevant significant points associated with standard instrument departure and arrival procedures;

Note.— Routes used in the vectoring of aircraft to and from the significant points may be shown.

iv. transition altitude, where established;

v. information associated with vectoring including:

A. minimum vectoring altitudes to the nearest higher 50 m or 100 ft, clearly identified;

B. lateral limits of minimum vectoring altitude sectors normally defined by bearings and radials to/from radio navigation aids to the nearest degree or, if not practicable, geographical coordinates in degrees, minutes and seconds and shown by heavy lines so as to clearly differentiate between established sectors;

Note.— In congested areas, geographical coordinates may be omitted in the interest of legibility.

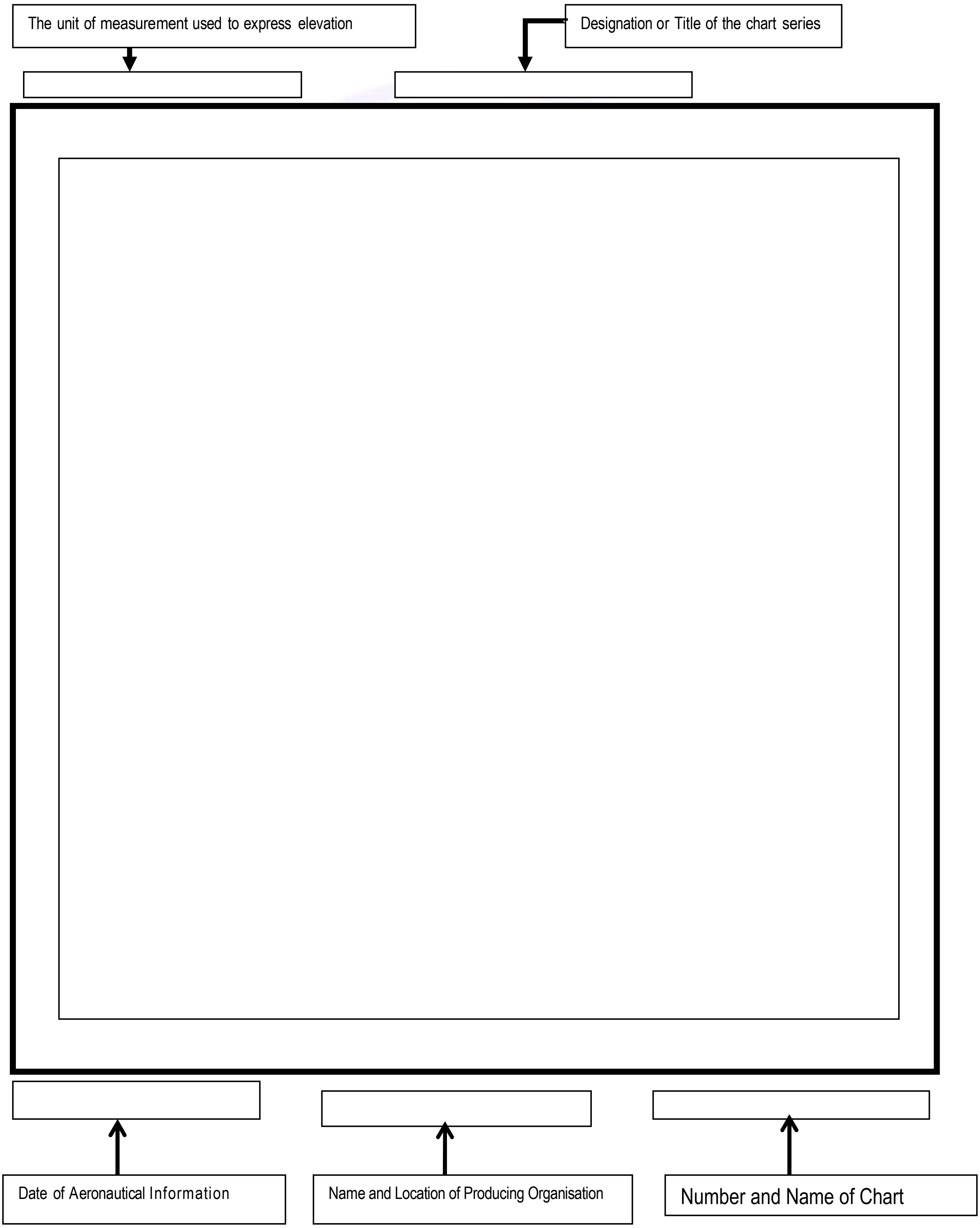
C. distance circles at 20-km or 10-NM intervals or, when practicable, 10-km or 5-NM intervals shown as fine dashed lines with the radius indicated on the circumference and centred on the identified aerodrome main VOR radio navigation aid or, if not available, on the aerodrome/heliport reference point;

D. notes concerning correction for low temperature effect, as applicable;

vi. communications procedures including call sign(s) and channel(s) of the ATC unit(s) concerned.

2) A textual description of relevant communication failure procedures shall be provided and shall , whenever feasible, be shown on the chart or on the same page that contains the chart.

APPENDIX 1 MARGINAL **NOTE LAYOUT**



APPENDIX 2. ICAO CHART SYMBOLS

1. CATEGORY INDEX

	Symbol No.
Shoals	41
Shore line (reliable)	19
Shore line (unreliable)	20
Small river (perennial)	24
Spring, well or water hole	37
Swamp	35
Tidal flats	21
Unusual water features appropriately labelled	46
Wash	40

CULTURE (47–83)

Built-up Areas (47–50)

Buildings	50
City or large town	47
Town	48
Village	49

Railroads (51–56)

Railroad (single track)	51
Railroad (two or more tracks)	52
Railroad (under construction)	53
Railroad bridge	54
Railroad station	56
Railroad tunnel	55

Highways and Roads (57–62)

Dual highway	57
Primary road	58
Road bridge	61
Road tunnel	62
Secondary road	59
Trail	60

Miscellaneous (63–83)

Boundaries (international)	63
Church	80
Coast guard station	73
Dam	67
Fence	65
Ferry	68
Forest ranger station	76
Fort	79
Lookout tower	74
Mine	75
Mosque	81
Nuclear power station	72
Oil or gas field	70
Outer boundaries	64
Pagoda	82

Symbol No.

Symbol No.

SYMBOLS FOR AERODROME OBSTACLE CHARTS — TYPE A, B AND C (162–170)

ADDITIONAL SYMBOLS FOR USE ON PAPER AND ELECTRONIC CHARTS (171–180)

2. ALPHABETICAL INDEX

Symbol No.

A

B

Symbol No.

C

D

Symbol No.

E

F

G

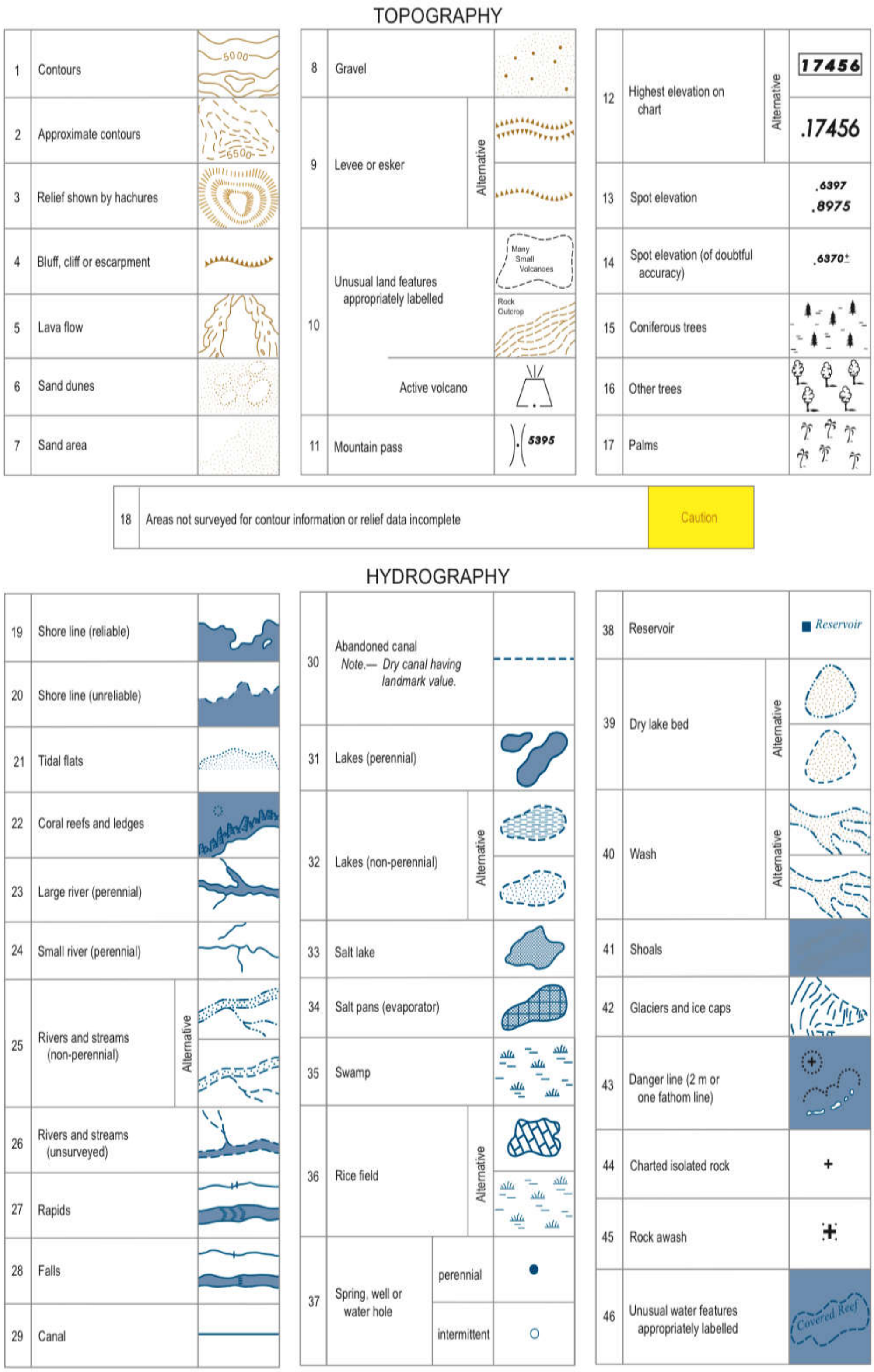
H

I

Symbol No.

P

R


TOPOGRAPHY
1 Contours
5000
2 Approximate contours
6500
3 Relief shown by hachures
4 Bluff, cliff or escarpment
5 Lava flow
6 Sand dunes
7 Sand area
8 Gravel
9 Levee or esker
Alternative
10 Unusual land features appropriately labelled
Many Small Volcanoes
Rock Outcrop
Active volcano
11 Mountain pass
5395
12 Highest elevation on chart
Alternative
17456
.17456
13 Spot elevation
.6397
.8975
14 Spot elevation (of doubtful accuracy)
.6370±
15 Coniferous trees
16 Other trees
17 Palms
18 Areas not surveyed for contour information or relief data incomplete
Caution
HYDROGRAPHY
19 Shore line (reliable)
20 Shore line (unreliable)
21 Tidal flats
22 Coral reefs and ledges
23 Large river (perennial)
24 Small river (perennial)
25 Rivers and streams (non-perennial)
Alternative
26 Rivers and streams (unsurveyed)
27 Rapids
28 Falls
29 Canal
30 Abandoned canal
Note.— Dry canal having landmark value.
31 Lakes (perennial)
32 Lakes (non-perennial)
Alternative
33 Salt lake
34 Salt pans (evaporator)
35 Swamp
36 Rice field
Alternative
37 Spring, well or water hole
perennial
intermittent
38 Reservoir
Reservoir
39 Dry lake bed
Alternative
40 Wash
Alternative
41 Shoals
42 Glaciers and ice caps
43 Danger line (2 m or one fathom line)
44 Charted isolated rock
45 Rock awash
46 Unusual water features appropriately labelled
Covered Reef

CULTURE

BUILT-UP AREAS

47	City or large town	
48	Town	
49	Village	
50	Buildings	

RAILROADS

51	Railroad (single track)	
52	Railroad (two or more tracks)	
53	Railroad (under construction)	
54	Railroad bridge	
55	Railroad tunnel	
56	Railroad station	

HIGHWAYS AND ROADS

57	Dual highway	
58	Primary road	
59	Secondary road	
60	Trail	
61	Road bridge	
62	Road tunnel	

MISCELLANEOUS

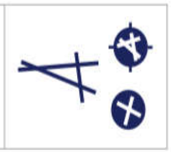
63	Boundaries (international)	
64	Outer boundaries	
65	Fence	
66	Telegraph or telephone line (when a landmark)	
67	Dam	
68	Ferry	

MISCELLANEOUS (Cont.)

69	Pipeline	Pipeline
70	Oil or gas field	
71	Tank farms	
72	Nuclear power station	
73	Coast guard station	
74	Lookout tower	
75	Mine	
76	Forest ranger station	
77	Race track or stadium	
78	Ruins	
79	Fort	
80	Church	
81	Mosque	
82	Pagoda	
83	Temple	

AERODROMES

84	Civil	Land	
85	Civil	Water	
86	Military	Land	
87	Military	Water	
88	Joint civil and military	Land	
89	Joint civil and military	Water	
90	Emergency aerodrome or aerodrome with no facilities		
91	Abandoned or closed aerodrome		
92	Sheltered anchorage		
93	Aerodrome for use on charts on which aerodrome classification is not required e.g. Enroute Charts		
94	Heliport *Note.— Aerodrome for the exclusive use of helicopters*		

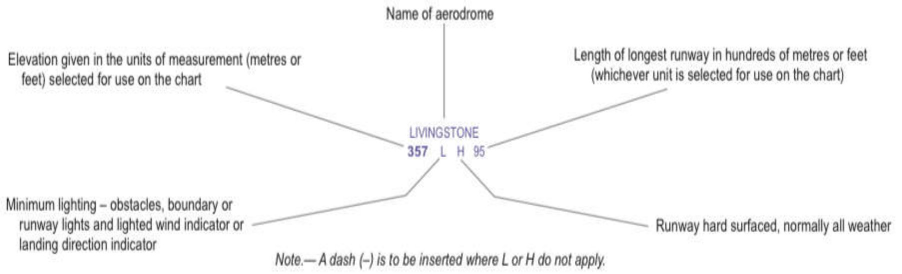
95	*Note.— Where required by the function of the chart, the runway pattern of the aerodrome may be shown in lieu of the aerodrome symbol, for example:*	

AERODROMES *(Cont.)*

AERODROME DATA IN ABBREVIATED FORM WHICH MAY BE IN ASSOCIATION WITH AERODROME SYMBOLS

(Reference: 16.9.2.2 and 17.9.2.2)

96



Note.— A dash (–) is to be inserted where L or H do not apply.

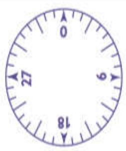
AERODROME SYMBOLS FOR APPROACH CHARTS

97	Aerodromes affecting the traffic pattern on the aerodrome on which the procedure is based	
98	The aerodrome on which the procedure is based	

RADIO NAVIGATION AIDS*

99	Basic radio navigation aid symbol *Note.— This symbol may be used with or without a box to enclose the data.*		
100	Non-directional radio beacon	NDB	
101	VHF omnidirectional radio range	VOR	
102	Distance measuring equipment	DME	
103	Collocated VOR and DME radio navigation aids	VOR/DME	
104	DME distance	Distance in kilometres (nautical miles) to DME Identification of radio navigation aid	15 km KAV
105	VOR radial	Radial bearing from, and identification of, VOR	R 090 KAV
106	UHF tactical air navigation aid	TACAN	
107	Collocated VOR and TACAN radio navigation aids	VORTAC	
108	Instrument landing system	ILS	PLAN VIEW (B, Y) Electronic: FRONT COURSE, BACK COURSE PROFILE Electronic: GLIDE PATH
109	Radio marker beacon	Elliptical Bone Shape	
	Note.— Marker beacon may be shown by outline, or stipple, or both.		

110 Compass rose
To be orientated on the chart in accordance with the alignment of the station (normally Magnetic North)



Compass rose to be used as appropriate in combination with the following symbols:

VOR	
VOR/DME	
TACAN	
VORTAC	

Note.— Additional points of compass may be added as required.

**Note.— Guidance material on the presentation of radio navigation aid data is given in the* Aeronautical Chart Manual *(Doc 8697).*

AIR TRAFFIC SERVICES

111	Flight information region	FIR		
112	Aerodrome traffic zone	ATZ		
113	Control area Airway Controlled route	CTA AWY	Alternative	
114	Uncontrolled route			
115	Advisory airspace	ADA		
116	Control zone	CTR		

117	Air defence identification zone	ADIZ		ADIZ
118	Advisory route	ADR	Alternative	
119	Visual flight path	compulsory with radio communication requirement		R
		compulsory, without radio communication requirement		R
		recommended		
120	Scale-break (on ATS route)		Alternative	

Significant Point Functionality

		Significant point depiction for conventional navigation		Significant point depiction for area navigation			
	REPORTING FLY-BY/FLY-OVER	On request (NA)	Compulsory (NA)	On request fly-by	Compulsory fly-by	On request flyover	Compulsory flyover
121 Basic Symbols with functionality	VFR reporting point						
	Intersection INT						
	VORTAC						
	TACAN						
	VOR						
	VOR/DME						
	NDB						
	Waypoint WPT	Not used	Not used				

For details on use and meaning of these symbols, refer to paragraph 2.4

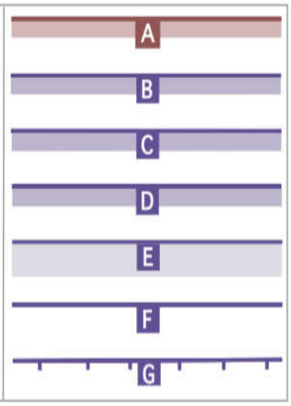
122	Change-over point — To be superimposed on the appropriate route symbol at right angles to the route	COP	26 36	
123	ATS/MET reporting point	MRP	Compulsory	
			On request	
124	Final approach fix	FAF		

AIR TRAFFIC SERVICES *(cont.)*

125	Procedure altitudes/flight levels	Altitude/flight level "window"	17 000 / 10 000 FL 220 / 10 000
		"At or above" altitude/flight level	7 000 FL 070
		"At or below" altitude/flight level	5 000 FL 050
		"At" altitude/flight level	3 000 FL 030
		"Recommended" altitude/flight level	5 000 FL 050
		"Expected" altitude/flight level	Expect 5 000 Expect FL 050

AIRSPACE CLASSIFICATIONS

126 Airspace classifications



Aeronautical data in abbreviated form to be used in association with airspace classification symbols:

127		TMA DONLON 119.1 C 200m AGL - FL 245 Type / Name or call sign / Radio frequency(ies) / Airspace classification / Vertical limits
	Alternative	TMA DONLON C FL 245 / 200m AGL 119.1

AIRSPACE RESTRICTIONS

128	Restricted airspace (prohibited, restricted or danger area)		Common boundary of two areas	
	Note.— The angle and density of rulings may be varied according to scale and the size, shape and orientation of the area.			
129	International boundary closed to passage of aircraft except through air corridor			

OBSTACLES

130	Obstacle	
131	Lighted obstacle	
132	Group obstacles	
133	Lighted group obstacles	

134	Exceptionally high obstacle (optional symbol)	
135	Exceptionally high obstacle – lighted (optional symbol) *Note.— For obstacles having a height of the order of 300 m (1 000 ft) above terrain.*	
136	Elevation of top (italics) *52* (15) Height above specified datum (upright type in parentheses)	

MISCELLANEOUS

137	Prominent transmission line	
138	Isogonic line or isogonal	3° E
139	Ocean station vessel (normal position)	
140	Wind turbine – unlighted and lighted	
141	Wind turbines – minor group and group in major area, lighted	

VISUAL AIDS

142	Marine light *Note 2.— Characteristics are to be indicated as follows:*	F	*Note 1.— Marine alternating lights are red and white unless otherwise indicated. Marine lights are white unless colours are stated.*

Alt	Alternating	Occ	Occulting
B	Blue	R	Red
F	Fixed	SEC	Sector
Fl	Flashing	sec	Second
G	Green	(U)	Unwatched
Gp	Group	W	White

143	Aeronautical ground light		Electronic
144	Lightship		

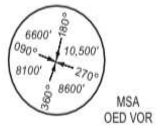
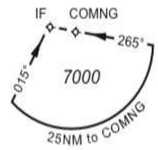
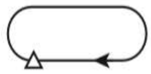
SYMBOLS FOR AERODROME/HELIPORT CHARTS

145	Hard surface runway	
146	Pierced steel plank or steel mesh runway	
147	Unpaved runway	
148	Stopway SWY	
149	Taxiways and parking areas	
150	Helicopter alighting area on an aerodrome	H
151	Aerodrome reference point ARP	
152	VOR check-point	
153	Runway visual range (RVR) observation site	
154	Point light	
155	Obstacle light	
156	Landing direction indicator (lighted)	
157	Landing direction indicator (unlighted)	
158	Stop bar	
159	Runway-holding position *Note.— For application, see Annex 14, Volume I, 5.2.10.*	Pattern A Pattern B
160	Intermediate holding position *Note.— For application, see Annex 14, Volume I, 5.2.11.*	
161	Hot spot *Note.— Hot spot location to be circled.*	

SYMBOLS FOR AERODROME OBSTACLE CHARTS - TYPE A, B AND C

		Plan	Profile
162	Tree or shrub		Identification number
163	Pole, tower, spire, antenna, etc.		
164	Building or large structure		
165	Railroad		
166	Transmission line or overhead cable	—T—T—	
167	Terrain penetrating obstacle plane		
168	Escarpment		
169	Stopway SWY		
170	Clearway CWY		

ADDITIONAL SYMBOLS FOR USE ON PAPER AND ELECTRONIC CHARTS

PLAN VIEW			Electronic
171	Minimum sector altitude *Note.— This symbol may be modified to reflect particular sector shapes.*	MSA	
172	Terminal arrival altitude *Note.— This symbol may be modified to reflect particular TAA shapes.*	TAA	
173	Holding pattern		
174	Missed approach track		
PROFILE			
175	Runway		
176	Radio navigation aid (type of aid and its use in the procedure to be annotated on top of the symbol)		
177	Radio marker beacon (type of beacon to be annotated on top of the symbol)		
178	Collocated radio navigation aid and marker beacon (type of aid to be annotated on top of the symbol)		
179	DME fix (distance from DME and the fix use in the procedure to be annotated on top of the symbol)		
180	Collocated DME fix and marker beacon (distance from DME and the type of beacon to be annotated on top of the symbol)		

APPENDIX 3 COLOUR GUIDE

CHART SYMBOLS

Culture, except highways and roads; outlines of large cities, grids and graticules; spot elevations; danger lines and off-shore rocks; names and lettering except for aeronautical and hydrographic features		BLACK
Built-up areas of cities		BLACK Stipple
Highways and roads	Optional colours	BLACK Half-tone
		RED
Built-up areas for cities (alternative to black stipple)		YELLOW
Contours and topographic features: Items 1 through 10 of Appendix 2 Hydrographic features: Items 39 through 41 of Appendix 2		BROWN
Shore lines, drainage, rivers, lakes, bathymetric contours and other hydrographic features including their names or description		BLUE
Open water areas		BLUE Half-tone
Salt lakes and salt pans		BLUE Stipple
Large non-perennial rivers and non-perennial lakes		BLUE Stipple
Aeronautical data, except for Enroute and Area Charts — ICAO, where different colours may be required. Both contours may be used on the same sheet but, where only one colour is used, dark blue is preferred	Optional colours	MAGENTA
		DARK BLUE

CHART SYMBOLS *(Cont.)*

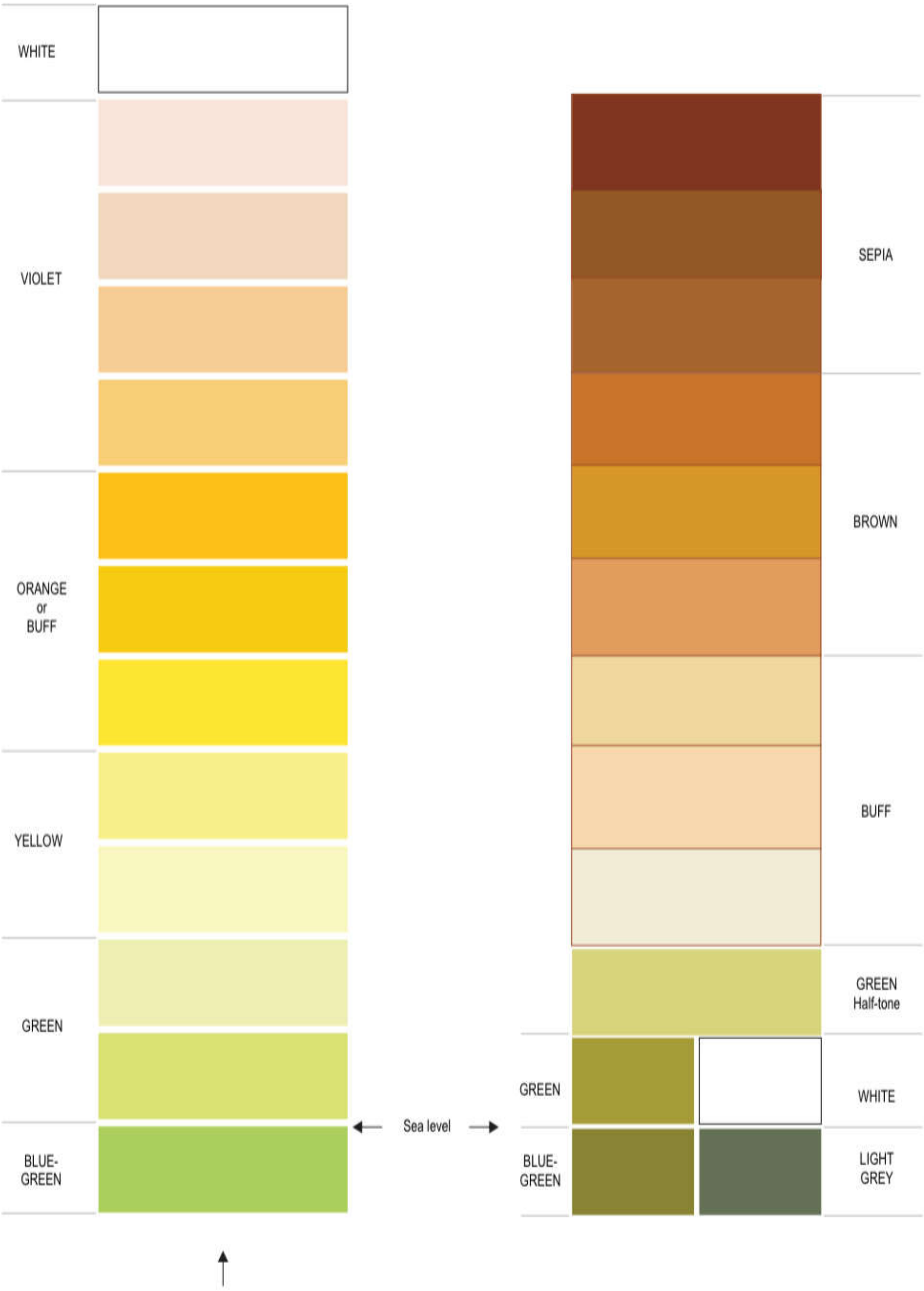
Woods		GREEN
Areas which have not been surveyed for contour information or relief data are incomplete	Optional colours	GOLDEN BUFF WHITE

HYPSOMETRIC TINTS

WHITE VIOLET	Tint for extreme elevations		SEPIA
ORANGE or BUFF	Tint for higher range elevations		BROWN
YELLOW	Tint for middle range elevations		BUFF
GREEN	Tint for lower range elevations	Optional colours	GREEN WHITE
BLUE-GREEN	Tint for areas below sea level	Optional colours	BLUE-GREEN LIGHT GREY

Note.— Basic tints are identical to those specified for the International Map of the World.

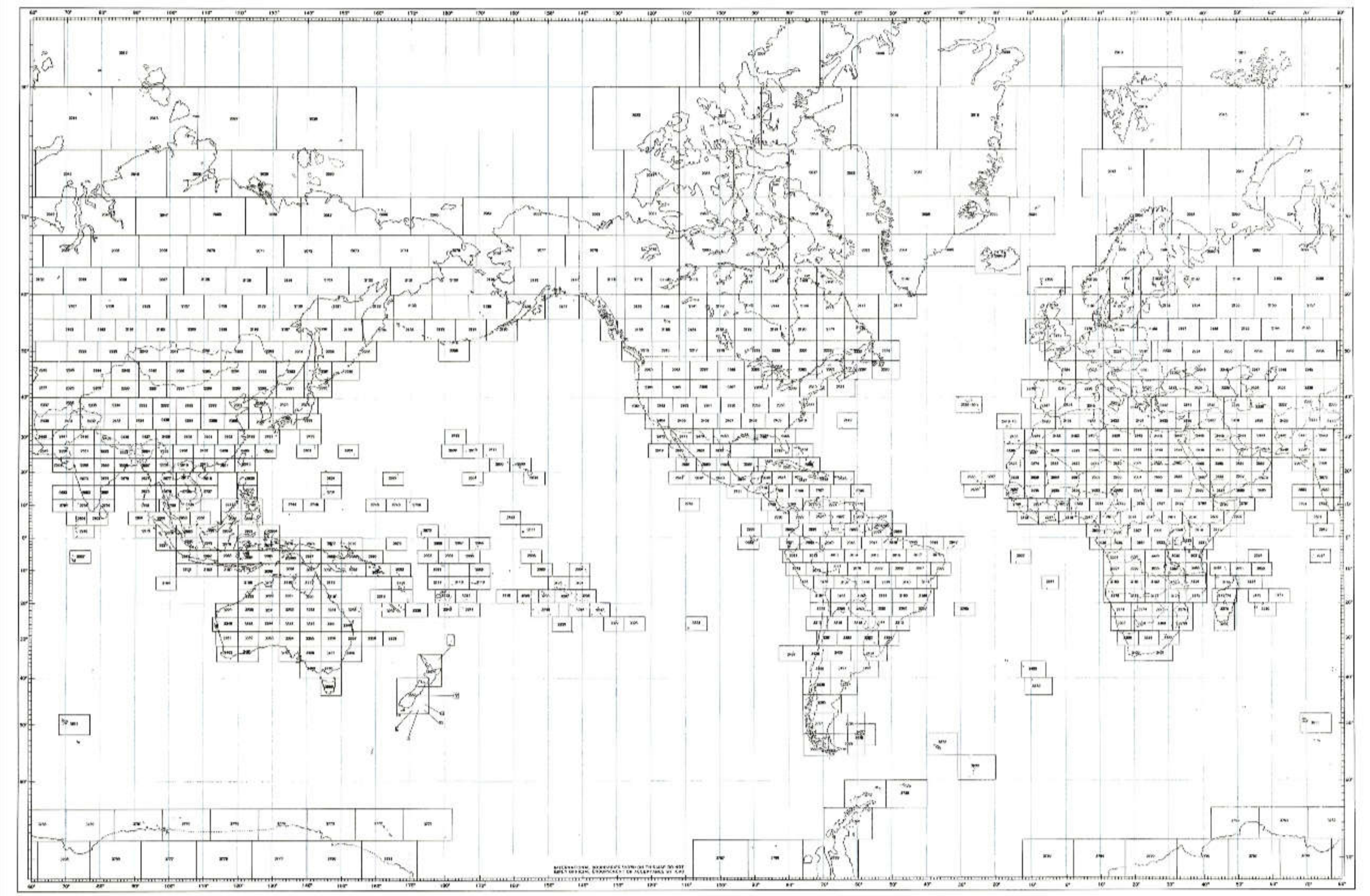
APPENDIX 4. HYPSOMETRIC TINT GUIDE



Note 1.— These tints are identical to those specified for the International Map of the World.

Note 2.— Elevations have not been associated with tints of either system in order to allow for flexibility in their selection.

APPENDIX 5. SHEET LAYOUT FOR THE WORLD AERONAUTICAL CHART – ICAO 1:1 000 000



PART 14: AIR NAVIGATION SERVICES

SUB-PART: 14.6 AIR TRAFFIC MANAGEMENT

AERONAUTICAL METEOROLOGICAL SERVICES (AMS)

14.6.0 GENERAL PROVISION OF AMS

a) No aeronautical meteorological information service shall be provided at aerodromes or portion of airspace in Nigeria, except as specified under these Regulations,

b) An aeronautical meteorological services provider shall prepare and submit to the Authority for approval, its Manual of Operations detailing:

1. policy and procedures for determining the capacity of the aeronautical meteorological services to be provided, the number of personnel required and their responsibilities to ensure the provision of adequate services;
2. the types of services to be provided;
3. type and the location from which the services shall be provided;
4. the hours during which each aeronautical meteorological service is proposed to be available.
5. training and checking of staff and how that information is tracked;
6. quality management system;
7. safety management system;
8. contingency plans developed for part or total system failure for which the organisation provides a service;
9. security measures;
10. facilities and equipment and how those facilities are maintained;
11. fault and defect reporting;
12. maintenance of documents and records;
13. procedures for reporting of facilities and equipment inadequacies to the Authority;
14. procedures for decommissioning of equipment or facilities;
15. procedures for carrying out factory acceptance and site
16. acceptance tests for new equipment or facility;
17. procedures for regular safety reviews of its operations and systems by its appropriately designated personnel;

18. procedures for release of meteorological information to aeronautical search and rescue unit; and
19. any other information requested by the Authority

c) The aeronautical meteorological services provider's Manual of Operations shall carry a written statement (compliance statement) describing the arrangements the provider has made to comply with the requirements of these Regulations.

d) The Aeronautical meteorological services provider shall prepare the Local Standards Operation Procedures (LSOP) applicable to the services that are provided at each location of the aeronautical meteorological service provider.

e) Aeronautical meteorological services provider shall make available at least one complete and current copy of its Manual of Operations and Local Standards Operation Procedures (LSOP) at each aeronautical meteorological service station specified in its Manual of Operations;

f) Aeronautical meteorological services provider shall comply with all procedures detailed in its Manual of Operations;

g) Aeronautical meteorological services provider shall comply with relevant safety directives issued by the Authority;

h) Aeronautical meteorological services provider shall make each applicable part of the Manual of Operations available to the personnel who require those parts to carry out their duties;

i) Aeronautical meteorological services provider shall continue to comply with the provisions in these Regulations;

j) The Aeronautical Meteorological Services Provider may deviate from the standards in time of an emergency, or other circumstances that may make the deviation necessary in the interest of safety;

k) The provider shall report, the deviation to the Authority immediately stating how long the deviation is expected to last.

l) A provider of aeronautical meteorological services shall permit the Authority to carry out such safety audit and inspection as may be necessary to determine compliance with the appropriate requirements prescribed in this Part and for post-implementation monitoring to verify that the defined level of safety continues to be met.

14.6.1.1 GENERAL REQUEST FOR THE PROVISION OF AERONAUTICAL METEOROLOGICAL SERVICES

(a) The Authority shall grant an AMSP certificate for the provision of meteorological service that meet the needs of international air navigation over international waters and other areas In accordance with the provisions of Part

14.6 and where applicable, with due regard to regional air navigation agreement.

(b) The requirements of the certificate shall be as prescribed in these Regulations.

(c) The details of the Aeronautical Meteorological Services Provider shall be published in the AIP, AIP SUP, NOTAM and AIRAC as appropriate.

(d) A holder of an aeronautical meteorological service provider certificate shall ensure that the meteorological information and data necessary for the safe, regular and efficient operation of air navigation are accurate, timely and coded correctly in the form suitable for the operational requirements of operators, flight crew members, air traffic services units, search and rescue services units, airport managements and others concerned with the conduct or development of international air navigation.

(e) The AMSP shall comply with the requirements of the World Meteorological Organization (WMO) in respect of qualifications and training of meteorological personnel providing service for international air navigation.

Note.— Requirements concerning the qualifications, competencies, education and training of meteorological personnel in aeronautical meteorology are given in the Technical Regulations (WMO-No. 49), Volume I — General Meteorological Standards and Recommended Practices, Part V — Qualifications and Competencies of Personnel Involved in the Provision of Meteorological (Weather and Climate) and Hydrological Services, Part VI — Education and Training of Meteorological Personnel, and Appendix A — Basic Instruction Packages.

14.6.1.2 Objective, determination and provision of meteorological service

a) The objective of meteorological service for international air navigation shall be to contribute towards the safety, regularity and efficiency of international air navigation.

b) The objective shall be achieved by supplying the following users: operators, flight crew members, air traffic services units, search and rescue services units, airport managements and others concerned with the conduct or development of international air navigation, with the meteorological information necessary for the performance of their respective functions.

c) Meteorological service shall be provided to meet the needs of international air navigation in accordance with the provisions of Nig. CARs Part 14.6 and regional air navigation agreements; it shall include the determination of the meteorological service to be provided for international air navigation over international waters and other areas which lie outside the territory of Nigeria.

d) The Nigerian Meteorological Agency is designated as the aeronautical meteorological service provider (AMSP) to provide or to arrange for the provision of meteorological service for international air navigation in Nigeria. Details of the Nigerian Meteorological Agency are included in the Nigeria Aeronautical Information Publication (AIP), in accordance with Annex 15, Chapter 5.

Note. — Detailed specifications concerning presentation and contents of the aeronautical information publication is provided in the Procedures for Air Navigation Services — Aeronautical Information Management (PANS-AIM, Doc 10066), Appendix 2.

e) The AMSP shall comply with the requirements of the World Meteorological Organization (WMO) in respect of qualifications, competencies, education and training of meteorological personnel providing service for international air navigation.

Note. — Requirements concerning the qualifications, competencies, education and training of meteorological personnel in aeronautical meteorology are given in the Technical Regulations (WMO-No. 49), Volume I — General Meteorological Standards and Recommended Practices, Part V — Qualifications and Competencies of Personnel Involved in the Provision of Meteorological (Weather and Climate) and Hydrological Services, Part VI — Education and Training of Meteorological Personnel, and Appendix A — Basic Instruction Packages.

14.6.1.3 Supply, use, quality management and interpretation of meteorological information

a) The AMSP shall maintained a close liaison with those concerned with the use of meteorological information on matters which affects the provision of meteorological service for international air navigation.

b) The AMSP shall establish and implement a properly organized quality system comprising procedures, processes and resources necessary to provide for the quality management of the meteorological information to be supplied to the users listed in 14.6.1.2 b)

c) The quality system established in accordance with 14.6.3 (b)by the AMSP shall be in conformity with the International Organization for Standardization (ISO) 9000 series of quality assurance standards and shall be certified by an approved organization

Note. — The ISO 9000 series of quality assurance standards provide a basic framework for the development of a quality assurance programme. The details of a successful programme are to be formulated by Nigeria and in most cases are unique to the Nigerian Civil Aviation Authority. Guidance on the establishment and implementation of a quality management system is given in Guide to the implementation of Quality Management Systems National Meteorological and Hydrological Services and other Relevant Service Providers (WMO-No.1100).

d) The AMSP quality system shall provide the users with assurance that the meteorological information supplied complies with the stated requirements in terms of the geographical and spatial coverage, format and content, time and frequency of issuance and period of validity, as well as the accuracy of measurements, observations and forecasts. When the quality system indicates that meteorological information to be supplied to the users does not comply with the stated requirements, and automatic error correction procedures are not appropriate, such information shall not be supplied to the users unless it is validated with the originator.

Note. — Requirements concerning the geographical and spatial coverage, format and content, time and frequency of issuance and period of validity of meteorological information to be supplied to aeronautical users are given in Chapters 3, 4, 6, 7, 8, 9 and 10 and Appendices 2, 3,5, 6, 7, 8 and 9 of this Manual and the relevant regional air navigation plans. Guidance concerning the accuracy of measurement and observation, and accuracy of forecasts is given in Attachments A and B, respectively, to Annex 3.

e) In regard to the exchange of meteorological information for operational purposes, the AMSP quality system shall include verification and validation procedures and resources for monitoring adherence to the prescribed transmission schedules for individual messages and/or bulletins required to be exchanged, and the times of their filing for transmission. The quality system shall be capable of detecting excessive transit times of messages and bulletins received.

Note. — Requirements concerning the exchange of operational meteorological information are given in Chapter 11 and Appendix 10 of Annex 3

f) Demonstration of compliance of the quality system applied by the AMSP shall be by audit. If nonconformity of the system is identified, the AMSP shall initiate action to determine and correct the cause. All audit observations shall be evidenced and properly documented.

g) The AMSP shall implement a Quality Management System (QMS) in line with ISO 9001 series of quality assurance standards. The implementation shall be in accordance with the guidance on the establishment and implementation of a quality management systems as given in the Manual on the Quality Management System for the Provision of Meteorological Service for International Air Navigation (ICAO-Doc 9873) and Guide to the Implementation of Quality Management Systems for National Meteorological and Hydrological Services and Other Relevant Service Providers (WMO-No. 1100).

h) The AMSP quality management system shall be certified by an approved organization in order to provide the user with assurance that the meteorological information supplied complies with the stated requirements in terms of the geographical and spatial coverage, format and content, time and frequency of issuance and period of validity, the accuracy of measurement, observation and forecasts.

i) The QMS documentation requirements shall include:

1) documented statements of policy and objectives;

2) relevant procedures, processes and resources necessary to provide for the quality management of the meteorological information to be supplied to users;

3) verification and validation procedures and resources for monitoring adherence to standards;

4) documents and records as needed to ensure effective planning, operation and control of processes.

j) The AMSP shall determine, collect and analyze appropriate data to demonstrate the suitability and effectiveness of its QMS.

k) The AMSP shall keep under review its QMS and take such corrective action as it is necessary to ensure continuous improvement in the effectiveness of the QMS.

l) The compliance of the quality system applied by the AMSP shall be demonstrated by internal and external audit including that of the Authority.

m) If nonconformity of the system is identified, action shall be initiated by the AMSP to determine and correct the cause.

n) Audit observations shall be evidenced and properly documented by the AMSP.

Note – Guidance on the establishment and implementation of quality management systems is given in the Guide to the Implementation of Quality Management Systems for National Meteorological and Hydrological Services and Other Relevant Service Providers (WMO-No. 1100).

o) Owing to the variability of meteorological elements in space and time, to limitations of observing techniques and to limitations caused by the definitions of some of the elements, the specific value of any of the elements given by the AMSP in a report shall be understood by the recipient to be the best approximation of the actual conditions at the time of observation as given in the guidance on the operationally desirable accuracy of measurement or observation in Attachment A to Annex 3

Note. — Guidance on the operationally desirable accuracy of measurement or observation is given in Attachment A.

p) Owing to the variability of meteorological elements in space and time, to limitations of forecasting techniques and to limitations caused by the definitions of some of the elements, the specific value of any of the elements given by the AMSP in a forecast shall be understood by the recipient to be the most probable value which the element is likely to assume during the period of the forecast. Similarly, when the time of occurrence or change of an element is given by the AMSP in a forecast, this time shall be understood as the most probable time as prescribed in ICAO-Attachment B.

Note. — Guidance on the operationally desirable accuracy of forecasts is given in Attachment B

q) The meteorological information supplied to the users listed in 14.6.1.2 b) shall be consistent with Human Factor principles and shall be in forms which require a minimum of interpretation by these users, as prescribed in the Human Factors Training Manual (Doc. 9683).

Note. — Guidance material on the application of Human Factors principles can be found in the Human Factors Training Manual (Doc 9683).

r) The quality management system shall be adequate enough to ensure proper maintenance and timely calibration of equipment and facilities, efficent and accurate provision of meteorological services, forecast verification system, staff suggestion and stake holders feed back.

14.6.1.4 Grant of Certificate to Aeronautical Meteorological Services Provider (AMSP) and supply of meteorological information

a) The Authority shall grant an Aeronautical Meteorological Service Provider certificate for the supply of the following services in support of international air navigation:

1. routine meteorological observations at fixed intervals;

2. special weather observations whenever specified changes occur in respect of surface wind, visibility, runway visual range, present weather, cloud and air temperature ;

3. weather forecasts and other relevant information for Aerodromes, Flight Information Regions, routes and flights with which it is concerned;

4. flight crew briefing, consultation and flight documentation to flight crew members and other flight operations personnel;

5. continuous survey of meteorological conditions over the Aerodromes, Flight Information Regions, routes and flights with which it is designated to prepare forecasts;

6. weather watch and monitoring, including the ability to detect and forecast hazards relevant to the aviation community;

7. forecast and warning products to the standards required by the user community;

8. record of aeronautical climatological information in the form of aerodrome climatological tables and summaries required for the planning of flight operations, investigation or operational analysis for supply, on request, to aeronautical users;

9. exchange of meteorological information with other meteorological offices;

10. tailor meteorological products and services to civil aviation operations, in accordance with these Regulations;

11. supply information received concerning the accidental release of radioactive materials into the atmosphere within the Nigerian airspace to the ATS providers, AIS Provider and other meteorological watch offices for dissemination;

12. issue SIGMET information phenomena which may affect the safety of aircraft operations, and the development of those phenomena in time and space within its airspace to the ATS providers, AIS Provider and other meteorological watch offices.

13. issue SIGMET messages concerning volcanic ash cloud, tropical cyclones and space weather information which shall be based on advisory information provided by Volcanic Ash Advisory Centers, Tropical Cyclone Advisory Centers, and Space Weather Centers respectively, designated by regional air navigation agreement;

14. issue wind shear warnings for aerodromes where wind shear is considered a factor;

15. at aerodromes where wind shear is detected by automated ground based, wind shear remote-sensing or detection equipment;

    i) wind shear alerts generated by these systems shall be issued.

    ii) the wind shear alerts shall give concise, up-to-date information related to the observed existence of wind shear involving a headwind /tailwind change of 7.5m/s (15 kt) or more which could adversely affect aircraft on the final approach path or initial take-off path and aircraft on the runway during the landing roll or take-off run.

    iii) Wind sensors for local meteorological reports shall be appropriately sited to give the best practicable indication of conditions along the runway/touchdown zone.

    iv) the provision in air traffic services units of wind displays shall be related to the same integrated automatic systems as that of the aeronautical meteorological service provider;

    v) the calibration and maintenance programme of these wind displays/instruments shall be complied with;

    vi) the use to be made of these wind displays/instruments by air traffic services personnel shall be agreed upon between the AMSP and ATS unit;

    v) the provision of supplementary visual observations for meteorological phenomena of operational significance in the climb-out and approach areas made by air traffic services personnel shall be used to update or supplement the information supplied by the meteorological observer.

vi) action shall be taken in respect of meteorological information obtained from aircraft taking off or landing.

vii) consideration shall be given to the implementation of the required criteria/procedures regarding meteorological information/data for the establishment of aerodrome operating minima.

16. issue aerodrome warnings and any other hazardous weather events on meteorological conditions which could adversely affect aircraft on the ground, including parked aircraft, and the aerodrome facilities and services;
17. supply runway visual range on all runways intended for Category II and III instrument approach and landing operations;
18. supply AIRMET information when taking into account the density of air traffic operating below flight level 100;
19. supply up-to-date meteorological information to relevant Aeronautical Information Services (AIS) units, as necessary for the conduct of their functions;
20. ensure that when forecasts are identified as being originated by the WAFCs, no modifications shall be made to their meteorological content.
21. keep the records of all regular internal inspections for a period of at least one year from the date of each inspection.

b) The AMSP shall provide meteorological service that meet the needs of international air navigation over international waters and other areas which lie outside Nigeria airspace in accordance with the provisions of this Part and where applicable, with due regard to regional air navigation agreement.

c) The AMSP shall ensure that the meteorological information and data necessary for the safe, regular and efficient operation of air navigation are accurate, timely and coded correctly in the form suitable for the operational requirements of operators, flight crew members, air traffic services units, search and rescue services units, airport managements and others concerned with the conduct or development of international air navigation as specified in ICAO Annex 3, Part II – Appendices and Attachments.

d) The details of the AMSP shall be published in The AIP, AIPSUP, NOTAM and AIRAC as appropriate.

14.6.1.5 Notifications Required from Operators

a) An AMSP certificate holder shall establish procedures to enable operator requiring meteorological service or changes in existing meteorological service to notify, sufficiently in advance, the aerodrome meteorological office concerned. The operator requiring meteorological service or changes in existing meteorological service shall notify, sufficiently in advance, the aerodrome meteorological office. The minimum amount of advance notice required shall be as agreed between the aerodrome meteorological office and the operator concerned.

b) The aerodrome meteorological office shall be notified by the operator requiring service when:

1. New routes or new types of operations are planned;

2. Changes of a lasting character are to be made in scheduled operations; and

3. Other changes, affecting the provision of meteorological service, are planned.

c) The information in (b) shall contain all details necessary for the planning of appropriate arrangements by the AMSP.

d) The operator or a flight crew member shall ensure that, where required, the aerodrome meteorological office in consultation with users, is notified:

1. of flight schedules;

2. when non-scheduled flights are to be operated;

3. when flights are delayed, advanced or cancelled.

e) The notification to the aerodrome meteorological office of individual flights shall contain the following information except that, in the case of scheduled flights, the requirement for some or all of this information may be waived by agreement between aerodrome meteorological office and the operator concerned:

1. aerodrome of departure and estimated time of departure;

2. destination and estimated time of arrival;

3. route to be flown and estimated times of arrival at, and departure from, any intermediate aerodrome(s)

4. alternate aerodromes needed to complete the operational flight plan and taken from the relevant list contained in the regional air navigation plan;

5. cruising level;

6. type of flight, whether under visual or instrument flight rules;

7. type of meteorological information requested for a flight crew member, whether flight documentation and/or briefing or consultation; and

8. time(s) at which briefing, consultation and/or flight documentation are required.

14.6.2 Meteorological Offices

14.6.2.1 Aerodrome Meteorological Offices

a) The AMSP certificate holder shall establish one or more aerodrome and /or other meteorological offices which shall be adequate for the provision of the meteorological service required to satisfy the needs of international air navigation.

b) For an aerodrome without an aerodrome meteorological office located at the aerodrome, the AMSP certificate holder shall designate one or more of its aerodrome meteorological office(s) to supply meteorological information as required.

c) An AMSP shall establish means by which such information can be supplied to the aerodromes concerned.

d) An aerodrome meteorological office shall carry out all or some of the following functions as necessary to meet the needs of flight operations at the aerodrome:

   1) prepare and/or obtain forecasts and other relevant information for flights with which it is concerned; the extent of its responsibilities to prepare forecasts shall be related to the local availability and use of en-route and aerodrome forecast material received from other offices;

   2) prepare and/or obtain forecasts of local meteorological conditions;

   3) maintain a continuous survey of meteorological conditions over the aerodromes for which it is designated to prepare forecasts;

   4) provide briefing, consultation and flight documentation to flight crew members and/or other flight operations personnel;

   5) supply other meteorological information to aeronautical users;

   6) display the available meteorological information;

   7) exchange meteorological information with other aerodrome meteorological offices; and

   8) supply information received on pre-eruption volcanic activity, a volcanic eruption or volcanic ash cloud, to its associated air traffic services unit, aeronautical information service unit and meteorological watch offices (MWO) as agreed between the AMSP and ATS Provider.

e) The aerodromes for which landing forecasts are required shall be determined by regional air navigation agreement.

14.6.2.2 METEOROLOGICAL WATCH OFFICES (MWO)

a) In accordance with regional air navigation agreement, a MWO is established in Kano for providing air traffic services within the flight information region (FIR) of Nigeria.

Note. — Guidance on the bilateral or multilateral arrangements between Contracting States for the provision of MWO services, including for cooperation and delegation, can be found in the Manual of Aeronautical Meteorological Practice (Doc 8896).

b) The MWO shall:

1) Maintain continuous watch over meteorological conditions affecting flight operations within its area of responsibility;

2) prepare SIGMET and other information relating to its area of responsibility;

3) supply SIGMET information and, as required, other meteorological information to associated air traffic services units;

4) disseminate SIGMET information;

5) when required by regional air navigation agreement, in accordance with

i) prepare AIRMET information relating to its area of responsibility;

ii) supply AIRMET information to associated air traffic services units; and

iii) disseminate AIRMET information;

c) supply information received on pre-eruption volcanic activity, a volcanic eruption and volcanic ash cloud for which a SIGMET has not already been issued, to its associated area control centre (ACC)/flight information centre (FIC), as agreed between the meteorological and ATS authorities concerned, and to its associated VAAC as determined by regional air navigation agreement; and

d) supply information received concerning the release of radioactive materials into the atmosphere, in the area for which it maintains watch or adjacent areas, to its associated ACC/FIC, as agreed between the AMSP and ATS Provider and to aeronautical information service units, as agreed between the AMSP and the Authority. The information shall comprise location, date and time of the release, and forecast trajectories of the radioactive materials.

Note. — The information is provided by RSMCs for the provision of transport model products for radiological environmental emergency response, at the request of the delegated authority of the State in which the radioactive material was released into the atmosphere, or the International Atomic Energy Agency (IAEA). The information is sent by the RSMC to a single contact point of the AMSP. This contact point has the responsibility of redistributing the RSMC products within the State concerned. Furthermore, the information is provided by IAEA to RSMC co-located with VAAC London (designated as the focal point) which in turn notifies the ACCs/FICs concerned about the release.

e) The boundaries of the area over which meteorological watch is to be maintained by the MWO is coincident with the boundaries of Kano FIR.

i) The AMSP shall coordinate SIGMET with neighbouring MWO(s), especially when the en- route weather phenomenon extends or is expected to extend beyond the MWO's specified area of responsibility, in order to ensure the provision of harmonized SIGMET.

Note — Guidance on the bilateral or multilateral coordination between MWOs of Contracting States for the provision of SIGMET can be found in the Manual of Aeronautical Meteorological Practice (Doc 8896).

14.6.3 AERONAUTICAL METEOROLOGICAL OBSERVATIONS AND REPORTS

14.6.3.1 AERONAUTICAL METEOROLOGICAL STATIONS AND OBSERVATIONS

Note. – Technical specifications and detailed criteria related to this chapter are given in, Appendix 3 of Annex 3

a) The AMSP shall establish such aeronautical meteorological stations as it determines to be necessary at Nigeria aerodromes. The aeronautical meteorological station may be a separate station or may be combined with a synoptic station.

Note. – Aeronautical meteorological stations may include sensors installed outside the aerodrome, where considered justified, by the AMSP to ensure the compliance of meteorological service for international air navigation with the provisions of this Part 14.6

b) The AMSP shall establish, or arrange for the establishment of, aeronautical meteorological stations on offshore structures or at other points of significance in support of helicopter operations to offshore structures, if required by regional air navigation agreement.

c) Aeronautical meteorological stations shall make routine observations at fixed intervals. At aerodromes, the routine observations shall be supplemented by special observations whenever specified changes occur in respect of surface wind, visibility, runway visual range, present weather, clouds and/or air temperature.

d) The aeronautical meteorological stations shall be inspected by the Authority at sufficiently frequent intervals to ensure that a high standard of observation is maintained, that instruments and all their indicators are functioning correctly, and that the exposure of the instruments has not changed significantly.

Note. – Guidance on the inspection of aeronautical meteorological stations including the frequency of inspections is given in the Manual on Automatic Meteorological Observing Systems at Aerodromes (Doc 9837).

e) At aerodromes with runways intended for Category II and III instrument approach and landing operations, automated equipment for measuring or assessing, as appropriate, and for monitoring and remote indicating of surface wind, visibility, runway visual range, height of cloud base, air and dew-point temperatures and atmospheric pressure shall be installed by the AMSP to support approach, landing and take-off operations. These devices shall be integrated automatic systems for acquisition, processing, dissemination and display in real time of the meteorological parameters affecting landing and take-off operations. The design of integrated automatic systems shall observe Human Factors principles and include back-up procedures.

Note 1. – Categories of precision approach and landing operations are defined in Annex 6, Part 1

Note 2. – Guidance material on the application of Human Factors principles can be found in the Human Factors Training Manual (Doc 9683).

f) At aerodromes with runways intended for Category I instrument approach and landing operations, automated equipment for measuring or assessing, as appropriate, and for monitoring and remote indicating of surface wind, visibility, runway visual range, height of cloud base, air and dew-point temperatures and atmospheric pressure shall be installed by the AMSP to support approach and landing and take-off operations. These devices shall be integrated automatic systems for acquisition, processing, dissemination and display in real time of the meteorological parameters affecting landing and take-off operations. The design of integrated automatic systems shall observe Human Factors principles and include back-up procedures.

g) Where an integrated semi-automatic system is used for the dissemination/display of meteorological information, it shall be capable of accepting the manual insertion of data covering those meteorological elements which cannot be observed by automatic means.

h) The observations shall form the basis for the preparation of reports to be disseminated at the aerodrome of origin and of reports to be disseminated beyond the aerodrome of origin.

14.6.3.2 Agreement between AMSP and ATS Provider

a) An agreement between the AMSP and ATS Provider shall be established to cover, among other things:

1. the provision in air traffic services units of displays related to integrated automatic systems;

2. the calibration and maintenance of these displays/instruments;

3. the use to be made of these displays/instruments by air traffic services personnel;

4. as and where necessary, supplementary visual observations (for example, of meteorological phenomena of operational significance in the climb-out and approach areas) if and when made by air traffic services personnel to update or supplement the information supplied by the meteorological station;

5. meteorological information obtained from aircraft taking off or landing (for example, on wind shear); and

6. if available, meteorological information obtained from ground weather radar.

Note. — Guidance on the subject of coordination between ATS and aeronautical meteorological services is contained in the Manual on Coordination between Air Traffic Services, Aeronautical Information Services and Aeronautical Meteorological Services (Doc 9377).

14.6.3.3 Routine Observations and Reports

a) At aerodromes, routine observations shall be made throughout the 24 hours each day, unless otherwise agreed between the AMSP and ATS Provider, and the operator concerned. Such observations shall be made at intervals of one hour or, if so determined by regional air navigation agreement, at intervals of half - hour. At other aeronautical meteorological stations, such observations shall be made as determined by the AMSP taking into account the requirements of air traffic services units and aircraft operations.

b) Reports of routine observations shall be issued as;

i) local routine reports, only for dissemination at the aerodrome of origin (intended for arriving and departing aircraft); and

ii) METAR for dissemination beyond the aerodrome of origin (mainly intended for flight planning, VOLMET broadcasts and D-VOLMET).

