THIRTEENTH REVISED EDITION 2020

AIR REGULATIONS FOR CPL/ATPL

ATC AND FLIGHT DISPATCHER EXAMINATIONS

INCORPORATING
- AS PER DGCA'S REVISED SYLLABUS
- TOPIC WISE QUESTIONS AND ANSWERS INCLUDED
- SAMPLE QUESTION PAPERS
- MORE THAN 1100 QUESTIONS WITH ANSWERS

DGCA APPROVED DGCA

Wg. Cdr. R.K. BALI (Retd.)

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APPROVED BY DGCA
AS STUDY MATERIAL FOR
PPL, CPL AND ATPL EXAMS

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Air Regulations For CPL, ATPL

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PREFACE

DGCA has come out with a new syllabus. Several new topics have been added which were never required in the past. This posed a big challenge for anyone to consolidate all topics into one book. Fact that the syllabus includes 18 ICAO Annexes, Doc 4444, Doc 8168, AIP India, several DGCA'S CARs, Aircraft Act and Rules, material on Human aspects, radiotelephony and several other ICAO, National and International documents. The material runs into thousands of pages. At one stage I had thought it to be an impossible task. On persistent inspiration from several aviators, I did a lot of juggling to put all the pieces together. There was also request from readers to accommodate sample questions in the book. I have managed to do so. I have spent several sleepless nights to come out with this book. I hope it proves to be worth the trouble and benefits all aviation enthusiasts.

Ghaziabad,
January 2012

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PREFACE 13TH EDITION

In the fast moving Aviation field rules keep changing very fast. Therefore this book needs frequent updates to keep in pace with developments. The current edition aims to incorporate several changes in recent times.

Let me once again thank the aviation community for continued support to enable me to bring out updated editions at short intervals.

Ghaziabad,
May 2020

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FOR UPDATES AND CORRECTIONS VISIT:
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CONTENT

1

DEFINITIONS AND ABBREVIATIONS

A

A Basic Instrument Flight Trainer. which is equipped with appropriate instruments, and which simulates the flight deck environment of an aircraft in flight in instrument flight conditions.

A Flight Procedures Trainer. which provides a realistic flight deck environment, and which simulates instrument responses, simple control functions of mechanical, electrical, electronic, etc. aircraft systems, and the performance and flight characteristics of aircraft of a particular class;

A Flight Simulator. which provides an accurate representation of the flight deck of a particular aircraft type to the extent that the mechanical, electrical, electronic, etc. aircraft systems control functions, the normal environment of flight crew members, and the performance and flight characteristics of that type of aircraft are realistically simulated;

Accelerate-Stop Distance Available (ASDA). The length of the take-off run available plus the length of stop way, if provided.

Accepting Unit. Air traffic control unit next to take control of an aircraft.

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

a) a person is fatally or seriously injured.
b) the aircraft sustains damage or structural failure.
c) the aircraft is missing or is completely inaccessible.
(For details see chapter 21, Part II)

Advisory Airspace (ADA). An airspace of defined dimensions, or designated route, within which air traffic advisory service is available.

Advisory Route (ADR). A designated route along which air traffic advisory service is available.

Aerial Work. means any aircraft operation undertaken for an industrial or commercial purpose or any other remunerative purpose, but does not include operation of an air transport service;

Aerodrome Beacon (ABN). Aeronautical beacon used to indicate the location of an aerodrome from the air.

Aerodrome Control Service. Air traffic control service for aerodrome traffic.

Aerodrome Control Tower (TWR). A unit established to provide air traffic control service to aerodrome traffic.

Aerodrome Elevation. The elevation of the highest point of the landing area.

Aerodrome Identification Sign. A sign placed on an aerodrome to aid in identifying the aerodrome from the air.

Aerodrome operating minima. The limits of usability of an aerodrome for:

a) take-off, expressed in terms of runway visual range and/or visibility and, if necessary, cloud conditions;
b) landing in 2D instrument approach operations, expressed in terms of visibility and/or runway visual range, minimum descent altitude/height (MDA/H) and, if necessary, cloud conditions; and
c) landing in 3D instrument approach operations, expressed in terms of visibility and/or runway visual range and decision altitude/height (DA/H) as appropriate to the type and/or category of the operation..

Aerodrome traffic zone(ATZ). An airspace of defined dimensions established around an aerodrome for the protection of aerodrome traffic.

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

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

Aerodrome(AD). 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.

Aerodyne. means an aircraft whose support in flight is derived dynamically from the reaction on surfaces in motion relative to the air, and includes all aeroplanes, helicopters, gyroplanes, gliders and kites;

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

Aeronautical Ground Light. Any light specially provided as an aid to air navigation, other than a light displayed on an aircraft.

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

Aeronautical Information Publication (AIP). A publication issued by or with the authority of a State and containing aeronautical information of a lasting character essential to air navigation.

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

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

Aeronautical Mobile Service (AMS). 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 Station. A land station in the aeronautical mobile service. In certain instances, an aeronautical station may be located, for example, on board ship or on a platform at sea.

Aeronautical Telecommunication Station. A station in the aeronautical telecommunication service.

Aeroplane Reference Field Length. The minimum field length required for take-off at maximum certificated take-off mass, sea level, standard atmospheric conditions, still air and zero runway slope, as shown in the appropriate aeroplane flight manual prescribed by the certificating authority or equivalent data from the aeroplane manufacturer. Field length means balanced field length for aeroplanes, if applicable, or take-off distance in other cases.

Note: — Attachment A, Section 2 provides information on the concept of balanced field length and the ICAO Airworthiness Manual (Doc 9760) contains detailed guidance on matters related to take-off distance.

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

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

Air Operator Permit/ Certificate (AOP/AOC). A Permit /Certificate authorizing an operator to carry out specified commercial air transport operations.

Air Traffic Advisory Service. 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. Authorization for an aircraft to proceed under conditions specified by an air traffic control unit.

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

Note 2: — The abbreviated term "clearance" may be 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. A service provided for the purpose of:

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

Air Traffic Control Unit (ATCU). A generic term meaning variously, area control centre, approach control unit or aerodrome control tower.

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

Air Traffic Service (ATS). A generic term meaning variously, flight information service, alerting service, air traffic advisory service, air traffic control service (area control service, approach control service or aerodrome control service).

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

Air Traffic Services Reporting Office (ARO). 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 (ATSU). A generic term meaning variously, air traffic control unit, flight information centre or air traffic services reporting office.

Air Traffic. All aircraft in flight or operating on the manoeuvring area of an aerodrome.

Air Transport Service. means a service for the transport by air of persons, mails or any other thing, animate or inanimate, for any kind of remuneration whatsoever, whether such service consists of a single flight or series of flights;

Air Transport Undertaking. means an undertaking whose business includes the carriage by air of passengers or cargo for hire or reward;

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

Airborne Collision Avoidance System (ACAS). 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 Classification Number (ACN). A number expressing the relative effect of an aircraft on a pavement for a specified standard sub grade category.

Note: — The aircraft classification number is calculated with respect to the center of gravity (CG) position which yields the critical loading on the critical gear. Normally the aft most CG position appropriate to the maximum gross apron (ramp) mass is used to calculate the ACN. In exceptional cases, the forward most CG position may result in the nose gear loading being more critical.

Aircraft Operating Manual. A manual, acceptable to the DGCA containing normal, abnormal and emergency procedures, checklists, limitations, performance information, details of the aircraft systems and other material relevant to the operation of the aircraft.

Note: — The aircraft operating manual is the part of the operation manual.

Aircraft Stand. A designated area on an apron intended to be used for parking an aircraft.

Aircraft (ACFT). Any machine which can derive support in the atmosphere from the reactions of the air other than reactions of the air against the earth's surface and includes balloons whether fixed or free, airships, kites, gliders and flying machines.

Air-Ground Communication. Two-way communication between aircraft and stations or locations on the surface of the earth.

Air-Ground Control Radio Station. An aeronautical telecommunication station having primary responsibility for handling communications pertaining to the operation and control of aircraft in a given area.

AIRMET Information. 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.

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.

Airship. means a power-driven lighter-than air aircraft;

Air-taxiing. 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).

Airway (AWY). A control area or portion thereof established in the form of a corridor.

Airworthy. The status of an aircraft, engine, propeller or part when it conforms to its approved design and is in a condition for safe operation.

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

ALERFA. The code word used to designate an alert phase.

Alert Phase. (ALERFA) A situation wherein apprehension exists as to the safety of an aircraft and its occupants.

Alerting Post. Any facility intended to serve as an intermediary between a person reporting an emergency and a rescue coordination centre or rescue sub centre.

Alerting Service (ALRS). A service provided to notify appropriate organizations regarding aircraft in need of search and rescue aid, and assist such organizations as required.

Alternate Aerodrome (ALTN). 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. Alternate aerodromes include the following:

Altimetry System Error (ASE). The difference between the altitude indicated by the altimeter display, assuming a correct altimeter barometric setting, and the pressure altitude corresponding to the undisturbed ambient pressure.

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

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

Amphibian. means an aeroplane capable normally of taking off from and alighting on either land or a solid platform or water;

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

Approach procedure with vertical guidance (APV). A performance-based navigation (PBN) instrument approach procedure designed for 3D instrument approach operations Type A.

Approach Control Service (App). Air traffic control service for arriving or departing controlled flights.

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

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

Appropriate Authority.

a) Regarding flight over the high seas: The relevant authority of the State of Registry.

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

Apron Management Service. A service provided to regulate the activities and the movement of aircraft and vehicles on an apron.

Apron (APN). 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.

Area Control Centre (ACC). A unit established to provide air traffic control service to controlled flights in control areas under its jurisdiction.

Area Control Service. Air traffic control service for controlled flights in control areas.

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

The term RNP as previously defined as "a statement of the navigation performance, necessary for operation within a defined airspace", has been removed from this Annex as the concept of RNP has been overtaken by the concept of PBN. The term RNP in this Annex is now solely used in 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 the PBN Manual (Doc 9613).

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

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. An ATS route established for the use of aircraft capable of employing area navigation.

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

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

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

ATS Surveillance System. A generic term meaning variously, ADS-B, PSR,SSR or any comparable ground-based system that enables the identification of aircraft. A comparable ground-based system is one that has been demonstrated, by comparative assessment or other methodology, to have a level of safety and performance equal to or better than monopulse SSR.

Automatic Fixed ELT (ELT(AF)). An automatically activated ELT which is permanently attached to an aircraft.

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

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

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 Dependent Surveillance (ADS). A surveillance technique in which aircraft automatically provide, via a data link, data derived from onboard navigation and position-fixing systems, including aircraft identification, four-dimensional position and additional data as appropriate.

Automatic Deployable ELT (ELT(AD)). An ELT which is rigidly attached to an aircraft and which is automatically deployed and activated by impact, and, in some cases, also by hydrostatic sensors. Manual deployment is also provided

Automatic Portable ELT (ELT(AP)). An automatically activated ELT which is rigidly attached to an aircraft but readily removable from the aircraft.

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

B

Barrette. Three or more aeronautical ground lights closely spaced in a transverse line so that from a distance they appear as a short bar of light.

Base Turn. 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.

C

Cabin Crew Member. A crew member who performs, in the interest of safety of passengers, duties assigned by the operator or the pilot-in-command of the aircraft, but who shall not act as a flight crew member

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

Certificate of Airworthiness. means a certificate issued under these rules;

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

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

Circling Approach. An extension of an instrument approach procedure which provides for visual circling of the aerodrome prior to landing.

Class Rating. shall comprise (a) Single-engine, land; (b) Single-engine, sea; (c) Multi-engine, land; (d) Multi-engine, sea;

Clearance Limit. The point to which an aircraft is granted an air traffic control clearance.

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

Commercial Air Transport Operation. An aircraft operation involving the transport of passengers, cargo or mail for remuneration or hire.

Continuous descent final approach (CDFA). A technique consistent with stabilized approach procedures, for flying the final approach segment of a non-precision instrument approach procedure as a continuous descent, without level-off, from an altitude/height at or above the final approach fix altitude/height to a point approximately 15 m (50 ft) above the landing runway threshold or the point where the flare manoeuvre should begin for the type of aircraft flown.

Contracting State. means any State which is for the time being a party to the Convention on International Civil Aviation concluded at Chicago on December 7, 1944, and any amendment which may be made thereto under the provisions of Article 94 thereof;

Control Area (CTA). A controlled airspace extending upwards from a specified limit above the earth.

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

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

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

Controlled Flight. Any flight which is subject to an air traffic control clearance.

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

Convention. means the Convention relating to International Civil Aviation signed at Chicago on the 7th day of December, 1944, as amended from time to time;

Co-pilot. means a licensed pilot serving in any piloting capacity other than as pilot-in-command but excluding a pilot who is on board the aircraft for the sole purpose of receiving flight instruction;

Course. or "heading" means the direction in which the longitudinal axis of an aircraft is pointed, usually expressed in degrees from North (True, Magnetic or Compass);

Crew Member. A person assigned by an operator to duty on an aircraft during a flight duty period.

Cruise Climb. An aeroplane cruising technique resulting in a net increase in altitude as the aeroplane mass decreases.

Cruise Relief Pilot. A flight crew member who is assigned to perform pilot tasks during cruise flight, to allow the pilot-in-command or a co-pilot to obtain planned rest.

Cruising Level. A level maintained during a significant portion of a flight.

Current Flight Plan. The flight plan, including changes, if any, brought about by consequent clearances.

D

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

Dangerous Goods. Articles or substances which are capable of posing a risk to health, safety, property or the environment and which are shown in the list of dangerous goods in the Technical Instructions or which are classified according to those Instructions.

Note: — Dangerous goods are classified in Aircraft (Carriage of Dangerous Goods Rules, 2003).

Data Link Communications. A form of communication intended for the exchange of messages via a data link.

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

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

Dead Reckoning (DR) Navigation. The estimating or determining of position by advancing an earlier known position by the application of direction, time and speed data.

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

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

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

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

Declared Distances.

a) Take-off run available (TORA). The length of runway declared available and suitable for the ground run of an aeroplane taking off.
b) Take-off distance available (TODA). The length of the take-off run available plus the length of the clearway, if provided.
c) Accelerate-stop distance available (ASDA). The length of the take-off run available plus the length of the stop way, if provided.
d) Landing distance available (LDA). The length of runway, which is declared available and suitable for, the ground run of an aeroplane landing.

De-icing/anti-icing Facility. A facility where frost, ice or snow is removed (de-icing) from the aeroplane to provide clean surfaces, and/or where clean surfaces of the aeroplane receive protection (anti-icing) against the formation of frost or ice and accumulation of snow or slush for a limited period of time.

Note: — Further guidance is given in the ICAO Manual of Aircraft Ground De-icing/ Anti-icing Operations (Doc 9640).

Dependent Parallel Approaches. Simultaneous approaches to parallel or near-parallel instrument runways where radar separation minima between aircraft on adjacent extended runway centre lines are prescribed.

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

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

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

DETRESFA. The code word used to designate a distress phase.

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

Director-General. means Director-General of Civil Aviation;

Displaced Threshold. A threshold not located at the extremity of a runway.

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

Ditching. The forced landing of an aircraft on water.

DME Distance. The line of sight distance (slant range) from the source of a DME signal to the receiving antenna.

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

Dual Flight Time. means flight time during which a person is receiving flight instructions from a pilot on board the aircraft;

E

EDTO critical fuel. The fuel quantity necessary to fly to an en-route alternate aerodrome considering, at the most critical point on the route, the most limiting system failure.

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

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

Emergency Locator Transmitter (ELT). A generic term describing equipment which broadcast distinctive signals on designated frequencies and, depending on application, may be automatically activated by impact or be manually activated. An ELT may be any of the following:

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

Engine. A unit used or intended to be used for aircraft propulsion. It consists of at least those components and equipment necessary for functioning and control, but excludes the propeller/rotors (if applicable).

Enhanced vision system (EVS). A system to display electronic real-time images of the external scene achieved through the use of image sensors.

Note.— EVS does not include night vision imaging systems (NVIS).

En-route Alternate. An alternate aerodrome at which an aircraft would be able to land after experiencing an abnormal or emergency condition while en-route.

En-route Alternate. An aerodrome at which an aircraft would be able to land fter experiencing an abnormal or emergency condition while en route.

Estimated Off-Block Time (EOBT). The estimated time at which the aircraft will commence movement associated with departure.

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

at which the aircraft will arrive over the aerodrome. For VFR flights, the time at which it is estimated that the aircraft will arrive over the aerodrome.

ETOPS en-route Alternate. A suitable and appropriate alternate aerodrome at which an aeroplane would be able to land after experiencing an engine shut-down or other abnormal or emergency condition while en route in an ETOPS operation.

Expected Approach Time (EAT). The time at which ATC expects that an arriving aircraft, following a delay, will leave the holding fix to complete its approach for a landing.

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

Export. means taking out of India;

Extended Range Operations with Twin Engined Aeroplane (ETOPS). Any flight by aeroplane with two turbine power engines where from any point on the route the flight time at the one engine inoperative cruise speed to an adequate aerodrome is greater than the threshold time.

F

Filed Flight Plan. The flight plan as filed with an ATS unit by the pilot or a designated representative, without any subsequent changes.

Final Approach (FNA). That part of an instrument approach procedure which commences at the specified final approach fix or point, or where such a fix or point is not specified, a) at the end of the last procedure turn, base turn or inbound turn of a racetrack procedure, if specified; or b) at the point of interception of the last track specified in the approach procedure; and ends at a point in the vicinity of an aerodrome from which:

1) a landing can be made; or
2) a missed approach procedure is initiated.

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

Final Approach Segment (FAS). That segment of an instrument approach procedure in which alignment and descent for landing are accomplished.

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

Flight Information Centre (FIC). A unit established to provide flight information service and alerting service.

Flight Information Region (FIR). An airspace of defined dimensions within which flight information service and alerting service are provided.

Flight Information Service (FIS). A service provided for the purpose of giving advice and information useful for the safe and efficient conduct of flights.

Flight Level (FL). A surface of constant atmospheric pressure which is related to a specific pressure datum, 1013.2 hectopascals (hPa), and is separated from other such surfaces by specific pressure intervals.

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

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

b) when set to a QFE altimeter setting, will indicate height above the QFE reference datum; c) when set to a pressure of 1013.2 hPa, may be used to indicate flight levels.

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

Flight Manual. A manual, associated with the certificate of airworthiness, containing limitations within which the aircraft is to be considered airworthy, and instructions and information necessary to the flight crew members for the safe operation of the aircraft.

Flight Operations Officer/Flight Dispatcher. A person designated by the operator to engage in the control and supervision of flight operations, whether licensed or not, suitably qualified in accordance with CAR Section 7, Series 'M' Part II, who supports, briefs and/or assists the pilot-in-command in the safe conduct of the flight.

Flight Plan (PLN). Specified information provided to air traffic services units, relative to an intended flight or portion of a flight of an aircraft.

Flight Recorder. Any type of recorder installed in the aircraft for the purpose of complementing accident/incident investigation.

Note: — See Annex 6, Parts I, II and III, for specifications relating to flight recorders.

Flight Simulation Training Device. Any one of the following three types of apparatus in which flight conditions are simulated on the ground:

Flight Time in a Glider. means the total time occupied in flight, whether being towed or not, from the moment the glider first moves for the purpose of taking off until the movement it comes to rest at the end of the flight;

Flight Time in Free Flight. includes flight time in glider when it is not being towed;

Flight Time. –

(i) in respect of an aeroplane, means the total time from the moment the aeroplane first moves for the purpose of taking off until the moment it finally comes to rest at the end of the flight; and

(ii) in respect of a helicopter, means the total time from the moment the helicopter's rotor blades start turning until the moment it finally comes to rest at the end of the flight, and the rotor blades are stopped.

Note: — Flight time as herein defined is synonymous with the term "block to block" time, or "chock to chock" time in general usage which is measured from the time an aeroplane first moves for the purpose of taking off until it finally stops at the end of the flight;

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

Forecast (FCST). A statement of expected meteorological conditions for a specified time or period, and for a specified area or portion of airspace.

Foreign Aircraft. means an aircraft registered in a country other than India;

Frangible Object. An object of low mass designed to break, distort or yield on impact so as to present the minimum hazard to aircraft.

G

General Aviation Operation. An aircraft operation other than a commercial air transport operation or an aerial work operation.

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

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

Geoid. The equipotential surface in the gravity field of the Earth which coincides with the undisturbed mean sea level (MSL) extended continuously through the continents. The geoid is irregular in shape because of local gravitational disturbances (wind tides, salinity, current, etc.) and the direction of gravity is perpendicular to the geoid at every point.

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

Government Aerodrome. means an aerodrome which is maintained by or on behalf of the Central Government and includes an airport to which the Airports Authority of India Act, 1994 (55 of 1994) applies or is made applicable;

Ground Handling. Services necessary for an aircraft's arrival at, and departure from, an airport, other than air traffic services.

Ground Visibility. The visibility at an aerodrome, as reported by an accredited observer or by automatic system.

H

Hazard Beacon (HBN). An aeronautical beacon used to designate a danger to air navigation.

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

Head-up Display (HUD). A display system that presents flight information into the pilot's forward external field of view.

Height (HGT). The vertical distance of a level, a point or an object considered as a point, measured from a specified datum.

Helicopter. means a heavier-than -air aircraft supported in flight by the reactions of the air on one or more power driven rotors on substantially vertical axis;

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

Holding Bay. A defined area where aircraft can be held, or bypassed, to facilitate efficient surface movement of aircraft.

Holding Procedure. A predetermined maneuver which keeps an aircraft within a specified airspace while awaiting further clearance.

Holdover Time. The estimated time the anti-icing fluid (treatment) will prevent the formation of ice and frost and the accumulation of snow on the protected (treated) surfaces of an aeroplane.

I

Identification Beacon (IBN). An aeronautical beacon emitting a coded signal by means of which a particular point of reference can be identified.

IFR Flight. A flight conducted in accordance with the instrument flight rules.

INCERFA. The code word used to designate an uncertainty phase.

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

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

Initial Approach Segment. That segment of an instrument approach procedure between the initial approach fix and the intermediate fix or, where applicable, the final approach fix or point.

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

> **Non-precision approach (NPA) procedure.** An instrument approach procedure designed for 2D instrument approach operations Type A (Instrument approach operation 250' or above).
>
> **Approach procedure with vertical guidance (APV).** A performance-based navigation (PBN) instrument approach procedure designed for 3D instrument approach operations Type A.
>
> **Precision approach (PA) procedure.** An instrument approach procedure based on navigation systems (ILS, MLS, GLS and SBAS Cat I) designed for 3D instrument approach operations Type A or B (A-Instrument approach operation 250' or above or B- below 250').

Note: — Lateral and vertical guidance refers to the guidance provided either by: a) a ground-based navigation aid; or b) computer-generated navigation data.

Instrument Flight Time. means the time during which a pilot is piloting an aircraft solely by reference to instruments and without external reference points;

Instrument Ground Time. means the time during which a pilot is practising, on the ground, simulated instrument flight on a mechanical device approved by the Director -General;

Instrument Meteorological Conditions (IMC). 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 Annex 2.

Instrument Runway. One of the following types of runways intended for the operation of aircraft using instrument approach procedures:

a) *Non-precision approach runway.* A runway served by visual aids and non-visual aid(s) intended for landing operations following an instrument approach operation type A (Instrument approach operation 250' or above) and a visibility not less than 1000 m.

b) *Precision approach runway, category I.* A runway served by visual aids and non-visual aid(s) intended for landing operations following an instrument approach operation type B (Instrument approach operation below 250') with a decision height (DH) not lower than 60 m (200 ft) and either a visibility not less than 800 m or a runway visual range not less than 550 m.

c) *Precision approach runway, category II.* A runway served by visual aids and non-visual aid(s) intended for landing operations following an instrument approach operation type B with a decision height (DH) lower than 60 m (200 ft) but not lower than 30 m (100 ft) and a runway visual range not less than 300 m.

d) *Precision approach runway, category III.* A runway served by visual aids and non-visual aid(s) intended for landing operations following an instrument approach operation type B to and along the surface of the runway and:

A – intended for operations with a decision height (DH) lower than 30 m (100 ft), or no decision height and a runway visual range not less than 175 m.

B – intended for operations with a decision height (DH) lower than 15 m (50 ft), or no decision height and a runway visual range less than 175 m but not less than 50 m.

C – intended for operations with no decision height (DH) and no runway visual range limitations.

Note 1. – Visual aids need not necessarily be matched to the scale of non-visual aids provided. The criterion for the selection of visual aids is the conditions in which operations are intended to be conducted.

Note 2. – Refer to Annex 6 for instrument approach operation types.

Instrument Time. means the instrument flight time or the instrument ground time.

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

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

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

International Airport. Any airport designated by the Contracting State in whose territory it is situated as an airport of entry and departure for international air traffic, where the formalities incident to customs, immigration, public health, animal and plant quarantine and similar procedures are carried out.

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

L

Landing Area. That part of a movement area intended for the landing or takeoff of aircraft.

Landing Direction Indicator (LDI). A device to indicate visually the direction currently designated for landing and for take-off.

Landing Distance Available (LDA). The length of runway which is declared available and suitable for the ground run of an aeroplane landing.

Large Aeroplane. An aeroplane of a maximum certificated take-off mass of over 5700kg.

Level (LVL). A generic term relating to the vertical position of an aircraft in flight and meaning variously, height, altitude or flight level.

M

Maintenance. The performance of tasks required to ensure the continuing airworthiness of an aircraft, including any one or combination of overhaul, inspection, replacement, defect rectification and the embodiment of a modification or repair or test;

Major Airport. Shall have the meaning assigned to it in clause (i) of section 2 of the Airports Economic Regulatory Authority of India Act, 2008 (27 of 2008);

Making Way. An aircraft is said to be "making way" when under way in the air or on the surface of the water, it has a velocity relative to the air or water, respectively;

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

Marker. An object displayed above ground level in order to indicate an obstacle or delineate a boundary.

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

Master Minimum Equipment List (MMEL). A list established for a particular aircraft type by the organization responsible for the type design with the approval of the State of Design containing items, one or more of which is permitted to be unserviceable at the commencement of a flight. The MMEL may be associated with special operating conditions, limitations or procedures.

Maximum Mass. Maximum certificated take-off mass.

Meteorological Office. An office designated to provide meteorological service for international air navigation.

Microlight Aircraft (single seater). means a fixed wing aircraft with maximum all up weight not exceeding 330 kg. and a wing area not less than 10 sq. meters and which is designed to carry not more than one person;

Microlight Aircraft (two seater). means a fixed wing aircraft with a maximum all up weight not exceeding 450 kg. and a wing area not less than 10 sq. meters and which is designed to carry not more than two persons;

Microlight Aircraft. means Microlight aircraft (single seater) and Microlight aircraft (two seater) and excludes hang gliders and para-planes.

Military Aircraft. includes naval, military and air force aircraft, and every aircraft commanded by a person in naval, military or air force service detailed for the purpose;

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

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

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

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

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

Minimum Equipment List (MEL). A list which provides for the operation of aircraft, subject to specified conditions, with particular equipment inoperative, prepared by an operator in conformity with, or more restrictive than, the MMEL established for the aircraft type.

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

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

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

Missed Approach Holding Fix (MAHF). A fix used in RNAV applications that marks the end of the missed approach segment and the centre point for the missed approach holding.

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

Missed Approach Procedure. The procedure to be followed if the approach cannot be continued.

Movement Area. 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).

N

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

> **Required navigation peforamnce (RNP) specification.** A navigation specification based on area navigation that includes the requirement for performance monitoring and alerting, designated by the prefix RNP, e.g. RNP 4, RNP APCH.
>
> **Area navigation (RNAV) specification.** A navigation specification based on area navigation that does not include the requirement for performance monitoring and alerting, designated by the prefix RNAV, e.g. RNAV 5, RNAV 1.

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

Night (NGT). Hours between the end of evening civil twilight and the beginning of morning civil twilight or such other period between sunset and sunrise, as may be prescribed by the appropriate authority. Civil twilight ends in the evening when the centre of the sun's disc is 6 degrees below the horizon and begins in the morning when the centre of the sun's disc is 6 degrees below the horizon.

Non-instrument Runway. A runway intended for the operation of aircraft using visual approach procedures.

Non-precision approach (NPA) procedure. An instrument approach procedure designed for 2D instrument approach operations Type A.

NOTAM. A notice to airmen 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.

O

Obstacle (OBST). All fixed (whether temporary or permanent) and mobile objects, or parts thereof, that: a) are located on an area intended for the surface movement of aircraft or b) extend above a defined surface intended to protect aircraft in flight; or c) stand outside those defined surfaces and that have been assessed as being a hazard to air navigation.

Obstacle Assessment Surface (OAS). A defined surface intended for the purpose of determining those obstacles to be considered in the calculation of obstacle clearance altitude/height for a specific ILS facility and procedure.

Obstacle Clearance Altitude (OCA) or Obstacle Clearance Height (OCH). The lowest altitude or the lowest height above the elevation of the relevant runway threshold or the aerodrome elevation as applicable, used in establishing compliance with appropriate obstacle clearance criteria.

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

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

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

On the surface of the water. An aircraft is deemed to be "on the surface of the water" so long as any portion of it is in contact with the water;

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

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

Operations Manual. A manual containing procedures, instructions and guidance for use by operational personnel in the execution of their duties.

Operations Specifications. The authorizations, conditions and limitations associated with the air operator certificate and subject to the conditions in the operations manual.

Operator (OPS). A person, organization or enterprise engaged in or offering to engage in an aircraft operation.

P

Passenger Aircraft., "mail aircraft" and "goods aircraft" means aircraft which effect public transport of passengers, mails or goods, respectively;

Pavement Classification Number (PCN). A number expressing the bearing strength of a pavement for unrestricted operations.

Performance-based communication (PBC). 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). 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). 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.

Performance class 1 helicopter. A helicopter with performance such that, in case of critical power- unit failure, it is able to land on the rejected take-off area or safely continue the flight to an appropriate landing area depending on when the failure occurs.

Performance class 2 helicopter. A helicopter with performance such that, in case of critical power-unit failure, it is able to safety continue the flight, except when the failure occurs prior to a defined point after take-off or after a defined point before landing, in which cases a forced landing may be required.

Permit to Fly. in relation to microlight aircraft, means a document issued by the Director-General of Civil Aviation authorising the flight of a microlight aircraft in accordance with these rules.

Personnel. in relation to any aircraft means the person in charge, the pilot, the navigator, the engineer, and all other members of the crew;

Petroleum in Bulk. means petroleum contained in receptacle exceeding 900 liters in capacity;

Pilot-in-command. in respect of a pilot, -

(i) engaged in commercial operations means the pilot designated by the operator as being in command and charged with the safe conduct of a flight; and

(ii) engaged in general aviation or helicopter operations means the pilot designated by the operator or owner as being in command and charged with the safe conduct of a flight.

Point-in-space Approach (PinS). The point-in-space approach is based on a basic GNSS non-precision approach procedure designed for helicopters only. It is aligned with a reference point located to permit subsequent flight manoeuvring or approach and landing using visual manoeuvring in adequate visual conditions to see and avoid obstacles.

