



CIVIL AVIATION DIRECTIVE – 11



AIR TRAFFIC SERVICES

ATS

CIVIL AVIATION AUTHORITY OF MALAYSIA

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Introduction

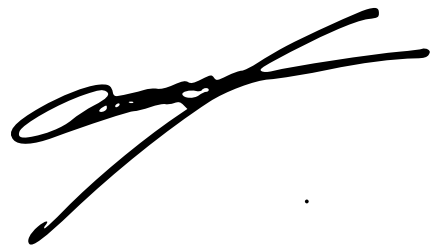
In exercise of the powers conferred by Section 24O of the Civil Aviation Act 1969 [Act 3], the Chief Executive Officer makes these Civil Aviation Directives 11 – Air Traffic Services (CAD 11 - ATS), pursuant to Regulation 76 and 156 of the Malaysian Civil Aviation Regulations (MCAR) 2016.

This CAD contains the standards, requirements and procedures pertaining to the provision of Air Traffic Services. The standards and requirements in this Directive are based mainly on standards and recommended practices (SARPs) stipulated in International Civil Aviation Organisation (ICAO) Annex 11 to the Chicago Convention – Air Traffic Services.

This Civil Aviation Directives 11 – Air Traffic Services (CAD 11 – ATS) is published by the Chief Executive Officer under Section 24O of the Civil Aviation Act 1969 [Act 3] and come into operation on 1 May 2021.

Non-compliance with this CAD

Any person who contravenes any provision in this CAD commits an offence and shall on conviction be liable to the punishments under Section 24O (2) of the Civil Aviation Act 1969 [Act 3] and/or under Malaysia Civil Aviation Regulation 2016.



(Captain Chester Voo Chee Soon)
Chief Executive Officer
Civil Aviation Authority of Malaysia

Civil Aviation Directive components and Editorial practices

This Civil Aviation Directive is made up of the following components and are defined as follows:

Standards: Usually preceded by words such as “shall” or “must”, are any specification for physical characteristics, configuration, performance, personnel or procedure, where uniform application is necessary for the safety or regularity of air navigation and to which Operators must conform. In the event of impossibility of compliance, notification to the CAAM is compulsory.

Recommended Practices: Usually preceded by the words such as “should” or “may”, are any specification for physical characteristics, configuration, performance, personnel or procedure, where the uniform application is desirable in the interest of safety, regularity or efficiency of air navigation, and to which Operators will endeavour to conform.

Appendices: Material grouped separately for convenience but forms part of the Standards and Recommended Practices stipulated by the CAAM.

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

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

Notes: Included in the text, where appropriate, Notes give factual information or references bearing on the Standards or Recommended Practices in question but not constituting part of the Standards or Recommended Practices;

Attachments: Material supplementary to the Standards and Recommended Practices or included as a guide to their application.

It is to be noted that some Standards in this Civil Aviation Directive incorporates, by reference, other specifications having the status of Recommended Practices. In such cases, the text of the Recommended Practice becomes part of the Standard.

The units of measurement used in this CAD are in accordance with the International System of Units (SI) as specified in CAD 5. Where CAD 5 permits the use of non-SI alternative units, these are shown in parentheses following the basic units. Where two sets of units are quoted it must not be assumed that the pairs of values are equal and interchangeable. It may, however, be inferred that an equivalent level of safety is achieved when either set of units is used exclusively.

Any reference to a portion of this CAD, which is identified by a number and/or title, includes all subdivisions of that portion.

Throughout this Civil Aviation Directive, the use of the male gender should be understood to include male and female persons.



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1 General

1.1 Citation

- 1.1.1 These Directives are the Civil Aviation Directive 11 – Air Traffic Services (CAD 11 – ATS), Issue 01/Revision 00, and comes into operation on 1 May 2021.
- 1.1.2 This CAD contains the standards, requirements and procedures pertaining to the provision of air traffic services. The standards and requirements in this CAD are based mainly on standards and recommended practices (SARPs) stipulated in International Civil Aviation Organisation (ICAO) Annex 11 to the Chicago Convention Air Traffic Services (ATS), including related guidelines stipulated in ICAO Doc 9426 – Air Traffic Services Planning Manual.
- 1.1.3 This CAD shall be read together with CAD 1101 Air Traffic Management (ATM).

1.2 Applicability

- 1.2.1 The standards specified in this CAD applies to all Air Traffic Service providers.

1.3 Revocation

- 1.3.1 This CAD read together with CAD 1101 Air Traffic Management revoke Air Traffic Inspectorate Directives – Air Traffic Services Edition 2, published on 15 April 2016.

1.4 Definitions

Note 1. — Throughout the text of this document the term “service” is used as an abstract noun to designate functions, or service rendered; the term “unit” is used to designate a collective body performing a service.

Note 2. — The designation (RR) in these definitions indicates a definition which has been extracted from the Radio Regulations of the International Telecommunication Union (ITU) [see Handbook on Radio Frequency Spectrum Requirements for Civil Aviation including statement of approved ICAO policies (ICAO Doc 9718)].

When the following terms are used in the Standards and Recommended Practices for Air Traffic Services (ATS), they have the following meanings:

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

Accident means an occurrence associated with the operation of an aircraft which, in the case of a manned aircraft, takes place between the time any person boards the aircraft with the intention of flight until such time as all such persons have disembarked, or in the case of an unmanned aircraft, takes place between the time the aircraft is ready to move with the purpose of flight until such time it comes to rest at the end of the flight and the primary propulsion system is shut down, in which:

- a) a person is fatally or seriously injured as a result of:
 - 1) being in the aircraft, or

- 2) direct contact with any part of the aircraft, including parts which have become detached from the aircraft, or
- 3) 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:
 - 1) adversely affects the structural strength, performance or flight characteristics of the aircraft, and
 - 2) would normally require major repair or replacement of the affected component,

except for engine failure or damage, when the damage is limited to a single engine, (including its cowlings or accessories), to propellers, wing tips, antennas, probes, vanes, tires, brakes, wheels, fairings, panels, landing gear doors, windscreens, the aircraft skin (such as small dents or puncture holes), or for 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, by ICAO, as a fatal injury.

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 CAD 13, 5.1.

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

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.

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.

Aerodrome control service means air traffic control service for aerodrome traffic.

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

Aerodrome traffic means all traffic on the manoeuvring 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, entering or leaving an aerodrome traffic circuit.*

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 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 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 telecommunication station means a station in the aeronautical telecommunication service.

Airborne collision avoidance system (ACAS) means an aircraft system based on secondary surveillance radar (SSR) transponder 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.

Air-ground communication means two-way communication between aircraft and stations or locations on the surface of the earth.

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-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 8 m (25 ft) AGL to reduce ground effect turbulence or provide clearance for cargo sling loads.*

Air traffic means all aircraft in flight or operating on the manoeuvring 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 authorisation 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 prefixed 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 a service provided for the purpose of:

- a) preventing collisions:
 - 1) between aircraft, and
 - 2) on the manoeuvring area between aircraft and obstructions; and
- b) expediting and maintaining an orderly flow of air traffic.

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

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 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 utilised to the maximum extent possible and that the traffic volume is compatible with the capacities declared by the appropriate ATS authority.

Air traffic service (ATS) 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 airspace means airspace 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 airspace is classified as Class A to G as described in 2.6.

Air traffic services reporting office means a 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.

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

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

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

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

Alternate aerodrome means an 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 means an alternate aerodrome at which an aircraft would be able to land should this become necessary shortly after take-off and it is not possible to use the aerodrome of departure.

En-route alternate means an alternate aerodrome at which an aircraft would be able to land in the event that a diversion becomes necessary while en-route.

Destination alternate means an alternate aerodrome at which an aircraft would be able to land 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.*

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

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.

Apron means a defined area, on a land aerodrome, intended to accommodate aircraft for purposes of loading or unloading passengers, mail or cargo, fuelling, 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 control service means air traffic control service for controlled flights in control areas.

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.

ATS route means a specified route designed for channelling 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 which 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.

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

Automatic dependent surveillance — contract (ADS-C) is 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 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) means the provision of ATIS via data link.

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

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.

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

Change-over point means the point at which an aircraft navigating on an ATS route segment defined by reference to very high frequency omnidirectional 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.

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

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

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 2.6.

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

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

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

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

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.

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.

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 authorised amendment.

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

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

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

* All ISO Standards are listed at the end of this chapter.

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.

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

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

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.

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.

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

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.

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.

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 (FIR) 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 1 013.2 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.

Note. — Specifications for flight plans are contained in CAD 2. When the expression “flight plan form” is used it denotes the model flight plan form at Appendix 2 to the PANS- ATM.

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

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.

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.

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

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.

IFR is the symbol used to designate the instrument flight rules.

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

IMC is the symbol used to designate instrument meteorological conditions.

INCERFA means the code word used to designate an uncertainty phase.

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

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

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. — The specified minima for visual meteorological conditions are contained in CAD 2.

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

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

International NOTAM office means an office designated by a State for the exchange of NOTAM internationally.

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

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

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

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

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:

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

Area navigation (RNAV) specification means 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 (ICAO Doc 9613), Volume II, contains detailed guidance on navigation specifications.

Note 2. — The concept of RNP has been overtaken by the concept of PBN. The term “RNP” 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.

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.

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.

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.

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

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 data, safety and functionality needed for the proposed operation in the context of a particular airspace concept.

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.

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

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.

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.

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

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 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.

Rescue coordination centre (RCC) means a unit responsible for promoting efficient organisation of search and rescue services and for coordinating the conduct of search and rescue operations within a search and rescue region.

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.

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

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

Safety management system (SMS) means a systematic approach to managing safety, including the necessary organisational structures, accountabilities, policies and procedures.

SIGMET information means information issued by a meteorological watch office 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.

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.

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

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.

Taxiing means movement of an aircraft on the surface of an aerodrome under its own power, excluding take-off and landing.

Terminal control area means a control area normally established at the confluence of ATS routes in the vicinity of one or more major aerodromes.

Time-in-position means the period of time when an air traffic controller is exercising the privileges of the air traffic controller's licence at an operational position.

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).

Traffic avoidance advice means advice provided by an air traffic services unit specifying manoeuvres 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.

Transfer of control point means a defined point located along the flight path of an aircraft, at which the responsibility for providing air traffic control service to the aircraft is transferred from one control unit or control position to the next.

Transferring unit means air traffic control unit in the process of transferring the responsibility for providing air traffic control service to an aircraft to the next air traffic control unit along the route of flight.

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

VFR is the symbol used to designate the visual flight rules.

VFR flight means a flight conducted in accordance with the visual flight rules.

Visual meteorological conditions (VMC) means meteorological conditions expressed in terms of visibility, distance from cloud, and ceiling, equal to or better than specified minima.

Note. — *The specified minima are contained in CAD 2.*

VMC means the symbol used to designate visual meteorological conditions.

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 means a waypoint which requires turn anticipation to allow tangential interception of the next segment of a route or procedure, or

Flyover waypoint mean a waypoint at which a turn is initiated in order to join the next segment of a route or procedure.

* ISO Standard

19104 — Geographic information — Terminology

19108 — Geographic information — Temporal schema



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2 General

2.1 Establishment of Authority

2.1.1 ATS provider shall determine, in accordance with the provisions of this directive and for the territories over which they have jurisdiction, those portions of the airspace and those aerodromes where air traffic services will be provided. They shall thereafter arrange for such services to be established and provided in accordance with the provisions of this directive, except that, by mutual agreement, the ATS provider may delegate to another State the responsibility for establishing and providing air traffic services in flight information regions, control areas or control zones extending over the territories of the former.

Note. — If one State delegates to another State the responsibility for the provision of ATS over its territory, it does so without derogation of its national sovereignty. Similarly, the providing State's responsibility is limited to technical and operational considerations and does not extend beyond those pertaining to the safety and expedition of aircraft using the concerned airspace. Furthermore, the providing State in providing ATS within the territory of the delegating State will do so in accordance with the requirements of the latter which is expected to establish such facilities and services for the use of the providing State as are jointly agreed to be necessary. It is further expected that the delegating State would not withdraw or modify such facilities and services without prior consultation with the providing State. Both the delegating and providing States may terminate the agreement between them at any time.

2.1.2 Those portions of the airspace over the high seas or in airspace of undetermined sovereignty where air traffic services will be provided shall be determined on the basis of regional air navigation agreements. The ATS provider having accepted the responsibility to provide air traffic services in such portions of airspace shall thereafter arrange for the services to be established and provided in accordance with the provisions of this directive.

Note 1. — 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.

Note 2. — The Council, when approving the Foreword to Annex 11, indicated that a Contracting State accepting the responsibility for providing air traffic services over the high seas or in airspace of undetermined sovereignty may apply the Standards and Recommended Practices in a manner consistent with that adopted for airspace under its jurisdiction.

2.1.3 When it has been determined that air traffic services will be provided, the CEO shall designate the authority responsible for providing such services.

Note 1. — The Director of Air Traffic Management Division of Civil Aviation Authority of Malaysia acting under the authority of the CEO, is the authority responsible for the overall administration of ATS in the provision of ATS within the Kuala Lumpur and Kota Kinabalu Flight Information Regions (FIRs).

Note 2. — ATS are provided for the entire territory of Malaysia, including its territorial waters as well as the airspace over the high seas within the Kuala Lumpur and Kota Kinabalu FIRs.

Note 3. — In some cases, in accordance with the regional air navigation agreement, ATS are provided, under the delegated authority, in the airspace within another bordering FIR. Details of such services are provided in Malaysia AIP Section ENR 2.

Note 4. — The airspace of the Kuala Lumpur FIR embraces Peninsular Malaysia and extensive international waters. The airspace of the Kota Kinabalu FIR embraces Sabah/Sarawak including Brunei and extensive international waters.

Note 5. — The boundaries of the Kuala Lumpur, Kota Kinabalu and Singapore FIRs are defined in Malaysia AIP Section ENR 2.1 - 9.

Note 6. — Area of Responsibility of Aerodrome and Approach Control units are listed in Malaysia AIP Section AD 2.17.

- 2.1.4 Where air traffic services are established, information shall be published as necessary to permit the utilisation of such services.

2.2 Objectives of ATS

- 2.2.1 The objectives of ATS shall be to:
- a) prevent collisions between aircraft;
 - b) prevent collisions between aircraft on the manoeuvring area and obstructions on that 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) notify appropriate organisations regarding aircraft in need of search and rescue aid, and assist such organisations as required.

2.3 Divisions of ATS

ATS shall comprise three services identified as follows:

- 2.3.1 The air traffic control service, to accomplish objectives a), b) and c) of 2.2.1, this service being divided in three parts as follows:
- a) Area control service: the provision of air traffic control service for controlled flights, except for those parts of such flights described in 2.3.2 b) and c), in order to accomplish objectives a) and c) of 2.2.1;
 - b) Approach control service: the provision of air traffic control service for those parts of controlled flights associated with arrival or departure, in order to accomplish objectives a) and c) of 2.2.1; and

- c) Aerodrome control service: the provision of air traffic control service for aerodrome traffic, except for those parts of flights described in 2.3.2 b), in order to accomplish objectives a), b) and c) of 2.2.1.

2.3.2 The flight information service, to accomplish objective d) of 2.2.1.

2.3.3 The alerting service, to accomplish objective e) of 2.2.1.

2.4 Determination of the need for ATS

2.4.1 The need for the provision of ATS shall be determined by consideration of the following:

- a) the types of air traffic involved;
- b) the density of air traffic;
- c) the meteorological conditions; and
- d) such other factors as may be relevant.

Note. — Due to the number of elements involved, it has not been possible to develop specific data to determine the need for ATS in a given area or at a given location. For example:

- a) *a mixture of different types of air traffic with aircraft of varying speeds (conventional jet, etc.) might necessitate the provision of ATS, whereas a relatively greater density of traffic where only one type of operation is involved would not;*
- b) *meteorological conditions might have considerable effect in areas where there is a constant flow of air traffic (e.g. scheduled traffic), whereas similar or worse meteorological conditions might be relatively unimportant in an area where air traffic would be discontinued in such conditions (e.g. local VFR flights); and*
- c) *open stretches of water, mountainous, uninhabited or desert areas might necessitate the provision of ATS even though the frequency of operations is extremely low.*

2.4.2 The carriage of airborne collision avoidance systems (ACAS) by aircraft in a given area shall not be a factor in determining the need for ATS in that area.

2.5 Designation of the portions of the airspace and controlled aerodromes where ATS will be provided

2.5.1 When it has been determined that ATS 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 ATS that are to be provided.

- 2.5.2 The designation of the particular portions of the airspace or the particular aerodromes shall be as follows:
- 2.5.2.1 Flight information regions. Those portion of the airspace where it is determined that flight information service and alerting service will be provided shall be designated as flight information regions.
- 2.5.2.2 Control areas and control zones
- 2.5.2.2.1 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.
- Note. — The distinction between control areas and control zones is made in 2.11.*
- 2.5.2.2.1.1 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.
- 2.5.2.2.1.2 Where designated within a FIR, control areas and control zones shall form part of that FIR.
- 2.5.2.3 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.

2.6 Classification of airspaces

- 2.6.1 ATS airspaces shall be classified and designated in accordance with the following:
- a) **Class A.** IFR flights only are permitted, all flights are provided with air traffic control service and are separated from each other.
 - b) **Class B.** IFR and VFR flights are permitted; all flights are provided with air traffic control service and are separated from each other.
 - c) **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.
 - d) **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.
 - e) **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.

- f) **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 CAD 1101 Chapter 9.)*

- g) **Class G.** IFR and VFR flights are permitted and receive flight information service if requested.

2.6.2 The CEO shall select those airspace classes appropriate to the operational needs.

2.6.3 The requirements for flights within each class of airspace shall be as shown in the table in CAD 11, 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.*

2.7 Performance-Based Navigation (PBN) operations

2.7.1 When applicable, the navigation specification(s) for designated areas, tracks or ATS routes shall 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

2.7.2 PBN operations shall be implemented as soon as practicable.

2.7.3 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 PBN and implementation is published in the Performance based Navigation (PBN) Manual (ICAO Doc 9613).*

2.8 Performance-Based Communication (PBC) operations

2.8.1 In applying performance-based communication (PBC), RCP specifications shall be prescribed by the ATS provider. When applicable, the RCP specification(s) shall 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.*

- 2.8.2 The prescribed RCP specifications shall be appropriate to the ATS provided in the airspace concerned.

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 (ICAO Doc 9869).

2.9 Performance-Based Surveillance (PBS) operations

- 2.9.1 In applying performance-based surveillance (PBS), RSP specifications shall be prescribed by service provider. When applicable, the RSP specification(s) shall 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.

- 2.9.2 The prescribed RSP specification shall be appropriate to the air traffic services provided.

- 2.9.3 Where an RSP specification has been prescribed 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 (ICAO Doc 9869).

2.10 Establishment and designation of the units providing ATS

ATS shall be provided by units established and designated as follows:

- 2.10.1 Flight information centres shall be established to provide flight information service and alerting service within FIRs, unless the responsibility of providing such services within a FIR is assigned to an air traffic control unit having adequate facilities for the discharge of such responsibility.

Note. — This does not preclude delegating to other units the function of providing certain elements of the flight information service.

- 2.10.2 Air traffic control units shall be established to provide air traffic control service, flight information service and alerting service within control areas, control zones and at controlled aerodromes.

Note. — The services to be provided by various air traffic control units are indicated in 3.2.