Note. – Meteorological information used in ATIS (voice-ATIS and D-

ATIS) is to be extracted from the local routine report, in accordance with Annex 11, 4.3.6.1 g).

c) At aerodromes that are not operational throughout 24 hours, METAR shall be issued prior to the aerodrome resuming operations in accordance with regional air navigation agreements.

14.6.3.4 Special Observations and Reports

a) A list of criteria for special observations shall be established by the AMSP in consultation with the ATS Provider, operators and others concerned.

b) Reports of special observations shall be issued as:

i) Local special reports, only for dissemination at the aerodrome of origin (intended for arriving and departing aircraft); and

ii) SPECI for dissemination beyond the aerodrome of origin (mainly intended for flight planning, VOLMET broadcasts and D-VOLMET) unless METAR are issued at half- hourly intervals.

Note. – Meteorological information used in ATIS (voice-ATIS and D-ATIS) is to be extracted from the local special report, in accordance with Annex 11, 4.3.6.1 g).

c) At aerodromes that are not operational throughout 24 hours, METAR shall be issued prior to the aerodrome resuming operation in accordance with regional air navigation agreement.

d) SPECI shall be issued as necessary.

14.6.3.5 Contents of Meteorological Reports

a) Local routine reports, local special reports, METAR and SPECI shall contain the following elements in the order indicated:

1. identification of the type of report;

2. location indicator;

3. time of the observation;

4. identification of an automated or missing report, when applicable;

5. surface wind direction and speed;

6. visibility;

7. runway visual range, when applicable;

8. present weather;

9. cloud amount, cloud type (only for cumulonimbus and towering cumulus

clouds) and height of cloud base or, where measured, vertical visibility;

10. air temperature and dew-point temperature; and

11. QNH and, when applicable, QFE (QFE included only in local routine and special reports).

Note. – The location indicators referred to under 14.6.3.5(a)(2) and their significations are published in Location Indicators (Doc 7910).

i) In addition to elements listed under 14.6.3.5 (a) (1 – 11), local routine reports, local special reports, METAR and SPECI shall contain supplementary information to be placed after element 11).

ii) Optional elements included under supplementary information shall be included in METAR and SPECI in accordance with regional air navigation agreement.

14.6.3.6 Observing and Reporting Meteorological Elements

a) Surface wind

1) The mean direction and the mean speed of the surface wind shall be measured, as well as significant variations of the wind direction and speed, and reported in degrees true and metres per second (or knots), respectively.

2) When local routine and special reports are used for departing aircraft, the surface wind observations for these reports shall be representative of conditions along the runway; when local routine and special reports are used for arriving aircraft, the surface wind observations for these reports shall be representative of the touchdown zone.

3) For METAR and SPECI, the surface wind observations shall be representative of conditions above the whole runway where there is only one runway and the whole runway complex where there is more than one runway.

4) When Surface wind displays relating to each sensor shall be located in the meteorological station with corresponding displays in the appropriate air traffic services units. The displays in the meteorological station and in the air traffic services units shall relate to the same sensors, and where separate sensors are required, the displays shall be clearly marked to identify the runway and section of runway monitored by each sensor.

b) Visibility

1) The visibility as defined in 14.6.0 (82) shall be measured or observed by human observers and or automated observing equipment with provision for the manual insertion whenever conditions warrant it and shall be reported in metres or kilometres.

Note. – Guidance on the conversion of instrument readings into visibility is given in Attachment D.

2) When local routine and special reports are used for departing aircraft, the visibility observations for these reports shall be representative of

conditions along the runway; when local routine and special reports are used for arriving aircraft, the visibility observations for these reports shall be representative of the touchdown zone of the runway.

3) For METAR and SPECI, the visibility observations shall be representative of the aerodrome.

c) Runway visual range

Note. – Guidance on the subject of runway visual range is contained in the Manual of Runway Visual Range Observing and Reporting Practices (Doc 9328).

1) Runway visual range as defined in 14.6.0 (71) shall be assessed on all runways intended for Category II and III instrument approach and landing operations by human observer and/or automated equipment whenever condition warrant it.

2) Runway visual range as defined in 14.6.0 (71) shall be assessed on all runways intended for use during periods of reduced visibility, including:

i) precision approach runways intended for Category I instrument approach and landing operations; and

ii) runways used for take-off and having high-intensity edge lights and/or centre line lights.

Note. — Precision approach runways are defined in Annex 14, Volume I, Chapter 1, under "Instrument runway".

3) Runway visual range shall be reported in metres throughout periods when either the visibility or the runway visual range is less than 1500m.

4) Runway visual range assessments shall be representative of:

i) the touchdown zone of the runway intended for non-precision or Category I instrument approach and landing operations;

ii) the touchdown zone and the mid-point of the runway intended for Category II instrument approach and landing operations; and

iii) the touchdown zone the mid-point and stop-end of the runway intended for Category III instrument approach and landing operations.

5) The units providing air traffic service and aeronautical information service for an aerodrome shall be kept informed without delay of changes in the serviceability status of the automated equipment used for assessing runway visual range.

d) Present weather

1. The present weather occurring at the aerodrome shall be observed and reported as necessary. The following present weather phenomena shall be identified, as a minimum: rain, drizzle, snow and freezing precipitation (including intensity thereof), haze, mist, fog, freezing fog and thunderstorms (including thunderstorms in the vicinity).

2. For local routine and special reports, the present weather information shall be representative of conditions at the aerodrome.

3. For METAR and SPECI, the present weather information shall be representative of conditions at the aerodrome and, for certain specified present weather phenomena, in its vicinity.

e) Clouds

1. Cloud amount, cloud type and height of cloud base shall be observed and reported as necessary to describe the clouds of operational significance. When the sky is obscured, vertical visibility shall be observed and reported, where measured, in lieu of cloud amount, cloud type and height of cloud base. The height of cloud base and vertical visibility shall be reported in metres (or feet).

2. Cloud observations for local routine and special reports shall be representative of the runway threshold(s) in use.

3. Cloud observations for METAR and SPECI shall be representative of the aerodrome and its vicinity

f) Air temperature and dew-point temperature

1. The air temperature and the dew-point temperature shall be measured and reported in degree Celsius.

2. Observations of air temperature and dew-point temperature for local routine reports, and local special reports, METAR and SPECI shall be representative of the whole runway complex.

g) Atmospheric pressure

The atmospheric pressure shall be measured, and QNH and QFE values shall be computed and reported in hectoPascals.

h) Supplementary information

Observations made at aerodromes shall include the available supplementary information concerning significant meteorological conditions, particularly those in the approach and climb-out areas. Where practicable, the information shall identify the location of the meteorological condition.

14.6.3.7 Reporting Meteorological Information from Automatic Observing Systems

a) METAR and SPECI from automatic observing systems shall be used by AMSP during non-operational hours of the aerodrome, and during operational hours of the aerodrome in consultation with users based on the availability and efficient use of personnel.

Note. — Guidance on the use of automatic meteorological observing systems is given in Doc 9837.

b) Local routine and special reports from automatic observing systems shall be used by AMSP during operational hours of the aerodrome in consultation with users based on the availability and efficient use of personnel.

c) Local routine reports, local special reports, METAR and SPECI from automatic observing systems shall be identified with the word "AUTO".

14.6.3.8 Observations and Reports of Volcanic Activity

a) The occurrence of pre-eruption volcanic activity, volcanic eruptions and volcanic ash cloud shall be reported without delay to the associated air traffic services unit, aeronautical information services unit and meteorological watch office. The report shall be made in the form of a volcanic activity report comprising the following information in the order indicated:

1. message type, volcanic activity report;

2. station identifier, location indicator or name of station;

3. date/time of message;

4. location of volcano and name if known; and

5. concise description of event including, as appropriate, level of intensity of volcanic activity, occurrence of an eruption and its date and time, and the existence of a volcanic ash cloud in the area together with direction of ash cloud movement and height.

Note. — Pre-eruption volcanic activity in this context means unusual and/or increasing volcanic activity which could presage a volcanic eruption.

14.6.4 AIRCRAFT OBSERVATIONS AND REPORTS

Note. – Technical specifications and detailed criteria related to this chapter are given in Appendix 4.

14.6.4.1 Obligations of States

The AMSP shall arrange, according to the provisions of this regulation, for observations to be made by aircraft of Nigeria registry operating on international air routes and for the recording and reporting of these observations.

14.6.4.2 Types of Aircraft Observations

a) The following aircraft observations shall be made:

1. routine aircraft observations during en-route and climb-out phases of the flight; and

2. special and other non-routine aircraft observations during any phase of the flight.

14.6.4.3 Routine Aircraft Observations – Designation

a) When air-ground data link is used and automatic dependent surveillance - (ADS-C) or secondary surveillance radar (SSR) Mode S is being applied, automated routine observations shall be made every 15 minutes during the en-route phase and every 30 seconds during the climb-out phase for the first 10 minutes of the flight.

b) For helicopter operations to and from aerodromes on offshore structures, routine Observations shall be made from helicopters at points and times as agreed between the AMSP and the helicopter operators concerned.

c) In the case of air routes with high-density air traffic (e.g. organized tracks), an aircraft from among the aircraft operating at each flight level shall be designated, at approximately hourly intervals, to make routine observations in accordance with 14.6.4.3(a). The designation procedures shall be in accordance with regional air navigation agreement.

d) In the case of the requirement to report during the climb-out phase, an aircraft shall be designated, at approximately hourly intervals, at each aerodrome to make routine observations in accordance with 14.6.4.3 (a)

14.6.4.4 Routine Aircraft Observations – Exemptions

Aircraft not equipped with air-ground data link shall be exempted from making routine aircraft observations.

14.6.4.5 Special Aircraft Observations

a) Special observations shall be made by all aircraft whenever the following conditions are encountered or observed:

1. moderate or severe turbulence, or

2. moderate or severe icing; or

3. severe mountain wave; or

4. thunderstorms, without hail, that are obscured, embedded, widespread or in squall lines; or

5. thunderstorms, with hail, that are obscured, embedded, widespread or in squall lines; or

6. heavy duststorm or heavy sandstorm; or

7. volcanic ash cloud; or

8. pre-eruption volcanic activity or a volcanic eruption.

Note. – Pre-eruption volcanic activity in this context means unusual and/or increasing volcanic activity which could presage a volcanic eruption.

14.6.4.6 Other Non-Routine Aircraft Observations

When other meteorological conditions not listed under 14.6.4.5, e.g. wind shear, are encountered and which, in the opinion of the pilot-in-command, may affect the safety or markedly affect the efficiency of other aircraft operations, the pilot-in-command shall advise the appropriate air traffic services unit as soon as practicable.

Note. – Icing, turbulence and, to a large extent, wind shear are elements which, for the time being, cannot be satisfactorily observed from the ground and for which in most cases aircraft observations represent the only available evidence.

14.6.4.7 Reporting of Aircraft Observations During Flight

a) Aircraft observations shall be reported by air-ground data link. Where air-ground data link is not available or appropriate, special and other non-routine aircraft observations during flight shall be reported by voice communications.

b) Aircraft observations shall be reported during flight at the time the observation is made or as soon thereafter as is practicable.

c) Aircraft observations shall be reported as air-reports.

14.6.4.8 Relay of Air-Reports by ATS Units

a) The AMSP shall make arrangements with the ATS Provider to ensure that, on receipt by the ATS units of:

1. special air-reports by voice communications, the ATS units relay them without delay to their associated meteorological watch office; and

2. routine and special air-reports by data link communications, the ATS units relay them without delay to their associated meteorological watch office, and the WAFCs and the centres designated by regional air navigation agreement for the operation of aeronautical fixed service Internet-based services.

14.6.4.9 Recordings and Post-Flight Reporting of Aircraft Observations of Volcanic Activity

Special aircraft observations of pre-eruption volcanic activity, a volcanic eruption or volcanic ash cloud shall be recorded on the special air-report of volcanic activity form. A copy of the form shall be included with the flight documentation provided to flights operating on routes which, in the opinion of the AMSP, could be affected by volcanic ash clouds.

14.6.5 AEROMET FORECASTS

Note. – Technical specifications and detailed criteria related to this chapter are given in Appendix 5

14.6.5.1 Use of Forecasts

The issue of a new forecast by an aerodrome meteorological office, such as a routine aerodrome forecast, shall be understood to cancel automatically any forecast of the same type previously issued for the same place and for the same period of validity or part thereof.

14.6.5.2 Aerodrome Forecasts

a) An aerodrome forecast shall be prepared, in accordance with regional air navigation agreement, by the aerodrome meteorological office designated by the AMSP.

   Note. – The aerodromes for which aerodrome forecasts are to be prepared and the period of validity of these forecasts are listed in the relevant facilities and services implementation document (FASID).

b) An aerodrome forecast shall be issued at a specified time not earlier than one hour prior to the beginning of its validity period and consist of a concise statement of the expected meteorological conditions at an aerodrome for a specified period.

c) Aerodrome forecasts and amendments thereto shall be issued as TAF and include the following information in the order indicated:

   1. identification of the type of forecast;

   2. location indicator;

3. time of issue of forecast;

4. identification of a missing forecast, when applicable;

5. date and period of validity of forecast;

6. identification of a cancelled forecast, when applicable

7. surface wind;

8. visibility;

9. weather;

10. cloud; and

11. expected significant changes to one or more of these elements during the period of validity.

Optional elements shall be included in TAF in accordance with regional air navigation agreement.

Note. – The visibility included in TAF refers to the forecast prevailing visibility.

d) Aerodrome meteorological offices preparing TAF shall keep the forecasts under continuous review and, when necessary, shall issue amendments promptly. The length of the forecast messages and the number of changes indicated in the forecast shall be kept to a minimum.

Note. – Guidance on methods to keep TAF under continuous review is given in Chapter 3 of the Manual of Aeronautical Meteorological Practice (Doc 8896).

e) TAF that cannot be kept under continuous review shall be cancelled.

1. The period of validity of a routine TAF shall be not less than 6 hours nor more than 30 hours; the period of validity shall be determined by regional air navigation agreement. Routine TAF valid for less than 12 hours shall be issued every 3 hours and those valid for 12 to 30 hours shall be issued every 6 hours.

2. When issuing TAF, aerodrome meteorological offices shall ensure that not more than one TAF is valid at an aerodrome at any given time.

14.6.5.3 Landing Forecasts

a) A landing forecast shall be prepared by the aerodrome meteorological office designated by the AMSP as determined by regional air navigation agreement; such forecasts are intended to meet the requirements of local users and of aircraft within about one hour's flying time from the aerodrome.

b) Landing forecasts shall be prepared in the form of a trend forecast.

c) A trend forecast shall consist of a concise statement of the expected significant changes in the meteorological conditions at that aerodrome to be appended to a local routine report or local special report, METAR or SPECI. The period of validity of a trend forecast shall be 2 hours from the time of the report which forms part of the landing forecast.

14.6.5.4 Forecasts for Take-Off

a) A forecast for take-off shall be prepared by the aerodrome meteorological office designated by the AMSP as agreed with the operators concerned.

b) A forecast for take-off shall refer to a specified period of time and shall contain information on expected conditions over the runway complex in regard to surface wind direction and speed and any variations thereof, temperature, pressure (QNH), and any other elements as agreed locally.

c) A forecast for take-off shall be supplied to operators and flight crew members on request within the 3 hours before the expected time of departure.

d) Aerodrome meteorological offices preparing forecasts for take-off shall keep the forecasts under continuous review and, when necessary, shall issue amendments promptly.

14.6.5.5 Area Forecasts for Low-Level Flights

a) When the density of traffic operating below flight level 100 (or up to flight level 150 in mountainous areas, or higher, where necessary) warrants the routine issue and dissemination of area forecasts for such operations, the frequency of issue, the form and the fixed time or period of validity of those forecasts and the criteria for amendments thereto shall be determined by the AMSP in consultation with the users.

b) When the density of traffic operating below flight level 100 warrants the issuance of AIRMET information in accordance with 14.6.6.2, area forecasts for such operations shall be prepared in a format as agreed between the Authority and the AMSP. When abbreviated plain language is used, the forecast shall be prepared as a GAMET area forecast, employing approved ICAO abbreviations and numerical values; when chart form is used, the forecast shall be prepared as a combination of forecasts of upper wind and upper-air temperature, and of SIGWX phenomena. The area forecasts shall be issued to cover the layer between the ground and flight level 100 (or up to flight level 150 in mountainous area, or higher, where necessary) and shall contain information on en-route weather phenomena hazardous to low-level flights, in support of the issuance of AIRMET information, and additional information required by low-level flights.

c) Area forecasts for low-level flights prepared in support of the issuance of AIRMET information shall be issued every 6 hours for a period of validity of 6 hours and transmitted to meteorological watch offices and/or aerodrome meteorological offices concerned not later than one hour prior to the beginning of their validity period.

14.6.6 SIGMET AND AIRMET INFORMATION, AERODROME WARNINGS AND WIND SHEAR WARNINGS AND ALERTS

Note. – Technical specifications and detailed criteria related to this chapter are given in Appendix 6.

14.6.6.1 SIGMET Information

a) SIGMET information shall be issued by a meteorological watch office and shall give a concise description in abbreviated plain language concerning the occurrence or expected occurrence of specified en-route weather and other phenomena, that may affect the safety of aircraft operations, and of the development of those phenomena in time and space.

b) SIGMET information shall be cancelled when the phenomena are no longer occurring or are no longer expected to occur in the area.

c) The period of validity of a SIGMET message shall be not more than 4 hours. In the special case of SIGMET messages for volcanic ash cloud and tropical cyclones, the period of validity shall be extended up to 6 hours.

d) SIGMET messages concerning volcanic ash cloud and tropical cyclones shall be based on advisory information provided by VAACs and TCACs, respectively, designated by regional air navigation agreement

e) Close coordination shall be maintained between the meteorological watch office and the associated area control centre/flight information centre to ensure that information on volcanic ash included in SIGMET and NOTAM messages is consistent.

f) SIGMET messages shall be issued not more than 4 hours before the commencement of the period of validity. In the special case of SIGMET messages for volcanic ash cloud and tropical cyclones, these messages shall be issued as soon as practicable but not more than 12 hours before the commencement of the period of validity. SIGMET messages for volcanic ash and tropical cyclones shall be updated at least every 6 hours.

14.6.6.2 AIRMET Information

a) AIRMET information shall be issued by a meteorological watch office in accordance with regional air navigation agreement, taking into account the density of air traffic operating below flight level 100. AIRMET information shall give a concise description in abbreviated plain language concerning the occurrence and/or expected occurrence of specified en-route weather phenomena, which have not been included in Section I of the area forecast for low-level flights issued in accordance with Chapter 6, 6.5 and which may affect the safety of low-level flights, and of the development of those phenomena in time and space.

b) AIRMET information shall be cancelled when the phenomena are no longer occurring or are no longer expected to occur in the area.

c) The period of validity of an AIRMET message shall be not more than 4 hours.

14.6.6.3 Aerodrome Warnings

a) Aerodrome warnings shall be issued by the aerodrome meteorological office designated by the AMSP and shall give concise information of meteorological conditions which could adversely affect aircraft on the ground, including parked aircraft, and the aerodrome facilities and services.

b) Aerodrome warnings shall be cancelled when the conditions are no longer occurring and/or no longer expected to occur at the aerodrome.

14.6.6.4 Wind Shear Warnings and Alerts

Note. – Guidance on the subject is contained in the Manual on Low-level Wind Shear (Doc 9817). Wind shear alerts are expected to complement wind shear warnings and together are intended to enhance situational awareness of wind shear.

a) Wind shear warnings shall be prepared by the aerodrome meteorological office designated by the AMSP for aerodromes where wind shear is considered a factor, in accordance with local arrangements with the appropriate ATS unit and operators concerned. Wind shear warnings shall give concise information on the observed or expected existence of wind shear which could adversely affect aircraft on the approach path or take-off path or during circling approach between runway level and 500 m (1 600 ft) above that level and aircraft on the runway during the landing roll or take-off run. Where local topography has been shown to produce significant wind shears at heights in excess of 500 m (1 600 ft) above runway level, then 500 m (1 600 ft) shall not be considered restrictive.

b) Wind shear warnings for arriving aircraft and/or departing aircraft shall be cancelled when aircraft reports indicate that wind shear no longer exists or, alternatively, after an agreed elapsed time. The criteria for the cancellation of a wind shear warning shall be defined locally for each aerodrome, as agreed between the AMSP, the ATS Provider and the operators concerned.

c) At aerodromes where wind shear is detected by automated, ground-based, wind shear remote-sensing or detection equipment, wind shear alerts generated by these systems shall be issued.

d) Wind shear alerts shall give concise, up-to-date information related to the observed existence of wind shear involving a headwind/tailwind change of 7.5 m/s (15 kt) or more which could adversely affect aircraft on the final approach path or initial take-off path and aircraft on the runway during the landing roll or take-off run.

e) Wind shear alerts shall be updated at least every minute. The wind shear alert shall be cancelled as soon as the headwind/tailwind change falls below 7.5 m/s (15 kt).

14.6.7 AERONAUTICAL CLIMATOLOGICAL INFORMATION

Note. – Technical specifications and detailed criteria related to this chapter are given in Appendix 7

14.6.7.1 General Provisions

Note. – In cases where it is impracticable to meet the requirements for aeronautical climatological information on a national basis, the collection, processing and storage of observational data may be effected through computer facilities available for international use, and the responsibility for the preparation of the required aeronautical climatological information may be delegated by the meteorological authorities concerned.

a) Aeronautical climatological information required for the planning of flight operations shall be prepared in the form of aerodrome climatological tables and aerodrome climatological summaries. Such information shall be supplied to aeronautical users as agreed by the AMSP and the users concerned.

Note. — Climatological data required for aerodrome planning purposes are set out in Annex 14, Volume I, 3.1.4 and Attachment A.

b) Aeronautical climatological information shall normally be based on observations made over a period of at least five years and the period shall be indicated in the information supplied.

c) Climatological data related to sites for new aerodromes and to additional runways at existing aerodromes shall be collected starting as early as possible before the commissioning of those aerodromes or runways.

14.6.7.2 Aerodrome Climatological Tables

a) The AMSP shall make arrangements for collecting and retaining the necessary observational data and have the capability:

1. to prepare aerodrome climatological tables for each regular and alternate international aerodrome within its territory; and

2. to make available such climatological tables to an aeronautical user within a time period as agreed between the AMSP and the user concerned.

14.6.7.3 Aerodrome Climatological Summaries

Aerodrome climatological summaries shall follow the procedures prescribed by the World Meteorological Organisation (WMO). Where computer facilities are available to store, process and retrieve the information, the summaries shall be published or otherwise made available to aeronautical users on request. Where such computer facilities are not available, the summaries shall be prepared using the models specified by the World Meteorological Organisation and shall be published and kept up to date as necessary.

14.6.7.4 Copies of Meteorological Observational Data

The AMSP, on request and to the extent practicable, shall make available to any other meteorological authority, to operators and to others concerned with the application of meteorology to international air navigation, meteorological observational data required for research, investigation or operational analysis.

14.6.8 SERVICE FOR OPERATORS AND FLIGHT CREW MEMBERS

Note. – Technical specifications and detailed criteria related to this chapter are given in, Appendix 8.

14.6.8.1 General Provisions

a) Meteorological information shall be supplied to operators and flight crew members for:

1. pre-flight planning by operators;

2. in-flight re-planning by operators using centralized operational control of flight operations;

3. use by flight crew members before departure; and

4. aircraft in flight.

b) Meteorological information supplied to operators and flight crew members shall cover the flight in respect of time, altitude and geographical extent. Accordingly, the information shall relate to appropriate fixed times, or periods of time, and shall extend to the aerodrome of intended landing, also covering the meteorological conditions expected between the aerodrome of intended landing and the alternate aerodromes designated by the operator.

c) Meteorological information supplied to operators and flight crew members shall be up to date and include the following information, as agreed between the AMSP and the operators concerned:

1. Forecasts of

   i) upper wind and upper-air temperature;

   ii) upper-air humidity

   iii geopotential altitude of flight levels;

   iv) flight level and temperature of tropopause;

   v) direction, speed and flight level of maximum wind; and

   vi) SIGWX phenomena;

   vii) cumulonimbus clouds, icing and turbulence;

   Note. – Forecasts of upper-air humidity and geopotential altitude of flight levels are used only in automatic flight planning and need not be displayed.

   Note 2..— Forecasts of cumulonimbus clouds, icing and turbulence are intended to be processed and, if necessary, visualized according to the specific thresholds relevant to user operations

2. METAR or SPECI (including trend forecasts as issued in accordance with regional air navigation agreement) for the aerodromes of departure and intended landing, and for take-off, en-route and destination alternate aerodromes;

3. TAF or amended TAF for the aerodromes of departure and intended landing, and for take-off, en-route and destination alternate aerodromes;

4. forecasts for take-off;

5. SIGMET information and appropriate special air-reports relevant to the whole route;

   Note. — Appropriate special air-reports will be those not already used in the preparation of SIGMET.

6. volcanic ash and tropical cyclone advisory information relevant to the whole route;

7. as determined by the regional air navigation agreement, GAMET area forecast and/or area forecasts for low-level flights in chart form prepared in support of the issuance of AIRMET information, and AIRMET information for low-level flights relevant to the whole route;

8. aerodrome warnings for the local aerodrome;

9. meteorological satellite images;

10. ground-based weather radar information.

d) Forecasts listed under 14.6.8.1 (c) (1) shall be generated from the digital forecasts provided by the WAFCs whenever these forecasts cover the intended flight path in respect of time, altitude and geographical extent, unless otherwise agreed between the AMSP and the operator concerned.

e) When forecasts are identified as being originated by the WAFCs, no modifications shall be made to their meteorological content.

f) Charts generated from the digital forecasts provided by the WAFCs shall be made available, as required by operators, for fixed areas of coverage as shown in Appendix 8, Figures A8-1, A8-2 and A8-3 of Annex 3

g) When forecasts of upper wind and upper-air temperature listed under 14.6.8.1 (c) (1) (i) are supplied in chart form, they shall be fixed time prognostic charts for flight levels as specified in Appendix 2, 1.2.2. a) of Annex 3. When forecasts of SIGWX phenomena listed under 14.6.8.1(c) (1) (vi) are supplied in chart form, they shall be fixed time prognostic charts for an atmospheric layer limited by flight levels as specified in Appendix 2, 1.3.2 and Appendix 5,4.3.2 of Annex 3

h) The forecasts of upper wind and upper-air temperature and of SIGWX phenomena above flight level 100 requested for pre-flight planning and in-flight re-planning by the operator shall be supplied as soon as they become available, but not later than 3 hours before departure. Other meteorological information requested for pre-flight planning and in- flight re-planning by the operator shall be supplied as soon as is practicable.

i) When necessary, the AMSP shall initiate coordinating action with the meteorological authorities of other States with a view to obtaining from them the reports and/or forecasts required.

j) Meteorological information shall be supplied to operators and flight crew members at the location to be determined by the Authority and the AMSP, after consultation with the operators concerned and at the time agreed between the aerodrome meteorological office and the operator concerned. The service for pre-flight planning shall be confined to flights originating within the territory of the Federal Republic of Nigeria. At an aerodrome without meteorological office at the aerodrome, arrangements for the supply of meteorological information shall be agreed by the the Authority and the AMSP and the operator concerned.

14.6.8.2 Briefing, Consultation and Display

Note. – The requirements for the use of automated pre-flight information systems in providing briefing, consultation and display are given in 14.6.28.4

a) Briefing and/or consultation shall be provided, on request, to flight crew members and/or other flight operations personnel at a flight crew briefing room suitably located with appropriate and adequate signage. Its purpose shall be to supply the latest available information on existing and expected meteorological conditions along the route to be flown, at the aerodrome of intended landing, alternate aerodromes and other aerodromes as relevant, either to explain and amplify the information contained in the flight documentation, or as agreed between the AMSP and the operator concerned, in lieu of flight documentation.

b) Meteorological information used for briefing, consultation and display shall include any or all of the information listed in 14.6.8.1 (1) (c) – (j).

c) If the aerodrome meteorological office expresses an opinion on the development of the meteorological conditions at an aerodrome which differs appreciably from the aerodrome forecast included in the flight documentation, the attention of flight crew members shall be drawn to the divergence. The portion of the briefing dealing with the divergence shall be recorded at the time of briefing and this record shall be made available to the operator.

d) The required briefing, consultation, display and/or flight documentation shall normally be provided by the aerodrome meteorological office associated with the aerodrome of departure. At an aerodrome where these services are not available, arrangements to meet the requirements of flight crew members shall be as agreed between the AMSP and the operator concerned. In exceptional circumstances such as an undue delay, the aerodrome meteorological office associated with the aerodrome shall provide or, if that is not practicable, arrange for the provision of a new briefing, consultation and/or flight documentation as necessary.

e) The flight crew member and/or other flight operations personnel for whom briefing, consultation and/or flight documentation has been requested shall visit the aerodrome meteorological office at the time agreed upon between the aerodrome meteorological office and the operator concerned. Where local circumstances at an aerodrome make personal briefing or consultation impracticable, the aerodrome meteorological office shall provide those services by telephone or other suitable telecommunications facilities.

f) The flight crew briefing room shall be adequately equipped with adequate documentations including Manual of Operations, all required working tools in a conducive working environment.

14.6.8.3 Flight Documentation

Note. – The requirements for the use of automated pre-flight information systems in providing flight documentation are given in 14.6.8.4

a) Flight documentation to be made available shall comprise information listed under 14.6.8.1 (c) – (g) and, if appropriate, h). However, flight documentation for flights of two hours' duration or less, after a short stop or turnaround, shall be limited to the information operationally needed, but in all cases the flight documentation shall at least comprise information on 14.6.8.1) b), c), e), f) and, if appropriate, g).

b) Whenever it becomes apparent that the meteorological information to be included in the flight documentation will differ materially from that made available for pre-flight planning and in-flight preplanning, the operator shall be advised immediately and, if practicable, be supplied with the revised information as agreed between the operator and the Aerodrome meteorological office concerned.

c) In cases where a need for amendment arises after the flight documentation has been supplied, and before take-off of the aircraft, the aerodrome meteorological office shall, as agreed locally, issue the necessary amendment or updated information to the operator or to the local air traffic services unit, for transmission to the aircraft.

d) The AMSP shall retain information supplied to flight crew members, either as printed copies or in computer files, for a period of at least 30 days from the date of issue. This information shall be made available, on request, for inquiries or investigations and, for these purposes, shall be retained until the inquiry or investigation is completed.

14.6.8.4 Automated Pre-Flight Information Systems for Briefing, Consultation, Flight Planning and Flight Documentation

a) Where the AMSP uses automated pre-flight information systems to supply and display meteorological information to operators and flight crew members for self-briefing, flight planning and flight documentation purposes, the information supplied and displayed shall comply with the relevant provisions in 14.6.8.1 to 14.6.8.3 inclusive.

b) Automated pre-flight information systems providing for a harmonized, common point of access to meteorological information and aeronautical information services information by operators, flight crew members and other aeronautical personnel concerned shall be as agreed between the AMSP and the Authority in accordance with Annex 15, 2.1.1 c).

Note.— The meteorological and aeronautical information services information concerned is specified in 14.6.8.1 a)-c) and Appendix 8 and in the Procedures for Air Navigation Services-Aeronautical Information Management (PANS-AIM, Doc 10066), 5.5, respectively.

c) Where automated pre-flight information systems are used to provide for a harmonized, common point of access to meteorological information and aeronautical information services information by operators, flight crew members and other aeronautical personnel concerned, the AMSP shall remain responsible for the quality control and quality management of meteorological information provided by means of such systems in accordance with 14.6.1.3.

Note. – The responsibilities relating to aeronautical information services information and the quality assurance of the information are given in Annex 15, Chapter 1, 2 and 3.

14.6.8.5 Information for Aircraft in Flight

a) Meteorological information for use by aircraft in flight shall be supplied by an aerodrome meteorological office or meteorological watch offices to its associated air traffic services unit and through D-VOLMET or VOLMET broadcasts as determined by regional air navigation agreement. Meteorological information for planning by the operator for aircraft in flight shall be supplied on request, as agreed between the AMSP, the Authority and the operator concerned.

b) Meteorological information for use by aircraft in flight shall be supplied to air traffic services units in accordance with the specifications of 14.6.9.1.

c) Meteorological information shall be supplied through D-VOLMET or VOLMET broadcasts in accordance with the specifications of 14.6.10.5, 14.6.10.6

14.6.9 INFORMATION FOR AIR TRAFFIC SERVICES, SEARCH AND RESCUE SERVICES AND AERONAUTICAL INFORMATION SERVICES

Note. – Technical specifications and detailed criteria related to this chapter are given in Appendix 9

14.6.9.1 Information for Air Traffic Services Units

(a) The AMSP shall designate an aerodrome meteorological office or meteorological watch office to be associated with each air traffic services unit. The associated aerodrome meteorological office or meteorological watch offices shall, after coordination with the air traffic services unit, supply, or arrange for the supply of, up-to- date meteorological information to the unit as necessary for the conduct of its functions.

(b) An aerodrome meteorological office shall be associated with an aerodrome control tower or approach control unit for the provision of meteorological information.

(c) A meteorological watch office shall be associated with a flight information centre or an area control centre for the provision of meteorological information.

(d) Where, owing to local circumstances, it is convenient for the duties of an associated aerodrome meteorological office or meteorological watch office to be shared between two or more aerodrome meteorological offices or meteorological watch offices, the division of responsibility shall be determined by the AMSP in consultation with the ATS Provider.

(e) Any meteorological information requested by an air traffic services unit in connection with an aircraft emergency shall be supplied as rapidly as possible.

14.6.9.2 Information for Search and Rescue Services Units

Aerodrome meteorological offices or meteorological watch offices designated by the AMSP in accordance with regional air navigation agreement shall supply search and rescue services units with the meteorological information they require in a form established by mutual agreement. For that purpose, the designated aerodrome meteorological office or meteorological watch office shall maintain liaison with the search and rescue services unit throughout a search and rescue operation.

14.6.9.3 Information for Aeronautical Information Services Units

The AMSP, in coordination with the Authority, shall arrange for the supply of up-to-date meteorological information to relevant aeronautical information services units, as necessary, for the conduct of their functions.

14.6.10 REQUIREMENTS FOR AND USE OF COMMUNICATIONS

Note 1. – Technical specifications and detailed criteria related to this chapter are given in Appendix 10.

Note 2. – It is recognized that it is for the Nigeria Civil Aviation Authority to decide upon its own internal organization and responsibility for implementing the telecommunications facilities referred to in this chapter.

14.6.10.1 Requirements for Communications

a) Suitable telecommunications facilities shall be made available to permit aerodrome meteorological offices and, as necessary, aeronautical meteorological stations to supply the required meteorological information to air traffic services units on the aerodromes for which those offices and stations are responsible, and in particular to aerodrome control towers, approach control units and the aeronautical telecommunications stations serving these aerodromes.

b) Suitable telecommunications facilities shall be made available to permit meteorological watch offices to supply the required meteorological information to air traffic services and search and rescue services units in respect of the flight information regions, control areas and search and rescue regions for which those offices are responsible, and in particular to flight information centres, area control centres and rescue coordination centres and the associated aeronautical telecommunications stations.

c) Suitable telecommunications facilities shall be made available to permit world area forecast centres to supply the required world area forecast system products to the AMSP and other users.

d) Telecommunications facilities between aerodrome meteorological offices and, as necessary, aeronautical meteorological stations and aerodrome control towers or approach control units shall permit communications by direct speech, the speed with which the communications can be established being such that the required points may normally be contacted within approximately 15 seconds.

e) Telecommunications facilities between aerodrome meteorological offices or meteorological watch offices and flight information centres, area control centres, rescue coordination centres and aeronautical telecommunications stations shall permit:

i) communications by direct speech, the speed with which the communications can be established being such that the required points may normally be contacted within approximately 15 seconds; and

ii) printed communications, when a record is required by the recipients; the message transit time shall not exceed 5 minutes.

Note. — In 14.6.10.1 d) e), "approximately 15 seconds" refers to telephony communications involving switchboard operation and "5 minutes" refers to printed communications involving retransmission.

f) The telecommunications facilities required in accordance with 14.6.10.1 d) e), shall be supplemented, as and where necessary, by other forms of visual or audio communications, for example, closed-circuit television or separate information processing systems.

g) As agreed between the AMSP and operators concerned, provision shall be made to enable operators to establish suitable telecommunications facilities for obtaining meteorological information from aerodrome meteorological offices or other appropriate sources.

h) Suitable telecommunications facilities shall be made available to permit meteorological offices to exchange operational meteorological information with other meteorological offices.

i) The telecommunications facilities used for the exchange of operational meteorological information shall be the aeronautical fixed service or, for the exchange of non-time critical operational meteorological information, the public Internet, subject to availability, satisfactory operation and bilateral/multilateral and/or regional air navigation agreements.

Note 1. — aeronautical fixed service internet based services, operated by the world area forecast centres, providing for global coverage are used to support the global exchanges of operational meteorological information

Note 2. — Guidance material on non-time-critical operational meteorological information and relevant aspects of the public Internet is provided in the Guidelines on the Use of the Public Internet for Aeronautical Applications (Doc 9855).

14.6.10.2 Use of Aeronautical Fixed Service Communications and the Public Internet–Meteorological Bulletins

Meteorological bulletins containing operational meteorological information to be transmitted via the aeronautical fixed service or the public Internet shall be originated by the appropriate meteorological office or aeronautical meteorological station.

Note. – Meteorological bulletins containing operational meteorological information authorized for transmission via the aeronautical fixed service are listed in Annex 10, volume II, Chapter 4, together with the relevant priorities and priority indicators.

14.6.10.3 Use of Aeronautical Fixed Service Communications – World Area Forecast System Products

World area forecast system products in digital form should be transmitted using binary data communications techniques. The method and channels used for the dissemination of the products shall be as determined by regional air navigation agreement.

14.6.10.4 Use of Aeronautical Mobile Service Communications

The content and format of meteorological information transmitted to aircraft and by aircraft shall be consistent with the provisions of this Part 14.6.

14.6.10.5 Use of Aeronautical Data Link Service – Contents of D-VOLMET

D-VOLMET shall contain current METAR and SPECI, together with trend forecasts where available, TAF and SIGMET, special air-reports not covered by a SIGMET and, where available, AIRMET.

Note. – The requirement to provide METAR and SPECI may be met by the data link-flight information service (D-FIS) application entitled “Data link-aerodrome routine meteorological report (D-METAR) service”; the requirement to provide TAF may be met by the D-FIS application entitled “Data link-aerodrome forecast (D-TAF) service”; and the requirement to service”. The details of these data link services are specified in the Manual of Air Traffic Services Data Link Applications (Doc 9694).

14.6.10.6 Use of Aeronautical Broadcasting Service – Contents of VOLMET Broadcasts

a) Continuous VOLMET broadcasts, normally on very high frequencies (VHF), shall contain current METAR and SPECI, together with trend forecasts where available.

b) Scheduled VOLMET broadcasts, normally on high frequencies (HF), shall contain current METAR and SPECI, together with trend forecasts where available and, where so determined by regional air navigation agreement, TAF and SIGMET.

14.6.11 Coordination of AMSP with Meteorological Watch Offices and Associated Area Control Center or Flight Information Center.

a) The holder of an Aeronautical Meteorological Services Provider certificate shall maintain close co-ordination between the Meteorological Watch Office and the associated Area Control Center/Flight Information Center to ensure that meteorological information for SIGMET and others are consistent to the extent that

1) SIGMET information shall be issued by a meteorological watch office and shall give a concise description in abbreviated plain language concerning the occurrence and/or expected occurrence of specified en-route weather phenomena which may affect the safety of aircraft operations, and of the development of those phenomena in time and space;

2) SIGMET messages shall be disseminated to other meteorological watch offices, WAFCs and to other meteorological offices in accordance with regional air navigation agreement;

3) SIGMET messages for volcanic ash shall also be disseminated to VAACs;

4) SIGMET messages shall be disseminated to international OPMET databanks and the centres designated by regional air navigation agreement for the operation of aeronautical fixed service satellite distribution systems in accordance with regional air navigation agreement;

5) SIGMET information shall be cancelled when the phenomena are no longer occurring or are no longer expected to occur in the area;

6) Standards regarding the period of validity of a SIGMET message, period of validity of special case of SIGMET messages for volcanic ash cloud and tropical cyclones, and period within which SIGMET messages shall be issued before the commencement of the period of validity and period of up-dating SIGMET shall be complied with

Note. — Guidance on the bilateral or multilateral coordination between MWOs of Contracting States for the provision of SIGMET can be found in the Manual of Aeronautical Meteorological Practice (Doc 8896).

14.6.12 EQUIPMENT

14.6.12.1 Equipment Requirements

a) The holder of an Aeronautical Meteorological Services Provider Certificate shall comply with the Requirements of this Part 14.6 and;

1) replace or upgrade obsolete installations;

2) provide and implement appropriate equipment calibration and maintenance programme in accordance with the manufacturers' specifications;

3) install only meteorological instruments that are approved by the World Meteorological Organization's as suitable for aeronautical meteorological services;

4) provide at aerodromes with runways intended for Cat II and Cat III instrument approach and landing operations; automated equipment for measuring or assessing, as appropriate, and for monitoring and remote indicating of surface wind, visibility, runway visual range, height of cloud base, air and dew-point temperatures and atmospheric pressure to support approach and landing and take-off operations.

b) The automated devices shall be integrated automatic systems for acquisition, processing, dissemination and display in real time of the meteorological parameters affecting landing and takeoff operations.

c) Where an integrated semi-automatic system is used for the dissemination/display of meteorological information, it shall be capable of accepting the manual insertion of data covering those meteorological elements which cannot be observed by automatic means.

d) Ensure that the units providing air traffic service and aeronautical information service for an aerodrome is kept informed without delay of changes in the serviceability status of the automated equipment

14.6.12.2 Installation, Maintenance and Calibration of Equipment and Facilities

a) No installation of aeronautical meteorological equipment/facility shall be carried-out at an aerodrome in Nigeria without the approval of the Authority.

b) The process of installation of aeronautical meteorological equipment/facility shall include the acceptance or approval by the Authority;

1) the intention to procure an aeronautical meteorological equipment for use at an aerodrome in Nigeria;

2) the report of feasibility studies for appropriate siting of sensors outside the aerodrome boundaries;

3) the plan for the conduct of factory acceptance test;

4) the plan for the conduct of site acceptance test; and

5) the maintenance plan for the equipment/facility

6) request and grant of aviation height clearance by the Authority.

c) An Aeronautical Meteorological Service Provider shall make available to its personnel, a properly maintained and calibrated equipment and facilities required for the aeronautical meteorological services covered by its certificate.

d) The aeronautical meteorological services provider’s equipment and facilities shall meet the requirements for measuring and detecting the meteorological elements specified in this Regulations.

e) The maintenance of aeronautical meteorological services equipment shall comply with the specifications in the manufacturer’s maintenance manual.

f) The holder of an Aeronautical Meteorological Services Provider certificate shall ensure that the maintenance personnel are properly trained to carry out maintenance and calibration works on the equipment.

g) The Aeronautical Meteorological Service Provider’s equipment and facilities shall be calibrated, if applicable, to the required operational standards specified in the manufacturer’s maintenance manual.

h) The list of equipment that require calibration shall be documented in the Manual of Operations

i) The calibration shall be carried out at the defined intervals of time and the results recorded and filed.

14.6.12.3 Minimum Equipment for Aeronautical Meteorological Services

a) The holder of an Aeronautical Meteorological Services Provider certificate shall, for each location for which a service is being provided, make available as the minimum, the following facilities and equipment:

1. Dedicated Met Office
2. Wall clocks displaying UTC and local time;
3. Automatic Weather Observing System (AWOS)
4. Secure Aviation Data Information Service (SADIS) work station
5. METEO-station
6. Visibility targets;
7. Back-up power;
8. Telecommunication equipment capable of transmitting/receiving meteorological information to/from other Agencies and MET Offices;
9. Office furniture

10. Refrigerator

11. Television; and

12. Other utilities for convenience.

14.6.12.4 Fault and Defect Reporting of Equipment

a) An Aeronautical Meteorological Services Provider shall maintain a system for tracking and rectifying faults within the aeronautical meteorological service system.

b) The procedures for tracking, reporting and resolution of faults and defects shall be documented in the AMSP approved Manual of Operations and implemented, accordingly.

c) The procedures for decommissioning of equipment/facility shall be documented in the AMSP approved Manual of Operations and implemented, accordingly.

14.6.12.5 Protection of Aeronautical Meteorological Equipment and Facilities.

a) The holder of an Aeronautical Meteorological Services Provider certificate shall ensure the protection of its equipment, facilities and infrastructure by providing adequate security measures, both physical and procedural.

14.6.13 PERSONNEL

14.6.13.1 Personnel Requirements

a) An Aeronautical Meteorological Service provider shall maintain an appropriate organization with a sound and effective management structure to enable it provide, in accordance with the standards set out in the Regulations, the aviation meteorological services covered by its approval.

b) The holder of an Aeronautical Meteorological Services Provider certificate shall have suitably qualified and trained personnel in sufficient number to enable it provide, in accordance with the standards set out in the Regulations, the aviation meteorological services covered by its approval.

c) The holder of an Aeronautical Meteorological Services Provider Certificate shall set up and maintain, in accordance with its Manual of Operations:

1. current unit organizational chart and written delegated responsibilities and position descriptions;

2. staffing-levels for operational positions;

3. staffing numbers and qualifications of personnel at each office or station;

4. continuing assessment of its personnel competency for the purposes of ensuring that they continue to satisfy the competency requirements in relation to observation, forecasting and instrumentation; and

5. process of retraining of any of its personnel who at any time do not satisfy the competency requirement.

d) The Aeronautical Meteorological Service provider shall ensure that its personnel are in sufficient numbers, possess the necessary experience and have been given the appropriate authority to be able to discharge their allocated responsibilities.

e) An Aeronautical Meteorological Service provider shall arrange the work flow schedule of aviation meteorological personnel to provide sufficient rest time.

f) A sample of the Aviation Meteorological service providers roster shall be included in the Manual of Operations.

g) The Aeronautical Meteorological Service provider shall engage, employ or contract at each Aeronautical Meteorological Office:

1. enough personnel to plan, provide and supervise the services listed in its approval as a service provider, in a safe and efficient manner.

2. a senior person to whom authority has been granted to ensure that all activities undertaken by the unit are carried out in accordance with the applicable requirements prescribed in this section, and who shall in addition be vested with the following powers and duties in respect of the compliance with such:

i. unrestricted access to work performed or activities undertaken by all other persons as employees of, and other persons rendering service within the unit;

ii. full rights of consultation with any such person(s) in respect of such compliance by him or her;

iii. powers to order cessation of any activity where such compliance is not affected;

iv. a duty to establish liaison mechanisms with the Authority with a view to ascertain correct manners of compliance with the said requirements, and interpretations of such requirements by the Authority, and to facilitate liaison between the Authority and the unit concerned;

v. powers to report directly to the management of the organization, on investigations and consultations generally, and in cases contemplated in subparagraph (iii), and with regard to the results of the liaison contemplated in sub-paragraph (iv).

3. a person who is responsible for:

   i. quality control, and who shall have direct access to the person referred to in paragraph 14.6.13.1(g)(2) on matters affecting Aeronautical Meteorology; and

   ii. preparation of proficiency reports on personnel within the stations for onward transmission to the management of the aviation meteorological service provider;

14.6.13. Qualification, Training and Competency of Personnel

a) The holder of an Aeronautical Meteorological Services Provider certificate shall comply with the requirements for qualifications, competencies, education and training of its personnel in compliance with the details set out in the Guidelines for the Education and Training of Personnel in Meteorology and Hydrology; Supplement No1- WMO-No. 258 (Training and Qualification Requirements for Aeronautical Meteorological Personnel).

b) The holder of an Aeronautical Meteorological Services Provider certificate shall establish and maintain proficiency standards in service provision.

c) The Aeronautical Meteorological Service provider shall establish a procedure for initially assessing, the personnel required to operate and maintain the unit concerned.

d) The Aeronautical Meteorological Service provider shall establish a procedure for assessing the competence of the personnel engaged to operate and maintain the unit concerned.

e) The competency assessment shall be in accordance with the guidelines prescribed in the Technical Regulations (WMO-No. 49), Volume I — General Meteorological Standards and Recommended Practices, Part V — Qualifications and Competencies of Personnel Involved in the Provision of Meteorological (Weather and Climate) and Hydrological Services, Part VI — Education and Training of Meteorological Personnel, and Appendix A — Basic Instruction Packages

f) The procedures for paragraphs (c) and (d) shall include the design of appropriate assessment forms to measure competencies of the personnel.

g) The Authority will monitor the competency assessment of the AMSP to ascertain the effectiveness of the procedures in paragraph (d).

h) On receipt of competency assessment monitoring reports from the Authority, the AMSP shall undertake thorough evaluation with a view to correcting the deficiencies revealed by the report.

i) The holder of an Aeronautical Meteorological Services Provider certificate shall establish a training program for its technical staff.

j) The holder of an Aeronautical Meteorological Services Provider certificate shall establish an appropriate and detailed training program consisting of initial, specialized, On the Job, Recurrent and developmental training for its technical staff.

k) The holder of an Aeronautical Meteorological Services Provider certificate shall submit the established training program in paragraph (f) to the Authority for documentation and monitoring of implementation performance.

l) The holder of an Aeronautical Meteorological Services Provider certificate shall, at the beginning of the current year, submit to the Authority, the training plan approved by its management for the technical staff

m) The Authority will monitor the training plan to determine the implementation status and the effects on competencies of the personnel.

n) The holder of an Aeronautical Meteorological Services Provider certificate shall maintain proper accounts of the training undertaken by each staff member.

o) An Aeronautical Meteorological Service provider shall ensure that a training carried out by him or her or on his or her by the AMSP or on its behalf complies with its approved operations manual.

14.6.14 Maintenance of Documents and Records

a) An AMSP shall make available the following operational documentation at each location of its service:

1. Manual of Operations;
2. Directives and Instructions File;
3. Operational Logbooks;
4. Equipment/Facility Maintenance and Calibration Logbooks;
5. Equipment Manuals;
6. Local Standard Operating Procedures;
7. Personnel Training Records; and
8. Other applicable and relevant Documents.

b) An AMSP shall ensure that:

1. the documentations are reviewed and authorized for use by appropriate personnel;

2. current issues of relevant documentation are available to personnel;

3. obsolete documentation is removed from all points of issue or use;

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

5. the current version of each document can be identified to preclude the use of obsolete editions.

c) The holder of an Aeronautical Meteorological Services Provider certificate shall put in place a system to record and retain operational data.

d) Records shall be maintained on the following:

1. operational information

2. equipment installation, maintenance and calibration

3. survey, inspection and test report

4. feedback reports from end users;

5. aircraft incident or emergency report

6. training files;

7. duty rosters, and

8. other relevant records.

e) AN AMSP shall retain information supplied to flight crew members, either as printed copies or in computer files, for a period of at least 30 days from the date of issue. Except that if the information is required for enquiries or investigations, it shall be retained until the enquiry or investigation is concluded.

14.6.15 Responsibilities of AMSP to Search and Rescue (SAR) Unit

a) An AMSP shall:

1. Provide such assistance as requested by the Agency responsible for conducting SAR.;

2. develop appropriate procedures in its manual of operation for the release of meteorological information to aeronautical search and rescue unit;

3. supply as rapidly as possible, any meteorological information requested by an air traffic services unit in connection with an aircraft emergency;

4. retain information supplied to flight crew members, either as printed copies or in computer files, for a period of at least 30 days from the date of issue. Except that if the information is required for enquiries or investigations, it shall be retained until the enquiry or investigation is concluded.

14.6.16 CONTINGENCY PLAN

a) The holder of an Aeronautical Meteorological Services provider certificate shall develop and maintain Contingency Plans for implementation in the event of disruption, or potential disruption, of aeronautical meteorological services. The disruption may be caused intentionally (sabotage) or unintentionally (equipment failure or industrial action).

b) The plan shall include:

(1) the actions to be taken by the provider's personnel responsible for providing the service; and

(2) possible alternative arrangements for providing the service; and

(3) the arrangements for resuming normal operations for the service.

c) These plans shall be submitted as part of the Manual of Operation.

14.6.17 Approval of External Source (Contract) for Aeronautical Meteorological Service Provider

a) A holder of an Aeronautical Meteorological Services Provider certificate may contract a function to an external source.

b) The Authority will approve the external source to perform the function(s).

c) The Authority will be informed 60 days before the termination of such agreement

d) To enable the approval of an external source, the holder of an Aeronautical Meteorological Services Provider certificate shall make available to the Authority, the following information:

1) The function(s) to be contracted to the external source;

2) The Agreement between the Aeronautical Meteorological Services Provider and contractor detailing how the contractor shall carry out the function(s) in accordance with the Aeronautical Meteorological Service Provider Manual of Operation;

3) The cost recovery method; and the organizational chart, nominal roll and

qualifications of personnel of the contractor;

e) The holder of an Aeronautical Meteorological Services Provider Certificate shall verify, by test and/or inspection and maintain records that the function(s) has been performed satisfactorily by the contractor.

f) The holder of an Aeronautical Meteorological Services Provider certificate shall take the responsibility for the function(s) performed by the contractor.

PART 14: AIR NAVIGATION SERVICE

SUB-PART 14.7: AERONAUTICAL TELECOMMUNICATION SERVICE

14.7.1 RADIO NAVIGATION AIDS

14.7.1.1. Provision of Radio Navigation Aids

(a) No person shall provide Radio Navigation Aids Services or operate an aeronautical facility, except in accordance with the provisions of these Regulations

(b) The Provisionof14.7.1.1does not apply if a person operates an aeronautical facility on an aeronautical radio frequency and the aeronautical facility:

(1) Is a radio communication transmitter that does not support air traffic services; or

(2) is a radio navigation aid that does not support IFR flight or air traffic services;

(c) the aeronautical telecommunication facility does not constitute harmful interference with any other Aeronautical Telecommunications Services or aeronautical facility;

(d) a certificate has been granted by the appropriate Authority for the aeronautical facility; and

(e) an identification code or a call sign has been assigned to the aeronautical facility under subpart 14.7.1;

(f) The provision of 14.7.1.1 does not apply if a person operates a ground mobile radio on an aeronautical radio frequency and:

(1) the radio is not used to support air traffic services;

(2) the radio is operated in accordance with the applicable communication procedures prescribed in these Regulations; and

(3) the radio transmission does not constitute harmful interference with any other Aeronautical Telecommunications Services or aeronautical facility.

14.7.1. 2. Requirement for Aeronautical Telecommunication Services Provider Approval

No person may provide Radio Navigation Aids services at aerodromes or portion of airspace in Nigeria, unless such person holds an issued by the Authority.

14.7.1.3. General Provisions of Radio Navigation Aids Services.

The holder of an Aeronautical Telecommunication Services Provider Approval issued under these Regulations shall be responsible for the provision of Aeronautical Telecommunications Services to ensure that the telecommunications information and data necessary for safe, regular and efficient operation of air navigation is available in the form suitable for the operational requirements of:

(a) Flight operations personnel including flight crews and other personnel responsible for the provision of pre-flight briefing; and

(b) Providers of Air Traffic Services;

14.7.1.4. Standard radio navigation aids

The standard radio navigation aids shall be:

(a) the instrument landing system (ILS);

(b) the global navigation satellite system (GNSS);

(c) the VHF omnidirectional radio range (VOR);

(d) the distance measuring equipment (DME) and

(e) the non-directional radio beacon (NDB);

14.7.1.5. Provision of information on the operational status of radio navigation aids services.

Aerodrome control towers and units providing approach control service shall be provided with information on the operational status of radio navigation services essential for approach, landing and take-off at the aerodrome(s) with which they are concerned, on a timely basis consistent with the use of the service(s) involved.

Note. Guidance material on the application of this Standard in the case of PBN-based operations supported by GNSS is contained in the Performance-based Navigation (PBN) Manual (Doc9613).

SPECIFICATION FOR INSTRUMENT LANDING SYSTEMS:

14.7.1.6 The ILS shall be constructed and adjusted so that, at a specified distance from the threshold, similar instrumental indications in the aircraft represent similar displacements from the course line or ILS glide path as appropriate, irrespective of the particular ground installation in use.

14.7.1.7 The localizer and glide path components which form part of a Facility Performance Category I — ILS shall comply at least with the Standards, excepting those in which application to Facility Performance Category II — ILS is prescribed.

14.7.1.8 The localizer and glide path components which form part of a Facility Performance Category II — ILS shall comply with the Standards applicable to these components in a Facility Performance Category I — ILS, as supplemented or amended in which application to Facility Performance Category II — ILS is prescribed.

14.7.1.9 The localizer and glide path components and other ancillary equipment, which form part of a Facility Performance Category III — ILS, shall otherwise comply with the Standards applicable to these components in Facility Performance Categories I and II — ILS, except as supplemented by the Standards in which application to Facility Performance Category III — ILS is prescribed.

14.7.1.10 At locations where ILS facilities serving opposite ends of the same runway or different runways at the same airport use the same paired frequencies, an interlock shall ensure that only one facility shall radiate at a time. When switching from one ILS facility to another, radiation from both shall be suppressed for not less than 20 seconds.

14.7.1.11 All horizontal angles employed in specifying the localizer field patterns shall originate from the centre of the localizer antenna system which provides the signals used in the front course sector.

LOCALIZER RADIO FREQUENCY:

14.7.1.12 The localizer shall operate in the band 108 MHz to 111.975 MHz. Where a single radio frequency carrier is used, the frequency tolerance shall not exceed plus or minus 0.005 per cent. Where two radio frequency carriers are used, the frequency tolerance shall not exceed 0.002 per cent and the nominal band occupied by the carriers shall be symmetrical about the assigned frequency. With all tolerances applied, the frequency separation between the carriers shall not be less than 5 kHz nor more than 14 kHz.