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

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

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

Precision approach (PA) procedure. An instrument approach procedure based on navigation systems (ILS, MLS, GLS and SBAS Cat I) designed for 3D instrument approach operations Type A or B.

Precision approach runway, see **Instrument runway**.

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

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

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

Primary Runway(s). Runway(s) used in preference to others whenever conditions permit.

Private Aircraft. means all aircraft other than aerial work aircraft or public transport aircraft;

Problematic use of Substances. The use of one or more psychoactive substances by aviation personnel in a way that: a) constitutes a direct hazard to the user or endangers the lives, health or welfare of others; and/or b) causes or worsens an occupational, social, mental or physical problem or disorder.

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

Procedure Turn (PTN). A manoeuvre in which a turn is made away from a designated track followed by a turn in the opposite direction to permit the aircraft to intercept and proceed along the reciprocal of the designated track.

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

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

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

Protected Flight Zones. Airspace specifically designated to mitigate the hazardous effects of laser radiation.

Psychoactive Substances. Alcohol, opioids, cannabinoids, sedatives and hypnotics, cocaine, other psychostimulants, hallucinogens, and volatile solvents, whereas coffee and tobacco are excluded.

Public Transport Aircraft. means an aircraft which effects public transport;

Public Transport. means all carriage of persons or things effected by aircraft for a remuneration of any nature whatsoever, and all carriage of persons or things effected by aircraft without such remuneration if the carriage is effected by an air transport undertaking;

Q

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

Quality Control. Part of quality management focused on fulfilling quality requirements will be fulfilled (ISO 9000*).

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

R

Racetrack Procedure. A procedure designed to enable the aircraft to reduce altitude during the initial approach segment and/or establish the aircraft inbound when the entry into a reversal procedure is not practical.

Radiotelephony. A form of radio-communication primarily intended for the exchange of information in the form of speech.

Rating. means an authorisation entered on a licence and forming part thereof, stating special conditions, privileges or limitations pertaining to such licence;

RCP Type. A label (e.g. RCP 240) that represents the values assigned to RCP parameters for communication transaction time, continuity, availability and integrity.

Reference Datum Height (RDH). The height of the extended glide path or a nominal vertical path at the runway threshold.

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

Reporting Point (REP). A specified geographical location in relation to which the position of an aircraft can be reported.

Rescue Coordination Centre (RCC). A unit responsible for promoting efficient organization of search and rescue services and for coordinating the conduct of search and rescue operations within a search and rescue region.

Rescue Subcentre (RSC). A unit subordinate to a rescue coordination centre, established to complement the latter according to particular provisions of the responsible authorities.

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

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

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

Road. An established surface route on the movement area meant for the exclusive use of vehicles.

Road-holding Position. A designated position at which vehicles may be required to hold.

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

Runway (RWY). A defined rectangular area on a land aerodrome prepared for the landing and take-off of aircraft.

Runway End Safety Area (RESA). An area symmetrical about the extended runway centre line and adjacent to the end of the strip primarily intended to reduce the risk of damage to an aeroplane undershooting or overrunning the runway.

Runway Guard Lights. A light system intended to caution pilots or vehicle drivers that they are about to enter an active runway.

Runway Strip. A defined area including the runway and stopway, if provided, intended:

a) to reduce the risk of damage to aircraft running off a runway; and
b) to protect aircraft flying over it during take-off or landing operations.

Runway Turn Pad. A defined area on a land aerodrome adjacent to a runway for the purpose of completing a 180-degree turn on a runway.

Runway Visual Range (RVR). 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.

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

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

S

Safety. means the state in which the risk of harm to persons or of property damage is reduced to and maintained at or below an acceptable level of safety through a continuing process of hazard identification and risk management. Explanation: — For the purposes of this clause, "acceptable level of safety" is the minimum degree of safety that must be assured by a system in actual practice.

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

Scheduled Air Transport Service. means an air transport service undertaken between the same two or more places and operated according to a published time table or with flights so regular or frequent that they constitute a recognisably systematic series, each flight being open to use by members of the public;

Seaplane. means an aeroplane capable normally of taking off from and alighting solely on water;

Search and Rescue Aircraft. An aircraft provided with specialized equipment suitable for the efficient conduct of search and rescue missions.

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

Search and Rescue Region (SRR). An area of defined dimensions, associated with a rescue coordination centre, within which search and rescue services are provided.

Search and Rescue Service. The performance of distress monitoring, communication, coordination and search and rescue functions, initial medical assistance or medical evacuation, through the use of public and private resources, including cooperating aircraft, vessels and other craft and installations.

Search and Rescue Unit. A mobile resource composed of trained personnel and provided with equipment suitable for the expeditious conduct of search and rescue operations.

Search. An operation normally coordinated by a rescue coordination centre or rescue subcentre using available personnel and facilities to locate persons in distress.

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

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

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

Sensitive Flight Zone. The LFFZ and LCFZ where the irradiance is restricted to a level unlikely to cause flashblindness or after-image effects.

Serious Incident. An incident involving circumstances indicating that an accident nearly occurred.

Serious Injury. An injury which is sustained by a person in an accident.

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

SIGMET Information. Information issued by a meteorological watch office concerning the occurrence or expected occurrence of specified enroute weather phenomena which and other phenomena in the atmosphere that may affect the safety of aircraft operations.

Sign.

a) Fixed message sign. A sign presenting only one message.
b) Variable message sign. A sign capable of presenting several pre-determined messages or no message, as applicable.

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

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

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.

Small Aeroplane. An aeroplane of a maximum certificated take-off mass of 5700 kg or less.

Solo Flight Time. means flight time during which a pilot is the sole occupant of an aircraft;

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

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

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

State Aircraft. includes military aircraft and aircraft exclusively employed in the service of the Government such as posts, customs, police.

State of Design. The State having jurisdiction over the organization responsible for the type design.

State of Manufacture. The State having jurisdiction over the organization responsible for the final assembly of the aircraft.

State of Occurrence. The State in the territory of which an accident or incident occurs.

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

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

State of the Operator. The State in which the operator's principal place of business is located or, if there is no such place of business, the operator's permanent residence.

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

Student Pilot-in-Command. means a trainee pilot, acting as Pilot-in-Command under observation of a flight instructor, who shall not manipulate the flight controls of an aircraft or influence the flight during flight time except when the safety of the aircraft is jeopartised.

Note: — In the event the instructor manipulates the flight controls during the flight, the flight shall be deemed to be a dual instructional flight.

Subsequent Aircraft. means an aircraft which is constructed in accordance with the design and specification of a type of aircraft, which has been approved or accepted by the Central Government for the issue of a certificate of airworthiness;

Survival ELT (ELT(S)). An ELT which is removable from an aircraft, stowed so as to facilitate its ready use in an emergency, and manually activated by survivors.

Synthetic Flight Trainer. Any one of the following three types of apparatus in which flight conditions are simulated on the ground:

T

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

Take-off Runway. A runway intended for take-off only.

Taxiing (TAX). Movement of an aircraft on the surface of an aerodrome under its own power, excluding take-off and landing.

Taxiway (TWY). A defined path on a land aerodrome established for the taxiing of aircraft and intended to provide a link between one part of the aerodrome and another, including:

a) Aircraft stand taxilane. A portion of an apron designated as a taxiway and intended to provide access to aircraft stands only.

b) Apron taxiway. A portion of a taxiway system located on an apron and intended to provide a through taxi route across the apron.

c) Rapid exit taxiway. A taxiway connected to a runway at an acute angle and designed to allow landing aeroplanes to turn off at higher speeds than are achieved on other exit taxiways thereby minimizing runway occupancy times.

Taxiway Intersection. A junction of two or more taxiways.

Taxiway Strip. An area including a taxiway intended to protect an aircraft operating on the taxiway and to reduce the risk of damage to an aircraft accidentally running off the taxiway.

Temporary Aerodrome. means an aerodrome intended to be used for a period not exceeding six months;

Terminal Control Area (TMA). A control area normally established at the confluence of ATS routes in the vicinity of one or more major aerodromes.

Terrain. The surface of the Earth containing naturally occurring features such as mountains, hills, ridges, valleys, bodies of water, permanent ice and snow, and excluding obstacles. In practical terms, depending on the method of data collection used, terrain represents the continuous surface that exists at the bare Earth, the top of the canopy or something in-between, also known as "first reflective surface".

Threshold (THR). The beginning of that portion of the runway usable for landing.

To Pilot. means to manipulate the flight controls of an aircraft during flight time.

Total Estimated Elapsed Time. For IFR flights, the estimated time required from take-off to arrive over that designated point, defined by reference to navigation aids, from which it is intended that an instrument approach procedure will be commenced, or, if no navigation aid is associated with the destination aerodrome, to arrive over the destination aerodrome. For VFR flights, the estimated time required from take-off to arrive over the destination aerodrome.

Touchdown Zone (TDZ). The portion of a runway, beyond the threshold, where it is intended landing aeroplanes first contact the runway.

Track (TR). 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. Advice provided by an air traffic services unit specifying maneuvers to assist a pilot to avoid a collision.

Traffic Information. 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. 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. 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.

Transition Altitude (TA). The altitude at or below which the vertical position of an aircraft is controlled by reference to altitudes.

Transition Layer. The airspace between the transition altitude and the transition level.

Transition Level (TRL). The lowest flight level available for use above the transition altitude.

Type Certificate. means a certificate issued or validated by the Director-General to signify that the design of a type of aircraft, aircraft component or item of equipment, complies with the applicable design standard specified or approved by the Director-General;

Type of Aircraft. means all aircraft of the same basic design including all modifications thereto except those modifications which result in a change in handing or flight characteristics;

Type Rating. means a rating for each type of aircraft;

U

Uncertainty Phase (INCERFA). A situation wherein uncertainty exists as to the safety of an aircraft and its occupants.

Under Control. an aircraft is said to be "under control" when it is able to manoeuvre as required by these rules;

Unmanned Free Balloon. A non-power-driven, unmanned, lighter-than-air aircraft in free flight.

Note: — Unmanned free balloons are classified as heavy ,medium or light in accordance with specifications contained in Appendix 3.

V

VFR Flight. A flight conducted in accordance with the visual flight rules.

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

Visibility (VIS). Visibility for aeronautical purposes is the greater of: a) the greatest distance at which a black object of suitable dimensions, situated near the

ground, can be seen and recognized when observed against a bright background; b) the greatest distance at which lights in the vicinity of 1000 candelas can be seen and identified against an unlit background.

Note 1: — The two distances have different values in air of a given extinction coefficient, and the latter b) varies with the background illumination. The former a) is represented by the meteorological optical range (MOR).

Note. 2.— The definition applies to the observations of visibility in local routine and special reports, to the observations of prevailing and minimum visibility reported in METAR and SPECI and to the observations of ground visibility.

Visible. as applied to lights means visible on a dark night with a clear atmosphere.

Visual Manoeuvring (circling) Area. The area in which obstacle clearance should be taken into consideration for aircraft carrying out a circling approach.

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

VMC. The symbol used to designate visual meteorological conditions.

Voice-automatic Terminal Information Service (Voice-ATIS). The provision of ATIS by means of continuous and repetitive voice broadcasts.

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

VOLMET. Meteorological information for aircraft in flight.

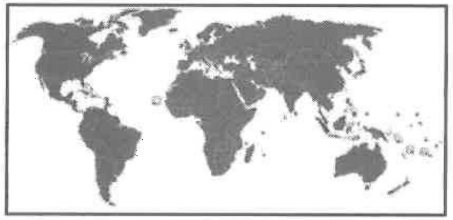
W

Waypoint (WPT). A specified geographical location used to define an area navigation route or the flight path of an aircraft employing area navigation. Waypoints are identified as either: Fly-by waypoint. A waypoint which requires turn anticipation to allow tangential interception of the next segment of a route or procedure, or Flyover waypoint. A waypoint at which a turn is initiated in order to join the next segment of a route or procedure.

Wet/Dry runway. A runway is considered to be wet when the runway surface is covered by any visible dampness or water up to and including 3 mm deep within the intended area of use. A runway is considered dry if its surface is free of visible moisture and not contaminated within the area intended to be used.

2

INTERNATIONAL ORGANISATIONS AND CONVENTIONS



PARIS CONVENTION, 1917

It was held to regulate air navigation with particular attention to sovereinity, airworthiness, competency of aircrew, definitions etc.

CHICAGO CONVENTION, 1944

Chicago convention consisting of 96 articles was signed on 7 Dec 1944. India has ratified this convention. Some important articles are listed below:

AIR NAVIGATION

Article 1 - Sovereignty: The contracting States recognize that every State has complete and exclusive sovereignty over the airspace above its territory.

Article 2 - Territory: For the purposes of this Convention the territory of a State shall be deemed to be the land areas and territorial waters adjacent thereto under the sovereignty, suzerainty, protection or mandate of such State.

Article 3 - Civil and state aircraft:

a) This Convention shall be applicable only to civil aircraft, and shall not be applicable to state aircraft.

b) Aircraft used in military, customs and police services shall be deemed to be state aircraft.

c) No state aircraft of a contracting State shall fly over the territory of another State or land thereon without authorization by special agreement or otherwise, and in accordance with the terms thereof.

d) The contracting States undertake, when issuing regulations for their state aircraft, that they will have due regard for the safety of navigation of civil aircraft.

Article 4 - Misuse of Civil Aviation: Each contracting State agrees not to use civil aviation for any purpose inconsistent with the aims of this Convention.

FLIGHT OVER TERRITORY OF CONTRACTING STATES

Article 5 - Right of non-scheduled Flight: Although the operations of scheduled aircraft are restricted, under Article 5, aircraft engaged in non scheduled flights enjoy the right to fly into or across the territory of another State, and to make stops for non traffic purposes (first and second freedom rights). However, the State flown over has the right to require the non scheduled aircraft to land, and to follow prescribed routes, or obtain special permission for such flights.

Article 6 - Scheduled Air Services: No scheduled international air service may be operated over or into the territory of a contracting State, except with the special permission or other authorization of that State, and in accordance with the terms of such permission or authorization.

Article 7 - Cabotage: Each contracting State shall have the right to refuse permission to the aircraft of other contracting States to take on in its territory passengers, mail and cargo carried for remuneration or hire and destined for another point within its territory. Each contracting State undertakes not to enter into any arrangements which specifically grant any such privilege on an exclusive basis to any other State or an airline of any other State, and not to obtain any such exclusive privilege from any other State.

Article 8 - Pilotless Aircraft: No aircraft capable of being flown without a pilot shall be flown without a pilot over the territory of a contracting State without special authorization by that State and in accordance with the terms of such authorization. Each contracting State undertakes to insure that the flight of such aircraft without a pilot in regions open to civil aircraft shall be so controlled as to obviate danger to civil aircraft.

Article 9 - Prohibited Areas: Each contracting State may, for reasons of military necessity or public safety, restrict or prohibit uniformly the aircraft of other States from flying over certain areas of its territory.

Article 10 - Landing at Customs Airport: The state can require that landing to be made at a designated customs airport and similarly departure from the territory can be required to be from a designated customs airport.

Article 11 - Applicability of Air Regulations: All aircraft are to be treated equal while operating from or in the territory of a nation, irrespective of their nationality.

Article 12 - Rules of the Air: Each contracting State undertakes to adopt measures to insure that every aircraft flying over or maneuvering within its territory and that every aircraft carrying its nationality mark, wherever such aircraft may be, shall comply with the rules and regulations relating to the flight and maneuver of aircraft there in force. Each contracting State undertakes to keep its own regulations in these respects uniform, to the greatest possible extent, with those established from time to time under this Convention. Over the high seas, the rules in force shall be those established under this Convention. Each contracting State undertakes to insure the prosecution of all persons violating the regulations applicable.

Article 13 - Entry and Clearance Regulations: The laws and regulations of a contracting State as to the admission to or departure from its territory of passengers, crew or cargo of aircraft, such as regulations relating to entry, clearance, immigration, passports, customs, and quarantine shall be complied with by or on behalf of such passengers, crew or cargo upon entrance into or departure from, or while within the territory of that State.

Article 14 - Prevention of Spread of Disease: Each contracting State agrees to take effective measures to prevent the spread by means of air navigation of cholera, typhus (epidemic, smallpox, yellow fever, plague, and such other communicable diseases as the contracting States shall from time to time decide to designate.

Article 15 - Airport and Similar Charges: Every state shall provide airports and air navigation services available to its' own aircraft to all aircraft from other contracting states. Airport and similar charges will not be more than those that will be paid by its' national aircraft.

Article 16 - Search of Aircraft: The appropriate authorities of each of the contracting States shall have the right, without unreasonable delay, to search aircraft of the other contracting States on landing or departure, and to inspect the certificates and other documents prescribed by this Convention.

NATIONALITY OF AIRCRAFT

Article 17 - Nationality of Aircraft: Aircraft have the nationality of the State in which they are registered.

Article 18 - Dual Registration: An aircraft cannot be validly registered in more than one State, but its registration may be changed from one State to another.

Article 19 - National laws governing registration: The registration or transfer of registration of aircraft in any contracting State shall be made in accordance with its law and regulations.

Article 20 - Display of Marks: Every aircraft engaged in international air navigation shall bear its appropriate nationality and registration marks.

Article 21 - Report of Registrations: The registering State must report to ICAO data revealing the ownership and control of aircraft it registers. It also must make available to other contracting States, or ICAO, information available concerning the registration and ownership of aircraft registered in it, on demand.

MEASURES TO FACILITATE AIR NAVIGATION

Article 22 - Facilitation of Formalities: Each contracting State agrees to adopt all practicable measures, to facilitate and expedite navigation by aircraft between the territories of contracting States, and to prevent unnecessary delays to aircraft, crews, passengers and cargo, especially in the administration of the laws relating to immigration, quarantine, customs and clearance.

Article 23 - Customs and Immigration Procedures: Each contracting State undertakes, so far as it may find practicable, to establish customs and immigration procedures affecting international air navigation in accordance with the practices which may be established or recommended from time to time, pursuant to this Convention.

Article 24 - Customs Duty: Aircraft flying to, from or across, the territory of a state shall be admitted temporarily free of duty. Fuel, Oil, spare parts, regular equipment and aircraft stores retained on board are also exempt custom duty, inspection fees or similar charges.

Article 25 - Aircraft in Distress: Each contracting State undertakes to provide such measures of assistance to aircraft in distress in its territory as it may find practicable.

Article 26 - Investigation of Accidents: In the event of an accident to an aircraft of a contracting State occurring in the territory of another contracting State, and involving death or serious injury, or indicating serious technical defect in the aircraft or air navigation facilities, the State in which the accident occurs will institute as laws permit, with the procedure which may be recommended by the International Civil Aviation Organization. The State in which the aircraft is registered shall be given the opportunity to appoint observers to be present at the inquiry and the State holding the inquiry shall communicate the report and findings in the matter to that State.

Article 27 - Exemption from Seizure on Patent Claims: An aircraft on flight can not be seized for violation of patent laws of a state..

Article 28 - Air Navigation Facilities and Standard Systems: Each state should provide airports, navigation facilities, met facilities, radio, charts, maps etc. to confirm to the convention specifications.

CONDITIONS TO BE FULFILLED WITH RESPECT TO AIRCRAFT

Article 29-Documents Carried in Aircraft: Every aircraft of a contracting State, engaged in international navigation, shall carry the following documents in conformity with the conditions prescribed in this Convention:

a) Its certificate of registration;
b) It's certificate of airworthiness;
c) The appropriate licenses for each member of the crew;
d) Its journey log book;
e) If it is equipped with radio apparatus, the aircraft radio station license;
f) If it carries passengers, a list of their names and places of embarkation and destination;
g) If it carries cargo, a manifest and detailed declarations of the cargo.

Article 30 - Aircraft Radio Equipment: The aircraft of a state flying in or over the territory of another state shall carry radios licensed and used in accordance with the regulations of the state in which the aircraft is registered. The radios may only be used by members of the flight crew suitably licensed by the state in which the aircraft is registered.

Article 31 - Certificates of airworthiness: Every aircraft engaged in international navigation shall be provided with a certificate of airworthiness issued or rendered valid by the State in which it is registered.

Article 32 - Licenses of Personnel:

a) The pilot of every aircraft and the other members of the operating crew of every aircraft engaged in international navigation shall be provided with certificates of competency and licenses issued or rendered valid by the State in which the aircraft is registered.
b) Each contracting State reserves the right to refuse to recognize, for the purpose of flight above its own territory, certificates of competency and licenses granted to any of its nationals by another contracting State.

Article 33 - Recognition of Certificates and Licenses: Certificates of airworthiness and certificates of competency and licenses issued or rendered valid by the contracting State in which the aircraft is registered, shall be recognized as valid by the other contracting States, provided that the requirements under which such certificates or licenses were issued or rendered valid are equal to or above the minimum standards which may be established from time to time pursuant to this Convention.

Article 34 - Journey Log Books: There shall be maintained in respect of every aircraft engaged in international navigation a journey log book in which shall be entered particulars of the aircraft, its crew and of each journey, in such form as may be prescribed from time to time pursuant to this Convention.

Article 35 - Cargo restrictions: No munitions of war or any item prohibited to be carried by a state shall be carried.

Article 36 - Photographic Apparatus: Each contracting State may prohibit or regulate the use of photographic apparatus in aircraft over its territory.

INTERNATIONAL STANDARDS AND RECOMMENDED PRACTICES

Article 37 - Adoption of International Standards and Procedures: Each contracting State undertakes to collaborate in securing the highest practicable degree of uniformity in regulations, standards, procedures, and organization in relation to aircraft, personnel, airways and auxiliary services in all matters in which such uniformity will facilitate and improve air navigation. To this end the International Civil Aviation Organization shall adopt and amend from time to time, as may be necessary, international standards and recommended practices and procedures.

Article 38 - Departures from International Standards and Procedures: Any State which finds it impracticable to comply in all respects with any such international standard or procedure, or to bring its own regulations or practices into full accord with any international standard or procedure after amendment of the latter, or which deems it necessary to adopt regulations or practices differing in any particular respect from those established by an international standard, shall give immediate notification to the International Civil Aviation Organization of the differences between its own practice and that established by the international standard. In the case of amendments to international standards, any State which does not make the appropriate amendments to its own regulations or practices shall give notice to the Council within sixty days of the adoption of the amendment to the international standard, or indicate the action which it proposes to take. In any such case, the Council shall make immediate notification to all other states of the difference which exists between one or more features of an international standard and the corresponding national practice of that State.

Article 39 - Endorsement of Certificates and Licenses: Any aircraft not satisfying the international requirements of airworthiness and any person not satisfying such requirements for licence shall get the certificate/licence endorsed giving full details.

Article 40 - Validity of Endorsed Certificates and Licenses: No aircraft or personnel having certificates or licenses so endorsed shall participate in international navigation, except with the permission of the State or States whose territory is entered. The registration or use of any such aircraft, or of any certificated aircraft part, in any State other than that in which it was originally certificated shall be at the discretion of the State into which the aircraft or part is imported.

Article 41 - Recognition of Existing Standards of Airworthiness: The provisions of this Chapter shall not apply to aircraft and aircraft equipment of types of which the prototype is submitted to the appropriate national authorities for certification prior to a date three years after the date of adoption of an international standard of airworthiness for such equipment.

Article 42 - Recognition of Existing Standards of Competency of Personnel: The provisions of this Chapter shall not apply to personnel whose licences are originally issued prior to a date one year after initial adoption of an international standard of qualification for such personnel; but they shall in any case apply to all personnel whose licenses remain valid five years after the date of adoption of such standard.

ICAO

The International Civil Aviation Organization, a UN Specialized Agency, is the global forum for civil aviation. ICAO works to achieve its vision of safe, secure and sustainable development of civil aviation through cooperation amongst its member States.

Name and composition

An organization named the International Civil Aviation. Organization is formed by the Chicago Convention,1944. It is made up of an Assembly, a Council, and such other bodies as may be necessary.

Organisation

Objectives

The aims and objectives of the Organization are to develop the principles and techniques of international air navigation and to foster the planning and development of international air transport so as to:

a) Insure the safe and orderly growth of international civil aviation throughout the world;
b) Encourage the arts of aircraft design and operation for peaceful purposes;
c) Encourage the development of airways, airports, and air navigation facilities for international civil aviation;
d) Meet the needs of the peoples of the world for safe, regular, efficient and economical air transport;
e) Prevent economic waste caused by unreasonable competition;
f) Insure that the rights of contracting States are fully respected and that every contracting State has a fair opportunity to operate international airlines;
g) Avoid discrimination between contracting States;
h) Promote safety of flight in international air navigation;
i) Promote generally the development of all aspects of international civil aeronautics

ASSEMBLY
It is the highest body, meets not less than once in three years.
All Contracting States one member one vote

COUNCIL
36 Contracting States elected by the Assembly
(President of the Council is elected by the Council)

COMMISSIONS AND COMMITTEES
(Each of between nine and fifteen members.)

- Air Navigation Commission
  19 members appointed by the Council.
- Air Transport Committee
  Appointed by the Council.
- Legal Committee
- Committee on Joint Support of Air Navigation Services
  Not more than 11 members, with not less than 9 members, appointed by the Council.
- Finance Committee
  Not more than 13 members, with not less than 9 members, appointed by the Council.
- Committee on Unlawful Interference
  15 members appointed by the Council.

THE SECRETARIAT
(Secretary-General appointed by the council.)

- **Air Navigation Bureau.**
- **Air Transport Bureau.**
- **Technical Assistance Bureau.**
- **Legal Bureau.**
- **Bureau of Administration and Services.**

Membership

International Civil Aviation Organization member states:

ICAO members are 193 of the United Nations members including a non member of UNO, the Cook Islands.

The non-member states are Liechtenstein, Niue, Tuvalu, Vatican City and the states with limited recognition.

World Headquarters, Regions and regional offices:

ICAO World Headquarters: Montreal,Canada

The ICAO has seven regional offices serving nine regions:

1. Asia and Pacific, Bangkok, Thailand
2. Middle East, Cairo, Egypt
3. Western and Central Africa, Dakar, Senegal
4. South America, Lima, Peru
5. North America, Central America and Caribbean, Mexico City, Mexico
6. Eastern and Southern Africa, Nairobi, Kenya
7. Europe and North Atlantic, Paris, France

Regional Air Navigation (RAN) meetings are held periodically to consider the requirements of air operations within specified geographic areas.

ICAO TECHNICAL PUBLICATIONS:

International Standards and Recommended Practices are adopted by the Council in accordance with Articles 54, 37 and 90 of the Convention on International Civil Aviation and are designated, for convenience, as Annexes to the Convention. The uniform application by Contracting States of the specifications contained in the **International Standards** is recognized as necessary for the safety or regularity of international air navigation while the uniform application of the specifications in the **Recommended Practices** is regarded as desirable in the interest of safety, regularity or efficiency of international air navigation. In the event of non-compliance with an

International Standard, a State has, in fact, an obligation, under Article 38 of the Convention, to notify the Council of any differences. Knowledge of differences from **Recommended Practices** may also be important for the safety of air navigation and, although the Convention does not impose any obligation with regard thereto, the Council has invited Contracting States to notify such differences in addition to those relating to International Standards.

Procedures for Air Navigation Services (PANS). Are approved by the Council for worldwide application. They contain, for the most part, operating procedures regarded as not yet having attained a sufficient degree of maturity for adoption as International Standards and Recommended Practices, as well as material of a more permanent character which is considered too detailed for incorporation in an Annex, or is susceptible to frequent amendment, for which the processes of the Convention would be too cumbersome.

Regional Supplementary Procedures (SUPPS). Have a status similar to that of PANS in that they are approved by the Council, but only for application in the respective regions.

Technical Manuals provide guidance and information in amplification of the International Standards, Recommended Practices and PANS, the implementation of which they are designed to facilitate.

Air Navigation Plans detail requirements for facilities and services for international air navigation in the respective ICAO Air Navigation Regions.

ICAO Circulars make available specialized information of interest to Contracting States. This includes studies on technical subjects.

ICAO STANDARDS

Annexes 2, 5, 7 & 8 contain international standards and no recommended practices (RPs). The remaining 15 Annexes contain both.

1. Annex 1 : Personal Licensing
2. Annex 2 : Rules of the Air
3. Annex 3 : Meteorological Service for International Air Navigation
4. Annex 4 : Aeronautical Charts
5. Annex 5 : Units of Measurement to be Used in Air and Ground
6. Annex 6 : Operation of Aircraft:
   - Part I : International Commercial Air Transport
   - Part II : International General Aviation
   - Part III : International Operations – Helicopters
7. Annex 7 : Aircraft Nationality and Registration Marks

8. Annex 8 : Airworthiness of Aircraft
9. Annex 9 : Facilitation
10. Annex 10 : Aeronautical Telecommunication
    - Vol. I : Radio Navigational Aids
    - Vol. II : Communication Procedures
    - Vol. III : Communication Systems
    - Vol. IV : Surveillance Radar and Collision Avoidance Systems
    - Vol. V : Aeronautical Radio Frequency Spectrum Utilisation
11. Annex 11 : Air Traffic Services
12. Annex 12 : Search and Rescue
13. Annex 13 : Aircraft Accident Investigation
14. Annex 14 : Aerodromes:
    - Vol. I : Aerodrome Design and Operations
    - Vol. II : Heliports
15. Annex 15 : Aeronautical Information Service
16. Annex 16 : Environmental Protection:
    - Vol. I : Aircraft Noise
    - Vol. II : Aircraft Engine Emissions
17. Annex 17 : Safeguarding International Civil Aviation against Acts of Unlawful Interference
18. Annex 18 : Safe Transport of Dangerous Goods by Air
19. Annex 19 : Safety Management

ICAO RECOMMENDED PRACTICES

Documents

01. Doc 4444 : Procedure for Air Navigation Services – Air Traffic Management (PANS ATM).
02. Doc 7030 : Regional Supplementary Procedures (SUPPS).
03. Doc 8400 : ICAO Abbreviations and Codes
04. Doc 8168 : Aircraft Operations
05. Doc 7910 : Location Indicators

06. Doc 8585 : Designators for Aircraft Operating Agencies, Aeronautical Authorities and Services
07. Doc 8643 : Aircraft Type Designator
08. Doc 8126 : Aeronautical Information Service Manual
09. Doc 8697 : Aeronautical Chart Manual
10. Doc 8896 : Manual of Aeronautical Meteorological Procedure
11. Doc 7383 : Aeronautical Information Service by States
12. Doc 7101 : Aeronautical Chart Catalogue
13. Doc 7100 : Manual of Airport and Air Navigation Facility Tariffs
14. Doc 7333 : Search And Rescue Manual
15. Doc 9432 : Manual of Radio Telephony
16. Doc 9137 : Airport Service Manual
17. Doc 9426 : Air Traffic Service Planning Manual
18. Doc 9674 : WGS – 84 Manual
19. ISO 8402 : ISO Standard – 8402
20. Doc 9691 : Manual of Volcanic Ash, Radio Active Material and Toxic Chemical Clouds
21. Doc 9433 : Manual Concerning Interception of Civil Aircraft
22. Doc 9554 : Manual Concerning Safety Measures Relating to Military Activities Hazardous to Civil Aircraft Operations
23. Doc 9613 : Manual on RNP (Co-located with RNAV Manual
24. Doc 9156 : Accident/Incident Reporting Manual
25. Doc 6920 : Manual of Aircraft Accident Investigation
26. Doc 9422 : Accident Prevention Manual
27. Doc 9342 : Aerodromes, Air Routes and Ground Aids
28. Doc 9750 : Global Air Navigation Plan for CNS/ATM Systems
29. Doc 9849 : Global Navigation Satellite System (GNSS) Manual
30. Doc 9688 : Manual on Mode S Specific Services
31. Doc 8071 : Manual on Testing of Radio Navigation Aide
32. Doc 9684 : Manual on the Secondary Surveillance Radar (SSR) Systems
33. Doc 9694 : Manual of Air Traffic Services Data Link Applications

THE INTERNATIONAL AIR SERVICES TRANSIT AGREEMENT, 1944

Signed at Chicago on 7th Dec, 1944,it was ratified by India.