2.11 Specifications for FIRs, control areas and control zones

- 2.11.1 Where applicable, the delineation of airspace, wherein ATS are to be provided, shall be related to the nature of the route structure and the need for efficient service rather than to national boundaries.

Note 1. — Agreements to permit the delineation of airspace lying across national boundaries are advisable when such action will facilitate the provision of air traffic services (see 2.1.1). Agreements which permit delineation of airspace boundaries by straight lines will, for example, be most convenient where data processing techniques are used by air traffic services units.

Note 2. — Where delineation of airspace is made by reference to national boundaries there is a need for suitably sited transfer points to be mutually agreed upon.

- 2.11.2 FIRs

- 2.11.2.1 FIRs shall be delineated to cover the whole of the air route structure to be served by such regions.

- 2.11.2.2 A FIR shall include all airspace within its lateral limits, except as limited by an upper flight information region.

- 2.11.2.3 Where a FIR is limited by an upper FIR, the lower limit specified for the upper FIR shall constitute the upper vertical limit of the FIR and shall coincide with a VFR cruising level of the tables in Appendix 3 to CAD 2.

Note. — In cases where an upper flight information region is established the procedures applicable therein need not be identical with those applicable in the underlying flight information region.

- 2.11.3 Control areas

- 2.11.3.1 Control areas including, inter alia, airways and terminal control areas shall be delineated so as to encompass sufficient airspace to contain the flight paths of those IFR flights or portions thereof to which it is desired to provide the applicable parts of the air traffic control service, taking into account the capabilities of the navigation aids normally used in that area.

Note. — In a control area other than one formed by a system of airways, a system of routes may be established to facilitate the provision of air traffic control.

- 2.11.3.2 A lower limit of a control area shall be established at a height above the ground or water of not less than 200 m (700 ft).

Note. — This does not imply that the lower limit has to be established uniformly in a given control area (see Figure A-5 of the Air Traffic Services Planning Manual (ICAO Doc 9426), Part I, Section 2, Chapter 3).

- 2.11.3.2.1 The lower limit of a control area shall, when practicable and desirable in order to allow freedom of action for VFR flights below the control area, be established at a greater height than the minimum specified in 2.11.3.2.
- 2.11.3.2.2 When the lower limit of a control area is above 900 m (3 000 ft) MSL it shall coincide with a VFR cruising level of the tables in Appendix 3 to CAD 2.
- Note. — This implies that the selected VFR cruising level be such that expected local atmospheric pressure variations do not result in a lowering of this limit to a height of less than 200 m (700 ft) above ground or water.*
- 2.11.3.3 An upper limit of a control area shall be established when either:
- a) air traffic control service will not be provided above such upper limit; or
 - b) the control area is situated below an upper control area, in which case the upper limit shall coincide with the lower limit of the upper control area.

When established, such upper limit shall coincide with a VFR cruising level of the tables in Appendix 3 to CAD 2.

2.11.4 FIRs or control areas in the upper airspace

- 2.11.4.1 Where applicable, to limit the number of FIRs or control areas through which high flying aircraft would otherwise have to operate, a FIR or control area, as appropriate, shall be delineated to include the upper airspace within the lateral limits of a number of lower flight information regions or control areas.

2.11.5 Control zones

- 2.11.5.1 The lateral limits of control zones shall encompass at least those portions of the airspace, which are not within control areas, containing the paths of IFR flights arriving at and departing from aerodromes to be used under instrument meteorological conditions.

Note. — Aircraft holding in the vicinity of aerodromes are considered as arriving aircraft.

- 2.11.5.2 The lateral limits of a control zone shall extend to at least 9.3 km (5 NM) from the centre of the aerodrome or aerodromes concerned in the directions from which approaches may be made.

Note. — A control zone may include two or more aerodromes situated close together.

- 2.11.5.3 If a control zone is located within the lateral limits of a control area, it shall extend upwards from the surface of the earth to at least the lower limit of the control area.

Note. — An upper limit higher than the lower limit of the overlying control area may be established when desired.

2.11.5.4 If a control zone is located outside of the lateral limits of a control area, an upper limit shall be established.

2.11.5.5 If it is desired to establish the upper limit of a control zone at a level higher than the lower limit of the control area established above it, or if the control zone is located outside of the lateral limits of a control area, its upper limit shall be established at a level which can easily be identified by pilots. When this limit is above 900 m (3 000 ft) MSL it shall coincide with a VFR cruising level of the tables in Appendix 3 to CAD 2.

Note. — This implies that, if used, the selected VFR cruising level be such that expected local atmospheric pressure variations do not result in a lowering of this limit to a height of less than 200 m (700 ft) above ground or water.

2.12 Identification of ATS units and airspaces

2.12.1 Where applicable, an area control centre or flight information centre shall be identified by the name of a nearby town or city or geographic feature.

2.12.2 Where applicable, an aerodrome control tower or approach control unit shall be identified by the name of the aerodrome at which it is located.

2.12.3 Where applicable, a control zone, control area or FIR shall be identified by the name of the unit having jurisdiction over such airspace.

2.13 Establishment and identification of ATS routes

2.13.1 When ATS routes are established, a protected airspace along each ATS route and a safe spacing between adjacent ATS routes shall be provided.

2.13.2 Where applicable, when warranted by density, complexity or nature of the traffic, special routes shall be established for use by low-level traffic, including helicopters operating to and from helidecks on the high seas. When determining the lateral spacing between such routes, account shall be taken of the navigational means available and the navigation equipment carried on board helicopters.

2.13.3 ATS routes shall be identified by designators.

2.13.4 Designators for ATS routes other than standard departure and arrival routes shall be selected in accordance with the principles set forth in Appendix 1.

2.13.5 Standard departure and arrival routes and associated procedures shall be identified in accordance with the principles set forth in Appendix 3.

Note 1. — Guidance material relating to the establishment of ATS routes is contained in the Air Traffic Services Planning Manual (ICAO Doc 9426).

Note 2. — Guidance material relating to the establishment of ATS routes defined by VOR is contained in Attachment A.

Note 3. — The spacing between parallel tracks or between parallel ATS route centre lines based on performance-based navigation will be dependent upon the relevant navigation specification required.

2.14 Establishment of change-over point

2.14.1 Where applicable, change-over points shall be established on ATS route segments defined by reference to very high frequency omnidirectional radio ranges where this will assist accurate navigation along the route segments. The establishment of change-over points shall be limited to route segments of 110 km (60 NM) or more, except where the complexity of ATS routes, the density of navigation aids or other technical and operational reasons warrant the establishment of change-over points on shorter route segments.

2.14.2 Unless otherwise established in relation to the performance of the navigation aids or frequency protection criteria, the change-over point on a route segment where applicable, shall be the mid-point between the facilities in the case of a straight route segment or the intersection of radials in the case of a route segment which changes direction between the facilities.

Note. — Guidance on the establishment of change-over points is contained in Attachment A.

2.15 Establishment and identification of significant points

2.15.1 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.

2.15.2 Significant points shall be identified by designators.

2.15.3 Significant points shall be established and identified in accordance with the principles set forth in Appendix 2.

2.16 Establishment and Identification of Standard Routes for Taxiing Aircraft

2.16.1 Where necessary, standard routes for taxiing aircraft shall be established on an aerodrome between runways, aprons and maintenance areas. Where applicable, such routes shall be direct, simple and where practicable, designed to avoid traffic conflicts.

2.16.2 Standard routes for taxiing aircraft shall be identified by designators distinctively different from those of the runways and ATS routes.

2.17 Coordination between the operator and ATS

- 2.17.1 ATS units, in carrying out their objectives, shall have due regard for the requirements of the operators consequent on their obligations as specified in CAD 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.
- 2.17.2 When so requested by an operator, messages (including position reports) received by ATS 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.

Note. — For aircraft subjected to unlawful interference, see 2.24.3.

2.18 Coordination between military authorities and ATS

- 2.18.1 ATS authorities shall establish and maintain close cooperation with military authorities responsible for activities that may affect flights of civil aircraft.
- 2.18.2 Coordination of activities potentially hazardous to civil aircraft shall be effected in accordance with 2.19.
- 2.18.3 Arrangements shall be made to permit information relevant to the safe and expeditious conduct of flights of civil aircraft to be promptly exchanged between ATS units and appropriate military units.
- 2.18.3.1 ATS 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, ATS authorities shall designate any areas or routes where the requirements of CAD 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. — For aircraft subjected to unlawful interference, see 2.24.3 and 2.25.1.3.

- 2.18.3.2 Special procedures shall be established in order to ensure that:
- a) ATS 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; and
 - b) 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.

2.19 Coordination of activities potentially hazardous to civil aircraft

2.19.1 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 ATS authorities. The coordination shall be effected early enough to permit timely promulgation of information regarding the activities in accordance with the provisions of CAD 15.

2.19.1.1 If the appropriate ATS authority is not that of the State where the organisation planning the activities is located, initial coordination shall be effected through the ATS authority responsible for the airspace over the State where the organisation is located.

2.19.2 The objective of the coordination shall be to achieve the best arrangements which will avoid hazards to civil aircraft and minimise interference with the normal operations of such aircraft.

2.19.2.1 In determining these arrangements, the following shall be applied:

- a) the locations or areas, times and durations for the activities shall be selected to avoid closure or realignment of established ATS routes, blocking of the most economic flight levels, or delays of scheduled aircraft operations, unless no other options exist;
- b) the size of the airspace designated for the conduct of the activities shall be kept as small as possible; and
- c) direct communication between the appropriate ATS authority or ATS unit and the organisation or unit conducting the activities shall be provided for use in the event that civil aircraft emergencies or other unforeseen circumstances require discontinuation of the activities.

2.19.3 The appropriate ATS authorities shall be responsible for initiating the promulgation of information regarding the activities.

2.19.4 If activities potentially hazardous to civil aircraft take place on a regular or continuing basis, special committees shall be established as required to ensure that the requirements of all parties concerned are adequately coordinated.

2.19.5 Adequate steps shall be taken to prevent emission of laser beams from adversely affecting flight operations.

Note 1. — Guidance material regarding the hazardous effects of laser emitters on flight operations is contained in the Manual on Laser Emitters and Flight Safety (ICAO Doc 9815).

Note 2. — See also CAD 14 — Aerodromes, Volume I — Aerodrome Design and Operations, Chapter 5.

- 2.19.6 In order to provide added airspace capacity and to improve efficiency and flexibility of aircraft operations, ATS authority shall establish procedures providing for a flexible use of airspace reserved for military or other special activities. The procedures shall permit all airspace users to have safe access to such reserved airspace.

2.20 Aeronautical data

- 2.20.1 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 governing the quality system are given in CAD 1501.*

- 2.20.2 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 CAD 1501.*

2.21 Coordination between meteorological and ATS authorities

- 2.21.1 To ensure that aircraft receive the most up-to-date meteorological information for aircraft operations, arrangements shall be made, where necessary, between meteorological and ATS authorities for ATS personnel:

- a) in addition to using indicating instruments, to report, if observed by ATS personnel or communicated by aircraft, such other meteorological elements as may be agreed upon;
- b) to report as soon as possible to the associated meteorological office meteorological phenomena of operational significance, if observed by ATS personnel or communicated by aircraft, which have not been included in the aerodrome meteorological report; and
- c) 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 centres and flight information centres shall report the information to the associated meteorological watch office and volcanic ash advisory centres (VAACs).

Note 1. — *VAACs are designated by regional air navigation agreements in accordance with CAD 3, Chapter 3.*

Note 2. — *See 4.2.3 regarding transmission of special air-reports.*

- 2.21.2 Close coordination shall be maintained between area control centres, flight information centres and associated meteorological watch offices to ensure that information on volcanic ash included in NOTAM and SIGMET messages is consistent.

2.22 Coordination between Aeronautical Information Services and ATS authorities

- 2.22.1 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 ATS authorities responsible for ATS to report to the responsible aeronautical information services unit, with a minimum of delay:
- a) information on aerodrome conditions;
 - b) the operational status of associated facilities, services and navigation aids within their area of responsibility;
 - c) the occurrence of volcanic activity observed by air traffic services personnel or reported by aircraft; and
 - d) any other information considered to be of operational significance.
- 2.22.2 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.
- 2.22.3 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 CAD 15, Chapter 6. The predetermined, internationally agreed AIRAC effective dates in addition to 14 days postage time shall be observed by the responsible ATS when submitting the raw information/data to aeronautical information services.
- Note. — Detailed specifications concerning the AIRAC system are contained in CAD 1501, Chapter 6.*
- 2.22.4 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.
- Note 1. — Specifications concerning the accuracy and integrity classification of air traffic services-related aeronautical data are contained in CAD 1501, Appendix 1.*
- Note 2. — Specifications for the issue of a Notice to Airmen (NOTAM) and ASHTAM are contained in CAD 15, Chapter 5.*
- Note 3. — Reports of volcanic activity comprise the information detailed in CAD 3, Chapter 4.*

Note 4. — AIRAC information is distributed by the aeronautical information service 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.

Note 5. — The schedule of the predetermined, internationally agreed AIRAC common effective dates at intervals of 28 days and guidance for the AIRAC use are contained in the Aeronautical Information Services Manual (ICAO Doc 8126, Chapter 2, 2.6).

2.22.5 NOTAM issuance and register

Note. — NOTAMs are intended to supplement the AIP and serve as fast medium for disseminating information whenever it is necessary to give due warning of any change or occurrence at short notice. The NOTAM Office (NOF) at Kuala Lumpur International Airport is the designated unit to issue NOTAM.

2.22.5.1 All NOTAM issued shall be in compliance with CAD 15, ICAO Doc 8400 and ICAO Doc 8126.

2.22.5.2 ATS provider that functions as a NOTAM originator shall promptly issue NOTAM in conformity with the provisions in Chapter 5 of CAD 15.

2.22.5.3 While NOF is responsible for the control of national NOTAM registers involving all Domestic and International NOTAM, the ATS units shall maintain their own NOTAM register for issued NOTAM.

2.22.5.4 NOTAM originators shall keep and maintain a NOTAM register for all NOTAM issued from its unit.

2.23 Minimum flight altitudes

2.23.1 Minimum flight altitudes shall be determined and promulgated by the CEO for each ATS route and control area over its territory. The minimum flight altitudes determined shall provide a minimum clearance above the controlling obstacle located within the areas concerned.

Note. — The requirements for publication of minimum flight altitudes and of the criteria used to determine them are contained in CAD 1501. Detailed obstacle clearance criteria are contained in PANS-OPS (ICAO Doc 8168), Volume II.

2.24 Service to aircraft in the event of an emergency

2.24.1 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:

- a) on Mode A, Code 7700; or
- b) on Mode A, Code 7500, to indicate specifically that it is being subjected to unlawful interference; and/or
- c) activate the appropriate emergency and/or urgency capability of ADS-B or ADS-C; and/or
- d) transmit the appropriate emergency message via CPDLC.

2.24.1.1 In communications between ATS units and aircraft in the event of an emergency, Human Factors principles shall be observed where applicable.

Note. — *Guidance material on Human Factors principles can be found in the Human Factors Training Manual (ICAO Doc 9683).*

2.24.2 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.

2.24.3 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 CEO 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. — *CAD 1101 contains more specific procedures related to unlawful interference.*

Note 4. — *Chapter 11 of this document contains more detailed procedures related to emergencies and emergency response plan.*

2.25 In-flight contingencies

2.25.1 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.*
- b) *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.

2.25.1.1 As soon as an ATS unit becomes aware of a strayed aircraft it shall take all necessary steps as outlined in 2.25.1.1.1 and 2.25.1.1.2 to assist the aircraft and to safeguard its flight.

Note. — Navigational assistance by an ATS 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.

2.25.1.1.1 If the aircraft’s position is not known, the ATS unit shall:

- a) attempt to establish two-way communication with the aircraft, unless such communication already exists;
- b) use all available means to determine its position;
- c) 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;
- d) inform, in accordance with locally agreed procedures, appropriate military units and provide them with pertinent flight plan and other data concerning strayed aircraft; and
- e) 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).

2.25.1.1.2 When the aircraft’s position is established, the ATS unit shall:

- a) advise the aircraft of its position and corrective action to be taken; and
- b) provide, as necessary, other ATS units and appropriate military units with relevant information concerning the strayed aircraft and any advice given to that aircraft.

2.25.1.2 As soon as an ATS unit becomes aware of an unidentified aircraft in its area, it shall endeavour to establish the identity of the aircraft whenever this is necessary for the provision of ATS or required by the appropriate military authorities in accordance with locally agreed procedures. To this end, the ATS unit shall take such of the following steps as are appropriate in the circumstances:

- a) attempt to establish two-way communication with the aircraft;

- b) inquire of other ATS units within the FIR about the flight and request their assistance in establishing two-way communication with the aircraft;
- c) inquire of ATS units serving the adjacent FIRs about the flight and request their assistance in establishing two-way communication with the aircraft; and
- d) attempt to obtain information from other aircraft in the area.

2.25.1.2.1 The ATS unit shall, as necessary, inform the appropriate military unit as soon as the identity of the aircraft has been established.

2.25.1.3 Should the ATS unit consider that a strayed or unidentified aircraft may be the subject of unlawful interference, the appropriate authority designated by the CEO shall immediately be informed, in accordance with locally agreed procedures.

2.25.2 Interception of civil aircraft

2.25.2.1 As soon as an ATS 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:

- a) 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;
- b) inform the pilot of the intercepted aircraft of the interception;
- c) establish contact with the intercept control unit maintaining two-way communication with the intercepting aircraft and provide it with available information concerning the aircraft;
- d) relay messages between the intercepting aircraft or the intercept control unit and the intercepted aircraft, as necessary;
- e) in close coordination with the intercept control unit take all necessary steps to ensure the safety of the intercepted aircraft; and
- f) inform ATS units serving adjacent FIRs if it appears that the aircraft has strayed from such adjacent FIRs.

2.25.2.2 As soon as an ATS 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:

- a) 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 2.25.2.1; and

- b) relay messages between the intercepted aircraft and the appropriate ATS unit, the intercept control unit or the intercepting aircraft.

2.26 Time in ATS

- 2.26.1 ATS units shall use Coordinated Universal Time (UTC) and shall express the time in hours and minutes and, when required, seconds of the 24-hour day beginning at midnight.
- 2.26.2 ATS units shall be equipped with clocks indicating the time in hours, minutes and seconds, clearly visible from each operating position in the unit concerned.
- 2.26.3 ATS 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 utilised by an ATS unit, clocks and other time-recording devices shall be checked as necessary to ensure correct time to within 1 second of UTC.
- 2.26.4 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.
- 2.26.5 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. ATS units shall, in addition, provide aircraft with the correct time on request. Time checks shall be given to the nearest half minute.

2.27 Establishment of requirements for carriage and operation of pressure-altitude reporting transponders

- 2.27.1 All aircraft flying within controlled airspace in the Kuala Lumpur and Kota Kinabalu FIRs shall be equipped with SSR transponder complying with ICAO Standards and having both Mode 3/A4096 and Mode C automatic pressure altitude reporting capabilities. They shall operate their SSR transponder on Mode 3A and Mode C simultaneously.
- 2.27.2 Special dispensation may be granted to aircraft without a serviceable transponder. This will be treated on an individual basis and subject to any conditions that may be imposed. Approval for such dispensation shall be made through nearest ATCC unit. Such approval will depend on the traffic movements in the airspace concerned.

Note.1— This provision is intended to improve the effectiveness of ATS as well as airborne collision avoidance systems.