14.7.1.13 The emission from the localizer shall be horizontally polarized. The vertically polarized component of the radiation on the course line shall not exceed that which corresponds to a DDM error of 0.016 when an aircraft is positioned on the course line and is in a roll attitude of 20 degrees from the horizontal.

14.7.1.14 For Facility Performance Category II localizers, the vertically polarized component of the radiation on the course line shall not exceed that which corresponds to a DDM error of 0.008 when an aircraft is positioned on the course line and is in a roll attitude of 20 degrees from the horizontal

14.7.1.15 For Facility Performance Category III localizers, the vertically polarized component of the radiation within a sector bounded by 0.02 DDM either side of the course line shall not exceed that which corresponds to a DDM error of 0.005 when an aircraft is in a roll attitude of 20 degrees from the horizontal.

14.7.1.16 For Facility Performance Category III localizers, signals emanating from the transmitter shall contain no components which result in an apparent course line fluctuation of more than 0.005 DDM peak to peak in the frequency band 0.01 Hz to 10 Hz.

COVERAGE:

14.7.1.17 The localizer shall provide signals sufficient to allow satisfactory operation of a typical aircraft installation within the localizer and glide path coverage sectors. The localizer coverage sector shall extend from the centre of the localizer antenna system to distances of:

46.3 km (25 NM) within plus or minus 10 degrees from the front course line;

31.5 km (17 NM) between 10 degrees and 35 degrees from the front course line;

18.5 km (10 NM) outside of plus or minus 35 degrees from the front course line if coverage is provided;

except that, where topographical features dictate or operational requirements permit, the limits may be reduced down to 33.3 km (18 NM) within the plus or minus 10-degree sector and 18.5 km (10 NM) within the remainder of the coverage when alternative navigational means provide satisfactory coverage within the intermediate approach area. The localizer signals shall be receivable at the distances specified at and above a height of 600 m (2 000 ft) above the elevation of the threshold, or 300 m (1 000 ft) above the elevation of the highest point within the intermediate and final approach areas, whichever is the higher, except that, where needed to protect ILS performance and if operational requirements permit, the lower limit of coverage at angles beyond 15 degrees from the front course line shall be raised linearly from its height at 15 degrees to as high as 1 350 m (4 500 ft) above the elevation of the threshold at 35 degrees from the front course line. Such signals shall be receivable, to the distances specified, up to a surface extending outward from the localizer antenna and inclined at 7 degree s above the horizontal.

Note.— Where intervening obstacles penetrate the lower surface, it is intended that guidance need not be provided at less than line-of-sight heights .

14.7.1.18 In all parts of the coverage volume , the field strength shall be not less than 40 microvolts per metre (minus 114 dBW/m2).

Note.— This minimum field strength is required to permit satisfactory operational usage of ILS localizer facilities.

14.7.1.19 Above 7 degrees, the signals shall be reduced to as low a value as practicable.

14.7.1.20 When coverage is achieved by a localizer using two radio frequency carriers, one carrier providing a radiation field pattern in the front course sector and the other providing a radiation field pattern outside that sector, the ratio of the two carrier signal strengths in space within the front course sector to the coverage limits, shall not be less than 10 dB

14.7.1.21 For Facility Performance Category III localizers, the ratio of the two carrier signal strengths in space within the front course sector shall not be less than 16 dB.

COURSE STRUCTURE:

14.7.1.22 For Facility Performance Category I localizers, bends in the course line shall not have amplitudes which exceed the following:

Zone	Amplitude (DDM) (95% probability)
Outer limit of coverage to ILS Point “A”	0.031
ILS Point “A” to ILS Point “B”	0.031 at ILS Point “A” decreasing at a linear rate to 0.015 at ILS Point “B”
ILS Point “B” to ILS Point “C”	0.015

14.7.1.23 For Facility Performance Categories II and III localizers, bends in the course line shall not have amplitudes which exceed the following:

Zone	Amplitude (DDM) (95% probability)
Outer limit of coverage to ILS Point “A”	0.031
ILS Point “A” to ILS Point “B”	0.031 at ILS Point “A” decreasing at a linear rate to 0.005 at ILS Point “B”
ILS Point “B” to the ILS reference datum	0.005

and, for Facility Performance Category III only:

ILS reference datum to ILS Point “D”	0.005
ILS Point “D” to ILS Point “E”	0.005 at ILS Point “D” increasing at a linear rate to 0.010 at ILS Point “E”

CARRIER MODULATION:

14.7.1.24 The nominal depth of modulation of the radio frequency carrier due to each of the 90 Hz and 150 Hz tones shall be 20 per cent along the course line.

14.7.1.25 The depth of modulation of the radio frequency carrier due to each of the 90 Hz and 150 Hz tones shall be within the limits of 18 and 22 per cent.

14.7.1.26 The following tolerances shall be applied to the frequencies of the modulating tones:

a) the modulating tones shall be 90 Hz and 150 Hz within plus or minus 2.5 per cent;

b) the modulating tones shall be 90 Hz and 150 Hz within plus or minus 1.5 per cent for Facility Performance Category II installations;

c) the modulating tones shall be 90 Hz and 150 Hz within plus or minus 1 per cent for Facility Performance Category III installations;

d) the total harmonic content of the 90 Hz tone shall not exceed 10 per cent; additionally, for Facility Performance Category III localizers, the second harmonic of the 90 Hz tone shall not exceed 5 per cent;

e) the total harmonic content of the 150 Hz tone shall not exceed 10 per cent.

14.7.1.27 For Facility Performance Category I — ILS, the modulating tones shall be 90 Hz and 150 Hz within plus or minus 1.5 per cent where practicable.

14.7.1.28 For Facility Performance Category III localizers, the depth of amplitude modulation of the radio frequency carrier at the power supply frequency or its harmonics, or by other unwanted components, shall not exceed 0.5 per cent. Harmonics of the supply, or other unwanted noise components that may intermodulate with the 90 Hz and 150 Hz navigation tones or their harmonics to produce fluctuations in the course line, shall not exceed 0.05 per cent modulation depth of the radio frequency carrier.

14.7.1.29 The modulation tones shall be phase-locked so that within the half course sector, the demodulated 90 Hz and 150 Hz wave forms pass through zero in the same direction within:

a) for Facility Performance Categories I and II localizers: 20 degrees; and
b) for Facility Performance Category III localizers: 10 degrees,

of phase relative to the 150 Hz component, every half cycle of the combined 90 Hz and 150 Hz wave form.

14.7.1.30 Alternative two-frequency localizer systems that employ audio phasing different from the normal in-phase conditions shall be permitted. In this alternative system, the 90 Hz to 90 Hz phasing and the 150 Hz to 150 Hz phasing shall be adjusted to their nominal values to within limits.

14.7.1.31 The sum of the modulation depths of the radio frequency carrier due to the 90 Hz and
150 Hz tones shall not exceed 60 per cent or be less than 30 per cent within the required coverage.

14.7.1.32 For equipment first installed after 1 January 2000, the sum of the modulation depths of the radio frequency carrier due to the 90 Hz and 150 Hz tones shall not exceed 60 per cent or be less than 30 per cent within the required coverage.

14.7.1.33 When utilizing a localizer for radiotelephone communications, the sum of the modulation depths of the radio frequency carrier due to the 90 Hz and 150 Hz tones shall not exceed 65 per cent within 10 degrees of the course line and shall not exceed 78 per cent at any other point around the localizer.

14.7.1.34 Undesired frequency and phase modulation on ILS localizer radio frequency carriers that can affect the displayed DDM values in localizer receivers should be minimized to the extent practical.

COURSE ALIGNMENT ACCURACY:

14.7.1.35 The mean course line shall be adjusted and maintained within limits equivalent to the following displacements from the runway centre line at the ILS reference datum:

a) for Facility Performance Category I localizers: plus or minus 10.5 m (35 ft), or the linear equivalent of 0.015 DDM, whichever is less;

b) for Facility Performance Category II localizers: plus or minus 7.5 m (25 ft);

c) for Facility Performance Category III localizers: plus or minus 3 m (10 ft).

14.7.1.36 For Facility Performance Category II localizers, the mean course line shall be adjusted and maintained within limits equivalent to plus or minus 4.5 m (15 ft) displacement from runway centre line at the ILS reference datum

DISPLACEMENT SENSITIVITY:

14.7.1.37 The lateral displacement sensitivity shall be adjusted and maintained within the limits of plus or minus:

a) 17 per cent of the nominal value for Facility Performance Categories I and II;

b) 10 per cent of the nominal value for Facility Performance Category III.

14.7.1.38 For Facility Performance Category II — ILS, displacement sensitivity shall be adjusted and maintained within the limits of plus or minus 10 per cent where practicable.

14.7.1.39 is zero) up to an angle on either side of the front course line where the DDM is

0.180. From that angle to plus or minus 10 degrees, the DDM shall not be less than 0.180. From plus or minus 10 degrees to plus or minus 35 degrees, the DDM shall not be less than 0.155. Where coverage is required outside of the plus or minus 35 degrees sector, the DDM in the area of the coverage, except in the back course sector, shall not be less than 0.155.

VOICE:

14.7.1.40 Facility Performance Categories I and II localizers may provide a ground-to-air radiotelephone communication channel to be operated simultaneously with the navigation and identification signals, provided that such operation shall not interfere in any way with the basic localize function

.

14.7.1.41 If the channel is provided, it shall conform with the following Standards:

14.7.1.42 The channel shall be on the same radio frequency carrier or carriers as used for the localizer function, and the radiation shall be horizontally polarized. Where two carriers are modulated with speech, the relative phases of the modulations on the two carriers shall be such as to avoid the occurrence of nulls within the coverage of the localizer.

14.7.1.43 The peak modulation depth of the carrier or carriers due to the radiotelephone communications shall not exceed 50 per cent but shall be adjusted so that:

a) the ratio of peak modulation depth due to the radiotelephone communications to that due to the identification signal is approximately 9:1;

b) the sum of modulation components due to use of the radiotelephone channel, navigation signals and identification signals shall not exceed 95 per cent.

14.7.1.44 The audio frequency characteristics of the radiotelephone channel shall be flat to within 3 dB relative to the level at 1 000 Hz over the range 300 Hz to 3 000 Hz.

IDENTIFICATION:

14.7.1.45 The localizer shall provide for the simultaneous transmission of an identification signal, specific to the runway and approach direction, on the same radio frequency carrier or carriers as used for the localizer function. The transmission of the identification signal shall not interfere in any way with the basic localizer function.

14.7.1.46 The identification signal shall be produced by Class A2A modulation of the radio frequency carrier or carriers using a modulation tone of 1 020 Hz within plus or minus 50 Hz. The depth of modulation shall be between the limits of 5 and 15 per cent except that, where a radiotelephone communication channel is provided, the depth of modulation shall be adjusted so that the ratio of peak modulation depth due to radiotelephone communications to that due to the identification signal modulation. The emissions carrying the identification signal shall be horizontally polarized. Where two carriers are modulated with identification signals, the relative phase of the modulations shall be such as to avoid the occurrence of nulls within the coverage of the localizer.

14.7.1.47 The identification signal shall employ the International Morse Code and consist of two or three letters. It may be preceded by the International Morse Code signal of the letter “I”, followed by a short pause where it is necessary to distinguish the ILS facility from other navigational facilities in the immediate area.

14.7.1.48 The identification signal shall be transmitted by dots and dashes at a speed corresponding to approximately seven words per minute, and shall be repeated at approximately equal intervals, not less than six times per minute, at all times during which the localizer is available for operational use. When the transmissions of the localizer are not available for operational use, as, for example, after removal of navigation components, or during maintenance or test transmissions, the identification signal shall be suppressed. The dots shall have a duration of 0.1 second to 0.160 second. The dash duration shall be typically three times the duration of a dot. The interval between dots and/or dashes shall be equal to that of one dot plus or minus 10 per cent. The interval between letters shall not be less than the duration of three dots.

SITING:

14.7.1.49 The offset localizer system shall be located and adjusted in accordance with the offset ILS provisions of the Procedures for Air Navigation Services — Aircraft Operations (PANS-OPS) (Doc 8168), Volume II, and the localizer standards shall be referenced to the associated fictitious threshold point.

14.7.1.50 In the case of localizers in which the basic functions are provided by the use of a two-frequency system, the conditions requiring initiation of monitor action shall include the case when the DDM in the required coverage beyond plus or minus 10 degrees from the front course line, except in the back course sector, decreases below 0.155.

14.7.1.51 The total period of radiation, including period(s) of zero radiation, outside the performance limits shall be as short as practicable, consistent with the need for avoiding interruptions of the navigation service provided by the localizer.

14.7.1.52 The total period shall not exceed under any circumstances:

10 seconds for Facility Performance Category I localizers;

5 seconds for Facility Performance Category II localizers;

2 seconds for Facility Performance Category III localizers.

14.7.1.53 Where practicable, the total period shall be reduced so as not to exceed two seconds for Facility Performance Category II localizers and one second for Facility Performance Category III localizers.

MONITORING:

14.7.1.54 Design and operation of the monitor system shall be consistent with the requirement that navigation guidance and identification will be removed and a warning provided at the designated remote control points in the event of failure of the monitor system itself.

INTERFERENCE IMMUNITY PERFORMANCE FOR ILS LOCALIZER RECEIVING SYSTEM:

14.7.1.55 The ILS localizer receiving system shall provide adequate immunity to interference from two -signal, third- order intermodulation products caused by VHF FM broadcast signals having levels in accordance with the following:

$2N1 + N2 + 72 \leq 0$ for VHF FM sound broadcasting signals in the range 107.7 – 108.0 MHz and

≤ 0

for VHF FM sound broadcasting signals below 107.7 MHz,

where the frequencies of the two VHF FM sound broadcasting signals produce, within the receiver, a two-signal, third-order intermodulation product on the desired ILS localizer frequency.

N1 and N2 are the levels (dBm) of the two VHF FM sound broadcasting signals at the ILS localizer receiver input. Neither level shall exceed the desensitization criteria..

$\Delta f = 108.1 - f1$, where f1 is the frequency of N1, the VHF FM sound broadcasting signal closer to 108.1 MHz.

14.7.1.56 The ILS localizer receiving system shall not be desensitized in the presence of VHF FM broadcast signals having levels in accordance with the following table:

Maximum level of unwanted Frequency (dBm)	signal at receiver input (MHz)
88-102	+15
104	+10
106	+5
107.9	–10

14.7.1.57 The radiation from the UHF glide path antenna system shall produce a composite field pattern which is amplitude modulated by a 90 Hz and a 150 Hz tone. The pattern shall be arranged to provide a straight line descent path in the vertical plane containing the centre line of the runway, with the 150 Hz tone predominating below the path and the 90 Hz tone predominating above the path to at least an angle equal to 1.75 θ.

14.7.1.58 The radiation from the UHF glide path antenna system shall produce a composite field pattern which is amplitude modulated by a 90 Hz and a 150 Hz tone. The pattern shall be arranged to provide a straight line descent path in the vertical plane containing the centre line of the runway, with the 150 Hz tone predominating below the path and the 90 Hz tone predominating above the path to at least an angle equal to 1.75 θ. be 3 degrees. ILS glide path angles in excess of 3 degrees shall not be used except where alternative means of satisfying obstruction clearance requirements are impracticable.

14.7.1.59 The glide path angle shall be adjusted and maintained within:

a) 0.075 θ from θ for Facility Performance Categories I and II — ILS glide paths;

b) 0.04 θ from θ for Facility Performance Category III — ILS glide paths.

14.7.1.60 The downward extended straight portion of the ILS glide path shall pass through the ILS reference datum at a height ensuring safe guidance over obstructions and also safe and efficient use of the runway served.

14.7.1.61 The height of the ILS reference datum for Facility Performance Categories II and III — ILS shall be 15 m (50 ft). A tolerance of plus 3 m (10 ft) is permitted.

14.7.1.62 The height of the ILS reference datum for Facility Performance Category I — ILS shall be 15 m (50 ft). A tolerance of plus 3 m (10 ft) is permitted.

14.7.1.63 The height of the ILS reference datum for Facility Performance Category I — ILS used on short precision approach runway codes 1 and 2 shall be 12 m (40 ft). A tolerance of plus 6 m (20 ft) is permitted.

GLIDE PATH RADIO FREQUENCY:

14.7.1.64 The glide path equipment shall operate in the band 328.6 MHz to 335.4 MHz. Where a single radio frequency carrier is used, the frequency tolerance shall not exceed 0.005 per cent. Where two carrier glide path systems are used, the frequency tolerance shall not exceed 0.002 per cent and the nominal band occupied by the carriers shall be symmetrical about the assigned frequency. With all tolerances applied, the frequency separation between the carriers shall not be less than 4 kHz nor more than 32 kHz.

14.7.1.65 The emission from the glide path equipment shall be horizontally polarized.

14.7.1.66 For Facility Performance Category III — ILS glide path equipment, signals emanating from the transmitter shall contain no components which result in apparent glide path fluctuations of more than 0.02 DDM peak to peak in the frequency band 0.01 Hz to 10 Hz.

COVERAGE:

14.7.1.67 The glide path equipment shall provide signals sufficient to allow satisfactory operation of a typical aircraft installation in sectors of 8 degrees in azimuth on each side of the centre line of the ILS glide path, to a distance of at least 18.5 km (10 NM) up to 1.75 θ and down to 0.45 θ above the horizontal or to such lower angle, down to 0.30 θ, as required to safeguard the promulgated glide path intercept procedure.

14.7.1.68 In order to provide the coverage for glide path performance specified in 3.1.5.3.1, the minimum field strength within this coverage sector shall be 400 microvolts per metre (minus 95 dBW/m2). For Facility Performance Category I glide paths, this field strength shall be provided down to a height of 30 m (100 ft) above the horizontal plane containing the threshold. For Facility Performance Categories II and III glide paths, this field strength shall be provided down to a height of 15 m (50 ft) above the horizontal plane containing the threshold.

ILS GLIDE PATH STRUCTURE:

14.7.1.69 For Facility Performance Category I — ILS glide paths, bends in the glide path shall not have amplitudes which exceed the following: For Facility Performance Category I — ILS glide paths, bends in the glide path shall not have amplitudes which exceed the following:

Zone
Amplitude (DDM) (95% probability)

Outer limit of coverage to
ILS Point “C”

14.7.1.70 For Facility Performance Categories II and III — ILS glide paths, bends in the glide path shall not have amplitudes which exceed the following: For Facility Performance Categories II and III — ILS glide paths, bends in the glide path shall not have amplitudes which exceed the following:

Zone
Amplitude (DDM) (95% probability)

Outer limit of coverage to ILS Point “A”	0.035
ILS Point “A” to ILS Point “B”	0.035 at ILS Point “A” decreasing at a linear rate to 0.023 at ILS Point “B”
ILS Point “B” to the ILS reference datum	0.023

CARRIER MODULATION:

14.7.1.71 The nominal depth of modulation of the radio frequency carrier due to each of the 90 Hz and 150 Hz tones shall be 40 per cent along the ILS glide path. The depth of modulation shall not deviate outside the limits of 37.5 per cent to 42.5 per cent.

14.7.1.72 The following tolerances shall be applied to the frequencies of the modulating tones:

a) the modulating tones shall be 90 Hz and 150 Hz within 2.5 per cent for Facility Performance Category I — ILS;

b) the modulating tones shall be 90 Hz and 150 Hz within 1.5 per cent for Facility Performance Category II — ILS;

c) the modulating tones shall be 90 Hz and 150 Hz within 1 per cent for Facility Performance Category III — ILS;

d) the total harmonic content of the 90 Hz tone shall not exceed 10 per cent: additionally, for Facility Performance Category III equipment, the second harmonic of the 90 Hz tone shall not exceed 5 per cent;

e) the total harmonic content of the 150 Hz tone shall not exceed 10 per cent.

14.7.1.73 For Facility Performance Category I — ILS, the modulating tones shall be 90 Hz and 150 Hz within plus or minus 1.5 per cent where practicable.

14.7.1.74 For Facility Performance Category III glide path equipment, the depth of amplitude modulation of the radio frequency carrier at the power supply frequency or harmonics, or at other noise frequencies, shall not exceed 1 per cent.

14.7.1.75 The modulation shall be phase-locked so that within the ILS half glide path sector, the demodulated 90 Hz and 150 Hz wave forms pass through zero in the same direction within:

a) for Facility Performance Categories I and II — ILS glide paths: 20 degrees;

b) for Facility Performance Category III — ILS glide paths: 10 degrees, of phase relative to the 150 Hz component, every half cycle of the combined 90 Hz and 150 Hz wave form.

14.7.1.76 Alternative two-frequency glide path systems that employ audio phasing different from the normal in-phase condition shall be permitted. In these alternative systems, the 90 Hz to 90 Hz phasing and the 150 H z to 150 Hz phasing shall be adjusted to their nominal values to within limits.

14.7.1.77. Facility Performance Category I — ILS.

The Category I ILS shall provide guidance information from the coverage limit of the ILS to the point at which the localizer course line intersects the ILS glide path at a height of 60/30 m (200/100 ft) or less above the horizontal plane containing the threshold.

Note. The lower limit is set to 30 m (100 ft) below the minimum Category I decision height (DH).

14.7.1.78 Facility Performance Category II — ILS.

Category II ILS shall provide guidance information from the coverage limit of the ILS to the point at which the localizer course line intersects the ILS glide path at a height of 15 m (50 ft) or less above the horizontal plane containing the threshold.

Note. The lower limit is set to 15 m (50 ft) below the minimum Category II decision height (DH).

14.7.1.79 Facility Performance Categories I, II and III — ILS

(a) Facility Performance Categories I, II and III — ILS shall provide indications at designated remote-control points of the operational status of all ILS ground system components, as follows:

(1) for all Facility Performance Category II and Category III ILS, the air traffic services unit involved in the control of aircraft on the final approach shall be one of the designated remote-control points and shall receive information on the operational status of the ILS, with a delay commensurate with the requirements of the operational environment;

(2) for a Facility Performance Category I ILS, if that ILS provides an essential radio navigation service, the air traffic services unit involved in the control of aircraft on the final approach shall be one of the designated remote-control points and shall receive information on the operational status of the ILS, with a delay commensurate with the requirements of the operational environment.

Note 1. The indications required by this Standard are intended as a tool to support air traffic management functions and the applicable timeliness requirements are sized accordingly.

(b) To ensure an adequate level of safety, the ILS shall be so designed and maintained that the probability of operation within the performance requirements specified is of a high value, consistent with the category of operational performance concerned.

(c) For Facility Performance Category II and III localizers and glide paths, the level of integrity and continuity of service shall be at least Level 3.

Note. The specifications for Facility Performance Categories II and III — ILS are intended to achieve the highest degree of system integrity, reliability and stability of operation under the most adverse environmental conditions to be encountered.

(d) At those locations where two separate ILS facilities serve opposite ends of a single runway, and operationally harmful interference would be present if both facilities were transmitting, an interlock shall ensure that only the localizer serving the approach direction in use shall radiate.

Note 1. While a low height overflight of a transmitting localizer may generate interference within airborne ILS receivers, this interference may only be considered as operationally harmful when it occurs in specific conditions, e.g. without visual cues of the runway, or when the autopilot is engaged.

Note 2. Interference may also be caused by transmissions from other localizers not serving the opposite end of the same runway (i.e. crossing, parallel or adjacent runways). In such cases, use of interlock to prevent the interference can also be considered.

Note 3. an interlock can be provided through hardware, software or an equivalent procedural means.

(e) At those locations where an ILS facility and a GBAS facility serve opposite approach directions to the same runway, when the approach direction in use is not the direction served by the ILS, the localizer shall not radiate when GBAS low visibility operations that require GAST D are being conducted, except where it can be demonstrated that the localizer signal supports compliance with the requirements in defining the desired to undesired signal ratios and the maximum adjacent channel power tolerable by the GBAS VDB receiver.

Note. If the localizer is radiating there is a possibility of interference to the GBAS VDB signals in the region where the Aircraft overflies the localizer. A means to ensure that the localizer does not radiate can be provided through either hardware or software interlock or a procedural mitigation.

(f) For Facility Performance Category I localizers, the minimum field strength on the ILS glide path and within the localizer course sector from a distance of 18.5 km (10 NM) to a height of 60/30 m (200/100 ft) above the horizontal plane containing the threshold shall be not less than 90 microvolts per metre (minus 107 dBW/m2).

(g) The 90 Hz modulating tone of one carrier shall be phase-locked to the 90 Hz modulating tone of the other carrier so that the demodulated wave forms pass through zero in the same direction within:

(1) for Facility Performance Categories I and II localizers: 20 degrees; and

(2) for Facility Performance Category III localizers: 10 degrees, of phase relative to 90 Hz. Similarly, the 150 Hz tones of the two carriers shall be phase-locked so that the demodulated wave forms pass through zero in the same direction within:

i. for Facility Performance Categories I and II localizers: 20 degrees; and

ii. for Facility Performance Category III localizers: 10 degrees, of phase relative to 150 Hz.

14.7.1.80 Displacement sensitivity

(a) The nominal displacement sensitivity within the half course sector shall be the equivalent of 0.00145 DDM/m (0.00044 DDM/ft) at the ILS reference datum except that for Facility Performance Category I localizers, where the specified nominal displacement sensitivity cannot be met, the displacement sensitivity shall be adjusted as near as possible to that value. For Facility Performance Category I localizers on runway codes 1 and 2, the nominal displacement sensitivity shall be achieved at the ILS Point “B”. The maximum course sector angle shall not exceed six degrees.

(b) Facility Performance Category III localizers shall not provide such a channel, except where extreme care has been taken in the design and operation of the facility to ensure that there is no possibility of interference with the navigational guidance.

Note. It is important to recognize that a frequency change resulting in a loss of the frequency difference may produce a hazardous condition. This problem is of greater operational significance for Facility Performance Categories II and III installations. As necessary, this problem can be dealt with through special monitoring provisions or highly reliable circuitry.

Note. Integrity and continuity of service levels and requirements.The probability of not radiating false guidance signals shall not be less than 1 – 0.5 × 10–9 in any one landing for Facility Performance Categories II and III localizers. A localizer shall be assigned a level of integrity and continuity of service.

Note. Levels are used to provide the necessary information for the determination of the category of operation and associated minima, which are a function of the Facility Performance Category, the (separate) integrity and continuity of service level, and a number of operational factors (e.g. aircraft and crew qualification, meteorological conditions, and runway features). If a localizer does not meet its required integrity and continuity of service level, some operational use may still be possible. Similarly, if a localizer exceeds the minimum integrity and continuity of service level, more demanding operations may be possible.

(c) The localizer level shall be Level 1 if either:

(1) the localizer’s integrity of service or its continuity of service, or both, are not demonstrated; or

(2) the localizer’s integrity of service and its continuity of service are both demonstrated, but at least one of them does not meet the requirements of Level 2.

(d) The localizer level shall be Level 2 if:

(1) the probability of not radiating false guidance signals is not less than 1 – 1.0 x 10–7 in any one landing; and

(2) the probability of not losing the radiated guidance is greater than 1 – 4 × 10–6 in any period of 15 seconds (equivalent to 1 000 hours mean time between outages).

(e) The localizer level shall be Level 3 if:

(1) the probability of not radiating false guidance signals is not less than 1 – 0.5 × 10–9 in any one landing; and

(2) the probability of not losing the radiated guidance is greater than 1 – 2 × 10–6 in any period of 15 seconds (equivalent to 2 000 hours mean time between outages).

(f) The localizer level shall be Level 4 if:

(1) the probability of not radiating false guidance signals is not less than 1 – 0.5 × 10–9 in any one landing; and

(2) the probability of not losing the radiated guidance is greater than 1 – 2 × 10–6 in any period of 30 seconds (equivalent to 4 000 hours mean time between outages).

(g) With two-frequency glide path systems,

(1) shall apply to each carrier. In addition, the 90 Hz modulating tone of one carrier shall be phase-locked to the 90 Hz modulating tone of the other carrier so that the demodulated wave forms pass through zero in the same direction within:

i. for Facility Performance Categories I and II — ILS glide paths: 20 degrees;

ii. for Facility Performance Category III — ILS glide paths: 10 degrees

iii. for Facility Performance Category III — ILS glide paths: 10 degrees, of phase relative to 90 Hz. Similarly, the 150 Hz tones of the two carriers shall be phase-locked so that the demodulated wave forms pass through zero in the same direction, within:

A. for Facility Performance Categories I and II — ILS glide paths: 20 degrees;

B. for Facility Performance Category III — ILS glide paths: 10 degrees, of phase relative to 150 Hz.

(h) The automatic monitor system shall provide a warning to the designated control points and cause radiation to cease if any of the following conditions persist:

(1) shift of the mean ILS glide path angle equivalent to more than minus 0.075 θ to plus 0.10 θ from θ;

(2) in the case of ILS glide paths in which the basic functions are provided by the use of a single frequency system, a reduction of power output to less than 50 percent of normal, provided the glide path continues to meet the requirements of 14.7.1.9(m), 14.7.1.9(n)and 14.7.1.9(o);

(3) in the case of ILS glide paths in which the basic functions are provided by the use of two frequency systems, a reduction of power output for either carrier to less than 80 percent of normal, except that a greater reduction to between 80 per cent and 50 per cent of normal may be permitted, provided the glide path

continues to meet the requirements of 14.7.1.9(m), 14.7.1.9(n)and 14.7.1.9(o);

(4) for Facility Performance Category I — ILS glide paths, a change of the angle between the glide path and the line below the glide path (150 Hz predominating) at which a DDM of 0.0875 is realized by more than the greater of:

(i) plus, or minus 0.0375 θ; or

(ii) an angle equivalent to a change of displacement sensitivity to a value differing by 25 per cent from the nominal value:

(5) for Facility Performance Categories II and III — ILS glide paths, a change of displacement sensitivity to a value differing by more than 25 per cent from the nominal value;

(6) lowering of the line beneath the ILS glide path at which a DDM of 0.0875 is realized to less than 0.7475 θ from horizontal;

(7) a reduction of DDM to less than 0.175 within the specified coverage below the glide path sector.

(i) Integrity and continuity of service levels and requirements.

(j) A glide path shall be assigned a level of integrity and continuity of service.

Note. Levels are used to provide the necessary information for the determination of the category of operation and associated minima, which are a function of the Facility Performance Category, the (separate) integrity and continuity of service level, and a number of operational factors (e.g. aircraft and crew qualification, meteorological conditions, and runway features). If a glide path does not meet its required integrity and continuity of service level, some operational use may still be possible. Similarly, if a glide path exceeds the minimum integrity and continuity of service level, more demanding operations may be possible.

(k) The glide path level shall be Level 1 if either:

(1) The glide path's integrity of service or its continuity of service, or both, are not demonstrated; or

(2) The glide path's integrity of service and its continuity of service are both demonstrated, but at least one of them does not meet the requirements of Level 2.

(l) The glide path level shall be Level 3 or 4 if:

(1) The probability of not radiating false guidance signals is not less than 1 – 0.5 × 10–9 in any one landing; and

(2) The probability of not losing the radiated guidance is greater than 1

– 2 × 10–6 in any period of 15 seconds (equivalent to 2 000 hours mean time between outages).

Note. The requirements for glide path Level 3 and Level 4 are the same. The declaration of the glide path integrity and continuity of service levels should match the declaration of the localizer (i.e. the glide path is declared as Level 4 if the localizer is meeting Level 4).

(m) Coverage.

(1) The glide path equipment shall provide signals sufficient to allow satisfactory operation of a typical aircraft installation in sectors of 8 degrees in azimuth on each side of the centre line of the ILS glide path, to a distance of at least 18.5 km (10 NM) up to 1.75θ and down to 0.45 θ above the horizontal or to such lower angle, down to 0.30 θ as required to safeguard the promulgated glide path intercept procedure.

(2) In order to provide the coverage for glide path performance specified in 14.7.1.9(m)(1), the minimum field strength within this coverage sector shall be 400 microvolts per metre (minus 95 dBW/m2). For Facility Performance Category I glide paths, this field strength shall be provided down to a height of 30 m (100ft) above the horizontal plane containing the threshold. For Facility Performance Categories II and III glide paths, this field strength shall be provided down to a height of 15 m (50 ft) above the horizontal plane containing the threshold.

(n) ILS glide path structure.

(1) For Facility Performance Category I — ILS glide paths, bends in the glide path shall not have amplitudes which exceed the following:

zone	Amplitude (DDM) (95% probability)
Outer limit of coverage to	0.035
ILS Point “A” to ILS Point “B”	0.035 at ILS Point “A” decreasing at a linear rate to 0.023 at ILS point “B”
ILS Point “B” to the ILS reference datum	0.023

(2) In order to provide the coverage for glide path performance specified in 14.7.1.9(m)(1), the minimum field strength within this coverage sector shall be 400 microvolts per metre (minus 95 dBW/m2). For Facility Performance Category I glide paths, this field strength shall be provided down to a height of 30 m (100ft) above the horizontal plane containing the threshold. For Facility Performance Categories II and III glide paths, this field strength shall be provided down to a height of 15 m (50 ft) above the horizontal plane containing the threshold.

(0) Carrier modulation.

(1) The nominal depth of modulation of the radio frequency carrier due to each of the 90 Hz and 150 Hz tones shall be 40 per cent along the ILS glide path. The depth of modulation shall not deviate outside the limits of 37.5 per cent to 42.5 per cent.

(2) The following tolerances shall be applied to the frequencies of the modulating tones:

(i) the modulating tones shall be 90 Hz and 150 Hz within 2.5 per cent for Facility Performance Category I — ILS;

(ii) the modulating tones shall be 90 Hz and 150 Hz within 1.5 per cent for Facility Performance Category II — ILS;

(iii) the modulating tones shall be 90 Hz and 150 Hz within 1 per cent for Facility Performance Category III — ILS;

(iv) the total harmonic content of the 90 Hz tone shall not exceed 10 per cent: additionally, for Facility Performance Category III equipment, the second harmonic of the 90 Hz tone shall not exceed 5 per cent;

(v) the total harmonic content of the 150Hz tone shall not exceed 10 per cent.

(3) For Facility Performance Category I — ILS, the modulating tones should be 90 Hz and 150 Hz within plus or minus 1.5 percent where practicable.

(4) For Facility Performance Category III glide path equipment, the depth of amplitude modulation of the radio frequency carrier at the power supply frequency or harmonics, or at other noise frequencies, shall not exceed 1 per cent.

(5) The modulation shall be phase locked so that within the ILS half glide path sector, the demodulated 90 Hz and 150 Hz wave forms pass through zero in the same direction within:

(i) for Facility Performance Categories I and II — ILS glide paths: 20 degrees;

(ii) for Facility Performance Category III — ILS glide paths: 10 degrees,

(iii) of phase relative to the 150 Hz component, every half cycle of the combined 90 Hz and 150 Hz wave form.

(6) With two-frequency glide path systems, 14.7.1.9(o)(5) shall apply to each carrier. In addition, the 90 Hz modulating tone of one carrier shall be phase locked to the 90 Hz modulating tone of the other carrier so that the demodulated wave forms pass through zero in the same direction within:

(i) for Facility Performance Categories I and II — ILS glide paths: 20 degrees;

(ii) for Facility Performance Category III — ILS glide paths: 10 degrees, of phase relative to 90 Hz. Similarly, the 150 Hz tones of the two carriers shall be phase-locked so that the demodulated wave forms pass through zero in the same direction, within:

a. for Facility Performance Categories I and II — ILS glide paths: 20 degrees;

b. for Facility Performance Category III — ILS glide paths: 10 degrees, of phase relative to 150 Hz.

(7) Alternative two-frequency glide path systems that employ audio phasing different from the normal in-phase condition described in 14.7.1.9(o)(6) shall be permitted. In these alternative systems, the 90 Hz to 90 Hz phasing and the 150 Hz to 150 Hz phasing shall be adjusted to their nominal values to within limits equivalent to those stated in 14.7.1.9(o)(6).

Note. — This is to ensure correct airborne receiver operation within the glide path sector where the two carrier signal strengths are approximately equal.

14.7.1.81 Responsibilities of Air Navigation Services Provider

The holder of an Air Navigation Services Provider Approval shall ensure that the services listed in its Manual of Operations, are in accordance with the procedures prescribed in these Regulations.

(a) The Manual of Operations shall include the following information:

(1) Personnel requirements and the responsibilities of personnel as contained in IS 14.7.1.81 (b)(1);

(2) Training and checking of staff and how that information is tracked as contained in IS 14.7.1.81.(b)(2);

(3) Quality assurance/safety management system as contained in IS14.7.1.81 (b)(3);

(4) Contingency plans developed for partial or total system failure as contained in IS 14.7.1.81 (b)(4);

(5) Security plan as contained in IS 14.7.1.81.(b)(5);

(6) Minimum air navigation facility equipment list (MANFEL) applicable to class of Aerodrome as contained in; IS 14.7.1.81 (b)(6);

(7) Facilities and equipment and how those facilities are maintained as contained in IS 14.7.1.81 (b) (7);

(8) Fault and defect reporting;

(9) Maintenance of documents and records; and

(10) Other information requested by the Authority.

(b) The holder of Air Navigation Services Provider Approval shall keep at least one complete and current copy of its Manual of Operations at each Aeronautical Telecommunications Services unit specified in its Manual of Operations;

(c) Comply with the ICAO Annex 10 Volume I radio navigation aid, Annex 10 Volume II communication procedure with those of PANS-OPS, Annex 10 Volume III-Communication Systems (Part I Digital Data Communication Systems and Part II-

Voice Communication Systems), Annex 10 Volume IV (Surveillance And Avoidance Collision Systems),, Annex 10 Volume V frequency spectrum management and Annex 10 Volume VI (Remotely Piloted Aircraft Systems (RPAS) and with the Manual Of Standards prescribed by the Authority in the provision of Aeronautical Telecommunication Services.

(d) Make each applicable part of the Manual of Operations available to the personnel who require those parts to carry out their duties;

(e) Continue to comply with the appropriate requirements prescribed in these Regulations;

(f) Keep the records of all regular internal inspections for a period of five years from the date of each inspection;

(g) Furnish the Authority with the enroute, terminal and aerodrome facility statistics, status, and performance index;

(h) Replace or upgrade any degraded facility;

(i) keep the Authority informed of its plans for the development and modernization of its facilities.

(j) Develop Standard Operating Procedure (SOP) Manual for each facility in the certificate as Contained in IS.14.7.1.81(k)

14.7.1.82. Site validation, Safety Inspections and Audits.

An applicant for the Issuance of a Air Navigation Services Provider Approval shall permit the Authority's Inspector to carry out, safety inspections and audits as may be necessary to verify the validity of any application made in accordance with these Regulations.

(a) The holder of an Air Navigation Services Approval shall permit the Authority to carry out such safety audits and inspections Aeronautical Telecommunications facility, safety inspections and audits as may be necessary to determine compliance with the appropriate requirements prescribed in this subpart and for post implementation monitoring to verify that the certificate holder continues to meet the defined level of safety.

(b) The holder of an Air Navigation Services Provider Approval shall permit the Authority to carry out site validation inspection prior to installation and participate in the conduct of Factory Acceptance Test (FAT)

(c) The holder of an Air Navigation Services Provider Approval shall permit the Authority’s Inspector to carry out radio frequency audit to ascertain the usability and status of the assigned frequencies.

14.7.1.83 Persons Authorized to perform Equipment/ Facility Inspections.

(a) No person shall perform equipment/facility inspections prior to, or after commissioning, maintenance, preventive maintenance, and upgrade, except such person holds an ATSEP licence or is authorized by the Authority.

(b) An ATSEP licensed personnel shall conduct the required inspections of Radio Navigation Aids facility for which such personnel is rated and current.

14.7.1.84 Impairment of assigned aeronautical radio frequency.
No person shall alter, change, swap or reassign any radio frequency already in use without the approval of the Authority.

14.7.1.85. Exemptions

(a) The Authority may exempt, in writing, Air Navigation Services Provider from complying with specific provisions of these Regulations;

(b) The exemption process shall be in accordance with Nig.CARs Part 1.4;

(c) An exemption is subject to the Air Navigation Services Provider complying with the conditions and procedures specified by the Authority in the Aeronautical Telecommunications Certificate as being necessary in the interest of safety;

(d) When Air Navigation Service does not meet the requirement of a standard or practice specified in these Regulations and other relevant advisory documents, the Authority may determine, after evaluating the operational manual and operational environment where such facilities or services are to be provided by the Air Navigation Service Provider, the conditions and procedures that are necessary to ensure a level of safety equivalent to that established by the relevant Regulations;

(e) Deviation from these Regulations and the conditions and procedures shall be set out in an endorsement on the Air Navigation Services Approval and published in the AIP.

(f) Differences in radio navigation aids in any respect from the Standards Shall be published in an Aeronautical Information Publication (AIP).

(g) Wherever there is installed radio navigation aid that is neither an ILS nor an MLS, equipment designed for use with the ILS or MLS, full details of parts that may be so used shall be published in an Aeronautical Information Publication (AIP).

Note. This provision is to establish a requirement for promulgation of relevant information rather than to authorize such installations

14.7.1.86. Certification of Radio Navigation equipment, facility and procedures.

The Authority shall certify all the Air Navigation Services Communications, Navigation, Surveillance, landing aids, products, facilities and procedures before their deployment in the Nigerian airspace and aerodrome.

14.7.1.87. Requirements for the Global Navigation Satellite System (GNSS)

(a) The holder of an Air Navigation Services Approval shall provide navigation information specifications to permit the use of GNSS procedures.

(b) Time reference. The time data provided by the GNSS to the user shall be expressed in a time scale that takes the Universal Time Coordinated Co-ordinated Universal Time (UTC) as reference.

(c) Satellite-based augmentation system (SBAS) Service Provider shall provide SBAS services.

(d) SBAS shall raise an alarm within 8 seconds if any combination of active data and GNSS signals-in-space results in an out-of-tolerance condition for enroute through APV I.

Note. The monitoring applies to all failure conditions, including failures in core satellite constellation(s) or SBAS satellites.

14.7.1.88. IOD monitoring.

(a) SBAS shall monitor the GPS IODE values for possible invalid transmissions of values used previously for a different set of ephemeris parameters within the time interval(s) and take appropriate action to ensure the integrity of its broadcast corrections, if such an invalid use is detected.

Note1. The IOD uniqueness is granted by design in the case of SBAS augmenting GLONASS satellites.

Note2. The GPSIODC is not currently used in the processing of GPSL1 navigation messages in an SBAS receiver mode. Therefore, monitoring is not specifically required.

14.7.1.89. Robustness to core satellite constellation(s) failures.

(a) Upon occurrence of a core satellite constellation (s)satellite anomaly, SBAS shall continue to operate normally using the available healthy satellite signals that can be tracked.

(b) Low-frequency data. Except during an ephemeris change, the first ranging source in the Type 1, Type 11 or Type 101 message shall sequences o that the low-frequency data for Type1 message, for Type 11 message and for Type 101 message) for each core satellite constellation’s ranging source are transmitted at least once every 10 seconds. During an ephemeris change, the first ranging source shall sequence so that the low frequency for each core satellite constellation’s ranging source is transmitted at least once every 27 seconds.

(c) Adjacent channel rejection. The level of ILS localizer or VOR undesired signals shall be measured as the power in the RF carrier.

Note. Even though S max is the maximum desired VHF data broadcast signal power, it is also used to limit the maximum adjacent channel undesired signal power at the receiver input.

(d) First adjacent 25kHz channels(±25kHz). The VHF data broadcast receiver shall meet the requirements in the presence of an undesired signal with power levels at the receiver input up to Smax offset by 25kHz on either side of the desired channel that is either:

(1) 18dB above the desired signal power at the receiver input when the undesired signal is another VHF data broadcast signal assigned to the same time slot(s); or

(2) equal in power at the receiver input when the undesired signal is VOR; or.

(3) equal in power at the receiver input when the undesired signal is ILS localizer.

(e) Second adjacent 25kHz channels (±50kHz). The VHF data broadcast receiver shall meet the requirements in the presence of an undesired signal with power levels at the receiver input up to Smax offset by 50kHz on either side of the desired channel that is either:

(1) 43dB above the desired signal power at the receiver input when the undesired signal is another

(2) VHF data broadcast source assigned to the same time slot (s); or

(3) 34dB above the desired signal power at the receiver input when the undesired signal is VOR; or

(4) 34dB above the desired signal power at the receiver input when the undesired signal is ILS localizer.

(f) Third up to thirty-ninth and beyond adjacent 25kHz channels (±75kHzto±975kHzor). The VHF data broadcast receiver shall meet the requirements in the presence undesired signal with power levels at the receiver input up to Smax offset by 75kHz to 975 or more on either side of the desired channel that is either:

(1) 46dB above the desired signal power at the receiver input when the undesired signal is another VHF data broadcast signal assigned to the same time slot(s); or

(2) 46dB above the desired signal power at the receiver input when the undesired signal is VOR; or.

(3) when the undesired signal is ILS

(g) Course bends. Localizer course bends shall be evaluated in terms of the course structure. With regard to landing and roll, this course structure is based on the desire to provide adequate guidance for manual and/or automatic operations along the runway in low visibility conditions. With regard to Facility Performance Category I in the approach phase, this course structure 46dB above the desired signal power at the receiver input is based on the desire to restrict aircraft deviations, due to course bends (95percent probability basis)at the 30m (100ft)height, to lateral displacement of less than10m (30ft).With regard to Facility Performance Categories II and III in the approach phase, this course structure is based on the desire to restrict aircraft deviations due to course bends (95percent probability basis) in the region between ILS Point Band the ILS reference datum (Facility Performance Category II facilities) or Point D (Facility Performance Category III facilities), to less than 2 degrees of roll and pitch attitude and to lateral displacement of less than 5m (15ft).

(h) ILS glide path bends. Bends shall be evaluated in terms of the ILS glide path structure with regard to Facility Performance Category I. This glide path structure is based on the desire to restrict aircraft deviations due to glide path bends (95 percent probability basis) at the 30m (100ft) height, to vertical displacements of less than 3m(10ft).With regard to Facility Performance Categories II and III, this glide path structure is based on the desire to restrict aircraft deviations due to path bends (95 percent probability basis) at the 15m (50ft) height, to less than 2 degrees of roll and pitch attitude and to vertical displacements of less than 1.2m (4ft) the relationship between the maximum(95 percent probability) localizer course/glide path bend amplitudes and distances from the runway threshold that have been specified for Facility Performance Categories I, II and III ILS performance.

(i) Technical determination of critical and sensitive area dimensions.

Critical and sensitive areas are normally calculated in the planning stage, prior to ILS installation, usingComputer simulation. A similar process is used when there are changes to the installation or to the environment. When using computer simulations, it is necessary to allocate the protection of individual Parts of the approach to either the critical or sensitive area. It is desirable to ensure that the combined Critical and sensitive areas protect the entire approach. However, this may not be possible in all cases. Furthermore, if the logic is used, this may lead to restrictively large critical areas. Some States have found that a reasonable compromise can be achieved using a different logic, where by the critical area protects the segment from the edge of coverage down to 2NM from the Runway threshold, while the sensitive area protects the approach from 2NM down to the runway. In this case, a sensitive area for Category I operations will exist and may require operational mitigation.

(j) IOD monitoring. SBAS shall monitor the GPS IODE values for possible invalid 14 transmissions of values used previously for a different set of ephemeris parameters within the time interval(s) and take appropriate action to ensure the integrity of its broadcast corrections, if such an invalid use is detected.

Note 1. The IOD uniqueness is granted by design in the case of SBAS augmenting GLONASS satellites.

Note 2. The GPS IODC is not currently used in the processing of GPS L1 navigation messages in an SBAS receiver mode. Therefore, monitoring is not specifically required.

(k) Low-frequency data. Except during an ephemeris change, the first ranging source in the Type 1, Type 11 or Type 101 message shall sequence so that the ephemeris decorrelation parameter, ephemeris CRC and source availability duration low-frequency data for Type 1 message, for Type 11 message and for Type 101 message) for each core satellite constellation's ranging source are transmitted at least once every 10 seconds. During an ephemeris change, the first ranging source shall sequence so that the low-frequency data for each core satellite constellation's ranging source are transmitted at least once every 27 seconds. VHF data broadcast monitoring. The data broadcast transmissions shall be monitored. The transmission of the data shall cease within 0.5 seconds in case of continuous disagreement during any 3-second period between the transmitted application data and the application data derived or stored by the monitoring system prior to transmission. For FAST D ground subsystems, the transmission of the data Type 11 messages shall cease within 0.5 seconds in case of continuous disagreement during any 1-second period between the transmitted application data and the application data derived or stored by the monitoring system prior to transmission.

Note. For ground subsystems that support authentication, ceasing the transmission of data means ceasing the transmission of Type 1 messages and/or Type 11 messages if applicable or ceasing the transmission of Type 101 messages. The ground subsystem must still transmit messages such that the defined percentage or more of every assigned slot is occupied. This can be accomplished by transmitting Type 2, Type 3, Type 4 and/or Type 5 messages.

(l) VHF data broadcast receiver performance
VHF data broadcast message failure rate. The VHF data broadcast receiver shall achieve a message failure rate less than or equal to one failed message per 1 000 full-length (222 bytes) application data messages, within the range of the RF field strength as received by the airborne antenna., provided that this requirement shall apply when the variation in the average received signal power between successive bursts in a given time slot does not exceed 40 dB. Failed messages include those lost by the VHF data broadcast receiver system or which do not pass the CRC after application of the FEC.

(m) Co-channel rejection.
ILS localizer as the undesired signal. The VHF data broadcast receiver shall meet the requirements in the presence of an undesired co-channel ILS localizer signal that is 26 dB below the desired VHF data broadcast signal power at the receiver input.

(n) Adjacent channel rejection.
The level of ILS localizer or VOR undesired signals shall be measured as the power in the RF carrier.

Note. Even though Smax is the maximum desired VHF data broadcast signal power, it is also used to limit the maximum adjacent channel undesired signal power at the receiver input.

(1) First adjacent 25 kHz channels (±25 kHz). The VHF data broadcast receiver shall meet the requirements of a transmitted undesired signal with power levels at the receiver input up to Smax offset by 25 kHz on either side of the desired channel that is either:

i. 18 dB above the desired signal power at the receiver input when the undesired signal is another VHF data broadcast signal assigned to the same time slot(s); or

ii. equal in power at the receiver input when the undesired signal is VOR; or.

iii. equal in power at the receiver input when the undesired signal is ILS localizer.

(2) Second adjacent 25 kHz channels (±50 kHz). The VHF data broadcast receiver shall meet the requirements of a transmitted undesired signal with power levels at the receiver input up to Smax offset by 50 kHz on either side of the desired channel that is either:

i. 46 dB above the desired signal power at the receiver input when the undesired signal is another VHF data broadcast signal assigned to the same time slot(s); or

ii. 46 dB above the desired signal power at the receiver input when the undesired signal is VOR; or.

iii. 46 dB above the desired signal power at the receiver input when the undesired signal is ILS localizer.

(3) Fortieth and beyond adjacent 25 kHz channels (±1 MHz or more). The VHF data broadcast receiver shall meet the requirements specified in the presence of an undesired signal offset by 1 MHz or more on either side of the desired channel that is either:

i. 46 dB above the desired signal power at the receiver input when the undesired signal with power levels at the receiver input up to Smax is another VHF data broadcast signal assigned to the same time slot(s); or

ii. 46 + ΔP dB above the desired signal power at the receiver input when the undesired signal is a VOR with power levels at the receiver input up to Smax – ΔP dB and ΔP ranges from 0 to 14 dB; or

iii. 46 + ΔP dB above the desired signal power at the receiver input when the undesired signal is an ILS localizer with power levels at the receiver input up to Smax – ΔP dB and ΔP ranges from 0 to 14 dB.

Note 1. ΔP equals Smax minus the undesired signal power at the receiver input with the following two constraints. ΔP equals 0 dB when the undesired power reaches Smax. ΔP equals 14 dB when the undesired power is 14 dB or more below Smax.

Note 2. The requirements in items b) and c) accommodate a third order inter modulation between the undesired signal and the local oscillator in the first mixer of the RF front-end of the VDB receiver; it is similar to the FM inter modulation immunity where N1 is the undesired signal and N2 is the local oscillator.

(4) Receiver recovery from short-term excess undesired signal power. The VHF data broadcast receiver shall meet the requirements within 187.5 milliseconds (equivalent duration of three VDB slots) after encountering an adjacent channel interference signal (ILS localizer or VOR) whose power is above Smax for no more than 2.5 seconds and by no more than 9 dB at the receiver input.

Note 1. This requirement supports brief excessive power received during ILS localizer and VOR overflight. The duration of the excess power is limited by the continuity of the operation, e.g., the opportunity to receive three Type 1 messages in every 3.5 second window without excess power for GAST C. For GAST D, no excess power is allowed when the timeout is 1.5 seconds. A VDB undesired signal never exceeds the maximum allowed field strength of the desired VDB signal within the service volume.

(o) Compatibility with VHF communications.

For GBAS VDB assignments above 116.400 MHz, it is necessary to consider VHF communications and GBAS VDB compatibility. Considerations for assignment of these VDB channels include the frequency separation between the VHF communication and the VDB, the distance separation between the transmitter antennas and coverage areas, the field strengths, the polarization of the VDB signal, and the VDB and VHF communication receiver sensitivity. Both aircraft and ground VHF communication equipment are to be considered. For GBAS/E equipment with a transmitter maximum power of up to 150 W (100 W for horizontal component and 50 W for vertical component), the 64th channel (and beyond) will be below –112 dBm in a 25 kHz bandwidth at a distance of 80 m from the VDB transmitter antenna including an allowance of +5 dB increase due to constructive multipath. For GBAS/H equipment with a transmitter maximum power of 100 W, the 32nd channel (and beyond) will be below –112 dBm in a 25 kHz bandwidth at a distance of 80 m from the VDB transmitter antenna including an allowance of +5 dB increase due to constructive multipath, and a 10 dB polarization isolation. It must be noted that due to differences in the GBAS VDB and VDL transmitter masks, separate analysis must be performed to ensure VDL does not interfere with the GBAS VDB.

14.7.1.90. Recording and retention

(a) Recordings shall be retained for a period of at least 30 days.

Note. Recorded data may support accident and incident investigations, may also support periodic analysis to verify the GNSS performance parameters.

(b) When the recordings are pertinent to accident and incident investigations, they shall be retained or longer periods until it is evident that they will no longer be required.

14.7.1.91. Continued Serviceability, Availability and Maintainability of Radio Navigation Aids Facility and Components.

(a) The Radio Navigation Aids Services Provider shall be responsible for maintaining the Radio Navigation Aids facility by ensuring that—

(1) All maintenance, overhaul, alterations and repairs which may affect or alter continued serviceability are carried out as contained in the equipment maintenance manual;

(2) Maintenance personnel make appropriate entries in the logbook certifying the serviceability of the equipment;

(3) The approval for return to services is completed to the effect that the maintenance carried out has satisfactorily been completed in accordance with the equipment maintenance manual;

(4) Power supply for radio navigation aids and communication systems

(5) Radio navigation aids and ground elements of communication systems shall be provided with suitable power supplies and means to ensure continuity of service consistent with the use of the service(s) involved.

14.7.1.92. Faults and Defects Reporting.

The Air Navigation Services Provider shall maintain system for tracking and rectifying faults within the Aeronautical Telecommunications Services system.

(a) Procedure for reporting and the resolutions of faults and defects shall be documented in the manual of operations. This includes procedures for ensuring that the operational Status of Communications, Navigation and Surveillance, Air Navigation facilities are provided to the Air Traffic Services Provider.

(b) The Air Navigation Services Provider shall forward daily, weekly and monthly defect reports to the Authority.

(c) Air Navigation Services Provider shall report power system failures to the Authority as they occur.

14.7.1.93. Persons Authorized to Perform Maintenance, Preventive Maintenance and Alterations.

(a) No person shall perform maintenance on an Air Navigation facility, equipment part or component except such a person is:

(1) an Air Traffic Safety Electronic Personnel licensed by the Authority;

(2) working under supervision of an ATSEP license holder;

(3) a licensed ATSEP maintenance personnel performing or supervising the maintenance of an Air Navigation facility for which the personnel is rated.

(b) An Air Navigation facility manufacturer or its representative may:

(1) replace, upgrade, or alter any Air Navigation facility part manufactured by that manufacturer;

(2) Perform any inspection as prescribed in the Regulation and the Air Navigation Services Provider’s Manual of Operations (MOO).

14.7.1.94. Flight Inspection and Calibration.

The holder of an Air Navigation Services Approval, shall carry out flight calibration of navigation and landing aids and surveillance systems in accordance with the provisions of these Regulations.

14.7.1.95. Maximum Periodicity of Ground Check and Flight Calibration.

Radio Navigation Aids of the types covered by these Regulations and available for use by aircraft engaged in air navigation shall be subject to ground check and flight calibration as indicated below:

(a) Non-directional Beacon and distance measuring equipment shall be ground-checked once in 6months and flight calibrated once in 12months.

(b) Conventional Very High Frequency Omni-directional Radio range shall be ground-checked and flight-calibrated once in 12months.

(c) Doppler Very High Frequency Omni-directional Radio range shall be ground-checked once in 12months and be flight calibrated once in 3years.

(d) Instrument Landing System-Localizer and Glide slope shall be ground checked once in 3months and flight calibrated once in 6months.

(e) Radar shall be calibrated once in 3years or after a major breakdown or modification.

Note. Guidance on the ground and flight testing of ICAO standard facilities, including the periodicity of the testing, is contained in the Manual on Testing of Radio Navigation Aids (Doc8071).

14.7.1.96. Approval for return of Equipment/ Facility to services.

(a) No person shall approve for return to services any Air Navigation facility that has undergone maintenance, preventive maintenance, or alteration/ or upgrading unless—

(b) The appropriate entry has been made in the maintenance logbook;

(c) The facility is tested, ground-checked and flight checked.

(d) No person shall make a description in a maintenance logbook of an Air Navigation on a facility as being altered/ upgraded except when dismantled, cleaned, Inspected and certified operation.

(e) No person shall approve the return to service of equipment/ facility after a major alteration or equipment part replacement unless such person has tested the equipment to determine satisfactory performance in accordance with the current manufacturer's recommendations.

14.7.1.97. Approval for return of Equipment/ Facility to services.

No person, other than the Chief Executive Officer of an Air Navigation Services Provider shall authorize the return to service, of an Air Navigation equipment/facility especially after a major component of the equipment/facility has been replaced or undergone maintenance or alteration.