Each Contracting State grants to the other contracting States the following "Technical Freedoms of the Air" in respect of scheduled international air services :

TECHNICAL FREEDOMS OF THE AIR:

First Freedom of Air: The privilege to fly across its territory without landing;

Second Freedom of Air: The privilege to land for non-traffic purposes.

THE INTERNATIONAL AIR TRANSPORT AGREEMENT

Signed at Chicago on 7th Dec, 1944 it was not ratified by India.

Each Contracting State grants to the other contracting States the Technical Freedoms of the Air in respect of scheduled international air services as specified above. In addition, the following "Commercial Freedoms of the Air" are granted:

COMMERCIAL FREEDOMS OF THE AIR:

Third Freedom of Air : The privilege to put down passengers, mail and cargo taken on in the territory of the State whose nationality the aircraft possesses;

Fourth Freedom of Air: The privilege to take on passengers, mail and cargo destined for the territory of the State whose nationality the aircraft possesses;

Fifth Freedom of Air: The privilege to take on passengers, mail and cargo destined for the territory of any other Contracting State and the privilege to put down passengers, mail and cargo coming from any such territory.

UNLAWFUL ACTS

Following conventions were held to deal with unlawful acts associated with Aviation, and ratified by India:

CONVENTION ON OFFENCES AND CERTAIN OTHER ACTS COMMITTED ON BOARD AIRCRAFT, SIGNED AT TOKYO, ON 14 SEPTEMBER 1963 (TOKYO CONVENTION.)

SCOPE OF THE CONVENTION

Article 1 :

1. This Convention shall apply in respect of:
   a) offences against penal law;
   b) acts which, whether or not they are offences, may or do jeopardize

the safety of the aircraft or of persons or property therein or which jeopardize good order and discipline on board.

2. Convention shall apply in respect of offences committed or acts done by a person on board any aircraft registered in a Contracting State, while that aircraft is in flight or on the surface of the high seas or of any other area outside the territory of any State.
3. For the purposes of this Convention, an aircraft is considered to be **in flight** from the moment when power is applied for the purpose of take off until the moment when the landing run ends.
4. This Convention shall not apply to aircraft used in military, customs or police services.

Article 2: No provision of this Convention shall be interpreted as authorizing or requiring any action in respect of offences against penal laws of a political nature or those based on racial or religious discrimination.

JURISDICTION:

Article 3:

1. The State of registration of the aircraft is competent to exercise jurisdiction over offences and acts committed on board.
2. Each Contracting State shall take such measures as may be necessary to establish its jurisdiction as the State of registration over offences committed on board aircraft registered in such State.
3. This Convention does not exclude any criminal jurisdiction exercised in accordance with national law.

Article 4: A Contracting State which is not the State of registration may not interfere with an aircraft in flight in order to exercise its criminal jurisdiction over an offence committed on board except in the following cases:

a) the offence has effect on the territory of such State;
b) the offence has been committed by or against a national or permanent resident of such State;
c) the offence is against the security of such State;
d) the offence consists of a breach of any rules or regulations relating to the flight or manoeuvre of aircraft in force in such State;
e) the exercise of jurisdiction is necessary to ensure the observance of any obligation of such State under a multilateral international agreement.

POWERS OF THE AIRCRAFT COMMANDER:

Article 5:

1. The provisions of this Chapter shall not apply to offences and acts committed or about to be committed by a person on board an aircraft in flight in the airspace of the State of registration or over the high seas or any other area outside the territory of any State unless the last point of takeoff or

the next point of intended landing is situated in a State other than that of registration, or the aircraft subsequently flies in the airspace of a State other than that of registration with such person still on board.

2. An aircraft shall for the purposes of this Chapter, be considered to be in flight at any time from the moment when all its external doors are closed following embarkation until the moment when any such door is opened for disembarkation. In the case of a forced landing, the provisions of this Chapter shall continue to apply with respect to offences and acts committed on board until competent authorities of a State take over the responsibility for the aircraft and for the persons and property on board.

Article 6:

1. The aircraft commander may, when he has reasonable grounds to believe that a person has committed, or is about to commit, on board the aircraft, an offence or act contemplated in Article 1, paragraph 1, impose upon such person reasonable measures including restraint which are necessary:
   a) to protect the safety of the aircraft, or of persons or property therein; or
   b) to maintain good order and discipline on board; or
   c) to enable him to deliver such person to competent authorities or to disembark him in accordance with the provisions of this Chapter.
2. The aircraft commander may require or authorize the assistance of other crew members and may request or authorize, but not require, the assistance of passengers to restrain any person whom he is entitled to restrain. Any crew member or passenger may also take reasonable preventive measures without such authorization when he has reasonable grounds to believe that such action is immediately necessary to protect the safety of the aircraft, or of persons or property therein.

Article 7:

1. Measures of restraint imposed upon a person in accordance with Article 6 shall not be continued beyond any point at which the aircraft lands unless:
   a) such point is in the territory of a non-Contracting State and its authorities refuse to permit disembarkation of that person or those measures have been imposed in accordance with Article 6, paragraph 1c) in order to enable his delivery to competent authorities;
   b) the aircraft makes a forced landing and the aircraft commander is unable to deliver that person to competent authorities; or
   c) that person agrees to onward carriage under restraint.
2. The aircraft commander shall as soon as practicable, and if possible before landing in the territory of a State with a person on board who has been placed under restraint in accordance with the provisions of Article 6, notify the authorities of such State of the fact that a person on board is under restraint and of the reasons for such restraint.

THE HAGUE CONVENTION OF 1970

Following the Tokyo Convention, and after a spate of politically motivated terrorists hijackings. ICAO called a convention hosted by the Dutch government to address this problem. The Convention for the Suppression of Unlawful Seizure of Aircraft defines the act of unlawful seizure and the measures to be taken by contracting states to enforce severe punishment upon perpetrators. This agreement specifies extradition of offenders and obliges contracting states to extradite offenders.

THE MONTREAL CONVENTION OF 1971

The Convention for the Suppression of Unlawful Acts Against the safety of Civil Aviation compliments the Hague Convention by making it an offence to:

- commit acts of violence on board aircraft that endanger people and property and the safety of the aircraft.
- Destroy an aircraft in service or cause damage which renders the aircraft incapable of flight or which is likely to endanger the safety of flight.
- Place a device on board an aircraft that is likely to destroy the aircraft, damage it, or render it unfit for flight.
- Destroy or damage any navigation facility or interference with its correct operation.
- Interfere with aircraft communications or transmit information known to be false that endangers the safety of an aeroplane in flight.

MONTREAL PROTOCOL, 1988

This extended the Montreal Convention to include offence committed at aerodromes serving international civil aviation, including the intentional use of any device, substance or weapon:

- Likely to cause serious injury or death.
- To destroy or seriously damage the facilities of an airport.
- To destroy or damage aircraft not in service at the airport.
- To disrupt the services at an airport.

THE MONTREAL CONVENTION, 1991

Convention on the marking of plastic explosives for the purpose of detection was signed at Montreal on 1st march, 1991.

Tokyo Convention 1963, Hague Convention 1970, Montreal Conventions 1971 and 1991 and Montreal Protocol 1988 have been ratified by India.

INDIAN ORGANISATIONS

Ministry of Civil Aviation
Government Of India

Located at Rajiv Gandhi Bhavan at the Safdarjung Airport in New Delhi, the Ministry of Civil Aviation is responsible for formulation of national policies and programmes for the development and regulation of the Civil Aviation sector in the country. It is responsible for the administration of the Aircraft Act, 1934, Aircraft Rules, 1937 and various other legislations pertaining to the aviation sector in the country. This Ministry exercises administrative control over attached and autonomous organizations like the Directorate General of Civil Aviation, Bureau of Civil Aviation Security and Indira Gandhi Rashtriya Udan Academy and affiliated Public Sector Undertakings like National Aviation Company of India Limited, Airports Authority of India and Pawan Hans Helicopters Limited. The Commission of Railway Safety, which is responsible for safety in rail travel and operations in terms of the provisions of the Railways Act, 1989 also comes under the administrative control of this Ministry.

The **Directorate General of Civil Aviation (DGCA.** is the regulatory body in the field of Civil Aviation, primarily dealing with safety issues. It is responsible for regulation of air transport services to/from/within India and for enforcement of civil air regulations, air safety, and airworthiness standards. The DGCA also co-ordinates all regulatory functions with the International Civil Aviation Organisation (ICAO..

The functions of DGCA include the following:

1. Registration of civil aircraft;
2. Formulation of standards of airworthiness for civil aircraft registered in India and grant of certificates of airworthiness to such aircraft;
3. Licensing of pilots, aircraft maintenance engineers and flight engineers, and conducting examinations and checks for that purpose;
4. Licensing of air traffic controllers;
5. Certification of aerodromes and CNS/ATM facilities;
6. Granting of Air Operator's Certificates to Indian carriers and regulation of air transport services operating to/from/within/over India by Indian and foreign operators, including clearance of scheduled and non-scheduled flights of such operators;
7. Conducting investigation into accidents/incidents and taking accident prevention measures including formulation of implementation of Safety Aviation Management programmes.
8. Carrying out amendments to the Aircraft Act, the Aircraft Rules and the

Civil Aviation Requirements/AICs/Circulars etc. for complying with the amendments to ICAO Annexes, and initiating proposals for amendment to any other Act or for passing a new Act in order to give effect to an international Convention or amendment to an existing Convention;

9. Coordination at national level for flexi-use of air space by civil and military air traffic agencies and interaction with ICAO for provision of more air routes for civil use through Indian air space;
10. Keeping a check on aircraft noise and engine emissions in accordance with ICAO Annex 16 and collaborating with the environmental authorities in this matter, if required;
11. Promoting indigenous design and manufacture of aircraft and aircraft components by acting as a catalytic agent;
12. Approving training programmes of operators for carriage of dangerous goods, issuing authorizations for carriage of dangerous goods, etc.

The **Airports Authority of India (AAI).** Was formed on 1st April 1995 by merging the International Airports Authority of India and the National Airports Authority with a view to accelerate the integrated development, expansion, and modernization of the operational, terminal and cargo facilities at the airports in the country conforming to international standards.

The main functions of Airports Authority of India are as under:

1. Design, Development, Operation and Maintenance of international and domestic airports and civil enclaves.
2. Control and Management of the Indian airspace extending beyond the territorial limits of the country, as accepted by ICAO.
3. Construction, Modification and Management of passenger terminals.
4. Development and Management of cargo terminals at international and domestic airports.
5. Provision of passenger facilities and information system at the passenger terminals at airports.
6. Expansion and strengthening of operation area, viz. Runways, Aprons, Taxiway etc.
7. Provision of visual aids.
8. Provision of Communication and Navigation aids, viz. ILS, DVOR, DME, Radar etc.
9. Provision of Air Traffic Services at Airports under it's jurisdiction.
10. Provision of aeronautical information services publication of AIP, NOTAMS, AIRRACS, PIBs etc.

CONVENTION FOR THE UNIFICATION OF CERTAIN RULES RELATING TO INTERNATIONAL CARRIAGE BY AIR, SIGNED AT WARSAW ON 12 OCTOBER 1929 (WARSAW CONVENTION.) AND IT'S AMMENDMENTS

The Hague Protocol, 1955, The Guadalajara Convention, 1961,The Guatemala City Protocol, 1971, additional Montreal Protocol nos. 1 to 4, 1975, and The Montreal Convention, 1999 were held to amend the rules and for the unification of certain provisions relating to international carriage by air signed at Warsaw on 12 October, 1929. The Montreal convention 1999 aims at replacing Warsaw convention system. India has ratified only Warsaw Convention and Hague protocol out of the afore listed conventions and protocols.

This Convention applies to all international carriage of persons, luggage or goods performed by aircraft for reward. It applies equally to gratuitous carriage by aircraft performed by an air transport undertaking.

This Convention does not apply to carriage performed under the terms of any international postal Convention.

This Convention to which 152 states are party, is one of the most widely accepted unifications of private law. It unifies legislation on:

- Documentation on the carriage of passengers, baggage, and cargo.
- The financial liability of airlines (operators).
- The question of jurisdiction, by defining the courts before which any action may be brought.

Passenger ticket

A passenger ticket shall be issued for each flight containing:

- The place and date of issue.
- An indication of the place of departure and destination.
- The agreed stopping places, provided that the carrier may reserve the right to alter the stopping places, and that if he exercises that right, the alteration shall not have the effect of depriving the carriage of its international character.
- The name and address of the carrier or carriers.
- a statement that the carriage is subject to the rules relating to the liability established by this convention usually printed on the ticket jacket.

The absence, irregularity, or loss of the passenger ticket does not affect the validity of the contract of carriage, which shall be subject to the rules of the convention. If a carrier accepts a passenger without a ticket, the carrier will not be able to fall back on the provisions of the convention that limit liability. If a carrier issues an 'electronic' ticket, then the provisions of the warsaw Convention must be communicated by other means.

Baggage check

For luggage, other than small personal objects that the passengers take themselves, the carrier must issue a luggage ticket. The luggage ticket is made out in duplicate, one for the passenger and the other for the carrier.

Liability of the carrier

The Treaty also imposed limitations on the liability of the operator. However, where gross negligence can be proved, the limit of liability is removed. Currently, the limit of liability for death of a passenger is SDR 100 000. As per Montreal convention 1999, there are no financial limits to the liability for passenger injury or death. For damages up to 113,100 SDRs, the air carrier cannot contest claims for compensation. Above that amount, the air carrier can defend itself against a claim by proving that it was not negligent or otherwise at fault.

The Carriage by Air Act, 1972.

The rights and liabilities of air carriers are governed by the Carriage by Air Act, 1972 [as amended in 2009]. **The Act extends to the whole of India.** Consequently, the Act is applicable to Indian citizens involved in domestic carriage by air and in international carriage by air, irrespective of the nationality of the aircraft performing the carriage.

THE RESPONSIBILITY OF THE OPERATOR AND THE PILOT REGARDING DAMAGE TO PERSONS AND GOODS ON THE GROUND

THE CONVENTION OF ROME 1952

This convention replaced Rome convention 1933 and Brussels protocol 1938.

The convention produced uniformity in place of the differing national laws covering the liability of the owner or operator of an aircraft that causes damage to persons or property on the ground. In simple terms, the operator is liable for any damage, but the liability is limited to a sum that is proportionate to the weight of the aircraft. The Convention makes it compulsory to insure against this liability. A later Rome Convention looked at the problems of damage caused by foreign aircraft to third parties on the surface of the earth. The amount of compensation is limited, but carriers are liable for damage caused to third parties. The convention does accept compulsory recognition and execution of any foreign judgement on damage to third parties. The 1933 convention also regulated the right of arrest where an aircraft is seized in the case of debt. India has not ratified this convention.

Montreal protocol 1978 amended Rome convention by including operator living in another contracting state.

GENEVA CONVENTION 1948.

This convention protects the rights of seller for aircraft bought on Hire Purchase, Lease or Mortgage.

THE CAPE TOWN CONVENTION, 2001 AND THE CAPE TOWN PROTOCOL, 2001

Convention on international interests in mobile equipment as applied to aircraft objects to meet the particular requirements of aircraft finance and to extend the sphere of application of the Convention to include contracts of sale of aircraft equipment; was signed at Cape Town on 16 November 2001. Convention aims at introducing a legally certain, effective and prompt system of enforcement that can assure and encourage investments in Aircraft objects. India has ratified this convention and protocol in 2008.

COMMERCIAL PRACTICES AND ASSOCIATED RULES (LEASING).

AOC/AOP Air Operators Certificate/Permit, a document issued by the Authority of a State allowing an Operator to conduct public transport flights.

Dry lease The aeroplane is operated under the AOC of the lessee (the company leasing the aeroplane.

Wet lease The aeroplane is operated under the AOC of the lessor (the company who let the aircraft out).

"Military aircraft" includes naval, military and air force aircraft, and every aircraft commanded by a person in naval, military or air force service detailed for the purpose.

QUESTIONS

1. **Which of the following is obligating for members of ICAO ?**
   A) ICAO shall approve the pricing of tickets on international airline connections
   B) ICAO must be informed about changes in the national regulations
   C) ICAO must be informed about differences from the standards in any of the Annexes to the convention

2. **For aircraft flying over the high seas, which rules shall be in force?**
   A) The rules established by the state of the operator of the aircraft
   B) The rules established by the state(s) adjacent to the high seas over flown
   C) The rules established under the Convention of international civil aviation

3. **Annex 14 to the convention on international civil aviation contains SARPS for:**
   A) Air Traffic Services
   B) Aerodromes
   C) Facilitation

4. **The Warsaw convention and later ammendments deals with:**
   A) limitation of the operator's responsibility vis-a-vis passengers and goods transported
   B) operator's license for international scheduled aviation
   C) the security system at airports

5. **Annex 17 to the Convention of Chicago covers:**
   A) Aerodromes
   B) Security
   C) Facilitations

6. **The State has to notify the Council of ICAO and publish such differences in the national AIP If a state finds that it is impracticable to comply with an International Standard:**
   A) It shall give 45 days notice to ICAO of the differences between its own practices and the International Standard
   B) It shall give 60 days notice to ICAO of the differences between its own practices and the International Standard
   C) It shall give immediate notice to ICAO of the differences between its own practices and the International Standard

7. The international convention defining rules relative to the responsibilities of international air carriers for the carriage of passengers, baggage and freight is the

A) Hague Convention
B) Warsaw Convention
C) Tokyo Convention

8. The 'Standards' contained in the Annexes to the Chicago convention are to be considered:

A) binding for the member states that have not notified ICAO about a national difference
B) advice and guidance for the aviation legislation within the member states
C) binding for all air line companies with international traffic

9. An aircraft flying over the territory of another state must:

A) Follow the rules of the Air of the State it is over flying, provided they follow ICAO rules
B) Follow the rules of the Air of the State of the Operator, if registered in other State
C) Follow the rules of the Air of the State of Registration to the extent that they do not conflict with the rules published by the State having jurisdiction over the territory overflown

10. An airplane is planning a flight that will require a technical landing in a neighboring state. Which freedom of the air will be exercised?

A) 3rd freedom
B) 4th freedom
C) 2nd freedom

11. The convention of Tokyo applies to damage:

A) caused in the territory of a contracting state or in a ship or aircraft registered there in, by an aircraft registered in the territory of another contracting state
B) only caused in the territory of a contracting state by any aircraft registered in the territory of another contracting state
C) caused in the territory of a contracting state by any aircraft regardless the registration

12. The International Civil Organisation (ICAO) was established by the international convention of:

A) Warsaw
B) Chicago
C) Montreal

13. The Rome Convention and later amendments deals with:

A) Damage caused by foreign aircraft to third parties on the surface
B) offences and certain other acts committed on board aircraft
C) Regulation of transportation of dangerous goods

14. The convention on offences and certain acts committed on board aircraft, is:

A) the convention of Rome
B) the convention of Tokyo
C) the convention of Chicago

15. The aircraft commander, when he has reasonable grounds to believe that a person has committed or is about to commit, on board the aircraft, an offense against penal law

A) may not require or authorise the assistance of other crew members
B) may require the assistance of passengers to restrain such persons
C) may deliver such person to the competent authorities

16. If a person is injured by a part falling from an aircraft flying over the state but registered in another state, which convention covers this?

A) Paris
B) Chicago
C) Rome

17. India is a signatory to THE INTERNATIONAL AIR TRANPORT AGREEMENT, 1944:?

A) Yes
B) Yes, but it does not subscribe to Technical Freedoms
C) No

18. The convention signed by the states and moved by a desire to endure adequate compensation for persons who suffer damage caused on the surface by foreign aircraft is :

A) the Paris Convention
B) the Rome Convention
C) the Warsaw Convention

19. Which Annex to the Chicago Convention covers dangerous goods carried in aircraft?

A) Annex 16
B) Annex 18
C) Annex 17

20. Proposal to give effect to an international Convention in India is initiated by:

A) Ministry of Civil Aviation
B) Parliament
C) DGCA

21. If a Air India provides an aeroplane and complete crew for lease to Indian Air Force (a wet lease-out situation), who is the operator of the aeroplane?

A) Air India provided they carry civil load only
B) Air India - because it is their crew flying the aero plane
C) Indian Air Force- providing they absolve Air India of any responsibility in the manner in which the aeroplane is operated

22. What flights are protected by the Prevention of Terrorism Act?

A) All flights B) Private flights only C) Military flights only

23. The second freedom of the air is the:

A) right to operate a commercial passenger flight with passengers on board between two states
B) right to land for a technical stop
C) right to " cabotage" traffic, (trans-border traffic)

24. Which convention makes acts of violence on board, destruction of aircraft in flight and destroying or damaging any air navigation facility punishable?

A) The Tokyo convention
B) The Montreal convention
C) The Warsaw convention

25. According to which Convention may an aircraft commander impose measures upon a person committing a crime or an offence on board the aircraft?

A) The Convention of Rome
B) The Convention of Warsaw
C) The Convention of Tokyo

26. 'Cabotage' refers to:

A) domestic air services
B) a national air carrier
C) crop spraying

ANSWERS

1	2	3	4	5	6	7	8	9
C	C	B	A	B	B	B	A	C

10	11	12	13	14	15	16	17	18
C	A	B	A	B	C	C	C	B

19	20	21	22	23	24	25	26
B	C	B	A	B	B	C	A

3

AIRCRAFT NATIONALITY AND REGISTRATION MARKS

(Annex 7, Rules of the Air,1937, CAR SECTION 2 - AIRWORTHINESS SERIES F PART I ISSUE II, 10th SEPT, 1998)

Introduction: Annex 7 sets out procedures for selection by ICAO Contracting States of nationality marks from the nationality symbols included in the radio call signs allocated to the States of Registry by the ITU. ITU has alloted symbols 4YA to 4YZ for common marks for two or more states carrying out joint operations.

It sets standards for the use of letters, numbers and other graphic symbols to be used in the nationality and registration marks, and spells out where these characters will be located on different types of airborne vehicles, such as lighter-than air aircraft and heavier-than-air aircraft.

This Annex also calls for the registration of the aircraft, and provides a sample of this certificate for use by ICAO Contracting States. This certificate must be carried in the aircraft at all times.

Identification Plate: An aircraft shall carry an identification plate inscribed with at least its nationality or common mark and registration mark. The plate shall be made of fireproof metal or other fireproof material of suitable physical properties and the identification plate shall be secured to the aircraft in a prominent position near the main entrance or:

a) in the case of an unmanned free balloon, affixed conspicuously to the exterior of the payload.; and

b) in the case of a remotely piloted aircraft, secured in a prominent position near the main entrance or compartment or affixed conspicuously to the exterior of the aircraft if there is no main entrance or compartment.

- The registration mark shall be letters, numbers, or a combination of letters and numbers consisting of 1 to 5 digits or characters, and shall be that assigned by the State of Registry or common mark registering authority.
- When letters are used for the registration mark, combinations shall not be used which might be confused with the five-letter combinations used in the International Code of Signals, Part II, the three-letter combinations beginning with Q used in the Q Code, and with the

distress signal SOS, or other similar urgent signals, for example XXX, PAN and TTT.

MEASUREMENTS OF NATIONALITY, COMMON AND REGISTRATION MARKS

Heavier-than-air aircraft

Wings. The height of the marks on the wings of heavier-than-air aircraft shall be at least 50 centimetres.

Fuselage (or equivalent structure) and vertical tail surfaces. The height of the marks on the fuselage (or equivalent structure) and on the vertical tail surfaces of heavier-than-air aircraft shall be at least 30 centimetres. The letters and numbers in each separate group of marks shall be of equal height.

Lighter-than-air aircraft

The height of the marks on lighter-than-air aircraft other than unmanned free balloons shall be at least 50 centimetres. The measurements of the marks related to unmanned free balloons shall be determined by the State of Registry, taking into account the size of the payload to which the identification plate is affixed.

NATIONAL PROVISIONS

Certificate of Registration – The authority empowered to register aircraft and to grant certificate of registration in India shall be the Central Government. The certificate of registration shall include the following particulars, namely:

Type of aircraft, constructor's number, and year of manufacture, nationality and registration marks referred to under these rules, full name, nationality and address of the owner, usual station of aircraft and the date of registration and the period of validity of such registration:

Provided that in the case of a leased aircraft, the certificate of registration shall also include the validity of the lease and the names, nationalities and addresses of the lessor and the lessee.

Cancellation: The registration of an aircraft registered in India may be cancelled at any time by the DGCA, if it is satisfied that –

i. Such registration is not in conformity with the provisions of rules; or
ii. The registration has been obtained by furnishing false information; or
iii. The aircraft could more suitably be registered in some other country; or
iv. The lease in respect of the aircraft, registered is not in force; or
v. The aircraft has been destroyed or permanently withdrawn from use; or
vi. It is inexpedient in the public interest that the aircraft should remain registered in India.
vii. The Certificate of Airworthiness in respect of the aircraft has expired for a period of five years or more..
viii. The registration of an aircraft registered in India, to which the provisions of

the Cape Town Convention or Cape Town Protocol apply, shall be canceled by the DGCA, as provided in the Cape Town Protocol, if an application is received from irrevocable deregistration and export request authorisations (IDERA) holder prior to expiry of the lease.

Register of Aircraft: A register of aircraft registered in India shall be maintained by the Director-General and shall include the particulars as provided for in respect of certificate of registration. Such a register shall be open to inspection by members of the public at such times and subject to such conditions as may be specified by the Director-General. The Register of aircraft is also available on DGCA website.

Nationality and Registration Marks, how to be affixed- The following provisions of this rule shall have effect with respect to the marks to be borne by aircraft registered in India-

(1) India has been allotted nationality symbols AT to AW by ITU. However we continue to use pre-Independence nationality marks. The nationality mark used for aircraft registered in India is the letter "VT" for civil aircraft and "VU" for Air-Force aircraft. The nationality mark is followed by a hyphen and a registration mark consisting of 3 letters e.g. VT-EPC or VU-AWB in Roman character with out ornamentation. The nationality mark for unmanned aircraft registered in India is U followed by 6 Alpha-Numeric characters, i.e., between 0 and 9 or A and Z, e.g., UB67DFC.

(2) The nationality and registration marks
- a) Shall be painted on the aircraft or shall be fixed thereto by any other means ensuring a similar degree of permanency in the form and manner as specified by the Director-General, from time to time;
- b) Shall be inscribed together with full name and address of the registered owner of the aircraft on the owner's name plate in the form and manner specified by the Director-General from time to time; and
- c) Shall always be kept clean and visible.

Use of State Marks-

(1) An aircraft shall not bear on any part of its exterior surface any Advertisement or any sign or lettering except those under these rules and as required or permitted by the Director-General.

(2) The name of an aircraft and the name and emblems of the owner of the aircraft may be displayed on the aircraft if the location, size, shape and colour of the lettering and signs do not interfere with easy recognition of, and are not capable of confusion with, the nationality and registration marks of the aircraft.

(3) An aircraft other than a State aircraft shall not bear any mark or sign prescribed for use by a State aircraft.

(4) National flags or colours may be displayed on the aircraft in such a manner that they are distinct and are not likely to create confusion with the markings used by military aircraft.

QUESTIONS

1. The registration mark shall be letters, numbers or a combination of letters and numbers and shall be that assigned by:

A) The International Telecommunication Union
B) The state of registry or common mark registering authority
C) The state of registry only

2. The common mark shall be selected from the series of symbols included in the radio call signs allocated:

A) To state of the operator
B) To the International Civil Aviation Organisation by the International Telecommunication Union
C) To the state of registry by the International Civil Aviation Organisation

3. The assignment of the common mark to a common mark registration authority will be made by:

A) The International Civil Aviation Organisation
B) The state of registry
C) The International Telecommunication Union

4. When letters are used for the registration mark combinations shall not be used which might be confused with urgent or distress signals for example

A) XXX
B) RCC
C) DDD

5. When letters are used for the registration mark combinations shall not be used which might be confused with

A) Three letters combinations used in the international code of signals
B) Four letter combinations beginning with Q
C) Five letter combinations used in the international code of signals

6. The height of the marks on the fuselage (or equivalent structure) and on the vertical tail surfaces of heavier than air aircraft shall be

A) At least 20 centimetres
B) At least 40 centimetres
C) At least 30 centimetres

7. The height of the marks on lighter than air aircraft other than unmanned free balloons shall be at least

A) 60 centimetres
B) 50 centimetres
C) 1 meter

8. When letters are used for registration mark combinations shall not be used which might be confused with urgent signals for example

A) LLL
B) PAN
C) RCC

9. When letters are used for registration mark combinations shall not be used which might be confused with urgent signals for example

A) LLL
B) TTT
C) RCC

10. The height of the marks under the wings of heavier than air aircraft shall be at least

A) 50 centimetres
B) Between 40 and 50 centimetres
C) 60 centimetres

11. A certificate of registration is valid from the date of registration to.

A) 1 year
B) Till the aircraft is destroyed in an accident
C) Till it is cancelled by DGCA

12. Nationality marks alloted to India by ITU are:

A) Letters VT and VW, both included
B) Letters VT only
C) Letters AT to AW

13. Nationality marks used in India are:

A) Letters VT, VU and U
B) Letters VT and VU only
C) Letters AT to AW

ANSWERS

1	2	3	4	5	6	7	8	9	10	11
B	B	A	A	C	C	B	B	B	A	C

12	13
C	A

4

RULES OF THE AIR

(Ref.: ICAO Annex 2, AIP, India and CAR SECTION 9 – AIR SPACE AND AIR NAVIGATION SERVICES STANDARDS SERIES 'C' PART I ISSUE II.)

APPLICABILITY OF THE RULES OF THE AIR

TERRITORIAL APPLICATION OF THE RULES OF THE AIR

These rules are applicable to all aircraft flying over Indian Territory and aircraft bearing the Indian nationality and registration marks, wherever they may be, to the extent that they do not conflict with the rules published by the State having jurisdiction over the territory over flown. For purposes of flight over those parts of the high seas where a Contracting State has accepted, pursuant to a regional air navigation agreement, the responsibility of providing air traffic services., the "appropriate ATS authority" referred to in this chapter is the relevant authority designated by the State responsible for providing those services.