Note.2— This provision is published in Malaysia AIP ENR 3.1.

2.28 Fatigue Management

Note. — Guidance on the development and implementation of fatigue management regulations is contained in the Manual for the Oversight of Fatigue Management Approaches (ICAO Doc 9966).

- 2.28.1 For the purpose of managing fatigue in the provision of air traffic control services, the ATS provider shall comply with the following:
- a) regulations that prescribe scheduling limits in accordance with Appendix 5; and
 - b) Use a fatigue risk management system (FRMS) to manage fatigue, FRMS regulations in accordance with Appendix 6.
- 2.28.2 For the purposes of managing fatigue-related safety risks, the ATS provider shall establish one of the following:
- a) air traffic controller schedules commensurate with the service(s) provided and in compliance with the prescriptive limitation regulations established in accordance with 2.28.1 a); or
 - b) an FRMS, in compliance with regulations in accordance with 2.28.1 b), for the provision of all air traffic control services; or
 - c) an FRMS, in compliance with regulations in accordance with 2.28.1 b), for a defined part of its air traffic control services in conjunction with schedules in compliance with the prescriptive limitation regulations in accordance with 2.28.1 a) for the remainder of its air traffic control services.
- 2.28.3 Where the ATS provider complies with prescriptive limitation regulations in the provision of part or all of its air traffic control services in accordance with 2.28.2 a), the ATS provider shall:
- a) ensure that the limitations are not exceeded and that non-duty period requirements are met;
 - b) familiarise its personnel with the principles of fatigue management and its policies with regard to fatigue management;
 - c) establish a process to allow variations from the prescriptive limitation regulations to address any additional risks associated with sudden, unforeseen operational circumstances; and
 - d) ensure the 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 ATS provider of the responsibility to manage its risks, including fatigue-related risks, using its SMS in accordance with the provisions of CAD 19.

- 2.28.4 Where an ATS 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 2.28.2 b), the service provider shall establish:
- a) processes to integrate FRMS functions with its other safety management functions; and
 - b) ensure the 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 CAD 19.

2.29 Safety Management

Note. — CAD 19 includes the safety management provisions applicable to ATS providers. Further guidance is contained in the Safety Management Manual (SMM) (Doc 9859) and associated procedures are contained in the CAD 1101.

- 2.29.1 Any significant safety-related change to the ATS system, including the implementation of a reduced separation minimum or a new procedure, shall only be effected after a safety assessment has demonstrated that an acceptable level of safety will be met and users have been consulted. When appropriate, the responsible authority 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 assessment may rely on operational judgement.

- 2.29.2 ATS provider shall have in place a safety management system (SMS) acceptable to the Secretary General of the Ministry of Transport (Sec-Gen) and which addresses high-level safety objectives as follows:
- a) identify safety hazards;
 - b) safety risks management;
 - c) ensure the implementation of remedial action necessary to maintain agreed safety performance;
 - d) provide for continuous monitoring and regular assessment of the safety performance; and;
 - e) aim at continuous improvement of the overall performance of the SMS.
- 2.29.3 The categorisation of SMS implementation for Air Traffic Service Providers are as follows:
- a) Level 5 – 95% to 100% SMS implementation

- b) Level 4 – 85% to 94% SMS implementation
- c) Level 3 – 65% to 84% SMS implementation
- d) Level 2 – 45% to 64% SMS implementation
- e) Level 1 – 0% to 44% SMS implementation

2.29.4 The ATS provider shall achieve at least Level 3 with a minimum of 65% of SMS implementation before it can be acceptable to the Secretary-General of Ministry of Transport (Sec-Gen).

Note 1. — The provisions and requirements for the acceptance processes of ATS providers SMS and safety performance indicators are contained in the CAD 19.

Note 2. — The provision of AIS, CNS, MET and/or SAR services, when under the authority of an ATS provider, are included in the scope of the ATS provider's SMS. When the provision of AIS, CNS, MET and/or SAR services are wholly or partially provided by an entity other than an ATS provider, the related services that come under the authority of the ATS provider, or those aspects of their services with direct operational implications, are included in the scope of the ATS provider's SMS.

2.29.5 Safety reviews

2.29.5.1 General requirements

Safety reviews of ATS units shall be conducted on a regular and systematic basis by personnel qualified through training, experience and expertise and having a full understanding of relevant Standards and Recommended Practices (SARPs), Procedures for Air Navigation Services (PANS), safe operating practices and Human Factors principles.

2.29.5.2 Scope

The scope of ATS unit safety reviews shall include at least the following issues:

2.29.5.2.1 Regulatory issues to ensure that:

- a) ATS operations manuals, ATS unit instructions and air traffic control coordination procedures are complete, concise and up-to-date;
- b) the ATS route structure, where applicable, provides for:
 - 1) adequate route spacing; and
 - 2) crossing points for ATS routes located so as to reduce the need for controller intervention and for inter- and intra-unit coordination
- c) the separation minima used in the airspace or at the aerodrome are appropriate and all the provisions applicable to those minima are being complied with;
- d) where applicable, provision is made for adequate observation of the manoeuvring area, and procedures and measures aimed at minimising

the potential for inadvertent runway incursions are in place. This observation may be performed visually or by means of an ATS surveillance system;

- e) appropriate procedures for low visibility aerodrome operations are in place;
- f) traffic volumes and associated controller workloads do not exceed defined, safe levels and that procedures are in place for regulating traffic volumes whenever necessary;
- g) procedures to be applied in the event of failures or degradations of ATS systems, including communications, navigation and surveillance systems, are practicable and will provide for an acceptable level of safety; and
- h) procedures for the reporting of incidents and other safety-related occurrences are implemented, that the reporting of incidents is encouraged and that such reports are reviewed to identify the need for any remedial action.

2.29.5.2.2

Operational and technical issues to ensure that:

- a) the environmental working conditions meet established levels for temperature, humidity, ventilation, noise and ambient lighting, and do not adversely affect controller performance;
- b) automation systems generate and display flight plan, control and coordination data in a timely, accurate and easily recognisable manner and in accordance with Human Factors principles;
- c) equipment, including input/output devices for automation systems, are designed and positioned in the working position in accordance with ergonomic principles;
- d) communications, navigation, surveillance and other safety significant systems and equipment:
 - 1) are tested for normal operations on a routine basis;
 - 2) meet the required level of reliability and availability as defined by the appropriate authority;
 - 3) provide for the timely and appropriate detection and warning of system failures and degradations;
 - 4) include documentation on the consequences of system, subsystem and equipment failures and degradations;
 - 5) include measures to control the probability of failures and degradations; and

- 6) include adequate backup facilities and/or procedures in the event of a system failure or degradation; and
- 7) detailed records of systems and equipment serviceability are kept and periodically reviewed.

Note. — In the context above, the terms reliability and availability have the following meanings:

- a) *Reliability. The probability that a device or system will function without failure over a specified time period or amount of usage; and*
- b) *Availability. The ratio of percentage of the time that a system is operating correctly to the total time in that period.*

2.29.5.2.3 Licensing and training issues to ensure that:

- a) air traffic controllers are adequately trained and properly licensed with valid ratings;
- b) air traffic 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;
- c) air traffic controllers, where the ATC unit/control sector is staffed by teams, are provided relevant and adequate training in order to ensure efficient teamwork;
- d) 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;
- e) air traffic controller competency in the English language is satisfactory in relation to providing ATS to air traffic; and
- f) standard phraseology is used.

2.29.6 Safety assessments

2.29.6.1 A safety assessment shall be carried out in respect of proposals for significant airspace reorganisations, for significant changes in the provision of ATS procedures applicable to an airspace or an aerodrome, and for the introduction of new equipment, systems or facilities, such as:

- a) a reduced separation minimum to be applied within an airspace or at an aerodrome;
- b) a new operating procedure, including departure and arrival procedures, to be applied within an airspace or at an aerodrome;
- c) a reorganisation of the ATS route structure;

- d) a re-sectorisation of an airspace;
- e) physical changes to the layout of runways and/or taxiways at an aerodrome; and
- f) implementation of new communications, surveillance or other safety-significant systems and equipment, including those providing new functionality and/or capabilities.

Note 1. — A reduced separation minimum may refer to the reduction of a horizontal separation minimum, including a minimum based on required navigation performance (RNP), a reduced vertical separation minimum of 300 m (1 000 ft) between FL 290 and FL 410 inclusive (RVSM), the reduction of a separation minimum based on the use of an ATS surveillance system or a wake turbulence separation minimum or reduction of minima between landing and/or departing aircraft.

Note 2. — When, due to the nature of the change, the acceptable level of safety cannot be expressed in quantitative terms, the safety assessments may rely on operational judgement.

2.29.6.2 Proposals shall be implemented only when the assessment has shown that an acceptable level of safety will be met.

2.29.7 Runway safety programme

At aerodromes, ATS provider shall participate in the aerodrome runway safety programme with the aerodrome and aircraft operators to improve runway safety established under the National Runway Safety Programme.

2.30 Common reference systems

2.30.1 Horizontal reference system

World Geodetic System — 1984 (WGS-84) shall be used as the horizontal (geodetic) reference system for air navigation. Reported 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 (ICAO Doc 9674).

2.30.2 Vertical reference system

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 for air navigation.

Note. — 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.

2.30.3 Temporal reference system

- 2.30.3.1 The Gregorian calendar and Coordinated Universal Time (UTC) shall be used as the temporal reference system for air navigation.
- 2.30.3.2 When a different temporal reference system is used, this shall be indicated in GEN 2.1.2 of the Malaysia AIP.

2.31 English language proficiency

- 2.31.1 An ATS authority shall ensure that air traffic controllers speak and understand the English language used for radiotelephony communications as specified in CAD 1.
- 2.31.2 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.

Note. — *The provisions for language proficiency requirement are contained in the CAD 1201.*

2.32 Contingency arrangements

- 2.32.1 ATS authorities shall develop and publish contingency plans for implementation in the event of disruption, or potential disruption, of ATS and related supporting services in the airspace for which they are responsible for the provision of such services. Such contingency plans shall be developed with the assistance of ICAO as necessary, in close coordination with the ATS authorities responsible for the provision of services in adjacent portions of airspace and with airspace users concerned.

Note 1. — *Guidance material relating to the development, promulgation and implementation of contingency plans is contained in Attachment C.*

Note 2. — *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.*

- 2.32.2 Where appropriate, the details of contingency ATS routes and flight level allocation scheme as agreed under the Asia/Pacific Air Navigation Planning and Implementation Regional Group (APANPIRG) shall be published in the Malaysia AIP.

2.33 Identification and delineation of prohibited, restricted and danger areas

- 2.33.1 Each prohibited area, restricted area, or danger area established by the CEO shall, upon initial establishment, be given identification and full details shall be promulgated.

Note. — *See CAD 1501, and Malaysia AIP ENR 5.1.*

- 2.33.2 The identification so assigned shall be used to identify the area in all subsequent notifications pertaining to that area.

- 2.33.3 The identification shall be composed of a group of letters and figures as follows:
- a) nationality letters for location indicators assigned to Malaysia which has established the airspace;
 - b) a letter P for prohibited area, R for restricted area and D for danger area as appropriate; and
 - c) a number, unduplicated within Malaysia.

Note. — *Nationality letters are those contained in Location Indicators (ICAO 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.
- 2.33.5 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.

2.34 Instrument flight procedure design service

- 2.34.1 The CEO may authorise PANS-OPS service providers to provide instrument flight procedure design services within Malaysia airspace.
- 2.34.2 All instrument flight procedures for aerodromes or airspace in Malaysia shall be designed by an Approved Flight Procedure Design Organisation in accordance with the design criteria and processes as described in the CAD 620 – AFPDO.



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3 Air Traffic Control Service

3.1 Application

3.1.1 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; and
- d) to all aerodrome traffic at controlled aerodromes.

3.2 Provision of air traffic control service

3.2.1 The parts of air traffic control service described in 2.3.1 shall be provided by the various units as follows:

- a) Area control service:
 - 1) by an area control centre; 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 centre is established.
- b) Approach control service:
 - 1) by an aerodrome control tower or area control centre 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.

3.3 Operation of air traffic control service

3.3.1 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: and
 - 1) whenever an aircraft might otherwise conflict with traffic operated under the control of such other units; and
 - 2) before transferring control of an aircraft to such other units.

3.3.2 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.

3.3.3 Air traffic control units shall be equipped with devices that record background communication and the aural environment at air traffic controller work stations, capable of retaining the information recorded during at least the last twenty-four hours of operation.

Note. — Provisions related to the non-disclosure of recordings and transcripts of recordings from air traffic control units are contained in CAD 13, 5.12.

3.3.4 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; and
- 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.

3.3.5 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 CAD 2, or
 - 2) a modified table of cruising levels, when so prescribed in accordance with Appendix 3 of CAD 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 Service Planning Manual (ICAO Doc 9426).

- 3.3.5.1 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 performance is contained in the Manual on Implementation of a 300 m (1 000 ft) Vertical Separation Minimum between FL 290 and FL 410 Inclusive (ICAO Doc 9574).

- 3.3.5.2 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 (ICAO Doc 9869).

- 3.3.5.3 ATS providers for the Kuala Lumpur and Kota Kinabalu Flight Information Regions (FIRs) shall establish and implement monitoring mechanisms for RVSM airspace including the collection of Large Height Deviation (LHD) and coordination failures and subsequent reporting to the Monitoring Agency for Asia Region (MAAR). Consequently, a copy of such report to MAAR shall be

sent to ANS Standards Division for the purpose of surveillance by the ATS regulator.

Note 1. — Monitoring Agency for Asia Region (MAAR) was established by Aeronautical Radio of Thailand, Ltd. (AEROTHAI) under the approval of the Asia/Pacific Air Navigation Planning and Implementation Regional Group (APANPIRG) to assume the duties and responsibilities of the Regional Monitoring Agency (RMA) for the Asia Region.

Note 2. — The principal role of the MAAR is to assist the International Civil Aviation Organisation (ICAO) in the continuation of the safety assessment program for the implementation of Reduced Vertical Separation Minimum (RVSM) and other monitoring requirements as determined by the APANPIRG.

Note 3. — This is to ensure the compliance with the related APANPIRG Conclusions in relation to RVSM approval status that the information is continuously available to RMAs.

3.4 Separation minima

3.4.1 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 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 appropriate ATS authority, following consultation with operators, for routes or portions of routes contained within the sovereign airspace of Malaysia; and
 - 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 CAD 1101 and Part 1 of the Regional Supplementary Procedures (ICAO Doc 7030).

- b) the selection of separation minima shall be made in consultation between the appropriate ATS authorities responsible for the provision of ATS in neighbouring airspace when:
 - 1) traffic will pass from one into the other of the neighbouring airspaces; and
 - 2) routes are closer to the common boundary of the neighbouring 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.

- 3.4.2 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 AIPs, where separation is based on the use by aircraft of specified navigation aids or specified navigation techniques.

3.5 Responsibility for control

- 3.5.1 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.
- 3.5.2 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 coordination between all air traffic control units concerned is assured.

3.6 Transfer of responsibility for control

- 3.6.1 Place or time of transfer
The responsibility for the control of an aircraft shall be transferred from one air traffic control unit to another as follows:
- 3.6.1.1 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.
- 3.6.1.2 Between a unit providing area control service and a unit providing approach control service. The responsibility for the control of an aircraft shall be transferred from a unit providing area control service to a unit providing approach control service, and vice versa, at a point or time agreed between the two units.
- 3.6.1.3 Between a unit providing approach control service and an aerodrome control tower
- 3.6.1.3.1 Arriving aircraft. The responsibility for the control of an arriving aircraft shall be transferred from the unit providing approach control service to the aerodrome control tower, when the aircraft:
- a) is in the vicinity of the aerodrome, and:

- 1) it is considered that approach and landing will be completed in visual reference to the ground, or
 - 2) it has reached uninterrupted visual meteorological conditions, or
- b) is at a prescribed point or level, as specified in letters of agreement or ATS unit instructions; or
 - c) 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.

3.6.1.3.2 Departing aircraft. The responsibility for control of a departing aircraft shall be transferred from the aerodrome control tower to the unit providing approach control service:

- a) 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 unit instructions;
- b) 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.

Note. — See Note following 3.6.1.3.1.

3.6.1.4 Between control sectors/positions within the same air traffic control unit
The responsibility for control of an aircraft shall be transferred from one control sector/position to another control sector/position within the same air traffic control unit at a point, level or time, as specified in ATS unit instructions.

3.6.2 Coordination of transfer

3.6.2.1 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 3.6.2.2, 3.6.2.2.1, 3.6.2.2.2 and 3.6.2.3.

- 3.6.2.2 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.
- 3.6.2.2.1 Where transfer of control is to be effected using radar or ADS-B data, 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.
- 3.6.2.2.2 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.
- 3.6.2.3 The accepting control unit shall:
- a) 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
 - b) 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.
- 3.6.2.4 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.
- 3.6.2.5 Applicable coordination procedures, including transfer of control points, shall be specified in letters of agreement and ATS unit instructions as appropriate.

3.7 Air Traffic Control Clearances

Air traffic control clearances shall be based solely on the requirements for providing air traffic control service.

3.7.1 Contents of clearances

3.7.1.1 An air traffic control clearance shall indicate:

- a) aircraft identification as shown in the flight plan;
- b) clearance limit;
- c) route of flight;
- d) 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 CAD 2.

- e) 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.

3.7.1.2 Standard departure and arrival routes and associated procedures shall be established when necessary to facilitate:

- a) the safe, orderly and expeditious flow of air traffic; and
- b) 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 (ICAO Doc 9426). The design criteria are contained in PANS-OPS, Volume II (ICAO Doc 8168).

3.7.2 Clearances for transonic flight

3.7.2.1 The air traffic control clearance relating to the transonic acceleration phase of a supersonic flight shall extend at least to the end of that phase.

3.7.2.2 The air traffic control clearance relating to the deceleration and descent of an aircraft from supersonic cruise to subsonic flight shall provide for uninterrupted descent, at least during the transonic phase.

3.7.3 Read-back of clearances and safety-related information

3.7.3.1 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:

- a) ATC route clearances;
- b) clearances and instructions to enter, land on, take off from, hold short of, cross and backtrack on any runway; and
- c) 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.

3.7.3.1.1 Other clearances or instructions, including conditional clearances, shall be read back or acknowledged in a manner to clearly indicate that they have been understood and will be complied with.

3.7.3.1.2 The air traffic 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.

- 3.7.3.2 Unless specified by the appropriate ATS authority, voice read-back of CPDLC messages shall not be required.

Note. — *The procedures and provisions relating to the exchange and acknowledgement of CPDLC messages are contained in CAD 10, Volume II, and PANS-ATM, Chapter 14.*

3.7.4 Coordination of clearances

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 as follows:

- 3.7.4.1 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.*

- 3.7.4.2 When coordination as in 3.7.4.1 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.

- 3.7.4.2.1 When prescribed by the appropriate ATS authority, aircraft shall contact a downstream air traffic control unit, for the purpose of receiving a downstream clearance prior to the transfer of control point.

- 3.7.4.2.1.1 Aircraft shall maintain the necessary two-way communication with the current air traffic control unit whilst obtaining a downstream clearance.

- 3.7.4.2.1.2 A clearance issued as a downstream clearance shall be clearly identifiable as such to the pilot.

- 3.7.4.2.1.3 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.