14.7.1.98. Maintenance of Documents and Entries.

Each person who maintains, performs preventive maintenance, or alters/upgrades Air Navigation facility shall, make an entry in the maintenance logbook on satisfactory completion of the task as follows:

(a) A description (or reference to data acceptable to the Authority) of work performed, including—

(i) Appropriate details of alterations and repairs;

(ii) The current status of the Air Navigation facility on return to services.

(b) Completion date of the work performed;

(c) Name, signature, and type of license held if any by the person making such records and person approving the work.

(d) The holder of an Air Navigation Services Provider Approval shall provide the following operational documentation at locations of the Air Navigation Services unit:

(1) procedures manual;
(2) Manual of Operations;
(3) SOP Manual;
(4) AIP and AIP Supplements;
(5) AIC's and NOTAM;
(6) Civil Aviation Acts,2022;
(7) Aeronautical Search and Rescue Manual, issued by the Authority;
(8) airport emergency plan, where applicable;
(9) directives and instructions file;
(10) occurrence logbooks;
(11) equipment/facility status logbooks;
(12) Circulars and bulletins file;
(13) equipment manuals; and
(14) applicable documents.

(e) Air Navigation Services Provider shall ensure that:

(1) the documentation is reviewed and authorized by appropriate personnel before issued;
(2) current issues of relevant documentation are available to personnel;
(3) obsolete documentation is removed from all points of issue or use;
(4) changes to documentation are reviewed and approved by appropriate personnel; and
(5) the current version of each document can be identified to preclude the use of

obsolete editions.

(f) Air Navigation Services provider shall demonstrate that there is a system in place to record and retain operational data.

(g) Records shall be maintained on the following:

(1) regular reports and returns to the Authority;
(2) local incidents with remedial actions;
(3) personnel files including supervisory reports;
(4) training files;
(5) licence and medical validity details;
(6) minutes of facility maintenance meetings;
(7) rosters; and
(8) leave records.

14.7.1.99. Maintenance of Documents and Entries the Air Navigation Services Provider shall provide such assistance as requested from the agency responsible for conducting SAR activities.

14.7.1.100. General Requirement for Installation, Maintenance and Inspection

(a) No person may operate an Air Navigation Services facility unless the facility and its components are maintained in accordance with equipment certification procedures and the facility is inspected in accordance with the Authority's certification program.

(b) The facility maintenance procedure in the Air Navigation Services Provider's Manual of Operation shall include a description of the equipment and components and recommended methods for the accomplishment of maintenance tasks. Such information shall include guidance on fault diagnosis.

(c) The Air Navigation Services Provider's Manual of Operation shall include the maintenance tasks and the recommended intervals at which these tasks are to be performed.

(d) Maintenance tasks and frequencies that have been specified as mandatory by the manufacturer of the equipment shall be identified in the Manual of Operations which includes basic details of the maintenance carried out.

(e) The provision of air navigation facilities shall be of dual installation (with redundancies)

14.7.1.101. Performance Rules Maintenance, Preventive Maintenance or Alterations/ Upgrade.

(a) Each person performing maintenance, preventive maintenance, or alteration/upgrade on an Air Navigation Services facility shall use:

(1) the methods, techniques, and practices prescribed in these Regulations.

(2) the current manufacturer's maintenance manual or Manual of Operations for Continued Serviceability prepared by the Services Provider and approved by

the Authority.

(b) Each person shall use the tools, equipment, and test apparatus necessary to ensure completion of the work in accordance with accepted industry practices. If the equipment manufacturer involved recommends special equipment or test apparatus, the person performing maintenance shall use that equipment or apparatus or its equivalent acceptable to the Authority.

(c) Each person performing maintenance, preventive maintenance, or alteration on an aeronautical facility shall use materials of high quality, to resuscitate the Air Navigation facility to the standards acceptable by the Authority.

(d) The methods, techniques, and practices contained in a Manual of Operations and equipment certification maintenance procedure, as approved by the Authority, will constitute an acceptable means of compliance with the requirements of this subsection.

14.7.2.1 COMMUNICATION PROCEDURES INCLUDING THOSE WITH PANS-OPS STATUS

14.7.2.2 Requirements for Approval as Aeronautical Telecommunication Services Provider.

(a) No person shall provide Aeronautical Telecommunication Services or operate an aeronautical facility, except in accordance with the provisions of these Regulations.

(b) The Provision of 14.7.2.1 does not apply if a person operates an aeronautical facility on an aeronautical radio frequency and the aeronautical facility;

(1) is a radio communication transmitter that does not support air traffic services; or

(2) is a that does not support Aeronautical Telecommunication or air traffic services;

(c) the aeronautical telecommunication service facility does not constitute harmful interference with any other International Aeronautical Telecommunications Services or aeronautical facility;

(d) a certificate has been granted by the appropriate Authority for the aeronautical facility; and

(e) an identification code or a call sign has been assigned to the aeronautical facility.

(f) The provision of 14.7.2.1.1 does not apply if a person operates a ground mobile radio on an aeronautical radio frequency and:

(1) the radio is not used to support air traffic services;

(2) the radio is operated in accordance with the applicable communication procedures prescribed in these Regulations; and

(3) the radio transmission does not constitute harmful interference with any other Aeronautical Telecommunications Services or aeronautical facility.

14.7.2.3. Requirement for Aeronautical Telecommunication Services Provider Approval

No person may provide Aeronautical Telecommunication Services at aerodromes or portion of airspace in Nigeria, unless such person holds an Approval issued by the Authority.

14.7.2.4 General Provisions for Aeronautical Telecommunication Services

The holder of an Aeronautical Telecommunication Services Provider Approval issued under these Regulations shall be responsible for the provision of Aeronautical Telecommunication Services to ensure that the telecommunications information and data necessary for safe, regular and efficient operation of air navigation is available in the form suitable for the operational requirements of:

(a) Flight operations personnel including flight crews and other personnel responsible for the provision of pre-flight briefing; and

(b) Providers of Air Traffic Services;

14.7.2.5. Responsibilities of Holder of an Aeronautical Telecommunication Services Provider Approval

(a) The holder of an Aeronautical Telecommunication Services Provider Approval shall ensure that the services listed in its Manual of Operations, are in accordance with the procedures prescribed in these Regulations.

(b) The Manual of Operations shall include the following information:

1. personnel requirements and the responsibilities of personnel.
2. training and checking of staff and how that information is tracked
3. quality assurance/safety management system.
4. contingency plans developed for partial or total system failure
5. security plan.
6. Minimum air navigation facility equipment list (MANFEL) applicable to class of Aerodrome.
7. Facilities and equipment and how those facilities are maintained.
8. fault and defect reporting.
9. maintenance of documents and records; and
10. any other information requested by the Authority

(c) The holder of Aeronautical Telecommunication Services Provider Approval shall keep at least one complete and current copy of its Manual of Operations at each Aeronautical Telecommunication Services unit specified in the Manual of Operations;

(d) comply with all procedures detailed in the Manual of Operations;

(e) make each applicable part of the Manual of Operations available to the personnel who require those parts to carry out their duties;

(f) continue to comply with the appropriate requirements prescribed in these Regulations;

(g) keep the records of all regular internal inspections for a period of five years from the date of each inspection;

(h) furnish the Authority with the en-route, terminal and aerodrome facility statistics, status, and performance index;

(i) replace or upgrade any degraded facility;

(j) keep the Authority informed of its plans for the development and modernization of its facilities;

(k) develop Standard Operating Procedure (SOP) Manual for each facility in the certificate.

(l) The Certificate shall specify the Aeronautical Telecommunication Services and facility types that the Approval holder is authorized to operate in support of Aeronautical Telecommunication Services.

(m) The holder of the Approval may operate any of the facility types specified on the Approval, provided:

1. Each aeronautical facility operated is listed in the Approval holder's Manual of Operations; or

2. The aeronautical facility is not listed in the Manual of Operations; its operation is for site test purposes controlled by the procedures required under these Regulations.

(n) The holder of Aeronautical Telecommunication Services Provider Approval shall display the Approval in a prominent place, generally accessible to the public at such holder's principal place of business and, if a copy of the original Approval is displayed, it shall produce the original to the Authority's officials, if so requested.

(o) An applicant for the Issuance of Aeronautical Telecommunication Services Provider Approval shall permit the Authority's Inspectors to carry out, safety inspections and audits as may be necessary to verify the validity of any application made in accordance with these Regulations.

(p) The holder of an Aeronautical Telecommunication Services Provider Approval shall permit the Authority to carry out such safety audits and inspections as may be necessary to determine compliance with the appropriate requirements prescribed in this Section and for postimplementation monitoring to verify that the Approval holder continues to meet the defined level of safety.

(q) The holder of an Aeronautical Telecommunication Services Provider Approval shall permit the Authority to carry out site validation inspection prior to installation and participate in the conduct of Factory Acceptance Test (FAT).

(r) The holder of an Aeronautical Telecommunication Services Provider Approval shall permit the Authority's Inspector to carry out radio frequency audit to ascertain the usability and status of the assigned frequencies.

(s) Application for Aeronautical Telecommunication Services Provider Approval, Amendment or Renewal.

(t) An applicant is eligible to become an Aeronautical Telecommunication Services Provider if the applicant is able to comply with the requirements of these Regulations.

14.7.2.6. Maintenance of Air navigation facilities

The Aeronautical Telecommunication Services Provider shall be responsible for maintaining the facility by ensuring that:

(a) All maintenance, overhaul, alterations and repairs which may affect or alter continued service ability are carried out as contained in the equipment maintenance manual;

(b) Maintenance personnel make appropriate entries in the log book certifying the serviceability of the equipment;

(c) The approval for return to services is completed to the effect that the maintenance carried out has satisfactorily been completed in accordance with the equipment maintenance manual;

14.7.2.7. Persons Authorized to Perform Maintenance, Preventive Maintenance and Alterations.

No person shall perform maintenance on an Air Navigation facility, equipment part or component except such a person is:

(a) An Air Traffic Safety Electronic Personnel licensed by the Authority;

(b) Working under supervision of an ATSEP license holder;

(c) A licensed ATSEP maintenance personnel performing or supervising the maintenance of an Air Navigation facility for which the personnel is rated.

14.7.2.8. Replace, upgrade, or alter any Air Navigation facility

An Air Navigation facility manufacturer or its representative may:

(a) Replace, upgrade, or alter any Air Navigation facility part manufactured by that manufacturer;

(b) Perform inspections as prescribed in the Authority's Regulations and the Aeronautical Telecommunication Services Provider's Manual of Operations (MOP).

14.7.2.9. Document Review

Aeronautical Telecommunication Services Provider shall ensure that:

(a) the documentation is reviewed and authorized by appropriate personnel before issue;

(b) current issues of relevant documentation are available to personnel;

(c) obsolete documentation is removed from all points of issue or use;

(d) changes to documentation are reviewed and approved by appropriate personnel; and

(e) the current version of each document can be identified to preclude the use of obsolete editions.

14.7.2.10 Responsibilities to Aeronautical Search and Rescue Unit

The Aeronautical Telecommunication Services Provider shall provide such assistance as requested from the agency responsible for conducting SAR activities.

14.7.2.11 Personnel Requirements and Responsibilities of an Aeronautical Telecommunication Services Provider.

(a) An applicant for the provision of Aeronautical Telecommunication Services shall provide in its Manual of Operations:

1. current unit organizational chart and written delegated responsibilities and position descriptions;

2. staffing-levels for operational positions;

3. designated instructors and ratings and proficiency assessment officers;

4. staffing numbers and qualifications at unit level.

(b) An Aeronautical Telecommunication Services provider shall, maintain an appropriate organisation with a sound and effective management structure to enable it provide, in accordance with the standards set out in the Regulations.

(c) An Aeronautical Telecommunication Services provider shall have, enough suitably qualified and trained personnel to enable it provide, in accordance with the standards set out in the Regulations, the aeronautical telecommunication services covered by its Approval.

(d) The Aeronautical Telecommunication Services provider shall ensure that its personnel are of sufficient numbers and experienced and have been given appropriate authority to be able to discharge their allocated responsibilities.

(e) An Aeronautical Telecommunication Services provider shall arrange the workflow schedule of Aeronautical Telecommunication Services officers to provide duty rest periods. A copy of the Aeronautical Telecommunication Services providers fatigue management procedure is to be included in the Manual of Operations.

(f) An Aeronautical Telecommunication Services officer shall not exercise the privileges of his license if he knows or suspects that he is suffering from or having regards to the circumstances of the period of duty to be undertaken is likely to suffer from such fatigue as may endanger the safety of any air craft to which an Aeronautical Telecommunication Services control services is provided.

(g) A person shall not when exercising the privileges of an ATSEP license be under the influence of alcohol or a drug to the extent as to impair his capacity to exercise such privileges.

(h) At the unit level the Aeronautical Telecommunication Services provider shall engage, employ or contract:

1. A senior person to whom authority has been granted to ensure that all activities undertaken by the unit are carried out in accordance with the applicable requirements prescribed in this section, and who shall in addition be vested with the following powers and duties in respect of the compliance with such requirements.

    i. Unrestricted access to work performed or activities undertaken by all other persons as employees of, and other persons rendering services within the unit;

    ii. full rights of consultation with any such person (s) in respect of such compliance by him or her;

    iii. powers to order cessation of any activity where such compliance is not affected.

    iv. A duty to establish liaison mechanisms with the Authority with a view to ascertain correct manners of compliance with the said requirements, and interpretations of such requirements by the Authority, and to facilitate liaison between the Authority and the unit concerned; and

2. A person who is responsible for quality control, and who shall have direct access to the person referred to in paragraph (a) on matters affecting aviation safety; and

3. Enough licensed personnel to plan, provide and supervise the services listed in its Approval as a services provider, in a safe and efficient manner.

14.7.2.12. Maintenance of Program.

(a) Aeronautical Telecommunication Services provider shall set up and maintain a program to ensure that its employees who hold ATSEP licenses maintain endorsements appropriate to their duties.

(b) That program shall be in accordance with standards and requirements set out in the Nig. CARs 14.7.

(c) The provider shall include details of the program, including necessary training and tests of competency, in its Manual of Operations.

14.7.2.13 DIVISION OF SERVICE

The international aeronautical telecommunication service shall be divided into four parts:

a) aeronautical fixed service;

b) aeronautical mobile service;

c) aeronautical radio navigation service;

d) aeronautical broadcasting service.

14.7.2.14 TELECOMMUNICATION — ACCESS

All aeronautical telecommunication stations, including end systems and intermediate systems of the aeronautical telecommunication network (ATN), shall be protected from unauthorized direct or remote access.

14.7.2.15 HOURS OF SERVICE

(a) The Competent Authority shall give notification of the normal hours of service of stations and offices of the international aeronautical telecommunication service under its control to the aeronautical telecommunication agencies designated to receive this information by other Administrations concerned.

(b) Whenever necessary and practicable, the Competent Authority shall give notification of any change in the normal hours of service, before such a change is effected, to the aeronautical telecommunication agencies designated to receive this information by other Administrations concerned. Such changes shall also, whenever necessary, be promulgated in NOTAM.

(c) If a station of the international aeronautical telecommunication service, or an aircraft operating agency, requests a change in the hours of service of another station, such change shall be requested as soon as possible after the need for change is known. The station or aircraft operating agency requesting the change shall be informed of the result of its request as soon as possible.

14.7.2.16 SUPERVISION

Each State shall designate the authority responsible for ensuring that the international aeronautical telecommunication service is conducted in accordance with these Regulations

(a) Occasional infringements of the Procedures contained herein, when not serious, shall be dealt with by direct communication between the parties immediately interested either by correspondence or by personal contact.

(b) When a station commits serious or repeated infringement, representations relating to them shall be made to the authority designated in the State to which the nation belongs by the authority which detects them.

(c) The authorities designated shall exchange information regarding the performance of systems of communication, radio navigation, operation and maintenance, unusual transmission phenomena, etc.

14.7.2.17 SUPERFLUOUS TRANSMISSIONS

Each State shall ensure that there is no wilful transmission of unnecessary or anonymous signals, messages or data by any station within that State.

14.7.2.18 INTERFERENCE

Before authorizing tests and experiments in any station, each Administration, in order to avoid harmful interference, shall prescribe the taking of all possible precautions, such as the choice of frequency and of time, and the reduction or, if possible, the suppression of radiation. Any harmful interference resulting from tests and experiments shall be eliminated as soon as possible.

14.7.2.19 EXTENSIONS OF SERVICE AND CLOSING DOWN OF STATIONS

(a) Stations of the aeronautical telecommunication service shall extend their normal hours of service as required to provide for traffic necessary for flight operation.

(b) Before closing down, a station shall notify its intention to all other stations with which it is in direct communication, confirm that an extension of service is not required and advise the time of re-opening if other than its normal hours of service.

(c) When it is working regularly in a network on a common circuit, a station shall notify its intention of closing down either to the control station, if any, or to all stations in the network. It shall continue watch for two minutes and may then close down if it has received no call during this period.

(d) Stations with other than continuous hours of operation, engaged in, or expected to become engaged in distress, urgency, unlawful interference, or interception traffic, shall extend their normal hours of service to provide the required support to those communications.

14.7.2.20 ACCEPTANCE, TRANSMISSION AND DELIVERY OF MESSAGES

(a) Only those messages coming within the categories shall be accepted for transmission by the aeronautical telecommunication service.

(b) The responsibility for determining the acceptability of a message shall rest with the station where the message is filed for transmission.

(c) Once a message is deemed acceptable, it shall be transmitted, relayed and (or) delivered in accordance with the priority classification and without discrimination or undue delay.

(d) The authority in control of any station through which a message is relayed, shall make representations at a later date to the authority in control of the accepting station regarding any message which is considered unacceptable.

(e) Only messages for stations forming part of the aeronautical telecommunication service shall be accepted for transmission, except where special arrangements have been made with the telecommunication authority concerned.

(f) Acceptance as a single message of a message intended for two or more addresses, whether at the same station or at different stations, shall be permitted.

(g) Messages handled for aircraft operating agencies shall be accepted only when handed in to the telecommunication station in the form prescribed herein and by an authorized representative of that agency, or when received from that agency over an authorized circuit.

(h) For each station of the aeronautical telecommunication service from which messages are delivered to one or more aircraft operating agencies, a single office for each aircraft operating agency shall be designated by agreement between the aeronautical telecommunication agency and the aircraft operating agency concerned.

(i) Stations of the international aeronautical telecommunication service shall be responsible for delivery of messages to addressee(s) located within the boundaries of the aerodrome(s) served by that station and beyond those boundaries only to such addressee(s) as may be agreed by special arrangements with the Administrations concerned.

(j) Messages shall be delivered in the form of a written record, or other permanent means as prescribed by authorities.

(k) In cases where telephone or loudspeaker systems are used without recording facilities for the delivery of messages, a written copy shall be provided, as confirmation of delivery, as soon as possible.

(l) Messages originated in the aeronautical mobile service by an aircraft in flight and which require transmission over the aeronautical fixed telecommunication network to effect delivery, shall be reprocessed by the aeronautical telecommunication station into the message format prior to transmission on the AFTN.

(m) Messages originated in the aeronautical mobile service by an aircraft in flight and which require transmission over the aeronautical fixed service, other than on AFTN circuits, shall also be reprocessed by the aeronautical telecommunication station into the format prior and other arrangements have been made between the aeronautical telecommunication agency and the aircraft operating agency concerned for predetermined distribution of messages from aircraft.

(n) Messages (including air-reports) without specific address containing meteorological information received from an aircraft in flight shall be forwarded without delay to the meteorological office associated with the point of reception.

(o) Messages (including air-reports) without specific address containing air traffic services information from aircraft in flight shall be forwarded without delay to the air traffic services unit associated with the communication station receiving the message.

14.7.2.21 TIME SYSTEM

(a) Coordinated Universal Time (UTC) shall be used by all stations in the aeronautical telecommunication service. Midnight shall be designated as 2400 for the end of the day and 0000 for the beginning of the day.

(b) A date-time group shall consist of six figures, the first two figures representing the date of the month and the last four figures the hours and minutes in UTC.

14.7.2.22 ESTABLISHMENT OF RADIOCOMMUNICATION

(a) All stations shall answer calls directed to them by other stations in the aeronautical telecommunication service and shall exchange communications on request.

(b) All stations shall radiate the minimum power necessary to ensure a satisfactory service.

14.7.2.23 USE OF ABBREVIATIONS AND CODES

(a) Abbreviations and codes shall be used in the in aeronautical telecommunication service whenever they are appropriate and their use will shorten or otherwise facilitate communication.

(b) Where abbreviations and codes other than those approved by the Authority are contained in the text of messages, the originator shall, if so required by the aeronautical telecommunication station accepting the message for transmission, make available to that station a decode for the abbreviations and codes used.

14.7.2.24 CANCELLATION OF MESSAGES

Messages shall be cancelled by a telecommunication station only when cancellation is authorized by the message originator.

14.7.2.25 AERONAUTICAL FIXED SERVICE (AFS)

The aeronautical fixed service shall comprise the following systems and applications that are used for ground- ground (i.e. point-to-point and/or point-to-multipoint) communications in the international aeronautical telecommunication service:

a) ATS direct speech circuits and networks;

b) meteorological operational circuits, networks and broadcast systems;

c) the aeronautical fixed telecommunication network (AFTN);

d) the common ICAO data interchange network (CIDIN);

e) the air traffic services (ATS) message handling services; and

f) the inter-centre communications (ICC).

Note 1. Provisions relating to ATS direct speech communications

Note 2. Provisions relating to meteorological operational channels and meteorological operational telecommunication networks

Note 3. The AFTN provides a store-and-forward messaging service for the conveyance of text messages in ITA-2 or IA-5 format, using character-oriented procedures. Provisions relating to the AFTN

Note 4. The CIDIN provides a common transport service for the conveyance of binary or text application messages, in support of the AFTN and OPMET applications. Procedural provisions relating to the CIDIN.

Note 5. The ATS (air traffic services) message handling services (ATSMHS) application allows ATS messages to be exchanged between service users over the aeronautical telecommunication network (ATN) internet communication service (ICS). Procedural provisions relating to ATS message handling services

Note 6. The inter-centre communications applications enable the exchange of information between air traffic service units over the aeronautical telecommunication network (ATN) internet communication service (ICS), in support of notification, coordination, transfer of control, flight planning, airspace management and air traffic flow management. Procedural provisions relating to inter-centre communications

Note 7. The aeronautical telecommunication network through its ATSMHS and ICC applications enable the transition of existing AFTN and CIDIN users and systems into the ATN architecture.

14.7.2.26 ATS DIRECT SPEECH CIRCUITS

Provisions relating to ATS direct speech communications shall be utilized to enable direct exchange of information between air traffic services (ATS) units.

14.7.2.27 METEOROLOGICAL OPERATIONAL CHANNELS AND METEOROLOGICAL OPERATIONAL TELECOMMUNICATION NETWORKS

Meteorological operational channel procedures and meteorological operational communication network procedures shall be compatible with aeronautical fixed telecommunication network (AFTN) or ATS message handling services (AMHS) procedures.

Note. "Compatible" is to be interpreted as a mode of operation ensuring that the information exchanged over the meteorological operational channels also can be exchanged over the AFTN or AMHS without harmful effect on the operation of the AFTN or AMHS and vice versa.

14.7.2.28 AERONAUTICAL FIXED TELECOMMUNICATION NETWORK (AFTN) CATEGORIES OF MESSAGES

The following categories of message shall be handled by the aeronautical fixed telecommunication network:

a) distress messages;

b) urgency messages;

c) flight safety messages;

d) meteorological messages;

e) flight regularity messages;

f) aeronautical information services (AIS) messages;

g) aeronautical administrative messages;

h) service messages.

14.7.2.29 Distress messages (priority indicator SS).

This message category shall comprise those messages sent by mobile stations reporting that they are threatened by grave and imminent danger and all other messages relative to the immediate assistance required by the mobile station in distress.

14.7.2.30 Urgency messages (priority indicator DD).

This category shall comprise messages concerning the safety of a ship, aircraft or other vehicles, or of some person on board or within sight.

14.7.2.31 Flight safety messages (priority indicator FF) shall comprise:

a) movement and control messages.

b) messages originated by an aircraft operating agency of immediate concern to aircraft in flight or preparing to depart;

c) meteorological messages restricted to SIGMET information, special air-reports, AIRMET messages, volcanic ash and tropical cyclone advisory information and amended forecasts.

14.7.2.32 Meteorological messages (priority indicator GG) shall comprise:

a) messages concerning forecasts, e.g. terminal aerodrome forecasts (TAFs), area and route forecasts;

b) messages concerning observations and reports, e.g. METAR, SPECI.

14.7.2.33 Flight regularity messages (priority indicator GG) shall comprise:

a) aircraft load messages required for weight and balance computation;

b) messages concerning changes in aircraft operating schedules;

c) messages concerning aircraft servicing;

d) messages concerning changes in collective requirements for passengers, crew and cargo covered by deviation from normal operating schedules;

e) messages concerning non-routine landings;

f) messages concerning pre-flight arrangements for Aeronautical Telecommunication Services and operational servicing for non-scheduled aircraft operations, e.g. overflight clearance requests;

g) messages originated by aircraft operating agencies reporting an aircraft arrival or departure;

h) messages concerning parts and materials urgently required for the operation of aircraft.

14.7.2.34 Aeronautical information services (AIS) messages (priority indicator GG) shall comprise:

a) messages concerning NOTAMs;

b) messages concerning SNOWTAMs.

14.7.2.35 Aeronautical administrative messages (priority indicator KK) shall comprise:

a) messages regarding the operation or maintenance of facilities provided for the safety or regularity of aircraft operations;

b) messages concerning the functioning of aeronautical telecommunication services;

c) messages exchanged between civil aviation authorities relating to aeronautical services.

14.7.2.36 Messages requesting information: shall take the same priority indicator as the category of message being requested except where a higher priority is warranted for flight safety.

14.7.2.37 Service messages (priority indicator as appropriate).

This category shall comprise messages originated by aeronautical fixed stations to obtain information or verification concerning other messages which appear to have been transmitted incorrectly by the aeronautical fixed service, confirming channel-sequence numbers, etc.

a) Service messages shall be assigned the appropriate priority indicator.

b) When service messages refer to messages previously transmitted, the priority indicator assigned shall be that used for the message(s) to which they refer.

c) Service messages correcting errors in transmission shall be addressed to all the addressees that will have received the incorrect transmission.

d) A reply to a service message shall be addressed to the station which originated the initial service message.

e) The text of all service messages shall be as concise as possible.

f) A service message, other than one acknowledging receipt of SS messages, shall be further identified by the use of the abbreviation SVC as the first item in the text.

14.7.2.38 ORDER OF PRIORITY.

a) The order of priority for the transmission of messages in the aeronautical fixed telecommunication network shall be as follows:

a) Transmission priority	Priority indicator
1	SS
2	DD FF
3	GG KK

b) Messages having the same priority indicator shall be transmitted in the order in which they are received for transmission.

14.7.2.39 ROUTING OF MESSAGES

All communications shall be routed by the most expeditious route available to effect delivery to the addressee.

a) Predetermined diversion routing arrangements shall be made, when necessary, to expedite the movement of communication traffic.

b) Each communication centre shall have the appropriate diversion routing lists, agreed to by the Administration(s) operating the communication centres affected and shall use them when necessary.

c) Diversion routing shall be initiated:

1) in a fully automatic communication centre:

i) immediately after detection of the circuit outage, when the traffic is to be diverted via a fully automatic communication centre;

ii) within a 10-minute period after detection of the circuit outage, when the traffic is to be diverted via a non-fully automatic communication centre;

2) in a non-fully automatic communication centre within a 10-minute period after detection of the circuit outage.

i) Service message notification of the diversion requirement shall be provided where no bilateral or multilateral prearranged agreements exist.

ii) As soon as it is apparent that it will be impossible to dispose of traffic over the aeronautical fixed service within a reasonable period, and when the traffic is held at the station where it was filed, the originator shall be consulted regarding further action to be taken, unless:

A) otherwise agreed between the station concerned and the originator; or

B) arrangements exist whereby delayed traffic is automatically diverted to commercial telecommunication services without reference to the originator.

14.7.2.40 SUPERVISION OF MESSAGE TRAFFIC (Continuity of message traffic)

The receiving station shall check the transmission identification of incoming transmissions to ensure the correct sequence of channel-sequence numbers of all messages received over that channel.

a) When the receiving station detects that one or more channel-sequence numbers are missing, it shall send a complete service message to the previous station rejecting receipt of any message that may have been transmitted with such missing number(s).

b) The text of this service message shall comprise the signal QTA, the procedure signal MIS followed by one or more missing transmission identification and the end-of-text signal.

Note. The following examples illustrate application of the above-mentioned procedure. In example 2) the hyphen (-) separator is understood to mean “through” in plain language.

i) when one channel-sequence number is missing:

SVC→QTA→MIS→ABC↑123↓<≡

ii) when several channel-sequence numbers are missing:

SVC→QTA→MIS→ABC↑123-126↓<≡

14.7.2.41 NOTIFICATION OF MISSING MESSAGE:

The station notified of the missing message(s) condition by the service message shall reassume its responsibility for transmission of the message (or messages) that it had previously transmitted with the transmission identification concerned, and shall retransmit that message (or those messages) with a new (correct in sequence) transmission identification. The receiving station shall synchronize such that the next expected channel- sequence number is the last received channel-sequence number plus one.

14.7.2.42 LESS CHANNEL SEQUENCE NUMBER:

When the receiving station detects that a message has a channel sequence number less than that expected, it shall advise the previous station using a service message with a text comprising:

a) the abbreviation SVC;

b) the procedure signal LR followed by the transmission identification of the received message;

c) the procedure signal EXP followed by the transmission identification expected;

d) the end-of-text signal.

Note. The following example illustrates application of the above-mentioned procedure:

SVC→LR→ABC↑123→↓EXP→ABC↑135↓<≡

14.7.2.43 OUT – OF SEQUENCE MESSAGE:

The station receiving the out-of- sequence message shall synchronize such that the next expected channel-sequence number is the last received channel- sequence number plus one. The previous station shall check its outgoing channel-sequence numbers and, if necessary, correct the sequence.

14.7.2.44 MISROUTED MESSAGES

Messages shall be considered to have been misrouted when there are no relaying instructions, expressed or implied, on which the receiving station can take action.

a) When the receiving station detects that a message has been misrouted to it, it shall either:

   i) send a service message to the previous station rejecting receipt of the misrouted message; or

   ii) itself assume responsibility for transmission of the message to all addressee indicators.

b) When the sending station is notified of the misrouted message condition by service message, it shall reassume its responsibility for the message and shall retransmit as necessary on the correct outgoing channel or channels.

c) When a sending station is notified of the misrouted message condition by service message, it shall reassume its responsibility for the message and shall retransmit as necessary on the correct outgoing channel or channels.

d) When a circuit becomes interrupted and alternative facilities exist, the last channel sequence numbers sent and received shall be exchanged between the stations concerned. Such exchanges shall take the form of complete service messages with the text comprising the abbreviation SVC, the procedure signals LR and LS followed by the transmission identifications of the relevant messages and the end-of- text signal.

14.7.2.45 Material permitted in AFS messages

The following characters are allowed in text messages:

a) Letters: ABCDEFGHIJKLMNOPQRSTUVWXYZ

b) Figures: 1 2 3 4 5 6 7 8 9 0

c) Other signs:

-	(hyphen)
?	(question mark)
:	(colon)
(	(open bracket)
)	(close bracket)
.	(full stop, period, or decimal point)
,	(comma)
’	(apostrophe)
=	(double hyphen or equal sign)
/	(oblique)
+	(plus sign)

d) Characters other than those listed above shall not be used in messages unless absolutely necessary for understanding of the text. When used, they shall be spelled out in full.

e) For the exchange of messages over the teletypewriter circuits, the following signals of the Telegraph Alphabet No. 2 (ITA-2) shall be permitted:

signals nos. 1 to 3	—	in letter and in figure case;
signal no. 4	—	in letter case only;
signal no. 5	—	in letter and in figure case;
signals nos. 6 to 8	—	in letter case only;
signal no. 9	—	in letter and in figure case;
signal no. 10	—	in letter case only; and
signals nos. 11 to 31	—	in letter and figure case.

f) The exchange of messages using the full IA-5 shall be subject to agreement between the Administrations concerned.

g) Roman numerals shall not be employed. If the originator of a message wishes the addressee to be informed that roman figures are intended, the arabic figure or figures shall be written and preceded by the word ROMAN.

h) Messages using the ITA-2 code shall not contain:

i) any uninterrupted sequence of signals nos. 26, 3, 26 and 3 (letter case and figure case) in this order, other than the one in the heading; and

ii) any uninterrupted sequence of four times signal no. 14 (letter case and figure case) other than the one in the ending.

iii) Messages using IA-5 shall not contain:

1) character 0/1 (SOH) other than the one in the heading;

2) character 0/2 (STX) other than the one in the origin line;

3) character 0/3 (ETX) other than the one in the ending;

4) any uninterrupted sequence of characters 5/10, 4/3, 5/10, 4/3 in this order (ZCZC);

5) any uninterrupted sequence of characters 2/11, 3/10, 2/11, 3/10 in this order (+:+:);

6) any uninterrupted sequence of four times character 4/14 (NNNN); and

7) any uninterrupted sequence of four times character 2/12 (,,,,).

j) The text of messages shall be drafted in plain language or in abbreviations and codes. The originator shall avoid the use of plain language when reduction in the length of the text by appropriate abbreviations and codes is practicable. Words and phrases which are not essential, such as expressions of politeness, shall not be used.

k) If the originator of a message wishes alignment functions [<≡] to be transmitted at specific places in the text part of such message, the sequence [<≡] shall be written on each of those places

14.7.2.46 FAILURE OF COMMUNICATIONS

Should communication on any fixed service circuit fail, the station concerned shall re-establish contact as soon as possible.

a) If contact cannot be re-established within a reasonable period on the normal fixed service circuit, an appropriate alternative circuit should be used. If possible, attempts should be made to establish communication on any authorized fixed service circuit available.

b) If these attempts fail, use of any available air-ground frequency shall be permitted only as an exceptional and temporary measure when no interference to aircraft in flight is ensured.

c) Where a radio circuit fails due to signal fade-out or adverse propagation conditions, a receiving watch shall be maintained on the regular fixed service frequency normally in use. In order to re-establish contact on this frequency as soon as possible there shall be transmitted:

i) the procedure signal DE;

ii) the identification of the transmitting station transmitted three times;

iii) the alignment function [<≡];

iv) the letters RY repeated without separation for three lines of page copy;

v) the alignment function [<≡];

vi) end-of-message signal (NNNN).

d) The foregoing sequence shall be repeated as required.

e) A station experiencing a circuit or equipment failure shall promptly notify other stations with which it is in direct communication if the failure will affect traffic routing by those stations. Restoration to normal shall also be notified to the same stations.

f) Where diverted traffic will not be accepted automatically or where a predetermined diversion routing has not been agreed, a temporary diversion routing shall be established by the exchange of service messages. The text of such service messages shall comprise:

i) the abbreviation SVC;

ii) the procedure signal QSP;

iii) if required, the procedure signal RQ, NO or CNL to request, refuse or cancel a diversion;

iv) identification of the routing areas, States, territories, locations, or stations for which the diversion applies;

v) the end-of-text signal.

14.7.2.47 Recording and retention

The Aeronautical Telecommunication Services provider shall demonstrate that there is a system in place to record and retain operational data.

a) A telecommunication log, written or automatic, shall be maintained in each station of the aeronautical telecommunication service except that an aircraft station, when using radiotelephony in direct communication with an aeronautical station, need not maintain a telecommunication log.

Note. The telecommunication log will serve as a protection, should the operator's watch activities be investigated. It may be required as legal evidence.

Note. Aeronautical stations should record messages at the time of their receipt, except that, if during an emergency the continued manual recording would result in delays in communication, the recording of messages may be temporarily interrupted and completed at the earliest opportunity.

Note. In the case of radiotelephony operation, it would be desirable if voice recording were provided for use during interruption in manual recording.

Note. When a record is maintained in an aircraft station, either in a radiotelephone log or elsewhere, concerning distress communications, harmful interference, or interruption to communications, such a record should be associated with information concerning the time and the position, and altitude of the aircraft.

b) In written logs, entries shall be made only by operators on duty except that other persons having knowledge of facts pertinent to the entries may certify in the log the accuracy of operators' entries.

c) All entries shall be complete, clear, correct and intelligible. Superfluous marks or notations shall not be made in the log.

d) In written logs, any necessary correction in the log shall be made only by the person making the initial entry. The correction shall be accomplished by drawing or typing a single line through the incorrect entry, initialling same, recording the time and date of correction. The correct entry shall be made on the next line after the last entry.

e) Telecommunication logs, written or automatic, shall be retained for a period of at least thirty days. When logs are pertinent to inquiries or investigations they shall be retained for longer periods until it is evident that they will be no longer required.

f) The following information shall be entered in written logs:

i) the name of the agency operating the station;

ii) the identification of the station;

iii) the date;

iv) the time of opening and closing the station;

v) the signature of each operator, with the time the operator assumes and relinquishes a watch;

vi) the frequencies being guarded and type of watch (continuous or scheduled) being maintained on each frequency;

vii) except at intermediate mechanical relay stations where the provisions of this paragraph need not be complied with, a record of each communication, test transmission, or attempted communication showing text of communication, time communication completed, station(s) communicated with, and frequency used. The text of the communication may be omitted from the log when copies of the messages handled are available and form part of the log;

viii) all distress communications and action thereon;

ix) a brief description of communication conditions and difficulties, including harmful interference. Such entries should include, whenever practicable, the time at which interference was experienced, the character, radio frequency and identification of the interfering signal;

x) a brief description of interruption to communications due to equipment failure or other troubles, giving the duration of the interruption and action taken; and

xi) such additional information as may be considered by the operator to be of value as a part of the record of the station's operations.

14.7.2.48 LONG-TERM RETENTION OF AFTN TRAFFIC RECORDS

Copies of all messages, in their entirety, transmitted by an AFTN origin station shall be retained for a period of at least 30 days.

a) The AFTN origin station, although responsible for ensuring that AFTN traffic is recorded, is not necessarily the unit where the records are made and retained. By local agreement the State concerned may permit the originators to perform those functions.

b) AFTN destination stations shall retain, for a period of at least 30 days, a record containing the information necessary to identify all messages received and the action taken thereon.

c) AFTN communication centres shall retain, for a period of at least 30 days, a record containing the information necessary to identify all messages relayed or retransmitted and the action taken thereon.

Note. The provision for identification of messages may be obtained by recording the heading, address and origin parts of messages.

14.7.2.49 SHORT-TERM RETENTION OF AFTN TRAFFIC RECORDS

a) AFTN communication centres shall retain, for a period of at least one hour, a copy of all messages, in their entirety, retransmitted or relayed by that communication centre.

b) In cases where acknowledgement is made between AFTN communication centres, a relay centre shall be considered as having no further responsibility for retransmission or repetition of a message for which it has received positive acknowledgement, and it may be deleted from its records.

14.7.2.50 TEST PROCEDURES ON AFTN CHANNELS

Test messages transmitted on AFTN channels for the purpose of testing and repairing lines shall consist of the following:

a) the start-of-message signal;

b) the procedure signal QJH;

c) the originator indicator;

d) three page-copy lines of the sequence of characters RY in ITA-2 or U(5/5) *(2/10) in IA-5; and

e) the end-of-message signal.

14.7.2.51 Message Format - International Telegraph Alphabet No. 2 (ITA- 2)
All messages, other than those prescribed in Nig.CARs 14.7.2.50 shall comprise the components inclusive.

14.7.2.52 HEADING

The heading shall comprise:

a) start-of-message signal, the characters ZCZC;

b) transmission identification comprising:

i) circuit identification;

ii) channel-sequence number.

c) additional service information (if necessary) comprising:

i) one SPACE

ii) no more than ten characters

d) spacing signal.

e) The circuit identification shall consist of three letters selected and assigned by the transmitting station; the first letter identifying the transmitting, the second letter the receiving end of the circuit and the third letter to identify the channel; where there is only one channel between the transmitting and receiving stations, channel letter A shall be assigned; where more than one channel between stations is provided the channels shall be identified as A, B, C, etc. in respective order.

f) Three-digit channel-sequence numbers from 001 to 000 (representing 1 000) shall be assigned sequentially by telecommunication stations to all messages transmitted directly from one station to another. A separate series of these numbers shall be assigned for each channel and a new series shall be started daily at 0000 hours.

Note— The use of the 4-digit channel-sequence number, to preclude duplication of the same numbers during the 24-hour period, is permitted subject to agreement between the authorities responsible for the operation of the circuit.

g) The transmission identification shall be sent over the circuit in the following sequence:

i) SPACE [→];

ii) transmitting-terminal letter;

iii) receiving-terminal letter;

iv) channel-identification letter;

v) FIGURE SHIFT [↑];

vi) channel-sequence number (3 digits).

h) In teletypewriter operation, the spacing signal, consisting of 5 SPACES [→→→→→] followed by 1 LETTER SHIFT [↓], shall be transmitted immediately following the transmission identification.

Note. The examples appearing below illustrate the application of the transmission identification Standard

Tape Page-copy
→GLB↑039→→→→→↓ GLB039
(This indicates the 39th message of the day transmitted on Channel B of the circuit from Station G to Station L.)

i) Optional service information shall be permitted to be inserted following the transmission identification subject to agreement between the authorities responsible for the operation of the circuit. Such additional service information shall be preceded by a SPACE followed by not more than ten characters and shall not contain any alignment functions.

j) To avoid any misinterpretation of the diversion indicator especially when considering the possibility of a partly mutilated heading, the sequence of two consecutive signals no. 22 (in the letter case or in the figure case) shall not appear in any other component of the heading.

14.7.2.53 ADDRESS

The address shall comprise:

a) alignment function;

b) priority indicator;

c) addressee indicator(s);

d) alignment function .

14.7.2.54 The priority indicator shall consist of the appropriate two-letter group assigned by the originator in accordance with the following:

Message category	Priority indicator
distress messages	SS
urgency messages	DD
flight safety messages	FF
meteorological messages	GG
flight regularity messages	GG
aeronautical information services messages	GG
aeronautical administrative messages	KK
service messages	(as appropriate)

14.7.2.55 ADDRESSEE INDICATOR:

An addressee indicator, which shall be immediately preceded by a SPACE, except when it is the first address indicator of the second or third line of address shall comprise:

a) the four-letter location indicator of the place of destination;

b) the three-letter designator identifying the organization/function (aeronautical authority, service or aircraft operating agency) addressed;

c) an additional letter, which shall represent a department, division or process within the organization/function addressed. The letter X shall be used to complete the address when explicit identification is not required.

Note 1. The four-letter location indicators are listed in Doc 7910 — Location Indicators.

Note 2. The three-letter designators are listed in Doc 8585 — Designators for Aircraft Operating Agencies, Aeronautical Authorities and Services.

d) Where a message is to be addressed to an organization that has not been allocated an ICAO three-letter designator, the location indicator of the place of destination shall be followed by the ICAO three-letter designator YYY (or the ICAO three-letter designator YXY in the case of a military service or organization). The name of the addressee organization shall then be included in the first item of the text of the message. The eighth position letter following the ICAO three-letter designator YYY or YXY shall be the filler letter X.

e) Where a message is to be addressed to an aircraft in flight and, therefore, requires handling over the AFTN for part of its routing before retransmission over the aeronautical mobile service, the location indicator of the aeronautical station which is to relay the message to the aircraft shall be followed by the ICAO three-letter designator ZZZ. The identification of the aircraft shall then be included in the first item of the text of the message. The eighth position letter following the ICAO three-letter designator ZZZ shall be the filler letter X.

f) The complete address shall be restricted to three lines of page-printing copy and separate addressee indicator shall be used for each addressee whether at the same or at different locations.

g) Where messages are offered in page-copy form for transmission and contain more addressee indicators than can be accommodated on three lines of a page-copy, such message shall be converted, before transmission, into two or more messages. During such conversion, the addressee indicators shall, in so far as practicable, be positioned in the sequence which will ensure that the minimum number of retransmissions will be required at subsequent communication centres.

h) On teletypewriter circuits, the completion of each line of addressee indicator groups in the address of a message shall be immediately followed by the alignment function [<≡].

14.7.2.56 Origin

The origin shall comprise:

a) filing time;

b) originator indicator;

c) priority alarm (when necessary);

d) optional heading field;

e) alignment function.

14.7.2.57 FILING TIME:

The filing time shall comprise the 6-digit date-time group indicating the date and time of filing the message for transmission. In teletypewriter operation, the filing time shall be followed by one LETTER SHIFT [↓].

14.7.2.58 ORIGINATOR INDICATOR:

An originator indicator, which shall be immediately preceded by a SPACE, shall comprise:

a) the four-letter location indicator of the place at which the message is originated;

b) the three-letter designator identifying the organization/function (aeronautical authority, service or aircraft operating agency) which originated the message;

c) an additional letter which shall represent a department, division or process within the organization/function of the originator. The letter X shall be used to complete the address when explicit identification is not required.

14.7.2.59 MESSAGE WITHOUT THREE-LETTER DESIGNATOR:

Where a message is originated by an organization that has not been allocated an ICAO three-letter designator, the location indicator of the place at which the message is originated shall be followed immediately by the ICAO three- letter designator YYY followed by the filler letter X (or the ICAO three-letter designator YXY followed by the filler letter X in the case of a military service or organization). The name of the organization (or military service) shall then be included in the first item in the text of the message.

14.7.2.60 MESSAGE ORIGINATED BY AIRCRAFT IN FLIGHT:

Where a message originated by an aircraft in flight requires handling on the AFTN for part of its routing before delivery, the originator indicator shall comprise the location indicator of the aeronautical station responsible for transferring the message to the AFTN, followed immediately by the ICAO three-letter designator ZZZ followed by the filler letter X. The identification of the aircraft shall then be included in the first item in the text of the message.

14.7.2.61 MESSAGES RELAYED OVER AFTN:

Messages relayed over the AFTN that have been originated in other networks shall use a valid AFTN originator indicator that has been agreed for use by the relay or gateway function linking the AFTN with the external network.

14.7.2.62 PRIORITY ALARM:

The priority alarm shall be used only for distress messages. When used, it shall consist of the following, in the order stated:

a) FIGURE SHIFT [↑];

b) FIVE transmissions of signal no. 10 (figure case);

c) LETTER SHIFT [↓].

Note 1. The figure case of signal no. 10 of the International Telegraph Alphabet No. 2 generally corresponds to the figure case of J of teletypewriter equipment in use on aeronautical fixed service circuits.

Note 2. Use of the priority alarm will actuate a bell (attention) signal at the receiving teletypewriter station, other than at those fully automatic stations which may provide a similar alarm on receipt of priority indicator SS, thereby alerting supervisory personnel at relay centres and operators at tributary stations, so that immediate attention may be given to the message.

14.7.2.63 INCLUSION OF OPTIONAL DATA:

The inclusion of optional data in the origin line shall be permitted provided a total of

69 characters is not exceeded and subject to agreement between the authorities concerned. The presence of the optional data field shall be indicated by one occurrence of the SPACE character immediately preceding optional data.

14.7.2.64 EXCHANGE OF ADDITIONAL INFORMATION IN A MESSAGE:

When additional addressing information in a message needs to be exchanged between source and destination addresses, it shall be conveyed in the optional data field (ODF), using the following specific format:

a) characters one and full stop (1.) to indicate the parameter code for the additional address function;

b) three modifier characters, followed by an equal sign [=] and the assigned 8-character ICAO address; and c) the character hyphen (-) to terminate the additional address parameter field.

14.7.2.65 SEPARATE ADDRESS:

When a separate address for service messages or inquiries is different from the originator indicator, the modifier SVC shall be used.

14.7.2.66 ORIGIN LINE:

The origin line shall be concluded by an alignment function [<≡].

14.7.2.67 Text

The text of messages shall contain the originator's reference and the addressee's indicator.

14.7.2.68 ALIGNMENT FUNCTION:

An alignment function shall be transmitted at the end of each printed line of the text except for the last.

14.7.2.69 CONFIRMATION OF PORTION OF THE TEXT:

When it is desired to confirm a portion of the text of a message in teletypewriter operation, such confirmation shall be separated from the last text group by an alignment function, and shall be indicated by the abbreviation CFM followed by the portion being confirmed.

14.7.2.70 ERROR IN TEXT:

When it is discovered that an error has been made in the text, the correction shall be separated from the last text group or confirmation, if any, by an alignment function in the case of teletypewriter circuits. This shall be followed by the abbreviation COR and the correction.

14.7.2.71 INDICATED CORRECTIONS:

Stations shall make all indicated corrections on the page-copy prior to local delivery.

14.7.2.72 Ending

The ending shall comprise:

a) the page-feed sequence consisting of 7 LINE FEEDS [≡≡≡≡≡≡≡];

Note. This, together with the 1 LINE FEED of the preceding alignment function, will provide sufficient separation between messages when appearing in page-copy form.

b) the end-of-message signal, consisting of the letter N, appearing FOUR times in undivided sequence.

Note. This component, transmitted intact from the moment of the first transmission of the message until ultimate delivery, is required so that connections set up for cross-office transmission, at a semi-automatic or fully automatic relay installation, can be cleared for following message traffic.

c) the message-separation signal, consisting of a LETTER SHIFT [↓] transmitted 12 times in uninterrupted sequence.

14.7.2.73. ENTRY OF AFTN MESSAGES:

AFTN messages entered by the AFTN origin station shall not exceed 2 100 characters in length.

14.7.2.74 REPROCESSING PROCEDURES

A message requiring retransmission shall have its previous heading deleted by the station which received such message for relay. The retransmission shall commence with the new heading using the transmission identification for the outgoing channel.

14.7.2.75 ATS MESSAGE HANDLING SERVICES (ATSMHS)

a) The ATS message service of the ATS (air traffic services) message handling service (ATSMHS) application shall be used to exchange ATS messages between users over the aeronautical telecommunication network (ATN) internet.

b) ATS message handling services shall comprise:

i) an ATS message server;

ii) an ATS message user agent; and

iii) an AFTN/AMHS gateway (aeronautical fixed telecommunication network/ATS message handling system).

Note. Connections may be established over the internet communications service between any pair constituted of these ATN end systems.

14.7.2.76 INTER-CENTRE COMMUNICATIONS (ICC)

The inter-centre communications (ICC) applications set shall be used to exchange ATS messages between air traffic service users over the ATN internet.

14.7.2.77 ICC APPLICATION:

The ICC applications shall support the following operational services:

a) flight notification;

b) flight coordination;

c) transfer of control and communications;

d) flight planning;

e) airspace management; and

f) air traffic flow management.

14.7.2.78 AERONAUTICAL MOBILE SERVICE — VOICE COMMUNICATIONS

a) Where it is necessary for an aircraft station to send signals for testing or adjustment which are liable to interfere with the working of a neighbouring aeronautical station, the consent of the station shall be obtained before such signals are sent. Such transmissions shall be kept to a minimum.

b) When it is necessary for a station in the aeronautical mobile service to make test signals, either for the adjustment of a transmitter before making a call or for the adjustment of a receiver, such signals shall not continue for more than 10 seconds and shall be composed of spoken numerals (ONE, TWO, THREE, etc.) in radiotelephony, followed by the radio call sign of the station transmitting the test signals. Such transmissions shall be kept to a minimum.

c) Except as otherwise provided, the responsibility of establishing communication shall rest with the station having traffic to transmit.

14.7.2.79 ELIMINATION OF UNNECESSARY TRANSMISSIONS:

After a call has been made to the aeronautical station, a period of at least 10 seconds shall elapse before a second call is made. This shall eliminate unnecessary transmissions while the aeronautical station is getting ready to reply to the initial call.

a) When an aeronautical station is called simultaneously by several aircraft stations, the aeronautical station shall decide the order in which aircraft shall communicate.

b) In communications between aircraft stations, the duration of communication shall be controlled by the aircraft station which is receiving, subject to the intervention of an aeronautical station. If such communications take place on an ATS frequency, prior permission of the aeronautical station shall be obtained. Such requests for permission are not required for brief exchanges.

14.7.2.80 COMMUNICATION TECHNIQUES

a) In all communications, the highest standard of discipline shall be observed at all times.

b) Standardized phraseology shall be used in all situations for which it has been specified. Only when standardized phraseology cannot serve an intended transmission, plain language shall be used.

c) The transmission of messages, on aeronautical mobile frequencies when the aeronautical fixed services are able to serve the intended purpose, shall be avoided.

d) In all communications, the consequences of human performance which could affect the accurate reception and comprehension of messages shall be taken into consideration.

Note. Guidance material on human performance can be found in the Human Factors Training Manual (Doc 9683).

14.7.2.81 Categories of messages

The categories of messages handled by the aeronautical mobile service and the order of priority in the establishment of communications and the transmission of messages shall be in accordance with the following table.

Message category and order of priority signal	Radiotelephony signal
a) Distress calls, distress messages and distress traffic	MAYDAY
b) Urgency messages, including messages preceded by the medical transports signal	PAN, PAN or PAN, PAN MEDICAL
c) Communications relating to direction finding	----
d) Flight safety messages	------
e) Meteorological messages	-------
f) Flight regularity messages	—

14.7.2.82 DIRECT PILOT-CONTROLLER COMMUNICATION CHANNELS

Air traffic services units using direct pilot-controller communication channels shall only be required to handle flight regularity messages provided this can be achieved without interference with their primary role and no other channels are available for the handling of such messages.

14.7.2.83 INTERPILOT AIR-TO-AIR COMMUNICATION

Interpilot air-to-air communication shall comprise messages related to any matter affecting safety and regularity of flight.

14.7.2.84 Cancellation of messages

a) Incomplete transmissions.

If a message has not been completely transmitted when instructions to cancel are received, the station transmitting the message shall instruct the receiving station to disregard the incomplete transmission. This shall be affected in radiotelephony by use of an appropriate phrase.

b) COMPLETE TRANSMISSIONS

When a completed message transmission is being held pending correction and the receiving station is to be informed to take no forwarding action, or when delivery or onward relay cannot be accomplished, transmission should be cancelled. This should be affected in radiotelephony by the use of an appropriate phrase.

c) The station cancelling a transmission shall be responsible for any further action required.

14.7.2.85 LANGUAGE TO BE USED

a) The air-ground radiotelephony communications shall be conducted in the language normally used by the station on the ground or in the English language.

Note 1. The language normally used by the station on the ground may not necessarily be the language of the State in which it is located. A common language may be agreed upon regionally as a requirement for stations on the ground in that region.

Note 2. The level of language proficiency required for aeronautical radiotelephony communications is specified in Appendix 1 to Annex 1.

b) The English language shall be available, on request from any aircraft station, at all stations on the ground serving designated airports and routes used by international air services.

c) The languages available at a given station on the ground shall form part of the Aeronautical Information Publications and other published aeronautical information concerning such facilities.

14.7.2.86 Word spelling in radiotelephony.

When proper names, service abbreviations and words of which the spelling is doubtful are spelled out in radiotelephony, the alphabet shall be used.

Note 1. The pronunciation of the words in the alphabet as well as numbers may vary according to the language habit of the speakers. In order to eliminate wide variations in pronunciation, posters illustrating the desired pronunciation are available from ICAO.

14.7.2.87 TRANSFER OF VHF COMMUNICATIONS

a) An aircraft shall be advised by the appropriate aeronautical station to transfer from one radio frequency to another in accordance with agreed procedures. In the absence of such advice, the aircraft station shall notify the appropriate aeronautical station before such a transfer takes place.

b) When establishing initial contact on, or when leaving, a VHF frequency, an aircraft station shall transmit such information as may be prescribed by the appropriate Authority.

14.7.2.88 VOICE COMMUNICATIONS FAILURE

a) AIR-GROUND

When an aircraft station fails to establish contact with the appropriate aeronautical station on the designated channel, it shall attempt to establish contact on the previous channel used and, if not successful, on another channel appropriate to the route. If these attempts fail, the aircraft station shall attempt to establish communication with the appropriate aeronautical station, other aeronautical stations or other aircraft using all available means and advise the aeronautical station that contact on the assigned channel could not be established. In addition, an aircraft operating within a network shall monitor the appropriate VHF channel for calls from nearby aircraft.

b) If the attempts fail, the aircraft station shall transmit its message twice on the designated channel(s), preceded by the phrase "TRANSMITTING BLIND" and, if necessary, include the addressee(s) for which the message is intended.

c) In network operation, a message which is transmitted blind should be transmitted twice on both primary and secondary channels. Before changing channel, the aircraft station shall announce the channel to which it is changing.

14.7.2.89 Receiver failure

a) When an aircraft station is unable to establish communication due to receiver failure, it shall transmit reports at the scheduled times, or positions, on the channel in use, preceded by the phrase "TRANSMITTING BLIND DUE TO RECEIVER FAILURE". The aircraft station shall transmit the intended message, following this by a complete repetition. During this procedure, the aircraft shall also advise the time of its next intended transmission.

b) An aircraft which is provided with air traffic control or advisory service shall, transmit information regarding the intention of the pilot-in-command with respect to the continuation of the flight of the aircraft.

c) When an aircraft is unable to establish communication due to airborne equipment failure it shall, when so equipped, select the appropriate SSR code to indicate radio failure.

Note. General rules which are applicable in the event of communications failure are contained in Annex 2 to the Convention.

14.7.2.90 DATA LINK INITIATION CAPABILITY

Before entering an airspace where data link applications are used by the ATS unit, data link communications shall be initiated between the aircraft and the ATS unit in order to register the aircraft and, when necessary, allow the start of a data link application. This shall be initiated by the aircraft, either automatically or by the pilot, or by the ATS unit on address forwarding.

14.7.2.91 LOGON ADDRESS

The logon address associated with an ATS unit shall be published in the Aeronautical Information Publications.

14.7.2.92 AIRCRAFT INITIATION

On receipt of a valid data link initiation request from an aircraft approaching or within a data link service area, the ATS unit shall accept the request and, if able to correlate it with a flight plan, shall establish a connection with the aircraft.