Compliance with the Rules of the Air

The operation of an aircraft either in flight or on the movement area of an aerodrome shall be in compliance with the general rules and, in addition, when in flight, either with:

a) the visual flight rules, or
b) the instrument flight rules.

Note :— Local flights as may be exempted by Air Traffic Control and such training flights of Flying Club aircraft as may be cleared by Air Traffic Control may be operated during night in Visual Meteorological Conditions. For this purpose local flight is a flight wholly conducted in the immediate vicinity of an aerodrome.

Responsibility for compliance with the rules of the air

Responsibility of pilot-in-command

The pilot-in-command of an aircraft shall, whether manipulating the controls or not, be responsible for the operation of the aircraft in accordance with the rules of the air, except that the pilot-in-command may depart from these rules in circumstances that render such departure absolutely necessary in the interests of safety.

Pre-flight action

Before beginning a flight, the pilot-in-command of an aircraft shall become familiar with all available information appropriate to the intended operation. Pre-flight action for flights away from the vicinity of an aerodrome, and for all IFR flights, shall include a careful study of available current weather reports and forecasts, taking into consideration fuel requirements and an alternative course of action if the flight cannot be completed as planned.

Authority of pilot-in-command of an aircraft

The pilot-in-command of an aircraft shall have final authority as to the disposition of the aircraft while in command.

Problematic use of psychoactive substances

No person whose function is critical to the safety of aviation (safety-sensitive personnel) shall undertake that function while under the influence of any psychoactive substance, by reason of which human performance is impaired. No such person shall engage in any kind of problematic use of substances.

GENERAL RULES

PROTECTION OF PERSONS AND PROPERTY

Negligent or reckless operation of aircraft

An aircraft shall not be operated in a negligent or reckless manner so as to endanger life or property of others.

Minimum Safe Heights

Except when necessary for take-off or landing, or except by permission from the Director General, aircraft shall not be flown over the congested areas of cities, towns or settlements or over an open-air assembly of persons, unless at such a height as will permit, in the event of an emergency arising, a landing to be made without undue hazard to persons or property on the surface.

Notwithstanding anything contained above, the Director-General may, by order in writing, permit, subject to such conditions and restrictions as he may deem fit to impose, any aircraft engaged in aerial spraying or crop dusting, mining exploration to fly at or above such height as may be specified in the order.

Cruising Levels

The cruising levels at which a flight or a portion of a flight is to be conducted shall be in terms of:

a) flight levels, for flights at or above the lowest usable flight level or, where applicable, above the transition altitude;
b) altitudes, for flights below the lowest usable flight level or, where applicable, at or below the transition altitude.

Dropping or Spraying

Nothing shall be dropped or sprayed from an aircraft in flight except under conditions prescribed in Rule 26 of the Aircraft Rules, 1937 and as indicated by relevant information, advice and/or clearance from the appropriate air traffic services unit.

Towing

No aircraft shall be towed by an aircraft. Objects other than an aircraft shall be towed by an aircraft, in accordance with requirements prescribed by the Director General and as indicated by relevant information, advise and/or clearance from the appropriate Air traffic services units. Towing of Aircraft is not permitted in India.

Parachute Descents

No person shall, except in an emergency, descend by means of a parachute from an aircraft and no person shall drop or cause or permit to be dropped from an aircraft in flight any article, whether attached to a parachute or not, unless the descent is made or the article is dropped in accordance with the subject to any conditions or limitations contained in general or special order of the Central Government in writing in that behalf. (Rule 26 of the Aircraft Rules, 1937). Parachute descent not allowed in normal conditions.

Acrobatic Flight

No aircraft shall be flown acrobatically except under conditions as prescribed below and as indicated by relevant information, advice and/or clearance from the appropriate air traffic services unit.

When an aircraft is used for aerobatics -

a) it shall be flown by a licensed pilot, or if it is flown by a person for the purpose of qualifying for a licence under these rules, such person shall be accompanied by a licensed pilot instructor;
b) if passengers are carried, whether the carriage is public transport or not, their previous consent to the performance of acrobatics shall be obtained in writing;
c) the pilot or person in charge of aircraft shall satisfy himself before commencing the flight that every person carried in the aircraft is properly secured by safety belts; and
(d) the aerobatics shall be commenced at such a height that will permit completion of the manoeuvre at a height of not less than 600 metres (2000 feet) above the ground or above such higher height as may be specified in the certificate of airworthiness issued in respect of an aircraft in aerobatic category.

No Person shall Fly Acrobatically;

a) so as to constitute hazard to air traffic;
b) in the vicinity of an aerodrome at a distance of less than two nautical miles from the nearest point of the perimeter of the aerodrome unless flown at height greater than 1800 meters (6000 ft);
c) when flying over any city, town. Village site or populous area; or when flying over any meeting for public; games or sports or other public assembly, except where a request for such flying has been made in writing to Director General by the promoters of such meeting and assembly.

Formation Flights

No civil aircraft shall be flown in formation in India.

Avoidance of Collisions

Nothing in these rules shall relieve the pilot-in-command of an aircraft from the responsibility of taking such action , including collision avoidance manoeuvres based on resolution advisories provided by ACAS equipment, as well as avert collision.

Proximity

An aircraft shall not be operated in such proximity to other aircraft as to create a collision hazard.

Right-of-way

The aircraft that has the right-of-way shall maintain its heading and speed. An aircraft that is obliged by the following rules to keep out of the way of another shall avoid passing over, under or in front of the other, unless it passes well clear and takes into account the effect of aircraft wake turbulence.

Approaching Head-on.

When two aircraft are approaching head-on or approximately so and there is danger of collision, each shall alter its heading to the right.

Converging.

When two aircraft are converging at approximately the same level, the aircraft that has the other on its right shall give way, except as follows:

a) power-driven heavier-than-air aircraft shall give way to airships, gliders and balloons;
b) airships shall give way to gliders and balloons;
c) gliders shall give way to balloons;
d) power-driven aircraft shall give way to aircraft which are seen to be towing other aircraft or objects.

Overtaking.

An overtaking aircraft is an aircraft that approaches another from the rear on a line forming an angle of less than 70 degrees with the plane of symmetry of the latter, i.e. is in such a position with reference to the other aircraft that at night it should be unable to see either of the aircraft's left (port) or right (starboard) navigation lights. An aircraft that is being overtaken has the right-of way and the overtaking aircraft, whether climbing, descending or in horizontal flight, shall keep out of the way of the other aircraft by altering its heading to the right, and no subsequent change in the relative positions of the two aircraft shall absolve the overtaking aircraft from this obligation until it is entirely past and clear.

Landing

An aircraft in flight, or operating on the ground or water, shall give way to aircraft landing or in the final stages of an approach to land.

When two or more heavier-than-air aircraft are approaching an aerodrome for the purpose of landing, aircraft at the higher level shall give way to aircraft at the lower level, but the latter shall not take advantage of this rule to cut in in front of another which is in the final stages of an approach to land, or to overtake that aircraft. Nevertheless, power-driven heavier-than-air aircraft shall give way to gliders.

Emergency Landing.

An aircraft that is aware that another is compelled to land shall give way to that aircraft.

Taking Off.

An aircraft taxiing on the manoeuvring area of an aerodrome shall give way to aircraft taking off or about to take off.

SURFACE MOVEMENT OF AIRCRAFT

In case of danger of collision between two aircraft taxiing on the movement area of an aerodrome the following shall apply:

a) when two aircraft are approaching head on, or approximately so, each shall stop or where practicable alter its course to the right so as to keep well clear;

b) when two aircraft are on a converging course, the one which has the other on its right shall give way;

c) an aircraft which is being overtaken by another aircraft shall have the right-of-way and the overtaking aircraft shall keep well clear of the other aircraft.

An aircraft taxiing on the manoeuvring area shall stop and hold at all runway-holding positions unless otherwise authorized by the aerodrome control tower.

An aircraft taxiing on the manoeuvring area shall stop and hold at all lighted stop bars and may proceed further when the lights are switched off.

LIGHTS TO BE DISPLAYED BY AIRCRAFT

From sunset to sunrise or during any other period which may be prescribed by Director General all aircraft in flight shall display:

a) anti-collision lights intended to attract attention to the aircraft; and

b) navigation lights intended to indicate the relative path of the aircraft to an observer and other lights shall not be displayed if they are likely to be mistaken for these lights.

Note:— Lights fitted for other purposes, such as landing lights and airframe floodlights, may be used in addition to the anti-collision lights specified in the Airworthiness Technical Manual (Doc 9051) to enhance aircraft conspicuity.

From sunset to sunrise or during any other period prescribed by the Director General,

a) all aircraft moving on the movement area of an aerodrome shall display navigation lights intended to indicate the relative path of the aircraft to an observer and other lights shall not be displayed if they are likely to be mistaken for these lights;

b) unless stationary and otherwise adequately illuminated, all aircraft on the movement area of an aerodrome shall display lights intended to indicate the extremities of their structure;

c) all aircraft operating on the movement area of an aerodrome shall display lights intended to attract attention to the aircraft; and

d) all aircraft on the movement area of an aerodrome whose engines are running shall display lights which indicate that fact.

All aircraft in flight and fitted with anti-collision lights:

Shall display such lights also outside the period specified above.

All aircraft:

Operating on the movement area of an aerodrome and fitted with anti-collision lights shall display such lights also outside the period specified above.

A pilot shall be permitted to switch off or reduce the intensity of any flashing they do or are likely to:

a) adversely affect the satisfactory performance of duties; or

b) subject an outside observer to harmful dazzle.

SIMULATED INSTRUMENT FLIGHTS

An aircraft shall not be flown under simulated instrument flight conditions unless:

a) fully functioning dual controls are installed in the aircraft; and

b) a qualified pilot occupies a control seat to act as safety pilot for the person who is flying under simulated instrument conditions. The safety pilot shall have adequate vision forward and to each side of the aircraft, or a competent observer in communication with the safety pilot shall occupy a position in the aircraft from which the observer's field of vision adequately supplements that of the safety pilot.

OPERATION ON AND IN THE VICINITY OF AN AERODROME

An aircraft operated on or in the vicinity of an aerodrome shall, whether or not within an aerodrome traffic zone:

a) Observe other aerodrome traffic for the purpose of avoiding collision;
b) Confirm with or avoid the pattern of traffic formed by other aircraft in operation;
c) Make all turns to the left, when approaching for a landing and after taking off, unless otherwise instructed;
d) Land and take off into the wind unless safety, the runway configuration, or air traffic considerations determine that a different direction is preferable.

When an aerodrome control tower is in operation at an aerodrome the Pilot-in-command shall also,

a) Maintain a continuous listening watch on the appropriate radio frequency of the aerodrome control tower unless under approach control service furnished by another Air Traffic Control unit and if this is not possible, keep a watch for such instructions as may be issued by visual signals, and
b) Obtain either by radio or by visual signals prior authorization for any manoeuvre preparatory to or associated with taxiing, landing or take off.

FLIGHT PLANS

Submission of a Flight Plan

Except for flights of nano and micro remotely piloted aircraft (RPA) intending to operate up to 50 FT (15M) AGL and 200 FT (60 M) AGL respectively in uncontrolled airspace or enclosed premises, information pertaining to any flight undertaken in indian airspace shall be informed to the concerned air traffic service unit.

A flight plan shall be submitted prior to operating:

a) any flight or portion thereof to be provided with air traffic control service;
b) any IFR flight within advisory airspace;
c) any flight within or into designated areas, or along designated routes, when so required by the appropriate ATS authority to facilitate the provision of flight information, alerting and search and rescue services;
d) any flight within or into designated areas, or along designated routes, when so required by the appropriate ATS authority to facilitate co-ordination with appropriate military units or with air traffic services units in adjacent States in order to avoid the possible need for interception for the purpose of identification;
e) any flight across International borders.

An operator shall, prior to departure ensure that, where the flight is intended to operate on a route or in an area where an RNP/RVSM/RCP/RSP type specification is prescribed, the aircraft has an appropriate approval, and that all conditions applying to that approval will be satisfied.

Submission Time for Flight Plan

Except where necessary for operational or technical reasons, the flight plans for intended flights shall be submitted to appropriate ATS unit at least 180 minutes (3 Hrs.) before but not earlier than 120 hrs. from Estimated Off Block Time. Flight plans of remotely piloted aircraft (RPA) shall be submitted at least 24 hours before estimated time of departure.

In the event of a proposed delay of 15 minutes or more to the departure time for a flight plan when a flight plan has been previously filed, the Pilot-in-Command or his representative will be required to notify ATC of the revised ETD. Where applicable the flight plan should be amended or a new flight plan submitted by the Pilot-in-Command and the old flight plan cancelled.

Completion of a Flight Plan

Whatever the purpose for which it is submitted, a flight plan shall contain information, as applicable, on relevant items up to and including "Alternate aerodrome(s)" regarding the whole route or the portion thereof for which the flight plan is submitted.

Changes to a Flight Plan

All changes to a flight plan submitted for an IFR flight, or a VFR flight operated as a controlled flight, shall be reported as soon as practicable to the appropriate air traffic services unit. For other VFR flights, significant changes to a flight plan shall be reported as soon as practicable to the appropriate air traffic services unit.

Information submitted prior to departure regarding fuel endurance or total number of persons carried on board, if incorrect at time of departure, constitutes a significant change to the flight plan and as such must be reported.

Closing a Flight Plan

Unless otherwise prescribed by the appropriate ATS authority, a report of arrival shall be made in person, by radiotelephony or via data link at the earliest possible moment after landing, to the appropriate air traffic services unit at the arrival aerodrome, by any flight for which a flight plan has been submitted covering the entire flight or the remaining portion of a flight to the destination aerodrome.

TIME

Co-ordinated Universal Time (UTC) shall be used and shall be expressed in hours and minutes and, when required, seconds of the 24-hour day beginning at midnight.

A time check shall be obtained prior to operating a controlled flight and at such other times during the flight as may be necessary.

Air traffic services unit clocks and other time-recording devices shall be checked as necessary to ensure correct time to within plus or minus 30 seconds of UTC.

Wherever time is utilized in the application of data link communications, it shall be accurate to within 1 second of UTC.

AIR TRAFFIC CONTROL SERVICE

Air Traffic Control Clearances

An air traffic control clearance shall be obtained prior to operating a controlled flight, or a portion of a flight as a controlled flight. Such clearance shall be requested through the submission of a flight plan to an air traffic control unit.

Adherence to Flight Plan

An aircraft shall adhere to the current flight plan or the applicable portion of a current flight plan submitted for a controlled flight unless a request for a change has been made and clearance obtained from the appropriate air traffic control unit.

Deviations from the current flight plan

In the event that a controlled flight deviates from its current flight plan, the following action shall be taken:

a) **Deviation from track:**

If the aircraft is off track, action shall be taken forthwith to adjust the heading of the aircraft to regain track as soon as practicable.

b) **Deviation from ATC assigned Mach number/indicated airspeed:**

The appropriate air traffic services unit shall be informed immediately.

c) **Deviation from Mach number/true airspeed:**

If the sustained Mach number/true airspeed at cruising level varies by plus or minus Mach 0.02 or more, or plus or minus 19 km/h (10 kt) true airspeed or more from the current flight plan, the appropriate air traffic services unit shall be so informed.

d) **Change in time estimate:**

Except where ADS-C is activated and serviceable in airspace where ADS-C services are provided, if the time estimate for the next applicable reporting point, flight information region boundary or destination aerodrome, whichever comes first, change in excess of two minutes from that notified to air traffic services, or such other period of time as is prescribed by the appropriate ATS authority or on the basis of regional air navigation agreements, the flight crew shall notify the appropriate air traffic services unit as soon as possible .

When ADS-C services are provided and ADS-C is activated , the air traffic services unit (ATSU) shall be informed automatically via data link whenever changes occur beyond the threshold values stipulated by the ADS event contract

(e) **Changes Requests.**

Requests for current flight plan changes shall include information as indicated hereunder:

(1) Change of cruising level: aircraft identification; requested new cruising level and cruising Mach number/true air- speed at this level, revised time estimates (when applicable) at subsequent reporting points or flight information region boundaries.

(2) Change of Mach number/true airspeed: aircraft identification; requested Mach number/true airspeed.

b) **Change of Route:**

(1) **Destination unchanged:** aircraft identification; flight rules; description of new route of flight including related flight plan data beginning with the position from which requested change of route is to commence; revised time estimates; any other pertinent information.

(2) **Destination changed:** aircraft identification; flight rules; description of revised route of flight to revised destination aerodrome including related flight plan data, beginning with the position from which requested change of route is to commence; revised time estimates; alternate aerodrome(s); any other pertinent information.

Weather deterioration below the VMC. When it becomes evident that flight in VMC in accordance with its current flight plan will not be practicable, a VFR flight operated as a controlled flight shall:

a) request an amended clearance enabling the aircraft to continue in VMC to destination or to an alternative aerodrome, or to leave the airspace within which an ATC clearance is required; or

b) if no clearance in accordance with a) can be obtained, continue to operate in VMC and notify the appropriate ATC unit of the action being taken either to leave the airspace concerned or to land at the nearest suitable aerodrome; or

c) if operated within a control zone, request authorization to operate as a special VFR flight; or

d) request clearance to operate in accordance with the instrument flight rules.

POSITION REPORTS

Unless exempted by the appropriate ATS authority or by the appropriate air traffic services unit under conditions specified by that authority, a controlled flight shall report to the appropriate air traffic services unit, as soon as possible, the time and level of passing each designated compulsory reporting point, together with any other required information. Position reports shall similarly be made in relation to additional points when requested by the appropriate air traffic services unit.

COMMUNICATIONS

An aircraft operated as a controlled flight shall maintain continuous air-ground voice communication watch on the appropriate communication channel and establish two-way communication as necessary with, the appropriate air traffic control unit, except as may be prescribed by the appropriate ATS authority in respect of aircraft forming part of aerodrome traffic at a controlled aerodrome.

SELCAL or similar automatic signalling devices satisfy the requirement to maintain an air-ground voice communication watch.

The requirement for an aircraft to maintain air-ground voice communication watch remains in effect after CPDLC has been established.

Radio Communication Failure procedures for airports where specific RCF procedures have not been promulgated. RCF procedures are generally promulgated at airports. In other cases, the procedures to be followed are explained in detail in AIP, India. Some salient features of procedures are covered below.

If in visual Meteorological Conditions, the aircraft shall:

a) continue to fly in visual meteorological conditions; land at the nearest suitable aerodrome; and report its arrival by the most expeditious means to the appropriate air traffic control unit ;

b) if considered advisable, complete an IFR flight in accordance with the provisions given below .

If in instrument meteorological conditions or when the pilot of an IFR flight considers it inadvisable to complete the flight as per provisions for VMC, the aircraft shall:

a) unless otherwise prescribed on the basis of regional air navigation agreement, in airspace where radar is not used in the provision of air traffic control, maintain the last assigned speed and level, or minimum flight altitude if higher, for a period of 20 minutes following the aircraft's failure to report its position over a compulsory reporting point and thereafter adjust level and speed in accordance with the filed flight plan;

b) in airspace where radar is used in the provision of air traffic control, maintain the last assigned speed and level, or minimum flight altitude if higher, for a period of 7 minutes following:

   1) the time the last assigned level or minimum flight altitude is reached; or

   2) the time the transponder is set to Code 7600; or

   3) the aircraft's failure to report its position over a compulsory reporting point; whichever is later, and thereafter adjust level and speed in accordance with the filed flight plan.

c) when being radar vectored or having been directed by ATC to proceed offset using area navigation (RNAV) without a specified limit, rejoin the current flight plan route no later than the next significant point, taking into consideration the applicable minimum flight altitude;

d) proceed according to the current flight plan route to the appropriate designated navigation aid or fix serving the destination aerodrome and, when required to ensure compliance with e) below, hold over this aid or fix until commencement of descent;

e) commence descent from the navigation aid or fix specified in d) at, or as close as possible to, the expected approach time last received and acknowledged; or, if no expected approach time has been received and acknowledged, at, or as close as possible to, the estimated time of arrival resulting from the

current flight plan;

f) complete a normal instrument approach procedure as specified for the designated navigation aid or fix; and

g) land, if possible, within thirty minutes after the estimated time of arrival specified in e) or the last acknowledged expected approach time, whichever is later.

Note:— The provision of air traffic control service to other flights operating in the airspace concerned will be based on the premise that an aircraft experiencing communication failure will comply with these rules.

VMC visibility and distance from cloud minima

Table 3-1* (see 4.1)

Altitude band	Airspace class	Flight visibility	Distance for cloud
At and above 3 050 m (10 000 ft) AMSL	A*** BCDEFG	8Km	1500 m horizontally 300 M (1 000 ft) vertically
Below 3 050m (10 000 ft) AMSL and above 900 m (3 000 ft) AMSL, or above 300 m (1 000 ft) above terrain, whichever is the higher	A*** BCDEFG	5Km	1500 m horizontally 300 M (1 000 ft) vertically
At and below 900 m (3000 ft) AMSL, or m (1000 ft) above terrain, whichever is the higher	A***BCDE	5Km	1500 m horizontally 300 m (1000 ft) vertically
	FG	5Km**	Clear of cloud and with the surface in sight.

** 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.*

*** When so prescribed by the appropriate ATS authority:*

a) flight visibilities reduced to not less than 3 000 m may be permitted for flights operating:

   1) at speeds that, in the prevailing visibility, will give adequate opportunity to observe other traffic or any obstacles in time to avoid collision; or

   2) in circumstances in which the probability of encounters with other traffic would normally be low, e.g. in areas of low volume traffic and for aerial work at low levels.

b) HELICOPTERS may be permitted to operate upto 1500 m flight visibility, if manoeuvred at a speed that will give adequate opportunity to observe other traffic or any obstacles in time to avoid collision.

****The VMC minima in Class A airspace are included for guidance to pilots and do not imply acceptance of VFR flights in Class A airspace.*

Note: For Airspace F and G in India Altitude band 'At and below 900 m (3000 ft.) AMSL, or 300 m (1000 ft.) above terrain, whichever is the higher', flight visibilities reduced to not less than 3000 m may be permitted and HELICOPTERS may be permitted to operate upto 1000 m flight visibility.

VISUAL FLIGHT RULES

Except when operating as a special VFR flight, VFR flights shall be conducted so that the aircraft is flown in conditions of visibility and distance from clouds equal to or greater than those specified in Table.

Except when a clearance is obtained from an air traffic control unit, VFR flights shall not take off or land at an aerodrome within a control zone, or enter the aerodrome traffic zone or traffic pattern:

a) when the ceiling is less than 450 m (1 500 ft); or
b) when the ground visibility is less than 5 km.

VFR flights shall be operated during the period from 20 minutes before sunrise to 20 minutes after sunset, except when exempted by air traffic control for local flights and such training flights of flying club aircraft as may be cleared by air traffic control. Local flight is a flight wholly conducted in the immediate vicinity of an aerodrome.

Unless authorized by the appropriate ATS authority, VFR flights shall not be operated:

a) above FL150.
b) at transonic and supersonic speeds.
c) more than 100NM seaward from the shoreline within controlled airspace.

Authorization for VFR flights to operate above FL 290 shall not be granted in areas where a vertical separation minimum of 300 m (1000 ft) is applied above FL 290.

Except when necessary for take-off or landing, or except by permission from the Director General, a VFR flight shall not be flown:

a) over the congested areas of cities, towns or settlements or over an open air assembly of persons at a height less than 300 m (1000 ft) above the highest obstacle within a radius of 600 m from the aircraft;
b) elsewhere, at a height less than 150 m (500 ft) above the ground or water.

Except where otherwise indicated in air traffic control clearances or specified by the appropriate ATS authority, VFR flights in level cruising flight when operated above 900 m (3000 ft) from the ground or water, or a higher datum as specified by the appropriate ATS authority, shall be conducted at a cruising level appropriate to the track as specified in the Tables of cruising levels.

VFR flights shall comply with Air Traffic Control provisions:

a) when operated within Class B, C and D airspace;
b) when forming part of aerodrome traffic at controlled aerodromes; or
c) when operated as special VFR flights.

A VFR flight operating within or into areas, or along routes, designated by the

appropriate ATS authority shall maintain continuous air-ground voice communication watch on the appropriate communication channel of, and report its position as necessary to, the air traffic services unit providing flight information service.

An aircraft operated in accordance with the visual flight rules which wishes to change to compliance with the instrument flight rules shall:

a) if a flight plan was submitted, communicate the necessary changes to be effected to its current flight plan, or
b) when so required, submit a flight plan to the appropriate air traffic services unit and obtain a clearance prior to proceeding IFR when in controlled airspace.

SPECIAL VFR FLIGHTS

a) When traffic conditions permit, special VFR flights may be authorised subject to the approval from the unit providing approach control service.
b) Requests for such authorisation shall be handled individually.
c) When the ground visibility is not less than 1500 meters, special VFR flights may be authorised to enter a control zone for the purpose of landing, to take-off and depart from a control zone, to cross a control zone, or to operate locally within a control zone.
d) Provided that performance Class I and performance Class II helicopters may be authorised to operate special VFR flights when the ground visibility is not less than 1000 metres.
e) Pilot shall be responsible for meeting the criteria for performance Class I and performance Class II helicopters and should state this in field 18 of the Flight plan and report on RTF to appropriate ATC unit.
f) Special VFR flights shall be operated only by pilots holding instrument rating, Assistant Fight Instructor rating or Flight Instructor rating.

INSTRUMENT FLIGHT RULES

RULES APPLICABLE TO ALL IFR FLIGHTS

Aircraft Equipment

Aircraft shall be equipped with suitable instruments and with navigation equipment appropriate to the route to be flown.

Minimum Levels

Except when necessary for take-off or landing, or except when specifically authorized by the Director General, an IFR flight shall be flown at a level which is not below the minimum flight altitude established by the State whose territory is overflown, or, where no such minimum flight altitude has been established:

a) over high terrain or in mountainous areas, at a level which is at least 600 m (2000 ft) above the highest obstacle located within 8 km of the estimated position of the aircraft;

b) elsewhere than as specified in a), at a level which is at least 300m (1000 ft) above the highest obstacle located within 8 km of the estimated position of the aircraft.

Change from IFR flight to VFR flight

An aircraft electing to change the conduct of its flight from compliance with the instrument flight rules to compliance with the visual flight rules shall, if a flight plan was submitted, notify the appropriate air traffic services unit specifically that the IFR flight is cancelled and communicate thereto the changes to be made to its current flight plan. When an aircraft operating under the instrument flight rules is flown in or encounters visual meteorological conditions it shall not cancel its IFR flight unless it is anticipated, and intended, that the flight will be continued for a reasonable period of time in uninterrupted visual meteorological conditions.

Rules applicable to IFR flights within controlled airspace. IFR flights shall comply with these provisions when operated in controlled airspace.

An IFR flight operating in cruising flight in controlled airspace shall be flown at a cruising level, or, if authorized to employ cruise climb techniques, between two levels or above a level, selected from:

a) the Tables of cruising levels, or
b) a modified table of cruising levels, when so prescribed for flight above FL 410, except that the correlation of levels to track prescribed therein shall not apply whenever otherwise indicated in air traffic control clearances or specified by the appropriate ATS authority in Aeronautical Information Publications.

RULES APPLICABLE TO IFR FLIGHTS OUTSIDE CONTROLLED AIRSPACE

Cruising Levels

An IFR flight operating in level cruising flight outside of controlled airspace shall be flown at a cruising level appropriate to its track as specified in:

a) the Tables of cruising levels, except when otherwise specified by the appropriate ATS authority for flight at or below 900 m (3000 ft) above mean sea level; or
b) a modified table of cruising levels, when so prescribed for flight above FL 410.

Communications

An IFR flight operating outside controlled airspace but within or into areas, or along routes, designated by the appropriate ATS authority shall maintain an air-ground voice communication watch on the appropriate communication channel and establish two-way communication, as necessary, with the air traffic services unit providing flight information service.

Position Reports

An IFR flight operating outside controlled airspace and required by the appropriate ATS authority to:

— submit a flight plan,
— maintain an air-ground voice communication watch on the appropriate communication channel and establish two-way communication, as necessary, with the air traffic services unit providing flight information service, shall report position as specified for controlled flights.

Aircraft electing to use the air traffic advisory service whilst operating IFR within specified advisory airspace are expected to comply with these provisions, except that the flight plan and changes thereto are not subjected to clearances and that two -way communication will be maintained with the unit providing the air traffic advisory service.

Flight by Night. A flight performed between half an hour after sunset and half an hour before sunrise.

SIGNALS

Upon observing or receiving any of the signals given below , aircraft shall take such action as may be required by the interpretation of the signal given..

No person shall guide an aircraft unless trained, qualified and approved by the DGCA to carry out the functions of a signalman.

The signalman shall wear a distinctive fluorescent identification vest to allow the flight crew to identify that he or she is the person responsible for the marshalling operation.

Daylight fluorescent-coloured wands, table-tennis bats or gloves shall be used for all signalling by all participating ground staff during daylight hours.

Illuminated wands shall be used at night or in low visibility.

DISTRESS AND URGENCY SIGNALS

Note 1:— None of the provisions in this section shall prevent the use, by an aircraft in distress, of any means at its disposal to attract attention, make known its position and obtain help.

Distress Signals

The following signals, used either together or separately, mean that grave and imminent danger threatens, and immediate assistance is requested:

a) a signal made by radiotelegraphy or by any other signalling method consisting of the group SOS (. . . _ _ _ . . . in the Morse Code);
b) a radiotelephony distress signal consisting of the spoken word MAYDAY;
c) a distress message sent via data link which transmits the intent of the word MAYDAY;

d) rockets or shells throwing red lights, fired one at a time at short intervals;

e) a parachute flare showing a red light.

Urgency Signals

The following signals, used either together or separately, mean that an aircraft wishes to give notice of difficulties which compel it to land without requiring immediate assistance:

a) the repeated switching on and off of the landing lights; or

b) the repeated switching on and off of the navigation lights in such manner as to be distinct from flashing navigation lights.

The following signals, used either together or separately, mean that an aircraft has a very urgent message to transmit concerning the safety of a ship, aircraft or other vehicle, or of some person on board or within sight:

a) a signal made by radiotelegraphy or by any other signalling method consisting of the group X,X,X; (_ .. _ , _ .. _ , _ .. _);

b) a radiotelephony urgency signal consisting of the spoken words PAN, PAN;

c) an urgency message sent via data link which transmits the intent of the words PAN, PAN.

Establishment of Air Defense Identification Zone and procedures. Air Defense Identification Zones (A.D.I.Z) as indicated here have been established for air defense clearance: A.D.I.Z North, South, East, West, Central and sub ADIZ South East.

Procedures for the issue of Air Defense Clearance (ADC):

Except the local flights conducted within airspace of 5NM radius centered at ARP and vertical limits of 1000ft.AGL of an aerodrome; aircraft when operating to, through or within the ADIZ shall obtain Air Defense Clearance before take off, through the ATC concerned.