Note. — *Requirements relating to the application of downstream clearance delivery service are specified in CAD 10, Volume II. Guidance*

material is contained in the Manual of Air Traffic Services Data Link Applications (ICAO Doc 9694).

- 3.7.4.2.1.4 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.
- 3.7.4.3 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 centres concerned, coordination with the subsequent area control centre shall be effected prior to issuance of the departure clearance.
- 3.7.4.4 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.
- 3.7.5 Air traffic flow management
- 3.7.5.1 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.
- Note 1. — The capacity of the air traffic control services concerned will normally be declared by the appropriate ATS authority.*
- Note 2. — The provisions and guidelines for ATS system capacity are contained in Chapter 8 of this document.*
- 3.7.5.2 ATFM shall be implemented on the basis of Asia/Pacific Air Navigation Planning and Implementation Regional Work Group (APANPIRG) or, if appropriate, through multilateral agreements. Such agreements shall make provision for common procedures and common methods of capacity determination.
- 3.7.5.3 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.
- Note 1. — Operators concerned will normally be advised, in advance where possible, of restrictions imposed by the ATFM unit when such is established.*

Note 2. — Materials relating to the implementation of ATFM and associated procedures are contained in the CAD 1101.

3.8 Control of Persons and Vehicles at Aerodromes

3.8.1 The movement of persons or vehicles including towed aircraft on the manoeuvring 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.

3.8.2 In conditions where low visibility procedures are in operation:

- a) persons and vehicles operating on the manoeuvring 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;
- b) subject to the provisions in 3.8.3, the minimum separation between vehicles and taxiing aircraft shall be as prescribed by the appropriate ATS authority taking into account the aids available; and
- c) 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) (ICAO Doc 9476).

3.8.3 Emergency vehicles proceeding to the assistance of an aircraft in distress shall be afforded priority over all other surface movement traffic.

3.8.4 Subject to the provisions in 3.8.3, vehicles on the manoeuvring 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; and
- d) notwithstanding the provisions of a), b) and c), vehicles and vehicles towing aircraft shall comply with instructions issued by the aerodrome control tower.

3.9 Provision of radar and ADS-B

Where applicable, 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.

3.10 Use of Surface Movement Radar (SMR)

In the absence of visual observation of all or part of the manoeuvring area or to supplement visual observation, SMR provided in accordance with the provisions of CAD 14, Volume I, or other suitable surveillance equipment, shall be utilised to:

- a) monitor the movement of aircraft and vehicles on the manoeuvring 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 manoeuvring area.

Note. — See the *Manual of Surface Movement Guidance and Control Systems (SMGCS) (ICAO Doc 9476)*, the *Advanced-Surface Movement Guidance and Control Systems (A-SMGCS) Manual (ICAO Doc 9830)* and the *Air Traffic Services Planning Manual (ICAO Doc 9426)* for guidance on the use of SMR.

3.11 Reciprocal runway operations

Where applicable, the aerodrome and/or approach control units shall ensure that the procedure is established before allowing an aircraft to land and take-off;

- a) from non-duty runway; or
- b) reciprocal runway; or
- c) at airport with unidirectional operation where one direction is used for landings while the other direction for departures.

4 Flight Information Service

4.1 Application

4.1.1 Flight information service shall be provided to all aircraft which are likely to be affected by the information and which are:

- a) provided with air traffic control service; or
- b) otherwise known to the relevant ATS 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.

4.1.2 Where ATS 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 recognised 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.

4.2 Scope of flight information service

4.2.1 Flight information service shall include the provision of pertinent:

- a) SIGMET and AIRMET information;
- b) information concerning pre-eruption volcanic activity, volcanic eruptions and volcanic ash clouds;
- c) information concerning the release into the atmosphere of radioactive materials or toxic chemicals;
- d) information on changes in the availability of radio navigation services;
- e) 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 snow, ice or significant depth of water;
- f) information on unmanned free balloons; and of any other information likely to affect safety.

4.2.2 Flight information service provided to flights shall include, in addition to that outlined in 4.2.1, the provision of information concerning:

- a) weather conditions reported or forecast at departure, destination and alternate aerodromes; or
- b) collision hazards, to aircraft operating in airspace Classes C and G; or

- c) 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 ATS 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 airspace. Guidance on traffic information broadcasts by aircraft and related operating procedures is contained in Attachment B.

- 4.2.3 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 ATS authorities concerned.
- 4.2.4 Flight information service provided to VFR flights shall include, in addition to that outlined in 4.2.1, 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.

4.3 Operational flight information service broadcasts

4.3.1 Application

- 4.3.1.1 The meteorological information and operational information concerning radio navigation services and aerodromes included in the flight information service shall, whenever available, be provided in an operationally integrated form.
- 4.3.1.2 Where integrated operational flight information messages are to be transmitted to aircraft, they shall be transmitted with the content and, where specified, in the sequence indicated, for the various phases of flight.
- 4.3.1.3 Operational flight information service broadcasts, when provided, shall consist of messages containing integrated information regarding selected operational and meteorological elements appropriate to the various phases of flight. These broadcasts shall be of three major types, i.e. HF, VHF and ATIS where applicable.
- 4.3.1.4 Use of the OFIS messages in directed request/reply transmissions
When requested by the pilot, the applicable OFIS message(s) shall be transmitted by the appropriate ATS unit.

4.3.2 HF operational flight information service (OFIS) broadcasts

- 4.3.2.1 HF operational flight information service (OFIS) broadcasts shall be provided when it has been determined by regional air navigation agreements that a requirement exists.
- 4.3.2.2 Whenever such broadcasts are provided:
- a) the information shall be in accordance with 4.3.2.5, as applicable, subject to regional air navigation agreements;
 - b) the aerodromes for which reports and forecasts are to be included shall be as determined by regional air navigation agreements;
 - c) the time-sequencing of stations participating in the broadcast shall be as determined by regional air navigation agreements;
 - d) the HF OFIS broadcast message shall take into consideration human performance. The broadcast message shall not exceed the length of time allocated for it by regional air navigation agreements, care being taken that the readability is not impaired by the speed of the transmission;
- Note. — Guidance material on human performance can be found in the Human Factors Training Manual (ICAO Doc 9683).*
- e) each aerodrome message shall be identified by the name of the aerodrome to which the information applies;
 - f) when information has not been received in time for a broadcast, the latest available information shall be included together with the time of that observation;
 - g) the full broadcast message shall be repeated if this is feasible within the remainder of the time allotted to the broadcasting station;
 - h) the broadcast information shall be updated immediately a significant change occurs; and
 - i) the HF OFIS message shall be prepared and disseminated by the most appropriate unit(s) as designated by the CEO.
- 4.3.2.3 Pending the development and adoption of a more suitable form of speech for universal use in aeronautical radiotelephony communications, HF OFIS broadcasts concerning aerodromes designated for use by international air services shall be available in the English language.
- 4.3.2.4 Where HF OFIS broadcasts are available in more than one language, a discrete channel shall be used for each language.
- 4.3.2.5 HF operational flight information service broadcast messages shall contain the following information in the sequence indicated or as determined by regional air navigation agreements:
- a) En-route weather information

Information on significant en-route weather phenomena shall be in the form of available SIGMET as prescribed in CAD 3.

- b) Aerodrome information including:
- 1) name of aerodrome;
 - 2) time of observation;
 - 3) essential operational information;
 - 4) surface wind direction and speed; if appropriate, maximum wind speed;
 - 5) *visibility and, when applicable, runway visual range (RVR);
 - 6) *present weather;
 - 7) *cloud below 1 500 m (5 000 ft) or below the highest minimum sector altitude, whichever is greater; cumulonimbus; if the sky is obscured, vertical visibility when available; and
 - 8) aerodrome forecast.

*Note. — * These elements are replaced by the term “CAVOK” whenever the conditions as specified in the CAD 1101 prevail.*

4.3.3 VHF operational flight information service (OFIS) broadcasts

4.3.3.1 VHF operational flight information service broadcasts shall be provided as determined by regional air navigation agreements.

4.3.3.2 Whenever such broadcasts are provided:

- a) the aerodromes for which reports and forecasts are to be included shall be as determined by regional air navigation agreements;
- b) each aerodrome message shall be identified by the name of the aerodrome to which the information applies;
- c) when information has not been received in time for a broadcast, the latest available information shall be included together with the time of that observation;
- d) the broadcasts shall be continuous and repetitive;
- e) The VHF OFIS broadcast message shall take into consideration human performance. The broadcast message shall, whenever practicable, not exceed five minutes, care being taken that the readability is not impaired by the speed of the transmission;

Note. — Guidance material on human performance can be found in the Human Factors Training Manual (ICAO Doc 9683).

- f) the broadcast message shall be updated on a scheduled basis as determined by regional air navigation agreements. In addition, it shall be expeditiously updated immediately a significant change occurs; and
- g) the VHF OFIS message shall be prepared and disseminated by the most appropriate unit(s) as designated by each State.

4.3.3.3 Pending the development and adoption of a more suitable form of speech for universal use in aeronautical radiotelephony communications, VHF OFIS broadcasts concerning aerodromes designated for use by international air services shall be available in the English language.

4.3.3.4 Where VHF OFIS broadcasts are available in more than one language, a discrete channel shall be used for each language.

4.3.3.5 VHF operational flight information service broadcast messages shall contain the following information in the sequence indicated:

- a) name of aerodrome;
- b) time of observation;
- c) landing runway;
- d) significant runway surface conditions and, if appropriate, braking action;
- e) changes in the operational state of the radio navigation services, if appropriate;
- f) holding delay, if appropriate;
- g) surface wind direction and speed; if appropriate, maximum wind speed;
- h) *visibility and, when applicable, runway visual range (RVR);
- i) *present weather;
- j) *cloud below 1 500 m (5 000 ft) or below the highest minimum sector altitude, whichever is greater; cumulonimbus; if the sky is obscured, vertical visibility, when available;
- k) †air temperature;
- l) †dew point temperature;
- m) †QNH altimeter setting;
- n) supplementary information on recent weather of operational significance and, where necessary, wind shear;
- o) trend forecast, when available; and
- p) notice of current SIGMET messages.

Note 1. — These elements are replaced by the term “CAVOK” whenever the conditions as specified in the CAD 1101 prevail.

Note 2. — As determined on the basis of regional air navigation agreements.

4.3.4 Voice-automatic terminal information service (Voice-ATIS) broadcasts

4.3.4.1 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.

4.3.4.2 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.

4.3.4.3 Voice-ATIS broadcasts shall not be transmitted on the voice channel of an ILS.

4.3.4.4 Whenever Voice-ATIS is provided, the broadcast shall be continuous and repetitive.

4.3.4.5 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 take-off, whenever the message has not been prepared by that (those) unit(s).

Note. — The requirements for the provision of ATIS that applies to both Voice-ATIS and D- ATIS are contained in 4.3.5 below.

4.3.4.6 Voice-ATIS broadcasts provided at designated aerodromes for use by international air services shall be available in the English language.

4.3.4.7 The Voice-ATIS broadcast message shall, whenever practicable, not exceed 30 seconds, care being taken that the readability of the ATIS message is not impaired by the speed of the transmission or by the identification signal of a navigation aid used for transmission of ATIS. The ATIS broadcast message shall take into consideration human performance.

Note. — *Guidance material on human performance can be found in the Human Factors Training Manual (ICAO Doc 9683).*

4.3.5 Data link-automatic terminal information service (D-ATIS)

4.3.5.1 Where a D-ATIS supplements the existing availability of Voice-ATIS, the information shall be identical in both content and format to the applicable Voice-ATIS broadcast.

4.3.5.1.1 Where real-time meteorological information is included but the data remains within the parameters of the significant change criteria, the content, for the purpose of maintaining the same designator, shall be considered identical.

Note. — *Significant change criteria are specified in 2.3.2 of Appendix 3 to CAD 3.*

4.3.5.2 Where a D-ATIS supplements the existing availability of Voice-ATIS and the ATIS requires updating, Voice- ATIS and D-ATIS shall be updated simultaneously.

Note. — *Guidance material relating to D-ATIS is contained in the Manual of Air Traffic Services Data Link Applications (ICAO Doc 9694). The technical requirements for the D-ATIS application are contained in CAD 10, Volume III, Part I, Chapter 3.*

4.3.6 Automatic terminal information service (voice and/or data link)

4.3.6.1 Whenever Voice-ATIS and/or D-ATIS is provided:

- a) the information communicated shall relate to a single aerodrome;
- b) the information communicated shall be updated immediately a significant change occurs;
- c) the preparation and dissemination of the ATIS message shall be the responsibility of the air traffic services;
- d) individual ATIS messages shall be identified by a designator in the form of a letter of the ICAO spelling alphabet. Designators assigned to consecutive ATIS messages shall be in alphabetical order;
- e) aircraft shall acknowledge receipt of the information upon establishing communication with the ATS unit providing approach control service or the aerodrome control tower, as appropriate;
- f) the appropriate ATS unit shall, when replying to the message in e) above or, in the case of arriving aircraft, at such other time as may be prescribed by the appropriate ATS authority, provide the aircraft with the current altimeter setting; and
- g) the meteorological information shall be extracted from the local meteorological routine or special report.

Note 1. — In accordance with CAD 3, the surface wind direction and speed and runway visual range (RVR) are to be averaged over 2 minutes and 1 minute, respectively; and the wind information is to refer to conditions along the runway for departing aircraft and to conditions at the touchdown zone for arriving aircraft. A template for the local meteorological report, including the corresponding ranges and resolutions of each element, are in CAD 3. Additional criteria for the local meteorological report are contained in CAD 3.

Note 2. — MET Malaysia as the MET service provider has not implemented the local meteorological routine or special report as specified in CAD 3. Where applicable, ATS providers shall use real-time weather conditions from the visual automated weather observation system (AWOS) and automated wind and runway visual range (WRVR) located along the runways.

- 4.3.6.2 When rapidly changing meteorological conditions make it inadvisable to include a weather report in the ATIS, the ATIS messages shall indicate that the relevant weather information will be given on initial contact with the appropriate ATS unit.
- 4.3.6.3 Information contained in a current ATIS, the receipt of which has been acknowledged by the aircraft concerned, need not be included in a directed transmission to the aircraft, with the exception of the altimeter setting, which shall be provided in accordance with 4.3.6.1 f).
- 4.3.6.4 If an aircraft acknowledges receipt of an ATIS that is no longer current, any element of information that needs updating shall be transmitted to the aircraft without delay.
- 4.3.6.5 Contents of ATIS shall be kept as brief as possible. Information additional to that specified in 4.3.7 to 4.3.9, for example information already available in the AIPs and NOTAM, shall only be included when justified in exceptional circumstances.

Note. — Where applicable, the meteorological information shall be extracted from the local METAR when the local meteorological routine or special report as specified in 4.3.6.1 g) above is not available.

- 4.3.7 ATIS for arriving and departing aircraft
ATIS messages containing both arrival and departure information shall contain the following elements of information in the order listed:
- a) name of aerodrome;
 - b) arrival and/or departure indicator;
 - c) contract type, if communication is via D-ATIS;
 - d) designator;
 - e) time of observation, if appropriate;
 - f) type of approach(es) to be expected;

- g) the runway(s) in use; status of arresting system constituting a potential hazard, if any;
- h) significant runway surface conditions and, if appropriate, braking action;
- i) holding delay, if appropriate;
- j) transition level, if applicable;
- k) other essential operational information;
- l) surface wind direction (in degrees magnetic) and speed, including significant variations and, if surface wind sensors related specifically to the sections of runway(s) in use are available and the information is required by operators, the indication of the runway and the section of the runway to which the information refers;
- m) *visibility and, when applicable, RVR and, if visibility/RVR sensors related specifically to the sections of runway(s) in use are available and the information is required by operators, the indication of the runway and the section of the runway to which the information refers;
- n) *present weather;
- o) *cloud below 1 500 m (5 000 ft) or below the highest minimum sector altitude, whichever is greater; cumulonimbus; if the sky is obscured, vertical visibility when available;
- p) air temperature;
- q) **dew point temperature;
- r) altimeter setting(s);
- s) any available information on significant meteorological phenomena in the approach and climbout areas including wind shear, and information on recent weather of operational significance;
- t) trend forecast, when available; and
- u) specific ATIS instructions.

*Note 1. — * These elements are replaced by the term “CAVOK” whenever the conditions as specified in the CAD 1101 ATM, Chapter 11 prevail.*

*Note 2. — ** As determined on the basis of regional air navigation agreements.*

4.3.8 ATIS for arriving aircraft

ATIS messages containing arrival information only shall contain the following elements of information in the order listed:

- a) name of aerodrome;
- b) arrival indicator;

- c) contract type, if communication is via D-ATIS;
- d) designator;
- e) time of observation, if appropriate;
- f) type of approach(es) to be expected;
- g) main landing runway(s); status of arresting system constituting a potential hazard, if any;
- h) significant runway surface conditions and, if appropriate, braking action;
- i) holding delay, if appropriate;
- j) transition level, if applicable;
- k) other essential operational information;
- l) surface wind direction (in degrees magnetic) and speed, including significant variations and, if surface wind sensors related specifically to the sections of runway(s) in use are available and the information is required by operators, the indication of the runway and the section of the runway to which the information refers;
- m) *visibility and, when applicable, RVR and, if visibility/RVR sensors related specifically to the sections of runway(s) in use are available and the information is required by operators, the indication of the runway and the section of the runway to which the information refers;
- n) *present weather;
- o) *cloud below 1 500 m (5 000 ft) or below the highest minimum sector altitude, whichever is greater; cumulonimbus; if the sky is obscured, vertical visibility when available;
- p) air temperature;
- q) **dew point temperature;
- r) altimeter setting(s);
- s) any available information on significant meteorological phenomena in the approach area including wind shear, and information on recent weather of operational significance;
- t) trend forecast, when available; and
- u) specific ATIS instructions.

*Note 1. — * These elements are replaced by the term “CAVOK” whenever the conditions as specified in the CAD 1101 prevail.*

*Note 2. — ** As determined on the basis of regional air navigation agreements.*

- 4.3.9 ATIS for departing aircraft
ATIS messages containing departure information only shall contain the following elements of information in the order listed:
- a) name of aerodrome;
 - b) departure indicator;
 - c) contract type, if communication is via D-ATIS;
 - d) designator;
 - e) time of observation, if appropriate;
 - f) runway(s) to be used for take-off; status of arresting system constituting a potential hazard, if any;
 - g) significant surface conditions of runway(s) to be used for take-off and, if appropriate, braking action;
 - h) departure delay, if appropriate;
 - i) transition level, if applicable;
 - j) other essential operational information;
 - k) surface wind direction (in degrees magnetic) and speed, including significant variations and, if surface wind sensors related specifically to the sections of runway(s) in use are available and the information is required by operators, the indication of the runway and the section of the runway to which the information refers;
 - l) *visibility and, when applicable, RVR and, if visibility/RVR sensors related specifically to the sections of runway(s) in use are available and the information is required by operators, the indication of the runway and the section of the runway to which the information refers;
 - m) *present weather;
 - n) *cloud below 1 500 m (5 000 ft) or below the highest minimum sector altitude, whichever is greater; cumulonimbus; if the sky is obscured, vertical visibility when available;
 - o) air temperature;
 - p) **dew point temperature;
 - q) altimeter setting(s);
 - r) any available information on significant meteorological phenomena in the climb out area including wind shear;
 - s) trend forecast, when available; and
 - t) specific ATIS instructions.