14.7.2.93 ATS UNIT FORWARDING

The ground system initially contacted by the aircraft shall provide to the next ATS unit any relevant updated aircraft information in sufficient time to permit the establishment of data link communications.

14.7.2.94 FAILURE

In the case of a data link initiation failure, the data link system shall provide an indication of the failure to the appropriate ATS unit(s). The data link system shall also provide an indication of the failure to the flight crew when a data link initiation failure results from a logon initiated by the flight crew.

Note. When the aircraft's logon request results from responding to a contact request by a transferring ATS unit, then both ATS units will receive the indication.

14.7.2.95 ESTABLISHMENT OF DATA LINK PROCEDURES BY ATS:

The ATS unit shall establish procedures to resolve, as soon as practicable, data link initiation failures. Procedures shall include, as a minimum, verifying that the aircraft is initiating a data link request with the appropriate ATS unit (i.e. the aircraft is approaching or within the ATS unit's control area); and if so:

a) when a flight plan is available, verify that the aircraft identification, aircraft registration, or aircraft address and other details contained in the data link initiation request correspond with details in the flight plan, and where differences are detected verify the correct information and then make the necessary changes; or

b) when a flight plan is not available, create a flight plan with sufficient information in the flight data processing system, to achieve a successful data link initiation; then

c) arrange for the re-initiation of data link.

14.7.2.96 ESTABLISHMENT OF DATA LINK BY AIRCRAFT OPERATOR:

The aircraft operator shall establish procedures to resolve, as soon as practicable, data link initiation failures. Procedures shall include, as a minimum, that the pilot:

a) verify the correctness and consistency of the flight plan information available in the FMS or equipment from which data link is initiated, and where differences are detected make the necessary changes; and

b) verify the correct address of the ATS unit;

c) re-initiate data link.

14.7.3 COMMUNICATION SYSTEMS

These Regulations are based on Amendment 91 of November, 2022.

14.7.3.1 Support of Aeronautical Telecommunication Network Application.

(a) An Aeronautical Telecommunication Network shall specifically and exclusively be used to provide digital data communications services to air traffic service provider organizations and aircraft operating agencies in support of:

1. Air Traffic Services communications with aircraft.
2. Air Traffic Services Communications between air traffic service units.
3. Aeronautical Operational Control Communications.
4. Aeronautical Administrative Communications.

(b) Aeronautical Telecommunication Network communication services in sub-regulation

1. shall support Aeronautical Telecommunication Network applications.

14.7.3.2 Requirements for implementation of Aeronautical Telecommunication Network.

(a) Requirements for implementation of the Aeronautical Telecommunication Network shall be made on the basis of regional air navigation agreements.

(b) The agreements in sub-regulation (1) shall specify the area in which the communication standards for the Aeronautical Telecommunication Network/Open System Interconnection or the Aeronautical Telecommunication Network /Internet Protocol Suite are applicable.

(c) The Aeronautical Telecommunication Network shall either use International Organization for Standardization, communication standards for Open Systems Interconnection or use the Internet Society communications standards for the Internet Protocol Suite.

(d) The Aeronautical Fixed Telecommunication Network/Aeronautical Message Handling System gateway shall ensure the interoperability of Aeronautical Fixed Telecommunication Network stations and networks with the Aeronautical Telecommunication Network.

(e) An authorized path(s) for the Aeronautical Fixed Telecommunication Network shall be defined on the basis of a predefined routing policy.

(f) The Aeronautical Telecommunication Network shall;

1. Transmit, relay and deliver messages in accordance with the priority classifications and without discrimination or undue delay.
2. Provide means to define data communications that can be carried only over authorized paths for the traffic type and category specified by the user.
3. Provide communication in accordance with the prescribed Required Communication Performance.
4. Operates in accordance with the communication priorities in IS 14.7.3.2(f)(4)
5. Enables exchange of application information when one or more authorized paths exist.
6. Notify the appropriate application processes when no authorized path exists.
7. Make provisions for the efficient use of limited bandwidth subnetworks.
8. Enable an aircraft intermediate system to connect to a ground intermediate system via different sub-networks.
9. Enable an aircraft intermediate system to connect to different ground intermediate systems.
10. Enable the exchange of address information between applications.
11. Be accurate to within 1 second of UTC where the absolute time of day is used.

14.7.3.3. Aeronautical Telecommunication Network Applications Requirements.

(a) The Aeronautical Telecommunication Network (ATN) shall support the Data Link Initiation Capability

Applications when air-ground data links are implemented.

(b) The Aeronautical Telecommunication Network / Open System Interconnection end-system shall support the following Directory Services application functions when Aeronautical Message Handling System and security protocols are implemented.

1. Directory information retrieval; and

2. Directory information modification.

14.7.3.4. Air-ground applications

(a) The Aeronautical Telecommunication Network shall be capable of supporting one or more of the following applications;

1. Automatic Dependent Surveillance – Contract;

2. Controller Pilot Data Link Communication.

3. Flight Information Service including Automatic Terminal Information Service and Meteorological Reports.

14.7.3.5 Ground-Ground Applications.

(a) The Aeronautical Telecommunication Network shall be capable of supporting the following applications;

1. Air Traffic Service Interfacility Data Communication; and

2. Air Traffic Service Message Handling Services applications.

14.7.3.6 ATN/ Internet Protocol Suite upper layer communication service.

(a) An Aeronautical Telecommunication Network host shall be capable of supporting the Aeronautical Telecommunication Network /Internet Protocol Suite upper layers including an application layer.

14.7.3.7 ATN /Open System Interconnection upper layer communication service.

(a) An Aeronautical Telecommunication Network /Open System Interconnection end-system shall be capable of supporting the Open System Interconnection Upper Layer Communications Service including session, presentation and application layers.

14.7.3.8 ATN/Internet Protocol Suite communication service.

(a) An Aeronautical Telecommunication Network host shall be capable of supporting the Aeronautical Telecommunication Network -/Internet Protocol Suite including;

1. Transport layer in accordance with Transmission Control Protocols and User Datagram Protocols; and

2. Network layer in accordance with Internet Protocol version 6.

(b) An Internet Protocol Suite router shall support the Aeronautical Telecommunication Network layer in accordance with Internet Protocol (version 6) and multiprotocol extensions.

14.7.3.9 ATN/Open System Interconnection communications service.

(a) An Aeronautical Telecommunication Network /Open System Interconnection end-system shall be capable of supporting the Aeronautical Telecommunication Network including the;

1. Transport layer in accordance with International Organization for Standardization Transport Protocol Class 4 and optionally Connectionless Transport Protocol.

2. Network layer in accordance with International Organization for Standardization, Connectionless Network Protocol.

3. An ATN Intermediate System shall support the Aeronautical Telecommunication Network layer in accordance with International Organization for Standardization, Connectionless Network Protocol and International Organization for Standardization, Inter-domain routing protocol.

14.7.3.10 ATN Naming and Addressing Requirements

(a) The Aeronautical Telecommunication Network shall provide;

1. Provisions for unambiguous application identification and addressing.

2. Means to unambiguously address all Aeronautical Telecommunication Network end-systems and intermediate systems.

(b) The Aeronautical Telecommunication Network addressing and naming plans shall allow Authority and Organizations to assign addresses and names within their own administrative domains.

14.7.3.11. ATN security requirements.

(a) The Aeronautical Telecommunication Network shall;

1. Make provisions whereby only the controlling Air Traffic Services unit may provide Air Traffic Control instructions to aircraft operating in its airspace.

2. Enable the recipient of a message to identify the originator of that message.

3. Be protected against service attacks to a level consistent with the application service requirements.

(b) Aeronautical Telecommunication Network end-systems supporting Aeronautical Telecommunication Network security services shall be capable of authenticating the identity of peer end-systems, authenticating the source of messages and ensuring the data integrity of the messages.

14.7.3.12. Aeronautical Mobile – Satellite (Route) Service.

(a) A mobile-satellite system intended to provide Aeronautical Mobile-Satellite (Route) Service shall conform to the requirements of these Regulations.

(b) An Aeronautical Mobile-Satellite (Route) Service system shall support packet data service, voice service or both.

(c) Requirements for mandatory carriage of AMS(R)S system equipment including the level of system capability shall be made on the basis of regional air navigation agreements which specify the airspace of operation and the implementation timescales for the carriage of equipment and the level of system capability shall include the performance of the Aircraft Earth Station, the satellite and the Ground Earth Station.

(d) The agreements specified in sub regulation (3) shall provide at least a notice of two years of mandatory carriage of airborne systems.

(e) The Authority shall coordinate with national authorities and service providers the implementation aspects of an Aeronautical Mobile-Satellite (Route) Service system that permit worldwide interoperability and optimum use, as appropriate.

14.7.3.13. RF Characteristics.

(a) When providing Aeronautical Mobile-Satellite (Route) Service communications, an Aeronautical Mobile-Satellite (Route) Service system shall operate only in frequency bands which are appropriately allocated to Aeronautical Mobile-Satellite (Route) Service and protected by the International Telecommunications Union Radio Regulations.

(b) The total emissions of the Aircraft Earth Station necessary to meet designed system performance shall be controlled to avoid harmful interference to other systems necessary to support safety and regularity of air navigation, installed on the same or other aircraft.

(c) Emissions from an Aeronautical Mobile-Satellite (Route) Service system Aircraft Earth Station shall not cause harmful interference to an Aircraft Earth Station providing Aeronautical Mobile-Satellite (Route) Service on a different aircraft.

(d) The Aircraft Earth Station equipment shall operate properly in an interference environment causing a cumulative relative change in its receiver noise temperature ($\Delta T/T$) of 25 per cent.

14.7.3.14. Priority and pre-emptive access;

(a) Every aircraft earth station and ground earth station shall be designed to ensure that messages transmitted in accordance with Civil Aviation (Communication Procedures) Regulations including their order of priority, are not delayed by the transmission and reception of other types of messages.

(b) As a means to comply with the sub regulation (1) message types not defined in the Civil Aviation (Communication Procedures) Regulations shall be terminated even without warning, to allow messages specified in the Civil Aviation (Communication Procedures) Regulations to be transmitted and received.

(c) All Aeronautical Mobile-Satellite (Route) Service data packets and all Aeronautical Mobile-Satellite (Route) Service voice calls shall be identified as to their associated priority.

(d) The system shall provide voice communications priority over data communications within the same message category.

14.7.3.15. Signal acquisition and tracking.

(a) The Aircraft Earth Station, Ground Earth Station and satellites shall properly acquire and track service link signals when the aircraft is moving at a ground speed of up to 1 500 km/h (800 knots) along any heading.

(b) The Aircraft Earth Station, Ground Earth Station and satellites shall properly acquire and track service link signals when the component of the aircraft acceleration vector in the plane of the satellite orbit is up to 0.6 g.

14.7.3.16. Designated Operational Coverage

(a) An Aeronautical Mobile-Satellite (Route) Service system shall provide Aeronautical Mobile-Satellite (Route) Service throughout its designated Operational coverage.

14.7.3.17. Failure notification

An Aeronautical Mobile-Satellite (Route) Service system shall:

(a) Provide timely predictions of the time, location and duration of any resultant outages until full service is restored in the event of a service failure.

(b) Annunciate a loss of communications capability within 30 seconds of the time when it detects such a loss.

14.7.3.18. AES requirements.

(a) The Aircraft Earth Station shall meet the relevant performance requirements specified in regulations 14.7.3.19 and 14.7.3.22 for aircraft;

1. In straight and level flight throughout the designated operational coverage of the satellite system; or

2. Attitudes of +20/-5 degrees of pitch and +/-25 degrees of roll throughout the Designated Operational Coverage of the satellite system.

14.7.3.19. Packet data service performance

(a) If the system provides AMS(R)S packet data service, it shall meet the standards of regulations 14.7.3.20 and 14.7.3.21.

(b) Where an Aeronautical Mobile-Satellite (Route) Service system provides packet data service, it shall be capable of operating as a constituent mobile sub network of the Aeronautical Telecommunication Network.

14.7.3.20. Delay Parameters

(a) Connection establishment delay shall not be greater than 70 seconds.

(b) Data transit delay values shall be based on a fixed sub-network service data unit length of 128 octets in accordance with ISO 8348 and shall be defined as average values.

(c) Data transit delay from aircraft shall not be greater than 40 seconds for the highest priority data service.

(d) Data transit delay from aircraft shall not be greater than 28 seconds for the lowest priority data service.

(e) Data transit delay to aircraft shall not be greater than 12 seconds for the highest priority data service.

(f) Data transit delay to aircraft shall not be greater than 28 seconds for the lowest priority data service.

(g) Data transfer delay (95th percentile), shall not be greater than 80 seconds for the highest priority data service.

(h) Data transfer delay (95th percentile) from-aircraft, shall not be greater than 60 seconds for the lowest priority data service.

(i) Data transfer delay (95th percentile) to-aircraft shall not be greater than 15 seconds for the highest priority data service.

(j) Data transfer delay (95th percentile) to-aircraft shall not be greater than 30 seconds for the lowest priority data service.

(k) The connection release delay (95th percentile) shall not be greater than 30 seconds in either direction.

14.7.3.21. Integrity.

(a) The residual error rate in the from-aircraft direction shall not be greater than 10-4 per sub-network service data unit.

(b) The residual error rate in the to-aircraft direction shall not be greater than 10-6 per sub-network service data unit.

(c) The probability of a Sub Network Connection provider-invoked Sub Network Connection release shall not be greater than 10-4 over any one- hour interval.

(d) The probability of a sub-network connection provider-invoked reset shall not be greater than 10-1 over any one-hour interval.

14.7.3.22. Voice service performance.

(a) The system that provides Aeronautical Mobile-Satellite (Route) Service voice service shall meet the requirements in regulations 14.7.3.23,14.7.3.24 and 14.7.3.25

14.7.3.23. Call Processing Delay

(a) The 95th percentile of the time delay for a GES to present a call origination event to the terrestrial network interworking interface after a call origination event has arrived at the AES interface shall not be greater than 20 seconds.

(b) The 95th percentile of the time delay for an AES to present a call origination event at its aircraft interface after a call origination event has arrived at the terrestrial network interworking interface shall not be greater than 20 seconds.

14.7.3.24. Voice Quality.

a. The voice transmission shall provide overall intelligibility performance suitable for the intended operational and ambient noise environment.

b. The total allowable transfer delay within an Aeronautical Mobile- Satellite (Route) Service sub-network shall not be greater than 0.485 seconds.

14.7.3.25. Voice Capacity.

(a) The Aeronautical Mobile-Satellite (Route) Service system shall have sufficient available voice traffic channel resources such that an Aircraft Earth Station- or Ground Earth Station originated Aeronautical Mobile- Satellite (Route) Service voice call presented to the system shall experience a probability of blockage of no more than 10-2.

14.7.3.26. Security.

(a) The Aeronautical Mobile-Satellite (Route) Service system shall provide features for the protection:

1. of messages in transit from tampering.

2. against denial of service, degraded performance characteristics, or reduction of system capacity when subjected to external attacks; or

3. unauthorized entry.

14.7.3.27. System Interfaces.

(a) An Aeronautical Mobile-Satellite (Route) Service system shall allow sub- network users to address Aeronautical Mobile-Satellite (Route) Service communications to specific aircraft by means of the ICAO 24-bit aircraft address.

14.7.3.28. Packet data service interfaces.

(a) A system that provides Aeronautical Mobile-Satellite (Route) Service packet data service shall provide;

1. An interface to the Aeronautical Telecommunication Network; and

2. A Connectivity Notification function.

14.7.3.29. Air Ground Data Link Communication

(a) Where air ground data link communication is used by the SSR Mode S, the following shall be Implemented;

1. The Mode S characteristics shall be as specified in Implementing Standards

2. The DCE and XDCE state tables shall be as specified in the Implementing Standards.

3. The Mode S packet formats shall be as specified in the Implementing Standards.

14.7.3.30. Radio channels and functional channels.

(a) An aircraft station shall be capable of tuning to any of the channels in the range specified in regulation 52 within 100 milliseconds after the receipt of an autotune command.

(b) An aircraft station for Very High Frequency Digital Link Mode 3, shall be able to tune to any channel in the range specified in regulation 52 within 100 milliseconds after the receipt of any tuning command.

(c) A ground station shall be capable of operating on its assigned channel within the radio frequency range detailed in regulation 52.

(d) Frequency 136.975Megahertz shall be reserved as a worldwide common signaling channel for VHF Air-Ground Digital Link Mode 2.

14.7.3.31. System Capabilities.

(a) The Very High Frequency Air-Ground Digital Link system shall provide code-independent and byte-independent transfer of data.

(b) The Very High Frequency Air-Ground Digital Link system shall provide link layer data broadcast services Mode 2 or voice and data broadcast services Mode 3.

(c) For Very High Frequency Air-Ground Digital Link Mode 3, the data broadcast service shall support network multicasting capability originating from the ground.

(d) The Very High Frequency Air-Ground Digital Link system shall establish and maintain a reliable communications path between the aircraft and the ground system while allowing but not requiring manual intervention.

(e) A Very High Frequency Air-Ground Digital Link -equipped aircraft shall transition from one ground station to another when circumstances dictate.

(f) The Very High Frequency Air-Ground Digital Link Mode 3 system shall support a transparent, simplex voice operation based on a “Listen-Before- Push-To-Talk” channel access.

14.7.3.32. Air-ground VHF digital link communications system characteristics.

(a) The radio frequencies used for Air-ground VHF digital link communications shall be selected from the radio frequencies in the band 117.975–137 Megahertz.

(b) The lowest assignable frequency used for Air-ground Very High Frequency digital link communications shall be 118.000 Megahertz, and the highest assignable frequency shall be 136.975 Megahertz and the separation between assignable frequencies shall be 25 KHZ.

(c) The design polarization of emissions shall be vertical.

14.7.3.33. System characteristics of the ground installations for VHF Air-Ground Digital Link.

a. The radio frequency of VDL ground station equipment operation shall not vary more than plus or minus 0.0002 per cent (2 parts per million) from the assigned frequency.

b. The effective radiated power shall be such as to provide a field strength of at least 75 microvolts per metre (minus 109 dBW/m2) within the defined operational coverage of the facility, on the basis of free-space propagation.

c. Spurious emissions shall be kept at the lowest value which the state of the technique and the nature of the service permit.

d. The amount of power from all installations of a VDL ground transmitter under all operating conditions when measured over the 25 kHz channel bandwidth of the first adjacent channel shall not exceed 2 dBm.

e. The amount of power from all installations of a VDL ground transmitter under all operating conditions when measured over the 25 kHz channel bandwidth of the second adjacent channel shall be less than minus 28 dBm.

f. The amount of power from all new installations of a VDL ground transmitter under all operating conditions when measured over the 25 kHz channel bandwidth of the fourth adjacent channel shall be less than minus 38 dBm, and from thereon it shall monotonically decrease at the minimum rate of 5 dB per octave to a maximum value of minus 53 dBm.

g. The amount of power from all new installations of a VDL ground transmitter under all operating conditions when measured over a 16 kHz channel bandwidth centred on the first adjacent channel shall not exceed minus 18 dBm.

14.7.3.34. System characteristics of the aircraft installation.

a. The radio frequency of VDL aircraft equipment shall not vary more than plus or minus 0.0005 per cent (5parts per million) from the assigned frequency.

b. The effective radiated power shall be such as to provide a field strength of at least 20 microvolts per metre (minus 120 dBW/m2) on the basis of free-space propagation, at ranges and altitudes appropriate to the operational conditions pertaining to the areas over which the aircraft is operated.

c. Spurious emissions shall be kept at the lowest value which the state of the technique and the nature of the service permit.

d. The amount of power from all new installations of a VDL aircraft transmitter under all operating conditions when measured over the 25 kHz channel bandwidth of the firstadjacent channel shall not exceed 2 dBm.

e. The amount of power from all new installations of a VDL aircraft transmitter under all operating conditions when measured over the 25 kHz channel bandwidth of the second adjacent channel shall be less than minus 28 dBm.

f. The amount of power from all new installations of a VDL aircraft transmitter under all operating conditions when measured over the 25 kHz channel bandwidth of the fourth adjacent channel shall be less than minus 38 dBm, and from thereon it shall monotonically decrease at the minimum rate of 5 dB per octave to a maximum value of minus 53 dBm.

g. The amount of power from all new installations of a VDL aircraft transmitter under all operating conditions when measured over a 16 kHz channel bandwidth centred on the first adjacent channel shall not exceed minus 18 dBm.

14.7.3.35. Physical Layer Protocols and services

a. The aircraft and ground stations shall access the physical medium operating in simplex mode.

b. The physical layer shall provide the following functions:

1. transmitter and receiver frequency control.

2. Digital reception by the receiver.

3. Digital transmission by the transmitter.

4. Notification services.

14.7.3.36. Link Layer Protocols and services.

a. The VDL link layer shall provide the following sublayer functions:

1. media access control (MAC) sublayer, which requires the use of the carrier sense multiple access (CSMA) algorithm for Mode 2 or TDMA for Mode 3.

2. A data link service (DLS) sublayer.

3. A VDL management entity (VME), which establishes and maintains DLEs between the aircraft and

the ground-based systems using link management entities (LME).

b. The Very High Frequency Air Ground Digital Link systems link services shall be;

1. Connection-oriented. The VDL Mode 2 link layer shall provide a reliable point-to-point service using a connection oriented DLS sublayer.

2. Connectionless. The VDL Mode 2 and 3 link layers shall provide an unacknowledged broadcast service using a connectionless DLS sublayer.

3. Acknowledged connectionless. The VDL Mode 3 link layer shall provide an acknowledged point-to-point service using a connectionless DLS sublayer that relies upon the MAC sublayer to guarantee sequencing.

14.7.3.37. Sub-network Layer Protocols and services.

a. VDL Mode 2

1. On the air-ground interface, the aircraft subnetwork entity shall act as a DTE and the ground subnetwork entity shall act as a DCE.

b. VDL Mode 3

1. Both the air and ground subnetwork entities shall act as DCEs.

14.7.3.38. The VHF Data Link Mobile Sub Network Dependent Convergence Function.

(a) The Very High Frequency Digital Link Mode 2 mobile Sub Network Dependent Convergence Function shall be the standard mobile Sub Network Dependent Convergence Function.

(b) The Very High Frequency Digital Link Mode 2 mobile Sub Network Dependent Convergence Function shall;

1. support maintaining context across sub network calls;

2. use the same context across all Switched Virtual Circuits negotiated to a Data Terminal Equipment, when negotiated with the same parameters; or

3. support at least 2 Switched Virtual Circuits sharing a context.

14.7.3.39. VDL Mode 3 Sub Network Dependent Convergence Function.

(a) The Very High Frequency Digital Link Mode 3 shall support;

1. the standard International Standard Organization, ISO 8208 Sub Network Dependent Convergence Function; and

2. the denoted frame-based Sub Network Dependent Convergence Function.

14.7.3.40. Voice Unit for Mode 3 Services.

(a) The voice unit shall provide for a simplex, “push-to-talk” audio and signaling interface between the user and the Very High Frequency Digital Link and two separate mutually exclusive voice circuit types shall be supported.

(b) The two separate mutually exclusive voice circuit types in sub regulation (1) are;

1. Dedicated circuits.

2. Demand assigned circuits.

3. Dedicated circuits in sub regulation (2) (a) shall provide service to a specific user group on an exclusive basis with no sharing of the circuit with other users outside the group and access shall be based on a “listen-before- push-to-talk” discipline.

4. Demand assigned circuits in sub regulation (2) shall provide voice circuit access which is arbitrated by the ground station in response to an access request received from the aircraft station and allow dynamic sharing of the channel resource increasing trunking efficiency.

5. The voice unit operation shall support a priority override access for authorized ground users.

6. The voice unit operation shall support notification to the user of the source of a received message.

7. The voice unit shall support a coded squelch operation that offers some degree of rejection of undesired co-channel voice messages based on the burst time of arrival.

14.7.3.41. Voice Unit for Mode 3 speech encoding, parameters and procedures.

(a) The Very High Frequency Digital Link Mode 3 shall use the Advanced Multi-Band Excitation, 4.8 kilobits per second encoding or decoding algorithm, version number AMBE-ATC-10, developed by Digital Voice Systems, Incorporated for voice communications.

14.7.3.42 VDL Mode 4 radio channels.

(a) A Very High Frequency Digital Link Mode 4 transmitter or receiver shall be capable of tuning to any of the 25 kHz channels from 112 Megahertz to 137 MHz.

(b) A Very High Frequency Digital Link Mode 4 station shall be capable of receiving two channels simultaneously.

(c) Very High Frequency Digital Link Mode 4 stations shall use two assigned frequencies as Global Signaling Channels, to support user communications and link management functions.

14.7.3.43 VDL Mode 4 System capabilities.

(a) The Very High Frequency Digital Link Mode 4 system shall

1. support ATN/IPS-compliant sub network services;

2. provide code-independent and byte-independent transfer of data.

3. provide link layer broadcast services.

4. provide link layer point-to-point services.

5. provide air-air communications, without ground support, as well as air-ground communications

6. establish and maintain a reliable communications path between the aircraft and the ground system while allowing, but not requiring, manual intervention when supporting air-ground operations.

7. provide the capability for deriving time from time-of-arrival measurements of received Very High Frequency Digital Link Mode 4 transmissions whenever externally derived estimates of time are unavailable.

(b) A mobile Very High Frequency Digital Link Mode 4 DLS station shall transition from one ground Very High Frequency Digital Link Mode 4 DLS station to another as required.

(c) Mobile and ground Very High Frequency Digital Link Mode 4 stations shall access the physical medium operating in simplex mode.

14.7.3.44 Coordination of channel utilization.

(a) Transmissions shall be scheduled relative to UTC, to ensure efficient use of shared channels and to avoid unintentional slot re-use on a regional basis.

14.7.3.45 Characteristics of Interregional Aeronautical Fixed Service circuits.

(a) Interregional Aeronautical Fixed Service circuits being implemented or upgraded shall employ high quality telecommunications service and the modulation rate shall take into account traffic volumes expected under both normal and alternate route conditions.

14.7.3.46 Technical provisions relating to international ground-ground data interchange at medium and higher signaling rates.

(a) The technical provisions related to international ground –ground data interchange at medium and higher signaling rates for AFTN networks shall be as specified in this Regulation.

14.7.3.47 Aircraft Addressing System.

(a) The aircraft address shall be one of 16 777 214 twenty- four-bit aircraft addresses allocated by International Civil Aviation Organization to the State of Registry or common mark registering authority and assigned.

(b) Non-aircraft transponders that are installed on aerodrome surface vehicles, obstacles or fixed Mode S target detection devices for surveillance or radar monitoring purposes shall be assigned 24-bit aircraft addresses.

(c) Mode S transponders used in accordance with sub regulation (2) shall not have any negative impact on the performance of existing Air Traffic Services surveillance systems and ACAS.

14.7.3.48 Service via satellite for the dissemination of Aeronautical Information.

(a) Point-to-multipoint telecommunication service via satellite to support the dissemination of Aeronautical Information shall be based on full- time, non-pre-emptible, protected services as defined in the relevant Telecommunication Standardization Sector of the International Telecommunications Union Recommendations.

14.7.3.49. Service via satellite for the dissemination of World Area Forecast System products.

(a) System characteristics shall include the following:

1. frequency — C-band, earth-to-satellite, 6 GHz band, satellite- to- earth, 4 GHz band;

2. capacity with effective signaling rate of not less than 9 600 bits/s;

3. bit error rates — better than 1 in 107;

4. forward error correction; and e) availability 99.95 per cent.

14.7.3.50 System architecture.

(a) The High Frequency Data Link system shall;

1. consist of one or more ground and aircraft station subsystems, which implement the High Frequency Data Link protocol specified in regulation 14.7.3.52.

2. include a ground management subsystem regulations14.7.3.53.

14.7.3.51. Aircraft and Ground Station Subsystems.

(a) The High Frequency Data Link aircraft station subsystem and the High Frequency Data Link ground station subsystem shall include the following functions:

1. High Frequency transmission and reception;

2. data modulation and demodulation; and

3. High Frequency Data Link protocol implementation and frequency selection.

14.7.3.52 Operational coverage.

(a) Frequency assignments for High Frequency Data Link shall be protected throughout their Designated Operational Coverage area.

14.7.3.53 Requirements for carriage of HFDL equipment.

(a) Requirements for mandatory carriage of High Frequency Data Link equipment shall be made on the basis of regional air navigation agreements that specify the airspace of operation and the implementation timescale.

(b) The agreement in sub regulation (1) shall provide advance notice of at least two years for the mandatory carriage of airborne systems.

14.7.3.54 Ground station networking.

(a) High Frequency Data Link ground station subsystems shall interconnect through a common ground management subsystem.

14.7.3.55 Ground station synchronization.

(a) Synchronization of High Frequency Data Link ground station subsystems shall be to within ±25 ms of UTC.

(b) For any station not operating within ±25 ms of UTC, appropriate notification shall be made to all aircraft and ground station subsystems to allow for continued system operation.

14.7.3.56 Quality of service.

(a) The undetected error rate for a network user packet which contains between 1 and 128 octets of user data shall be equal to or less than 1 in 106.

(b) Transit and transfer delays for network user packets of 128 octets shall not exceed the values of the specifications.

14.7.3.57. HF Data Link Protocol.

(a) The High Frequency Data Link protocol shall consist of a physical layer, a link layer, and a sub-network layer.

(b) The aircraft and ground stations shall access the physical medium operating in simplex mode.

(c) HFDL installations shall be capable of operating at any single sideband (SSB) carrier (reference) frequency available to the aeronautical mobile (R) service in the band 2.8 to 22 MHz, and in compliance with the relevant provisions of the Radio Regulations.

(d) Channel utilization shall be in conformity with the table of carrier (reference) frequencies of Appendix 27 to the ITU Radio Regulations.

(e) The equipment shall be capable of operating on integral multiples of 1 kHz.

(f) The sideband used for transmission shall be on the higher side of its carrier (reference) frequency.

(g) HFDL shall employ M-ary phase shift keying (M-PSK) to modulate the radio frequency carrier at the assigned frequency. The symbol rate shall be 1 800 symbols per second ±10 parts per million (i.e. 0.018 symbols per second).

14.7.3.58. Ground Management Subsystem.

(a) The ground management subsystem shall:

1. perform the functions necessary to establish and maintain communications channels between the High Frequency Data Link ground and aircraft station subsystems.

2. interface with the ground station subsystem in order to exchange control information required for frequency management, system table management, log status management, channel management, and Quality of Service data collection.

14.7.3.59. Universal Access Transceiver system characteristics of aircraft and ground stations.

(a) The Universal Access Transmitter physical layer and system characteristics of aircraft and ground stations shall be as specified below;

1. The transmission frequency shall be 978 MHz.

2. The radio frequency of the UAT equipment shall not vary more than ±0.002 per cent (20 ppm) from the assigned frequency.

3. UAT equipment shall operate at one of the power levels (minimum or maximum).

4. The maximum equivalent isotropically radiated power (EIRP) for a UAT aircraft or ground station shall not exceed +58 dBm.

5. The spectrum of a UAT ADS-B message transmission modulated with pseudorandom message data blocks (MDB) shall fall within the specified limits when measured in a 100 kHz bandwidth.

6. Spurious emissions shall be kept at the lowest value which the state of the technique and the nature of the service permit.

7. The design polarization of emissions shall be vertical.

8. The time/amplitude profile of a UAT message transmission shall meet the following requirements, in which the reference time is defined as the beginning

of the first bit of the synchronization sequence appearing at the output port of the equipment.

14.7.3.60. Mandatory carriage requirements.

(a) Requirements for mandatory carriage of Universal Access Transmitter equipment shall be made on the basis of regional air navigation agreements which specify the airspace of operation and the implementation timescales for the carriage of equipment, including the appropriate lead time.

14.7.3.61. Air-Ground VHF Communication System characteristics.

(a) The characteristics of the air-ground Very High Frequency communication system used in the International Aeronautical Mobile Service shall be in conformity with IS 14.7.3.61.

(b) The systems characteristics for both ground and airborne installation shall conform to the specifications in IS 14.7.3.61.

14.7.3.62. Single sideband High Frequency Communication System Characteristics.

a. The characteristics of the air-ground High Frequency Single Side Band system, when used in the Aeronautical Mobile Service, shall be in conformity with the specifications in this regulation.

14.7.3.63. SELCAL System.

a. Where a Select - Calling system is installed, the system characteristics contained in this regulation shall apply.

b. Aeronautical Stations which are required to communicate with Select - Calling equipped aircraft shall have Select - Calling encoders that supports all tones.

14.7.3.64. Technical provisions relating to International Aeronautical speech circuit switching and signaling for ground-ground applications.

a. The use of circuit switching and signaling to provide speech circuits to interconnect Air Traffic Services units not interconnected by dedicated circuits shall be by agreement between the Administrations concerned.

b. The application of aeronautical speech circuit switching and signaling shall be made on the basis of regional air navigation agreements.

c. The Air Traffic Control communication requirements defined in the Civil Aviation (Air Traffic Services) Regulations shall be met by implementation of one or more of the following basic three call types-

1) instantaneous access.

2) direct access.

3) indirect access.

d. Subject to sub regulation (3), the following functions shall be provided in order to meet the requirements specified in Civil Aviation (Air Traffic Services) Regulations.

1) means of indicating the calling or called party identity;

2) means of initiating urgent or priority calls; and

3) conference capabilities.

e. The characteristics of the circuits used in aeronautical speech circuit switching and signaling shall conform to appropriate international standards and Telecommunication Standardization Sector of the International Telecommunications Union recommendations.

f. Digital signaling systems shall be used wherever their use can be justified in terms of any of the following:

1) improved quality of service;

2) improved user facilities; or

3) reduced costs where quality of service is maintained.

g. The characteristics of supervisory tones to be used such as ringing, busy, number unobtainable shall conform to appropriate Telecommunication Standardization Sector of the International Telecommunications Union, recommendations.

h. To take advantage of the benefits of interconnecting regional and national aeronautical speech networks, the international aeronautical telephone network numbering scheme shall be used.

14.7.3.65. Operating frequencies.

a. All installations of emergency locator transmitters operating on 406 MHz shall meet the provisions specified in 14.7.3.68.

b. All installations of emergency locator transmitters operating on 121.5 MHz shall meet the provisions specified in 14.7.3.67.

c. Emergency locator transmitters shall operate on 406 MHz and121.5 MHz simultaneously.

d. All emergency locator transmitters installed on or after 1 January 2002 shall operate simultaneously on 406 Megahertz and 121.5 MHz.

e. The technical characteristics for the 406 MHz component of an integrated emergency locator transmitters shall be in accordance with 14.7.3.68

f. The technical characteristics for the 121.5 MHz component of an integrated emergency locator transmitters shall be in accordance with 14.7.3.67

14.7.3.66. Emergency Locator transmitters Register.

a. The Authority shall make arrangements to have 406 MHz Emergency Locator transmitters register and shall ensure that the register is updated whenever necessary.

b. Register information regarding the Emergency Locator transmitters shall be immediately available to search and rescue authorities.

c. Emergency Locator transmitters register information shall include the following:

1) transmitter identification expressed in the form of an alphanumerical code of 15 hexadecimal characters;

2) transmitter manufacturer, model and serial number;

3) COSPAS-SARSAT type approval number;

4) name, address and emergency telephone number of the owner and operator;

5) name, address and telephone number of other emergency contacts to whom the owner or the operator is known;

6) aircraft manufacturer and type; and

7) color of the aircraft.

14.7.3.67. Specification for the 121.5 MHz component of Emergency Locator Transmitter.

a. Emergency Locator Transmitters shall operate on121.5 MHz and the frequency tolerance shall not exceed plus or minus 0.005 per cent.

b. The emission from an Emergency Locator transmitter under normal conditions and attitudes of the antenna shall be vertically polarized and essentially omni-directional in the horizontal plane.

c. Over a period of 48 hours of continuous operation, at an operating temperature of minus 20°C, the Peak Effective Radiated Power shall at no time be less than 50 mW.

d. The type of emission shall be A3X and any other type of modulation that meets the requirements shall be used provided that the emission does not prejudice precise location of the beacon by homing equipment.

e. The carrier shall be amplitude modulated at a modulation factor of at least 0.85.

f. The modulation applied to the carrier shall have a minimum duty cycle of 33 per cent.

g. The emission shall have a distinctive audio characteristic achieved by amplitude modulating the carrier with an audio frequency sweeping downward over a range of not less than 700Hz within the range 1 600 Hertz to 300 Hertz and with a sweep repetition rate of between 2Hz and 4 Hz.

h. The emission shall include a clearly defined carrier frequency distinct from the modulation sideband components; in particular, at least 30 per cent of the power shall be contained at all times within plus or minus 30 Hertz of the carrier frequency on 121.5 MHz.

14.7.3.68. Specification for the 406 MHz component of Emergency Locator Transmitter.

a. Emergency Locator Transmitters shall operate on one of the frequency channels assigned for use in the frequency band406.0 to 406.1 MHz.

b. The period between transmissions shall be 50 seconds plus or minus 5 per cent.

c. Over a period of 24 hours of continuous operation at an operating temperature of –20°C, the transmitter power output shall be within the limits of 5 W plus or minus 2 dB.

d. The 406 MHz Emergency Locator Transmitters shall be capable of transmitting a digital message.

14.7.3.69. Transmitter identification coding.

a. Emergency locator transmitters operating on 406 Megahertz shall be assigned a unique coding for identification of the transmitter or aircraft on which it is carried.

b. The emergency locator transmitter shall be coded in accordance with either the aviation user protocol or one of the serialized user protocols and shall be registered with the appropriate the Authority.

14.7.4.0 PROVISION OF SURVEILLANCE AND COLLISION AVOIDANCE SYSTEMS SERVICES

14.7.4.1. Applicability

This subpart is applicable to the provision Surveillance and Collision Avoidance System services.

14.7.4.2. Requirements for Surveillance and Collision Avoidance System Services Provider.

(a). No person shall provide Surveillance and Collision Avoidance System Services except in accordance with the provisions of these Regulations.

(b). The Provision of 14.7.4.1 does not apply if a person operates Surveillance and Collision Avoidance System—

(1) the Surveillance and Collision Avoidance System facility:

i. Surveillance and Collision Avoidance System facility that does not support air traffic services;

ii. is a Surveillance and Collision Avoidance System facility that does not support IFR flight or air traffic services;

(2) the Surveillance and Collision Avoidance System facility does not constitute harmful interference with any other Aeronautical Surveillance and Collision Avoidance System facility;

(3) an approval has been granted by the appropriate Authority for the aeronautical facility;

(4) an identification code or a call sign has been assigned to the Collision Avoidance System facility;

(c) The provision of 14.7.4.1does not apply if a person operates a: surveillance systems

(1) the surveillance systems are not used to support air traffic services;

(2) the surveillance systems is operated in accordance with the applicable surveillance systems operations procedures prescribed in these Regulations; and

(3) the electromagnetic wave transmission does not constitute harmful interference with any other Aeronautical Telecommunications Services or aeronautical facility.

(d) No person may provide Surveillance and Collision Avoidance Systems services at aerodromes or portion of airspace in Nigeria, unless such person holds a certificate issued by the Authority.

14.7.4.3. PROVISION OF SURVEILLANCE AND COLLISION AVOIDANCE SYSTEMSERVICES

(a) 14.7.4.8 The holder of an Aeronautical Telecommunication Services Provider approval issued under these Regulations shall be responsible for the provision of Surveillance and Collision Avoidance System Services to ensure that the information and data necessary for safe, regular and efficient operation of air navigation is available in the form suitable for the operational requirements of:

(1). Flight operations personnel including flight crews and other personnel responsible for the provision of pre-flight briefing; and

(2). Providers of Air Traffic Services;

14.7.4.4 SECONDARY SURVEILLANCE RADAR (SSR)

(a) SSR shall be installed and maintained in operation as an aid to air traffic services, it shall conform with the provisions of 14.7.4.13. a unless otherwise specified in this 14.7.4.5.a

14.7.4.5. INTERROGATION MODES (GROUND-TO-AIR)

(a) Air traffic services shall be performed Interrogation on the modes described in

14.7.4.13. iv. or 14.7.4.14. The uses of each mode shall be as follows:

(1) Mode A—to elicit transponder replies for identity and surveillance.

(2) Mode C—to elicit transponder replies for automatic pressure-altitude transmission and surveillance.

(3) Inter-mode—

i. Mode A/C/S all-call: to elicit replies for surveillance of Mode A/C transponders and for the acquisition of Mode S transponders.

ii. Mode A/C-only all-call: to elicit replies for surveillance of Mode A/C transponders. Mode S transponders do not reply.

(4) Mode S—

i. Mode S-only all-call: to elicit replies for acquisition of Mode S transponders.

ii. Broadcast: to transmit information to all Mode S transponders. No replies are elicited.

iii. Selective: for surveillance of, and communication with, individual Mode S transponders.

a) For each interrogation, a reply is elicited only from the transponder uniquely addressed by the interrogation.

b) Where necessary in areas of overlapping coverage, across international boundaries off light information regions, the assignment of interrogator identifier (II) codes, shall be the subject of regional air navigation agreements.

c) Where necessary in areas of overlapping coverage, the assignment of surveillance identifier (SI) codes, shall be the subject of regional air navigation agreements.

d) Surveillance Systems with Mode A and Mode C interrogations capability shall be provided for safe and regularity of air craft operations by the Services Provider.

14.7.4.6 SIDE-LOBE SUPPRESSION CONTROL INTERROGATION

a) Side-lobe suppression shall be provided in accordance with the provisions of 14.7.4.13.a.1.iv and 14.7.4.13.a.1.v on all Mode A, Mode C and inter-mode interrogations.

b) Side-lobe suppression shall be provided in accordance with the provisions of 14.7.4.14.a.5.ii on all Mode S-only all-call interrogations.

14.7.4.7 Transponder reply modes (air-to-ground)

a) Transponders shall respond to Mode A interrogations in accordance with the provisions of 14.7.4.13.a.1.vii.L.1 and to Mode C interrogations in accordance with the provisions of 14.7.4.13.a.1.vii. L.2.

1) The pressure-altitude reports contained in Mode S replies shall be derived as specified in 14.7.4.13.a.1.vii. L.2.

b) Where the need for Mode C automatic pressure- been determined, transponders, when used within the airspace shall respond to Mode C interrogations with pressure-altitude encoding in the information pulses.

1) From 1 January 1999, all transponders used in Nigeria airspace shall respond to Mode C interrogations with pressure-altitude information.

2) Where aircraft is equipped with7.62m(25ft), better pressure-altitude sources, the pressure-altitude information provided by Mode S transponders in response to selective interrogations (i.e.in the AC field, shall be reported in 7.62m (25 ft) increments.

3) All Mode A/C transponders shall report pressure-altitude encoded in the information pulses in Mode C replies.

4) All Mode S transponders shall report pressure-altitude encoded in the information pulses in Mode C replies and in the AC field of Mode S replies.

5) When a Mode S transponder is not receiving more pressure-altitude information from a source with a quantization of 7.62 m (25 ft) or better increments, the reported value of the altitude shall be the value obtained by expressing the measured value of the uncorrected pressure-altitude of the aircraft in 30.48m (100ft) increments and the Q bit shall be set to 0.

c) Transponders used within Nigeria airspace where the need for Mode S airborne capability has been determined shall also respond to inter-mode and Mode S interrogations in accordance with the applicable provisions of 14.7.4.14.

1) Requirements for mandatory carriage of SSR Mode S transponders shall be on the basis of regional air navigation agreements which shall specify the airspace and the airborne implementation timescales.

2) The agreements indicated in 14.7.4.7(c)(1) should provide at least five years' notice.

14.7.4.8 Mode A reply codes (information pulses)

a) All transponders shall be capable of generating 4096 reply codes conforming to the characteristics given in 14.7.4.13.a.1.vi.B.

1) ATS provider shall establish the procedures for the allotment of SSR codes in conformity with Regional Air Navigation agreements, taking into account other users of the system.

b) The following Mode A codes shall be reserved for special purposes:

1) Code 7700 to provide recognition of an aircraft in an emergency.

2) Code 7600 to provide recognition of an aircraft with radio communication failure.

3) Code 7500 to provide recognition of an aircraft which is being subjected to unlawful interference.

c) Surveillance systems provider shall made appropriate provisions in ground decoding equipment to ensure immediate recognition of Mode A codes 7500, 7600 and 7700.

d) Mode A code 0000 should be reserved for allocation subject to regional agreement, as a general-purpose code.

e) Mode A code 2000 shall be reserved to provide recognition of an aircraft which has not received any instructions from air traffic control units to operate the transponder.

14.7.4.9. Mode S airborne equipment capability

a) All Mode S transponders shall conform to one of the following five levels:

1) Level 1 — Level 1 transponders shall have the capabilities prescribed for:

i. Mode A identity and Mode C pressure-altitude reporting (14.7.4.13.a.1);

ii. inter-mode and Mode S all-call transactions (14.7.4.14.e.);

iii. addressed surveillance altitude and identity transaction

iv. lock out protocols

v. basic data protocols except datalink capability and air-air service and squitter transactions

2) Level 2— Level 2 transponders shall have the capabilities of 14.7.4.9(a)(1) and also those prescribed for:

i. Standard length communications (Comm-A and Comm-B)

ii. Datalink capability reporting

iii. Aircraft identification reporting and

iv. Data parity with overlay control for equipment certified on or after 1 January2020.

3) Level 3— Level 3 transponders shall have the capabilities of 14.7.4.9(a)(2) and also those prescribed for ground- to-air extended length message (ELM) communications (14.7.4.10.a to 14.7.4.10.e).

4) Level 4—Level 4 transponders shall have the capabilities of 14.7.4.9(a)(3) and also those prescribed for air-to- ground extended length message (ELM) communications

5) Level 5— Level 5 transponders shall have the capabilities of 14.7.4.9.a.4 and also those prescribed for enhanced Comm-Band extended length message (ELM) communications (14.7.4.10.f and 14.7.4.10.j)

6) Extended squitter — Extended squitter transponders shall have the capabilities of 14.7.4.9(a), 14.7.4.9(a) 14.7.4.9.a.4 and 14.7.4.9.a.5, the capabilities prescribed for extended squitter operation and the capabilities prescribed for ACAS cross-link operation (14.7.4.4). Transponders with these capabilities shall be designated with a suffix “e”.

7) SI capability—Transponders with the ability to process SI codes shall have the capabilities of 14.7.4.9(a)(1), 14.7.4.9(a)(2), 14.7.4.9(a)(3), 14.7.4.9(a)(4), 14.7.4.9(a)(5) and also those prescribed for SI code operation (14.7.4.14.C.2.i.D). Transponders with this capability shall be designated with a suffix “s”.

   i. 14.7.4.9(a)(7)(i) SI code capability shall be provided in accordance with the provisions of 14.7.4.9(a)(7) for all Mode S transponders installed on or after1 January 2003 and by all Mode S transponders by 1 January2005.

8) Extended squitter non-transponder devices. Devices that are capable of broadcasting extended squitters that are not part of a Mode S transponder shall conform to all of the 1090MHz RF signals in space requirements specified for a Mode S transponder, except for transmit power levels for the identified equipment class as specified in 14.7.4.21.a

b) All Mode S transponders used by international civil air traffic shall conform, at least, to the requirements of Level 2 prescribed in 14.7.4.9(a)(2)

c) Mode S transponders installed on aircraft with gross mass in excess of 5700 kg or a maximum cruising true airspeed capability in excess of 463 km/h (250kt) shall operate with antenna diversity as prescribed if:

   i. the aircraft individual certificate of airworthiness is first issued on or after 1 January 1990; or

   ii. Mode S transponder carriage is required on the basis of regional air navigation agreement in accordance with 14.7.4.7(c)(1) and 14.7.4.9(c)(2)

d) CAPABILITY REPORTING IN MODE S SQUITTERS

   i. Capability reporting in Mode S acquisition squitter (unsolicited downlink transmissions) shall be provided for all Mode S transponders installed on or after1 January 1995.

e) EXTENDED LENGTH MESSAGE (ELM) TRANSMIT POWER

Where to facilitate the conversion of existing Mode S transponders to include full Mode S capability, transponders originally manufactured before 1 January 1999 shall be permitted to transmit a burst of 16 ELM segments at a minimum power level of 20 dBW.

14.7.4.10. SSR Mode S address (aircraft address)

The SSR Mode S address shall be one of 16777214 twenty-four-bit aircraft addresses allocated by ICAO to the State of Registry or common mark registering authority and assigned as prescribed in 14.7.4.14.d.2.B.ii and the Appendix to Chapter 9, Part I, Volume III, Annex10.

14.7.4.11. Transponder occupancy

Transponder occupancy shall be in accordance to the provision in Appendix M of the Aeronautical Surveillance Manual (Doc9924) for guidance on consistent modelling of transponder occupancy.

14.7.4.12. HUMAN FACTORS CONSIDERATIONS

Human Factors principles shall be observed in the design and certification of surveillance radar, transponder and collision avoidance systems.

a) Operation of controls

1) Transponder controls which are not intended to be operated in flight shall not be directly accessible to the flight crew.

14.7.4.13. SURVEILLANCE SYSTEMS

a) SECONDARY SURVEILLANCE RADAR (SSR) SYSTEM CHARACTERISTICS

Operation of Surveillance Radar shall be in accordance to section14.7.4.12. a.1 that prescribes the technical characteristics of SSR systems having only Mode A and Mode C capabilities. And Section14.7.4.14 prescribes the characteristics of systems with Mode S capabilities. Chapter 5 prescribes additional requirements on Mode S extended squitter.

1) Systems having only Mode A and Mode C capabilities
SSR modes shall be designated by letters A and C. Suffixed letters, e.g. A2, C4, are used to designate the individual pulses used in the air-to-ground pulse trains. This common use of letters is not to be construed as implying any particular association of modes and codes.

i. INTERROGATION AND CONTROL (INTERROGATION SIDE-LOBE SUPPRESSION) RADIO FREQUENCIES (GROUND-TO-AIR)

A. The carrier frequency of the interrogation and control transmissions shall be 1030MHz.

B. The frequency tolerance shall be plus or minus 0.2MHz.

C. The carrier frequencies of the control transmission and of each of the interrogation pulse transmissions shall not differ from each other by more than 0.2MHz

ii. REPLY CARRIER FREQUENCY (AIR-TO-GROUND)

A. The carrier frequency of the reply transmission shall be1090MHz.

B. The frequency tolerance shall be plus or minus 3 MHz

iii. POLARIZATION

Polarization of the interrogation, control and reply transmissions shall be predominantly vertical.

iv. INTERROGATION MODES (SIGNALS-IN-SPACE)

A. The interrogation shall consist of two transmitted pulses designated P1 and P3. A control pulse P2 shall be transmitted following the first interrogation pulse P1.

B. Interrogation Modes A and C shall be as defined in 14.7.4.13. a.1.iv.C.

C. The interval between P1and P3 shall determine the mode of interrogation and shall be as follows: Mode A 8 ± 0.2 microseconds Mode C 21 ± 0.2microseconds

D. The interval between P1 and P2 shall be 2.0 plus or minus 0.15 microseconds.

E. The duration of pulses P1, P2 and P3 shall be 0.8 plus or minus 0.1 microsecond.

F. The rise time of pulses P1, P2 and P3 shall be between 0.05 and 0.1 microsecond.

G. The decay time of pulses P1, P2 and P3 shall be between 0.05 and 0.2 microsecond.

v. INTERROGATOR AND CONTROL TRANSMISSION CHARACTERISTICS (INTERROGATION SIDE-LOBE SUPPRESSION—SIGNALS-IN-SPACE)

A. The radiated amplitude of P2 at the antenna of the transponder shall be:

a) equal to or greater than the radiated amplitude of P1 from the side-lobe transmissions of the antenna radiating P1; and

b) at a level lower than 9 dB below the radiated amplitude of P1, within the desired arc of interrogation.

B. Within the desired beamwidth of the directional interrogation (main lobe), the radiated amplitude of P3 shall be within 1 dB of the radiated amplitude of P1.

vi. TECHNICAL CHARACTERISTICS OF TRANSPONDERS WITH MODE A AND MODE C CAPABILITIES ONLY

A. Reply. The transponder shall reply (not less than 90 percent triggering) when all of the following conditions have been met:

a. the received amplitude of P3 is in excess of a level 1 dB below the received amplitude of P1 but no greater than 3dB

b. above the received amplitude of P1;

c. either no pulse is received in the interval 1.3 microseconds to 2.7 microseconds after P1, or P1 exceeds by more than

d. 9 dB any pulse received in this interval;

e. the received amplitude of a proper interrogation is more than 10 dB above the received amplitude of random pulses where the latter are not recognized by the transponder as P1, P2 or P3.

B. The transponder shall not reply under the following conditions:

a) to interrogations when the interval between pulses P1 and P3 differs from those specified in 3.1.1.4.3 by more than plus or minus 1.0 microsecond;

b) upon receipt of any single pulse which has no amplitude variations approximating a normal interrogation `condition.

C. Dead time. After recognition of a proper interrogation, the transponder shall not reply to any other interrogation, at least for the duration of the reply pulse train. This dead time shall end no later than 125 microseconds after the transmission of the last reply pulse of the group.

D. RECEIVER SENSITIVITY AND DYNAMIC RANGE

1) The minimum triggering level of the transponder shall be such that replies are generated to at least 90per cent of the interrogation signals when:

a) the two pulses P1 and P3 constituting an interrogation are of equal amplitude and P2 is not detected; and

b) the amplitude of these signals is nominally 71dB below 1mW, with limits between 69dB and 77dB below 1mW.

2) The reply and suppression characteristics shall apply over a received amplitude of P1 between minimum triggering level and 50dB above that level.

3) The variation of the minimum triggering level between modes shall not exceed 1dB for nominal pulse spacings and pulse widths.

E. Pulse duration discrimination. Signals of received amplitude between minimum triggering level and 6 dB above this level, and of a duration less than 0.3 microsecond, shall not cause the transponder to initiate reply or suppression action. With the exception of single pulses with amplitude variations approximating an interrogation, any single pulse of a duration more than 1.5 microseconds shall not cause the transponder to initiate reply or suppression action over the signal amplitude range of minimum triggering level (MTL) to 50 dB above that level.

E. Echo suppression and recovery. The transponder shall contain an echo suppression facility designed to permit normal operation in the presence of echoes of signals-in-space. The provision of this facility shall be compatible with the requirements for suppression of side lobes given in 14.7.4.13.a.1.vii. D.1.

1) Desensitization. Upon receipt of any pulse more than 0.7 microsecond in duration, the receiver shall be desensitized by an amount that is within at least 9dB of the amplitude of the desensitizing pulse but shall at no time exceed the amplitude of the desensitizing pulse, with the exception of possible overshoot during the first microsecond following the desensitizing pulse.

2) Recovery. Following desensitization, the receiver shall recover sensitivity (within3 dB of minimum triggering level) within 15 microseconds after reception of a desensitizing pulse having a signal strength up to 50 dB above minimum triggering level. Recovery shall be at an average rate not exceeding 4.0 dB per microsecond.

F. Random triggering rate. In the absence of valid interrogation signals, Mode A/C transponders shall not generate more than 30 unwanted Mode A or Mode C replies per second as integrated over an interval equivalent to at least 300random triggers, or 30seconds, whichever is less. This random triggering rate shall not be exceeded when all possible interfering equipment installed in the same aircraft are operating at maximum interference levels.

1) Random triggering rate in the presence of low-level in-band continuous wave (CW) interference. The total random trigger rate on all Mode A and/or Mode C replies shall not be greater than 10 reply pulse groups or suppressions per second, averaged over a period of 30seconds, when operated in the, presence of non-coherent CW interference at a frequency of 1030 ± 0.2 MHz and a signal level of – 60dBm or less.

G. REPLY RATE

1) All transponders shall be capable of continuously generating at least 500 replies per second for a 15-pulse coded reply. Transponder installations used solely below 4500m (15000ft), or below a lesser altitude established by the appropriate authority or by regional air navigation agreement, and in aircraft with a maximum cruising true airspeed not exceeding 175kt (324km/h) shall be capable of generating at least 100015- pulse coded replies per second for a duration of 100milliseconds. Transponder installations operated above 4500m (15 000ft) or in aircraft with a maximum cruising true airspeed in excess of 175kt (324km/h), shall be capable of generating at least 120015 – pulse coded replies per second for a duration of 100 milliseconds.

2) Reply rate limit control. To protect the system from the effects of transponder

over-interrogation by preventing response to weaker signals when a predetermined reply rate has been reached , a sensitivity reduction type reply limit control shall be incorporated in the equipment. The range of this control shall permit adjustment, as a minimum, to any value between 500 and 2 000 replies per second, or to the maximum reply rate capability if less than 2 000 replies per second, without regard to the number of pulses in each reply. Sensitivity reduction in excess of 3dB shall not take effect until 90 per cent of the selected value is exceeded. Sensitivity reduction shall be at least 30dB for rates in excess of 150 percent of the selected value.

I. Reply delay and jitter. The time delay between the arrival, at the transponder receiver, of the leading edge of P3 and the transmission of the leading edge of the first pulse of the reply shall be 3 plus or minus 0.5 microseconds. The total jitter of the reply pulse code group, with respect to P3, shall not exceed 0.1 microsecond for receiver input levels between 3 dB and 50 dB above minimum triggering level. Delay variations between modes on which the transponder is capable of replying shall not exceed 0.2 microsecond

J. TRANSPONDER POWER OUTPUT AND DUTY CYCLE

1) The peak pulse power available at the antenna end of the transmission line of the transponder shall beat least 21 dB and not more than 27 dB above 1W, except that for transponder installations used solely below 4500m (15 000ft), or below a lesser altitude established by the appropriate authority or by regional air navigation agreement, a peak pulse power available at the antenna end of the transmission line of the transponder of at least 18.5 dB and not more than 27 dB above1W shall be permitted.

K. REPLY CODES

1) Identification. The reply to a Mode A interrogation shall consist of the two framing pulses specified in 14.7.4.13. a.1.vi. A together with the information pulses (Mode A code) specified in 14.7.4.13.a.1.vi.B.

a) The Mode A code shall be manually selected from the 4 096 codes available.