» ADC shall be valid for the entire route, irrespective of intermediate halts for flight originating in one ADIZ/FIR and transiting through other ADIZ/FIR.

» All flights shall obtain Air Defense Clearance before entering ADIZ from respective FIC ten minutes prior to entering Indian Airspace.

» ADC shall be obtained before departure. ADC Validity Period is minus (-) 15 minutes to plus (+) 45 minutes of EOBT in RPL/FPL or subsequent revision of EOBT by DLA/CHG message. In the case of communication difficulty or delay in receipt of ADC, or non-existence of communication at the place of departure, the aircraft equipped with radio may be allowed to take off with instructions to obtain ADC immediately after airborne from the FIC concerned.

» Flying club aircraft intending to operate beyond immediate vicinity of an aerodrome where no ATC is functioning may obtain ADC from the nearest IAF ATC Unit. The IAF ATC Unit will advise the FIC concerned regarding the movement of the Flying club aircraft.

» Scheduled aircraft or flying club aircraft returning to the Aerodrome of departure on the same day may be issued with Air Defense Clearance for return flight also, if so desired, provided that a fresh ADC will have to be obtained in the event of the delay for more than thirty minutes in excess of the estimated departure time for the return flight.

INTERCEPTION

As soon as an air traffic services unit learns that an aircraft is being intercepted in its area of responsibility, it shall take such of the following steps as are appropriate in the circumstances:

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 and if practicable, repeating this call on the emergency frequency 243 MHz;

b) if equipped with SSR transponder, select Mode A, Code 7700, unless otherwise instructed by the appropriate air traffic services unit.

c) if equipped with ADS-B or ADS-C, select the appropriate emergency functionality, if available, unless otherwise instructed by the appropriate air traffic services unit.

If any instructions received by radio from any sources conflict with those given by the intercepting aircraft by visual signals, the intercepted aircraft shall request immediate clarification while continuing to comply with the visual instructions given by the intercepting aircraft.

If any instructions received by radio from any sources conflict with those given by the intercepting aircraft by radio, the intercepted aircraft shall request immediate clarification while continuing to comply with the radio instructions given by the intercepting aircraft.

Phraseology: When an interception is being made, the intercept control unit and the intercepting aircraft should:

a) first attempt to establish two-way communication with the intercepted aircraft in a common language on the emergency frequency 121.5 MHz, using the call signs “INTERCEPT CONTROL”, “INTERCEPTOR (call sign)” and “INTERCEPTED AIRCRAFT” respectively; and

b) failing this, attempt to establish two-way communication with the intercepted aircraft on such other frequency or frequencies as may have been prescribed by the appropriate ATS authority, or to establish contact through the appropriate ATS unit(s).

If radio contact is established during interception but communication in a common language is not possible, attempts must be made to convey instructions, acknowledgement of instructions and essential information by using the phrases and pronunciations in Table and transmitting each phrase twice.

Phrases for use by INTERCEPTING aircraft			Phrases for use by INTERCEPTED aircraft		
Phrase	Prominciation	Meaning	Phrase	Prominciation	Meaning
CALL SIGN	KOL SA-IN	What is your call sign	CALL SIGN (call sign)2	KOL SA-IN (call sign)	My call sign is (call sign)
FOLLOW	FOL-LO	Follow me	WILCO	VILL-KO	Understood Will comply
DESCEND	DEE-SEND	Descend for landing	CAN NOT	KANN NOTT	Unable to comply
YOU LAND	YOU LAAND	Land at this aerodrome	REPEAT	REE-PEET	Repeat your instruction
PROCEED	PRO-SEED	You may procced	AM LOST	AM LOSST	Position unknown
			MAYDAY	MAYDAY	I am in distress
			HIJACK3	HI-JACK	I have been hijacked
			LAND (place name)	LAAND (place name)	I request to land at (place name)
			DESCEND	DEE-SEND	I require descent

1. *In the second column, syllables to be emphasized are underlined.*
2. *The call sign required to be given is that used in radiotelephony communications with air traffic services units and corresponding to the aircraft identification in the flight plan.*
3. *Circumstances may not always permit, nor make desirable, the use of the phrase "HIJACK."*

SIGNALS FOR USE IN THE EVENT OF INTERCEPTION

Signals initiated by intercepting aircraft and responses by intercepted aircraft:

Series	Intercepting Aircraft Signals	Meaning	Intercepted Aircraft	Meaning
1	DAY or NIGHT — Rocking aircraft and flashing navigational lights at irregular intervals (and landing lights in the case of a helicopter) from a position slightly above and ahead of, and normally to the left of, the intercepted aircraft (or to the right if the intercepted aircraft is a helicopter) and, after acknowledgement, a slow level turn, normally to the left, (or to the right in the case of a helicopter) on the desired heading.	You have been intercepted. Follow me.	DAY or NIGHT — Rocking aircraft flashing navigational lights at irregular intervals and following.	Understood, will comply.

Series	Intercepting Aircraft Signals	Meaning	Intercepted Aircraft	Meaning
	Note 1:- Meteorological conditions or terrainmay require the intercepting aircraft to reverse the positions and direction of tum give above in Series 1. Note 2 :- If the intercepted aircraft is not able to keep pace with the intercepting aircraft, the latter is expected to fly a series of race-track patterns and to rock the aircraft each time it passes the intercepted aircraft.			
2	DAY or NIGHT - An abrupt break-away manoeuvre from the intercepted aircraft consisting of a climbing turn of 90 degrees or more without crossing the line of flight of the intercepted aircraft.	You may proceed.	DAY or NIGHT — Rocking the aircraft.	Understood, will comply.
3	DAY or NIGHT — Lowering landing gear (if fitted), showing steady landing lights and overflying runway in use or, if the intercepted aircraft is a helicopter, overflying the helicopter landing area. In the case of helicopters, the intercepting helicopter makes a landing approach, coming to hover near to the landing area.	Land at this aerodrome.	DAY or NIGHT — Lowering landing gear (if fitted), showing steady landing lights and following the intercepting aircraft and, if after overflying the runway in use or helicopter landing area, landing is considered safe, proceding to land.	Understood, will comply.

Signals initiated by intercepted aircraft and response by intercepting aircraft:

Series	Intercepted Aircraft Signals	Meaning	Intercepting Aircraft	Meaning
4	DAY or NIGHT — Raising landing gear (if fitted) and flashing landing lights while passing over runway in use or helicopter landing area at a height exceeding 300 m (1000 ft) but not exceeding 600 m (2000 ft) in the case of a helicopter, at a height exceeding 50 m (170 ft) but not exceeding 100 m (330 ft) above the aerodrome level, and continuing to circle runway in use or helicopter landing area. If unable to flash landing lights, flash any other lights available.	Aerodrome you have designated is not adequate	DAY or NIGHT — If it is desired that the intercepted aircraft follow the intercepting aircraft to an altermate aerodrome, the intercepting aircraft raises its landing gear (if fitted) and uses the Series 1 signals prescribed for intercepting aircraft. If it is decided to release the intercepted aircraft, the intercepting aircraft uses the Sejries 2 signals prescribed for intercepting aircraft.	Understood, follow me. Understood, you may
5	DAY or NIGHT — Regular switching on and off of all available lights but in such a manner as to be distinct from flashing lights.	Cannot comply.	DAY or NIGHT — Use Series 2 signals prescribed for intercepting aircraft.	Understood.
6	DAY or NIGHT — irregular flashing of all available lights.	In distress	DAY or NIGHT — Use Series 2 signals prescribed for intercepting aircraft.	Understood.

VISUAL SIGNALS USED TO WARN IN OR ABOUT TO ENTER A RESTRICTED, PROHIBITED OR DANGER AREA

By day and by night, a series of projectiles discharged from the ground at intervals of 10 seconds, each showing, on bursting, red and green lights or stars will indicate to an unauthorized aircraft that it is flying in or about to enter a restricted, prohibited or danger area, and that the aircraft is to take such remedial action as may be necessary.

SIGNALS FOR AERODROME TRAFFIC

LIGHT AND PYROTECHNIC SIGNALS

Instructions from Aerodrome Control Tower to Aircraft

Light	Aircraft in Flight	Aircraft on the ground
Steady green	Cleared to land	Cleared for takeoff
Steady red	Give way to other aircraft and continue circling	Stop
Series of green flashes	Return for landing*	Cleared to taxi
Series of red flashes	Aerodrome unsafe, do not land	Taxi clear of landing area in use
Series of white flashes	Land at this aerodrome and proceed to apron*	Return to starting point on the aerodrome
Red pyrotechnic	Notwithstanding any previous instructions, do not land for the time being	
* Clearances to land and taxi will be given in due course.		

ACKNOWLEDGEMENT BY AN AIRCRAFT

a) When in flight:

(i) during the hours of daylight: by rocking the aircraft's wings;

Note:— This signal should not be expected on the base and final legs of the approach.

(ii) during the hours of darkness: by flashing on and off twice the aircraft's landing lights or, if not so equipped, by switching on and off twice its navigation lights.

b) When on the ground:

(i) During the hours of daylight: by moving the aircraft's ailerons or rudder;

(ii) During the hours of darkness: by flashing on and off twice the aircraft's landing lights or, if not so equipped, by switching on and off twice its navigation lights.

VISUAL GROUND SIGNALS

PROHIBITION OF LANDING :

A horizontal red square panel with yellow diagonals when displayed in a signal area indicates that landings are prohibited and that the prohibition is liable to be prolonged

NEED FOR SPECIAL PRECAUTIONS WHILE APPROACHING OR LANDING:

A horizontal red square panel with one yellow diagonal when displayed in a signal area indicates Yellow that owing to the bad state of the manoeuvring area, or for any other reason, special precautions must be observed in approaching to land or in landing.

USE OF RUNWAYS AND TAXIWAYS:

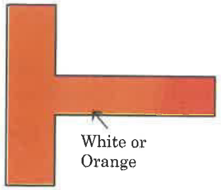
A horizontal white dumbbell when displayed in a signal area indicates that aircraft are required to land, takeoff and taxi on runways and taxiways only.

The same horizontal white dumbbell but with a black bar placed perpendicular to the shaft across each circular portion of the dumbbell when displayed in a signal area indicates that aircraft are required to land and take off on runways only, but other manoeuvres need not be confined to runways and taxiways.

CLOSED RUNWAYS OR TAXIWAYS

Crosses of a single contrasting colour, white or yellow displayed horizontally on runways and taxiways or parts there of indicate an area unfit for movement of aircraft.

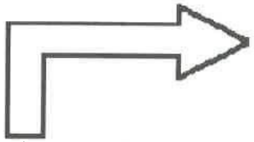
DIRECTION FOR LANDING OR TAKE OFF:



A horizontal white or orange landing 'T' indicates the direction to be used by aircraft for landing and takeoff, which shall be in a direction parallel to the shaft of the 'T' towards the cross arm

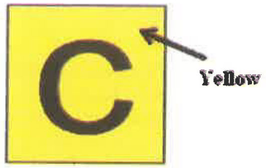
Note: When used at night, the landing 'T' is either illuminated or outlined in white-colored lights.

A set of two digits displayed vertically at or near the aerodrome control tower indicates to aircraft on the maneuvering area the direction for takeoff, expressed in units of 10 degrees to the nearest 10 degrees of the magnetic compass.



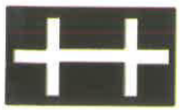
RIGHT HAND TRAFFIC

When displayed in a signal area, or horizontally at the end of the runway or strip in use, a right-hand arrow of conspicuous colour indicates that turns are to be made to the right before landing and after takeoff.



AIR TRAFFIC SERVICES REPORTING OFFICE:

The letter 'C' displayed vertically in black against a yellow background indicates the location of the air traffic services reporting office.



GLIDER FLIGHTS IN OPERATION:

A double white cross displayed horizontally in the signal area indicates that the aero-drome is being used by gliders and that glider flights are being performed.

MARSHALLING SIGNALS

FROM A SIGNALMAN TO AN AIRCRAFT

Note 1:— These signals are designed for use by the signalman, with hands illuminated as necessary to facilitate observation by the pilot, and facing the aircraft in a position:

a) for fixed-wing aircraft, on the left side of aircraft, where best seen by the pilot; and

b) for helicopters, where the signalman can best be seen by the pilot.

Note 2:— The meaning of the relevant signals remains the same if bats, illuminated wands or torch lights are held.

Note 3:— The aircraft engines are numbered, for the signalman facing the aircraft, from right to left (i.e. No. 1 engine being the port outer engine).

Note 4:— Signals marked with an asterisk (*) are designed for use to hovering helicopters.

Note 5:— References to wands may be also read to refer to daylight fluorescent-coloured table-tennis bats or gloves (daytime only).

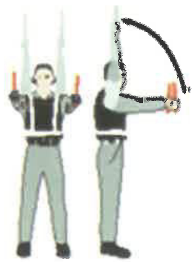
Prior to using the following signals, the signalman shall ascertain that the area within which an aircraft is to be guided is clear of objects which the aircraft, might otherwise strike.

Note:— The design of many aircraft is such that the path of the wing tips, engines and other extremities cannot always be monitored visually from the flight deck while the aircraft is being manoeuvred on the ground.

1. Wingwalker/ guide

Raise right hand above head level with wand pointing up, move left hand wand pointing down toward body.

Note:- This signal provides an indication by a person positioned at the aircraft wingtip, to the pilot/marshaller/pushback operator, that the aircraft movement on/off a parking position would be unobstructed.



2. Identify Gate

Raise fully extended arms straight above head with wands pointing up.

3. Proceed to next signalman or as directed by tower/ ground control.

Point both arms upward; move and extend arms outward to side of body and point with wands to direction of next signalman or taxi area.

4. Straight Ahead

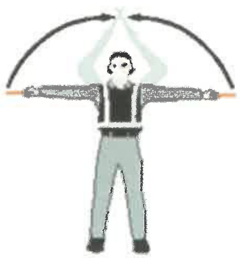
Bend extended arms at elbows and move wands up and down from chest height to head.

5 a). Turn left (from the pilots point of view).

With right arm and wand extended at a 90° angle to body, make "come ahead" signal with left hand. The rate of signal motion indicates to pilot the rate of aircraft turn.

5 b). Turn right (from the pilots point of view)

With right arm and wand extended at a 90° angle to body, make "come ahead" signal with right hand. The rate of signal motion indicates to pilot the rate of aircraft turn.



6 a) Normal Stop

Fully extend arms and wands at a 90° angle to sides and slowly move to above head until wands cross.

6 b). Emergency Stop

Abruptly extend arms and wands to top of head, crossing wands.

7 a). Set Brakes

Raise hand just above shoulder height with open palm. Ensuring eye contact with flight crew, close hand into a fist. Do not move until receipt of thumbs up acknowledgment from flight crew.

7 b). Release brakes

Raise hand just above shoulder height with hand closed in a fist. Ensuring eye contact with flight crew, open palm. Do not move until receipt of "thumbs up" acknowledgment from flight crew.

8 a). Chocks Inserted

With arms and wands fully extended above head, move wands inward in a "jabbing" motion until wands touch. Ensure an acknowledgment is received from flight crew.

8 b). Chocks Removed

With arms and wands fully extended above head, move wands outward in a "jabbing" motion. Do not remove chocks until authorised by the flight crew.

9. Start engine(s)

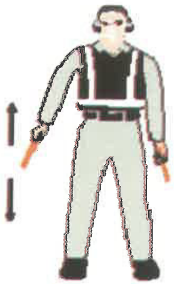
Raise right arm to head level with wand pointing up and start a circular motion with hand, at the same time with the left arm raised above head level, point to engine to be started.

10. Cut Engines

Extend arm with wand forward of body at shoulder level; move hand and wand to top of left shoulder and draw wand to top of right shoulder in a slicing motion across throat.

11. Slow Down

Move extended arms downwards in a "patting" gesture, moving wands up and down from waist to knees.



12. Slow down engine(s) on indicated side.

With arms down and wands toward ground, wave either right or left wand up and down indicating engine(s) on left or right side respectively should be slowed down.

13. Move Back

With the arms in front of the body at waist height, rotate arms in a forward motion. To stop rearward movement, use Signals 6 a) or 6 b).

14 a). Turns while backing - (for tail to starboard)

Point left arm with wand down and bring right arm from overhead vertical position to horizontal forward position, repeating right-arm movement.

14 b). Turns while backing - (for tail to port)

Point right arm with wand down and bring left arm from overhead vertical position to horizontal forward position, repeating left-arm movement.

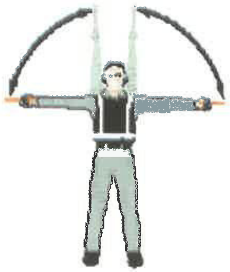
15. Affirmative/all clear

Raise right arm to head level with wand pointing up or display hand with "thumbs up"; left arm remains at side by knee.

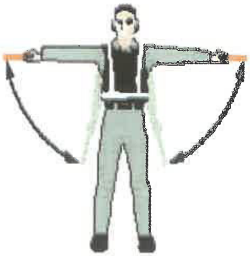
Note:- This signal is also used as a technical/ servicing communication signal.

***16. Hover**

Fully extend arms and wands at a 90° angle to sides.



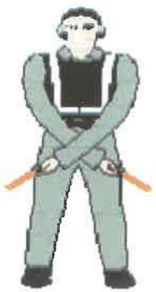
***17. Move upwards**
Fully extend arms and wands at a 90° angle to sides and with palms turned up move hands upwards. Speed of movement indicates rate of ascent.



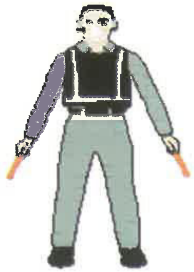
***18. Move downwards**
Fully extend arms and wands at a 90° angle to sides and with palms turned down move hands downwards. Speed of movement indicates rate of descen.

***19 a). Move horizontally left (from pilots point of view)**
Extend arm horizontally at a 90° angle to right side of the body. Move other arm in same direction in a sweeping motion.

***19 b). Move horizontally right (from pilots point of view)**
Extend arm horizontally at a 90° angle to left side of body. Move other arm in same direction in a sweeping motion.



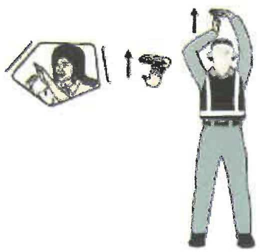
***20. Land**
Cross arms with wands downwards and in front of body.



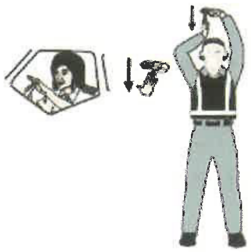
21. Hold position/ stand-by
Fully extend arms and wands downwards at a 45° angle to sides. Hold position until aircraft is clear for next maneuver.

22. Dispatch Aircraft
Perform a standard salute with right hand and/or wand to dispatch the aircraft. Maintain eye contact with flight crew until aircraft has begun to taxi.

23. Do not touch controls (technical/ servicing communication signal)
Extend right arm fully above head and close fist or hold wand in horizontal position; left arm remains at side by knee.

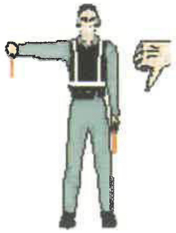


24. Connect Ground Power (technical/ servicing communication signal)
Hold arms fully extended above head, open left hand horizontally and move finger tips of right hand into and touch the open palm of left hand (forming a "T"). At night, illuminated wands can also be used to form the "T"above the head.



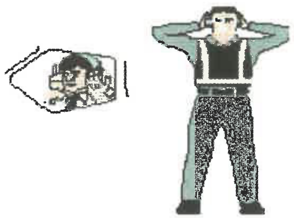
25. Disconnect Power (technical/servicing communication signal)

Hold arms fully extended above head with finger tips of right hand touching open horizontal palm of left hand (forming a "T"), then move right hand away from left. Do not disconnect power until authorised by flight crew. At night, illuminated wands can also be used to form the "T" above head.



26. Negative (technical/servicing communication signal)

Hold right arm straight out at 90° from shoulder and point wand down to ground or display hand with "thumbs down", left hand remains at side by knee.



27. Establish communication via interphone (technical/servicing communication signal)

Extend both arms at 90° from body and move hands to cup both ears.

28. Open/close stairs (technical/servicing communication signal)

With right arm at side and left arm raised above head at a 45° angle, move right arm in a sweeping motion towards top of left shoulder.

Note:- This signal is intended mainly for aircraft with the set of integral stairs at the front.

STANDARD EMERGENCY HAND SIGNALS:

The following hand signals are established as the minimum required for emergency communication between the ARFF incident commander/ARFF firefighters and the cockpit and/or cabin crews of the incident aircraft. ARFF emergency hand signals should be given from the left front side of the aircraft for the cockpit crew.

Note:– In order to communicate more effectively with the cabin crew, emergency hand signals may be given by ARFF from other positions.

1. Recommend Evacuation -

Evacuation recommended based on ARFF and Incident Commander's assessment of external situation.

Arm extended from body and held horizontal with hand upraised at eye level. Execute beckoning arm motion angled backward. Non-beckoning arm held against body.

Night – same with wands.

2. Recommended Stop -

Recommend evacuation in progress be halted. Stop aircraft movement or other activity in progress.

Arms in front of head – Crossed at wrists

Night – same with wands

3. Emergency Contained

No outside evidence of dangerous conditions or "all-clear."

Arms extended outward and down at a 45 degree angle.

Arms moved inward below waistline simultaneously until wrists crossed, then extended outward to starting position (umpire's "safe" signal).

Night – same with wands.

4. Fire

Move right hand wand in a "fanning" motion from the shoulder to the knee, while at the same time pointing with the left-hand wand to the area of the fire.

From the pilot of an aircraft to a signalman:

BRAKES

a) Brakes engaged: raise arm and hand, with fingers extended, horizontally in front of face, then clench fist.

b) Brakes released: raise arm, with fist clenched, horizontally in front of face, then extend fingers.

CHOCKS

a) Insert chocks: arms extended, palms outwards, move hands inwards to cross in front of face.

b) Remove chocks: hands crossed in front of face, palms outwards, move arms outwards.

TABLE OF CRUISING LEVELS

CVSM (Conventional Vertical Separation Minimum), also called non RVSM and RVSM (Reduced Vertical Separation Minimum). CVSM is the general vertical separation minimum applied every where. In areas where, on the basis of regional air navigation agreements and in accordance with conditions specified therein, a reduced vertical separation minimum (RVSM) of 300 m (1 000 ft) is applied between FL 290 and FL 410 inclusive. RVSM is applied in Indian airspaces as per table.

The cruising levels to be observed when so required are as follows:

RVSM – FEET (USED IN INDIA)

In areas where feet are used for altitude and where, in accordance with regional air navigation agreements, a vertical separation minimum of 1 000 ft is applied between FL 290 and FL 410 inclusive:*

TRACK**											
From 000 degrees to 179 degrees***						From 180 degrees to 359 degrees					
IFR Flights Level			VF R Flights Level			IFR Flights Level			VFR Flights Level		
FL	Feet	Metres	FL	Feet	Metres	FL	Feet	Metres	FL	Feet	Metres
010	1000	300	-	-	-	020	2 000	600	-	-	-
030	3 000	900	035	3 500	1 050	040	4 000	1 200	045	4 500	1350
050	5 000	1 500	055	5 500	1 700	060	6 000	1 850	065	6 500	2 000
070	7 000	2 150	075	7 500	2 300	080	8 000	2 450	085	8 500	2 600
090	9 000	2 750	095	9 500	2 900	100	10 000	3 050	105	10 500	3 200
110	11 000	3 350	115	11 500	3 500	120	12 000	3 650	125	12 500	3 800
130	13 000	3 950	135	13 500	4 100	140	14 000	4 250	145	14 500	4 400
150	15 000	4 550	155	15 500	4 700	160	16 000	4 900	165	16 500	5 050
170	17 000	5 200	175	17 500	5 350	180	18 000	5 500	185	18 500	5 650
190	19 000	5 800	195	19 500	5 950	200	20 000	6 100	205	20 500	6 250
210	21 000	6 400	215	21 500	6 550	220	22 000	6 700	225	22 500	6 850
230	23 000	7 000	235	23 500	7 150	240	24 000	7 300	245	24 500	7 450
250	25 000	7 600	255	25 500	7 750	260	26 000	7 900	265	26 500	8 100
270	27 000	8 250	275	27 500	8 400	280	28 000	8 550	285	28 500	8 700
290	29 000	8 850				300	30 000	9 150			
310	31 000	9 450				320	32 000	9 750			
330	33 000	10 050				340	34 000	10 350			
350	35 000	10 650				360	36 000	10 950			
370	37 000	11 300				380	38 000	11 600			
390	39 000	11 900				400	40 000	12 200			
410	41 000	12 500				430	43 000	13 100			
450	45 000	13 700				470	47 000	14 350			
490	49.000	14 950				510	51 000	15 550			
etc.	etc.	etc.				etc.	etc.	etc.			

*Except when, on the basis of regional air navigation agreements, a modified table of cruising levels based on a nominal vertical separation minimum of 1 000 ft (300 m) is prescribed for use, under specified conditions, by aircraft operating above FL 410 within designated portions of the airspace.

**Magnetic track, or in polar areas at latitudes higher than 70 degrees and within such extensions to those areas as may be prescribed by the appropriate ATS authorities, grid tracks as determined by a network of lines parallel to the Greenwich Meridian superimposed on a polar stereographic chart in which the direction towards the North Pole is employed as the Grid North.

***Except where, on the basis of regional air navigation agreements, from 090 to 269 degrees and from 270 to 089 degrees is prescribed to accommodate predominant traffic directions and appropriate transition procedures to be associated therewith are specified.

Note:- Guidance material relating to vertical separation is contained in the Manual on Implementation of a 300 m (1 000 ft) Vertical Separation Minimum between FL 290 and FL 410 Inclusive (Doc 9574).

NON- RVSM-FEET

TRACK**											
From 000 degrees to 179 degrees**						From 180 degrees to 359 degrees					
IFR Flights Level			VF R Flights Level			IFR Flights Level			VFR Flights Level		
FL	Feet	Metres	FL	Feet	Metres	FL	Feet	Metres	FL	Feet	Metres
010	1000	300	-	-	-	020	2 000	600	-	-	-
030	3 000	900	035	3 500	1 050	040	4 000	1 200	045	4 500	1350
050	5 000	1 500	055	5 500	1 700	060	6 000	1 850	065	6 500	2 000
070	7 000	2 150	075	7 500	2 300	080	8 000	2 450	085	8 500	2 600
090	9 000	2 750	095	9 500	2 900	100	10 000	3 050	105	10 500	3 200
110	11 000	3 350	115	11 500	3 500	120	12 000	3 650	125	12 500	3 800
130	13 000	3 950	135	13 500	4 100	140	14 000	4 250	145	14 500	4 400
150	15 000	4 550	155	15 500	4 700	160	16 000	4 900	165	16 500	5 050
170	17 000	5 200	175	17 500	5 350	180	18 000	5 500	185	18 500	5 650
190	19 000	5 800	195	19 500	5 950	200	20 000	6 100	205	20 500	6 250
210	21 000	6 400	215	21 500	6 550	220	22 000	6 700	225	22 500	6 850
230	23 000	7 000	235	23 500	7 150	240	24 000	7 300	245	24 500	7 450
250	25 000	7 600	255	25 500	7 750	260	26 000	7 900	265	26 500	8 100
270	27 000	8 250	275	27 500	8 400	280	28 000	8 550	285	28 500	8 700
290	29 000	8 850	300	30 000	9 150	310	31 000	9 450	320	32 000	9 750
330	33 000	10 050	340	34 000	10 350	350	35 000	10 650	360	36 000	10 950
370	37 000	11 300	380	38 000	11 600	390	39 000	11 900	400	40 000	12 200
410	41 000	12 500	420	42 000	12 800	430	43 000	13 100	440	44 000	13 400
450	45 000	13 700	460	46 000	14 000	470	47 000	14 350	480	48 000	14 650
490	49.000	14 950	500	50 000	15 250	510	51 000	15 550	520	52 000	15 850
etc.	etc.	etc.	etc.	etc.	etc.	etc.	etc.	etc.	etc.	etc.	etc.

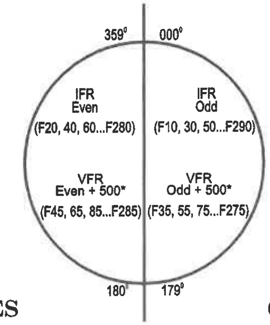
**Magnetic track, or in polar areas at latitudes higher than 70 degrees and within such extensions to those areas as may be prescribed by the appropriate ATS authorities, grid tracks as determined by a network of lines parallel to the Greenwich Meridian superimposed on a polar stereographic chart in which the direction towards the North Pole is employed as the Grid North.

***Except where, on the basis of regional air navigation agreements, from 090 to 269 degrees and from 270 to 089 degrees is prescribed to accommodate predominant traffic directions and appropriate transition procedures to be associated therewith are specified.

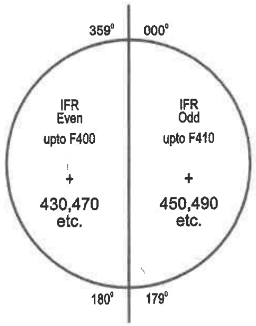
Note:- Guidance material relating to vertical separation is contained in the Manual on Implementation of a 300 m (1 000 ft) Vertical Separation Minimum between FL 290 and FL 410 Inclusive (Doc 9574).

SEMI-CIRCULAR SYSTEM OF CRUISING LEVELS

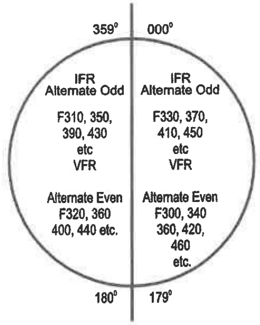
(a) Upto F290 for both RVSM and CVSM (Conventional Vertical Separation Minimum) Airspaces



(b) Above F290 (i) RVSM AIRSPACES



(b) Above F290 (ii) CVSM AIRSPACES



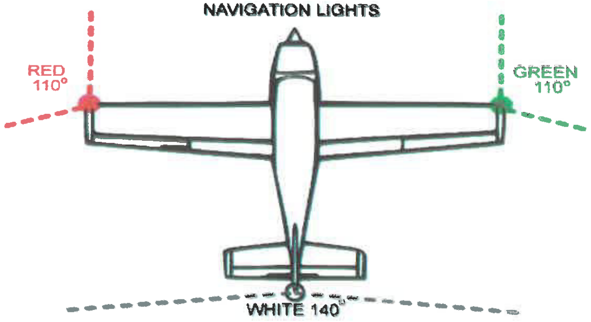
LIGHTS TO BE DISPLAYED BY AEROPLANES

NAVIGATION LIGHTS TO BE DISPLAYED IN THE AIR

Note:— The lights specified herein are intended to meet the requirements of Annex 2 for navigation lights.