*Note 1. — * These elements are replaced by the term “CAVOK” whenever the conditions as specified in the CAD 1101 prevail.*

*Note 2. — ** As determined on the basis of regional air navigation agreements. CAD 3, 11.5 and 11.6 provide details of VOLMET broadcasts and DVOLMET service.*

4.4 VOLMET broadcasts and D-VOLMET service

4.4.1 HF and/or VHF VOLMET broadcasts and/or D-VOLMET service shall be provided when it has been determined by regional air navigation agreements that a requirement exists.

4.4.2 VOLMET broadcasts shall use standard radiotelephony phraseologies.

Note. — Guidance on standard radiotelephony phraseologies to be used in VOLMET broadcasts is given in the Manual on Coordination between Air Traffic Services, Aeronautical Information Services and Aeronautical Meteorological Services (ICAO Doc 9377), Appendix 1.

5 Alerting Service

5.1 Application

5.1.1 Alerting service shall be provided:

- a) for all aircraft provided with air traffic control service;
- b) in so far as practicable, to all other aircraft having filed a flight plan or otherwise known to the ATS; and
- c) to any aircraft known or believed to be the subject of unlawful interference.

5.1.2 Flight information centres or area control centres shall serve as the central point for collecting 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 (RCC).

5.1.3 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 flight information centre or area control centre responsible which shall in turn notify the RCC, except that notification of the area control centre, flight information centre, or RCC shall not be required when the nature of the emergency is such that the notification would be superfluous.

5.1.4 Nevertheless, 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 organisations which can give the immediate assistance required.

5.2 Notification of RCCs

5.2.1 Without prejudice to any other circumstances that may render such notification advisable, ATS units shall, except as prescribed in 5.5.1, notify the RCC immediately an aircraft is considered to be in a state of emergency in accordance with the following:

- a) Uncertainty phase when:
 - 1) no communication has been received from an aircraft within a period of thirty minutes after the time a communication should 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
 - 2) an aircraft fails to arrive within thirty minutes of the estimated time of arrival last notified to or estimated by ATS units, whichever is the later, except when no doubt exists as to the safety of the aircraft and its occupants.
- b) Alert phase when:

- 1) 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
 - 2) 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
 - 3) 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, except when evidence exists that would allay apprehension as to the safety of the aircraft and its occupants, or when
 - 4) an aircraft is known or believed to be the subject of unlawful interference.
- c) Distress phase when:
- 1) 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
 - 2) the fuel on board is considered to be exhausted, or to be insufficient to enable the aircraft to reach safety, or when
 - 3) 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
 - 4) information is received or it is reasonably certain that the aircraft is about to make or has made a forced landing,
except when there is reasonable certainty that the aircraft and its occupants are not threatened by grave and imminent danger and do not require immediate assistance.

5.2.2 The notification shall contain such of the following information as is available in the order listed:

- a) INCERFA, ALERFA or DETRESFA, as appropriate to the phase of the emergency;
- b) agency and person calling;
- c) nature of the emergency;
- d) significant information from the flight plan;
- e) unit which made last contact, time and means used;
- f) last position report and how determined;
- g) colour and distinctive marks of aircraft;
- h) dangerous goods carried as cargo;
- i) any action taken by reporting office; and
- j) other pertinent remarks.

5.2.2.1 Such part of the information specified in 5.2.2, which is not available at the time notification is made to a RCC, shall be sought by an ATS unit prior to the declaration of a distress phase, if there is reasonable certainty that this phase will eventuate.

5.2.3 Further to the notification in 5.2.1, the RCC shall, without delay, be furnished with:

- a) any useful additional information, especially on the development of the state of emergency through subsequent phases; or
- b) information that the emergency situation no longer exists.

Note. — *The cancellation of action initiated by the RCC is the responsibility of that RCC.*

5.3 Use of communication facilities

ATS units shall, as necessary, use all available communication facilities to endeavour to establish and maintain communication with an aircraft in a state of emergency, and to request news of the aircraft.

1.1 Plotting aircraft in a state of emergency

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.

5.4 Information to the operator

5.4.1 When an area control or a flight information centre decides that an aircraft is in the uncertainty or the alert phase, it shall, when practicable, advise the operator prior to notifying the RCC.

Note. — *If an aircraft is in the distress phase, the RCC has to be notified immediately in accordance with 5.2.1.*

5.4.2 All information notified to the RCC by an area control or flight information centre shall, whenever practicable, also be communicated, without delay, to the operator.

5.5 Information to aircraft operating in the vicinity of an aircraft in a state of emergency

5.5.1 When it has been established by an ATS unit 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 5.6.2, be informed of the nature of the emergency as soon as practicable.

5.5.2 When an ATS unit knows or believes 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 aggravate the situation.

6 ATS Requirements for Communications

6.1 Aeronautical mobile service (air-ground communications)

6.1.1 General

6.1.1.1 Radiotelephony and/or data link shall be used in air-ground communications for ATS purposes.

Note. — Requirements for ATS units to be provided with and to maintain guard on the emergency channel 121.5 MHz are specified in CAD 10, Volumes II and V.

6.1.1.2 Where RCP types have been prescribed the CEO for ATM functions, ATS units shall, in addition to the requirements specified in 6.1.1.1, be provided with communication equipment which will enable them to provide ATS in accordance with the prescribed RCP type(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 (ICAO Doc 9869).

6.1.1.3 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.

Note. — Requirements for retention of all automatic recordings of communications in ATC are specified in CAD 10, Volume II, 3.5.1.5.

6.1.1.4 Recordings of communications channels as required in paragraph 6.1.1.3 shall be retained for a period of at least thirty days.

6.1.2 For flight information service

6.1.2.1 Air-ground communication facilities shall enable two-way communications to take place between a unit providing flight information service and appropriately equipped aircraft flying anywhere within the flight information region.

6.1.2.2 Whenever practicable, air-ground communication facilities for flight information service shall permit direct, rapid, continuous and static-free two-way communications.

6.1.3 For area control service

6.1.3.1 Air-ground communication facilities shall enable two-way communications to take place between a unit providing area control service and appropriately equipped aircraft flying anywhere within the control area(s).

- 6.1.3.2 Whenever practicable, air-ground communication facilities for area control service shall permit direct, rapid, continuous and static-free two-way communications.
- 6.1.3.3 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.
- 6.1.4 For approach control service
- 6.1.4.1 Air-ground communication facilities shall enable direct, rapid, continuous and static-free two-way communications to take place between the unit providing approach control service and appropriately equipped aircraft under its control.
- 6.1.4.2 Where the unit providing approach control service functions as a separate unit, air-ground communications shall be conducted over communication channels provided for its exclusive use.
- 6.1.5 For aerodrome control service
- 6.1.5.1 Air-ground communication facilities shall enable direct, rapid, continuous and static-free two-way communications to take place between an aerodrome control tower and appropriately equipped aircraft operating at any distance within 45 km (25 NM) of the aerodrome concerned.
- 6.1.5.2 Where conditions warrant, separate communication channels shall be provided for the control of traffic operating on the manoeuvring area.

6.2 Aeronautical Fixed Service (Ground-Ground Communications)

6.2.1 General

- 6.2.1.1 Direct-speech and/or data link communications shall be used in ground-ground communications for ATS purposes.

Note 1. — Indication by time of the speed with which the communication should be established is provided as a guide to communication services, particularly to determine the types of communication channels required, e.g. that “instantaneous” is intended to refer to communications which effectively provide for immediate access between controllers; “fifteen seconds” to accept switchboard operation and “five minutes” to mean methods involving retransmission.

Note 2. — Requirements for retention of all automatic recordings of communications in ATC are specified in CAD 10, Volume II, 3.5.1.5.

6.2.2 Communications within a flight information region

6.2.2.1 Communications between ATS units

- 6.2.2.1.1 A flight information centre shall have facilities for communications with the following units providing a service within its area of responsibility:
- a) the area control centre, unless collocated;
 - b) approach control units; and
 - c) aerodrome control towers.
- 6.2.2.1.2 An area control centre, in addition to being connected to the flight information centre as prescribed in 6.2.2.1.1, shall have facilities for communications with the following units providing a service within its area of responsibility:
- a) approach control units;
 - b) aerodrome control towers; and
 - c) ATS reporting offices, when separately established.
- 6.2.2.1.3 An approach control unit, in addition to being connected to the flight information centre and the area control centre as prescribed in 6.2.2.1.1 and 6.2.2.1.2, shall have facilities for communications with the associated aerodrome control tower(s) and, when separately established, the associated ATS reporting office(s).
- 6.2.2.1.4 An aerodrome control tower, in addition to being connected to the flight information centre, the area control centre and the approach control unit as prescribed in 6.2.2.1.1, 6.2.2.1.2 and 6.2.2.1.3, shall have facilities for communications with the associated ATS reporting office, when separately established.
- 6.2.2.2 Communications between ATS units and other units
- 6.2.2.2.1 A flight information centre and an area control centre shall have facilities for communications with the following units providing a service within their respective area of responsibility:
- a) appropriate military units;
 - b) the meteorological office serving the centre;
 - c) the aeronautical telecommunications station serving the centre;
 - d) appropriate operator's offices;
 - e) the RCC or, in the absence of such centre, any other appropriate emergency service; and
 - f) the international NOTAM office serving the centre.

- 6.2.2.2.2 An approach control unit and an aerodrome control tower shall have facilities for communications with the following units providing a service within their respective area of responsibility:
- a) appropriate military units;
 - b) rescue and emergency services (including ambulance, fire, etc.);
 - c) the meteorological office serving the unit concerned;
 - d) the aeronautical telecommunications station serving the unit concerned; and
 - e) the unit providing apron management service, when separately established.
- 6.2.2.2.3 The communication facilities required under 6.2.2.2.1 a) and 6.2.2.2.2 a) shall include provisions for rapid and reliable communications between the ATS unit concerned and the military unit(s) responsible for control of interception operations within the area of responsibility of the ATS unit.
- 6.2.2.3 Description of communication facilities
- 6.2.2.3.1 The communication facilities required under 6.2.2.1, 6.2.2.2.1 a) and 6.2.2.2.2 a), b) and c) shall include provisions for:
- a) 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
 - b) printed communications, when a written record is required; the message transit time for such communications being no longer than five minutes.
- 6.2.2.3.2 In all cases not covered by 6.2.2.3.1, the communication facilities shall include provisions for:
- a) communications by direct speech alone, or in combination with data link communications, whereby the communications can normally be established within fifteen seconds; and
 - b) printed communications, when a written record is required; the message transit time for such communications being no longer than five minutes.
- 6.2.2.3.3 In all cases where automatic transfer of data to and/or from ATS computers is required, suitable facilities for automatic recording shall be provided.
- 6.2.2.3.4 The communication facilities required in accordance with 6.2.2.1 and 6.2.2.2 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.

6.2.2.3.5 The communication facilities required under 6.2.2.2.2 a), b) and c) shall include provisions for communications by direct speech arranged for conference communications.

6.2.2.3.6 The communication facilities required under 6.2.2.2.2 d) shall include provisions for communications by direct speech arranged for conference communications, whereby the communications can normally be established within fifteen seconds.

6.2.2.3.7 All facilities for direct-speech or data link communications between ATS units and between ATS units and other units described under 6.2.2.2.1 and 6.2.2.2.2 shall be provided with automatic recording.

6.2.2.3.8 Recordings of data and communications as required in 6.2.2.3.3 and 6.2.2.3.7 shall be retained for a period of at least thirty days.

6.2.3 Communications between FIRs

6.2.3.1 Flight information centres and area control centres shall have facilities for communications with all adjacent flight information centres and area control centres.

6.2.3.1.1 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.

6.2.3.1.2 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, 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.

6.2.3.1.3 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 6.2.3.1.2 shall include provisions for direct speech alone, or in combination with data link communications. The communication facilities shall be provided with automatic recording.

- 6.2.3.1.4 The communication facilities in 6.2.3.1.3 shall permit communications to be established normally within fifteen seconds.
- 6.2.3.2 Adjacent ATS units shall be connected in all cases where special circumstances exist.
- Note. — Special circumstances may be due to traffic density, types of aircraft operations and/or the manner in which the airspace is organised and may exist even if the control areas and/or control zones are not contiguous or have not (yet) been established.*
- 6.2.3.3 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.
- 6.2.3.4 The communication facilities in 6.2.3.2 and 6.2.3.3 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, 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.
- 6.2.3.5 In all cases where automatic exchange of data between ATS computers is required, suitable facilities for automatic recording shall be provided.
- 6.2.3.6 Recordings of data and communications as required in 6.2.3.5 shall be retained for a period of at least thirty days.
- 6.2.4 Procedures for direct-speech Communications
- 6.2.4.1 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.
- 6.3 Surface movement control service**
- 6.3.1 Communications for the control of vehicles other than aircraft on manoeuvring areas at controlled aerodromes
- 6.3.1.1 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.

6.3.1.2 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.

6.3.1.3 Recordings of communications as required in 6.3.1.2 shall be retained for a period of at least thirty days.

Note. — See also CAD 10, Volume II, 3.5.1.5.

6.4 Aeronautical radio navigation service

6.4.1 Automatic recording of surveillance data

6.4.1.1 Surveillance data from primary and secondary radar equipment or other systems (e.g. ADS-B, ADS-C), used as an aid to ATS, shall be automatically recorded for use in accident and incident investigations, search and rescue, air traffic control and surveillance systems evaluation and training.

6.4.1.2 Automatic recordings shall be retained for a period of at least thirty days. When the recordings are pertinent to accident and incident investigations, they shall be retained for longer periods until it is evident that they will no longer be required.



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7 ATS Requirements for Information

7.1 Meteorological information

7.1.1 General

7.1.1.1 ATS 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 ATS personnel and with a frequency which satisfies the requirements of the ATS units concerned.

7.1.1.2 ATS 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.

Note. — The meteorological phenomena are listed in CAD 3, Chapter 4.

7.1.1.3 When computer-processed upper air data are made available to ATS units in digital form for use by ATS computers, the contents, format and transmission arrangements shall be as agreed between the Meteorological Authority and the appropriate ATS Authority.

7.1.2 Flight information centres and area control centres

7.1.2.1 Flight information centres and area control centres shall be supplied with meteorological information as described in CAD 3, Appendix 9, 1.3, particular emphasis being given to the occurrence or expected occurrence of weather deterioration as soon as this can be determined. These reports and forecasts shall cover the flight information region or control area and such other areas as may be determined on the basis of regional air navigation agreements.

Note. — For the purpose of this provision, certain changes in meteorological conditions are construed as deterioration in a weather element, although they are not ordinarily considered as such. An increase in temperature may, for example, adversely affect the operation of certain types of aircraft.

7.1.2.2 Flight information centres and area control centres shall be provided, at suitable intervals, with current pressure data for setting altimeters, for locations specified by the flight information centre or area control centre concerned.

7.1.3 Units providing approach control service

7.1.3.1 Units providing approach control service shall be supplied with meteorological information as described in CAD 3, Appendix 9, 1.2 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 indicators to which they are related shall be clearly marked to identify the runway and section of the runway monitored by each anemometer.

Note. — For the purpose of this provision, certain changes in meteorological conditions are construed as deterioration in a weather element, although they are not ordinarily considered as such. An increase in temperature may, for example, adversely affect the operation of certain types of aircraft.

7.1.3.2 Units providing approach control service shall be provided with current pressure data for setting altimeters, for locations specified by the unit providing approach control service.

7.1.3.3 Units 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.

7.1.3.4 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 in the aerodrome control tower and in the meteorological station, where such a station exists.

7.1.3.5 Units providing approach control service for final approach, landing and take-off 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 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.

7.1.3.6 Units 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.

Note. — Provisions concerning the issuance of wind shear warnings and alerts and ATS requirements for meteorological information are given in CAD 3, Chapter 7 and CAD 3 Appendices 6 and 9.

7.1.4 Aerodrome control towers

7.1.4.1 Aerodrome control towers shall be supplied with meteorological information as described in CAD 3, Appendix 9, 1.1 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.

Note. — For the purpose of this provision, certain changes in meteorological conditions are construed as deterioration in a weather element, although they are not ordinarily considered as such. An increase in temperature may, for example, adversely affect the operation of certain types of aircraft.

7.1.4.2 Aerodrome control towers shall be provided with current pressure data for setting altimeters for the aerodrome concerned.

7.1.4.3 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 sensor(s) 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 sensor.

7.1.4.4 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.

7.1.4.5 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 location(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.

7.1.4.6 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.

7.1.4.7 Aerodrome control towers and/or other appropriate units shall be supplied with aerodrome warnings.

Note. — The meteorological conditions for which aerodrome warnings are issued are listed in CAD 3, Appendix 6, 5.1.3.

7.1.5 Communication stations

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.

1.2 Information on aerodrome conditions and the operational status of associated facilities

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.

7.2 Information on the operational status of navigation services

7.2.1 ATS units shall be kept currently informed of the operational status of radio navigation services and visual aids essential for take-off, departure, approach and landing procedures within their area of responsibility and those radio navigation services and visual aids essential for surface movement.

7.2.2 Information on the operational status, and any changes thereto, of radio navigation services and visual aids as referred to in 7.3.1 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.

Note. — Guidance material regarding the provision of information to ATS units in respect to visual and non-visual navigation aids is contained in the Air Traffic Services Planning Manual (ICAO Doc 9426). Specifications for monitoring visual aids are contained in CAD 14, Volume I, and related guidance material is in the Aerodrome Design Manual (ICAO Doc 9157), Part 5. Specifications for monitoring non-visual aids are contained in CAD 10, Volume I.

7.3 Information on unmanned free balloons

Operators of unmanned free balloons shall keep the appropriate ATS units informed of details of flights of unmanned free balloons in accordance with the provisions contained in CAD 2.

7.4 Information concerning volcanic activity

7.4.1 ATS units shall be informed, in accordance with local agreement, of pre-eruption volcanic activity, volcanic eruptions and volcanic ash cloud which could affect airspace used by flights within their area of responsibility.

7.4.2 Area control centres and flight information centres shall be provided with volcanic ash advisory information issued by the associated VAAC.

Note. — VAACs are designated by regional air navigation agreements in accordance with CAD 3, 3.5.1.

7.5 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.

8 ATS Organisation

8.1 ATS personnel

Note. — The objective of this section is to ensure that human resources are properly managed with a view to minimising their contribution to accident/incident in the provision of ATS.

8.1.1 Job Description

8.1.1.1 The ATS providers shall identify the key personnel responsible for the safe conduct of the ATM. Their positions, responsibilities, functions, accountabilities and authorities are to be clearly defined. ATS provider shall also develop job descriptions for other ATM staff & other technical staff. Organisation chart indicating the specific responsibilities shall be provided.

8.1.1.2 The ATS authority shall document and define the method of determining staffing levels to ensure safe and efficient ATM operations.

8.1.2 Recruitment and retention of ATS staff

The ATS authority shall establish and implement policies and procedures to enable recruitment and retention of adequate, appropriate qualified and experienced ATS staff.

8.1.3 Training programme, assessment and training records

8.1.3.1 The ATS provider shall establish and implement training programmes and procedures to ensure the initial and continuing competence of operational personnel including continued competence (refresher) in using new equipment, procedures and updated communications.

Note. — The provisions and requirements for the licensing including ratings, validation and proficiency for air traffic controllers are contained in the Civil Aviation Regulations 2016, CAD 1 Personnel Licencing and CAD 1201 ATC Licencing.