2) Pressure-altitude transmission. The reply to Mode C interrogation shall consist of the two framing pulses specified in 14.7.4.13. a.1.vi. A above. When digitized pressure-altitude information is available, the information pulses specified in 14.7.4.13.a.1.vi.B shall also be transmitted.

a) Transponders shall be provided with means to remove the information pulses but to retain the framing pulses when the provision of 14.7.4.13.a.1.vii.L.2.d below is not complied within reply to Mode C interrogation.

b) The information pulses shall be automatically selected by an analog-to-digital converter connected to a pressure-altitude data source in the aircraft referenced to the standard pressure setting of 1 013.25 hector pascals.

c) Pressure-altitude shall be reported in 100-ft increments by selection of pulses as shown in the Appendix to this chapter.

d) The digitizer code selected shall correspond to within plus or minus 38.1m (125ft), on a 95 percent probability basis, with the pressure-altitude information (referenced to the standard pressure setting of 1013.25 hectopascals), used on board the aircraft to adhere to the assigned flight profile.

L. Transmission of the special position identification (SPI) pulse. When required, this pulse shall be transmitted with Mode A replies, as specified in 14.7.4.13.a.1.vi.C, for a period of between 15 and 30 seconds.

M. ANTENNA

1) The transponder antenna system, when installed on an aircraft, shall have a radiation pattern which is essentially omnidirectional in the horizontal plane.

vii. TECHNICAL CHARACTERISTICS OF GROUND INTERROGATORS WITH MODE A AND MODE C CAPABILITIES ONLY

A. Interrogation repetition frequency. The maximum interrogation repetition frequency shall be 450 interrogations per second.

B. RADIATED POWER

In order to minimize system interference, the effective radiated power of interrogators shall be reduced to the lowest value consistent with the operationally required range of each individual interrogator site.

C. When Mode C information is to be used from aircraft flying below transition levels, the altimeter pressure reference datum shall be taken into account.

viii. INTERROGATOR RADIATED FIELD PATTERN

The beam width of the directional interrogator antenna radiating P3 should not be wider than is operationally required. The side-and back-lobe radiation of the directional antenna should be at least 24 dB below the peak of the main-lobe radiation.

ix. INTERROGATOR MONITOR

1) The range and azimuth accuracy of the ground interrogator shall be monitored at sufficiently frequent intervals to ensure system integrity.

2) In addition to range and azimuth monitoring, provision shall be made to monitor continuously the other critical parameters of the ground interrogator for any degradation of performance exceeding the allowable system tolerances and to provide an indication of any such occurrence.

x. SPURIOUS EMISSIONS AND SPURIOUS RESPONSES

1) SPURIOUS RADIATION

CW radiation shall not exceed 76dB below 1W for the interrogator and 70 dB below 1W for the transponder.

2) SPURIOUS RESPONSES

The response of both airborne and ground equipment to signals not within the receiver pass band should be at least 60 dB below normal sensitivity.

14.7.4.14. Systems having Mode S capabilities

a) Interrogation signals-in-space characteristics. The paragraphs here in describe the signals-in-space as they can be expected to appear at the antenna of the transponder.

1. Interrogation carrier frequency. The carrier frequency of all interrogations (uplink transmissions) from ground facilities with Mode S capabilities shall be 1030 plus or minus 0.01MHz, except during the phase reversal, while maintaining the spectrum requirements of 14.7.4.14.a.2.

2. Interrogation spectrum. The spectrum of a Mode S interrogation about the carrier frequency shall not exceed the limits specified in Figure 3-2.

3. Polarization. Polarization of the interrogation and control transmissions shall be nominally vertical.

4. Modulation. For Mode S interrogations, the carrier frequency shall be pulse modulated. In addition, the data pulse, P6, shall have internal phase modulation.

i. Pulse modulation. Inter-mode and Mode S interrogations shall consist of a sequence of pulses as specified in 14.7.4.14.a,5 and Tables 3-1,3-2,3-3, and 3-4.

ii. Phase modulation. The short (16.25-microsecond) and long (30.25-microsecond) P6 pulses of 14.7.4.14.a.4.i shall have internal binary differential phase modulation consisting of 180-degree phase reversals of the carrier at a 4-megabit per second rate.

a) Phase reversal duration. The duration of the phase reversal shall be less than 0.08 microsecond and the phase shall advance (or retard) monotonically throughout the transition region. There shall be no amplitude modulation applied during the phase transition.

b) Phase relationship. The tolerance on the 0 and 180-degree phase relationship between successive chips and on the sync phase reversal (14.7.4.14.a.5.ii.ii) within the P6 pulse shall be plus or minus 5 degrees.

5. Pulse and phase reversal sequences. Specific sequences of the pulses or phase reversals described in 14.7.4.14.a.4 shall constitute interrogations.

i. Inter-mode interrogation

A. Mode A/C/S all-call interrogation. This interrogation shall consist of three pulses: P1, P3, and the long P4 as shown in Figure 3-3. One or two control pulses (P2 alone, or P1 and P2) shall be transmitted using a separate antenna pattern to suppress responses from aircraft in the side lobes of the interrogator antenna.

1. Mode A/C/S all-call interrogations shall not be used on or after 1 January 2020.

B. Mode A/C - only all – call interrogation. This interrogation shall be identical to that of the Mode A/C/S all- call interrogation except that the short P4 pulse shall be used.

C. Pulse intervals. The pulse intervals between P1, P2 and P3 shall be as defined in 14.7.4.13.a.iv.C and 14.7.4.13.a.iv.D. The pulse interval between P3 and P4 shall be 2 plus or minus 0.05 microsecond.

D. Pulse amplitudes. Relative amplitudes between pulses P1, P2 and P3 shall be in accordance with ICAO Annex 10 Vol 4 Chapter 3.1.1.5. The amplitude of P4 shall be within 1 dB of the amplitude of P3.

ii. Mode S interrogation. The Mode S interrogation shall consist of three pulses: P1, P2 and P6.

A. Mode S side-lobe suppression. The P5 pulse shall be used with the Mode S – only all -call interrogation (UF= 11, to prevent replies from aircraft in the side and back lobes of the antenna When used, P5 shall be transmitted using a separate antenna pattern.

B. Sync phase reversal. The first phase reversal in the P6 pulse shall be the sync phase reversal. It shall be the timing reference for subsequent transponder operations related to the interrogation.

C. Data phase reversals. Each data phase reversal shall occur only at a time interval (Ntimes0.25) plus or minus 0.02 microsecond (N equal to, or greater than 2) after the sync phase reversal. The 16.25- microsecond P6 pulse shall contain at most 56 data phase reversals. The 30.25-microsecond P6 pulse shall contain at most 112 data phase reversals. The last chip, that is the 0.25-microsecond time interval following the last data phase reversal position, shall be followed by a 0.5-microsecond guard interval.

D. Intervals. The pulse interval between P1 and P2 shall be 2 plus or minus 0.05 microsecond. The interval between the leading edge of P2 and the sync phase reversal of P6 shall be 2.75 plus or minus 0.05 microsecond. The leading edge of P6 shall occur 1.25 plus or minus 0.05 microsecond before the sync phase reversal. P5, if transmitted, shall be centered over the sync phase reversal; the leading edge of P5 shall occur 0.4 plus or minus 0.05 microsecond before the sync phase reversal.

E. Pulse amplitudes. The amplitude of P2 and the amplitude of the first microsecond of P6 shall be greater than the amplitude of P1 minus 0.25 dB. Exclusive of the amplitude transients associated with phase reversals, the amplitude variation of P6 shall be less than 1 dB and the amplitude variation between successive chips in P6 shall be less than 0.25 dB. The radiated amplitude of P5 at the antenna of the transponder shall be:

a) Equal to or greater than the radiated amplitude of P6 from the side-lobe transmissions of the antenna radiating P6; and

b) at a level lower than 9dB below the radiated amplitude of P6 within the desired arc of interrogation.

b) REPLY SIGNALS-IN-SPACE CHARACTERISTICS

1. Reply carrier frequency. The carrier frequency of all replies (downlink transmissions) from transponders with Mode S capabilities shall be 1 090 plus or minus1 MHz

2. Reply spectrum. The spectrum of a Mode S reply about the carrier frequency shall not exceed the limits specified in Figure 3-5.

3. Polarization. Polarization of the reply transmissions shall be nominally vertical.

4. Modulation. The Mode S reply shall consist of a preamble and a data block. The preamble shall be a 4-pulse sequence and the data block shall be binary pulse-position modulate data 1 mega bit per second data rate.

i. Pulse shapes. Pulse shapes shall be as defined in Table 3-2. All values are in microseconds.

5. Mode S reply. The Mode S reply shall be as shown in Figure 3-6. The data block in Mode S replies shall consist of either 56 or 112 information bits.

i. Pulse intervals. All reply pulses shall start at a defined multiple of 0.5 microsecond from the first transmitted pulse. The tolerance in all cases shall be plus or minus 0.05 microsecond.

A. Reply preamble. The preamble shall consist of four pulses, each with a duration of 0.5 microsecond. The pulse intervals from the first transmitted pulse to the second, third and fourth transmitted pulses shall be 1, 3.5 and 4.5 microseconds, respectively.

B. Reply data pulses. The reply data block shall begin 8 microseconds after the leading edge of the first transmitted pulse. Either 56 or 112 one-microsecond bit intervals shall be assigned to each transmission. A 0.5-microsecond pulse shall be transmitted either in the first or in the second half of each interval. When a pulse transmitted in the second half of one interval is followed by another pulse transmitted in the first half of the next interval, the two pulses merge and a one- microsecond pulse shall be transmitted.

ii. Pulse amplitudes. The pulse amplitude variation between one pulse and any other pulse in a Mode S reply shall not exceed 2 dB.

C. GENERAL INTERROGATION-REPLY PROTOCOL

1. Transponder transaction cycle. A transponder transaction cycle shall begin when the SSR Mode S transponder has recognized an interrogation. The transponder shall then evaluate the interrogation and determine whether it shall be accepted. If accepted, it shall then process the received interrogation and generate a reply, if appropriate. The transaction cycle shall end when:

a) anyone of the necessary conditions for acceptance has not been met,

b) an interrogation has been accepted and the transponder has either:

1) completed the processing of the accepted interrogation if no reply is required, or

2) completed the transmission of a reply.

A new transponder transaction cycle shall not begin until the previous cycle has ended.

i. Interrogation recognition. SSR Mode S transponders shall be capable of recognizing the following distinct types of interrogations:

a) Mode A and C;

b) inter-mode; and

c) Mode S.

A. Mode A and Mode C interrogation recognition. A Mode A or Mode C interrogation shall be recognized when a P1–P3 pulse pair meeting the requirements of 14.7.4.13.a.1.iv has been received, and the leading edge of a P4 pulse with an amplitude that is greater than a level 6dB below the amplitude of P3 is not received within the interval from 1.7 to 2.3 microseconds following the leading edge of P3.

If a P1–P2 suppression pair and a Mode A or Mode C interrogation are recognized simultaneously, the transponder shall be suppressed. An interrogation shall not be recognized as Mode A or Mode C if the transponder is in suppression (14.7.4.14.d.2). If a Mode A and a Mode C interrogation are recognized simultaneously the transponder shall complete the transaction cycle as if only a Mode C interrogation had been recognized.

B. Inter-mode interrogation recognition. An inter-mode interrogation shall be recognized when a P1–P3–P4 pulse triplet meeting the requirements of 14.7.4.14.a.5.i is received. An interrogation shall not be recognized as an inter-mode interrogation if:

a) the received amplitude of the pulse in the P4 position is smaller than 6 dB below the amplitude of P3; or

b) the pulse interval between P3 and P4 is larger than 2.3 microseconds or shorter than 1.7microseconds;

c) the received amplitude of P1 and P3 is between MTL and –45 dBm and the pulse duration of P1 or P3 is less than 0.3microsecond; or

d) the transponder is in suppression (3.1.2.4.2).

If a P1–P2 suppression pair and a Mode A or Mode C inter-mode interrogation are recognized simultaneously the transponder shall be suppressed.

C Mode S interrogation recognition. A Mode S interrogation shall be recognized when a P6 pulse is received with a sync phase reversal within the interval from 1.20 to 1.30 microseconds following the leading edge of P6. A Mode S interrogation shall not be recognized if a sync phase reversal is not received within the interval from 1.05 to 1.45 microseconds following the leading edge of P6.

2. Interrogation acceptance. Recognition according to 14.7.4.14.d.1 shall be a prerequisite for acceptance of any interrogation.

i. Mode A and Mode C interrogation acceptance. Mode A and Mode C interrogations shall be accepted when recognized 14.7.4.14.d.1.i).

A. Inter-mode interrogation acceptance

1. Mode A/C/S all-call interrogation acceptance. A Mode A/C/S all-call interrogation shall be accepted if the trailing edge of P4 is received within 3.45 to 3.75 microseconds following the leading edge of P3 and no lockout condition prevents acceptance. A Mode A/C/S all-call shall not be accepted if the trailing edge of P4 is received earlier than 3.3 or later than 4.2 microseconds following the leading edge of P3, or if a lockout condition prevents acceptance.

2. Mode A/C-only all-call interrogation acceptance. A Mode A/C-only all-call interrogation shall not be accepted by a Mode S transponder.

B. Mode S interrogation acceptance. A Mode S interrogation shall only be accepted if:

a) the transponder is capable of processing the uplink format (UF) of the interrogation (14.7.4,14. c.2.i.A);

b) the address of the interrogation matches one of the addresses as defined in 14.7.4.14.d.2.B.ii 1implying that parity is established, as defined in14.7.4.14. c.3;

c) in the case of an all-call interrogation, no all-call lockout condition applies, as definedin3.1.2.6.9; and

d) the transponder is capable of processing the uplinked data of a long air-air surveillance (ACAS) interrogation (UF-16) and presenting it at an output interface as prescribed in 14.7.4.19. e.2. ii.

Addresses. Mode S interrogations shall contain either:

a) aircraft address; or

b) the all-call address; or

c) the broadcast address.

i. Aircraft address. If the aircraft's address is identical to the address extracted from a received interrogation according to the procedure of 14.7.4.14.c.3.ii and 14.7.4.14. c.3. ii. A, the extracted address shall be considered correct for purposes of Mode S interrogation acceptance.

ii. All-call address. A Mode S-only all-call interrogation (uplink format UF=11) shall contain an address, designated the all-call address, consisting of twenty-four consecutive ONEs. If the all-call address is extracted from a received interrogation with format UF=11 according to the procedure of 14.7.4.14. c.3.ii and 14.7.4.14.c.3.ii.A, the address shall be considered correct for Mode S-only all-call interrogation acceptance.

iii. Broadcast address. To broadcast a message to all Mode S transponders within the interrogator beam, a Mode S interrogation uplink format 20 or 21shall be used and an address of twenty-four consecutive ONEs shall be substituted for the aircraft address. If the UF code is 20 or 21 and this broadcast address is extracted from a received interrogation according to the procedure of 14.7.4.14. c.3.ii and 14.7.4.14.c.3.ii.A, the address shall be considered correct for Mode S broadcast interrogation acceptance.

3. Transponder replies. Mode S transponders shall transmit the following reply types:

a) Mode A and Mode C replies; and

b) Mode S replies.

i. Mode A and Mode C replies. A Mode A (Mode C) reply shall be transmitted as specified in 3.1.1.6 when a Mode A (Mode C) interrogation has been accepted.

ii. Mode S replies. Replies to other than Mode A and Mode C interrogations shall be Mode S replies.

A. Replies to inter-mode interrogations. A Mode S reply with downlink format 11 shall be transmitted in accordance with the provisions 14.7.14.e.2. A when a Mode A/C/S all-call interrogation has been accepted. Equipment certified on or after 1 January 2020 shall not reply to Inter-mode Mode A/C/S all-call interrogations.

B. Replies to Mode S interrogations. The information content of a Mode S reply shall reflect the conditions existing in the transponder after completion of all processing of the interrogation eliciting that reply. The correspondence between uplink and

downlink formats shall be as summarized in Table 3-5.
a) Mode S all-call replies (DF=11);

b) surveillance and standard-length communications replies (DF=4, 5,20 and21);

c) extended length communications replies (DF=24); and

d) air-air surveillance replies (DF=0 and16).

1. Replies to SSR Mode S-only all-call interrogations. The downlink format of the reply to a Mode S- only all-call interrogation (if required) shall be DF=11. The reply content and rules for determining the requirement to reply shall be as defined in14.7.4.14. e.

2. Replies to surveillance and standard-length communications interrogations. A Mode S reply shall be transmitted when a Mode S interrogation with UF=4, 5, 20 or 21 and an aircraft address has been accepted.

3. Replies to extended length communications interrogations. A series of Mode S replies ranging in number from 0 to16 shall be transmitted when a Mode S interrogation with UF= 24 has been accepted. The downlink format of the reply (if any) shall be DF = 24.

4. Replies to air-air surveillance interrogations. A Mode S reply shall be transmitted when a Mode S interrogation with UF = 0 and an aircraft address has been accepted. The contents of these interrogations and replies shall be as defined in 14.7.4.17.

2. SUPPRESSION

i. Effects of suppression. A transponder in suppression (14.7.4.13.a.1.vii.D) shall not recognize Mode A, Mode C or inter-mode interrogations if either the P1 pulse alone or both the P1 and P3 pulses of the interrogation are received during the suppression interval. Suppression shall not affect their cognition of, acceptance of, or replies to Mode S interrogations.

ii. Suppression pairs. The two-pulse Mode A/C suppression pair defined in 14.7.4.13.a.1.vii.D.1 shall initiate suppression in a Mode S transponder regardless of the position of the pulse pair in a group of pulses, provided the transponder is not already suppressed or in a transaction cycle.

iii. Suppression in presence of S1 pulse shall be as defined in 14.7.4.13.a.1.vii. D.3.

14.7.4.15 ESSENTIAL SYSTEM CHARACTERISTICS OF THE SSR MODE S TRANSPONDER

(a) Transponder sensitivity and dynamic range. Transponder sensitivity shall be defined in terms of a given interrogation signal input level and a given percentage of corresponding replies. Only correct replies containing the required bit pattern for the interrogation received shall be counted. Given an interrogation that requires a reply according to14.7.4.14. d, the minimum triggering level, MTL, shall be defined as the minimum input power level for 90 per cent reply-to-interrogation ratio. The MTL shall be–74dBm ±3dB for Mode S interrogations (interrogations using P6), and for Mode A and C, and inter-mode interrogations.

(b) Reply ratio in the presence of interference Reply ratio in the presence of an interfering pulse. Given a Mode S interrogation which requires a reply, the reply ratio of a transponder shall be at least 95 percent in the presence of an interfering Mode A/C interrogation pulse if the level of the interfering pulse is 6 dB or more below the signal level for Mode S input signal levels between-68dBm and–21dB m and the interfering pulse overlaps the P6 pulse of the Mode S interrogation anywhere after the synphase reversal. Under the same conditions, the reply to ratio shall be at least 50 percent if the interference pulse level is 3dB orm or below the signal level.

(c) Reply ratio in the presence of pulse pair interference. Given an interrogation which requires a reply, the reply to ratio of a transponder shall be at least 90 percent in the presence of an interfering P1–P2 pulse pair if the level of the interfering pulse pair is 9dBorm or below signals level for input signal levels between–68dBm and–21dBm and the P1 pulse of the interfering pair occurs no earlier than the P1pulse of the Mode S signal.

(d) reply ratio in the presence of low-level asynchronous interference. For all received signals between– 65 dBm and–21dBm and given a Mode S interrogation that requires a reply and if no lockout condition is in effect, the transponder shall reply correctly with at least 95 percent reply to ratios in the presence of asynchronous interference. Asynchronous interference shall be taken to be a single Mode A/C interrogation pulse occurring at all repetition rates up to 10000Hz at a level I12 dB or more below the level of the Mode S signal.

(e) Reply ratio in the presence of low-level in-band CW interference. In the presence of non-coherent CW interference at a frequency of 1 030 ± 0.2 MHz at signal levels of 20dB or more below the desired Mode A/C or Mode S interrogation signal level, the transponder shall reply correctly to at least 90 percent of the interrogations.

(f) Spurious Response

i. The response to signals not within the receiver passband shall be at least 60 dB below normal sensitivity.

ii. For transponder designs first certified on or after 1January 2011, the spurious Mode A/C reply ratio resulting from low level Mode S interrogations shall be no more than:

1. an average of 1 percent in the input interrogation signal range between–81dBm and the Mode S MTL; and

2. a maximum of 3 percent at any given level in the input interrogation signal range between–81dBm and the Mode S MTL.

iii. Transponder peak pulse power. The peak power of each pulse of a reply shall be:

In active state transponder output power. When the transponder is in the inactive state the peak pulse power at 1090MHz plus or minus 3MHz shall not exceed –50dBm. The inactive state is defined to include the entire period between transmissions less10-microsecond transition periods preceding the first pulse and following the last pulse of the transmission.

iv. Spurious Emission Radiation.

CW radiation shall not exceed 70dB below 1 watt.

14.7.4.16 ESSENTIAL SYSTEM CHARACTERISTICS OF THE GROUND INTERROGATOR

(a) Interrogation repetition rates. Mode S interrogators shall use the lowest practicable interrogation repetition rates for all interrogation modes.

1. All-call interrogation repetition rate.

i. The interrogation repetition rate for the Mode A/C/S all-call, used for acquisition, shall be less than 250persecond. This rate shall also apply to the paired Mode S-only and Mode A/C-only all-call interrogations used for acquisition in the multisite mode.

ii. Maximum number of Mode S all-call replies triggered by an interrogator. For aircraft that are not locked out, a Mode S interrogator shall not trigger, on average, more than 6 Mode S all-call replies per period of 200m and no more than 26 Mode S all-call replies counted over a period of 18 seconds.

2. Interrogation repetition rate to a single aircraft

i. Interrogations requiring a reply. Mode S interrogations requiring a reply shall not be transmitted to a single aircraft at intervals shorter than 400microseconds.

ii. Uplink ELM interrogations. The minimum time between the beginning of successive Comm-C interrogations shall be 50 microseconds.

3. Transmission rate for selective interrogations

i. For all Mode S interrogators, the transmission rate for selective interrogations shall be:

a. less than 2400persecond averaged over a 40-millisecond interval; and

b. less than 480 into any 3-degreesect or averaged over a 1-second interval.

ii. Additionally, for a Mode S interrogator that has over lapping coverage with the side lobes of any other Mode S interrogator, the transmission rate for selective interrogations shall be:

a. less than 1200 per second averaged over a 4-second interval; and less than 1800 per second averaged over a 1-second interval.

b. INTERROGATOR-EFFECTIVE RADIATED POWER The effective radiated power of all interrogation pulses shall be minimized.

c. Inactive-state interrogator output power. When the interrogator transmitter is not transmitting an interrogation, its output shall not exceed –5 dBm effective radiated power at any frequency between 960 MHz and1215MHz.

1) Spurious Emission Radiation CW radiation shall not exceed 76dB below1 watt.

d. Tolerances on transmitted signals. In order that the signal-in-space be received by the transponder the tolerances on the transmitted signal shall be as summarized.

e. SPURIOUS RESPONSE The response to signals not within the passband shall be at least 60dB below normal sensitivity.

f. Lockout coordination. A Mode S interrogator shall not be operated using all-call lockout until coordination has been achieved with all other operating Mode S interrogator shaving any overlapping coverage volume in order to ensure that no interrogator can be denied the acquisition of Mode S-equipped aircraft.

g. MOBILE INTERROGATORS Mobile interrogators shall acquire, whenever possible, Mode S aircraft through the reception of squirters.

AIRBORNE COLLISION AVOIDANCE SYSTEM

14.7.4.17 ACAS I GENERAL PROVISIONS AND CHARACTERISTICS

(a) Functional requirements. ACASI shall perform the following functions:

1. surveillance of nearby SSR transponder-equipped aircraft; and

2. provide indications to the flight crew identifying the approximate position of nearby aircraft as an aid to visual acquisition.

(b) Signal format. The RF characteristics of all ACASI signals shall conform to the provisions of regulation.

(c) Interference Control

1. Maximum radiated RF power. The effective radiated power of an ACASI transmission at 0-degree elevation relative to the longitudinal axis of the aircraft shall not exceed 24dBW.

2. Unwanted radiated power. When ACASI is not transmitting an interrogation, the effective radiated power in any direction shall not exceed –70dBm.

(d) Interference limiting. Each ACASI interrogator shall control its interrogation rate or power or both in all SSR Mode S to minimize interference effects.

1. Determination of own transponder reply rate. ACASI shall monitor the rate that own transponder replies to interrogations to ensure that the provisions in regulation are met.

2. Determination of the number of ACASII and ACASIII interrogators. ACASI shall count the number of ACASII and ACASIII interrogators in the vicinity to ensure that the provisions in regulation are met. This count shall be obtained by monitoring ACAS broadcasts (UF=16), (14.7.4.18.g.ii.D) and shall be updated as the number of distinct ACAS aircraft addresses received within the previous 20-sperio data nominal frequency of at least 1Hz.

3. Mode A/C ACAS Interference limits. The interrogator power shall not exceed the acceptable limits.

14.7.4.18 GENERAL PROVISIONS RELATING TO ACAS II AND ACAS III

Functional requirements

(a) ACAS functions. ACAS shall perform the following functions:

1. Surveillance.

2. generation of Tas.

3. threat detection.

4. generation of RA.

5. coordination, and;

6. communication with ground stations.

7. The equipment shall execute functions 2. through 6. on each cycle of operation.

8. The duration of a cycle shall not exceed 1.2s

(b) Surveillance performance requirements.

General surveillance requirements. ACAS shall interrogate SSR Mode A/C and Mode S transponders in other aircraft and detect the transponder replies. ACAS shall measure the range and relative bearing of responding aircraft. For ACASX-compliant systems, in addition to information from other sources described above, ACAS shall be able to receive other aircraft's ADS-B position, velocity and status information. Using these measurements and information conveyed by transponder replies and for ACASX-compliant systems also by ADS-B messages, ACAS shall estimate the relative positions of each responding aircraft. ACAS shall include provisions for achieving such position determination in the presence of ground reflections, interference, and variations in signal strength.

1. Track establishment probability. ACAS shall generate an established track,

with at least a 0.90 probability that the track is established 30s before closest approach, on aircraft equipped with transponders when all the following conditions are satisfied:

i. The elevation angles of these aircraft are within ± 10degrees relative to the ACAS aircraft pitch plane.

ii. The magnitudes of these aircraft's rates of change of altitude are less than or equal to 51m/s(10000ft/min).

iii. The transponders and antennas of these aircraft meet the Standards of 14.7.4.13, 14.7,4,13, a.1 and 14.7.4.14.

iv. The closing speeds and directions of these aircraft, the local density of SSR transponder-equipped aircraft and the number of other ACAS interrogators in the vicinity (as determined by monitoring ACAS broadcasts, (14.7.4.18.g.ii.D) and

v. The minimum slant range is equal to or greater than 300m (1000ft).

vi. ACAS shall continue to provide surveillance with no abrupt degradation in track establishment probability as any one of the condition bounds defined in 4.3.2.1.1 is exceeded.

vii. ACAS shall not track Mode S aircraft that report that they are on the ground.

2. False track probability. The probability that an established Mode A/C track does not correspond in range and altitude, if reported, to an actual aircraft shall be less than 1.2percent. For an established Mode S track this probability shall be less than 0.1 percent. These limits shall not be exceeded in any traffic environment.

3. RANGE AND BEARING ACCURACY

i. Range shall be measured with a resolution of 14.5m (1/128NM) or better.

4. INTERFERENCE CONTROL

i. Maximum radiated RF power. The effective radiated power of an ACAS transmission at 0-degree elevation relative to the longitudinal axis of the aircraft shall not exceed 27dBW.

ii. Unwanted radiated power. When ACAS is not transmitting an interrogation, the effective radiated power in any direction shall not exceed –70dBm

iii. Interference limiting. Each ACAS interrogator operating below a pressure-altitude of 5490m (18 000ft) shall control its interrogation rate or power or both, so as to conform with specific inequalities.

iv. Determination of the number of other ACAS. ACAS shall count the number of other ACASII and III interrogators in the vicinity to ensure that the interference limits are met. This count shall be obtained by monitoring ACAS broadcasts (UF= 16). Each ACAS shall monitor such broadcast interrogations to determine the number of other ACAS within detection range.

v. ACAS interference limiting inequalities. ACAS shall adjust its interrogation rate and interrogation power such that the following three inequalities remain true.

vi. The variables in these inequalities shall be defined as follows:

a. Transmissions during RAs. All air-to-air coordination interrogations shall be transmitted at full power and these interrogations shall be excluded from the summations of Mode S interrogations in the left-hand terms of inequalities (1) and (2).

b. Transmissions during RAs. All air-to-air coordination interrogations shall be transmitted at full power and these interrogations shall be excluded from the summations of Mode S interrogations in the left-hand terms of inequalities (1) and (2).

c. Transmissions from ACAS units above 5490m (18 000ft) altitude. Each ACAS interrogator operating above a pressure-altitude of 5490m (18 000ft) shall control its interrogation rate or power or both such that inequalities (1) and (3) remain true when na and α are equal to n1.

5. Traffic advisories (TAs)

i. TA function. ACAS shall provide TAs to alert the flight crew to potential threats. Such TAs shall be accompanied by an indication of the approximate relative position of potential threats to facilitate visual acquisition.

ii. TA function. ACAS shall provide TAs to alert the flight crew to potential threats. Such TAs shall be accompanied by an indication of the approximate relative position of potential threats to facilitate visual acquisition.

6. PROXIMATE TRAFFIC DISPLAY

i. While any RA and /or TA are displayed, proximate traffic within 11km (6 NM) range and, if altitude reporting, ±370m(1200ft) altitude shall be displayed. This proximate traffic should be distinguished (e.g. by colour or symbol type) from threats and potential threats, which should be more prominently displayed.

ii. While any RA and /or TA are displayed, visual acquisition of the threats and / or potential threat should not be adversely affected by the display of proximate traffic or other data unrelated to collision avoidance.

7. TAs as RA precursors. The criteria for Tas shall be such that they are satisfied before those for an RA.

   i. TA warning time. For TCAS Version 7.1-compliant systems, the nominal TA warning time for intruders reporting altitude shall not be greater than (T+20s) where T is the nominal warning time for the generation of the resolution advisory.

   ii. For ACASX-compliant systems, the TA warning time shall be sufficient to allow the flight crew to take actions.

   iii. Note. The nominal TA warning time is 20s or less before the generation of their solution advisory.

8. Threat detection. Intruder characteristics. As a minimum, the characteristics of an intruder that are used to identify a threat shall include:

   i. tracked altitude.

   ii. tracked rate of change of altitude.

   iii. tracked slant rang,

   iv. tracked rate of change of slant range, and

   v. for TCAS Version7.1 compliant systems: sensitivity level of intruder's ACAS, Si.

9. Sensitivity levels. ACAS shall be capable of operating at any number sensitivity levels. These shall include:

   i. S=1, a "standby" mode in which the interrogation of other aircraft and all advisories are inhibited.

   ii. S =2, a "TA only" mode in which RAs are inhibited; and

   iii. for TCAS Version 7.1 compliant systems: S=3-7, further levels that enable the issue of Ras that provide the warning times indicated in Table 4-2 as well as TAs.; and

   iv. for ACASX compliant systems: S= 3, a "TA/RA" mode in which Ras and Tas can be issued.

10. Selection of own sensitivity level (So). The selection of own ACAS sensitivity level shall be determined by sensitivity level control (SLC) commands which shall be accepted from number of sources as follows:

   i. SLC command generated automatically by ACAS based on altitude band or other external factors.

ii. SLC command from pilot input and

iii. for TCAS Version7.1 compliant systems: SLC command from Mode S ground stations.

Note.— ACASX compliant system sack knowledge SLC commands from ground stations so that the Ground stations do not need to be modified for the sec commands.

iv. However, the sensitivity level value is not Used in ACASX compliant systems. For TCAS Version 7.1 compliant systems:

a. R altitude-band SLC command. Where ACAS selects an SLC command based on altitude, hysteresis is shall be applied to the nominal altitude thresholds at which SLC command value changes are required as follows: for a climbing ACAS aircraft the SLC command shall be increased at the appropriate altitude threshold plus the hysteresis is value; for a descending ACAS aircraft the SLC command shall be decreased at the appropriate altitude threshold minus the hysteresis is value.

b. Pilot SLC command. For the SLC command set by the pilot the value 0 shall indicate the selection of the

c. “automatic” mode for which the sensitivity level selection shall be based on the other commands.

11. Mode S ground station SLC command.

i. For TCAS Version 7.1-compliant systems: For SLC commands transmitted via Mode S ground stations (4.3.8.4.2.1.1), the value 0 shall indicate that the station concerned is not issuing an SLC command and that sensitivity level selection shall be based on the other commands, including non-0 commands from other Mode S ground stations. ACAS shall not process an uplinked SLC value of 1.

ii. For ACASX- compliant systems: ACAS shall receive any SLC commands from Mode S ground stations but shall not use their sensitivity level values.

iii. ATS selection of SLC command code. ATS authorities shall ensure that procedures are in place to inform pilots of any ATS selected SLC command code other than 0 (4.3.4.3.1).

iv. Selection rule. Own ACAS sensitivity level shall be set to the smallest non-0 SLC command received from any of the sources listed in 4.3.4.3.

12. Selection of parameter values for RA generation. For TCAS Version 7.1-compliant systems: When the sensitivity level of own ACAS is 3 or greater, the parameter values used for RA generation that depend on sensitivity level shall be based on the greater of the sensitivity level of own ACAS, So, and the sensitivity level of the intruder’s ACAS, Si.

13. Selection of parameter values for TA generation. For TCAS Version 7.1-compliant systems: The parameter values used for TA generation that depend on sensitivity level shall be selected on the same basis as those for Ras (4.3.4.4) except when an SLC command with a value of 2 (“TA only” mode) has been received from either the pilot or a Mode S ground station. In this case, the parameter values for TA generation shall retain the values they would have had in the absence of the SLC command from the pilot or Mode S ground station.

14. Validation of ADS-B tracks for RA generation. For ACAS X-compliant systems: If ADS-B tracks fail validation via active interrogation and reply, ACAS shall revert back to using active surveillance for threat resolution logic.

Note.— Only validated ADS-B is used in the generation of RAs.

15. Designation of aircraft for do not alert (DNA).For ACASX-compliant systems with Xo functionality: If an intruder aircraft is designated as do not alert (DNA), no alerts for the intruder aircraft shall be issued to the flight crew of the own aircraft.

Note.—ACAS Xo provides additional modes with modified threat detection criteria in respect to designated intruders. For more details on ACAS Xo, refer to RTCA/DO-385 or EUROCAE/ED-256.

16. Resolution advisories (RAs)

i. RA generation. For all threats, ACAS shall generate an RA except where it is not possible to select an RA that can be predicted to provide adequate separation either because of uncertainty in the diagnose is of the intruder’s flight path or because there is a high risk that a man oeuvre by the threat will negate the RA.

ii. Display of threats. If threats are shown on a traffic display, they shall be displayed in red.

iii. RA cancellation

iv. For TCAS7.1-compliant systems: Once an RA has been generated against a threat or threats it shall be maintained or modified until tests that are less stringent than those for threat detection indicate on two consecutive cycles that the RA may be cancelled, at which time it shall be cancelled.

v. For ACASX-compliant systems: Once an RA has been generated against a threat or threats it shall be maintained until the intruder or intruders of the RA cease to be a threat.

vi. RA selection. ACAS shall generate the RA that is predicted to provide adequate separation from all threats and that has the least effect on the current flight path of the ACAS aircraft consistent with the other provisions in this chapter

vii. RA effectiveness. The RA shall not recommend or continue to recommend a maneuver or maneuver restriction that, considering the range of probable threat trajectories, is more likely to reduce separation than increase it.

viii. New ACAS installations after 1 January 2014 shall monitor own aircraft's vertical rate to verify compliance with the RA sense. If non-compliance is detected, ACAS shall stop assuming compliance, and instead shall assume the observed vertical rate.

ix. All ACAS shall comply with the requirementin14.7.4,18. e.3.i

x. After1 January 2017, all ACAS units shall comply with the requirements stated in14.7.4,18. e.3.i

xi. Reversals of sense. ACAS shall not reverse the sense of an RA from one cycle to the next, except as permitted in 14.7.4.18.e.5.i to ensure coordination or when the predicted separation at closest approach for the existing sense is in adequate.

xii. Sense reversals against equipped threats. If an RAC received from an equipped threat is incompatible with the current RA sense, ACAS shall modify the RA sense to conform with the received RAC if own aircraft address is higher in value than that of the threat.

xiii. ACAS shall not modify an RA sense in a way that makes it incompatible with an RAC received from an equipped threat if own aircraft address is higher in value than that of the threat.

xiv. Sense reversals due to inadequate predicted separation. ACAS shall initiate not more than one reversal per threat per encounter due to in adequate predicted separation.

xv. A strength retention. Subject to the requirement that a descend RA is not generated at low altitude (4.3.5.4.1), an RA shall not be modified if the time to closest approach is too short to achieve a significant response or if the threat is diverging in range.

xvi. Weakening an RA. An RA shall not be weakened if it is likely that it would subsequently need to be strengthened.

xvii. ACAS-equipped threats. The RA shall be compatible with all the RAC transmitted to threats (4.3.6.1.3). If an RAC is received from a threat before own ACAS generates an RAC for that threat, the RA generated shall be compatible with the RAC received unless such an RA is more likely to reduce separation than increase it and own aircraft address is lower in value than that of the threat.

xviii. Encoding of A RA subfield. On each cycle of an RA, the RA sense, strength hand attributes shall be encoded in the active RA(ARA) subfield.

xix. System response time. The system delay from receipt of the relevant SSR reply to presentation of an RA sense and strength to the pilot shall be as short as possible and shall not exceed 1.5s.

17. COORDINATION AND COMMUNICATION

i. PROVISIONS FOR COORDINATION WITH ACAS-EQUIPPED THREATS

ii. Multi-aircraft coordination. In a multi-aircraft situation, ACAS shall coordinate with each equipped threat individually.

iii. Data protection during coordination. ACAS shall prevent simultaneous access to stored data by concurrent processes, in particular during resolution message processing.

iv. Coordination interrogation. Each cycle ACAS shall transmit a coordination interrogation to each equipped threat, unless generation of an RA is delayed because it is not possible to select an RA that can be predicted to provide adequate separation. The resolution message transmitted to a threat shall include an RAC selected for that threat. If an RAC has been received from the threat before ACAS selects an RAC for that threat, the selected RAC shall become partible with the received RAC unless no more than three cycles have elapsed since the RAC was received, the RAC is altitude- crossing, and own aircraft address is lower in value than that of the threat in which case ACAS shall select its RA independently. If an RAC received from an equipped threat is incompatible with the RAC own ACAS has selected for that threat, ACAS shall modify the selected RAC to be compatible with the received RAC if own aircraft address is higher in value than that of the threat.

v. Coordination termination within the cycle during which an intruder ceases to bear as on for maintaining the RA, ACAS shall send are solution message to that intruder by means of a coordination interrogation. The resolution message shall include the cancellation code for the last RAC sent to that intruder while it was for maintaining the RA.

vi. ACAS coordination interrogations shall be transmitted until a coordination reply is received from the threat, up to a maximum of not less than six and not more than twelve attempts. The successive interrogations shall be nominally equally spaced over a period of 100±5ms. If the maximum number of attempts is made and no reply is received, ACAS shall continue its regular processing sequence.

vii. ACAS shall provide parity protection and or all fields in the coordination interrogation that convey RAC information.

viii. Whenever own ACAS reverses its sense against an equipped threat, there solution message that is senton the current and subsequent cycles to that threat shall contain both the newly selected RAC and the cancellation code for the RAC sent before the reversal.

ix. When a vertical RA is selected, the vertical RAC(VRC) that own ACAS includes in are solution message to the threat shall be as follows:

a. “do not pass above” when the RA is intended to provide separation above the threat;

b. “do not pass below” when the RA is intended to provide separation below the threat. Resolution message processing. Resolution messages shall be processed in the order in which they are received and with delay limited to that required to prevent possible concurrent access to stored data and delays due to the processing of previously received resolution messages. Resolution messages that are being delayed shall be temporarily queued to prevent possible loss of messages. Processing are solution message shall include decoding the message and updating the appropriate data structures with the information extracted from the message.

Note -For TCAS Version 7.1-compliant systems: According to regulation resolution message processing must not access any data whose usage is not protected by the coordination lock state.

c. An RAC or an RAC cancellation received from another ACAS shall be rejected if the encoded sense bits indicate the existence of a parity error or if undefined value(s) are detected in the resolution message. An RAC or an RAC cancellation received without parity errors and without undefined resolution message values shall be considered valid.

d. RAC storage. A valid RAC received from another ACAS shall be stored or shall be used to update the previously stored RAC corresponding to that ACAS. A valid RAC cancellation shall cause the previously stored RAC to be deleted. A stored RAC that has not been updated for an interval of 6 s shall be deleted.

e. RAC record update. A valid RAC or RAC cancellation received from another ACAS shall be used to update the RAC record. If a bit in the RAC record has not been refreshed for an interval of 6s by any threat, that bit shall be set to 0.

18. PROVISIONS FOR ACAS COMMUNICATION WITH GROUND STATIONS

i. Air-initiated down link of ACASR As. When an ACASR A exists, ACAS shall:

a. transfer to its Mode S transponder an RA report for transmission to the ground in a Comm-B reply and

b. transmit periodic RA broadcasts.

ii. Sensitivity level control (SLC) command. For TCAS Version 7.1-compliant systems: ACAS shall store SLC commands from Mode S ground stations. An SLC command received from a Mode S ground station shall remain effective until replaced by an SLC command from the same ground station as indicated by the site number contained in the IIS subfield of the interrogation. If an existing stored command from a Mode S ground station is not refreshed within 4minutes, or if the SLC command received has the value15 the stored SLC command for that Mode S ground station shall be set to 0.

19. PROVISIONS FOR DATA TRANSFER BETWEEN ACAS AND ITS MODE S TRANSPONDER

Data transfer from ACAS to its Mode S transponder:

i. ACAS shall transfer RA information to its Mode S transponder for transmission in an RA report) and in a coordination reply.

ii. ACAS shall transfer current sensitivity level to its Mode S transponder for transmission in a sensitivity level report and

iii. ACAS shall transfer capability information to its Mode S transponder for transmission in a data link capability report.

iv. Data transfer from Mode S transponder to its ACAS:

v. ACAS shall receive from its Mode S transponder sensitivity level control commands transmitted by Mode S ground stations.

vi. ACAS shall receive from its Mode S transponder ACAS broadcast messages transmitted by other ACAS; and

vii. CAS shall receive from its Mode S transponder resolution messages transmitted by other ACAS for air-air coordination purposes.

viii. ACAS protocols.

20. SURVEILLANCE PROTOCOLS

SURVEILLANCE OF MODE A/C TRANSPONDERS

i. ACAS shall use the Mode C-only all-call interrogation for surveillance of aircraft equipped with Mode A/C transponders.

ii. Using a sequence of interrogations with increasing power, surveillance interrogations shall be preceded by an S1-pulse to reduce interference and improve Mode A/C target detection.

21. SURVEILLANCE OF MODES TRANSPONDERS

i. Detection. ACAS shall monitor 1090MHz for Mode S acquisition squitters (DF=11). ACAS shall detect the presence and determine the address of Mode S-equipped aircraft using their Mode S acquisition squitters (DF=11) or extended squitters (DF= 17).

ii. Surveillance interrogations. On first receipt of a 24-bit aircraft address from an aircraft that is determined to be within the reliable surveillance range of ACAS based on reception reliability and that is within an altitude band 3050m 10 000ft) above and below own aircraft, ACAS shall transmit a short air-air interrogation (UF= 0) for range acquisition. Surveillance interrogations shall be transmitted at least once every five cycles when this altitude condition is satisfied. Surveillance interrogations shall be transmitted each cycle if the range of the detected aircraft is less than 5.6km (3NM) or the calculated time to closest approach is less than 60s, assuming that both the detected and own aircraft proceed from their current positions with unaccelerated motion and that the range at closest approach equals 5.6km (3NM). Surveillance interrogations shall be suspended for a period of five cycles if:

a. a reply was successfully received; and

b. own aircraft and intruder aircraft are operating below a pressure-altitude of 5490m (18 000 ft); and

c. the range of the detected aircraft is greater than 5.6km (3NM) and the calculated time to closest approach exceeds 60 seconds, assuming that both the detected and own aircraft proceed from their current positions with unaccelerated motion and that the range at closest approach equals 5.6km (3NM).

d. Range acquisition interrogations. ACAS shall use the short air-air surveillance format (UF=0) for range acquisition. ACAS shall set AQ = 1 and RL = 0 in an acquisition interrogation.

e. Tracking interrogations. ACAS shall use the short air-air surveillance format (UF=0) with RL=0and AQ= 0 for tracking interrogations.

f. Surveillance replies. These protocols described this regulation, full power from the top antenna. Installations using directional antennas shall operate such that complete circular coverage is provided nominally every 8 to10 s.

22. SURVEILLANCE OF ADS-B MESSAGES FROM INTRUDER AIRCRAFT FOR ACASX-COMPLIANT SYSTEMS:

i. Detection. ACAS shall monitor 1090MHz extended squitter.

ii. ACAS shall receive and use 1090MHz extended squitter messages which include information on ADS-B. Airborne and surface position, airborne velocity, target state and status, and aircraft operational status.

23. PROTOCOLS FOR ACAS COMMUNICATION WITH GROUND STATIONS

i. RA reports to Mode S ground stations Interfaces. As a minimum, the following input data shall be provided to the ACAS:

a. aircraft address code.

b. air-air and ground-air Mode S transmissions received by the Mode S transponder for use by ACAS.

c. own aircraft's maximum cruising true air speed capability.

d. pressure-altitude.

e. radio altitude

f. operating mode control (standby, TA only and TA/RA Mode);

g. for ACASX-compliant systems: heading.

h. for ACASX-compliant systems: GNSS own aircraft's position and velocity

i. for ACASX-compliant systems: ADS-B air borne and surface position, air borne velocity, target state and status, and aircraft operational status messages from other aircraft for use by ACAS; and

j. for ACASX-compliant systems with Xo special mode S available: Designation information for special operation mode

k. Aircraft antenna system. ACAS shall transmit interrogations and receive replies via two antennas, one mounted on the top of the aircraft and the other on the bottom of the aircraft. The top-mounted antenna shall be directional and capable of being used for direction finding.

l. Polarization. Polarization of ACAS transmissions shall be nominally vertical.

m. Radiation pattern. The radiation pattern in elevation of each antenna when installed on an aircraft shall be nominally equivalent to that of a quarter-wave mono pole on a ground plane.

24. ANTENNA SELECTION

i. Squitter reception. ACAS shall be capable of receiving squitters via the top and bottom antennas.

ii. Interrogations. ACAS interrogations shall not be transmitted simultaneously on both antennas.

iii. Pressure-altitude source. The altitude data for own aircraft provided to ACAS shall be obtained from the source that provides the basis for own Mode C or Mode S reports and they shall be provided at the finest quantization available.

iv. A source providing are solution finer than 7.62m (25ft shall be used.

v. Where a source providing are solution finer than 7.62m (25ft) is not available, and the only altitude data available for own aircraft is Gilhamen coded, at least two independent sources shall be used and compared continuously in order to detect encoding errors.

vi. Two altitudes at a source shall be used and compared in order to detect errors before provision to ACAS.

vii. The provisions of 14.7.4.18.j.3 shall apply when the comparison of the two altitude data sources indicates that one of the sources is in error.

25. Monitoring

i. Monitoring function. ACAS shall continuously perform a monitoring function in order to provide a warning if any of the following conditions at least are satisfied:

a. there is no interrogation power limiting due to interference control and the maximum radiated power is reduced to less than that necessary to satisfy the surveillance requirements.

b. any other failure in the equipment is detected which results in a reduced capability of providing Tas or RAs.

c. data from external sources in dispensable for ACAS operation are not provided, or the data provided are not credible.

d. Effect on ACAS operation. The ACAS monitoring function shall not adversely affect other ACAS functions

e. Monitoring response. When the monitoring function detects a failure, ACAS shall:

i. indicate to the flight crew that an abnormal condition exists.

ii. prevent any further ACAS interrogations and

iii. cause any Mode S transmission containing own aircraft's resolution capability to indicate that ACAS is not operating.

iv. Requirements for a Mode S transponder used in conjunction with ACAS.

v. Transponder capabilities. In addition to the minimum transponder capabilities defined in Chapter 3,3.1, the Mode S transponder used in conjunction with ACAS shall have the following capabilities:

1) ability to handle the following formats:

Format No.	Format name
UF= 16	Long air-air surveillance interrogation
DF= 16	Long air-air surveillance reply.

2) ability to receive long Mode S interrogations (UF= 16) and generate replies.

3) means for delivering the ACAS data content of all accepted interrogations addressed to the ACAS equipment.

4) antenna diversity.

5) mutual suppression capability and

6) in active state transponder output power restriction. When the Mode S transponder transmitter is in the in active state, the peak pulse power at 1090MHz ±3MHz at the terminals of the Mode S transponder antenna shall not exceed –70dBm.

26. DATA TRANSFER BETWEEN ACAS AND ITS MODE S TRANSPONDER.

i. Data transfer from ACAS to its Mode S transponder:

a. The Mode S transponder shall receive from its ACAS RA information for transmission in an RA report and in a coordination reply.

b. The Mode S transponder shall receive from its ACAS current sensitivity level for transmission in a sensitivity level report.

c. The Mode S transponder shall receive from its ACAS capability information for transmission in a data link capability report and for transmission in the RI field of air-air down link formats DF=0 and DF=16 and.

d. The Mode S transponder shall receive from its ACAS an indication that RAs are enabled or inhibited for transmission in the RI field of down link form ats 0 and 16.

ii. Data transfer from Mode S transponder to its ACAS:

a. For TCAS Version7.1- compliant systems: The Mode S transponder shall transfer to its ACAS received sensitivity level control commands transmitted by Mode S stations

b. The Mode S transponder shall transfer to its ACAS received ACAS broadcast messages transmitted by other ACASs.

c. The Mode S transponder shall transfer to its ACAS received resolution messages transmitted by other ACASs for air-air coordination purposes and

d. The Mode S transponder shall transfer to its ACAS own aircraft's Mode A identity data for transmission in an RA broadcast.

27. COMMUNICATION OF ACAS INFORMATION TO GROUND STATIONS

i. RA reports to Mode S ground stations. During the period of an RA and for 18±1 s following the end of the RA, the ACAS Mode S transponder shall indicate that it has an RA report by setting the appropriate DR field code in replies to a Mode S sensor. The RA report shall include the MB field. The RA report shall describe the most recent RA that existed during the preceding 18±1s period.

ii. Datalink capability report. The presence of an ACAS shall be indicated by its Mode S transponder to a ground station in the Mode S data link capability report.

iii. Indications to the flight crew.

28. CORRECTIVE AND PREVENTIVE RAS

i. Indications to the flight crew shall distinguish between preventive and corrective RAs.

29. ALTITUDE CROSSING RAS

i. If ACAS generates an altitude crossing RA, a specific indication shall be given to the flight crew that it is crossing.

14.7.4.19 PERFORMANCE OF THE ACAS II COLLISION AVOIDANCE LOGIC.

Caution shall be observed when considering potential improvements to ACAS since changes may affect more than one aspect of the system performance. It is essential that alternative designs would not degrade the performances of other designs and that such compatibility is demonstrated with a high degree of confidence. The performance specified in Section 4.4 is based on the performance achieved by TCAS Version 7.1-compliant systems.

Note 2. — The performance of ACAS X-compliant systems is improved compared to the performance of TCAS Version7.1-compliant systems. For more information, refer to the Airborne Collision Avoidance System (ACAS) Manual (Doc9863).

Conditions under which the requirements apply.

(a) The following assumed conditions shall apply to the performance requirements

1. range and bearing measurements and an altitude report are available for the intruder each cycle as long as it is within 14NM, but not when the range exceeds 14 NM;

2. the errors in the range and bearing measurements conform to standard range and bearing error models

3. the intruder's altitude reports, which are its Mode C replies, are expressed in 100ft quanta;

4. An altitude measurement that has not been quantized and is expressed with a precision of 1ft or better is available for own aircraft.

5. errors in the altitude measurements for both aircraft are constant throughout any particular encounter.

6. the pilot responses to Ras conform to a standard pilot model.

7. the aircraft operate in an airspace in which close encounters, including those in which ACAS generates an RA, conform to a standard encounter model.

8. ACAS-equipped aircraft are not limited in their ability to perform the maneuvers required by their Ras., and

   i. The intruder in volved in each encounter is not equipped; or

   ii. The intruder is ACAS-equipped but follows a trajectory identical to that in the unequipped encounter; or

   iii. The intruder is equipped with an ACAS having a collision avoidance logic identical to that of own ACAS.

   iv. The performance of the collision avoidance logic shall not degrade abruptly as the statistical distribution of the altitude errors or the statistical distributions of the various parameters that characterize the standard encounter model or the response of pilots to the advisories are varied, when surveillance reports are not available one very cycle or when the quantization of the altitude measurements for the intruder is varied or the altitude measurements for own aircraft are quantized.

(b) STANDARD RANGE ERROR MODEL

The errors in the simulated range measurements shall be taken from a Normal distribution with mean 0ft and standard deviation 50ft.

(a) STANDARD BEARING ERROR MODEL

The errors in the simulated bearing measurements shall be taken from a Normal distribution with mean 0.0degrees and standard deviation 10.0degrees.

(b) STANDARD ALTIMETRY ERROR MODEL

1. The errors in the simulated altitude measurements shall be

assumed to be distributed as a Laplacian distribution with zero mean having probability density.

2. The parameter λ required for the definition of the statistical distribution of altimeter error for each aircraft shall have one of two values, $\lambda 1$ and $\lambda 2$, which depend on the altitude layer of the encounter as follows:

Layer	1		2		3		4		5		6	
	m	ft	m	ft	m	ft	m	ft	m	ft	m	ft
$\lambda 1$	10	35	11	38	13	43	17	58	22	72	28	94
$\lambda 2$	18	60	18	60	21	69	26	87	30	101	30	101

3. For an aircraft equipped with ACAS the value of λ shall be $\lambda 1$.

4. For aircraft not equipped with ACAS, the value of λ shall be selected randomly using the following probabilities:

Layer	1	2	3	4	5	6
prob($\lambda 1$)	0.391	0.320	0.345	0.610	0.610	0.610
prob($\lambda 2$)	0.609	0.680	0.655	0.390	0.390	0.390

(c) STANDARD PILOT MODEL

The standard pilot model used in the assessment of the performance of the collision avoidance logic shall be that:

1. any RA is complied with by accelerating to the required rate (if necessary) after an appropriate delay.

2. when the aircraft's current rate is the same as its original rate and the original rate complies with the RA, the aircraft continues at its original rate, which is not necessarily constant due to the possibility of acceleration in the original trajectory.

3. when the aircraft is complying with the RA, its current rate is the same as the original rate and the original rate changes and consequently becomes inconsistent with the RA, the aircraft continues to comply with the RA.

4. when an initial RA requires a change in altitude rate, the aircraft responds with an acceleration of 0.25g after a delay of 5s from the display of the RA;

5. when an RA is modified and the original rate complies with the modified RA, the aircraft returns to its original rate. (if necessary) with the acceleration specified) after the delay specified in viii);

6. when an RA is modified and the original rate does not comply with

the modified RA, the aircraft responds to comply with the RA with the acceleration specified in g) after the delay specified in viii);

7. the acceleration used when an RA is modified is 0.25 gun less the modified RA is a reversed sense RA or an increased rate RA in which case the acceleration is 0.35g.
8. the delay used when an RA is modified is 2.5s unless this results in the acceleration starting earlier than 5s from the initial RA in which case the acceleration starts 5s from the initial RA; and
9. when an RA is cancelled, the aircraft returns to its original rate (if necessary) with an acceleration of 0.25g after a delay of 2.5s.

(d) STANDARD ENCOUNTER MODE

1. ELEMENTS OF THE STANDARD ENCOUNTER MODEL.

In order to calculate the effect of ACAS on the risk of collision (4.4.3) and the compatibility of ACAS with air traffic management (ATM) (4.4.4), sets of encounters shall be created for each of:

i. the two aircraft address orderings.

ii. these altitude layers.

iii. nineteen encounter classes and

iv. nine or ten vmd bins.

2. The results for these sets shall be combined using the relative weightings: Each set of encounters shall contain least 500 independent, randomly generated encounters.

3. The two aircraft trajectories in each encounter shall be constructed with the following randomly selected characteristics:

i. in the vertical plane:

ii. a vmd from within the appropriate vmd bin;

iii. a vertical rate for each aircraft at the beginning of the encounter window, $\dot{z}1$, and at the end of the encounter window, $\dot{z}2$.

iv. a vertical acceleration and

v. a start time for the vertical acceleration; and

vi. and in the horizontal plane:

vii. an hmd;

viii. an approach angles

ix. a speed for each aircraft at closest approach.

x. a decision for each aircraft whether or not it turns.

xi. the turn extent; the bank angle; and the turn end time.

xii. a decision for each aircraft whether or not its speed changes; and

xiii. the magnitude of the speed change.

xiv. models shall be used for the statistical distribution of hmd. For calculations of the effect of ACAS on the risk of collision, hmd shall be constrained to be less than 500ft. For calculations of the compatibility of ACAS with ATM (4.4.4),hmd shall be selected from a larger range of values.

ENCOUNTER CLASSES AND WEIGHTS

14.7.4.20 ACAS USE OF EXTENDED SQUITTER

(a) ACAS hybrid surveillance using extended squitter position data Surveillance protocols defined in this section are for ACAS hybrid surveillance, and surveillance protocols for ACAS not equipped for hybrid surveillance.

(b) PASSIVE SURVEILLANCE

EXTENDED HYBRID SURVEILLANCE

1. Systems using extended hybrid surveillance mode shall establish a track in such a way that no interrogations are performed, i.e., acquiring the track through exclusive use of ADS-B extended squitter, when the following conditions are met:

2. own aircraft position data meets the following minimum level of quality:

3. own aircraft horizontal position uncertainty (95 percent) is <0. 1NM; and

4. own aircraft horizontal position integrity shall be such that the probability of an undetected position error, which is greater than 0.6NM radius, is less than 1× 10-7.