As illustrated in Figure, the following unobstructed navigation lights shall be displayed:

a) a red light projected above and below the horizontal plane through angle of coverage L: 110 degrees
b) a green light projected above and below the horizontal plane through angle of coverage R: 110 degrees
c) a white light projected above and below the horizontal plane rearward through angle of coverage A: 140 degrees



RIGHT OF WAY AT NIGHT

The navigation lights allow a simplification of the right of way rules at night. If a pilot sees navigation light which is not moving relative to him, there is a risk of collision. If the light is green, he has right of way. If the light is red, he must give way by altering course to the right. If he sees both red and green, the other aircraft is approaching head on and he must alter course to the right. Navigation lights on the wings cannot be seen from the rear.

Examination question often involve positions in which lights become visible, and require answers about correct actions to be taken. A red light seen on a pilot's left, for example, would not remain in the same relative position, and would require no action. Relative bearings (360 degrees around the aircraft's heading) may be referred to in questions.

UNLAWFUL INTERFERENCE

If the pilot-in-command cannot proceed to an aerodrome in accordance with the rules, he/she should attempt to continue flying on the assigned track and at the assigned cruising level at least until able to notify an ATS unit or until within radar or ADS-B coverage.

When an aircraft subjected to an act of unlawful interference must depart from its assigned track or its assigned cruising level without being able to make radiotelephony contact with ATS, the pilot-in-command should, whenever possible:

a) attempt to broadcast warnings on the VHF channel in use or the VHF emergency frequency, and other appropriate channels, unless considerations aboard the aircraft dictate otherwise. Other equipment such as on-board transponders and data links should also be used when it is advantageous to do so and circumstances permit; and
b) proceed in accordance with applicable special procedures for in-flight contingencies, where such procedures have been established and promulgated in the Regional Supplementary Procedures (Doc 7030); or
c) if no applicable regional procedures have been established, proceed at a level which differs from the cruising levels normally used for IFR flight by:
   1) 150 m (500 ft) in an area where a vertical separation minimum of 300 m (1 000 ft) is applied; or
   2) 300 m (1 000 ft) in an area where a vertical separation minimum of 600 m (2 000 ft) is applied.

QUESTIONS

1. **Where State has not established minimum IFR altitudes, the minimum height of an aircraft above the highest obstacle over high terrain, or in mountainous areas shall be for an IFR flight:**
   A) At least 2000ft within 8km of the estimated position
   B) At least 1000ft within 8km of the estimated position
   C) At least 2000ft within 5km of the estimated position

2. **Aircraft wishing to conduct IFR flight within advisory airspace, but not electing to use the air traffic advisory service:**
   A) Need to file a flight plan
   B) Shall nevertheless submit a flight plan but changes made thereto are not necessary to be notified
   C) Shall nevertheless submit a and notify changes made thereto to the ATS unit providing that service

3. **The white dumb-bell with black perpendicular bar indicates that:**
   A) Taxiing need to be confined to the taxiways
   B) Glider flying is performed outside the landing area
   C) Landing, take-off and taxiing is allowed on runway and/or taxiway only

4. **Your aircraft is intercepted by a military aircraft. The signals given by this aircraft conflict with ATC instructions. You should:**
   A) Select code 7500 on your transponder
   B) Follow ATC instructions
   C) Follow the instructions of the intercepting aircraft

5. **An aircraft which is being subject to unlawful interference ("hijacked") and is forced to divert from the cleared track or cruising level without being able to communicate with ATS shall try to:**
   A) Fly the emergency triangle
   B) Continue at an altitude that differs from the semicircular rule with 1000ft when above FL 290 and 500ft when lower than FL 290
   C) As soon as possible commence emergency descent in order to minimize the difference between cabin pressure and outside pressure

6. **An aircraft manoeuvering in an airport's circuit receives a series of red flashes from the control tower. This signifies that the aircraft must:**
   A) Not land for the moment regardless of previous instructions
   B) Return to land and that clearance to land will be communicated in due course
   C) Not land because the airport is not available for landing

7. **Whilst flying in an aerodrome's traffic circuit, an aircraft receives a series of green flashes from the tower. The aircraft:**
   A) Is cleared to land
   B) Must land immediately and clear the landing area
   C) Must come back to land and the landing clearance will be sent in due time

8. **Except when a clearance is obtained from an ATC unit, a VFR flight can not enter or leave a control zone when ceiling is less than:**
   A) 2000ft or visibility is less than 5km
   B) 1000ft or visibility is less than 5km
   C) 1500ft or visibility is less than 5km

9. **Which of the following flights has the greatest priority to land?**
   A) Emergency aircraft
   B) Military aircraft
   C) VIP (Head of state) aircraft

10. **An aircraft flying above the sea between 4500ft MSL and 9000ft MSL outside controlled airspace under VFR, must remain on principle at least:**
    A) 1500m horizontally, 1000ft vertically from clouds; 8km visibility
    B) Clear of clouds and in sight of the surface; 8km visibility
    C) 1500m horizontally, 1000ft vertically from clouds; 5km visibility

11. **The VMC minima for an airspace classified as "B" above 10000ft MSL are:**
    A) 2000m horizontally, 1000ft vertically from clouds; 8km visibility
    B) Clear of clouds; 8km visibility
    C) 1 nautical mile horizontally and 1000ft vertically from clouds; 8km visibility

12. **The VMC minima for an airspace classified as "G" above 10000ft MSL are:**
    A) 1500m horizontally, 1000ft vertically from clouds; 8km visibility
    B) 1 nautical mile horizontally and 1000ft vertically from clouds; 8km visibility
    C) 1 nautical mile horizontally and 1000ft vertically from clouds; 5km visibility

13. **Minimum vertical distance from cloud for VFR flight within controlled space is.**
    A) 1000 ft B) 500 ft C) 1000 m

14. **Green flashes from Tower, this signal means that the aircraft:**
    A) May continue to taxy towards the take-off area
    B) Must return to its point of departure
    C) Must stop

15. Which of the following actions shall be taken in case of a controlled flight deviates from the track?

A) Adjust the heading of the aircraft to regain track as soon as possible
B) If VMC, maintain this condition, waiting for the ATC instructions
C) Notify ATC of the new track immediately and comply with instructions

16. An aircraft is flying under IFR in an area where the visibility is unlimited and the sky is clear (free of clouds), when it totally loses radio communications. The procedure to be followed is:

A) Descend to En-route Minimum Safe Altitude and join closest airfield open to IFR operations
B) Land on the closest appropriate aerodrome, then advise Air Traffic Services of landing
C) Continue flight onto destination, complying with last received clearances in the filed flight plan

17. While taxiing an aircraft receives the following light signal from the control tower: series of red flashes. This signal means that the aircraft:

A) Must vacate the landing area in use
B) May continue to taxi to the take-off area
C) Must stop

18. An aircraft intercepted by another aircraft shall immediately attempt to establish radio communication with the intercepting aircraft on the following frequencies:

A) 121.5MHz- 282.8MHz
B) 121.5MHz- 125.5MHz
C) 121.5MHz- 243MHz

19. If radio contact with the intercepting aircraft is established but communication on a common language is not possible, which phrase should be pronounced by the intercepted aircraft to communicate that he is unable to comply with the instructions received?

A) UNABLE TO COMPLY
B) CAN NOT
C) CAN NOT COMPLY

20. If radio communication is established during an interception but communications in a common language is not possible, which phrase should be pronounced by the intercepting aircraft to request the intercepted aircraft to descend for landing?

A) Descend for landing
B) Descend
C) You land

21. A signalman will ask the pilot to apply parking brakes by the following signals:

A) Arms down, palms facing inwards, moving arms from extended position inwards
B) Crossing arms extended above his head
C) Raise arm and hand, with fingers extended, horizontally in front of body, then clinch fist

22. Within uncontrolled airspace, the first usable level in IFR must provide a 500 feet margin above the following two levels:

A) 3000 feet AMSL or 1500 feet AGL
B) 3000 feet AMSL or 1000 feet AGL
C) FL 30 or 1500 feet AGL

23. An aircraft shall display, if so equipped, an anti-collision light:

A) Outside the daylight-period at engine-start. During the daylight-period this is not applicable
B) On the ground when the engines are running
C) While taxiing, but not when it is being towed

24. A red flare addressed to a flying aircraft means:

A) Dangerous airfield. Do not land
B) Not withstanding any previous instructions, do not land for the time being
C) Come back and land

25. A double white cross displayed horizontally in the signal area means:

A) An area unit for the movement of aircraft
B) Need special precautions while approaching for landing
C) The aerodrome is being used by gliders and that glider flights are being performed

26. An aircraft is considered to overtake another if it approaches the other aircraft from the rear on a line forming an angle of less than:

A) 50 degress with the plane of symmetry of the latter
B) 70 degress with the plane of symmetry of the latter
C) 60 degress with the plane of symmetry of the latter

27. During an IFR flight in VMC in controlled airspace you experience a two-way radio communication failure. You will:

A) Land at the nearest suitable aerodrome maintaining VMC and inform ATC
B) Select A7600 and continue according current flightplan to destination
C) Land at the nearest suitable aerodrome and inform ATC

28. When does FLIGHT TIME end?

A) When the aeroplane first stops after landing to disembark passengers
B) At touchdown
C) At engine shut down when the aeroplane has stopped in the parking bay

29. The aerodrome at Calicut is not declared suitable for night operations. If the sunrise is at 0550 the earliest time by which an VFR aircraft operation at the station can take place is;

A) 0530
B) 0520
C) 0550

30. What is the meaning of AGL?

A) Altitude of ground level
B) Aerodrome ground level
C) Above ground level

31. Which of the following defines flight visibility?

A) Visibility determined in flight not obscured by cloud, dust, haze or precipitation
B) The ability to determine in the air the distance and identity of unlighted objects by day and lighted objects by night
C) The forward visibility from the cockpit of an aircraft in flight

32. When operating under Special VFR clearance, the responsibility for remaining clear of obstacles on the ground rests with:

A) Operator
B) The aircraft commander
C) Air traffic control

33. Who shall have the final authority over the disposition of the aircraft?

A) The Authority
B) The Owner
C) The Commander

34. The commander of a public transport aircraft must ensure that passenger seat belts are secure for:

A) Take-off, landing and turbulence
B) Take-off, landing, taxiing and turbulence
C) Take-off, landing, taxiing, turbulence and during emergencies

35. Who decides whether to fly under IFR or VFR in VMC?

A) The PIC
B) The Operator
C) The ATS authority

36. An aircraft being towed by night must display:

A) The same lights that are required in flight
B) Flashing navigation lights
C) Steady navigation lights

37. Anti-collision lights on an aircraft must be switched on:

A) Between SS and SR or any other period specified by the appropriate authority
B) As soon as engines are running
C) All aircraft operating on the movement area

38. When two aircraft are approaching head on, and there is a danger of collision:

A) Both aircraft alter heading to port
B) Both aircraft alter course to the right (starboard side)
C) The smaller aircraft alters heading to port

39. A revised estimate shall be notified if the ETA destination passed by aircraft varies by:

A) 3 minutes
B) 2 minutes
C) 5 minutes

40. An aircraft that has the right of way shall maintain its:

A) Heading and speed
B) Right of progress
C) Course, speed and height

41. On aerodromes aircraft taxiing on the manoeuvring area of an aerodrome shall give way to:

A) Other converging aircraft
B) Aircraft taking off or about to take off
C) Other vehicles and pedestriants

42. What is Special VFR?

A) A VFR procedure to enable an aeroplane to transit a control zone or area in IMC without compliance with IFR
B) A VFR flight cleared by ATC to operate within a CTR in meteorological conditions below VMC
C) Any flight cleared by ATC to operate in conditions less than VMC in which the pilot is required to remain clear of cloud and in sight of the surface

43. Which is the correct order of priority:

A) Gliders do not give way to balloons
B) Power-driven heavier-than-air aircraft shall give way to airships, gliders and balloons
C) Gliders shall give way to airships and balloons

44. What is the minimum flight altitude permitted over towns and settlements and populated areas?

A) The altitude which permits the aircraft to land safely in the event of an engine failure
B) 1000 ft above the highest obstacle within 600 m of the aircraft position
C) 500 ft

45. A controlled flight is requested to inform the appropriate ATC unit whenever the average True Air Speed at cruising level varies or is expected to vary from that given in the flight plan by plus or minus:

A) 5%
B) Mach 0.02
C) 10 %

46. An aircraft operated on, or in the vicinity of, an aerodrome shall whether or not within an ATZ:

I) Observe other aerodrome traffic for the purpose of avoiding collision
II) Conform with or avoid the pattern of traffic formed by other aircraft in operation
III) Make all turns to the right, when approaching for landing or taking-off unless otherwise instructed
IV) Land and take-off into the wind unless safety, the runway configuration, or an air traffic consideration determines that a different direction should be used

A) All statements except II) are correct
B) All statements except I) are correct
C) All statements except III) are correct

47. Aircraft "A" with an ATC clearance is flying in VMC conditions within a control area. Aircraft "B" with no ATC clearance is approaching at appoximately the same altitude and on a converging course. Which is the right of way?

A) Aircraft "A" regardless of the direction which "B" is approaching
B) Aircraft "B" if "A" is on its left
C) Aircraft "A" if "B" is on its right

48. Which action shall be taken by an aircraft in the traffic pattern of an aerodrome, experiencing radio failure to indicate difficulties which compel it to land without requiring immediate assistance?

A) Switching on and off four times the landing lights
B) Switching on and off three times the landing lights
C) The repeated switching on and off of the landing lights

49. Aircraft taxiing in the manoeuvring area must give way to:

A) Follow-me vehicles
B) Landing traffic
C) Departing and landing traffic

50. Two or more white crosses, displayed on runways and taxiways, indicate that:

A) The threshold has been displaced
B) The section of the runway or taxiway is unfit for aircraft movement
C) The runway or taxiway should be used with caution

51. During initial climb in uncontrolled airspace, the altimeter setting should be:

A) Any desired value
B) Local QNH
C) Standard pressure setting

52. When a controlled flight inadvertently deviates from its current flightplan, ATC has to be informed in case:

A) Of an emergency
B) The estimated time is in error by more than 10 minutes
C) The TAS varies by plus or minus 5% of the TAS notified in the flightplan

53. Which manoeuvre shall be executed by an intercepting aircraft if the pilot wants to communicate to the intercepted aircraft "YOU MAY PROCEED"?

A) Rocking wings and flashing the navigational lights
B) Executing a climbing turn of 90 degrees or more without crossing the line of flight of the intercepted aircraft
C) Circling the intercepted aircraft in a clock-wise pattern

54. Semi-circular system sectors are.

A) From 000° to 179° and 180° to 359°
B) From 000° to 089°, 090° to 179°, 180° to 269° and 270° to 359°
C) From 090° to 260° and 270° to 089°

55. **While on IFR flight, a pilot has an emergency which causes a deviation from an ATC clearance. What action must be taken?**
   A) Squawk 7700
   B) The appropriate ATC unit shall be notified of the action taken as soon as circumstances permit
   C) Request an amended clearance or cancel the IFR flightplan

56. **Outside controlled airspace above 3000'AMSL**
   A) Fly on 1013.2
   B) QFE
   C) QNH

57. **An airborne flight plan must be submitted:**
   A) 30 minutes before the intended point of entry into a CTA or advisory area
   B) 10 minutes before the intended point of entry into a CTA or advisory area
   C) 60 minutes before the intended point of entry into a CTA or advisory area

58. **IFR flight in VMC, weather changes to IMC:**
   A) Fly VMC and land at nearest convenient aerodrome.
   B) Fly according to flight plan
   C) Change to VFR plan

59. **PIC of an aeroplane shall**
   A) Be responsible for safe conduct of navigation
   B) Be responsible for safe conduct of flight at all times
   C) All above is correct

60. **On the ground, when two aircraft are approaching head on:**
   A) Both airplanes must stop or where practicable alter course to the right to keep well clear
   B) Both should declare an urgency
   C) Traffic patrol has to be informed

61. **No aircraft shall be flown over the congested area of cities, towns or settlements unless at a height that will permit, In the event of an emergency a landing to be made safely. Exceptions to this rule are:**
   A) Take-off and landing and permission from the appropriate authority
   B) Permission from the appropriate authority
   C) Take-off and landing

62. **Which type of service is provided in Class F airspace:**
   A) Air traffic control service
   B) Air traffic advisory service and FIS
   C) Air traffic advisory service

63. **When is deviation from the rules of the air permitted?**
   A) Only in the interests of flight safety
   B) Only when it is economically advantageous
   C) Anytime the PIC thinks it is necessary

64. **One of the following statements about aircraft ground movement is correct:**
   A) A taxing aircraft has priority over a vehicle towing an aircraft
   B) A vehicle towing an aircraft has priority over a taxiing aircraft
   C) Two airplanes approaching head-on will alter course to the left

65. **While flying at night another aircraft reports that you are on his 100 degrees relative bearing. In that case you should see his:**
   A) Red navigation light
   B) Green navigation light
   C) Green and white navigation lights

66. **The signal from pilot to marshaller which means - brakes applied - is:**
   A) Fist clenched in front of the face then fingers extended
   B) Hands crossed in front of the face, palms outwards, then move arms outwards
   C) Right arm and hand with fingers extended in front of face, then clench fist

67. **What does a red flashing light from the control tower to an aircraft on the manoeuvring area mean?**
   A) Clear to taxi
   B) Return to the start point
   C) Move clear of the landing area

68. **A series of red flashes sent to an aircraft in flight means:**
   A) Return to the airfield and land
   B) Airfield is unsafe, do not land
   C) Notwithstanding any other instructions do not land at the moment

69. **A white dumbbell with a black bar spaced perpendicularly indicates**
   A) All aircraft are required to land, takeoff and taxi on taxiways and runways only.
   B) Are required to land and takeoff on runways only
   C) A white dumbbell when displayed requires a/c to land and takeoff and taxi on taxiways and runways only.

70. **A red square panel with a yellow strip along each diagonal, displayed in the signals area of an aerodrome indicates:**
   A) Aerodrome is unfit for aircraft movements, and landing are prohibited
   B) Exercise special care when landing
   C) Land on paved surface only

71. Two a/c of same category converging...

A) Both will turn to right
B) Aircraft on right will turn right
C) Aircraft on the left will give way

72. A signalman will ask the pilot to apply parking brakes by the following signals:

A) Raise arm and hand, with fingers extended, horizontally in front of body , then clench fist
B) Arms down , palms facing inwards, moving arms from extended position inwards.
C) Horizontally moving his hands, fingers extended, palms toward ground

73. An aircraft is following a track of 179° (M) on a VFR plan. The choice of flight levels available to the pilot are:

A) 50,70,90,150,170,190,210,230,250,270,290
B) 55, 75, 95, 115, 135, 155, 175, 195, 215, 235, 255, 275
C) 50,70,90,110,130,160,180,200,220,240,260,280

74. After an aircraft has been intercepted in flight, the intercepted aircraft is rocking its wings. This means:

A) Will comply
B) NO
C) you are not to enter this airspace

75. All flights above_________ flight levels are to be cleared IFR irrespective of weather Conditions

A) F 280
B) F 150
C) F 140

76. A flashing intermittent red light from the ground to an aircraft in the air means:

A) Continue for another approach
B) Go-around
C) Aerodrome unsafe, do not land

77. When a pilot raises his arms extended palms facing outwards and moves his hands inwards to cross in front of the face this means:

A) Remove chocks
B) Insert chocks
C) Brakes released

78. While taxiing, an aircraft receives from the airport controller the following light signal: a series of green flashes. This signal means that the aircraft:

A) Must stop
B) May continue to taxi towards the take-off area
C) Must return to its point of departure

79. A black letter " C" on a yellow background indicates:

A) The location of the control tower.
B) The location where visiting pilots should report.
C) Rest-room facilities for visiting pilots.

80. At an aerodrome special VFR may be authorized when

A) Visibility falls below 5 km or cloud ceiling is less than 1500 feet
B) Visibility falls below 8 km or cloud ceiling is less than 1500 feet
C) Visibility falls below 8 km or cloud ceiling is less than 2500 feet

81. A special VFR clearance may be obtained from ATC for the following airspaces:

A) CTR, TMA and AWY
B) CTR and TMA
C) CTR

82. If the sustained Mach number/true airspeed at cruising level varies by plus or minus_______ true airspeed or more from the current flight plan, the appropriate air traffic services unit shall be so informed:

A) Mach 0.2
B) 5%
C) 19 km/h

83. On a VFR flight, your magnetic track is 005° , the magnetic heading 355° . Which of the following flight level is correct?

A) FL 70
B) FL 55
C) FL 60

84. The VMC minima for an airspace classified as "G" above 10 000 feet MSL are :

A) 1500 m horizontally and 1 000 feet vertically from clouds; 8 km visibility.
B) 1 nautical mile horizontally and 1 000 feet vertically from clouds; 5 km visibility
C) 1 nautical mile horizontally and 1000 feet vertically from clouds; 8 km visibility

85. Which provisions on a VFR-flight in Class E airspace are CORRECT?

A) Service provided : Traffic Information as far as practical; ATC Clearance : required ;

B) Service provided : Traffic Information as far as practical; ATC Clearance : not required ;

C) Service provided : Air Traffic Control Service; ATC Clearance : required ;

86. If you are flying IFR in IMC conditions and you experience a total communications failure, you should:

A) Continue the flight according to flight plan

B) Land at the nearest suitable aerodrome and report to ATS

C) Try to contact another aircraft for relay

87. When flying on an airway on a heading of 255(M) the correct flight level will be:

A) Usually EVEN

B) Usually ODD

C) Always EVEN

88. You are outside controlled airspace on a VFR flight above 3,000ft. Your distance from the cloud should be:

A) Clear of cloud and in sight of the surface

B) 1,000 ft vertically and 1.5 km horizontally

C) 2,000 ft and 3 NM horizontally

89. In areas where a separation minimum of 1000 ft. is applied up to FL 410, authorisation for VFR flight shall not be granted above which flight level?

A) FL 200

B) FL 290

C) FL 240

90. When an aircraft is operating in class F airspace below 900 m amsl the minimum horizontal distance from cloud for VFR flight is:

A) 5 km

B) 1000 ft

C) Clear of cloud and in sight of the surface

91. SVFR may be authorized when the ground visibility is not less than:

A) 1500 m

B) 1800 m

C) 1000 m

92. Which of the following aerodrome ground signals displayed in the signals area indicates that glider flying is in progress?

A) A white double cross

B) A white dumb-bell

C) A black letter - C - on a yellow background

93. In areas where a vertical separation minimum (VSM) of 300 m (1000 ft) is applied between FL 290 and FL 410 inclusive an aircraft on a magnetic track of 350 would be expected to fly at:

A) FL 410

B) FL 405

C) FL 400

94. Above flight level FL 290 (non-RVSM) the vertical flight separation between aircraft on the same direction is:

A) 3000 ft

B) 4000 ft

C) 1500 ft

95. Aircraft shall not be flown in formation except:

A) Formation flying is not permitted in India for civil aircraft.

B) By pre-arrangement among the pilots taking part

C) By pre-arrangement among the PICs taking part

96. If the ground visibility is reported 1000 m, can a special VFR flight take off from an aerodrome in a control zone?

A) Yes, provided the cloud ceiling is higher than 500 ft

B) No

C) Yes, provided the pilot remains in visual contact with the ground

97. A VFR flight when flying inside an ATS airspace classified as C has to maintain the following minima of flight visibility and distance from clouds

A) 5km at or above 3050m (10000ft) AMSL 1500m horizontal and 300m vertical from clouds

B) 8km at or above 3050m (10000ft) AMSL, and clear of clouds

C) 8km at or above 3050m (10000ft) AMSL 1500m horizontal and 300m vertical from clouds

98. When, in airspace where VFR are permitted, the pilot in command of an IFR flight wishes to continue his flight in accordance with visual flight rules, until the destination is reached:

1 He must inform the control unit ("cancel IFR")
2 He must request and obtain clearance
3 He may request his IFR flightplan to be changed to a VFR flightplan
4 The flightplan automatically becomes a VFR flightplan
The combination of correct statements is:

A) 2, 4
B) 1, 3
C) 1, 4

99. In the event of a delay of a controlled flight, the submitted flightplan should be amended or cancelled and a new flightplan submitted when the delay is:

A) 30 minutes in excess of the estimated time of departure
B) 30 minutes in excess of the estimated time off blocks
C) 60 minutes in excess of the estimated time of departure

100. Changing of flight rules from IFR to VFR is possible

A) If the commander so requests
B) If instructed by ATC so long as VMC is forecasted during the next 30 minutes
C) Only when leaving controlled airspace

101. ADC Validity Period is:

A) (-) 15 minutes to (+) 45 minutes of EOBT in RPL/FPL
B) (+) 60 minutes of EOBT in RPL/FPL
C) (-) 15 minutes to (+) 30 minutes of EOBT in RPL/FPL

102. Flight Plan is to be filed atleast?

A) One hour before EOBT
B) Three hours before EOBT
C) One hour before TOBT

103. In the event of a proposed delay of _____ or more to the departure time for a flight plan when a flight plan has been previously filed, the Pilot-in-Command or his representative will be required to notify ATC of the revised ETD

A) 60 minutes
B) 30 minutes
C) 15 minutes

ANSWERS

1	2	3	4	5	6	7	8	9	10	11	12	13	14
A	C	A	C	B	C	C	C	A	C	B	A	A	A

15	16	17	18	19	20	21	22	23	24	25	26	27	28
A	B	A	C	B	B	C	B	B	B	C	B	A	A

29	30	31	32	33	34	35	36	37	38	39	40	41	42
A	C	C	B	C	C	A	A	B	B	B	A	B	B

43	44	45	46	47	48	49	50	51	52	53	54	55	56
B	B	B	C	B	C	C	B	A	C	B	A	B	A

57	58	59	60	61	62	63	64	65	66	67	68	69	70
B	B	C	A	A	B	A	A	B	C	C	B	B	A

71	72	73	74	75	76	77	78	79	80	81	82	83	84
C	A	B	A	B	C	B	B	B	A	C	C	B	A

85	86	87	88	89	90	91	92	93	94	95	96	97	98
B	A	A	B	B	C	A	A	C	B	A	B	C	C

99	100	101	102	103
B	A	A	B	C

5

AIR TRAFFIC SERVICES

(Ref: Annex 11, Doc 4444, AIP, India and CAR SECTION 9 – AIR SPACE AND AIR NAVIGATION SERVICES STANDARDS SERIES 'E', PART I ISSUE II)

GENERAL

Objectives of the Air Traffic Services

The objectives of the air traffic services 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;

e) notify appropriate organizations regarding aircraft in need of search and rescue aid, and assist such organizations as required.

Divisions of the Air Traffic Services:

The air traffic services shall comprise three services identified as follows.

The air traffic control service, to accomplish objectives a), b) and c) of the air traffic services above, 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 approach and aerodrome control service below, in order to accomplish objectives a) and c) of the air traffic services above;

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 the air traffic services above;

c) **Aerodrome Control Service:** the provision of air traffic control service for aerodrome traffic, except for those parts of flights described in approach control service, in order to accomplish objectives a), b) and c) of the air traffic services above.

Provisions of Control service AIP (India):

- Radio communication shall be established with the appropriate Aerodrome/ Approach Control Unit -
  - Prior to taxiing for departure; or
  - When intending to operate in a Class 'C and D' airspace.
- While operating in Class 'C and D' airspace only direct controller-pilot communication is permitted. RTF communication through interpreter shall not be permitted.
- For IFR or VFR operation in Class 'C and D' airspace, aircraft shall be equipped with appropriate two-way VHF radio apparatus, and a radio compass.
- A pilot-in-command under IFR or VFR intending to enter, cross or operate within a CTR or ATZ shall request a Clearance from the Aerodrome/ Approach Control on the appropriate radio frequency.
  - He shall:-Pass the aircraft's position, level, track and estimated time of crossing the airspace.
  - Maintain a continuous listening watch on that frequency while the aircraft is within the airspace.
  - Carry out any instructions received from Aerodrome /approach Control.

The flight information service, to accomplish objective d) of the air traffic services above.

The alerting service, to accomplish objective e) of the air traffic services above.

Designation of the portions of the airspace and controlled aerodromes where air traffic services will be provided:

When it has been determined that air traffic services will be provided in particular portions of the airspace or at particular aerodromes, then those portions of the airspace or those aerodromes shall be designated in relation to the air traffic services that are to be provided.

The designation of the particular portions of the airspace or the particular aerodromes shall be as follows:

Flight information regions. Those portions of the airspace where it is determined that flight information service and alerting service will be provided shall be designated as flight information regions.

Control areas and control zones. 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.

Those portions of controlled airspace where in 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.

Where designated within a flight information region, control areas and control zones shall form part of that flight information region.

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.

CLASSIFICATION AND DESIGNATION OF ATS AIRSPACE IN INDIA

ATS airspace in India is classified and designated in accordance with the following:

Class A*: Applicable to designated airspaces in terminal control area, control area and control zone. IFR flights only are permitted, all flights are provided with air traffic control service and are separated from each other.

Class B*: Applicable to designated airspaces in terminal control area, control area and control zone. IFR and VFR flights are permitted, all flights are provided with air traffic control service and are separated from each other.

Class C: Designated airspace within controlled airspace is classified as 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.

Class D: Airspace within controlled airspace is classified as 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.

Class E: Airspace within ATS Route segment outside controlled airspace is classified as 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.

Class F: Designated Airspace within ATS Route segment outside controlled airspace is classified as 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.

Class G: Airspace outside ATS route segment and outside controlled airspace is classified as Class G. IFR and VFR flights are permitted and receive flight information service if requested.

The Classification of Airspace within Restricted areas shall apply only to those portions of airspace controlled by civil ATC under Flexible Use of Airspace.

Procedures in class C airspace: Certain airspaces around airports capable of a runway handling capacity of more than 20 aircraft per hour and equipped with primary and secondary radars have been designated as class C airspaces. Class C airspaces extend from 4000 feet to FL 285. Airspaces upto 30 NMs around these airports are designated as class D airspaces. It is proposed to classify airspaces above FL 285 as class A airspaces.

- VFR flights intending to operate in class C airspace shall ensure that they will be able to meet the requirements of class C (MET/COM/SPEED).
- Pre-departure clearance from appropriate ATC shall be obtained by all VFR flights intending to enter class C airspace.
- Aircraft on SID/STAR shall follow published speed restrictions
- All aircraft shall follow any additional speed restrictions when instructed by ATC
- The responsibility of terrain clearance remains with the flight crew of VFR flight at all times
- VFR flights unable to adhere to ATC clearance shall obtain alternate clearance.

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.