8.1.3.2 The programmes and procedures in paragraph 9.1.3.1 shall ensure that operational personnel are trained, given regular recurrent training in normal and emergency procedures and are assessed on such.

8.1.3.3 The training programme and procedures shall include initial, recurrent and specialised training.

8.1.3.4 ATS providers shall maintain individual training records for each staff, which shall include a training plan detailing the courses completed by each staff.

8.1.4 Guidance material

8.1.4.1 ATS providers shall ensure that relevant ICAO documents and other technical and regulatory publications are readily available to all ATM personnel.

- 8.1.4.2 A technical library shall be available, to include any method to ensure receipt, control and distribution of the necessary technical documentation. The library shall be kept and maintained to ensure the currency of the documentations.

8.2 ATS operations manual

- 8.2.1 The ATS provider shall provide ATS in accordance with the Civil Aviation Act 1969, Civil Aviation Regulations 2016 Regulation 154, CAD 11, CAD 1101 and ICAO Doc 7030 as applicable.
- 8.2.2 The ATS provider shall publish the standard operating procedure as Manual of Air Traffic Services Volume 1 (MATS Vol.1) which supplement CAD 1101, act as guidance material for air traffic controllers and other operational staff tasked with the provision of ATS in their designated airspace.
- 8.2.3 MATS Vol.1 shall be submitted to ANS Standards Division for verification and shall be published under the authority of the CEO.
- 8.2.4 Detailed procedures to be employed by each ATS unit, with any applicable limitations, shall be set out in the unit's Manual of Air Traffic Services Volume 2 (MATS Vol.2).
- 8.2.5 The MATS shall be supplemented by directives in the form of Unit Operations Instructions (UOIs), Regional Operations Instructions (ROIs), Supplementary Operations Instructions (SOIs) and Letter of Agreements (LOAs) specific to each location.
- 8.2.6 UOI which contains information on permanent or temporary nature shall be published under the authority of the Regional Directors / Directors as appropriate.
- 8.2.7 UOI which contains information on permanent nature shall be incorporated into MATS Vol.2 while information on temporary nature shall be issued as an operating instruction that is self-cancelling.
- 8.2.8 The MATS Vol.2 shall describe the operational procedures of ATS unit(s) which comply with para 8.2.1, and shall include:
- a) the information required regarding hours of service, the establishment of an air traffic service and any transitional arrangements;
 - b) details of the procedures required regarding the control of documentation;
 - c) details of the systems and procedures regarding general information requirements that could have an operational impact on the air traffic service being provided;
 - d) details of the procedures required regarding the notification of facility status;

- e) details of the systems and procedures regarding meteorological information and reporting by ATS personnel;
- f) details of the procedures regarding the keeping of logbooks;
- g) procedures regarding shift administration;
- h) procedures to mitigate the effects of fatigue;
- i) procedures required regarding responsibility for control;
- j) systems and procedures regarding co-ordination requirements;
- k) the contingency plans as required in this document;
- l) procedures regarding incidents and accidents;
- m) systems and procedures regarding the retention and management of records;
- n) procedures regarding disruptions to service;
- o) procedures for issuing ATC clearances and obtaining a correct read-back of clearances and safety-related information;
- p) systems and procedures regarding the provision of approach control services, where applicable;
- q) systems and procedures regarding the provision of aerodrome control service, where applicable;
- r) procedures regarding the application of priorities;
- s) procedures regarding flow control, where applicable;
- t) procedures regarding the provision of flight information service;
- u) details of systems and procedures regarding the provision of aerodrome flight information service;
- v) systems and procedures regarding the provision of alerting service;
- w) procedures regarding the processing of flight plans;
- x) procedures regarding time system and accuracy in the provision of ATS;
- y) radiotelephony procedures;
- z) procedures regarding the provision of radar services, where applicable;
- aa) procedures regarding aircraft emergencies and irregular operation;
- bb) procedures for aircraft in the event of in-flight contingencies;
- cc) arrangements in place for provision of AIS to the unit; and
- dd) systems and procedures governing ATIS broadcasts.

- 8.2.9 MATS Vol.2 shall be submitted to ANS Standards Division for verification and shall be published under the authority of the CEO.

8.3 Records

The ATS provider shall maintain documents and records of operation and maintenance of the service for safety audit / inspection by the ATS regulator at any time. These documents shall include, inter alia:

- a) record of malfunction or fault of critical safety facilities and equipment;
- b) record of training programme and plan for each ATS staff;
- c) record and copy of certificates of all related trainings for each staff including where applicable, initial, OJT, recurrent and specialised training;
- d) safety risk management processes and the conduct of safety reviews;
- e) aircraft incidents investigations including abnormal occurrences and their related mitigation processes; and
- f) aircraft movement statistics, safety performance indicators including its related alerts and targets.

9 Equipment and Facilities

9.1 General

9.1.1 To function efficiently, an air traffic control system requires various equipment and facilities. Types and quantities of this equipment will vary with the complexity of the particular system. ATS authority shall meet the essential operational requirements apart from deciding which of the desirable features are reasonable.

9.1.2 ATS authority shall ensure that any automation systems generate and display flight plan, control and coordination data in a timely, accurate and easily recognisable manner, and in accordance with Human Factors principles.

9.1.3 ATS authority shall ensure that equipment, including input/output devices for automation systems, are designed and positioned in the control work position in accordance with ergonomic principles.

Note 1. — The Air traffic management (ATM) system should meet the requirements outlined in the ICAO vision for the integrated, harmonised, and globally interoperable ATM system.

Note 2. — The guidelines for the ground based navigation, surveillance and communications equipment generally be installed are contained in the Part III Section 1 of ATS Planning Manual (ICAO Doc 9426).

Note 3. — The guidelines for the facilities required by ATS are contained in the Part III Section 2 of ATS Planning Manual (ICAO Doc 9426).

9.2 Facilities and equipment maintenance

Note. — The definition of ATM is 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.

9.2.1 ATS providers shall ensure that:

- a) the facilities and equipment are maintained; and
- b) the environmental working conditions meet established levels for temperature, humidity, ventilation, noise and ambient lighting and do not adversely affect air traffic controller performance.

9.2.2 ATS providers shall ensure that the communications, navigation, surveillance and other safety significant systems, facilities, aids and equipment:

- a) are tested for normal operations on a routine basis;
- b) meet the required level of reliability and availability as defined by the appropriate authority;

- c) provide for the timely and appropriate detection and warning of system failures and degradations;
- d) include documentation on the consequences of system, subsystem and equipment failures and degradations;
- e) include measures to control the probability of failures and degradations; and
- f) include adequate backup facilities and/or procedures in the event of a system failure or degradation.

Note. — *In the context above, the terms reliability and availability have the following meanings:*

- 1) Reliability. The probability that a device or system will function without failure over a specified time period or amount of usage; and
- 2) Availability. The ratio of percentage of the time that a system is operating correctly to the total time in that period.

9.3 Failure or irregularity of aids, systems and equipment

- 9.3.1 ATC units shall immediately report in accordance with local instructions any failure or irregularity of communication, navigation and surveillance systems or any other safety significant systems, facilities, aids or equipment which could adversely affect the safety or equipment which or efficiency of flight operations and/or the provision of air traffic control service.
- 9.3.2 Aerodrome control towers shall immediately report in accordance with local instructions any failure or irregularity of operation in any equipment, light or other device established at an aerodrome for the guidance of aerodrome traffic and flight crews or required for the provision of air traffic control service.
- 9.3.3 ATS providers shall have system for reporting of unserviceability and detailed records of aids, systems, facilities and equipment serviceability are kept and periodically reviewed.

9.4 Facilities and equipment failure contingency plan

- 9.4.1 In order to reduce the impact of complete ground radio equipment failure on the safety of air traffic, the appropriate ATS authority shall establish contingency procedures to be followed by control positions and ATC units in the event of such failures. Where feasible and practicable, such contingency procedures shall provide for the delegation of control to an adjacent control position or ATC unit in order to permit a minimum level of services to be provided as soon as possible, following the ground radio failure and until normal operations can be resumed.
- 9.4.2 ATS providers shall have contingency plan for aids, systems, facilities and equipment failure procedures appropriate to the size, nature and complexity of the organisation.

- 9.4.3 The contingency plan shall address all possible or likely failure / crisis scenarios relating to the organisation’s aviation product or service deliveries.
- 9.4.4 The contingency plan shall include procedures for the continuing safe production, delivery or support of its aviation products or services during such failures / crisis.
- 9.4.5 There shall be a plan and record for drills or exercises with respect to the contingency plan.
- 9.4.6 The contingency plan shall address necessary coordination of its contingency procedures with the contingency procedures of other organisations where applicable.
- 9.4.7 The ATS provider shall have a process to distribute and communicate the contingency plan to all relevant personnel, including relevant external organisations.
- 9.4.8 There shall be a procedure for periodic review of the contingency plan to ensure its continuing relevance & effectiveness.



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10 Appendices

10.1 Appendix 1 - Principles Governing the Identification of Navigation Specifications and The Identification of ATS Routes Other Than Standard Departure and Arrival Routes

(Chapter 2, 2.7 and 2.13 refer)

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 (ICAO 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 CAD 4, and CAD 1501.

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 CAD 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 computerised 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.



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10.2 Appendix 2 - Principles Governing the Establishment and Identification of Significant points

(Chapter 2, 2.15 refers)

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 recognisable 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 (ICAO 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 recognisable 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.

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.



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10.3 Appendix 3 - Principles Governing the Identification of Standard Departure and Arrival Routes and Associated Procedures

(Chapter 2, 2.13 refers)

Note. — *Material relating to the establishment of standard departure and arrival routes and associated procedures is contained in the Air Traffic Services Planning Manual (ICAO 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 recognisable 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
- f) 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, 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 A 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.

10.4 Appendix 4 - ATS Airspace Classes — Services Provided and Flight Requirements.

(Chapter 2, 2.6 refers)

Class	Type of flight	Separation provided	Service provided	Speed limitation*	Radio communication requirement	Subject to an ATC clearance
A	IFR only	All aircraft	Air traffic control service	Not applicable	Continuous two-way	Yes
B	IFR	All aircraft	Air traffic control service	Not applicable	Continuous two-way	Yes
	VFR	All aircraft	Air traffic control service	Not applicable	Continuous two-way	Yes
C	IFR	IFR from IFR IFR from VFR	Air traffic control service	Not applicable	Continuous two-way	Yes
	VFR	VFR from IFR	1) Air traffic control service for separation from IFR; 2) VFR/VFR traffic information (and traffic avoidance advice on request)	250 kt IAS below 3 050 m (10 000 ft) AMSL	Continuous two-way	Yes
D	IFR	IFR from IFR	Air traffic control service, traffic information about VFR flights (and traffic avoidance advice on request)	250 kt IAS below 3 050 m (10 000 ft) AMSL	Continuous two-way	Yes
	VFR	Nil	IFR/VFR and VFR/VFR traffic information (and traffic avoidance advice on request)	250 kt IAS below 3 050 m (10 000 ft) AMSL	Continuous two-way	Yes
E	IFR	IFR from IFR	Air traffic control service and, as far as practical, traffic information about VFR flights	250 kt IAS below 3 050 m (10 000 ft) AMSL	Continuous two-way	Yes
	VFR	Nil	Traffic information as far as practical	250 kt IAS below 3 050 m (10 000 ft) AMSL	No	No
F	IFR	IFR from IFR as far as practical	Air traffic advisory service; flight information service	250 kt IAS below 3 050 m (10 000 ft) AMSL	Continuous two-way	No
	VFR	Nil	Flight information service	250 kt IAS below 3 050 m (10 000 ft) AMSL	No	No
G	IFR	Nil	Flight information service	250 kt IAS below 3 050 m (10 000 ft) AMSL	Continuous two-way	No
	VFR	Nil	Flight information service	250 kt IAS below 3 050 m (10 000 ft) AMSL	No	No

* When the height of the transition altitude is lower than 3 050 m (10 000 ft) AMSL, FL 100 should be used in lieu of 10 000 ft.



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10.5 Appendix 5 - 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 (ICAO Doc 9966).

1. The Service Provider's Responsibilities
 - a) Duty rosters should be prepared and published sufficiently in advance to provide ATCOs the opportunity to plan adequate rest. Consideration should be given to the cumulative effects of undertaking long duty hours interspersed with minimum non-work periods, and of avoiding rosters that result in the serious disruption of an established pattern of working and sleeping. Rosters should cover a period of one (1) month.
 - b) Minimum non-work periods need to provide adequate rest such that the ATCO can achieve a suitable sleep period, as well as allowing for consideration of other physiological requirements and any associated travelling or commuting time.
 - c) In order to avoid any detriment to an ATCO's performance, opportunities to consume a meal must be arranged when the duty period exceeds 6 hours.
 - d) The Service Provider should not require an ATCO to undertake any safety related task if it is known or suspected that the ATCO is fatigued to the extent that safety may be adversely affected.
 - e) To provide evidence of compliance with prescriptive limits, records will be kept for 6 months of the duties performed and non-duty periods achieved so as to facilitate inspection by the service's authorised personnel and audit by the Authority.
2. Air Traffic Controllers' Responsibilities
 - a) An ATCO should not perform any safety relevant tasks when he or she knows that he or she is fatigued or feels unfit to the extent that safety may be adversely affected.
 - b) ATCOs should make best use of the facilities and opportunities that are provided for rest and for the consumption of meals. They should plan and use rest periods to ensure that they are fully rested.
3. Duty Limitation Parameters
 - a) Duty Period
 - i. The duty period may not exceed 12 hours
 - ii. The aggregate of duty period hours may not exceed 200 hours within a defined period of 720 consecutive hours or 30 consecutive days
 - iii. There must be at least 12 hours between the end of one duty period and the beginning of the next
 - iv. No more than 6 consecutive days of duty shall be worked
 - v. If the maximum number of consecutive days of duty is rostered, there shall be a minimum interval of 60 hours between the end of one consecutive period of duty days and the next
 - b) Operational Duty
 - i. No period of operational duty shall exceed 2 hours

- ii. No operational duty shall exceed 2 hours without there being a break taken during or at the end of that period
 - iii. A break should total not less than 30 minutes
 - c) Night Duties
 - i. A period of night duty shall be defined as starting at 0130 local and ending at 0529 local
 - ii. A duty which covers all or part of the period of night duty shall not exceed 10 hours
 - iii. No more than 3 consecutive duties shall be worked which cover all or part of the period of night duty
 - iv. A minimum period of 54 hours shall occur between the end of duties which cover all or part of the period of night duty and the commencement of the next period of duty
 - d) On Call Duties
 - i. No more than 3 on-call duties shall be worked in a 7-day period
 - ii. The maximum length of on call period of duty where the ATCO does not attend the place of work shall be 20 hours
- 4. The ATS provider shall establish a process for assigning unscheduled duties that allows air traffic controllers to avoid extended periods of being awake.
- 5. Refer to 2.28.3 c) and d) service provider may apply variations from 3 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.

10.6 Appendix 6 - 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 (ICAO Doc 9966).

The ATS provider shall establish an FRMS contain, at a minimum:

1. FRMS policy and documentation

1.1. FRMS policy

1.1.1. The ATS provider shall define its FRMS policy, with all elements of the FRMS clearly identified.

1.1.2. The policy shall:

- e) define the scope of FRMS operations;
- f) reflect the shared responsibility of management, air traffic controllers, and other involved personnel;
- g) clearly state the safety objectives of the FRMS;
- h) be signed by the accountable executive of the organisation;
- i) be communicated, with visible endorsement, to all the relevant areas and levels of the organisation;
- j) declare management commitment to effective safety reporting;
- k) declare management commitment to the provision of adequate resources for the FRMS;
- l) declare management commitment to continuous improvement of the FRMS;
- m) require that clear lines of accountability for management, air traffic controllers, and all other involved personnel are identified; and
- n) require periodic reviews to ensure it remains relevant and appropriate.

Note. — Effective safety reporting is described in the Safety Management Manual (SMM) (ICAO Doc 9859).

1.2. FRMS documentation

An ATS 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 (ICAO 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 CAD 19.

An ATS 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 minimised. 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 ATS 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

An ATS 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 ATS 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 organisation 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 organisational 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

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 information.

10.7 Appendix 7 - State Responsibilities Concerning an Instrument Flight Procedure Design Service

(Chapter 2, 2.34 refers)

1. An ATS provider shall:
 - a) provide an instrument flight procedure design service; and/or
 - b) agree with one or more Contracting State(s) to provide a joint service; and/or
 - c) delegate the provision of the service to external agency(ies).
2. In all cases in paragraph 1 above, the ATS provider concerned shall approve and remain responsible for all instrument flight procedures for aerodromes and airspace under the authority of CAAM.
3. Instrument flight procedures shall be designed in accordance with CAAM design criteria.
4. The ATS provider shall ensure that an instrument flight procedure design service provider intending to design an instrument flight procedure for aerodromes or airspace under the authority of the ATS provider meets the requirements established by CAAM.

Note. — Guidance material for regulatory framework for the oversight of instrument flight procedure design service is contained CAD 620 - AFPDO.

5. The ATS provider shall ensure that an instrument flight procedure design service provider utilises a quality management system at each stage of the instrument flight procedure design process.

Note. — This requirement can be met by means of a quality assurance methodology, such as that described in PANS-OPS (ICAO Doc 8168), Volume II. Guidance for implementing such a methodology is contained in the Quality Assurance Manual for Flight Procedure Design (ICAO Doc 9906).

6. The ATS provider shall ensure that maintenance and periodic review of instrument flight procedures for aerodromes and airspace under the authority of the ATS provider are conducted. The ATS provider shall establish an interval for periodic review of instrument flight procedures not exceeding five years.

Note. — Guidance on maintenance and periodic review is contained in the Quality Assurance Manual for Flight Procedure Design (ICAO Doc 9906).



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11 Attachments

11.1 Attachment A - Material Relating to A Method of Establishing ATS Routes Defined by VOR

(Chapter 2, 2.7.1 and 2.13 refer)

1. Introduction

- 1.1. The guidance material in this Attachment results from comprehensive studies, carried out in Europe in 1972 and the United States in 1978, which were in general agreement.

Note. — *Details of the European studies are contained in Circular 120 — Methodology for the Derivation of Separation Minima Applied to the Spacing between Parallel Tracks in ATS Route Structures.*

- 1.2. In applying the guidance material in 3 and 4, it should be recognised that the data on which it is based are generally representative of navigation using VOR meeting the full requirements of Doc 8071 — Manual on Testing of Radio Navigation Aids, Volume I. Any additional factors, such as those due to particular operational requirements, frequency of aircraft passings or information available regarding the actual track-keeping performance of aircraft within a given portion of airspace should be taken into account.
- 1.3. Attention is also invited to the basic assumptions in 4.2 and to the fact that the values given in 4.1 represent a conservative approach. Before applying these values, account should therefore be taken of any practical experience gained in the airspace under consideration, as well as the possibility of achieving improvements in the overall navigation performance of aircraft.
- 1.4. ATS providers are encouraged to keep ICAO fully informed of the results of the application of this guidance material.

2. Determination of VOR system performance values

The large variability of the values which are likely to be associated with each of the factors that make up the total VOR system, and the limitation of presently available methods to measure all these effects individually with the required precision, have led to the conclusion that an assessment of the total system error provides a more realistic method for determining the VOR system performance. The material contained in 3 and 4 should be applied only after study of Circular 120 especially with respect to the environmental conditions.