5. the received signal strength is equal or less than−68dBm±2dB (extended hybrid surveillance minimum triggering level), or own aircraft is operating on the surface; and

6. the intruder data quality meets the following minimum requirements:

   i. The ADS-B version number ≥ 2.

   ii. The reported NIC ≥ 6 (<0.6 NM)

   iii. The reported NAC p ≥ 7 (<0.1NM)

iv. The reported SIL= 3

v. The reported SDA = 2 or 3 and

vi. The barometric altitude is valid

7. The system shall not use ADS-rebroadcast (ADS-R) and TIS-B data to passively acquire an aircraft.

8. A track maintained under extended hybrid surveillance mode shall transition to a track maintained under active surveillance mode if range and altitude of hybrid threat criteria are met.

9. A track under extended hybrid surveillance mode shall transition to a track under hybrid surveillance mode, if:

10. the signal indicates a high probability to be in close proximity, i.e., Signal > extended hybrid surveillance MTL, except when operating on the airport surface; or

11. intruder data or own data quality does not meet minimum requirements.

12. Validation. To validate the position of an intruder reported by extended squitter and not meeting the criteria for extended hybrid surveillance mode, ACAS shall determine the relative range and relative bearing as computed from the position and geographical heading of own aircraft and the intruder's position as reported in the extended squitter. This derived range and relative bearing and the altitude reported in the squitter shall be compared to the range, relative bearing and altitude determined by active ACAS interrogation requiring a short reply from the aircraft. Differences between the derived and measured range and relative bearing and the squitter and reply to altitude shall be computed and used in tests to determine whether the extended squitter data is valid. If these tests are satisfied the passive position shall be validated and the track shall be maintained on passive data unless it is a near threat. If any of these validation tests fail, active surveillance shall be used to track the intruder

13. Supplementary active interrogations. In order to ensure that an intruder's track is updated at least as frequently as required in the absence of extended squitter data, each time a track is updated using squitter information the time at which an active interrogation would next be required shall be calculated. An active interrogation shall be made at that time if a further squitter has not been received before the interrogation is due.

14. Near threat. An intruder shall be tracked under active surveillance if it is a near threat, as determined by separate tests on the range and altitude of the aircraft. These tests shall be such that an intruder is considered a near threat before it becomes a potential threat, and thus triggers a traffic advisory as described. These tests shall be performed once per second. All near threats, potential threats and threats shall be for Traffic Alert and Collision Avoidance System II (TCASII) Hybrid Surveillance.

15. Revalidation and monitoring. If an aircraft is being tracked using passive

surveillance and if criteria for extended hybrid surveillance mode are not met, periodic active interrogations shall be performed to validate and monitor the extended squitter data. The rates of revalidation shall be between once per minute and once per 10 seconds. The tests required shall be performed for each interrogation, and active surveillance shall be used to track the intruder if these revalidation tests fail data:

16. Full active surveillance. If the following condition is met for a track being updated via passive surveillance.

    i. $|a| \leq 10000$ft and both

    ii. $|a| \leq 3\,000$ft or $|a–3\,000 \text{ ft}|/|\dot{a}| \leq 60$s; and c) $r \leq 3$ NM or $(r–3 \text{ NM})/|\dot{r}| \leq 60$s;

    where: a = intruder altitude separation in ft
    $\dot{a}$ = altitude rate estimates in ft/s tracked using active surveillance.

17. All near threats, potential threats and threats shall be tracked using active surveillance.

18. Adequate protection against residual ADS-B position data shall be provided in track state computation when transitioning from passive to active surveillance, in order to avoid unnecessary advisories during such transitions.

19. A track under active surveillance shall transition to passive surveillance if it is neither a near threat, potential threat nor a threat. The tests used to determine it is no longer a near threat shall be similar to those used in 4.5.1.4 but with larger thresholds in order to have hysteresis which prevents the possibility off request transitions between active and passive surveillance.

20. ACAS operation with an improved receiver MTL.

    i. An ACAS operating with a receiver having a MTL more sensitive than–74 dBm shall implement the capabilities specified in the following paragraphs.

    ii. Dual minimum triggering levels. The ACAS receiver shall be capable of setting an indication for each squitter reception as to whether the reply would d have been detected by an ACAS operating with a conventional MTL(–74dBm). Squitter receptions received at the conventional MTL shall be passed to the ACAS surveillance function for further processing. Squitter receptions that do not meet this condition shall not be passed to the ACAS surveillance function.

    iii. Dual or re-triggerable reply to processor. The ACAS Mode S reply processing function shall:

        a. use separate reply to processors for Mode S reply formats received at or above the conventional MTL and a separate reply to processor for Mode S reply formats received below the conventional MTL; or,

b. use a Mode S reply process or that will re-trigger if it detects a Mode S preamble that is 2 to 3 dB stronger than the reply that is currently being processed.

14.7.4.21 MODES EXTENDED SQUITTER TRANSMITTING SYSTEM CHARACTERISTICS

Many of the requirements associated with the transmission of Mode S extended squitter are included in Mode S transponder and non-transponder devices using the message formats defined in the Technical Provisions for Mode S Services and Extended Squitter (Doc9871). The provisions presented with in the following subsections are focused on requirements applicable to specific classes of airborne and ground transmitting systems that shall support the applications of ADS-B and TIS-B.

a. ADS-B out requirements Aircraft, surface vehicles and fixed obstacles supporting an ADS-B capability shall incorporate the ADS-B message generation function and the ADS-B message exchange function (transmit).

b. ADS-B transmissions from aircraft shall include position, aircraft identification and type, airborne velocity, periodic status, and event driven messages including emergency/priority information.

c. Extended squitter ADS-B transmission requirements. Mode S extended squitter transmitting equipment shall be classified according to the unit's angle capability and the set of parameters that it can transmit consistent with the following definition of general equipment classes and the specific equipment classes:

d. Class A extended squitter airborne systems support an interactive capability incorporating both an extended squitter transmission capability (i.e., ADS-B OUT) with a complementary extended squitter reception capability (i.e., ADS-B IN) in support of onboard ADS-B applications.

e. Class B extended squitter systems provide a transmission only (i.e., ADS-BOUT without an extended squitter reception capability) for use on aircraft, surface vehicles, or fixed obstructions; and

f. Class C extended squitter systems have only a reception capability and thus have no transmission requirements.

g. Class A extended squitter system requirements. Class A extended squitter airborne systems shall have transmitted and receiving sub system characteristics of the same class (i.e. A0, A1, A2, or A3):

i. A0-to-A0 nominal air-to-air range is 10NM;

ii. A1-to-A1nominal air-to-air range is 20NM;

iii. A2-to-A2 nominal air-to-air range is 40NM; and

iv. A3-to-A3nominal air-to-air range is 90NM.

The above ranges are design objectives, and the actual effective air-to-air range of the Class A extended squitter systems may be larger in some cases (e.g.in environments with low levels of 1090MHz fruit) and shorter in other cases (e.g.in environments with very high levels of 1090MHz fruit).

h. CONTROL OF ADS-B OUT OPERATION

i. Protection against reception of corrupted data from the source providing the position should be satisfied by error detection on the data inputs and the appropriate maintenance of the installation.

ii. If an independent control of the ADS-B OUT function is provided, then the operational state of the ADS-B OUT function shall be indicated to the flight crew, at all times.

iii. TIS-B out requirements.

1. Ground stations supporting a TIS-B capability shall incorporate the TIS-B message generation function and the TIS-B message exchange function(transmit).

2. The extended squitter messages for TIS-B shall be transmitted by an extended squitter ground station when connected to an appropriate source of surveillance data.

3. ADS-B OUT requirements for surface vehicles.

iv. All surface vehicles supporting any versions of extended squitter ADS-B capability shall transmit extended squitter messages.

v. Extended squitter version 2 required system performance. The position source and equipment installed in surface vehicles to transmit extended squitter version 2 messages shall support the following performance characteristics:

vi. The NACP for the navigation position data shall be greater than or equal to 9, a 95 percent accuracy bound on horizontal position less than 30 meters.

vii. The NACV for the navigation velocity data shall be greater than or equal to 2 , a velocity error less than 3metres per second.

viii. The NACP and NACV minimum values shall be meta to minimum availability of 95percent.

ix. The system design assurance parameter shall be equal to1or more, which defines the probability of a failure resulting in transmission of false or misleading information to be less than or equal to1×10^{-3}.

14.7.4.22 MODES EXTENDED SQUITTER RECEIVING SYSTEM CHARACTERISTICS (ADS-B IN AND TIS-BIN)

(a) Mode S extended squitter receiving system functional requirements.

(b) Mode S extended squitter receiving systems shall perform the message exchange function (receive) and the report assembler function.

(c) Mode S extended squitter receiver classes. The required functionality and performance characteristics for the Mode S extended squitter receiving system will vary depending on the ADS-B and TIS-B client applications to be supported and the operational use of the system. Airborne Mode S extended squitter receivers shall be consistent with the definition of receiving system classes shown in Table5-3.

(d) Message exchange function.

i. The message exchange function shall include the 1090MHz receiving antenna and the radio equipment (receiver/demodulator/decoder/data buffer) sub-functions.

ii. Message exchange functional characteristics. The airborne Mode S extended squitter receiving system shall support the reception and decoding of all extended squitter messages as listed in Table 5-3. The ground ADS-B extended squitter receiving system shall, as a minimum, support the reception and decoding of all of the extended squitter message types that convey information needed to support the generation of the ADS-B reports of the types required by the client ATM ground applications.

iii. Required message reception performance. The airborne Mode S extended squitter receiver/demodulation/ decoder shall employ the reception techniques and have a receiver minimum trigger threshold level (MTL) as listed in Table5-3 as a function of the airborne receiver class. The reception technique and MTL for extended squitter ground receiver shall be selected to provide the reception performance (i.e., range and update rates) as required by the client ATM ground applications.

iv. Enhanced reception techniques. ClassA1, A2 and A3 airborne receiving systems shall include the following features to provide improved probability of Mode S extended squitter reception in the presence of multiple overlapping Mode A/C fruit and /or in the presence of an overlapping stronger Mode S fruit, as compared to the performance of the standard reception technique required for Class A 0 airborne receiving systems:

1. Improved Mode S extended squitter preamble detection.

2. Enhanced error detection and correction.

3. Enhanced bit and confidence declaration techniques applied to the airborne receiver classes as shown below:

4. Class A1 —Performance equivalent to or better than the use of the “Centre Amplitude” technique.

5. ClassA2— Performance equivalent to or better than the use of the "Multiple Amplitude Samples" base line technique, where at least 8 samples are taken for each Mode S bit position and are used in the decision process.

6. ClassA3—Performance equivalent to or better than the use of the "Multiple Amplitude Samples" baseline technique, where at least 10 samples are taken for each Mode S bit position and are used in the decision process.

v. Report assembler function

1. The report assembler function shall include the message decoding, report assembly, and output interface sub- functions.

2. When an extended squitter message is received, the message shall be decoded, and the applicable ADS-B report(s) of the types shall be generated within 0.5seconds.

3. Type I extended squitter receiving systems receive ADS-B and TIS-B messages and produce application-specific subsets of ADS-B and TIS-B reports. Type I extended squitter receiving systems are customized to the client applications using ADS-B and TIS-B reports. Type I extended squitter receiving systems may additionally be controlled by an external entity to produce installation-defined subsets of the reports that those systems can produce.

4. Type II extended squitter receiving systems receive ADS- B and TIS-B messages and are capable of producing complete ADS-B and TIS-B reports in accordance with the equipment class. Type II extended squitter receiving systems may be controlled by an external entity to produce installation-defined subsets of the reports that those systems can produce.

vi. ADS-B REPORT TYPES

1. State vector report. The state vector report shall contain time of applicability, information about an airborne or vehicle's current kinematic state (e.g., position, velocity), as well as a measure of the integrity of the navigation data, based on information received in airborne or ground position, airborne velocity, identification and category, aircraft operational status and target state and status extended squitter messages. Since separate messages are used for position and velocity, the time of applicability shall be reported individually for the position related report parameters and the velocity related report parameters. Also, the state vector report shall include a time of applicability for the estimated position and /or estimated velocity information (i.e., not based on a message with updated position or velocity information) when such estimated position and/ or velocity information is included in the state vector report.

2. Mode status report. The mode status report shall contain time of applicability and current operational information about the transmitting participant, including airborne/vehicle address, call sign, ADS-B version number, airborne/vehicle length and width information, state vector quality information, and other information based on information received in aircraft operational status, target state and status, aircraft identification and category, airborne velocity, and aircraft status extended squitter messages. Each time that a mode status report is generated, the report assembler function shall update the report time of applicability. Parameters for which valid data is not available shall either be indicated as in valid or omitted from the mode status report.

3. Air referenced velocity report. Air referenced velocity reports shall be generated when air referenced velocity information is received in airborne velocity extended squitter messages. The air referenced velocity report shall contain time of applicability, air speed and heading information. Only certain classes of extended squitter receiving systems, are required to generate air referenced velocity reports. Each time that an individual mode status report is generated, the report assembly function shall update the report time of applicability.

4. Resolution advisory (RA) report. The RA report shall contain time of applicability and the contents of an active ACAS resolution advisory (RA) as received in a Type = 28 and Sub type =2 extended squitter message.

5. TARGET STATE REPORT

   The target state report shall be generated when information is received in target state and status messages, along with additional information received in airborne identification and category extended squitter messages. The target state and status message is defined in the Technical Provisions for Mode S Services and Extended Squitter (Doc9871). Specific requirements for the customization of this type of report may vary according to the needs of the client applications of each participant (ground or airborne).

vii. TIS-B REPORT TYPES

1. As TIS-B messages are received by airborne receiving systems, the information shall be reported to client applications. Each time that an individual TIS-B report is generated, the report assembly function shall update the report time of applicability to the current time.

2. TIS-B target report. All received information elements, other than position, shall be reported directly, including all reserved fields for the TIS-B fine format messages and the entire message content of any received TIS-B management message. The reporting format is not specified in detail, except that the information content reported shall be the same as the information content received.

3. When a TIS-B position message is received, it is compared with tracks to determine whether it can be decoded into target position (i.e.,

correlated to an existing track). If the message is decoded into target position, a report shall be generated within 0.5seconds. The report shall contain the received position information with a time of applicability, the most recently received velocity measurement with a time of applicability, the estimated position and velocity applicable to a common time of applicability, airborne/ vehicle address, and all other information in the received message. The estimated values shall be based on the received position information and the track history of the target.

4. When a TIS-B velocity message is received, if it i s correlated toa complete track, a report shall be generated, within 0.5seconds of the message reception. The report shall contain the received velocity information with a time of applicability, the estimated position and velocity applicable to a common time of applicability, airborne / vehicle address, and all other information in the received message. The estimated values shall be based on the received ground reference velocity information and the track history of the target.

5. IS-B management report. The entire message content of any received TIS-B management message shall be reported directly to the client applications. The information content reported shall be the same as the information content received.

6. The contents of any received TIS-B management message shall be reported bit-for-bit to the client applications.

viii. REPORT TIME OF APPLICABILITY

The receiving system shall use a local source of reference time as the basis for reporting the time of applicability, as defined for each specific ADS-B and TIS-B report type.

1. Precision time reference. Receiving systems intended to generate ADS-B and / or TIS-B reports based on the reception of surface position messages, airborne position messages, and/ or TIS-B messages shall use GNSSUTC measured time for the purpose of generating the report time applicability for the following cases of received messages:

2. version zero (0) ADS-B messages, when the navigation uncertainty category (NUC) is 8 or 9; or

3. version one (1) or version two (2) ADS-B or TIS-B messages, when the navigation integrity category (NIC) is 10 or 11; UTC measured time data shall have a minimum range of 300 seconds and a resolution of 0.0078125 (1/128) seconds.

4. NON-PRECISION LOCAL TIME REFERENCE

For receiving systems not intended to generate ADS-B and / or TIS-B reports based on reception of ADS-B or TIS-B messages meeting the NUC or NIC criteria, a non-precision time source shall be allowed. In such cases, where there is no appropriate precision time source available, the receiving system shall establish an appropriate internal clock or counter having a maximum clock cycle or count time of 20milliseconds. The established cycle or clock count shall have a minimum range of 300seconds and a resolution of 0.0078125(1/128) seconds.

ix. REPORTING REQUIREMENTS

1. reporting requirements for Type I Mode S extended squitter airborne receiving systems. As a minimum, the report assembler function associated with Type I Mode S extended squitter receiving systems, shall support that subset of ADS-B and TIS-B reports and report parameters, that are required by the specific client applications being served by that receiving system.

2. Reporting requirements for Type II Mode S extended squitter airborne receiving systems. The report assembler function associated with Type II receiving systems, shall generate ADS-B and TIS-B reports according to the class of the receiving system as shown in Table5-4 when the prerequisite ADS-B and/ or TIS-B messages are being received.

3. Reporting requirements for Mode S extended squitter ground receiving systems. As a minimum, the report assembler function associated with Mode S extended squitter ground receiving systems, shall support that subset of ADS-B reports and report parameters, that are required by the specific client applications being served by that receiving system.

x. Interoperability

The Mode S extended squitter receiving system shall provide interoperability between the different versions of extended squitter ADS-B message formats.

xi. INITIAL MESSAGE DECODING

The Mode S extended squitter receiving systems hall, upon acquiring a new ADS-B target, initially apply the decoding provisions applicable to version 0 (zero) ADS-B messages until or unless an aircraft operational status message is received indicating that a higher version message format is in use.

xii. APPLYING VERSION NUMBER

The Mode S extended squitter receiving system shall decode the version number information conveyed in the aircraft operational status message and shall apply the corresponding decoding rules for the reported version, up to the highest version supported by the receiving system, for the decoding of the subsequent extended squitter ADS-B messages from that specific aircraft or vehicle.

xiii. HANDLING OF RESERVED MESSAGE SUBFIELDS

The Mode S extended squitter receiving system shall ignore the content s of any message subfield defined as reserved.

14.7.4.23 MULTILATERATION SYSTEMS.

(a) FUNCTIONAL REQUIREMENTS

i. Radio frequency characteristics, structure and data contents of signals used in 1090MHz MLAT systems shall conform to the provisions of Chapter 3.

ii. An MLAT system used for air traffic surveillance shall be capable of determining aircraft position and identity.

iii. Mode A code contained in Mode A or Mode S replies; or

iv. Aircraft identification contained in Mode S replies or extended squitter identity and category message.

v. Where an MLAT system is equipped to decode additional position information contained in transmissions, it shall report such information separately from the aircraft position calculated based on TDOA.

(b) PROTECTION OF THE RADIO FREQUENCY ENVIRONMENT

i. In order to minimize system interferences, the effective radiated power of active interrogators shall be reduced to the lowest value consistent with the operationally required range of each individual interrogator site.

ii. An active MLAT system shall not use active interrogations to obtain information that can be obtained by passive reception within each required update period.

iii. An active MLAT system consisting of a set of transmitters shall be considered as a single Mode S interrogator.

iv. The set of transmitters used by all active MLAT systems in any part of the airspace shall not cause any transponder to be impacted such that its occupancy, because of the aggregate of all MLAT 1030MHz interrogations, is greater than 2 percent at any time.

v. Active MLAT systems shall not use Mode S All-Call interrogations.

(c) PERFORMANCE REQUIREMENTS

i. The performance characteristics of the MLAT system used for air traffic surveillance shall be such that the intended operational service(s) can be satisfactorily supported.

14.7.4.24 GENERAL REQUIREMENTS

(a) Traffic data functions the aircraft that transmitting ADS-B messages used by other aircraft for airborne surveillance applications shall referred to as the reference aircraft.

(b) IDENTIFYING THE REFERENCE AIRCRAFT

(c) The system shall support a function to identify unambiguously each reference aircraft relevant to the application.

(d) TRACKING THE REFERENCE AIRCRAFT.

(e) The system shall support a function to monitor the movements and behavior of each reference aircraft relevant to the application.

(f) TRAJECTORY OF THE REFERENCE AIRCRAFT.

(g) Displaying traffic

i. The system shall display only one track for each distinct aircraft on a given display.

ii. Where a track generated by ADS-B / TIS-BIN and a track generated by ACAS have been determined to belong to the same aircraft, the track generated by ADS-B/TIS-BIN shall be displayed.

iii. The display of the tracks shall comply with the requirements of ACAS traffic display.

14.7.4.25 GNSS PROCEDURE

The holder of a surveillance approval shall be required to provide surveillance data / information specifications to permit the use of GNSS procedures.

14.7.4.26 Flight Calibration

(a) The holder of a Surveillance Systems Services approval shall carryout flight calibration surveillance systems in accordance with this Regulation.

(b) Surveillance Radar shall be calibrated once in 3 years or after a major break down or modification.

14.7.5 Aeronautical Frequency Spectrum

These Regulations are based on the Third Edition, Amendment 89 of November 2013 PROVISION OF AERONAUTICAL FREQUENCY SPECTRUM

14.7.5.1. Applicability

This section is applicable to the provision of aeronautical frequency spectrum.

14.7.5.2. GENERAL

(a) No person shall utilize Aeronautical frequency spectrum except in accordance with the provisions of these Regulations.

(b) The provision of these regulations does not apply if a person operates a ground mobile radio on an aeronautical radio frequency and:

i. the radio is not used to support air traffic services.

ii. the radio is operated in accordance with the applicable communication procedures prescribed in these Regulations, and

iii. the radio transmission does not constitute harmful interference with any other Aeronautical frequency spectrum.

(c) No person may utilize Aeronautical Frequency spectrum at aerodromes or portion of airspace in Nigeria, unless such person holds an Assignment Letter issued by the Authority.

(d) A holder of an Assignment Letter issued under these Regulations shall be responsible for the Aeronautical Frequency spectrum safe, secure, and efficient operation of air navigation in Nigeria.

14.7.5.3 Distress Frequencies

A holder of Aeronautical Frequency Spectrum Assignment Letter shall conform with the ITU Radio Regulations, Article S30 which provides general conditions for distress and safety communications for a mobile service

14.7.5.4 ELTs for Search and Rescue.

All emergency locator transmitters shall operate on both 406 MHz and 121.500 MHz.

14.7.5.5 Search and Rescue Frequencies.

(a) Where there is a requirement for the use of high frequencies for search and rescue scene of action coordination purposes, the frequencies 3 023 kHz and 5 680 kHz shall be employed.

(b) Where specific frequencies are required for communication between rescue coordination centers and aircraft engaged in search and rescue operations, the frequency shall be selected within appropriate aeronautical mobile frequency bands in light of the nature of the provisions made for the establishment of search and rescue aircraft.

(c) Where civil commercial aircraft take part in search and rescue operations, the aircraft shall normally communicate on the appropriate enroute channels with the flight information Centre associated with the rescue coordination Centre concerned.

14.7.5.6 Utilization of Frequencies below 30MHz.

Aeronautical mobile service, single channel simplex shall be used in radiotelephone communications utilizing radio frequencies below 30 MHz in the bands allocated exclusively to the aeronautical

14.7.5.7 Assignment of Single Sideband Channels mobile (R) service.

(a) Single sideband channels shall be assigned in accordance with this Regulation.

(b) or the operational use of the channels concerned, holder of letter of assignment shall take into account the provisions of 27/19 of Appendix 27 of the ITU Radio Regulations.

(c) Aeronautical mobile (R) frequencies below 30 MHz for international operations shall be coordinated as specified in Appendix 27 of the ITU Radio Regulations (27/19) - The International Civil Aviation Organization (ICAO) co-ordinates radiocommunications of the aeronautical mobile (R) service with international aeronautical operations and this Organization shall be consulted in all appropriate cases in the operational use of the frequencies in the Plan.

(d) Where international operating requirements for HF communications cannot be satisfied by the Frequency Allotment Plan at Part 2 of Appendix 27 to the Radio Regulations, an appropriate frequency shall be assigned as specified in Appendix 27 by the application of the following provisions: 27/20 as it is recognized that not all the sharing possibilities have been exhausted in the Allotment Plan contained in this Appendix.

(e) Part I, Section II B of Appendix 27 shall be relating to Interference Range Contours, and application of the procedure results in a protection ratio of 15 dB. 27/21 When necessary to satisfy the needs of international air operations holder shall adapt the allotment procedure for the assignment of aeronautical mobile (R) frequencies, which assignments shall then be the subject of prior agreement between Administrations affected. 27/22 The co-ordination described in No. 27/19 shall be affected where appropriate and desirable for the efficient utilization of the frequencies in question, and especially when the procedures of No. 27/21 are unsatisfactory.

(f) Classes of emission J7B and J9B shall be subject to the following provisions of Appendix 27: 27/12 For radiotelephone emissions, the audio frequencies will be limited to between 300 and 2 700 Hz and the occupied bandwidth of other authorized emissions will not exceed the upper limit of J3E emissions.

14.7.5.8 Assignment of frequencies for aeronautical operational control communications.

(a) Assignment of aeronautical operational control communications frequencies shall be in accordance with the following provisions of Appendix 27:

(b) 27/9 A world-wide allotment area is one in which frequencies are allotted to provide long distance communications between an aeronautical station within that allotment area and aircraft operating anywhere in the world. Assignment shall enable aircraft operating agencies to meet the obligations prescribed in Annex 6, Part I.

(c) The world-wide frequency allotments appearing in the tables at No. 27/213 and Nos. 27/218 to 27/231, except for carrier (reference) frequencies 3 023 kHz and 5 680 kHz, shall be reserved for assignment by the Authority to service provider operating under assignment granted by the Authority for the purpose of serving one or more aircraft operating agencies. The assignments are to provide communications between an appropriate aeronautical station and an aircraft station anywhere in the world for exercising control over regularity of flight and for safety of aircraft. Worldwide frequencies are not to be assigned by Authority MWARA, RDARA and VOLMET purposes.

(d) Where the operational area of an aircraft lies wholly within a RDARA or sub-RDARA boundary, frequencies allotted to those RDARAs and sub-RDARAs shall be used.

14.7.5.9 NDB frequency management.

(a) NDB frequency management shall take into account the following operations requirements:

i. The interference protection required at the edge of the rated coverage.

ii. The application of the figures shown for typical ADF equipment.

iii. The geographical spacings and the respective rated coverages.

iv. The possibility of interference from spurious radiation generated by non-aeronautical sources (e.g., electric power services, power line communication systems, industrial radiation, etc.).

(b) In order to alleviate frequency congestion problems at locations where two separate ILS facilities serve opposite ends of a single runway, the assignment of a common frequency to both of the outer locators shall be permitted, and the assignment of a common frequency to both of the inner locators shall be permitted, provided that:

i. The operational circumstances permit.

ii. Each locator is assigned a different identification signal; and

iii. Arrangements are made whereby locators using the same frequency cannot radiate simultaneously.

14.7.5.10 Utilization of Frequencies above 30Mhz.

(a) Utilization of the frequency band 117.975 – 137.000 MHz on a worldwide basis with due regard to economy and practicability shall requires plan that take into account of:

i. The need for an orderly evolution towards improved operation and the required degree of worldwide standardization.

ii. The desirability of providing for an economic transition from present utilization to optimum utilization of the frequencies available, taking into account the maximum possible utilization of existing equipment.

iii. The need to provide for coordination between international and national utilization so as to ensure mutual protection from interference.

iv. The need for providing a global framework for the coordinated development of

Regional Plans;

v. The need, in certain regions, to have more detailed plans and planning criteria in addition to the provisions in this section.

vi. The desirability of incorporating in any group of frequencies to be used those now in use for international air services.

vii. The need for keeping the total number of frequencies and their grouping in appropriate relation to the airborne equipment known to be widely used by international air services.

viii. A requirement for the provision of a single frequency that may be used for emergency purposes on a worldwide basis and, also, in certain regions, for another frequency that may be used as a common frequency for special purposes; and

ix. The need for providing sufficient flexibility to allow for the differences in application necessitated by regional conditions.

14.7.5.11 General allotment of frequency band 117.975 – 137.000 MHz

(a) Plan for allotment of frequency shall include a general Allotment Table that subdivides the complete frequency band 117.975 – 137.000 MHz, the chief subdivisions being the frequency bands allocated to both national and international services, and the frequency bands shall be allocated to national services. Observance of this general subdivision should keep to a minimum the problem of coordinating national and international application.

(b) The block allotment of the frequency band 117.975 – 137.000 MHz.

14.7.5.12 Frequency separation and limits of assignable frequencies.

(a) Channel spacing for 8.33 kHz channel assignments shall be defined as 25 kHz divided by 3 which is 8.333 ... kHz

(b) Lowest assignable frequency in the frequency band 117.975 – 137.000 MHz, shall be 118.000 MHz and the highest 136.975MHz.

(c) The minimum separation between assignable frequencies in the aeronautical mobile (R) service shall be 8.33 kHz

(d) It shall be recognized that 25 kHz channel spacing provides an adequate number of frequencies suitably related to international and national air services and that equipment designed specifically for 25 kHz channel spacing will remain adequate for services operating within such regions or areas. It is further recognized that assignments based on 25 kHz channel spacing as well as 8.33 kHz channel spacing may continue to co-exist within one region or area.

(e) Requirements for mandatory carriage of equipment specifically designed for 8.33 kHz channel spacing shall be made on the basis of regional air navigation agreements which specify the airspace of operation and the implementation timescales for the carriage of equipment, including the appropriate lead time.

(f) No changes shall be required to aircraft systems or ground systems operating solely in regions not using 8.33 kHz channel spacing.

(g) Requirements for mandatory carriage of equipment specifically designed for VDL Mode 2, VDL Mode 3 and VDL Mode 4 shall be made on the basis of regional air navigation agreements which specify the airspace of operation and the implementation timescales for the carriage of equipment, including the appropriate lead time.

(h) The agreement indicated in 14.7.5.11, d) shall provide at least two years' notice of mandatory carriage of airborne systems.

(i) In regions where 25 kHz channel spacing (DSB-AM and VHF digital link (VDL)) and 8.33 kHz DSB-AM channel spacing are in operation, the publication of the assigned frequency or channel of operation shall conform to the channel contained in Table 4-1 (bis) which provides the frequency channel pairing plan that retains the numerical designator of the 25 kHz DSB-AM environment and allows unique identification of a 25 kHz VDL and 8.33 kHz channel.

14.7.5.13 Frequencies used for particular functions.

(a) Emergency channel (121.500 MHz) shall be used only for genuine emergency purposes, as broadly outlined in the following:

i. to provide a clear channel between aircraft in distress or emergency and a ground station when the normal channels are being utilized for other aircraft.

ii. to provide a VHF communication channel between aircraft and aerodromes, not normally used by international air services, in case of an emergency condition arising.

iii. to provide a common VHF communication channel between aircraft, either civil or military, and between such aircraft and surface services, involved in common search and rescue operations, prior to changing when necessary to the appropriate frequency.

iv. to provide air-ground communication with aircraft when airborne equipment failure prevents the use of the regular channels.

v. to provide a channel for the operation of emergency locator transmitters (ELTs), and for communication between survival craft and aircraft engaged in search and rescue operations.

vi. to provide a common VHF channel for communication between civil aircraft and intercepting aircraft or intercept control units and between civil or intercepting aircraft and air traffic services units in the event of interception of the civil aircraft.

vii. The use of the frequency 121.500 MHz for the purpose outlined in c) is to be avoided if it interferes in any way with the efficient handling of distress traffic.

viii. The ITU Radio Regulations (RR 5.200) permit the use of the aeronautical emergency frequency 121.500 MHz by mobile stations of the maritime mobile service under the conditions laid down in Article 31 of the Radio Regulations for distress and safety purposes with stations of the aeronautical mobile service.

(b) The frequency 121.500 MHz shall be provided at:

i. All area control centers and flight information centers;

ii. Aerodrome control towers and approach control offices serving international aerodromes and international alternate aerodromes; and

iii. Any additional location designated by the appropriate ATS authority, where the provision of that frequency is considered necessary to ensure immediate reception of distress calls or to serve the purposes specified in 1.

iv. Where two or more of the above facilities are collocated, provision of 121.500 MHz at one would meet the requirement.

v. The frequency 121.500 MHz shall be available to intercept control units were considered necessary for the purpose specified in 1 f).

vi. The emergency channel shall be guarded continuously during the hours of service of the units at which it is installed.

vii. The emergency channel shall be guarded on a single channel simplex operation basis.

viii. The emergency channel (121.500 MHz) shall be available only with the characteristics as contained in Annex 10, Volume III, Part II, Chapter 2 (25 kHz).

14.7.5.14 Air-to-air communications channel

(a) An air-to-air VHF communications channel on the frequency of 123.450 MHz shall be designated to enable aircraft engaged in flights over remote and oceanic areas out of range of VHF ground stations to exchange necessary operational information and to facilitate the resolution of operational problems as use of the air-to-air channel can cause interference to and from aircraft using the same frequency for air-ground communications.

(b) In remote and oceanic areas out of range of VHF ground stations, the air-to-air VHF communications channel on the frequency 123.450 MHz shall be available only with the characteristics as contained in Annex 10, Volume III, Part II, Chapter 2 (25 kHz).

14.7.5.15 Common signaling channels for VDL

(a) Common signaling channel VDL Mode 2 frequency 136.975 MHz shall be reserved on a worldwide basis to provide a common signaling channel (CSC) to the VHF digital link Mode 2 (VDL Mode 2). This CSC uses the Mode 2 VDL modulation scheme and carrier sense multiple access (CSMA).

(b) In areas where Common signaling channels VDL Mode 4 is implemented, the frequencies 136.925 MHz and 113.250 MHz shall be provided as common signaling channels (CSCs) to the VHF digital link Mode 4 (VDL Mode 4).

14.7.5.16 Auxiliary frequencies for search and rescue operations.

(a) Where a requirement is established for the use of a frequency auxiliary to 121.500 MHz, as described in 14.7.5.13 (a) (3), the frequency 123.100 MHz shall be used.

(b) The auxiliary search and rescue channel (123.100 MHz) shall be available only with the characteristics as contained in Annex 10, Volume III, Part II, Chapter 2 (25 kHz).

(c) The use of the aeronautical auxiliary frequency 123.100 MHz by mobile stations of the maritime mobile service under the conditions laid down in Article 31 of the Radio Regulations for distress and safety purposes with stations of the aeronautical mobile service shall be permitted as prescribed in the ITU Radio Regulations (RR 5.200).

14.7.5.17 Provisions concerning the deployment of VHF frequencies and the avoidance of harmful interference.

(a) The geographical separation between facilities operating on the same frequency shall, except where there is an operational requirement for the use of common frequencies for groups of facilities, be such that the protected service volume of one facility is separated from the protected service volume of another facility by a distance not less than that required to provide a desired to undesired signal ratio of 20 dB or by a separation distance not less than the sum of the distances to the associated radio horizon of each service volume, whichever is smaller.

(b) For areas where frequency assignment congestion is severe or is anticipated to become severe, the geographical separation between facilities operating on the same frequency shall, except where there is an operational requirement for the use of common frequencies for groups of facilities, be such that the protected service volume of one facility is separated from the protected service volume of another facility by a distance not less than that required to provide a desired to undesired signal ratio of 14 dB or by a separation distance not less than the sum of the distances to the associated radio horizon of each service volume, whichever is smaller. This provision shall be implemented on the basis of a regional air navigation agreement.

(c) The geographical separation between facilities operating on adjacent channels shall be such that points at the edge of the protected service volume of each facility are separated by a distance sufficient to ensure operations free from harmful interference.

(d) The protection height shall be a height above a specified datum associated with a particular facility, such that below it harmful interference is improbable.

(e) The protection height to be applied to functions or to specific facilities shall be determined regionally, taking into consideration the following factors:

i. the nature of the service to be provided.

ii. the air traffic pattern involved.

iii. the distribution of communication traffic.

iv. the availability of frequency channels in airborne equipment.

v. probable future developments.

(f) Where the protected service volume is less than operationally desirable, separation between facilities operating on the same frequency shall not be less than that necessary to ensure that an aircraft at the upper edge of the operational service volume of one facility does not come above the radio horizon with respect to emissions belonging to the service of adjacent facilities.

(g) The geographical separation between VHF VOLMET stations shall be determined regionally and shall be such that operations free from harmful interference are secured throughout the protected service volume of each VOLMET station.

(h) In the frequency band 117.975 – 137.000 MHz, the frequencies used for National Aeronautical Mobile Services, unless worldwide or regionally allotted to this specific purpose, shall be so deployed that no harmful interference is caused to facilities in the International Aeronautical Mobile Services.

(i) The problem of inter-State interference shall be resolved by consultation between the States concerned.

(j) The communication coverage provided by a VHF ground transmitter shall, in order to avoid harmful interference to other stations, be kept to the minimum consistent with the operational requirement for the function.

14.7.5.18 Method of operation

(a) Single channel simplex operation shall be used in the frequency band 117.975 – 137.000 MHz at all stations providing service for aircraft engaged in international air navigation.

(b) In addition to the above, the ground-to-air voice channel associated with an ICAO standard radio navigation aid may be used, subject to regional agreement, for broadcast or communication purposes or both.

(c) Plan of assignable VHF radio frequencies for use in the international aeronautical mobile service shall designate the list of frequencies available for assignment, with the provision for the use by the aeronautical mobile (R) service of all frequencies with a channel spacing of 25 kHz, and of all frequencies with a channel width and spacing of 8.33 kHz.

(d) The frequencies in the frequency band 117.975 – 137.000 MHz for use in the aeronautical mobile (R) service shall be selected from the lists in 14.7.5.18 (g) (1)

(e) The frequencies 136.500 – 136.975 MHz inclusive shall not be made available for assignment to channels of less than 25 kHz width.

(f) Services that continue operation using 25 kHz assignments shall be protected in regions implementing 8.33 kHz channel spacing.

(g) The list of assignable frequencies shall include:

i. List A — assignable frequencies in regions or areas where 25 kHz frequency assignments are deployed:

118.000 – 121.450 MHz in 25 kHz steps
121.550 – 123.050 MHz in 25 kHz steps
123.150 – 136.975 MHz in 25 kHz steps

ii. List B — assignable frequencies in regions or areas where 8.33 kHz frequency assignments are deployed:

118.000 – 121.450 MHz in 8.33 kHz steps
121.550 – 123.050 MHz in 8.33 kHz steps
123.150 – 136.475 MHz in 8.33 kHz steps

(h) The frequencies that are allotted for use in the aeronautical mobile (R) service in a particular region shall be limited to the number determined as being necessary for operational needs in the region and as determined by the Council on the recommendations of Regional Air Navigation Meetings.

14.7.5.19 Utilization in the frequency band 108 – 117.975 MHz

(a) The block allotment of the frequency band 108 – 117.975 MHz shall be as follows:

i. Band 108 – 111.975 MHz: The block allotment mention a. shall be by the for the operation of ILS and VOR.

ii. ILS in accordance with this regulation.

iii. VOR provided that:

iv. no harmful adjacent channel interference is caused to ILS;

v. only frequencies ending in either even tenths or even tenths plus a twentieth of a megahertz are used.

vi. GNSS ground-based augmentation system (GBAS) in accordance with Annex 10, Volume I, 3.7.3.5, provided that no harmful interference is caused to ILS and VOR.

vii. The frequencies in the band 112.050 – 117.900 MHz shall be used for GBAS assignments.

viii. Band 111.975 – 117.975 MHz:

ix. VOR;

x. GNSS ground-based augmentation system (GBAS) in accordance with Annex

10, Volume I, 3.7.3.5, provided that no harmful interference is caused to VOR.

xi. For regional assignment planning, the frequencies for ILS facilities shall be selected in the following order:

xii. localizer channels ending in odd tenths of a megahertz and their associated glide path channels;

xiii. localizer channels ending in odd tenths plus a twentieth of a megahertz and their associated glide path channels

xiv. ILS channels identified by localizer frequencies ending in an odd tenth plus one twentieth of a megahertz in the band 108 – 111.975 MHz shall be permitted to be utilized on the basis of regional agreement when they become applicable in accordance with the following:

1. for restricted use commencing 1 January 1973;

2. for general use on or after 1 January 1976. Note.— See Note to 4.2.3.1.

xv. For regional assignment planning, the frequencies for VOR facilities shall be selected in the following order:

1. frequencies ending in odd tenths of a megahertz in the band 111.975 – 117.975 MHz;

2. frequencies ending in even tenths of a megahertz in the band 111.975 – 117.975 MHz;

3. frequencies ending in even tenths of a megahertz in the band 108 – 111.975 MHz;

4. frequencies ending in 50 kHz in the band 111.975 – 117.975 MHz, except as provided in (1)

5. frequencies ending in even tenths plus a twentieth of a megahertz in the band 108 – 111.975 MHz except as provided in 4.2.3.1.

xvi. Frequencies for VOR facilities ending in even tenths plus a twentieth of a megahertz in the band 108 – 111.975 MHz and all frequencies ending in 50 kHz in the band 111.975 – 117.975 MHz shall be permitted to be utilized on the basis of a regional agreement when they have become applicable in accordance with the following:

1. in the band 111.975 – 117.975 MHz for restricted use.

2. for general use in the band 111.975 – 117.975 MHz at a date fixed by the Council but at least one year after the approval of the regional agreement concerned

3. for general use in the band 108 – 111.975 MHz at a date fixed by the Council but giving a period of two years or more after the approval of the regional agreement concerned.

xvii. "Restricted use", where mentioned is intended to refer to the limited use of the frequencies by only suitably equipped aircraft and in such a manner that:

1. the performance of ILS or VOR equipment not capable of operating on these frequencies will be protected from harmful interference;

2. a general requirement for the carriage of ILS or VOR airborne equipment capable of operation on these frequencies will not be imposed; and

3. operational service provided to international operators using 100 kHz airborne equipment is not derogated.

xviii. To protect the operation of airborne equipment during the initial stages of deploying VORs utilizing 50 kHz channel spacing in an area where the existing facilities may not fully conform with the Standards in Nig.CARs14.7.1 all existing VORs within interference range of a facility utilizing 50 kHz channel spacing shall be modified to comply with the provisions of this Regulation.

xix. When deploying frequency, the geographical separation between facilities operating on the same and adjacent frequencies shall be determined regionally and shall be based on the following criteria:

1. the required functional service radii of the facilities.

2. the maximum flight altitude of the aircraft using the facilities.

3. the desirability of keeping the minimum IFR altitude as low as the terrain will permit.

xx. To alleviate frequency congestion problems at locations where two separate ILS facilities serve opposite ends of the same runway or different runways at the same airport, the assignment of identical ILS localizer and glide path paired frequencies shall be permitted, provided that:

1. the operational circumstances permit.

2. each localizer is assigned a different identification signal; and

3. arrangements are made whereby the localizer and glide path not in operational use cannot radiate.

14.7.5.20 Utilization in the frequency band 960 – 1 215 MHz for DME

(a) The Authority will apply the guidance on the frequency planning of channels for DME systems prescribed in Annex 10, Volume I, Attachment C, Section 7 to assign channel for DME which include.

(b) DME operating channels bearing the suffix "X" or "Y" shall be chosen on a general basis without restriction.

(c) DME channels bearing the suffix "W" or "Z" shall be chosen on the basis of regional agreement when they become applicable in accordance with the following:

i. for restricted regional use on or after, whichever is the later:

ii. 1 January 1989; or

iii. a date prescribed by the Council giving a period of two years or more following approval of the regional agreement concerned.

(d) for general use on or after, whichever is the later:

i. 1 January 1995; or

ii. a date prescribed by the Council giving a period of two years or more following approval of the regional agreement concerned.

(e) “Restricted use” is intended to refer to the limited use of the channel by only suitably equipped aircraft and in a manner that:

i. the performance of existing DME equipment not capable of operating on these multiplexed channels will be protected from harmful interference.

ii. a general requirement for the carriage of DME airborne equipment capable of operating on these multiplexed channels will not be imposed; and

iii. operational service provided to international operators using existing DME equipment without the multiplexed channel capability is not derogated.

14.7.5.21 Site Validation, Safety Inspections and Audits

(a) An applicant for assignment of Aeronautical Frequency Spectrum shall made available to the Authority the following documents:

i. equipment manual

ii. site coordinates data

iii. site survey map

iv. aerial survey report.

v. factory assessment test (FAT) report of the radio equipment

(b) The Authority will conduct site validation assessment prior to grant of an Assignment Letter.

(c) The site validation assessment shall include:

i. Site proving or assessment of topography/terrain of the location.

ii. Verification of coordinates data.

iii. Assessment of site survey map.

iv. Assessment of aerial survey report.

(d) The Authority will carry out safety inspections and audits post implementation monitoring of users of Aeronautical Frequency Spectrum as may be necessary to verify compliance with the requirements prescribed in this section and to ensure that the users continue to meet the defined level of safety regarding non-duplication or swapping of frequencies.

14.7.5.22. Impairment of Assigned Aeronautical Radio Frequency Aeronautical Frequency Spectrum

(a) No person shall alter, change, swap or reassign any radio frequency Aeronautical frequency Spectrum already in use without the approval of the Authority.

(b) The Authority will maintain a register of all Aeronautical frequency Spectrum Assignment letter issued by the Authority under this section.

14.7.5.23. Aeronautical frequency Spectrum Register

(a) The register shall contain information recorded on the Aeronautical frequency Spectrum Assignment letter and any other information required by the Authority.

14.7.5.24. Aeronautical frequency Spectrum Register Access

(a) A person who intends to access the register for the purpose of obtaining information shall apply in writing to the Authority and shall pay appropriate fees as may be prescribed by the Authority.

14.7.5.25. SATELLITE-BASED C2 LINK SYSTEM

a. Satellite-based RPAS C2 Link systems shall operate in the following frequency bands:

1. frequency bands with an appropriate allocation to aeronautical safety services under the aeronautical mobile satellite (route) service (AMS(R)S). Frequency bands that meet these criteria and can be used for RPAS C2 Links, subject to the conditions associated with the allocation, are: 1 610 – 1 626.5 MHz and 5 000 – 5 150 MHz;

2. frequency bands with an allocation to aeronautical safety services under the mobile-satellite service (MSS) where AMS(R)S operations have priority access. Frequency bands that meet these criteria and can be used for RPAS C2 Links are: 1 545 – 1 555 MHz and 1 646.5 – 1 656.5 MHz.

3. frequency bands with an allocation to the fixed satellite service (FSS) where the conditions in ITU Resolution 155 (WRC-15) are met. Frequency bands in which this resolution applies are:

i. 10.95 – 11.2 GHz (space-to-Earth);

ii. 11.45 – 11.7 GHz (space-to-Earth);

iii. 11.7 – 12.2 GHz (space-to-Earth) in Region 2;

iv. 12.2 – 12.5 GHz (space-to-Earth) in Region 3;

v. 12.5 – 12.75 GHz (space-to-Earth) in Regions 1 and 3;

vi. 19.7 – 20.2 GHz (space-to-Earth);

vii. 14.0 – 14.47 GHz (Earth-to-space); and

viii. 29.5 – 30.0 GHz (Earth-to-space) with an ITU satellite earth station class of "UG".

14.7.5.26. TERRESTRIAL C2 LINK COMMUNICATION SYSTEMS

a. Terrestrial RPAS C2 Link systems shall operate in the following bands:

1. bands allocated to the Aeronautical Mobile (Route) Service (AM(R)S). Frequency bands with such allocations include 113.250 MHz and 136.925 MHz (common signalling channels for VDL Mode 4), 960-1164 MHz and 5030-5091 MHz.

2. The operation of the C2 Link within any of these bands shall be implemented so as to be compatible with the systems currently using these allocations.

3. Compatibility shall be ensured through the development and application of necessary SARPs and determined on the basis of regional air navigation agreements.

NIGERIA CIVIL AVIATION REGULATIONS

PART 14 IMPLEMENTING STANDARDS

IMPLEMENTING STANDARDS (IS)

IS14.1.1(b)(1)(iv) **Sample of Air Navigation Services Provider Certificate**

NIGERIAN CIVIL AVIATION AUTHORITY

SAMPLE

CERTIFICATE NO.
ANS/(TYPE OF SERVICE)/LOCATION/001

AIR NAVIGATION SERVICE PROVIDER CERTIFICATE

PURSUANT TO PART IX section 30 (3) (n,r) OF CIVIL AVIATION ACT 2022 AND PART 14 OF THE NIGERIA CIVIL AVIATION REGULATIONS , THE NIGERIAN CIVIL AVIATION AUTHORITY HEREBY GRANTS THIS AIR NAVIGATION SERVICE PROVIDER CERTIFICATE SUBJECT TO THE TERMS SPECIFIED BELOW:

BENEFICIARY:

REGISTERED ADDRESS:

TERMS OF APPROVAL: TO PROVIDE AIR NAVIGATION SERVICES (type of services) IN THE FOLLOWING AREAS:

- **………..**
- **………..**
- **…………. etc**

Detailed Air Navigation Service Specifications and Limitations are as contained in the attached Scope of Approvals.

This Certificate is valid from ……. to ……... unless cancelled, suspended or revoked

Signed: …………………………………………
Director General

This Certificate is not transferable and must be displayed to the public in the principal business office of the Organisation

IS14.0.4.2 Application for approval as an Air Traffic Service Provider. **

(1) On application for issue and renewal of an ATS provider certificate, the applicant shall provide sufficient information to the Nigerian Civil Aviation Authority so that the Authority can assess and determine that the information required is included in the applicant's Manual of Operations.

(2) To assist applicants the following is a guideline to ensure that applicants include the information required.

(3) An applicant for an approval shall provide the Authority with a Manual of Operations containing:

(a) a statement signed by the accountable officer, on behalf of the applicant's organisation confirming that:

(i) the Manual of Operations defines the organisation and demonstrates its means and methods for ensuring ongoing compliance with the Regulation;

(ii) the Manual of Operations and appropriate operational documentation, shall be complied with by the organisation's personnel at all times;

(b) the titles and names of the senior person or persons;

(c) the duties and responsibilities of the senior person or persons in (b) including matters for which they have responsibility to deal directly with the Authority on behalf of the organisation;

(d) an organisation chart showing lines of responsibility of the senior persons in (b) and covering each location listed under (f) ;

(e) a summary of the organisation's staffing structure at each location listed under (f);

(f) a list of each type of air traffic service and the duration of that service to be operated under the authority of the air traffic service provider approval;

(g) the airspace in which each service will be provided;

(h) the aerodrome for which the service will be provided;

(i) procedures and a plan to undertake checking and training of staff in the positions for which they will provide a service;

(j) the detailed procedures required regarding internal quality assurance and safety management system;

(k) a contingency plan for implementation in the event of a disruption to services provided;

(l) a security programme that details protection for facilities, services and personnel;

(m) a summary of the operational details of each aeronautical facility associated with each location listed under (f) and (g);

(n) procedures to control, amend, and distribute documentation and retain records;

(o) an Aeronautical search and rescue Manual.

(4) The Authority may not grant an approval unless the Authority is satisfied that the applicant's Manual of Operation complies with this Part.

IS14.1.27.3 The Authority to carry out Air Traffic Control Function.

(1) A person may carry out an air traffic control function in Nigeria if, at the time the person carries out the function:

(a) he or she holds an ATC licence with a rating for the function and an endorsement for the place where, or the airspace in relation to which, he or she carries it out; and

(b) the licence, rating and endorsement are in force; (c) he or she:

(i) satisfies the recency and currency requirements in relation to the endorsement; and

(ii) satisfies the currency requirement in relation to the rating.

(2) A person may carry out an air traffic control function in Nigeria under the supervision of a person who meets the requirements above.

(3) A person who may carry out an air traffic control function in Nigeria under supervision is a person who the Authority has authorised in writing to carry out the relevant function and is ;

(a) a person who:

(i) holds an ATC licence with a rating for the function and an endorsement for the place where, or the airspace in relation to which, he or she carries it out ; but at the relevant time, in relation to the rating or endorsement, does not satisfy the recency or currency requirement;

(b) a person who:

(i) holds an ATC licence; and

(ii) carries out the function in the course of training for a rating or endorsement (whether or not the person holds a rating or endorsement at the time);

(c) a person (other than a person who held an ATC licence that has been cancelled) who:

(i) has completed an approved course of training in the theory of air traffic control; and

(ii) carries out the function in the course of undergoing practical training for an ATC licence.

IS 14.1.24.1 Contingency Plan.

The Contingency plan shall include:

The actions to be taken by the members of the ATS provider's personnel responsible for providing the service, including the notification of suspected communicable diseases, or other public health risk, on board an aircraft are as follows:

(1) The flight crew of an aircraft shall, upon identifying a suspected case(s) of communicable disease, or public health risk, on board the aircraft, promptly notify the ATS unit with which the pilot is communicating, the information listed below:

(i) aircraft identification ;

(ii) departure aerodrome ;

(iii) destination aerodrome ;

(iv) estimated time of arrival;

(iv) number of persons on board;

(v) number of suspected case(s) on board; and

(vi) nature of the public health risk, if known.

(2) The ATS unit, upon receipt of information from a pilot regarding suspected case(s) of communicable disease, or public health risk, on board the aircraft, shall forward a message as soon as possible to the ATS unit serving the destination/departure, unless procedures exist to notify the appropriate authority designated by the State and the aircraft operator or its designated representative.

(3) When a report of a suspected case(s) of communicable disease, or other public health risk, on board an aircraft is received by an ATS unit serving the destination/departure, from another ATS unit or from an aircraft or an aircraft operator, the unit concerned shall forward a message as soon as possible to the public health authority (PHA) or the appropriate authority designated by the State

IS14.1.1(t)(2) Facilities.

(1) The ATS provider shall, for each location for which a service is provided, supply and indicate from the list below a list of facilities and equipment. An indication shall be provided on the quality of the facilities and equipment.

(2) All equipment used in the provision of Air Traffic Services, including navigation and approach services shall perform and be maintained in accordance with the standards and practices as contained in these regulations.

(3) General Item

(i) The means to monitor the domestic frequency 121.7 MHz independent of mains and standby radio equipment
(ii) Emergency lighting
(iii) Notice boards
(iv) Head sets
(v) Lockers and a safe Emergency exits Lightening protection Fire alarm
(vi) A briefing room Equipment repair space Technical equipment storage Restrooms
(vii) Running water Entry control Any other items

(4) Control Tower Item

(i) Headsets Microphones Transceivers Speakers
(ii) Radio selector panel
(iii) Telephone selector panel/handsets
(iv) Intercom
(v) Auto-switch headset/speaker
(vi) Recorder (radio and telephone) where applicable
(vii) Power
(viii) Back-up power
(ix) Signal lamp
(x) Device for alerting RFFS in the event of aerodrome emergency
(xi) Rapid communications with RFFS Wind speed and direction display Barometric altimeter
(xii) Altimeter setting indicator
(xiii) Clock
(xiv) Aerodrome lighting panel
(xv) Navaid(s) monitor panel
(xvi) Lighting, including emergency lights
(xvii) Daylight radar/display consoles, as appropriate
(xviii) Flight data panel, flight progress strip card holders and flight progress strip cards
(xix) Clipboards/displays (NOTAM, etc.)
(xx) Automatic terminal information system recorder where applicable
(xxi) Fire alarm and extinguishers Desks/consoles/shelves Chairs
(xxii) Shades
(xxiii) Air Conditioning, heating/cooling
(xxiv) Binoculars

(xxv) Sound-absorbing coverings (floor/wall) Any other items

(5) Aerodrome/Approach Combined Item
(i) Headsets Microphones Transceivers Speakers
(ii) Radio selector panel
(iii) Telephone selector panel /headsets
(iv) Intercom
(v) Auto-switch headset/speaker
(vi) Voice recorder (radio and telephone) Power
(vii) Back-up power
(viii) Device for alerting RFFS in the event of aerodrome emergency
(ix) Rapid communications with RFFS Wind speed and direction display Altimeter setting indicator
(x) Clock
(xi) Navaid (s) monitor panel
(xii) Lighting, including emergency lights
(xiii) Radar displays, controls, consoles, as appropriate
(xiv) Secondary radar controls, as appropriate
(xv) Radar simulator, as appropriate
(xvi) Flight data panel, flight progress strip card holders and flight progress strip cards
(xvii) Automation equipment, if required
(xviii) Clipboards/display (NOTAM etc)
(xix) Automatic terminal information system recorder Fire alarm and extinguishers Desks/consoles/shelves
(xx) Chairs
(xxi) Air conditioning, heating/cooling
(xxii) Sound-absorbing coverings (floor/wall) Plotting and writing area
(xxiii) Navigation plotting equipment
(xxiv) Aeronautical fixed telecommunication network
(xxv) Any other items

(6) Area Control Centre/Flight Information Centre Item
(i) Area Control Centre/ Flight Information Centre
(ii) Writing area/counter space
(iii) Plotting table
(iv) Navigation plotting equipment
(v) Large-scale area map
(vi) Headsets
(vii) Microphones
(viii) Speakers
(ix) Radio communications selector panels
(x) Telephones and selector panels
(xi) Aeronautical fixed telecommunications network
(xii) Access to direction - finding equipment Flight progress console and equipment Clocks
(xiii) Lighting including emergency lighting
(xiv) Chairs
(xv) Storage for reference documents
(xvi) Lavatory
(xvii) Running water

(xviii) Fire alarm and extinguisher
(xix) Air conditioning heating/cooling
(xx) Power
(xxi) Back-up power
(xxii) Any other items

IS14.1.1(s)(1) Control Tower.

(1) The tower shall permit the controller to survey those portions of the aerodrome and its vicinity over which control is exercised.

(2) The tower shall be equipped so as to permit the controller rapid and reliable communications with aircraft with which he or she is concerned.

(3) The controller shall be able to discriminate between aircraft and vehicles while they are on the same or different runways/taxiways.

IS14.1.1.(w) (x) Maintenance of Documents and Records (Operational Documents).

(a) procedures manual;
(b) air traffic control instructions manual;
(c) local air traffic control instructions manual;
(d) AIP and AIP Supplements;
(e) AICs and NOTAM;
(f) Nigeria Civil Aviation Regulations;
(g) Aeronautical search and rescue Manual, approved by the Authority;
(h) airport emergency plan;
(i) directives and instructions file;
(j) occurrence log;
(k) unserviceability log;
(l) circulars and bulletins file;
(m) equipment manuals;
(n) technical standards and practices; and
(o) all applicable ICAO documents

IS14.1.56.1. Contents of Local Air Traffic Control Instructions (LATCI).