ATS AIRSPACE CLASSES
SERVICES PROVIDED AND FLIGHT REQUIREMENTS

Class	Type of flight	Separation provided	Service provided	Speed limitation**	Radio communication requirement	Subject to 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 3050m (10,000 ft) AMSL	Continuous two-way	Yes
D	IFR	IFR from IFR	Air traffic control service including traffic information about VFR flights (and traffic avoidance advice on request)	250 kt IAS below 3050m (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 3050m (10,000 ft) AMSL	Continuous two-way	Yes
E	IFR	IFR from IFR	Air traffic control services and, as far as practical, traffic information about VFR flights	250 kt IAS below 3050m (10,000ft) AMSL	Continuous two-way	Yes
	VFR	Nil	Traffic information as far as practical	250kt IAS below 3050m (10,000ft) AMSL	No	No
F	IFR	IFR from IFR as far as practicable	Air traffic advisory service; flight information service	250kt IAS below 3050m (10,000ft) AMSL	Continuous two-way	Yes
	VFR	Nil	Flight information	250kt IAS below 3050m (10,000ft) AMSL	No	No
G	IFR	Nil	Flight information service	250kt IAS below 3050m (10,000ft) AMSL	Continuous two-way	No
	VFR	Nil	Flight information service	250kt IAS below 3050m (10,000ft) AMSL	No	No

* Implementation of Class A & Class B Airspace under consideration

** When the height of the transition altitude is lower than 3600 m (10000 ft) AMSL, FL 100 should be used in lieu of 10000 ft.

Establishment and designation of the units providing Air Traffic Services: The air traffic services shall be provided by units established and designated as follows:

Flight information regions: Flight Information Centers shall be established to provide flight information and alerting services outside controlled airspaces. Flight information regions shall be delineated to cover the whole of the air route structure to be served by such regions.

Flight information region shall include all airspace within its lateral limits, except as limited by an upper flight information region.

FIRs and Location Indicators :

A four-letter code group formulated in accordance with the rules prepared by ICAO and assigned to the location of an aeronautical fixed station. ICAO has divided the whole world into non-overlapping 22 AFSRA. Each AFSRA is assigned a separate identifying alphabet. An AFSRA consists of number of states/countries, in some cases one AFSRA is consisting of only one country/state.

Location indicators are assigned by States and are supervised by ICAO by checking their conformity of with the "Formulation and Assignment of Location Indicators" set out below.

The formation is as under:

First alphabet identifies the AFSRA

Second alphabet identifies the State / Country

Third and fourth alphabets identify the place / station

Examples:

VIDP V......AFSRA, A,E.I,O......INDIAN FIR DP......Delhi

OPKC O......AFSRA, P......Pakistan KC......Karachi

OAKB O......AFSRA, A......Afganistan KB......Kabul

The second alphabet assigned to India are I,E,A,O. Indian FIRs are alloted Alphabets as follows:

Bombay FIR (Western India) is identified by "A"

Calcutta FIR (Eastern India) "E"

Guwahati sub FIR (Eastern India) "E"

Delhi FIR (Northern India) is identified by "I"

Madras FIR (Southern India) is identified by "O"

Indicators: Following Indicators are used in aeronautical charts:

(i) **NDB** is represented by generally two and sometimes three capital letters. Examples SP represents Sarsawa NDB, JG Dehradun NDB, DBR Dibrugarh NDB etc.

(ii) **VOR** is represented by three capital letters Examples Agartala VOR (AAT), Mumbai VOR (BBB) etc.

(iii) **ILS** is represented by four capital letters,starting with "I" Examples, IGHT Guwahati ILS RW 02, ILUC Lucknow ILS 27 etc.

(iv) **Aerodrome** is represented by four capital letters Example Amsterdam EHAM, Lisbon LPPT.Indian aerodromes start with AFSARA V followed by FIR indicator and two letter aerodrome designator,eg, Mumbai VABB, Madras VOMM etc.

(v) **Significant point** is represented by five capital letters inclusive of two vowels Example GOLEM, IDOLA

(vi) **Routes** will have at least one alphabet and a number from one to 999. Example A791, B209. This may be pre-fixed and suffixed by another letter. Domestic routes in India start with letter W. Example W 49. Route designators A,B,G,R and W are pronounced by the names of colours, ie, Amber, Blue, Green, Red and White.

(vii) **SIDs and STARs** start with NDB/VOR/Significant point indicators followed by a number and may have an alphabet suffixed. Example LETPU 1D Departure, SSB 1A Arrival.

(viii) **Prohibited, Restricted and Danger Areas:**

Identification:

The identification shall be composed of a group of letters and figures as follows:

a) nationality letters for location indicators assigned to the State or territory 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 the State or territory concerned.

Prohibited Areas:

An airspace of defined dimensions above the land areas or territorial waters of India within which the flights are not permitted at any time under any circumstances. VA(P)-2, indicates Prohibited Area No. 2 in Mumbai FIR.

Restricted Areas:

An airspace of defined dimensions above the land areas or territorial waters of India within which the flight of aircraft is restricted. VO(R)-81, is Restricted Area No. 81 in Chennai FIR.

Danger Area:

An airspace of defined dimensions within which activities dangerous to the flight of aircraft exist at the specified times. Such times are notified by NOTAM's. The effect of the the notification of the Danger Area is to caution aircraft operators/pilots that it is necessary for them to avoid it for the safety of the aircraft when the areas are active. VE(D)-72, indicates Danger Area No. 72 in Calcutta FIR.

Military Exercise and Training Areas

Temporary Segregated Area (TSA). Temporary Segregated Area (TSA) is an airspace temporarily segregated and allocated for the exclusive use of a particular user during a determined period of time and through which other traffic will not be allowed to transit. TSA is identified by alphabets 'TSA', followed by a number between 501 and 999 and then, after a space, followed by the name of the place associated with the area within square parentheses. If there are multiple areas established as parts of a general area, the number in the identifier should be followed by an alphabet in capital case within round parentheses. E.g. TSA801(A) [Thanjavur]

Temporary Reserved Area (TRA). Temporary Reserved Area (TRA) is an airspace temporarily reserved and allocated for the specific use of a particular user during a determined period of time and through which other traffic may be allowed to transit under air traffic control (ATC) clearance. TRA is identified by alphabets 'TRA', followed by a number between 501 and 999 and then, after a space, followed by the name of the place associated with the area within square parentheses. If there are multiple areas established as parts of a general area, the number in the identifier should be followed by an alphabet in capital case within round parentheses. E.g. TRA601(A) [Panagarh]

A single series of number between 501 and 999 is used for both the areas, regardless of type.

A number is not duplicated in any type of above areas. The allocation of the numerical part of the designator will be as under:

Areas in Mumbai FIR: A number between 501 and 600

Areas in Kolkata FIR: A number between 601 and 700

Areas in Delhi FIR: A number between 701 and 800

Areas in Chennai FIR: A number between 801 and 900

Reserved for Future Use: Numbers between 901 and 999

LOCAL/TRAINING FLIGHTS

For local training or test flights conducted by scheduled/non-scheduled operators, a flight plan shall be submitted as for non-scheduled flights.

For training flights conducted by flying clubs within aerodrome traffic zone, a flight plan may be submitted by Fax on ICAO model flight plan or on telephone.

Note:— On aerodromes where no aerodrome traffic zone is established or no airspace has been reserved for local flying, an area of 5 NM radius aerodrome reference point and vertical limits up to 3000 ft AGL shall be treated as the vicinity of aerodrome for VFR flights.

Flight plans for cross-country flights conducted by flying club and general aviation aircraft from airfields where ATS reporting office does not exist, shall be submitted to the FIC by Fax on ICAO model flight plan or on phone. A flight plan shall include accumulated elapsed times to FIR boundary points wherever applicable along with contact telephone/mobile number of pilot in command in field 18.

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.

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).

Flight Information Regions or Control Areas in the upper Airspace

Where it is desirable to limit the number of flight information regions or control areas through which high flying aircraft would otherwise have to operate, a flight information region 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.

Control Zones 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.

The lateral limits of a control zone shall extend to at least 9.3 km (5NM) 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.

Identification of air traffic services units and airspaces An area control centre or flight information centre shall be identified by the name of a nearby town or city or geographic feature.

An aerodrome control tower or approach control unit shall be identified by the name of the aerodrome at which it is located.

A control zone, control area or flight information region shall be identified by the name of the unit having jurisdiction over such airspace.

Service to aircraft in the event of an emergency. 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 77 00 ; or

b) on Mode A, Code 75 00 , to indicate specifically that it is being subjected to unlawful interference; or

c) activate the appropriate emergency and/or urgency capability of ADS; or

d) transmit the appropriate emergency message via CPDL C.

AIR TRAFFIC CONTROL SERVICE

Application Air traffic control service shall be provided:

a) to all IFR flights in airspace Classes A, B, C, D and E;

b) to all VFR flights in airspace Classes B, C and D;

c) to all special VFR flights;

d) to all aerodrome traffic at controlled aerodromes.

Provision of air traffic control service

The parts of air traffic control service described 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.

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.

Operation of Air Traffic Control Service Clearances issued by air traffic control units shall provide separation:

a) between all flights in airspace Classes A and B;

b) between IFR flights in airspace Classes C, D and E;

c) between IFR flights and VFR flights in airspace Class C;

d) between IFR flights and special VFR flights;

e) between special VFR flights when so prescribed by the appropriate ATS authority.

Separation Minima The selection of separation minima for application within a given portion of airspace shall be as per the separation minima selected from those prescribed by the provisions of the PANS-ATM and the Regional Supplementary Procedures.

Read-back of clearances and safety-related information 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.

The controller shall listen to the read-back to ascertain that the clearance or instruction has been correctly acknowledged by the flight crew and shall take immediate action to correct any discrepancies revealed by the read-back.

Voice read-back of CPDLC messages shall not be required.

Air Traffic Flow Management. ATFM is primarily meant to address the balancing of demand against the capacity to achieve optimum utilization of the major resources viz., Airport, Airspace and aircraft at every Indian airport where there is a capacity constraint.

Airports Authority of India (AAI) has established a Central Air Traffic Flow Management (C-ATFM) system in India. The C-ATFM network consist of a Central Command Center (CCC) at Delhi supported by Flow Management Positions (FMPs) at major Area Control Centres (ACCs) and ATC towers across the country. The CCC provides ATFM service in conjunction with the FMPs.

In phase I, Flow Management Positions (FMPs) of six airports namely Delhi, Mumbai, Bengaluru, Chennai, Kolkata and Hyderabad, which account for 60 % Air Traffic handled at Indian Airports, have become operational to provide support to Central Command Center (CCC). In Phase II, FMPs will be made operational in a phased manner at additional 30 airports.

FLIGHT INFORMATION SERVICE

Application 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 air traffic services units.

Scope of Flight Information Service Flight information service shall include the provision of pertinent:

a) SIGMET and AIRMET information; AIRMET is not provided in India.

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 serviceability of navigation aids;

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.

Flight information service provided to flights shall include,

a) weather conditions reported or forecast at departure, destination and alternate aerodromes;

b) collision hazards, to aircraft operating in airspace Classes C, D, E, F and G;

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.

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.

Flight information service provided to VFR flights shall include, 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.

OPERATIONAL FLIGHT INFORMATION SERVICE BROADCASTS

APPLICATION

Voice-automatic Terminal Information Service (Voice-ATIS)broadcasts: shall be provided at aerodromes where there is a requirement to reduce the communication load on the ATS VHF air-ground communication channels.

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.

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

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

The Voice-ATIS broadcast message should, whenever practicable, not exceed 30 seconds.

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

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

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.

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.

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 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;

*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 climb-out areas including wind shear, and information on recent weather of operational significance;

t) trend forecast, when available; and

u) specific ATIS instructions.

** These elements are replaced by the term "CAVOK", whenever visibility, cloud and present weather is better than prescribed value or conditions.*

Air traffic advisory service is provided to aircraft operating outside controlled airspace on ATS routes classified "F".

IFR flights electing to use air traffic advisory service when operating within Class F airspace are expected to comply with the same procedures as those applying to controlled flights except that

The flight plan and changes thereto are not subject to a clearance, since the unit furnishing air traffic service will only provide advice on the presence of essential traffic or suggestions as to a possible cause of action.

Air-ground contacts shall be made with the air traffic services unit designated to provide air traffic advisory service within the advisory airspace or portion thereof.

ALERTING SERVICE

Application 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 air traffic services; and

c) to any aircraft known or believed to be the subject of unlawful interference.

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.

Air traffic services units shall notify rescue coordination centres immediately an aircraft is considered to be in a state of emergency in accordance with the following:

a) Uncertainty phase (INCERFA) 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 air traffic services units, whichever is the later, except when no doubt exists as to the safety of the aircraft and its occupants.

b) Alert Phase (ALERFA) 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 reestablished 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 (DETRESFA) 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.

Information to aircraft operating in the vicinity of an aircraft in a state of emergency. When it has been established by an air traffic services unit that an aircraft is in a state of emergency, other aircraft known to be in the vicinity of the aircraft involved shall be informed of the nature of the emergency as soon as practicable. When an air traffic services unit knows or believes that an aircraft is being subjected to unlawful interference, no reference shall be made in ATS airground 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.

PRINCIPLES GOVERNING THE IDENTIFICATION OF RNP TYPES AND THE IDENTIFICATION OF ATS ROUTES OTHER THAN STANDARD DEPARTURE AND ARRIVAL ROUTES

Composition of Designator

The ATS route designator shall consist of a basic designator supplemented, if necessary, by:

a) one prefix as prescribed; and

b) one additional letter as prescribed.

The number of characters required to compose the designator shall not exceed six characters.

The number of characters required to compose the designator should, whenever possible, be kept to a maximum of five characters.

The basic designator shall consist of one letter of the alphabet followed by a number from 1 to 999.

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.

Where applicable, one supplementary letter shall be added as a prefix to the basic designator in accordance with the following:

1. K to indicate a low-level route established for use primarily by helicopters;
2. U to indicate that the route or portion thereof is established in the upper airspace;
3. S to indicate a route established exclusively for use by supersonic aircraft during acceleration, deceleration and while in supersonic flight.

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 or the turn performance required on the route in question in accordance with the following:

a) the letter F to indicate that on the route or portion thereof advisory service only is provided;

d) the letter G to indicate that on the route or portion thereof flight information service only is provided.

ATS Routes in India.

- Aircraft shall obtain ATC clearance from the appropriate ATS unit at least 10 minutes prior to entering controlled airspace.
- Aircraft shall not join or cross ATS routes without prior approval/ATC clearance from the ATS units concerned. This approval/clearance shall be obtain at least 10 minutes prior to entry into ATS routes if in direct contact on VHF and at least 20 minutes prior to such entry if contact is through en-route radio frequency.
- All aircraft transiting from one FIR to another FIR shall forward estimates for FIR boundary including flight level to the ATS unit responsible for providing flight information service in the FIR to be entered, at least 10 minutes prior to the entry.

  These provisions will not apply to aircraft transiting from one Indian FIR to another Indian FIR. Provisions will continue to apply to all aircraft, when transiting from a foreign FIR into Indian FIR except where specifically indicated otherwise against an ATS route.
- Aircraft will join or cross ATS routes at or close to a designated reporting point. Aircraft crossing that route shall do so at the angle of 90° to the direction of the route and at a level appropriate to the magnetic track. VFR flights to cross ATS routes outside the Controlled airspace shall only cross them at an appropriate VFR level at right angle to the direction of the ATS route, or as close as possible to this angle.
  - The pilot shall report position as soon as possible after the aircraft has passed over each designated reporting point of ATS route defined by designated significant points. Additional reports over other points may be requested by ATC when so required for air traffic management (ATM) purposes.
  - On routes not defined by designated significant points, position reports shall be made after the first half hour of flight and at hourly interval thereafter. Additional reports at shorter intervals of time may be requested by ATC units when so required for ATS purposes.
- The minimum flight altitude on the ATS routes as presented in AIP have been determined so as to ensure at least 1000 ft (300m) vertical clearance above the highest obstacle within 10 KM on each side of the centre line of the route.
- All aircraft are forbidden to operate within 15NM of the international border of India unless specifically permitted or except when following the ATS route or operating to and from any aerodrome situated within 15NM of the international border of India.

- Scheduled international flights are permitted to flight plan using domestic ATS routes segments to/from destination, departure and approved alternate airports in India which are not connected by international ATS Routes.
- Flying outside of ATS routes is prohibited within Indian FIRs, unless otherwise authorised by ATC.

Strayed Aircraft:

An aircraft that has deviated significantly from its intended track or reports that it is lost. As soon as an ATS (air traffic services) unit becomes aware of a strayed aircraft, it takes all necessary steps to assist the aircraft and safeguard its flight. An aircraft may be considered as "strayed" by one unit and as "unidentified" by another.

Types of services.

With the exception of services provided at military air bases, the following types of services are provided :

i) Air Traffic Control Service

ii) Air Traffic Advisory Services

iii) Flight Information Service and Alerting Service

iv) Surveillance Services

There is no distinction between upper and lower controlled airspace.

QUESTIONS

1. A lower limit of a Control Area shall be established at a height above the ground level or water of not less than:

A) 150 metres
B) 200 metres
C) 300 metres

2. The Approach Control Service is an air traffic control service

A) provided for the arriving and departing controlled flights
B) for IFR flights arriving and departing
C) provided for IFR traffic within a Control Zone

3. The units providing Air Traffic Services are:

A) Area control Center- Advisory Center- Flight information Center- Approach Control Office and Tower
B) Area Control Center- Flight Information Center- Approach Cotrol Office- Aerodrome Control Tower and Air Traffic Services reporting office
C) Area Control Center- Approach Control Office and Aerodrome Control Tower only.

4. Air traffic control service is provided for the purpose of:

A) Avoiding collisions between all aircraft and maintaining an orderly flow of air traffic
B) Preventing collisions between aircraft, between aircraft and obstacles on the manoeuvring area and expediting and maintaining an orderly flow of air traffic
C) Preventing collisions between controlled air traffic and expediting and maintaining an orderly flow of air traffic

5. To perform a VFR flight in airspace classification E

A) a clearance and/or two-way radio communication is required
B) a clearance is required
C) two-way radio communication is not required

6 Which statement is correct?

A) The lower limit of an UIR may coincide with an IFR cruising level
B) The lower limit of a TMA shall be established at a height of at least 700ft AGL
C) The upper limit of a CTR shall be established at a height of at least 3000ft AMSL

7. What is the speed limit (IAS) in an airspace class E?

A) 250kt VFR and IFR, all levels
B) 250kt for IFR and VFR up to FL 100
C) 250 kt only for IFR up to FL 100

8. The speed limitation for IFR flights inside ATS airspace classified as C, when flying below 3050m (1000ft) AMSL, is:

A) 250kt IAS
B) Not applicable
C) 250kt TAS

9. RCP 10 means:

A) 10 is the number of seconds it takes for an instruction to travel from the ground to aircraft and acknowledgment back to the ground.
B) 10 is the maximum number of minutes it takes for an instruction to be executed by an aircraft.
C) Aircraft must communicate with ATC every 10 minutes.

10. An ATS airspace where IFR and VFR flights are permitted, all flights are subject to air traffic control service and are separated from each other is classified as

A) Airspace C
B) Airspace B
C) Airspace D

11. The speed limitation for both IFR flights and VFR flights inside ATS airspace classified as B, when flying below 3050m (10000ft) AMLS, is:

A) 260kt IAS
B) Not applicable
C) 250kt IAS

12. Air traffic services unit clocks and other time recording devices shall be checked as necessary to ensure correct time within plus or minus

A) 1 minute of UTC at all times
B) 15 seconds of UTC at all times
C) 30 seconds of UTC at all times

13. The following airspace falls under Kolkata FIR?

A) VED
B) VEB
C) VOR

14. The VMC minima for a VFR flight inside an ATS airspace classified as B, is:

A) 8km visibility when at or above 3050m (10000ft) AMSL and clear of clouds
B) 8km visibility when at or above 3050m (10000ft) AMSL, and 1500m horizontal and 300m vertical from clouds
C) 5NM visibility when below 3050m (10000ft) AMSL, 1500m horizontal and 300m vertical from cloud

15. A VFR flight when flying inside an ATS airspace classified as B has to maintain the following minima of flight visibility and distance from clouds

A) 5km visibility, 1500m horizontal and 300m vertical from clouds
B) 8km below 3050m (10000ft) AMSL, 1500m horizontal and 300m vertical from clouds
C) 5km below 3050m (10000ft) AMSL and clear of clouds

16. An ATS airspace where IFR and VFR flights are permitted, all flights are subject to 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, is classified as:

A) Airspace B
B) Airspace E
C) Airspace C

17. Which condition is requested so that an aerodrome may be considered controlled?

A) The aerodrome shall be provided with a Control Tower
B) The aerodrome shall be located within a Control Zone (CTR) and provided with a Control Tower
C) The aerodrome shall be located within a Control Zone

18. An ATS airspace where IFR and VFR flights are permitted and all flights are subject to 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, is classified as:

A) Airspace B
B) Airspace D
C) Airspace A

19 An ATS airspace where IFR and VFR flights are permitted are subject to Air Traffic Control Service and are separated from other IFR flights. All flights receive traffic information as far as practical, is classified as

A) Airspace D
B) Airspace A
C) Airspace E

20. An ATS airspace where 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, is classified

A) Airspace F
B) Airspace E
C) Airspace D

21. Which statement regarding approach control service is correct?

A) Approach control have to advise the aircraft operators about substantial delays in departure in any event when they are expected to exceed 45 minutes

B) During a visual approach an aircraft is maintaining its own separation

C) If it is anticipated that an aircraft has to hold for 30 minutes or more, an Expected Approach Time will be transmitted by the most expeditious means to the aircraft

22. Which statement regarding aerodrome control service is correct?

A) An aircraft entering the traffic circuit without permission of ATC, will be cleared to land if this is desirable

B) Suspension of VFR operations can not be initiated by the aerodrome controller

C) ATC permission is required for entering the apron with a vehicle

23. In ATS route designator UA1Y what does U mean:

A) Upper.

B) Undirectional.

C) Uniform.

24. Special VFR flights may be authorized to operate locally within a control zone when the ground visibility is not less than 1500 metres, even when the aircraft is not equipped with a functioning radio receiver within class:

A) D airspace

B) D and E airspace

C) E airspace

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

A) Provided with the air traffic control services and otherwise known to the relevant air traffic service units

B) Known to the relevant air traffic services units by a filed flightplan

C) Provided with air traffic control services, only

26. Alerting service shall be provided:

A) For all controlled flight, to any aircraft known or believed to be subject of unlawful interference, and in so far as practicable to all aircraft having filed a flight plan or otherwise known to the ATS

B) For all aircraft provided with air traffic control services, only

C) To any aircraft known or believed to be subject of unlawful interference, only

27. The speed limitation for IFR flights inside ATS airspace classified as E, when flying below 3050m (10000ft) AMSL, is:

A) 250kt TAS

B) 250kt IAS

C) Not applicable

28. Air Traffic Service unit means:

A) Air Traffic Control units and Air Services reporting offices

B) Flight Information Centers and Air Services reporting offices

C) Air Traffic Control units, Flight Information Centers or Air Services reporting offices

29. A controlled airspace extending upwards from a specified limit above the earth is:

A) Advisory airspace

B) Control area

C) Flight Information Region

30. Tirupati aerodrome designator is?

A) VATP

B) VOTP

C) VITP

31. Aerodrome traffic is:

A) All traffic on the manoeuvring area and flying in the vicinity of an aerodrome

B) All traffic in the aerodrome circuit

C) All traffic on the manoeuvring area

32. Which of the following Annexes to the Chicago convention contains international standards and recommended practices for air traffic services (ATS)?

A) Annex 6

B) Annex 14

C) Annex 11

33. An information issued by a meteorological watch office concerning the occurence or expected occurence 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 is

A) An En-Route Met Report

B) A NOTAM

C) An AIRMET information

34. Regarding Aerodrome Flight Information (AFIS):

A) Its purpose is to supply ATC services but it is not a state organisation

B) It can only supply limited services to the users and under no circumstances may it supply ATC services

C) It has the same privileges and prerogatives as an ATC organisation but its activity is neither continuous nor regular

35. Air Traffic Control service shall be provided to::

A) All IFR flights in class A, B, C, D, E and F airspaces.

B) All VFR flights in class B, C, D and E airspaces.

C) To all aerodrome traffic at controlled aerodromes.

36. Flight Information Region (FIR) is an airspace within which the following services are provided:

A) Flight Information Service and Alerting Service

B) Flight Information Service and Advisory Service

C) Flight Information Service, Alerting Service and Advisory Service

37. Control Area (CTA) is defined as follows:

A) A controlled airspace extending upwards from a specified limit above the earth

B) A controlled airspace extending upwards from the surface of the earth to a specified limit

C) A controlled airspace extending upwards from a height of 900ft above the earth

38. Aerodrome local flying area is to be considered, if ATZ is not notified:

A) With in 5 NM of ARP up to 3000 feet.

B) With in 25 NM of ARP up to 10,000 feet.

C) With in 10 NM of ARP up to 5000 feet.

39. An air traffic control unit:

A) May ask an aircraft to temporarily change its callsign for safety reasons when there is a risk of confusion between two or more similar callsigns

B) May not ask an aircraft to change its callsign after accepting the flight plan

C) Must not ask an aircraft to change its callsign

40. Required Navigation Performance (RNP) shall be prescribed

A) By regional air navigation agreements

B) By states but not on the basis of regional air agreements

C) By states on the basis of regional air navigation agreements

41. A Control Zone shall extend laterally to at least:

A) 10 miles from the centre of the aerodrome or aerodromes concerned in the direction from which approaches may be made

B) 5 nautical miles from the centre of the aerodrome or aerodromes concerned in the direction from which approaches may be made

C) 20 miles from the centre of the aerodrome or aerodromes concerned in the direction from which approaches may be made

42. G245ZF is a designator for:

A) a SID

B) a STAR

C) an ATS Route

43. An ATS airspace where IFR and VFR are permitted and receive flight information service if requested, is classified as

A) Airspace G

B) Airspace E

C) Airspace C

44. Concerning to RNP (Required Navigation Performance) types, the indication RNP 4, represents a navigation accuracy of

A) Plus or minus 4 NM on a 95% containment basis

B) Plus or minus 4 NM on a 98% containment basis

C) Plus or minus 4 NM on a 90% containment basis

45. Area Control Centers issue clearances for the purpose of:

A) Achieving separation between IFR flights

B) Achieving separation between controlled flights

C) Providing flight information Service

46. Clearances will be issued by an ATC unit for the purpose of:

A) Achieving separation between controlled flights

B) Providing alerting services

C) Providing advisory services

47. You receive an IFR enroute clearance starting: Clearance expires at 0920. What does it mean?

A) If not airborne until 0920, a new clearance has to be issued

B) The take off clearance is expected at 0920

C) After 0920 return to the ramp and file a new flight plan

48. ATIS broadcast

A) Shall only be transmitted on a discrete VHF frequency
B) Shall not be transmitted on the voice channel of an ILS
C) Shall not be transmitted on the voice of VOR

49. Whenever ATIS is provided, the preparation and dissemination of the ATIS message shall be the responsibility of

A) Both air traffic services and the meteorological office
B) The meteorological office serving the aerodromes
C) The air traffic services

50. Whenever ATIS is provided, the broadcast information shall be updated

A) As prescribed by the meteorological office
B) Immediately a significant change occurs
C) As prescribed by the state

51. The ATIS broadcast message should, whenever practicable, not exceed

A) 30 seconds
B) 1 minute
C) 2 minutes

52. ATIS broadcast messages containing departure and arrival information should include cloud cover, when the clouds are:

A) Below 900m (3000ft) or below the highest minimum sector altitude, whichever is the greater
B) Below 2000m (600ft) or below the highest minimum sector altitude, whichever is the greater
C) Below 1500m (5000ft) or below the highest minimum sector altitude, whichever is the greater

53. When are ATIS broadcasts updated?

A) Upon receipt of any official weather, regardless of content change or reported values
B) Every 30 minutes if weather conditions are below those for VFR; otherwise hourly
C) Only when the ceiling and/or visibility changes by a reportable value

54. Flight Information Service shall be provided to aircraft in order to avoid collision hazards when operating in airspace classes:

A) F and G only
B) C, D, E, F and G
C) A, B, C, D, E, F and G

55. The lateral limit of CTR shall extend to atleast_____NMs from the center of aerodrome in directions from where approaches may be made:

A) 25
B) 10
C) 5

56. At radio communications, "Distress" differs from "Urgency" because in the first case

A) The aeroplane has suffered damages which impair its fitness to fly
B) There is a serious and imminent danger requiring immediate assistance
C) The aeroplane will not be able to reach a suitable aerodrome

57. The Alerting Service is provided by:

A) The Area Control Centers
B) The ATS unit responsible for the aircraft at that moment
C) Only by ATC units

58. The phases related to an aircraft in emergency or believed in emergency are:

A) Uncertainty phase, distress phase, urgency phase
B) Uncertainty phase, alert phase, distress phase
C) Uncertainty phase, urgency phase, distress phase

59. When an aircraft is experiencing difficulties, triggering of the alert phase is the responsibility of

A) Search and rescue coordination centers
B) Control centers only
C) Air traffic control and flight information centers

60. What type of flight is allowed in class A airspace

A) IFR only
B) IFR and VFR
C) IFR and special VFR

61. Alert phase is defined as follows:

A) A situation where an apprehension exists as to the safety of an aircraft and its occupants
B) An emergency event in which an aircraft and its occupants are considered to be threatened by a danger
C) A situation related to an aircraft and its occupants are considered to be in a state of emergency

62. A situation in which apprehension exists as to the safety of an aircraft. To which emergency phase does this situation correspond?

A) ALERFA
B) INCERFA
C) DETRESFA

63. Which of the following signals is a distress signal?

A) In radiotelephony the spoken words PAN, PAN
B) A parachute flare showing a red light
C) The repeated switching on and off of the navigation lights

64. An aircraft is in emergency when:

A) It is threatened by grave danger
B) It is threatened by grave danger and requires immediate assistance
C) It is forced to land

65. The different emergency phases (in correct order) are:

A) INCERFA, ALERTFA and DISTRESFA
B) INCERFA, ALERFA, DETRESFA
C) ALERTFA, DISTRESFA, RESCUEFA

66. Which of the following statements describes the Alert Phase (ALERFA)?

A) An aircraft fails to arrive within 30 minutes of the ETA which was last notified to ATC.
B) An aircraft declares that the fuel remaining is insufficient to reach safety.
C) An aircraft which has been cleared to land fails to land within 5 minutes of the ETA and communication has not been re-established.

67. DETRESFA is where:

A) An aircraft fails to land within 5 minutes of being cleared to land
B) All answers are correct.
C) The fuel on board is considered to be exhausted

68. RSP 180 indicates:

A) Time in seconds taken by a pilot to receive surveillance instructions from the controller.
B) Time in seconds between flight crew/HMI and controller/HMI.
C) Distance in NMs between two way points in defined RSP airspace.

69. A strayed aircraft is an aircraft:

A) that has deviated significantly from its intended track or reports that it is lost.
B) that has been observed or is reported to be operating in a given area but whose identity has not been established.
C) only that aircraft which has deviated significantly its intended track.

70. Having filed a flight plan to a particular destination and having landed at another destination, you should notify ATC:

A) within 60 minutes after landing at the alternate destination
B) within 30 minutes after landing at the alternate destination
C) within 30 minutes of your intended ETA at your original destination.

71. Designated airspace within controlled airspace in India is classified as Class:

A) C
B) D
C) C and D.