Note. — *Guidance material on overall VOR system accuracy is also contained in Annex 10, Volume I, Attachment C.*

3. Determination of protected airspace along VOR-defined routes

Note 1. — *The material of this section has not been derived by means of the collision-risk/target level of safety method.*

Note 2. — *The word “containment” as used in this section is intended to indicate that the protected airspace provided will contain the traffic for 95 per cent of the total flying time (i.e. accumulated over all aircraft) for which the traffic operates along the route in question. Where, for example 95 per cent containment is provided, it is implicit that for 5 per cent of the total flying time traffic will be outside the protected airspace. It is not possible to quantify the maximum distance which such traffic is likely to deviate beyond the protected airspace.*

- 3.1. For VOR-defined routes where radar or ADS-B is not used to assist aircraft in remaining within the protected airspace, the following guidance is provided. However, when the lateral deviations of aircraft are being controlled with the aid of radar or ADS-B monitoring, the size of the protected airspace required may be reduced, as indicated by practical experience gained in the airspace under consideration.
- 3.2. As a minimum, protection against activity in airspace adjacent to the routes should provide 95 per cent containment.
- 3.3. The work described in Circular 120 indicates that a VOR system performance based on the probability of 95 per cent containment would require the following protected airspace around the centre line of the route to allow for possible deviations:
 - VOR routes with 93 km (50 NM) or less between VORs: ± 7.4 km (4 NM);
 - VOR routes with up to 278 km (150 NM) between VORs: ± 7.4 km (4 NM) up to 46 km (25 NM) from the VOR then expanding protected airspace up to ± 11.1 km (6 NM) at 139 km (75 NM) from the VOR.

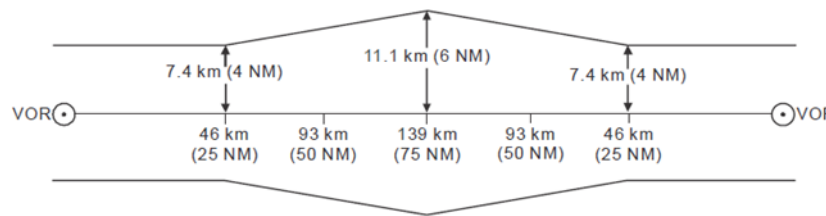


Figure A-1

- 3.4. If the appropriate ATS authority considers that a better protection is required, e.g. because of the proximity of prohibited, restricted or danger areas, climb or descent paths of military aircraft, etc., it may decide that a higher level of containment should be provided. For delineating the protected airspace, the following values should then be used:
 - for segments with 93 km (50 NM) or less between VORs, use the values in line A of the table below;
 - for segments with more than 93 km (50 NM) and less than 278 km (150 NM) between the VORs use the values given in line A of the table up to 46 km (25 NM), then expand linearly to the value given in line B at 139 km (75 NM) from the VOR.

	<i>Percentage containment</i>					
	95	96	97	98	99	99.5
A (km)	± 7.4	± 7.4	± 8.3	± 9.3	± 10.2	± 11.1
(NM)	± 4.0	± 4.0	± 4.5	± 5.0	± 5.5	± 6.0
B (km)	± 11.1	± 11.1	± 12.0	± 12.0	± 13.0	± 15.7
(NM)	± 6.0	± 6.0	± 6.5	± 6.5	± 7.0	± 8.5

For example, the protected area for a route of 222 km (120 NM) between VORs and for which 99.5 per cent containment is required should have the following shape:

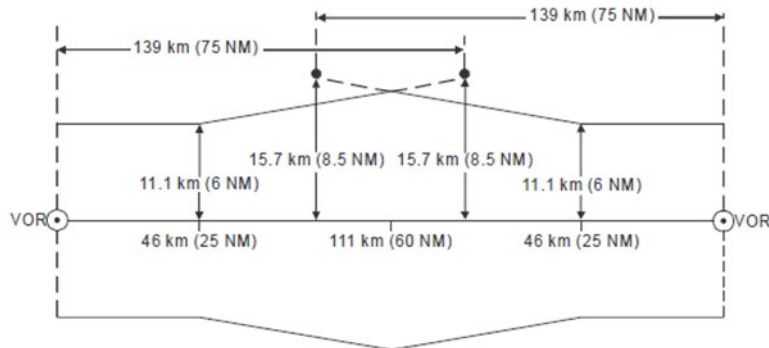


Figure A-2

- 3.5. If two segments of a VOR-defined ATS route intersect at an angle of more than 25 degrees, additional protected airspace should be provided on the outside of the turn and also on the inside of the turn as necessary. This additional space is to act as a buffer for increased lateral displacement of aircraft, observed in practice, during changes of direction exceeding 25 degrees. The amount of airspace added varies with the angle of intersection. The greater the angle, the greater the additional airspace to be used. Guidance is provided for protected airspace required at turns of no more than 90 degrees. For the exceptional circumstances which require an ATS route with a turn of more than 90 degrees, States should ensure that adequate protected airspace is provided on both the inside and outside of such turns.
- 3.6. The following examples have been synthesised from the practices of two States which use templates to facilitate the diagramming of airspace for planning purposes. Design of the turning area templates took into account factors such as aircraft speed, bank angle in turns, probable wind velocity, position errors, pilot delays and an intercept angle of at least 30 degrees to achieve the new track, and provides at least 95 per cent containment.
- 3.7. A template was used to establish the additional airspace required on the outside of turns to contain aircraft executing turns of 30, 45, 60, 75 and 90 degrees. The simplified figures below represent the outer limits of this airspace with the fairing curves removed to allow easy construction. In each case, the additional airspace is shown for aircraft flying in the direction of the large arrow. Where routes are used in both directions, the same additional airspace should be provided on the other outside boundary.
- 3.8. Figure A-3 illustrates the application of two segments intersecting at a VOR, at an angle of 60 degrees.

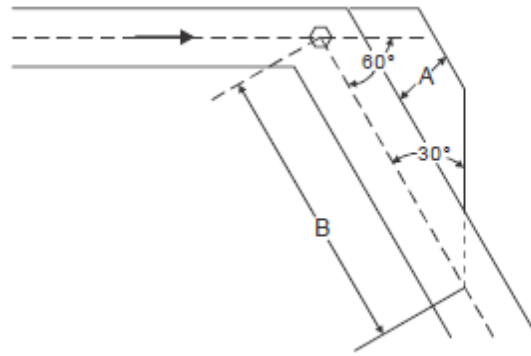


Figure A-3

- 3.9. Figure A-4 illustrates the application for two segments meeting at a VOR intersection at an angle of 60 degrees beyond the point where boundary splay is required in order to comply with 3.3 and Figure A-1.

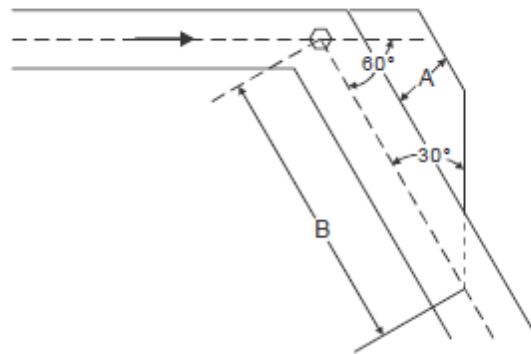


Figure A-4

- 3.10. The following table outlines the distances to be used in sample cases when providing additional protected airspace for route segments at and below FL 450, intersecting at a VOR or meeting at a VOR intersection not more than 139 km (75 NM) from each VOR.

Note. — Refer to Figures A-3 and A-4.

Angle of intersection	30°	45°	60°	75°	90°
<i>VOR</i>					
*Distance "A" (km)	5	9	13	17	21
(NM)	3	5	7	9	11
*Distance "B" (km)	46	62	73	86	92
(NM)	25	34	40	46	50
<i>Intersection</i>					
*Distance "A" (km)	7	11	17	23	29
(NM)	4	6	9	13	16
*Distance "B" (km)	66	76	88	103	111
(NM)	36	41	48	56	60

*Distances are rounded up to the next whole kilometre/nautical mile.

Note. — For behaviour of aircraft at turns, see Circular 120, 4.4.

3.11. Figure A-5 illustrates a method to construct the required additional protected airspace on the inside of turns for turns of 90 degrees or less:

- Locate a point on the airway centre line, equal to the radius of turn plus the along-track tolerance prior to the nominal turning point.
- From this point, drop a perpendicular line to intersect the edge of the airway on the inside of the turn.
- From this point on the inner edge of the airway, construct a line to intersect the airway centre line beyond the turn at an angle of half of the angle of turn.
- The resulting triangle on the inside of the turn depicts the additional airspace which should be protected for the change of direction. For any turn of 90 degrees or less, the extra space on the inside will serve for aircraft approaching the turn from either direction.

Note 1. — Criteria for the calculation of the along-track tolerance are contained in PANS-OPS (ICAO Doc 8168), Volume II.

Note 2. — Guidance on the calculation of radius of turn is provided in Section 7.

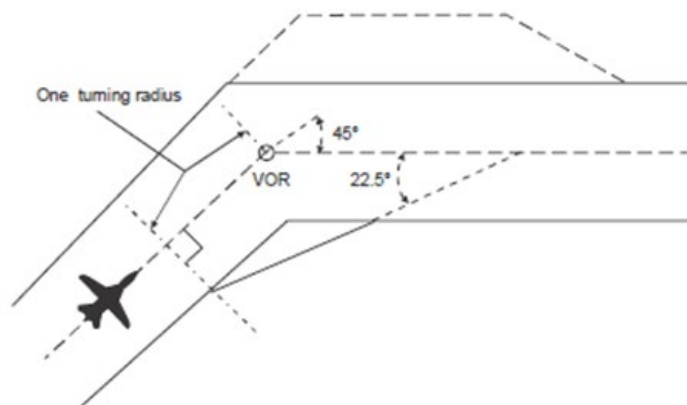


Figure A-5

- 3.12. For turns at VOR intersections, the principles of construction for extra airspace on the inside of a turn as described in 3.11 can be applied. Depending on the distance of the intersection from one or both VORs, one or both airways may have a splay at the intersection. Depending upon the situation, the extra airspace may be inside, partially inside, or outside of the 95 per cent containment. If the route is used in both directions, the construction should be completed separately for each direction.
- 3.13. Measured data for routes longer than 278 km (150 NM) between VORs are not yet available. To determine protected airspace beyond 139 km (75 NM) from the VOR, the use of an angular value of the order of 5 degrees as representing the probable system performance would appear satisfactory. The following figure illustrates this application.

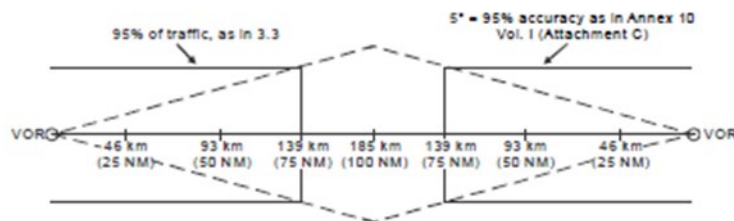


Figure A-6

4. Spacing of parallel routes defined by VORs

Note. — The material of this section has been derived from measured data using the collision-risk/target level of safety method.

- 4.1. The collision risk calculation, performed with the data of the European study mentioned in 1.1 indicates that, in the type of environment investigated, the distance between route centre lines (S in Figure A-7) for distances between VORs of 278 km (150 NM) or less should normally be a minimum of:
- 33.3 km (18 NM) for parallel routes where the aircraft on the routes fly in opposite direction; and
 - 30.6 km (16.5 NM) for parallel routes where the aircraft on the two routes fly in the same direction.

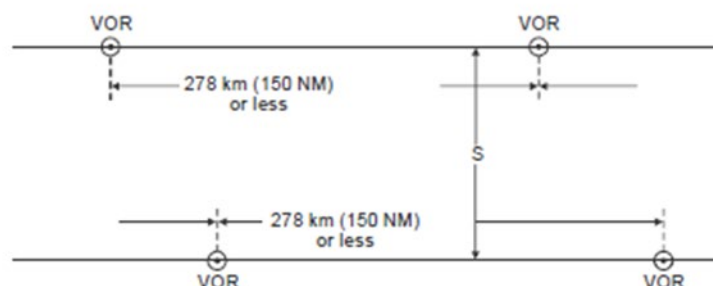


Figure A-7

Note. — *Two route segments are considered parallel when:*

- *they have about the same orientation, i.e. the angular difference does not exceed 10 degrees;*
- *they are not intersecting, i.e. another form of separation must exist at a defined distance from the intersection;*
- *traffic on each route is independent of traffic on the other route, i.e. it does not lead to restrictions on the other route.*

4.2. This spacing of parallel routes assumes:

- a) aircraft may either during climb or descent or during level flight be at the same flight levels on the two routes;
- b) traffic densities of 25 000 to 50 000 flights per busy two-month period;
- c) VOR transmissions which are regularly flight checked in accordance with Doc 8071 — Manual on Testing of Radio Navigation Aids, Volume I, and have been found to be satisfactory in accordance with the procedures in that document for navigational purposes on the defined routes; and
- d) no real-time radar or ADS-B monitoring or control of the lateral deviations is exercised.

4.3. Preliminary work indicates that, in the circumstances described in a) to c) below, it may be possible to reduce the minimum distance between routes. However, the figures given have not been precisely calculated and in each case a detailed study of the particular circumstances is essential:

- a) if the aircraft on adjacent routes are not assigned the same flight levels, the distance between the routes may be reduced; the magnitude of the reduction will depend on the vertical separation between aircraft on the adjacent tracks and on the percentage of climbing and descending traffic, but is not likely to be more than 5.6 km (3 NM);
- b) if the traffic characteristics differ significantly from those contained in Circular 120, the minima contained in 4.1 may require adjustment. For example, for traffic densities of about 10 000 flights per busy two-month period, a reduction of 900 to 1 850 m (0.5 to 1.0 NM) may be possible;
- c) the relative locations of the VORs defining the two tracks and the distance between the VORs will have an effect on the spacing, but this has not been quantified.

4.4. Application of radar or ADS-B monitoring and control of the lateral deviations of the aircraft may have a large effect on the minimum allowable distance between routes. Studies on the effect of radar monitoring indicate that:

- further work is necessary before a fully satisfactory mathematical model can be developed;
- any reduction of separation is closely related to:
 - traffic (volume, characteristics);
 - coverage and data processing, availability of an automatic alarm;
 - monitoring continuity;
 - sector workload; and
 - radiotelephony quality.

According to these studies and taking into account the experience some States have accumulated over many years with parallel route systems under continuous radar control, it can be expected that a reduction to the order of 15 to 18.5 km (8 to 10 NM), but most probably not less than 13 km (7 NM), may be possible as long as radar monitoring workload is not increased substantially by that reduction. Actual operations of such systems using reduced lateral spacing have shown that:

- it is very important to define and publish change-over points (see also 6);
- large turns should be avoided when possible; and
- where large turns cannot be avoided, required turn profiles should be defined for turns larger than 20 degrees.

Even where the probability of total radar or ADS-B failure is very small, procedures to cover that case should be considered.

5. Spacing of adjacent VOR-defined routes that are not parallel

Note 1. — The material of this section is intended to provide guidance for situations where non-intersecting VOR-defined routes are adjacent and have an angular difference exceeding 10 degrees.

Note 2. — The material of this section has not been derived by means of the collision-risk/target level of safety method.

- 5.1. For adjacent non-intersecting VOR-defined routes that are not parallel, the collision-risk/target level of safety method is not, at its present state of development, fully appropriate. For this reason, use should be made of the material in 3.
- 5.2. The protected airspace between such routes should not be less than that which will provide, without overlap, the 99.5 per cent containment values given in the table in 3.4 (see example in Figure A-8).
- 5.3. Where there is an angular difference of more than 25 degrees between route segments, additional protected airspace, as indicated in 3.5 to 3.10, should be provided.

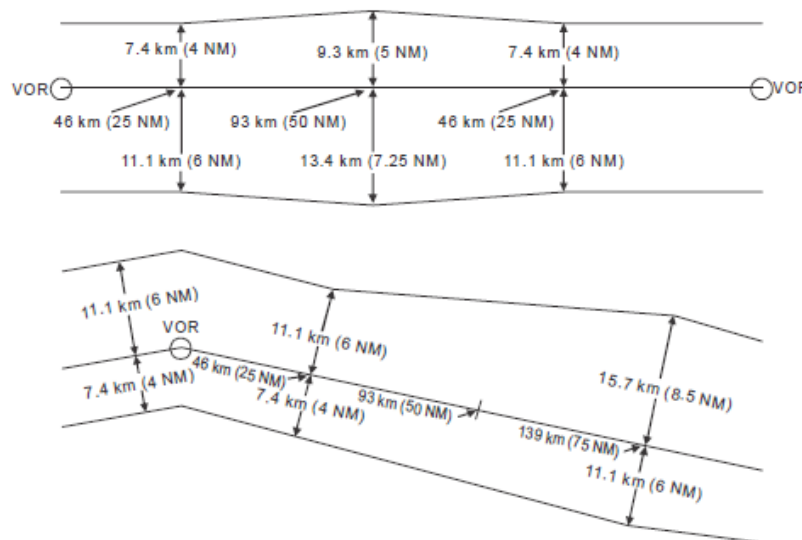


Figure A-8

6. Change-over points for VORs

- 6.1. When considering the establishment of points for changeover from one VOR to another for primary navigational guidance on VOR-defined ATS routes, States should bear in mind that:
 - a) the establishment of change-over points should be made on the basis of performance of the VOR stations concerned, including an evaluation of the interference protection criteria. The process should be verified by flight checking (see the Manual on Testing of Radio Navigation Aids (ICAO Doc 8071), Volume I);
 - b) where frequency protection is critical, flight inspection should be undertaken at the highest altitudes to which the facility is protected.
- 6.2. Nothing in 6.1 should be interpreted as placing a restriction on the service ranges of VOR installations meeting the specifications in Annex 10, Volume I, 3.3.

7. Calculation of radius of turn

- 7.1. The method used to calculate turn radii and the turn radii indicated below are applicable to aircraft performing a constant radius turn. The material has been derived from the turn performance criteria developed for RNP 1 ATS routes and can be used in the construction of the required additional protected airspace on the inside of turns also for ATS routes other than those defined by VOR.
- 7.2. Turn performance is dependent on two parameters — ground speed and bank angle. Due to the effect of the wind component changing with the change of heading, the ground speed and hence bank angle will change during a constant radius turn. However, for turns not greater than approximately 90 degrees and for the speed values considered below, the following formula can be used to calculate the achievable constant radius of turn, where the ground speed is the sum of the true airspeed and the wind speed:

$$\text{Radius of turn} = \frac{(\text{Ground speed})^2}{\text{Constant 'G' * TAN}(\text{bank angle})}$$

- 7.3. The greater the ground speed, the greater will be the required bank angle. To ensure that the turn radius is representative for all foreseeable conditions, it is necessary to consider extreme parameters. A true airspeed of 1 020 km/h (550 kt) is considered probably the greatest to be encountered in the upper levels. Combined with maximum anticipated wind speeds in the medium and upper flight levels of 370 km/h (200kt) [99.5 per cent values based on meteorological data], a maximum ground speed of 1 400 km/h (750 kt) should be considered. Maximum bank angle is very much a function of individual aircraft. Aircraft with high wing loadings flying at or near their maximum flight level are highly intolerant of extreme angles. Most transport aircraft are certified to fly no slower than 1.3 times their stall speed for any given configuration. Because the stall speed rises with TAN (bank angle), many operators try not to cruise below 1.4 times the stall speed to protect against gusts or turbulence. For the same reason, many transport aircraft fly at reduced maximum angles of bank in cruise conditions. Hence, it can be assumed that the highest bank angle which can be tolerated by all aircraft types is in the order of 20 degrees.
- 7.4. By calculation, the radius of turn of an aircraft flying at 1 400 km/h (750 kt) ground speed, with a bank angle of 20 degrees, is 22.51 NM (41.69 km). For purposes of expediency, this has been reduced to 22.5 NM (41.6 km). Following the same logic for the lower airspace, it is considered that up to FL 200 (6 100 m) the maximum figures to be encountered are a true airspeed of 740 km/h (400 kt), with a tailwind of 370 km/h (200 kt). Keeping the maximum bank angle of 20 degrees, and following the same formula,



the turn would be defined along a radius of 14.45 NM (26.76 km). For expediency, this figure may be rounded up to 15 NM (27.8 km).