(1) A Local Air Traffic Control Instructions shall contain the following:

(a) Detailed unit operational procedures and requirements;

(b) Detailed unit administrative requirements, including the responsibilities of each operating position;

(c) Amplification and/or explanation of provisions of the national requirements, where necessary;

(d) Procedures for the control of movement of persons and vehicles on the manoeuvring area; where required;

(e) Co-ordination procedures between internal and external agencies (and when this is to occur-(change in status of facilities, navigation aids, MET observation)

(f) Procedures for the provision of services to aircraft in an emergency:

(i) within the vicinity of the airport—Aerodrome emergencies of Air Traffic Services; and

(ii) outside the vicinity of the airport—Aeronautical search and rescue procedures;

(g) Contingency arrangements in the event of a communications, navaid, facility failure (including runway/taxiway closure);

(h) Procedures to provide assistance to strayed or unidentified aircraft;

(i) Procedures for pilots in the event of an air-ground radio communications failure.

(Note: These procedures shall be included in the AIP).

(j) Letters of Agreement with other agencies adjacent to the unit for the transfer of responsibility of control.

(k) Procedures for the LATCI amendment which shall include:

(i) a requirement that Air Traffic Controllers are to indicate, in the appropriate manner, that an amendment has been noted.

(ii) a requirement that any amendment by hand shall be accompanied by the authorised person’s signature and date. Authorised person means any air traffic controller authorised by the ATS provider to make the relevant amendment by hand.

A requirement that notice of these amendments shall be transmitted to the head office responsible for the relevant service for ratification.

PART14. 2 – IMPLEMENTING STANDARDS

IS 14.2.14. Responsibility of Holder of Procedures Design Certificate.

(1) An applicant for the provision of Instrument Procedures Design shall provide in its Manual of Operations:

(a) current unit organisational chart and written delegated responsibilities and position descriptions;

(b) staffing-levels for operational positions;

(c) designated instructors and ratings and proficiency assessment officers;

(d) staffing numbers and qualifications at unit level.

(2) A Procedures Design certificate holder shall, at all times, maintain an appropriate organisation with a sound and effective management structure to enable it provide, in accordance with the standards set out in the Regulations, the services covered by its certificate

(3) A Procedures Design certificate holder shall have, at all times, enough suitably qualified and trained personnel to enable it provide, in accordance with the standards set out in the Regulations, the services covered by its certificate

(4) The Procedures Design certificate holder shall ensure that its personnel are of sufficient numbers and experience and have been given appropriate authority to be able to discharge their allocated responsibilities.

(5) A Procedures Design certificate holder shall not carry out design work on a instrument flight procedure under the designer's certificate unless :

(a) the certificate holder has appointed a person to be the chief designer for the designer's organisation ; and

(b) the appointment is approved by the Authority and is in force ; and

(c) the functions of the head designer are being carried out by the person or, if the head designer is temporarily absent from duty, another authorized person :

(i) who is appointed by the certificate holder to act as head designer ; and

(ii) whose appointment is approved by the Authority and is in force.

(6) The minimum qualifications for a Qualified Designer, in relation to a flight procedure, means an individual who:

(a) is the holder, or an employee of the holder, of a procedures design certificate that authorises the holder to design flight procedures of the same type as the procedure concerned; and

(b) has successfully completed:

(i) an approved course of training in the methods and practices contained in ICAO Doc. 8168 (PANS-OPS) ; and

(ii) any training for persons carrying on design work on flight procedures that is specified in the Operations Manual under which the qualified designer performs the designer's duties; and

(iii) meets the experience requirements for performing the functions of a qualified designer set out in these regulations

(c) enough licensed personnel to plan, provide and supervise the services listed in its certificate in a safe and efficient manner.

IS14.2.16 Verification/Validation of Instrument Flight Procedure Design

(a) Each new or revised procedure designed shall be verified by a qualified procedure designer other than the one that designed the procedure to ensure compliance with applicable Criteria.

(b) Validation of designed instrument flight procedure shall be undertaken as the necessary final quality assurance step in the procedure design process prior to publication.

(c) The purpose shall be to verify all obstacle and navigational data and assessment fly-ability of the procedure.

(d) Validation shall consist of ground validation and flight validation.

(e) Ground validation shall be undertaken to enable the Authority verify the accuracy, completeness of all obstacle and navigation data considered in the procedure design and any other factors normally considered in the flight validation process.

(f) Ground validation shall be undertaken by a person(s) trained in procedure design and with appropriate knowledge of flight validation issue. This enables the Authority catch errors in Criteria and documentation and evaluate on the ground to the extent possible, those elements that will be evaluated in a flight validation, so that issues identified in the ground validation shall be addressed prior to flight validation.

(g) Ground validation shall be carried out to determine if flight validation is needed for modifications and amendments to previously published procedures.

IS 14.2.17 Validation of Flight Procedures

(a) Flight validation of instrument flight procedures shall be carried out as part of the initial certification and shall be included as part of the periodic quality assurance programme established by the Authority.

(b) Flight validation shall be accomplished by a qualified and experienced flight validation Pilot, certified or approved by the Authority.

(c) The objectives of the flight validation of instrument flight procedures shall be to;

1. provide assurance that adequate obstacle clearance has been provided;
2. verify that the navigation data to be published, as well as that used in the design of the procedure, is correct;
3. verify that all required infrastructure, such as runway markings, lighting, and communications and navigation sources, are in place and operative;
4. assess the fly ability to determine that the procedure can be safely flown; and
5. evaluate the charting, required infrastructure, visibility and other operational factors.

(d) Validation of 25Nm and 10 Nm Minimum Sector Altitude

(1) Each 25 NM sector, or the 25 NM circle, and the 10 NM circle must be checked at their specified altitudes. 25 NM and 10 NM MSAs include obstacles out to 30 NM and 15 NM respectively from the navigation aid or ARP upon which the MSA is based. Checks must include the controlling obstacle in addition to other obviously high terrain or obstacles. Where the sector/circle does not exhibit greatly differing terrain elevations, judgment may be exercised regarding the tracks flown to provide a full coverage of the area

.

.

PROCEDURE CHECKLIST FOR NON – PRECISION
THRESHOLD ELEVATION

INITIAL 1	A	B	C	D
Type straight(s)racetrack(RT)reversal(R)				
Obstacle elevation				
Location of Obstacle primary(P)secondary(S)				
MOC applied				
Required altitude				
Nominal altitude				
Speed restriction no(N) yes(Y) value				
Comments:				

INITIAL 2	A	B	C	D
Type straight(S) racetrack(RT)reversal(R)				
Obstacle elevation				
Location of obstacle primary(P) secondary(S)				
MOC applied				
Required altitude				
Nominal altitude				
Speed restriction no(N) yes(Y) value				
Comments:				

INTERMEDIATE yes(Y) no(N)	A	B	C	D
Length(L) or Time(T) value				
Alingment with final:straight(S) angle				
Obstacle elevation				
Primary(P)secondary(S)area				
MOC applied				
Required altitude				
Nominal altitude				
Gradient(G) rate of descent(R) value				
Comments:				

FINAL	A	B	C	D
On or OFF aerodrome facility				
Length(L) or time(T) value				
Obstacle elevation				
Primary(P) or secondary(S) area				
Stepdown fix yes(Y) or no(N) MOC applied				
OCA(final)				
Comments:				

MISSED APPROACH	A	B	C	D
MAPT facility(F) fix(FIX)distance/FAF(D)value				
Straight missed approach				
Obstacle elevation				
Primary(P) secondary(S)				
MOC applied (full MOC=30m)				
Required altitude				
OCAmissed approach				
Comments;(non standard gradient)				

TURNING MISSED APPROACH	A	B	C	D
Fix(F) altitude (A) distance D)				
Obstacle elevation in turn initiation area(if turn at an altitude)				
Minimum turn altitude (MOC=50m)				
Obstacle elevation in turn area				
Resulting turn altitude				
OCA(missed approach)				
Restricted speed no(N) yes(Y) value				
Comments:				

RESULT	A	B	C	D
Resulting OCA for the procedure				
Gradient(G) rate of descent(R)value on final				
Level acceleration segment height				
Comments;				

PROCEDURE CHECKLIST FOR PRECISION APPROACH

INITIAL 1	A	B	C	D
Type straight(S) racetrack(RT) reversal(R)				
Obstacle elevation				
Location of obstacle primary(P) secondary(S)				
MOC applied				
Required altitude				
Nominal altitude				
Speed restrivtion no(N) yes(Y)value				
Comments:				

INITIAL 2	A	B	C	D
Type straight(S) racetrack(RT) reversal(R)				
Obstacle elevation				
Location of obstacle primary(P) secondary(S)				
MOCapplied				
Rquired altitude				
Nominal altitude				
Speed restriction no(N) yes(Y) Comments:				

INTERMEDIATE yes(Y) no(N)	A	B	C	D
Length (L) time(T) value				
Alingment with final straight(S) angle				
Obstacle elevation				
Primary(P) secondary(S)				
MOC applied				
Required altitude				
Nominal altitude				
Gradient(G) rate of descent(R)value				
Comments:				

PRECISION SEGMENT	A	B	C	D
Distance FAP/Threshold				
OAS penetrated no(N) yes(Y)value				
Obsfacle height				
HL appliedOCHps				
OCHps (precision segment) applied				
OCHps CRM				
Comments:				

STRAIGHT MISSED APPROACH AFTER (PS)	A	B	C	D
Obstacle height				
SOC height				
HLapplied				
OCHm(missed approach)				
Comments:				

TURNING MISSED APPROACH	A	B	C	D
Fix(F) length (L)				
Obstacle height in turn initiation area(if turn at a height)				
Minimum turn height(MOC=50m)				
Obstacle height in turn area				
Resulting Turn height				
D2 (minimum 1200m)				
SOC height				
HL applied				
OCHm (missed approach)				
Comments:				

RESULTS	A	B	C	D
Resulting OCH for the progedure				
Level acceleration segment height Comments:				
Comments				

GP INOPERATIVE	A	B	C	D
FAF: Fix (Fix) facility (F) name				
Obstacle height				
MOC applied				
OCHf (final)				
MAPt facility(F) fix(FIX) distance/FAF(D)value				
Missed approach:straight(S) turn(T)				
If obstacle,height in turn intiation(T) area minimum (T) height (MOC=50m)				
Obstacle height				
Rquired height				
OCHm (missed approach)				
Resulting OCH				
Comments:				

CIRCLING	A	B	C	D
Obstacle elevation				
MOC applied				
OCA (check minimum value)				
Comments:				

Note: These checklists shall be retained as part of a permanent file along with terrain charts and other documents which support the procedure. Sample checklist to be included

CERTIFICATION

The specified altitudes of the above instrument procedures have been checked and the procedures are acceptable subject to the above- mentioned changes (if any) being incorporated.

The specified altitudes of the GPS Arrival Sector A have been checked and the procedure is acceptable subject to the above-mentioned changes (if any) being incorporated.

The aerodrome is currently certified/registered/other.

The WDIs are suitable for straight-in approaches to runways

…………………… and unsuitable for straight-in approaches to runways

………………… . The suitable WDIs are/are not illuminated.

The approach procedures were/were not found to be operationally suitable for straight-inminima.

(Signature of validation pilot)

IS14.1.54 (d). The Authority to carry out Air Traffic Control Function.

(1) A person may carry out an air traffic control function in Nigeria if, at the time the person carries out the function:

(*a*) he or she holds an ATC licence with a rating for the function and an endorsement for the place where, or the airspace in relation to which, he or she carries it out; and

(*b*) the licence, rating and endorsement are in force; (*c*) he or she:

(*i*) satisfies the recency and currency requirements in relation to the endorsement; and

(*ii*) satisfies the currency requirement in relation to the rating.

(2) A person may carry out an air traffic control function in Nigeria under the supervision of a person who meets the requirements above.

(3) A person who may carry out an air traffic control function in Nigeria under supervision is a person who the Authority has authorised in writing to carry out the relevant function and is ;

(*a*) a person who:

(*i*) holds an ATC licence with a rating for the function and an endorsement for the place where, or the airspace in relation to which, he or she carries it out ; but at the relevant time, in relation to the rating or endorsement, does not satisfy the recency or currency requirement;

(*b*) a person who:

(*i*) holds an ATC licence; and

(*ii*) carries out the function in the course of training for a rating or endorsement (whether or not the person holds a rating or endorsement at the time);

(*c*) a person (other than a person who held an ATC licence that has been cancelled) who:

(*i*) has completed an approved course of training in the theory of air traffic control; and

(*ii*) carries out the function in the course of undergoing practical training for an ATC licence.

IMPLIMENTING STANDARDS: AERONAUTICAL TELECOMMUNICATION SERVICE

RADIO NAVIGATION AIDS SERVICES

IS 14.7.1.10(b)(1)
Personnel Requirements and Responsibilities of Aeronautical Telecommunication Services Provider.

(1) An applicant for the provision of Aeronautical Telecommunication Services shall provide in its Manual of Operations:

(a) current unit organizational chart and written delegated responsibilities and position descriptions;

(b) staffing-levels for operational positions;

(c) designated instructors and ratings and proficiency assessment officers;

(d) staffing numbers and qualifications at unit level.

(2) An Aeronautical Telecommunication Services provider shall maintain an appropriate organisation with a sound and effective management structure to enable it provide, in accordance with the standards set out in the Regulations.

(3) An Aeronautical Telecommunication Services provider shall have, enough suitably qualified and trained personnel to enable it provide, in accordance with the standards set out in the Regulations, the aeronautical telecommunications services covered by its Approval.

(4) The Aeronautical Telecommunication Services provider shall ensure that its personnel are of sufficient numbers and experience and have been given appropriate authority to be able to discharge their allocated responsibilities.

(5) An Aeronautical Telecommunication Services provider shall arrange the workflow schedule of Aeronautical Telecommunication Services officers to provide duty rest periods. A copy of the Aeronautical Telecommunication Services providers fatigue management procedure is to be included in the Manual of Operations.

(6) An Aeronautical Telecommunications Services officer shall not exercise the privileges of his licence if he knows or suspects that he is suffering from or having regards to the circumstances of the period of duty to be undertaken is likely to suffer from such fatigue as may endanger the safety of any aircraft to which a Navigation control services is provided.

(7) A person shall not when exercising the privileges of an ATSEP licence be under the influence of alcohol or a drug to the extent as to impair his capacity to exercise such privileges.

(8) At the unit level the Aeronautical Telecommunication Services provider shall engage, employ or contract:

(a) a senior person to whom authority has been granted to ensure that all activities under taken by the unit are carried out in accordance with the applicable requirements prescribed in this section, and who shall in addition be vested with the following powers and duties in respect of the compliance with such requirements.

(i) Unrestricted access to work performed or activities under taken by all other persons as employees of, and other persons rendering services within the unit;

(ii) full rights of consultation with such person(s) in respect of such compliance by him or her;

(iii) powers to order cessation of activity where such compliance is not affected.

(iv) a duty to establish liaison mechanisms with the Authority with a view to ascertain correct manners of compliance with the said requirements, and interpretations of such requirements by the Authority, and to facilitate liaison between the Authority and the unit concerned; and

(v) powers to report directly to the management of his or her organization, on his or her investigations and consultations generally, and in cases contemplated in subparagraph(iii), and with regard to the results of the liaison contemplated in sub-paragraph(iv);

(b) a person who is responsible for quality control, and who shall have directaccesstothepersonreferredtoinparagraph(a)onmattersaffecting aviation safety; and

(c) enough licensed personnel to plan, provide and supervise the services listed in its Approval as a services provider, in a safe and efficient manner.

IS 14.7.1.10 (b)(2) Training and Checking of Air Navigation Personnel

(1) Aeronautical Telecommunication Services provider shall establish a procedure for initially assessing, and a procedure for maintaining, the competence of the personnel required to operate and maintain the equipment concerned.
Granting of Ratings and Endorsements

(2) An endorsement certifies that an ATSEP licence holder is competent to maintain a particular Air Navigation facility at a particular aerodrome, or in relation to particular airspace.

(3) The Authority may designate the Aeronautical Telecommunication Services provider authority to grant an endorsement to a person who:

(a) Is a senior technician with in the Aeronautical Telecommunication Services (Radio Navigation Aids) organization;

(b) Has held a rating for five year for the position in which an endorsement is being sought;

(c) Has been approved by the Authority to act in this capacity.

(4) A person approved by the Authority may grant an endorsement to a person who:

(a) is eligible to be granted an ATSEP licence with a rating; and

(b) successfully completes the training required by the Authority for the grant of the endorsement.

(5) An Aeronautical Telecommunication Services provider shall set up and maintain a program to ensure that its employees who hold ATSEP licences maintain endorsements appropriate to their duties.

(6) That program shall be in accordance with any standards and requirements set out in the Regulations.

(7) The provider shall include details of the program, including necessary training and tests of competency, in its Manual of Operations.

Periods of Validity of Ratings and Endorsement

(8) Unless sooner cancelled, a rating on an ATSEP licence is valid for 36 months or until the licence is cancelled.

(9) Unless sooner cancelled, an endorsement on an ATSEP licence remains valid:

(a) for the period (no longer than 6months) specified for an endorsement in the operations manual of the Aeronautical Telecommunication Services provider that granted it; or

(b) if the licence is cancelled before that time; or

(c) if the rating with which the endorsement is connected is cancelled before that time; or

(d) until the licence holder ceases to be employed by that Aeronautical Telecommunication Services provider.

(10) For paragraph3(c), an endorsement is connected with a rating if the endorsement authorizes the performance of the maintenance function of a facility for the holder of the rating.

(11) A rating or endorsement is not in force:

(a) during any period of suspension; or

(b) during any period of suspension of the relevant licence.

Proficiency

(12) As part of the quality system, the holder of an Aeronautical Telecommunication Services provider Approval shall assess the Aeronautical Telecommunication Services personnel in his or her employment.

(13) A formal proficiency assessment shall be carried out before a validation certificate or a rating validation can be issued to assess whether the applicant has achieved the required level of competence.

(14) At each facility the Aeronautical Telecommunication Services provider is to nominate a person to establish and maintain unit proficiency standards; specific senior officers are to be appointed and tasked by the person responsible for the services as proficiency assessment officers for each discipline; at units where operational staff are multi-disciplined, the person responsible for the services shall appoint and task at least one proficiency assessment officer. Proficiency assessment officers may be appointed and tasked for each discipline although it is a multi-disciplined environment.

(15) At each major facility, the manager is to appoint and task an Aeronautical Telecommunication Services officer responsible for satellite units as the proficiency assessment officer.

(16) A person assessed as unsatisfactory may not be permitted to continue in the assessed discipline without supervision. If after a reasonable period a person is unable to pass the proficiency check, all details pertaining to the unsatisfactory assessment shall be assembled and sent to the Authority.

(17) Proficiency assessment officers shall prepare proficiency check rosters so that all operational staff are screened on a regular basis. Personnel shall be given advanced notice of a real time annual proficiency checks that adequate preparation, mentally and functionally, can be made.

(18) In addition, a formal assessment shall be carried out at least every 12 months to determine whether all operational personnel are maintaining the required level of competence in the positions for which a valid rating is held. Routine assessments should be conducted on a non-going basis during duty assignment.

(19) Personnel shall be assessed in key elements of the performance areas detailed on an assessment form.

(20) An assessment shall be made of both the quality of work and the level of knowledge of the elements assessed.

(21) The Manual of Operations shall also include the procedures for:

(a) Aeronautical Telecommunication Services personnel to undertake remedial training; and

(b) updating Aeronautical Telecommunication Services personnel skills when introducing new equipment into services and updating communications.

(22) Proficiency and training records shall be maintained for all Aeronautical Telecommunication Services personnel. Aeronautical Telecommunication Services provider's obligation to provide currency and recency training and assessment.

(23) An Aeronautical Telecommunication Services provider shall setup and maintain, in accordance with these regulations, programmes for:

(a) continuing assessment of its employees' competency for the purposes of ensuring that they continue to satisfy the currency requirements in relation to ratings and endorsements; and

(b) familiarization, retraining and assessment of any of its employees who at any time do not satisfy the currency or recency requirement in relation to an endorsement.

(24) The provider shall include details of the program, including necessary training and tests of competency, in its operations manual.

Ancillary Qualifications

(25) An ATSEP qualification certifies that the holder is competent to perform a particular ancillary function.

(26) The functions include the following:

(a) class room instructor;

(b) on-the-job instructor;

(c) work place assessor.

(27) Within the limits set out in the Regulations, an Aeronautical Telecommunication

Services provider may define, for the provider's organisation, the responsibilities of the holder of an ATSEP qualification.

(28) Paragraph (26) does not prevent Aeronautical Telecommunication Services provider from defining an ancillary function for use within its own organisation.

(29) Aeronautical Telecommunication Services provider shall setup and maintain a program to grant ATSEP qualifications to, and administer ATSEP qualifications held by, its employees.

(30) The provider shall include details of the program, including necessary training and tests of competency, in its operations manual.

(31) The program shall be in accordance with the standards and requirements set out in the Regulations.

Conduct of Practical Training

(32) An Aeronautical Telecommunication Services provider shall ensure that practical training carried out by him or her or on his or her behalf, for the award of an ATSEP licence, rating, endorsement or ATSEP qualification, is carried out in accordance with:

(a) the standards and requirements set out in these Regulations; and

(b) the provider's Manual of Operations.

IS 14.7.1.10 (b)(3) Safety Management System.

(1) An Aeronautical Telecommunication Services provider shall have, and put into effect, a safety management system that includes the policies, procedures, and practices necessary to provide the Air Navigation Aids Services covered by its Approval safely.

(2) The providers hall keeps under review its safety management system and take such corrective action as is necessary to ensure that it operates properly. Safety reviews shall be conducted on a regular basis by qualified personnel.

(3) A safety assessment shall be undertaken for any safety related change.

(4) For assessment, the applicant shall include information on the procedures for the:

(a) recording and investigation of incidents;

(b) recording and investigation of accidents;

(c) monitoring of equipment outages;

(d) assessment of elements critical to the services provision; and

(e) monitoring of Mean Time Between Failures (MTBF).

IS 14.7.1.10.(b)(4) Contingency Plan of Aeronautical Telecommunication Service Provider.

(1) An Aeronautical Telecommunication Services provider shall develop and maintain Contingency Plans for implementation in the event of disruption, or potential disruption, of Aeronautical Telecommunication Services and related supporting services for the facilities it maintains. The disruption maybe caused intentionally (sabotage)or unintentionally (equipment failure).

(2) The plan shall include:

(a) the actions to be taken by the members of the provider's personnel responsible for providing the services; and

(b) possible alternative arrangements for providing the services; and

(c) the arrangements for resuming normal operations for the services.

(3) These plans shall be submitted as part of the Manual of Operations.

IS 14.7.1.10(b)(5) Security Plan of an Aeronautical Telecommunication Services Provider.

The applicant shall provide a plan that details what measures, both physical and procedural that they intend to protect facilities used for air navigation. This should include a security assessment of the facilities maintained by the applicant.

IS 14.7.1.10(b)(6) Minimum Air navigation facility equipment list for Aeronautical Telecommunication Services Provider Approval holder.

Minimum equipment list for different types /category of airport shall include:

INTERNATIONAL AIRPORTS:

1. Navigation equipment:

(i) VOR/DME co – located (dual installation)

(ii) Non-Directional Beacon (NDB) /Locator Beacon (dual installation).

(iii) One (1) number ILS/DME (dual installation), (PAPI) (serving both ends of a runway for category II condition).

Note: The provision of two (2) ILS/DME equipment serving one runway for opposite orientation is optional. Remote Navaids monitor

2. Surveillance equipment:

Terminal Approach radar and allied accessories (PSR/SSR) -(dual installation)-optional GNSS capability based on WGS – 84 surveys.

3. Power requirement:

(i) All equipment shall be connected to: -

(ii) Primary and secondary power supplies

(iii) UPS/Batteries.

(iv) Solar (optional)

DOMESTIC AIRPORT:

Minimum Navigational Aids requirement;

1. Navigation and Landing equipment

(i) VOR/ DME (co-located)

(ii) Non-Directional Beacon (NDB) or Locator Beacon.

(iii) ILS and ILS/DME category

(iv) Navaids monitor

2. Auxiliary Facilities

(i) Effective cooling system

3. Power requirement

(i) All equipment shall be connected to: -

(ii) Primary and secondary power supplies

(iii) UPS/Batteries (tertiary).

AIRSTRIP (critical for Dornier 228)
Minimum Navigational Aids requirement;

1. Navigation equipment
Non-Directional Beacon or Locator Beacon (dual installation).

2. Auxiliary Facilities

(i) VHF (hand-held) Air band Radios (monitoring)

(ii) Effective cooling systems

3. Power requirement

All equipment must be connected to: -

(i) Primary and secondary power supply

(ii) UPS/Batteries

CONTINGENCY PLAN FOR NAVIGATION AIDS AND SURVELLANCE FACILITIES-POWER AND REDUNDANCY

Contingency plan shall be drawn for Air Navigation facilities to establish continuity of service in both domestic and International Airports.

IS 14.7.1.10(b)(7) Facilities, Equipment and Maintenance Tools.

(1) An Aeronautical Telecommunication Services provider shall, make available for use by its personnel, the repair and equipment testing materials necessary for providing Aeronautical Telecommunication Services covered by its Approval.

(2) The Aeronautical Telecommunication Services provider shall include in their Manual of Operations a list of facilities, and the repair and equipment testing materials required to maintain the equipment within tolerance levels, that will be maintained by the Aeronautical Telecommunication Services provider.

(3) The equipment shall meet with the requirements specified in Nig.CARs Part 14.7, subpart 1.

(4) All persons involved with the provision of maintenance shall be fully conversant with current ICAO standards and recommended practices, documents, instructions, directives and relevant information.

IS 14.7.1.10(k) Standard Operating Procedure Manual (SOP)

(1) The holder of an Aeronautical Telecommunication Services Provider Approval shall provide each Air Navigation Services unit listed in its Manual of Operations, a local Air Navigation instructions manual which sets out the procedures for the operation of the Air Navigation Services unit concerned.

(2) The local Air Navigation Instructions Manual shall not be seen in isolation but rather as the document necessary to provide the interface between peculiarities of a particular unit and the various source documents, and does not relieve Aeronautical Telecommunication Services personnel from the responsibility of being familiar with and the application of procedures laid down in the following documents:

(a) Aeronautical Information Publication, AIP supplements, AIC and NOTAM;

(b) Nigeria Civil AviationAct,2022;

(c) Nigeria Civil Aviation Regulations 2023; and

(d) Relevant documents, manuals and annexes published by ICAO.
Contents of Standard Operation Procedure Manual

(3) Standard Operation Procedure Manual shall contain the following:

(a) detailed unit operational procedures and requirements;

(b) detailed unit administrative requirements, including the responsibilities of each operating position;

(c) amplification and/or explanation of provisions of the national requirements, where necessary;

(d) coordination procedures between internal and external agencies (and when this is to occur- (change in status of navigation aids);

(e) contingency arrangements in the event of an, air navigation facility failure;

(f) letters of Agreement with other agencies adjacent to the unit for the transfer of responsibility of control.

External Data Sources

(4) An Aeronautical Telecommunication Services provider shall consider the availability and reliability of external data sources required to provide services. The Aeronautical Telecommunication Services provider shall include the provider, the data source and means of receipt, display and integrity of the following information:

(a) AIS;

(b) AFTN;

(c) Flight testing;

(d) Meteorological information;

(e) Meteorological warnings;

(f) Voice coordination with ATS providers;

(g) Information on Aerodrome conditions and the operational status of facilities and navigation aid; and

(h) Aerodrome works and administration coordination.

Output Data

(5) The Aeronautical Telecommunication Services provider should provide a description of the arrangements made or proposed to be made by the applicant to ensure that it can, and will continue to be able to provide the information in relation to its Aeronautical Telecommunication Services to other organizations whose functions reasonably require that information (e.g. ATS units and centers, Aerodrome Operators).

(6) Data recipients may include:

(a) AIS;

(b) ATS providers;

(c) Aerodrome administration;

(d) ARFFS;

(e) Aeronautical Meteorology services provider;

(f) Military; and

(g) Other Government Agencies.

Amendments

(7) Amendments to the SOP should be recorded in the document itself and brought to the attention of all concerned.

(8) Air Navigation officers are required to indicate, in the appropriate manner, that an amendment has been noted.

(9) Any amendments by hand shall be accompanied by the authorized person's signature and date.

(10) Authorized person means any Air Navigation officer authorized by his or her manager

to make the relevant amendment by hand. Notice of these amendments shall be transmitted to the head office responsible for the relevant services for ratification.

(a) Military;

(b) The Radio Navigation Aids Provider; and

(c) Other Government Agencies.

The Authority to carry out an Aeronautical Telecommunication Services function.

(1) A person may carryout Aeronautical Telecommunication Services function in Nigeria if, at the time the person carried out the function:

(a) the Personnel holds an Air Traffic Safety Electronics Personnel (ATSEP) licence with a rating for the function and an endorsement for the equipment where, or, he or she carries it out; and

(b) the licence, rating and endorsement are in force; and

(c) he or she:

(i) Satisfies the recency and currency requirements in relation to the endorsement; and

(ii) satisfies the currency requirement in relation to the rating.

(2) A person may carry out an Aeronautical Telecommunication Services functions in Nigeria under the supervision of a person who meets the requirements.

(3) A person who may carry out an Aeronautical Telecommunication Services function in Nigeria under supervision is a person who the Authority has authorized in writing to carry out the relevant services function and is;

(a) a person who; holds an ATSEP licence with a rating for the function and an endorsement for the maintenance of equipment he or she carries out; but at the relevant time, in relation to the rating or endorsement, does not satisfy the recency or currency requirement;

(b) a person who:

(i) holds an ATSEP licence; and

(ii) carries out the function in the course of training for a rating or endorsement (whether or not the person holds a rating or endorsement at the time);

(c) a person (other than a person who held an ATSEP that has been cancelled) who:

(i) has completed an approved course of training in the theory of Aeronautical Telecommunication Services; and

(ii) carries out the function in the course of undergoing practical training for an ATSEP licence.

(4) Rules applicable when a person performs an Aeronautical Telecommunication Services function under supervision

(a) If a person (the trainee) is carrying out Aeronautical Telecommunication Services function under supervision of a person who meets the requirement; the trainee shall comply with the supervisor's directions.

(b) Failure by the supervisor to supervise the trainee adequately is an offence, and shall be taken into account in considering whether the supervisor's ATSEP licence should be suspended or cancelled.

(5) Application of Human Factors Principles

The applicant shall demonstrate that human factors principles are considered when assessing the appropriateness of equipment, systems, software, facilities, procedures, jobs, environments, training, staffing, and personnel management to produce safe, comfortable and effective human performance.

Note. Human factors shall be observed in the design and certification of radio navigation aids. These principles seek safe interface between human and other system components.

IS 14.7.1.23 Flight Inspection and Calibration.

(1) Flight tests are required to inspect signals-in-space as received at the aircraft after being influenced by external factors such as site conditions, ground conductivity, terrain irregularities, metallic structures, propagation effects, etc.

(2) The Aeronautical Telecommunication Services provider shall ensure that flight testing is used for:

(a) site proving;

(b) commissioning;

(c) periodic inspections (these should occur at least once a year); and

(d) special inspections, for example after an aircraft accident.

(6) Facility Operation and Maintenance Plan

The Aeronautical Telecommunication Services provider shall provide:

(a) A description of the maintenance scheduling system;

(b) The interval between scheduled maintenance and routine performance inspections and the basis of the establishment of that time interval;

(c) The operation and maintenance instructions for each facility;

(d) Details of planned facility flight inspections. This shall include details of the standards and procedures to be used for flight inspections, the scheduled time between flight inspections, and the identity of the flight inspection organisation that will be contracted to carry out the flight inspections;

Note. If repair work is to be undertaken by a third-party organisation, then the identity of the repair organisation should be included.

IS.14.7.1.25. Authorized Personnel to Approve Return to Service.

(a) The management (Chief Executive Officer) of ANS provider shall approve the return to service of an Air Navigation facility.

(b) An ATSEP personnel licensed by the Authority may approve return to services, of an Air Navigation facility after performing maintenance as delegated by the Chief Executive Officer.

(7) Existing Facilities

The Aeronautical Telecommunication Services provider shall, for each location for which a service is provided, indicate from the list below a list of facilities and equipment. An indication shall be provided on the quality of the facilities and equipment.

All equipment used in the provision of Aeronautical Telecommunication Services, including navigation and approach services shall perform and be maintained in accordance with the standards as contained in Nigeria Civil Aviation Regulations, subpart 14.7.

Procurement of Air Navigation Equipment

(1) Aeronautical Telecommunication Services providers shall:

(a) avoid the proliferation of equipment and systems;

(b) ease systems maintenance and spares sourcing;

(c) conduct quality assessment of equipment and systems prior to purchase; and

(d) maintain uniform operational characteristics and standardization.

(2) The Aeronautical Telecommunication Services provider shall inform the Authority by writing prior to the purchase of Air Navigation facilities.

(3) The Authority shall observe the installation and radiation tests of the facilities and commissioning tests before they are finally put into operation.

RADIO NAVIGATION AIDS SERVICES
IS 14.7.1.81(b)(1) Personnel Requirements and Responsibilities of Air Navigation Service Provider.

(1) An applicant for the provision of Air Navigation Services shall provide in its Manual of Operations:

(a) current unit organizational chart and written delegated responsibilities and position descriptions;

(b) staffing-levels for operational positions;

(c) designated instructors and ratings and proficiency assessment officers;

(d) staffing numbers and qualifications at unit level.

(2) An Air Navigation Services provider shall maintain an appropriate organisation with a sound and effective management structure to enable it provide, in accordance with the standards set out in the Regulations.

(3) An Air Navigation Services provider shall have, enough suitably qualified and trained personnel to enable it provide, in accordance with the standards set out in the Regulations, the aeronautical telecommunications services covered by its Approval.

(4) The Air Navigation Services provider shall ensure that its personnel are of sufficient numbers and experience and have been given appropriate authority to be able to discharge their allocated responsibilities.

(5) An Air Navigation Services provider shall arrange the workflow schedule of Air Navigation Services officers to provide duty rest periods. A copy of the Air Navigation Services providers fatigue management procedure is to be included in the Manual of Operations.

(6) An Aeronautical Telecommunications Services officer shall not exercise the privileges of his licence if he knows or suspects that he is suffering from or having regards to the circumstances of the period of duty to be undertaken is likely to suffer from such fatigue as may endanger the safety of any aircraft to which a Navigation control services is provided.

(7) A person shall not when exercising the privileges of an ATSEP licence be under the influence of alcohol or a drug to the extent as to impair his capacity to exercise such privileges.

(8) At the unit level the Air Navigation Services provider shall engage, employ or contract:

(a) a senior person to whom authority has been granted to ensure that all activities under taken by the unit are carried out in accordance with the applicable requirements prescribed in this section, and who shall in addition be vested with the following powers and duties in respect of the compliance with such requirements.

(i) Unrestricted access to work performed or activities under taken by all other persons as employees of, and other persons rendering services within the unit;

(ii) full rights of consultation with such person(s) in respect of such compliance by him or her;

(iii) powers to order cessation of activity where such compliance is not affected.

(iv) a duty to establish liaison mechanisms with the Authority with a view to ascertain correct manners of compliance with the said requirements, and interpretations of such requirements by the Authority, and to facilitate liaison between the Authority and the unit concerned; and

(v) powers to report directly to the management of his or her organization, on his or her investigations and consultations generally, and in cases contemplated in subparagraph(iii), and with regard to the results of the liaison contemplated in sub-paragraph(iv);

(b) a person who is responsible for quality control, and who shall have directaccesstothepersonreferredtoinparagraph(a)onmattersaffecting aviation safety; and

(c) enough licensed personnel to plan, provide and supervise the services listed in its Approval as a services provider, in a safe and efficient manner.

IS 14.7.1.81 (b)(2) Training and Checking of Air Navigation Personnel

(1) Air Navigation Services provider shall establish a procedure for initially assessing, and a procedure for maintaining, the competence of the personnel required to operate and maintain the equipment concerned.

Granting of Ratings and Endorsements

(2) An endorsement certifies that an ATSEP licence holder is competent to maintain a particular Air Navigation facility at a particular aerodrome, or in relation to particular airspace.

(3) The Authority may designate the Air Navigation Services provider authority to grant an endorsement to a person who:

(a) Is a senior technician with in the Air Navigation Services (Radio Navigation Aids) organization;

(b) Has held a rating for five year for the position in which an endorsement is being sought;

(c) Has been approved by the Authority to act in this capacity.

(4) A person approved by the Authority may grant an endorsement to a person who:

(a) is eligible to be granted an ATSEP licence with a rating; and

(b) successfully completes the training required by the Authority for the grant of the endorsement.

(5) An Air Navigation Services provider shall set up and maintain a program to ensure that its employees who hold ATSEP licences maintain endorsements appropriate to their duties.

(6) That program shall be in accordance with any standards and requirements set out in the Regulations.

(7) The provider shall include details of the program, including necessary training and tests of competency, in its Manual of Operations.

Periods of Validity of Ratings and Endorsement

(8) Unless sooner cancelled, a rating on an ATSEP licence is valid for 36 months or until the licence is cancelled.

(9) Unless sooner cancelled, an endorsement on an ATSEP licence remains valid:

(a) for the period (no longer than 6months) specified for an endorsement in the operations manual of the Air Navigation Services provider that granted it; or

(b) if the licence is cancelled before that time; or

(c) if the rating with which the endorsement is connected is cancelled before that time; or

(d) until the licence holder ceases to be employed by that Air Navigation Services provider.

(10) For paragraph3(c), an endorsement is connected with a rating if the endorsement authorizes the performance of the maintenance function of a facility for the holder of the rating.

(11) A rating or endorsement is not in force:

(a) during any period of suspension; or

(b) during any period of suspension of the relevant licence.

Proficiency

(12) As part of the quality system, the holder of an Air Navigation Services provider Approval shall assess the Air Navigation Services personnel in his or her employment.

(13) A formal proficiency assessment shall be carried out before a validation certificate or a rating validation can be issued to assess whether the applicant has achieved the required level of competence.

(14) At each facility the Air Navigation Services provider is to nominate a person to establish and maintain unit proficiency standards; specific senior officers are to be appointed and tasked by the person responsible for the services as proficiency assessment officers for each discipline; at units where operational staff are multi-disciplined, the person responsible for the services shall appoint and task at least one proficiency assessment officer. Proficiency assessment officers may be appointed and tasked for each discipline although it is a multi-disciplined environment.

(15) At each major facility, the manager is to appoint and task an Air Navigation Services officer responsible for satellite units as the proficiency assessment officer.

(16) A person assessed as unsatisfactory may not be permitted to continue in the assessed discipline without supervision. If after a reasonable period a person is unable to pass the proficiency check, all details pertaining to the unsatisfactory assessment shall be assembled and sent to the Authority.

(17) Proficiency assessment officers shall prepare proficiency check rosters so that all operational staff are screened on a regular basis. Personnel shall be given advanced notice of a real time annual proficiency checks that adequate preparation, mentally and functionally, can be made.

(18) In addition, a formal assessment shall be carried out at least every 12 months to determine whether all operational personnel are maintaining the required level of competence in the positions for which a valid rating is held. Routine assessments should be conducted on a non-going basis during duty assignment.

(19) Personnel shall be assessed in key elements of the performance areas detailed on an assessment form.

(20) An assessment shall be made of both the quality of work and the level of knowledge of the elements assessed.

(21) The Manual of Operations shall also include the procedures for:

(a) Air Navigation Services personnel to undertake remedial training; and

(b) updating Air Navigation Services personnel skills when introducing new equipment into services and updating communications.

(22) Proficiency and training records shall be maintained for all Air Navigation Services personnel. Air Navigation Services provider's obligation to provide currency and recency training and assessment.

(23) An Air Navigation Services provider shall setup and maintain, in accordance with the Manual of Standards, programs for:

(a) continuing assessment of its employees' competency for the purposes of ensuring that they continue to satisfy the currency requirements in relation to ratings and endorsements; and

(b) familiarization, retraining and assessment of any of its employees who at any time do not satisfy the currency or recency requirement in relation to an endorsement.

(24) The provider shall include details of the program, including necessary training and tests of competency, in its operations manual.

Ancillary Qualifications

(25) An ATSEP qualification certifies that the holder is competent to perform a particular ancillary function.

(26) The functions include the following:

(a) class room instructor;

(b) on-the-job instructor;

(c) work place assessor.

(27) Within the limits set out in the Regulations, an Air Navigation Services provider may define, for the provider's organisation, the responsibilities of the holder of an ATSEP qualification.

(28) Paragraph (26) does not prevent Air Navigation Services provider from defining an ancillary function for use within its own organisation.

(29) Air Navigation Services provider shall setup and maintain a program to grant ATSEP

qualifications to, and administer ATSEP qualifications held by, its employees.

(30) The provider shall include details of the program, including necessary training and tests of competency, in its operations manual.

(31) The program shall be in accordance with the standards and requirements set out in the Regulations.

Conduct of Practical Training

(32) An Air Navigation Services provider shall ensure that practical training carried out by him or her or on his or her behalf, for the award of an ATSEP licence, rating, endorsement or ATSEP qualification, is carried out in accordance with:

(a) the standards and requirements set out in these Regulations; and

(b) the provider's Manual of Operations.

IS 14.7.1.81 (b)(3) Safety Management System.

(1) An Air Navigation Services provider shall have, and put into effect, a safety management system that includes the policies, procedures, and practices necessary to provide the Air Navigation Aids Services covered by its Approval safely.

(2) The provider shall keep under review its safety management system and take such corrective action as is necessary to ensure that it operates properly. Safety reviews shall be conducted on a regular basis by qualified personnel.

(3) A safety assessment shall be undertaken for any safety related change.

(4) For assessment, the applicant shall include information on the procedures for the:

(a) recording and investigation of incidents;

(b) recording and investigation of accidents;

(c) monitoring of equipment outages;

(d) assessment of elements critical to the services provision; and

(e) monitoring of Mean Time Between Failures (MTBF).

IS 14.7.1.81(b)(4) Contingency Plan of Air Navigation Service Provider.

(1) An Air Navigation Services provider shall develop and maintain Contingency Plans for implementation in the event of disruption, or potential disruption, of Air Navigation Services and related supporting services for the facilities it maintains. The disruption maybe caused intentionally (sabotage)or unintentionally (equipment failure).

(2) The plan shall include:

(a) the actions to be taken by the members of the provider's personnel responsible for providing the services; and

(b) possible alternative arrangements for providing the services; and

(c) the arrangements for resuming normal operations for the services.

(3) These plans shall be submitted as part of the Manual of Operations.

IS 14.7.1.81(b)(5) Security Plan of an Air Navigation Services Provider.

The applicant shall provide a plan that details what measures, both physical and procedural that they intend to protect facilities used for air navigation. This should include a security assessment of the facilities maintained by the applicant.

IS 14.7.1.81(b)(6) Minimum Air navigation facility equipment list for Air Navigation services

Provider Approval holder.

Minimum equipment list for different types /category of airport shall include:

INTERNATIONAL AIRPORTS:

1. Navigation equipment:

(i) VOR/DME co – located (dual installation)

(ii) Non-Directional Beacon (NDB) /Locator Beacon (dual installation).

(iii) One (1) number ILS/DME (dual installation), (PAPI) (serving both ends of a runway for category II condition).

Note: The provision of two (2) ILS/DME equipment serving one runway for opposite orientation is optional. Remote Navaids monitor

2. Surveillance equipment:

Terminal Approach radar and allied accessories (PSR/SSR) -(dual installation)- optional GNSS capability based on WGS – 84 surveys.

3. Power requirement:

(i) All equipment shall be connected to: -

(ii) Primary and secondary power supplies

(iii) UPS/Batteries.

(iv) Solar (optional)

DOMESTIC AIRPORT:

Minimum Navigational Aids requirement;

1. Navigation and Landing equipment

(i) VOR/ DME (co-located)

(ii) Non-Directional Beacon (NDB) or Locator Beacon.

(iii) ILS and ILS/DME category

(iv) Navaids monitor

2. Auxiliary Facilities

(i) Effective cooling system

3. Power requirement

(i) All equipment shall be connected to: -

(ii) Primary and secondary power supplies

(iii) UPS/Batteries (tertiary).

AIRSTRIP (critical for Dornier 228)
Minimum Navigational Aids requirement;

1. Navigation equipment

Non-Directional Beacon or Locator Beacon (dual installation).

2. Auxiliary Facilities

(i) VHF (hand-held) Air band Radios (monitoring)

(ii) Effective cooling systems

3. Power requirement

All equipment must be connected to: -

(i) Primary and secondary power supply

(ii) UPS/Batteries

CONTINGENCY PLAN FOR NAVIGATION AIDS AND SURVELLANCE FACILITIES-POWER AND REDUNDANCY

Contingency plan shall be drawn for Air Navigation facilities to establish continuity of service in both domestic and International Airports.

IS 14.7.1.81(b)(7) Facilities, Equipment and Maintenance Tools.

(1) An Air Navigation Services provider shall, make available for use by its personnel, the repair and equipment testing materials necessary for providing Air Navigation Services covered by its Approval.

(2) The Air Navigation Services provider shall include in their Manual of Operations a list of facilities, and the repair and equipment testing materials required to maintain the equipment within tolerance levels, that will be maintained by the Air Navigation Services provider.

(3) The equipment shall meet with the requirements specified in Nig.CARs Part 14.7, subpart 1.

(4) All persons involved with the provision of maintenance shall be fully conversant with current ICAO standards and recommended practices, documents, instructions, directives and relevant information.

IS 14.7.1.81(k) Standard Operating Procedure Manual (SOP)

(1) The holder of an Air Navigation Services Provider Approval shall provide each Air Navigation Services unit listed in its Manual of Operations, a local Air Navigation instructions manual which sets out the procedures for the operation of the Air Navigation Services unit concerned.

(2) The local Air Navigation Instructions Manual shall not be seen in isolation but rather as the document necessary to provide the interface between peculiarities of a particular unit and the various source documents, and does not relieve Air Navigation Services personnel from the responsibility of being familiar with and the application of procedures laid down in the following documents:

(a) Aeronautical Information Publication, AIP supplements, AIC and NOTAM;

(b) Nigeria Civil AviationAct,2022;

(c) Nigeria Civil Aviation Regulations 2023;

(d) Manual of Standards approved, authorized, published and amended by the Authority; and

(e) Relevant documents, manuals and annexes published by ICAO.
Contents of Standard Operation Procedure Manual

(3) Standard Operation Procedure Manual shall contain the following:

(a) detailed unit operational procedures and requirements;

(b) detailed unit administrative requirements, including the responsibilities of each operating position;

(c) amplification and/or explanation of provisions of the national requirements, where necessary;

(d) coordination procedures between internal and external agencies (and when this is to occur- (change in status of navigation aids);

(e) contingency arrangements in the event of an, air navigation facility failure;

(f) letters of Agreement with other agencies adjacent to the unit for the transfer of responsibility of control.

External Data Sources

(4) An Air Navigation Services provider shall consider the availability and reliability of external data sources required to provide services. The Air Navigation Services provider shall include the provider, the data source and means of receipt, display and integrity of the following information:
(a) AIS;

(b) AFTN;

(c) Flight testing;

(d) Meteorological information;

(e) Meteorological warnings;

(f) Voice coordination with ATS providers;

(g) Information on Aerodrome conditions and the operational status of facilities and navigation aid; and

(h) Aerodrome works and administration coordination.

Output Data

(5) The Air Navigation Services provider should provide a description of the arrangements made or proposed to be made by the applicant to ensure that it can, and will continue to be able to provide the information in relation to its Air Navigation Services to other organizations whose functions reasonably require that information (e.g. ATS units and centers, Aerodrome Operators).

(6) Data recipients may include:

(a) AIS;

(b) ATS providers;

(c) Aerodrome administration;

(d) ARFFS;

(e) Aeronautical Meteorology services provider;

(f) Military; and

(g) Other Government Agencies.

Amendments

(7) Amendments to the SOP should be recorded in the document itself and brought to the attention of all concerned.

(8) Air Navigation officers are required to indicate, in the appropriate manner, that an amendment has been noted.

(9) Any amendments by hand shall be accompanied by the authorized person's signature and date.

(10) Authorized person means any Air Navigation officer authorized by his or her manager to make the relevant amendment by hand. Notice of these amendments shall be transmitted to the head office responsible for the relevant services for ratification.

(a) Military;

(b) The Radio Navigation Aids Provider; and

(c) Other Government Agencies.

The Authority to carry out an Air Navigation services function.

(1) A person may carryout Air Navigation Services function in Nigeria if, at the time the person carried out the function:

(a) the Personnel holds an Air Traffic Safety Electronics Personnel (ATSEP) licence with a rating for the function and an endorsement for the equipment where, or, he or she carries it out; and

(b) the licence, rating and endorsement are in force; and

(c) he or she:

(i) Satisfies the recency and currency requirements in relation to the endorsement; and

(ii) Satisfies the currency requirement in relation to the rating.

(2) A person may carry out an Air Navigation Services functions in Nigeria under the supervision of a person who meets the requirements.

(3) A person who may carry out an Air Navigation Services function in Nigeria under supervision is a person who the Authority has authorized in writing to carry out the relevant services function and is;

(a) a person who; holds an ATSEP licence with a rating for the function and an endorsement for the maintenance of equipment he or she carries out; but at the relevant time, in relation to the rating or endorsement, does not satisfy the recency or currency requirement;

(b) a person who:

(i) holds an ATSEP licence; and

(ii) carries out the function in the course of training for a rating or endorsement (whether or not the person holds a rating or endorsement at the time);

(c) a person (other than a person who held an ATSEP that has been cancelled) who:

(i) has completed an approved course of training in the theory of Air Navigation Services; and

(ii) carries out the function in the course of undergoing practical training for an ATSEP licence.

(4) Rules applicable when a person performs an Air Navigation Services function under supervision

(a) If a person (the trainee) is carrying out Air Navigation Services function under supervision of a person who meets the requirement; the trainee shall comply with the supervisor's directions.

(b) Failure by the supervisor to supervise the trainee adequately is an offence, and shall be taken into account in considering whether the supervisor's ATSEP licence should be suspended or cancelled.

(5) Application of Human Factors Principles

The applicant shall demonstrate that human factors principles are considered when assessing the appropriateness of equipment, systems, software, facilities, procedures, jobs, environments, training, staffing, and personnel management to produce safe, comfortable and effective human performance.

Note. Human factors shall be observed in the design and certification of radio navigation aids. These principles seek safe interface between human and other system components.

IS.14.7.1.93. Authorized Personnel to Approve Return to Service.

(a) The management (Chief Executive Officer) of ANS provider shall approve the return to service of an Air Navigation facility.

(b) An ATSEP personnel licensed by the Authority may approve return to services, of an Air Navigation facility after performing maintenance as delegated by the Chief Executive Officer

(1) Existing Facilities

The Air Navigation Services provider shall, for each location for which a service is provided, indicate from the list below a list of facilities and equipment. An indication shall be provided on the quality of the facilities and equipment.

All equipment used in the provision of Air Navigation Services, including navigation and approach services shall perform and be maintained in accordance with the standards as contained in Nigeria Civil Aviation Regulations, subpart 14.7.
Procurement of Air Navigation Equipment

(1) Air Navigation Services providers shall:

(a) avoid the proliferation of equipment and systems;

(b) ease systems maintenance and spares sourcing;

(c) conduct quality assessment of equipment and systems prior to purchase; and

(d) maintain uniform operational characteristics and standardization.

(2) The Air Navigation Services provider shall inform the Authority by writing prior to the purchase of Air Navigation facilities.

(3) The Authority shall observe the installation and radiation tests of the facilities and commissioning tests before they are finally put into operation.

IS 14.7.1.94 Flight Inspection and Calibration.

(1) Flight tests are required to inspect signals-in-space as received at the aircraft after being influenced by external factors such as site conditions, ground conductivity, terrain irregularities, metallic structures, propagation effects, etc.

(2) The Air Navigation Services provider shall ensure that flight testing is used for:

(a) site proving;

(b) commissioning;

(c) periodic inspections (these should occur at least once a year); and

(d) special inspections, for example after an aircraft accident.

(3) Facility Operation and Maintenance Plan

The Air Navigation Services provider shall provide:

(a) A description of the maintenance scheduling system;

(b) The interval between scheduled maintenance and routine performance inspections and the basis of the establishment of that time interval;

(c) The operation and maintenance instructions for each facility;

(d) Details of planned facility flight inspections. This shall include details of the standards and procedures to be used for flight inspections, the scheduled time between flight inspections, and the identity of the flight inspection organisation that will be contracted to carry out the flight inspections;

Note. If repair work is to be undertaken by a third-party organisation, then the identity of the repair organisation should be included.

IMPLEMENTINGSTANDARDS(IS) COMMUNICATION SYSTEMS

IS 14.7.3.2. Requirements for implementation of Aeronautical Telecommunication Network

IS 14.7.3.2(f)(4)The ATN shall operate in accordance with the communication priorities defined in Table 1

Table 1. Mapping of ATN communication priorities

Message categories	*ATN application*	*Corresponding protocol*	
		Transport layer priority	*Network layer priority*
Network/systems management		0	14
Distress communications		1	13
Urgent communications		2	12
High-priority flight safety messages	CPDLC, ADS-	3	11
Normal-priority flight safety messages	AIDC, ATIS	4	10
Meteorological communications	META	5	9
Flight regularity communications	DLIC,	6	8
Aeronautical information service		7	7
Network/systems administration	DI	8	6
Aeronautical administrative messages		9	5
<unassigned>		10	4
Urgent-priority administrative and U.N. Charter communications		11	3
High-priority administrative and State/Government communications		12	2
Normal-priority administrative communications		13	1
Low-priority administrative communications and aeronautical passenger communications		14	0

IS 14.7.3.29(a)(1) MODE S CHARACTERISTICS

(i) Message categories. The Mode S subnetwork shall only carry aeronautical communications classified under categories of flight safety and flight regularity as specified in this regulation

(ii) Signals in space. The signal-in-space characteristics of the Mode S subnetwork shall conform to the provisions contained in this Regulation.

(iii) Code and byte independency. The Mode S subnetwork shall be capable of code and byte independent transmission of digital data.

(iv) Data transfer. Data shall be conveyed over the Mode S data link in segments using either standard length message (SLM) protocols or extended length message (ELM) protocols as defined in this Regulation

(v) Bit numbering. In the description of the data exchange fields, the bits shall be numbered in the order of their transmission, beginning with bit 1. Bit numbers shall continue through the second and higher segments of multi-segment frames. Unless otherwise stated, numerical values encoded by groups (fields) of bits shall be encoded using positive binary notation and the first bit transmitted shall be the most significant bit (MSB).

(vi) Unassigned bits. When the length of the data is not sufficient to occupy all bit positions within a message field or subfield, the unassigned bit positions shall be set to 0.

2). Flight safety messages shall comprise the following:

(i) movement and control messages [see the PANS-ATM (Doc 4444)].

(ii) messages originated by an aircraft operating agency or by an aircraft, of immediate concern to an aircraft in flight.

(iii) meteorological advice of immediate concern to an aircraft in flight or about to depart (individually communicated or for broadcast)

(iv) other messages concerning aircraft in flight or about to depart.

1. Flight regularity messages shall comprise the following:

(i) messages regarding the operation or maintenance of facilities essential for the safety or regularity of aircraft operation.

(ii) messages concerning the servicing of aircraft.

(iii) instructions to aircraft operating agency representatives concerning changes in requirements for passengers and crew caused by unavoidable deviations from normal operating schedules. Individual requirements of passengers or crew shall not be admissible in this type of message.

(iv) messages concerning non-routine landings to be made by the aircraft.

(v) messages concerning aircraft parts and materials urgently required.

(vi) messages concerning changes in aircraft operating schedules.

IS 14.7.3.61. Air-Ground VHF communication system characteristics

The characteristics of the air-ground Very High Frequency communication system used in the International Aeronautical Mobile Service shall be in conformity with the following;

a. Radiotelephone emissions shall be double sideband (DSB) amplitude modulated (AM) carriers. The designation of emissions A3E, as specified in the ITU Radio Regulations.

b. Spurious emissions shall be kept at the lowest value, which the state of technique and the nature of the service permit.

c. The radio frequencies used shall be selected from the radio frequencies in the band 117.975 - 137MHz. The separation between assignable frequencies (channel spacing) and frequency tolerances applicable to elements of the system shall be as specified in Annex 10 vol. 5

d. The design polarization of emissions shall be vertical.

IS 14.7.3.62. Single side band High Frequency Communication System Characteristics

a. HF SSB installations shall be capable of operation at any SSB carrier (reference) frequency available to the Aeronautical Mobile (R) Service in the band 2.8 MHz to 22MHz and necessary to meet the approved assignment plan for the region(s) in which the system is intended to operate, and in compliance with the relevant provisions of the Radio Regulations.

b. The equipment shall be capable of operating on integral multiples of 1 kHz.

c. The sideband transmitted shall be that on the higher frequency side of its carrier (reference) frequency. Channel utilization shall be in conformity with the table of carrier (reference) frequencies at 27/16 and the Allotment Plan at 27/186 to 27/207 inclusive (or frequencies established on the basis of 27/21, as may be appropriate)

d. The system shall utilize the suppressed carrier class of emission J3E (also J7B and J9B as applicable). When SELCAL the installation shall utilize class H2B emission.

IS 14.7.3.63. Where a Select - Calling system is installed, the following system characteristics shall apply;

(a). Transmitted code. Each transmitted code shall be made up of two consecutive tone pulses, with each pulse containing two simultaneously transmitted tones. The pulses shall be of 1.0 plus or minus 0.25 seconds duration, separated by an interval of 0.2 plus or minus 0.1 second.

(b). Frequency stability. The frequency of transmitted tones shall be held to plus or minus 0.15 per cent tolerance to ensure proper operation of the airborne decoder.

(c). Distortion. The overall audio distortion present on the transmitted RF signal shall not exceed 15 per cent.

(d). Level stability. The RF signal transmitted by the ground radio station shall contain, within 3 dB, equal amounts of the two modulating tones