- 7.5. Given the above, the most logical break point between the two ground speed conditions is between FL 190 (5 800 m) and FL 200 (6 100 m). In order to encompass the range of turn anticipation algorithms used in current flight management systems (FMS) under all foreseeable conditions, the turn radius at FL 200 and above should be defined as 22.5 NM (41.6 km) and at FL 190 and below as 15 NM (27.8 km).

11.2 Attachment B - Traffic Information Broadcasts by Aircraft (TIBA) And Related Operating Procedures

(Chapter 4, 4.2.2, Note 2 refers)

1. Introduction and applicability of broadcasts

- 1.1. Traffic information broadcasts by aircraft are intended to permit reports and relevant supplementary information of an advisory nature to be transmitted by pilots on a designated VHF radiotelephone (RTF) frequency for the information of pilots of other aircraft in the vicinity.
- 1.2. TIBAs should be introduced only when necessary and as a temporary measure.
- 1.3. The broadcast procedures should be applied in designated airspace where:
 - a) there is a need to supplement collision hazard information provided by air traffic services outside controlled airspace; or
 - b) there is a temporary disruption of normal air traffic services.
- 1.4. Such airspaces should be identified by the States responsible for provision of air traffic services within these airspaces, if necessary with the assistance of the appropriate ICAO Regional Office(s), and duly promulgated in aeronautical information publications or NOTAM, together with the VHF RTF frequency, the message formats and the procedures to be used. Where, in the case of 1.3 a), more than one State is involved, the airspace should be designated on the basis of regional air navigation agreements and promulgated in Doc 7030.
- 1.5. When establishing a designated airspace, dates for the review of its applicability at intervals not exceeding 12 months should be agreed by the appropriate ATS authority(ies).

2. Details of broadcasts

2.1. VHF RTF frequency to be used

- 2.1.1. The VHF RTF frequency to be used should be determined and promulgated on a regional basis. However, in the case of temporary disruption occurring in controlled airspace, the States responsible may promulgate, as the VHF RTF frequency to be used within the limits of that airspace, a frequency used normally for the provision of air traffic control service within that airspace.
- 2.1.2. Where VHF is used for air-ground communications with ATS and an aircraft has only two serviceable VHF sets, one should be tuned to the appropriate ATS frequency and the other to the TIBA frequency.

2.2. Listening watch

A listening watch should be maintained on the TIBA frequency 10 minutes before entering the designated airspace until leaving this airspace. For an aircraft taking off from an aerodrome located within the lateral limits of the designated airspace, listening watch should start as soon as appropriate after take-off and be maintained until leaving the airspace.

2.3. Time of broadcasts

A broadcast should be made:

- a) 10 minutes before entering the designated airspace or, for a pilot taking off from an aerodrome located within the lateral limits of the designated airspace, as soon as appropriate after take-off;
- b) 10 minutes prior to crossing a reporting point;
- c) 10 minutes prior to crossing or joining an ATS route;
- d) at 20-minute intervals between distant reporting points;
- e) 2 to 5 minutes, where possible, before a change in flight level;
- f) at the time of a change in flight level; and
- g) at any other time considered necessary by the pilot.

2.4. Forms of broadcast

- 2.4.1. The broadcasts other than those indicating changes in flight level, i.e. the broadcasts referred to in 2.3 a), b), c), d) and g), should be in the following form:

ALL STATIONS (necessary to identify a traffic information broadcast)

(call sign)

FLIGHT LEVEL (number) (or CLIMBING TO FLIGHT LEVEL (number))*

(direction)

(ATS route) (or DIRECT FROM (position) TO (position))

*POSITION (position**) AT (time)*

ESTIMATING (next reporting point, or the point of crossing or joining a designated ATS route) AT (time)

(call sign)

FLIGHT LEVEL (number)

(direction)

** For the broadcast referred to in 2.3 a) in the case of an aircraft taking off from an aerodrome located within the lateral limits of the designated airspace.*

*** For broadcasts made when the aircraft is not near an ATS significant point, the position should be given as accurately as possible and in any case to the nearest 30 minutes of latitude and longitude.*

Fictitious example:

“ALL STATIONS WINDAR 671 FLIGHT LEVEL 350 NORTHWEST BOUND DIRECT FROM PUNTA SAGA TO PAMPA POSITION 5040 SOUTH 2010 EAST AT 2358 ESTIMATING CROSSING ROUTE LIMA THREE ONE AT 4930 SOUTH 1920 EAST AT 0012 WINDAR 671 FLIGHT LEVEL 350 NORTHWEST BOUND OUT”

2.4.2. Before a change in flight level, the broadcast (referred to in 2.3 e)) should be in the following form:

ALL STATIONS

(call sign)

(direction)

(ATS route) (or DIRECT FROM (position) TO (position))

LEAVING FLIGHT LEVEL (number) FOR FLIGHT LEVEL (number) AT (position and time)

2.4.3. Except as provided in 2.4.4, the broadcast at the time of a change in flight level (referred to in 2.3 f)) should be in the following form:

ALL STATIONS

(call sign)

(direction)

(ATS route) (or DIRECT FROM (position) TO (position))

LEAVING FLIGHT LEVEL (number) NOW FOR FLIGHT LEVEL (number)

followed by:

ALL STATIONS

(call sign)

MAINTAINING FLIGHT LEVEL (number)

2.4.4. Broadcasts reporting a temporary flight level change to avoid an imminent collision risk should be in the following form:

ALL STATIONS

(call sign)

LEAVING FLIGHT LEVEL (number) NOW FOR FLIGHT LEVEL (number)

followed as soon as practicable by:

ALL STATIONS

(call sign)

RETURNING TO FLIGHT LEVEL (number) NOW

2.5. Acknowledgement of the broadcasts

The broadcasts should not be acknowledged unless a potential collision risk is perceived.

3. Related operating procedures

3.1. Changes of cruising level

3.1.1. Cruising level changes should not be made within the designated airspace, unless considered necessary by pilots to avoid traffic conflicts, for weather avoidance or for other valid operational reasons.

3.1.2. When cruising level changes are unavoidable, all available aircraft lighting which would improve the visual detection of the aircraft should be displayed while changing levels.

3.2. Collision avoidance

If, on receipt of a traffic information broadcast from another aircraft, a pilot decides that immediate action is necessary to avoid an imminent collision risk, and this cannot be achieved in accordance with the right-of-way provisions of CAD 2, the pilot should:

- a) unless an alternative manoeuvre appears more appropriate, immediately descend 150 m (500 ft), or 300 m (1 000 ft) if above FL 290 in an area where a vertical separation minimum of 600 m (2 000 ft) is applied;
- b) display all available aircraft lighting which would improve the visual detection of the aircraft;
- c) as soon as possible, reply to the broadcast advising action being taken;
- d) notify the action taken on the appropriate ATS frequency; and
- e) as soon as practicable, resume normal flight level, notifying the action on the appropriate ATS frequency.

3.3. Normal position reporting procedures

Normal position reporting procedures should be continued at all times, regardless of any action taken to initiate or acknowledge a traffic information broadcast.

11.3 Attachment C - Material Relating to Contingency Planning

(Chapter 2, 2.32 refers)

1. Introduction

- 1.1. Guidelines for contingency measures for application in the event of disruptions of air traffic services and related supporting services were first approved by the Council on 27 June 1984 in response to Assembly Resolution A23-12, following a study by the Air Navigation Commission and consultation with States and international organisations concerned, as required by the Resolution. The guidelines were subsequently amended and amplified in the light of experience gained with the application of contingency measures in various parts of the world and in differing circumstances.
- 1.2. The purpose of the guidelines is to assist in providing for the safe and orderly flow of international air traffic in the event of disruptions of air traffic services and related supporting services and in preserving the availability of major world air routes within the air transportation system in such circumstances.
- 1.3. The guidelines have been developed in recognition of the fact that circumstances before and during events causing disruptions of services to international civil aviation vary widely and that contingency measures, including access to designated aerodromes for humanitarian reasons, in response to specific events and circumstances must be adapted to these circumstances. They set forth the allocation of responsibility among States and ICAO for the conduct of contingency planning and the measures to be taken into consideration in developing, applying and terminating the application of such plans.
- 1.4. The guidelines are based on experience which has shown, inter alia, that the effects of disruption of services in particular portions of airspace are likely to affect significantly the services in adjacent airspace, thereby creating a requirement for international coordination, with the assistance of ICAO as appropriate. Hence, the role of ICAO in the field of contingency planning and coordination of such plans is described in the guidelines. They also reflect the experience that ICAO's role in contingency planning must be global and not limited to airspace over the high seas and areas of undetermined sovereignty, if the availability of major world air routes within the air transportation system is to be preserved. Finally, they further reflect the fact that international organisations concerned, such as the International Air Transport Association (IATA) and the International Federation of Airline Pilots' Associations (IFALPA), are valuable advisers on the practicability of overall plans and elements of such plans.

2. Status of contingency plans

Contingency plans are intended to provide alternative facilities and services to those provided for in the regional air navigation plan when those facilities and services are temporarily not available. Contingency arrangements are therefore temporary in nature, remain in effect only until the services and facilities of the regional air navigation plan are reactivated and, accordingly, do not constitute amendments to the regional plan requiring processing in accordance with the "Procedure for the Amendment of Approved Regional Plans". Instead, in cases where the contingency plan would temporarily deviate from the approved regional air navigation plan, such deviations are approved, as necessary, by the President of the ICAO Council on behalf of the Council.

3. Responsibility for developing, promulgating and implementing contingency plans

- 3.1. The State(s) responsible for providing air traffic services and related supporting services in particular portions of airspace is (are) also responsible, in the event of disruption or potential disruption of these services, for instituting measures to ensure the safety of international civil aviation operations and, where possible, for making provisions for alternative facilities and services. To that end the State(s) should develop, promulgate and implement appropriate contingency plans. Such plans should be developed in consultation with other States and airspace users concerned and with ICAO, as appropriate, whenever the effects of the service disruption(s) are likely to affect the services in adjacent airspace.
- 3.2. The responsibility for appropriate contingency action in respect of airspace over the high seas continues to rest with the State(s) normally responsible for providing the services until, and unless, that responsibility is temporarily reassigned by ICAO to (an)other State(s).
- 3.3. Similarly, the responsibility for appropriate contingency action in respect of airspace where the responsibility for providing the services has been delegated by another State continues to rest with the State providing the services until, and unless, the delegating State terminates temporarily the delegation. Upon termination, the delegating State assumes responsibility for appropriate contingency action.
- 3.4. ICAO will initiate and coordinate appropriate contingency action in the event of disruption of air traffic services and related supporting services affecting international civil aviation operations provided by a State wherein, for some reason, the authorities cannot adequately discharge the responsibility referred to in 3.1. In such circumstances, ICAO will work in coordination with States responsible for airspace adjacent to that affected by the disruption and in close consultation with international organisations concerned. ICAO will also initiate and coordinate appropriate contingency action at the request of States.

4. Preparatory action

- 4.1. Time is essential in contingency planning if hazards to air navigation are to be reasonably prevented. Timely introduction of contingency arrangements requires decisive initiative and action, which again presupposes that contingency plans have, as far as practicable, been completed and agreed among the parties concerned before the occurrence of the event requiring contingency action, including the manner and timing of promulgating such arrangements.
- 4.2. For the reasons given in 4.1, States should take preparatory action, as appropriate, for facilitating timely introduction of contingency arrangements. Such preparatory action should include:
 - a) preparation of general contingency plans for introduction in respect of generally foreseeable events such as industrial action or labour unrest affecting the provision of air traffic services and/or supporting services. In recognition of the fact that the world aviation community is not party to such disputes, States providing services in airspace over the high seas or of undetermined sovereignty should take appropriate action to ensure that adequate air traffic services will continue to be provided to international civil aviation operations in non-sovereign airspace. For the same reason, States providing air traffic services in their own airspace or, by delegation, in the airspace of (an)other State(s) should take appropriate action to ensure that adequate air traffic services will continue to be provided to international civil aviation operations concerned, which do not involve landing or take-off in the State(s) affected by industrial action;
 - b) assessment of risk to civil air traffic due to military conflict or acts of unlawful interference with civil aviation as well as a review of the likelihood and possible consequences of natural disasters or public health emergencies. Preparatory action should include initial development of special contingency plans in respect of natural disasters, public health emergencies, military conflicts or acts of unlawful interference

with civil aviation that are likely to affect the availability of airspace for civil aircraft operations and/or the provision of air traffic services and supporting services. It should be recognised that avoidance of particular portions of airspace on short notice will require special efforts by States responsible for adjacent portions of airspace and by international aircraft operators with regard to planning of alternative routings and services, and the air traffic services authorities of States should therefore, as far as practicable, endeavour to anticipate the need for such alternative actions;

- c) monitoring of any developments that might lead to events requiring contingency arrangements to be developed and applied. States should consider designating persons/administrative units to undertake such monitoring and, when necessary, to initiate effective follow-up action; and
- d) designation/establishment of a central agency which, in the event of disruption of air traffic services and introduction of contingency arrangements, would be able to provide, 24 hours a day, up-to-date information on the situation and associated contingency measures until the system has returned to normal. A coordinating team should be designated within, or in association with, such a central agency for the purpose of coordinating activities during the disruption.

4.3. ICAO will be available for monitoring developments that might lead to events requiring contingency arrangements to be developed and applied and will, as necessary, assist in the development and application of such arrangements. During the emergence of a potential crisis, a coordinating team will be established in the Regional Office(s) concerned and at ICAO Headquarters in Montreal, and arrangements will be made for competent staff to be available or reachable 24 hours a day. The tasks of these teams will be to monitor continuously information from all relevant sources, to arrange for the constant supply of relevant information received by the State aeronautical information service at the location of the Regional Office and Headquarters, to liaise with international organisations concerned and their regional organisations, as appropriate, and to exchange up-to-date information with States directly concerned and States which are potential participants in contingency arrangements. Upon analysis of all available data, authority for initiating the action considered necessary in the circumstances will be obtained from the State(s) concerned.

5. Coordination

- 5.1. A contingency plan should be acceptable to providers and users of contingency services alike, i.e. in terms of the ability of the providers to discharge the functions assigned to them and in terms of safety of operations and traffic handling capacity provided by the plan in the circumstances.
- 5.2. Accordingly, States which anticipate or experience disruption of air traffic services and/or related supporting services should advise, as early as practicable, the ICAO Regional Office accredited to them, and other States whose services might be affected. Such advice should include information on associated contingency measures or a request for assistance in formulating contingency plans.
- 5.3. Detailed coordination requirements should be determined by States and/or ICAO, as appropriate, keeping the above in mind. In the case of contingency arrangements not appreciably affecting airspace users or service provided outside the airspace of the (single) State involved, coordination requirements are naturally few or non-existent. Such cases are believed to be few.
- 5.4. In the case of multi-State ventures, detailed coordination leading to formal agreement of the emerging contingency plan should be undertaken with each State which is to participate. Such detailed coordination should also be undertaken with those States whose services will

be significantly affected, for example by re-routing of traffic, and with international organisations concerned who provide invaluable operational insight and experience.

- 5.5. Whenever necessary to ensure orderly transition to contingency arrangements, the coordination referred to in this section should include agreement on a detailed, common NOTAM text to be promulgated at a commonly agreed effective date.

6. Development, promulgation and application of contingency plans

- 6.1. Development of a sound contingency plan is dependent upon circumstances, including the availability, or not, of the airspace affected by the disruptive circumstances for use by international civil aviation operations. Sovereign airspace can be used only on the initiative of, or with the agreement or consent of, the authorities of the State concerned regarding such use. Otherwise, the contingency arrangements must involve bypassing the airspace and should be developed by adjacent States or by ICAO in cooperation with such adjacent States. In the case of airspace over the high seas or of undetermined sovereignty, development of the contingency plan might involve, depending upon circumstances, including the degree of erosion of the alternative services offered, temporary reassignment by ICAO of the responsibility for providing air traffic services in the airspace concerned.
- 6.2. Development of a contingency plan presupposes as much information as possible on current and alternative routes, navigational capability of aircraft and availability or partial availability of navigational guidance from ground-based aids, surveillance and communications capability of adjacent air traffic services units, volume and types of aircraft to be accommodated and the actual status of the air traffic services, communications, meteorological and aeronautical information services. Following are the main elements to be considered for contingency planning depending upon circumstances:
- a) re-routing of traffic to avoid the whole or part of the airspace concerned, normally involving establishment of additional routes or route segments with associated conditions for their use;
 - b) establishment of a simplified route network through the airspace concerned, if it is available, together with a flight level allocation scheme to ensure lateral and vertical separation, and a procedure for adjacent area control centres to establish longitudinal separation at the entry point and to maintain such separation through the airspace;
 - c) reassignment of responsibility for providing air traffic services in airspace over the high seas or in delegated airspace;
 - d) provision and operation of adequate air-ground communications, AFTN and ATS direct speech links, including reassignment, to adjacent States, of the responsibility for providing meteorological information and information on status of navigation aids;
 - e) special arrangements for collecting and disseminating in-flight and post-flight reports from aircraft;
 - f) a requirement for aircraft to maintain continuous listening watch on a specified pilot-pilot VHF frequency in specified areas where air-ground communications are uncertain or non-existent and to broadcast on that frequency, preferably in English, position information and estimates, including start and completion of climb and descent;
 - g) a requirement for all aircraft in specified areas to display navigation and anti-collision lights at all times;
 - h) a requirement and procedures for aircraft to maintain an increased longitudinal separation that may be established between aircraft at the same cruising level;
 - i) a requirement for climbing and descending well to the right of the centre line of specifically identified routes;

- j) establishment of arrangements for controlled access to the contingency area to prevent overloading of the contingency system; and
 - k) a requirement for all operations in the contingency area to be conducted in accordance with IFR, including allocation of IFR flight levels, from the relevant Table of Cruising Levels in Appendix 3 of Annex 2, to ATS routes in the area.
- 6.3. Notification, by NOTAM, of anticipated or actual disruption of air traffic services and/or related supporting services should be dispatched to users of air navigation services as early as practicable. The NOTAM should include the associated contingency arrangements. In the case of foreseeable disruption, the advance notice should in any case not be less than 48 hours.
- 6.4. Notification by NOTAM of discontinuance of contingency measures and reactivation of the services set forth in the regional air navigation plan should be dispatched as early as practicable to ensure an orderly transfer from contingency conditions to normal conditions.

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