72. TSA801(A) is an airspace:

A) temporarily segregated and allocated in Delhi FIR
B) temporarily segregated and allocated in Chennai FIR
C) denoting an area navigation route in India

73. Temporary Reserved Area (TRA) is an airspace temporarily reserved and allocated:

A) through which other traffic may be allowed to transit in VMC only
B) through which other traffic is not allowed to transit with out proper equipment
C) through which other traffic may be allowed to transit under ATC clearance

74. MFA published in AIP ensures at least 1000 feet vertical clearance from obstacles within_____ of center line?

A) 10 Kms
B) 10 NMs
C) 20 NMs

75. Class C airspaces in India extend from________ to______.

A) Ground level, FL 150
B) 4000 feet, FL 285
C) FL 150, FL 290

ANSWERS

1	2	3	4	5	6	7	8	9	10	11	12	13	14
B	A	B	B	C	B	B	B	A	B	B	C	A	A

15	16	17	18	19	20	21	22	23	24	25	26	27	28
A	C	A	B	C	A	C	A	A	C	A	A	B	C

29	30	31	32	33	34	35	36	37	38	39	40	41	42
B	B	A	C	C	B	C	A	A	A	A	C	B	C

43	44	45	46	47	48	49	50	51	52	53	54	55	56
A	A	B	A	A	B	C	B	A	C	A	B	C	B

57	58	59	60	61	62	63	64	65	66	67	68	69	70
B	B	C	A	A	A	B	B	B	C	C	B	A	C

71	72	73	74	75
C	B	C	A	B

6

AREA CONTROL SERVICE

SEPARATION METHODS AND MINIMA (PANS ATM Doc 4444, AIP, India)

This chapter contains procedures and procedural separation minima for use in the separation of aircraft in the en-route phase as well as aircraft in the arrival and departure phases of flight.

GENERAL PROVISIONS FOR THE SEPARATION OF CONTROLLED TRAFFIC

Vertical or horizontal separation shall be provided:

a) between all flights in Class A and B airspaces;

b) between IFR flights in Class C, D and E airspaces;

c) between IFR flights and VFR flights in Class C airspace;

d) between IFR flights and special VFR flights; and

e) between special VFR flights, when so prescribed by the appropriate ATS authority except for IFR flights in airspace classes D and E, during the hours of daylight when flights have been cleared to climb or descend subject to maintaining own separation and remaining in visual meteorological conditions.

Composite separation: Consisting of a combination of vertical separation and horizontal separation, 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.

VERTICAL SEPARATION

Vertical Separation Minimum

a) A nominal 1000 feet below FL290 and a nominal 2000 feet at or above FL290, except as provided for in b) below; and

b) A nominal 1000 feet when both aircraft are RVSM compliant and operating within designated RVSM airspace.

Cruise Climb

Cruise climb is not permitted in Indian FIRs.

Vertical Separation during climb and descent

An aircraft may be cleared to a level previously occupied by another aircraft after the latter has reported vacating it, except when:

a) severe turbulence is known to exist; or

b) the aircraft concerned are established at the same holding pattern; or

c) the difference in aircraft performance is such that less than the applicable separation minimum may result; in which case such clearance shall be withheld until the aircraft vacating the level has reported at or passing another level separated by the required minimum.

Pilot in direct communication with each other may, with their concurrence, be cleared to maintain a specified vertical separation between their aircraft during ascent or descent.

VMC Climb and Descents:

When so requested by an aircraft and provided it is agreed by the pilot of the other aircraft, an ATC unit may clear a controlled flight, including departing and arriving flights, operating in airspace Classes D and E in VMC during the hours of daylight to fly subject to maintaining own separation to one other aircraft and remaining in VMC.

When a controlled flight is so cleared, the following shall apply:

a) Clearances shall be for a specified portion of the flight at or below 10,000 feet, during climb and descent;

b) Essential traffic information shall be passed; and

c) If there is possibility that flight under VMC may become impracticable, an IFR flight shall be provided with alternative instructions to be complied with in the event that in VMC cannot be maintained for the term of clearance.

Horizontal Separation

The three types of horizontal separation are:

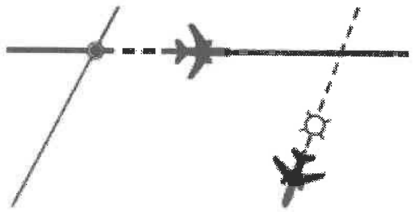
a) Lateral separation; b) Longitudinal separation; c) Separation minima based on ATS surveillance systems.

Lateral Separation

Means by which lateral separation may be applied include the following:

By using the same or different geographic locations:

By position reports which positively indicate the aircraft are over different geographic locations as determined visually or by reference to a navigation aid.

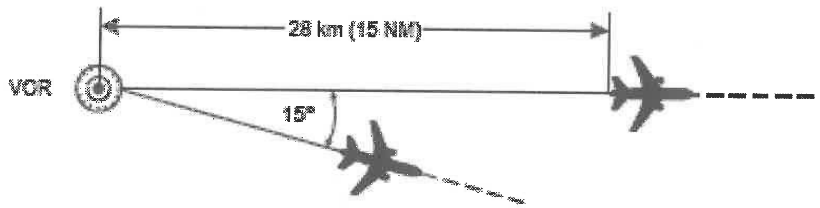


By use of NDB, VOR or GNSS on intersecting tracks or ATS routes.

By requiring aircraft to fly on specified tracks which are separated by a minimum amount appropriate to the navigation aid employed. Lateral separation between two aircraft exists when:

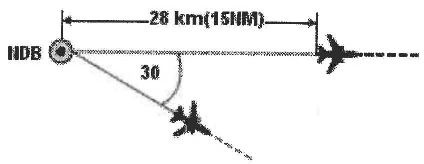
a) VOR

Both aircraft are established on radials diverging by at least 15 degrees and at least one aircraft is 15 NM or more from the facility.



b) NDB

Both aircraft are established on tracks to or from the NDB, which are diverging by at least 30 degrees and at least one aircraft is 15 NM or more from the facility. at least 20 degrees from the radial of first aircraft; and



c) GNSS/GNSS

Each aircraft is confirmed to be established on a track with zero offset between two waypoints and at least one aircraft is at a minimum distance from a common point as specified in Table below. or

d) VOR/GNSS

The aircraft using VOR is established on a radial to or from the VOR and the other aircraft using GNSS is confirmed to be established on a track with zero offset between two waypoints and at least one aircraft is at a minimum distance from a common point as specified in Table below.

	Aircraft 1 : VOR or GNSS *Aircraft 2 : GNSS*	
Angular difference between tracks measured at the common point (degrees)	FL 010 – FL 190 Distance from a common point	FL 200 – FL 600 Distance from a common point
15 – 135	27.8 km (15 NM)	43 km (23 NM)
The distances in the table are ground distances. States must take into account the distance (slant range) from the source of a DME signal to the receiving antenna when DME is being utilized to provide range information.		

Table : Lateral separation aircraft flying VOR and GNSS

Before applying GNSS-based track separation, the controller shall confirm the following:

a) ensure that the aircraft is navigating using GNSS; and

b) in airspace where strategic lateral offsets are authorized, that a lateral offset is not being applied.

GNSS-based track separation shall not be applied in cases of pilot-reported receiver autonomous integrity monitoring (RAIM) outages.

By use of different navigation aids or methods.

Lateral separation between aircraft using different navigation aids, or when one aircraft is using RNAV equipment, shall be established by ensuring that the derived protected airspaces for the navigation aid(s) or RNP do not overlap.

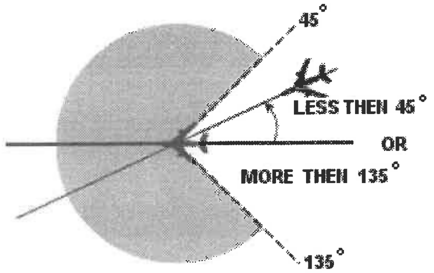
Longitudinal Separation

Longitudinal separation shall be applied so that the spacing between the estimated positions of the aircraft being separated is never less than a prescribed minimum.

For the purpose of application of longitudinal separation, the terms same track, reciprocal tracks and crossing tracks shall have the following meanings:

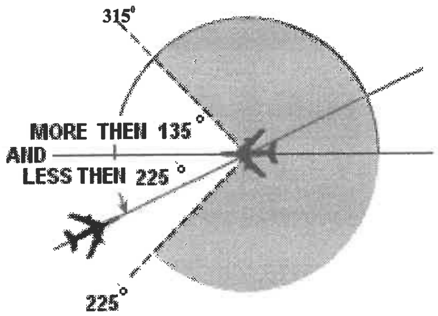
a) Same Track

Same direction tracks and intersecting tracks or portions thereof, the angular difference of which is less than 45 degrees or more than 315 degrees, and whose protection areas overlap.



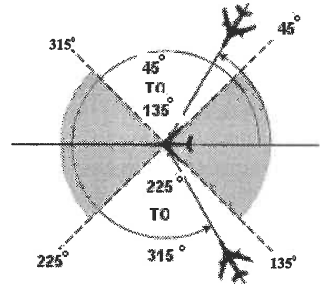
b) Reciprocal Tracks

Opposite tracks and intersecting tracks or portions thereof, the angular difference of which is more than 135 degrees but less than 225 degrees, and whose protection areas overlap.



c) Crossing Tracks

Intersecting tracks or portions thereof other than those specified in a) and b) above.



Longitudinal separation minima based on time:

Cross Check Calculations

a) Separation requirements must be cross-checked to ensure the integrity of calculations.

b) The cross-check is to validate the initial calculation and to confirm that the calculation is consistent with the traffic disposition.

Aircraft at the same cruising level

Aircraft flying on the same track:

a) 15 minutes;

15 min separation between aircraft on same track and same level

b) 10 minutes, if navigation aids permit frequent determination of position and speed;

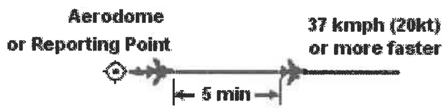
10 min separation between aircraft on same track and same level

c) five minutes in the following cases, provided that in each case preceding aircraft is maintaining a true airspeed faster than the succeeding aircraft of 37 kmph (20 knots) or more:

(i) between aircraft that have departed from the same aerodrome;

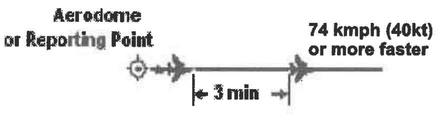
(ii) between en-route aircraft that have reported over the same exact significant point;

(iii) between departing and en-route aircraft after the en-route aircraft has reported over a fix that is so located in relation to the departure point as to ensure that five-minute separation can be established at the point the departing aircraft will join the air route; or



Longitudinal Separation by 5 minutes

d) three minutes in the cases listed under (c) provided that in each case the preceding aircraft is maintaining a true airspeed faster than the succeeding aircraft of 74 kmph (40 knots) or more.

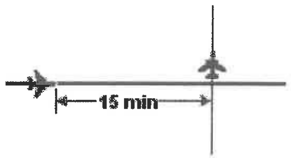


Longitudinal Separation by 3 minutes

Aircraft flying on crossing tracks:

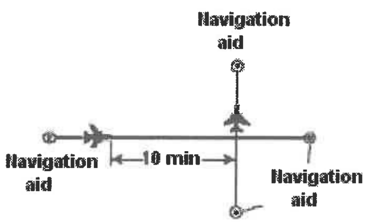
a) 15 minutes;

15 minute separation between aircraft on crossing track and same level

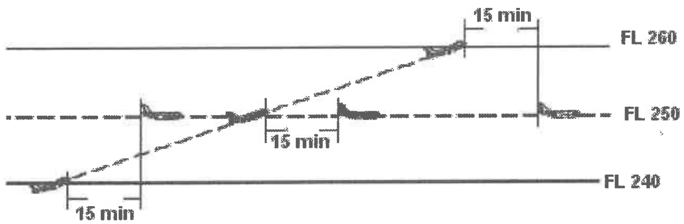


b) 10 minutes if navigation aids permit frequent determination of position and speed

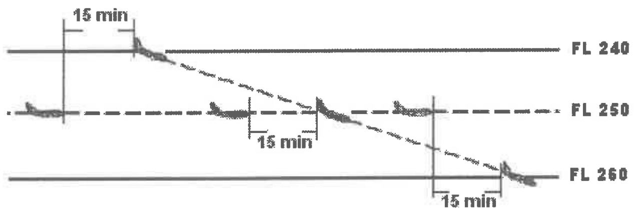
10 minute separation between aircraft on crossing track and same level



c) 10 minutes while vertical separation does not exist, provided that such separation is authorized only where navigation aids permit frequent determination of position and speed.

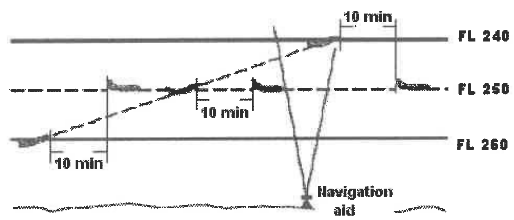


15 minute separation between aircraft climbing on same track

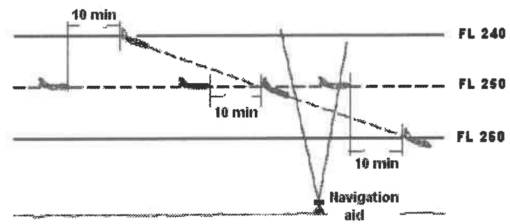


15 minute separation between aircraft descending and on same track

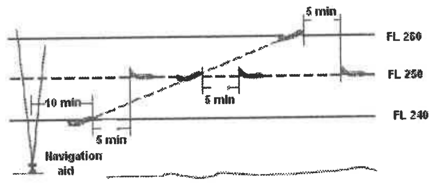
10 minute separation between aircraft climbing on same track

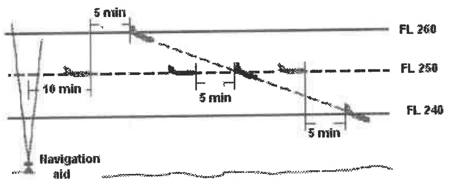


10 minute separation between aircraft descending on same track



d) 5 minutes while vertical separation does not exist, provided that the level change is commenced within 10 minutes of the time the second aircraft has reported over an exact reporting point.





Aircraft Climbing or Descending

Traffic on the same track. When an aircraft will pass through the level of another aircraft on the same track, the following minimum longitudinal separation shall be provided:

a) 15 minutes while vertical separation does not exist.

Traffic on crossing tracks: least ten minutes prior to and after the time the aircraft are estimated to pass, or are

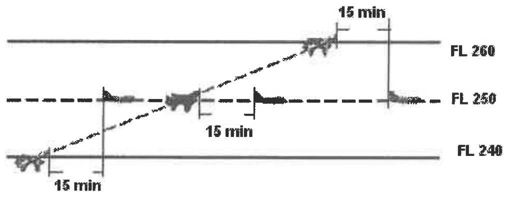
a) 15 minutes while vertical separation estimated to have passed. does not exist.

b) 10 minutes while vertical separation does not exist, provided that such separation is authorized only where ground-based navigation aids or GNSS permit frequent determination of position and speed.

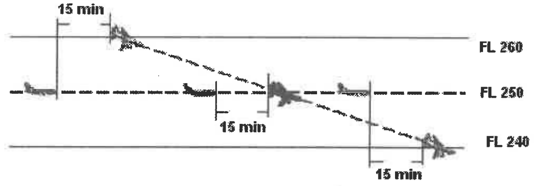
or

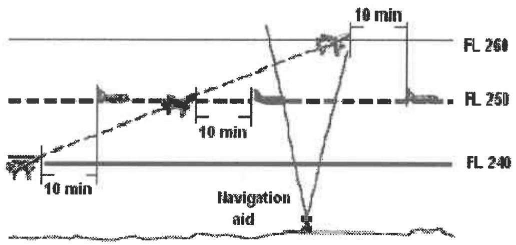
c) 5 minutes while vertical separation does not exist, provided that:

1) the level change is commenced within 10-minutes of the time the second aircraft has reported over a common point which must be derived from ground-based navigation aids or by GNSS; and
2) when issuing the clearance through third party communication or CPDLC a restriction shall be added to the clearance to ensure that the 10 minute condition is satisfied.



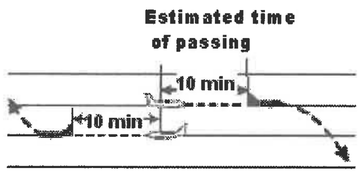
15 minute separation between aircraft descending and on crossing track





Separation for ascending aircraft on crossing track : 10 minutes

Traffic on reciprocal tracks. Where lateral separation is not provided, vertical separation shall be provided for at least ten minutes prior to and after the time the aircraft are estimated to pass, or are estimated to have passed.



10 minute separation between aircraft on reciprocal tracks

Longitudinal separation minima based on distance using DME and/or GNSS

Separation shall be established by maintaining not less than specified distance(s) between aircraft positions as reported by reference to DME in conjunction with other appropriate navigation aids and/or GNSS. This type of separation shall be applied between two aircraft using DME, or two aircraft using GNSS, or one aircraft using DME and one aircraft using GNSS. Direct controller-pilot VHF voice communication shall be maintained while such separation is used.

Note:— For the purpose of applying GNSS based separation minimum, a distance derived from an integrated navigation system incorporating GNSS input is regarded as equivalent to GNSS distance.

All distance reports must be made with reference to the same DME station.

When applying these separation minima between any aircraft with area navigation capability, controllers shall specifically request GNSS derived distance.

Note:— Reason making a pilot unable to provide GNSS distance information may include Traffic on reciprocal tracks.

Where lateral separation is not provided, vertical separation shall be provided for at *inadequate onboard equipment, on GNSS input into an integrated navigation system, or a loss of GNSS integrity.*

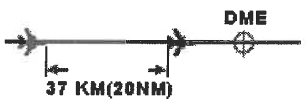
Aircraft at the same cruising level

Aircraft on the same track:

a) 20 NM, provided:

1) *each aircraft utilizes,*
   - i) the same "on track" DME station when both aircraft are utilizing DME, or
   - ii) an "on track" DME station and a collocated waypoint when one aircraft is utilizing DME and the other is utilizing GNSS, or
   - iii) the same waypoint when both aircraft are utilizing GNSS, and

2) separation is checked by obtaining simultaneous DME and/or GNSS readings from the aircraft at frequent intervals to ensure that the minimum will not be infringed.



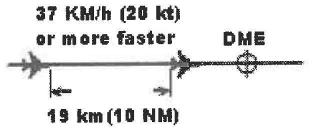
and/or collocated waypoint

b) 10 NM, provided:

1) the leading aircraft maintains a true airspeed of 20 kt or more faster than the succeeding aircraft;

2) each aircraft utilizes,
   - i) the same "on track" DME station when both aircraft are utilizing DME, or
   - ii) an "on track" DME station and a collocated waypoint when one aircraft is utilizing DME and the other is utilizing GNSS, or
   - iii) the same waypoint when both aircraft are utilizing GNSS, and

3) separation is checked by obtaining simultaneous DME and/or GNSS readings from the aircraft at frequent intervals to ensure that the minimum will not be infringed.

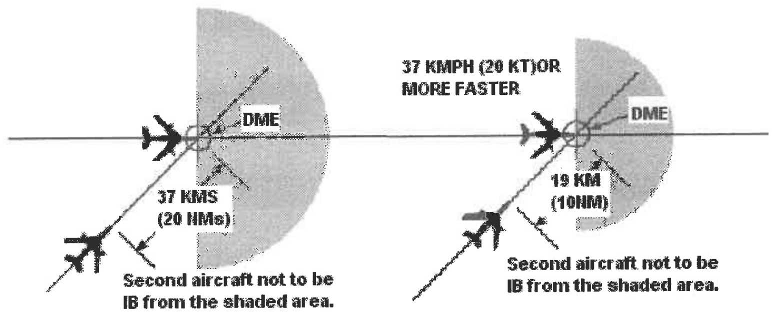


and/or collocated waypoint

Aircraft on crossing tracks:

a) 20 NM, provided:

- i) each aircraft reports distance from the DME station and/or collocated waypoint/or same waypoint located at the crossing point of the tracks and that the relative angle between the tracks is less than 90 degrees; and
- ii) separation is checked by obtaining simultaneous DME and/or GNSS readings from the aircraft at frequent intervals to ensure that the minimum will not be infringed.



b) 10 NM provided:

i) the leading aircraft maintains a true airspeed of 20 kts or more faster than the succeeding aircraft;

ii) each aircraft reports distance from the DME station and/or collocated waypoint/or same waypoint located at the crossing point of the tracks and that the relative angle between the tracks is less than 90 degrees; and

iii) separation is checked by obtaining simultaneous DME and/or GNSS readings from the aircraft at such intervals as are necessary to ensure that the minimum is established and will not be infringed.

Aircraft Climbing or Descending

Aircraft on the same track

10 NM while vertical separation does not exist, provided:

a) each aircraft utilizes,

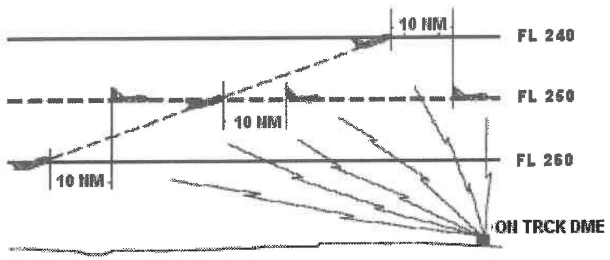
i) the same "on track" DME station when both aircraft are utilizing DME, or

ii) an "on track" DME station and a collocated waypoint when one aircraft is utilizing DME and the other is utilizing GNSS, or

iii) the same waypoint when both aircraft are utilizing GNSS, and

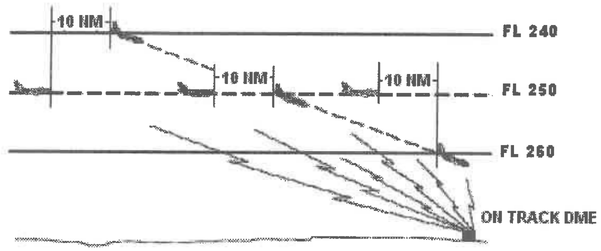
b) one aircraft maintains a level while vertical separation does not exist; and

c) separation is established by obtaining simultaneous DME and/or GNSS readings from the aircraft.



and/or collocated waypoint

Separation for aircraft ascending on the same tracks

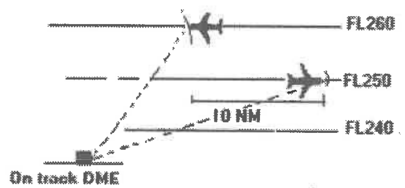


and/or collocated waypoint

Separation for aircraft descending on the same tracks

Aircraft on reciprocal tracks

Aircraft utilizing on-track DME and/or collocated waypoint or same waypoint may be cleared to climb or descend to or through the levels occupied by other aircraft utilizing on-track DME and/or collocated waypoint or same waypoint, provided that it has been positively established that the aircraft have passed each other and are at least 10 NM apart.



Separation minima based on ATS surveillance systems.

The following horizontal separation minima based on radar and/or ADS-B and/ or MLAT systems shall be applied :

a) Five Nautical Miles (5 NM) horizontal separation upto 60 NM from radar head.

b) Nautical Miles (5 NM) within 60 NM of ADS-B ground station when only ADS-B is used in non-radar environment.

c) Ten Nautical Miles (10 NM) horizontal separation beyond 60 NM from radar head.

d) Ten Nautical Miles (10 NM) beyond 60 NM of ADS-B ground station when only ADS-B is used in non radar environment.

e) 3 NM from radar head where specifically authorized.

SUMMARY OF LONGITIUDINAL SEPARATION

15 min Separation (if navigation aids do not permit frequent determination of position and speed):

(i) Same level, same track and same level crossing tracks.

(ii) Climbing & descending same track and Climbing & descending crossing tracks.

10 min Separation (if nav aids permit frequent determination of position and speed)

(i) Same level, same track and same level crossing track.

(ii) Climbing & descending same track and climbing & descending crossing track.

(iii) A/c on reciprocal tracks. From the estimated time of crossing the a/c is not allowed to climb or descend upto 10 mins.

5 min Separation:-

(i) Same level, Same track, common reference, a/c ahead 20kts faster and either both a/c have departed from same aerodrome or both reported over same reporting point or if departing is assured 5 mins separation at the time of joining a route.

(ii) Climb and descend same track, level change within 10 mins of second a/c reporting over same reporting point.

(iii) Between holding and route a/c.

3 min Separation

(i) Same level, same track, if a/c ahead is 40kts faster. And either both a/c have departed from same aerodrome or both reported over same reporting point or if departing is assured 5 mins separation at the time of joining a route.

DISTANCE (DME) / GNSS SEPERATION

20 NM

(i) Same level, same track

(ii) Same level, crossing track

10NM

(i) In the above situations, if the a/c ahead is 20 kts faster

(ii) A/c climbing & descending same track

(iii) A/c on reciprocal track

LONGITUDINAL SEPARATION MINIMA WITH MACH NUMBER TECHNIQUE BASED ON TIME AND DISTANCE:

When Mach number technique is applied, minimum longitudinal separation between turbojet aircraft on the same track, whether in level, climbing or descending flight shall be 10 minutes; or the prescribed minima based on application of differential Mach number on prescribed ATS routes.

RNAV distance-based separation may be applied between RNAV equipped aircraft when operating on designated RNAV routes or on ATS routes defined by VOR.

A 150 km (80 NM) RNAV distance-based separation minimum with Mach number technique may be used on same-direction tracks in lieu of a 10-minute longitudinal separation minimum with Mach number technique.

Required navigation performance (RNP) for en-route operations. A statement of the navigation performance necessary for operation within a defined airspace.

For the en- route phase of flight, suitable RNP types (RNP 1, RNP 4, RNP 10, RNP 12.6 and RNP 20) shall be implemented.

Performance-based navigation (PBN) operations. The prescribed navigation specification shall be appropriate to the level of communications, navigation and air traffic services provided in the airspace concerned. (Refer Doc 9613).

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

Performance-based communication (PBC) operations. In the case of communications, the number attached to Required Communications Performance (RCP) is the number of seconds it takes for an instruction to travel from the ground to aircraft and acknowledgment back to the ground. RCP is classified based on transaction time in seconds,eg, RCP 10,60,120,240 and 400 respectively.

Performance-based surveillance (PBS). ATS surveillance services and capability based on performance requirements for air traffic service provision, aircraft and flight operations along an ATS route, on an instrument approach procedure or in a designated airspace.

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

Required surveillance performance (RSP). Required Surveillance Performance (RSP) is the number of seconds it takes for surveillance data from the Communications Service Provider (CSP) interface to arrive at the ATSU flight data processing system. RSP 180,240 and 400 indicate time in seconds between flight crew/ HMI and controller/HMI. HMI stands for Human Machine Interaction.

PERFORMANCE-BASED LONGITUDINAL SEPARATION MINIMA.

For aircraft cruising, climbing or descending on:

a) the same track; or

b) crossing tracks provided that the relative angle between the tracks is less than 90 degrees, the following separation minima may be used:

Separation minima	*RNP*	*RCP*	*RSP*	*Maximum ADS-C periodic reporting interval*
93 km (50 NM)	10	240	180	27 minutes
	4	240	180	32 minutes
55.5 km (30 NM)	2 or 4	240	180	12 minutes
5 minutes	2 or 4 or 10	240	180	14 minutes

ESSENTIAL TRAFFIC INFORMATION

Essential traffic is that controlled traffic to which the provision of separation by ATC is applicable, but which, in relation to a particular controlled flight is not, or will not be, separated from other controlled traffic by the appropriate separation minimum.

Essential traffic information shall be given to controlled flights concerned whenever they constitute essential traffic to each other.

QUESTIONS

1. **An aircraft is maintaining FL 150 within airspace class D. Another aircraft below at FL 140 is receiving a clearance to descend to FL 70. It is severe turbulence in the area. When is the earliest that a clearance to descend to FL 140 or below can be expected?**

   A) When the other aircraft has reported that it has left FL 140
   B) When the other aircraft has reported that it has reached FL 70
   C) When the other aircraft has reported that it has descended through FL 130

2. **The longitudinal separation minima between aircraft departed from the same aerodrome and following the same track, and the preceding aircraft is maintaining a true airspeed of 20kt or more faster than the succeeding aircraft, is:**

   A) 5 minutes
   B) 3 minutes
   C) 2 minutes

3. **The longitudinal separation minima based on time between aircraft at same cruising level where navigation aids permit frequent determination of position and speed and the preceeding aircraft is maintaining a true airspeed of 40kt or more faster than the succeeding aircraft, is:**

   A) 5 minutes
   B) 3 minutes
   C) 10 minutes

4. **The longitudinal separation minima based on time between aircraft at same cruising level where navigation aids permit frequent determination of position and speed and the preceeding aircraft is maintaining a true airspeed of 20kt or more faster than the succeeding aircraft, is:**

   A) 15 minutes
   B) 10 minutes
   C) 5 minutes

5. **The longitudinal separation minima based on time between aircraft at same cruising level where navigation aids permit frequent determination of position and speed, is:**

   A) 10 minutes
   B) 3 minutes
   C) 15 minutes

6. **The longitudinal separation minima between aircraft departed from the same aerodrome and following the same track, and the preceding aircraft is maintaining a true airspeed of 40kt or more faster than the succeeding aircraft, is:**
   A) 10 minutes
   B) 8 minutes
   C) 3 minutes

7. **The longitudinal separation minima based on distance using DME, and each aircraft "on track" uses DME stations, is:**
   A) 10NM
   B) 20NM
   C) 5NM

8. **When an aircraft will pass through the level of another aircraft on the same track, the following minimum longitudinal separation shall be provided:**
   A) 5 minutes at the time the level is crossed
   B) 15 minutes at the time the level is crossed
   C) 10 minutes at the time the level is crossed

9. **"ESSENTIAL TRAFFIC" is that controlled flight to which the provision of separation by ATC is applicable, but which, in relation to a particular controlled flight is not separated therefore by the appropriate separation minima. Whenever separation minima is not applied. The following flights are considered essential traffic one to each other.**
   A) All IFR flights in controlled airspace and controlled VFR
   B) Only controlled IFR flights
   C) Controlled VFR flights and VFR flights

10. **Above FL 290 the vertical flight separation between aircraft on the same direction is:**
    A) 2000ft
    B) 4000ft
    C) 3000ft

11. **Track separation between aircraft using the same NDB shall be applied requiring the aircraft to fly:**
    A) At least 30° separated at a distance of 15NM or more from the facility
    B) At least 45° separated at a distance of 15NM or more from the facility
    C) At least 30° separated at a distance of 15 miles or more from the facility

12. **Two aircraft flying at FL 170 using GNSS are confirmed to be established on tracks separated by 120 degrees with zero offset between two waypoints. At least one aircraft is to be at a minimum distance _____ NMs from a common point for separation.**
    A) 5
    B) 10
    C) 15

13. **If an ATC clearance is not suitable to the pilot in command of an aircraft:**
    A) He may request another clearance and the ATC concerned has to accept the pilot request
    B) He may request and, if practicable, obtain an amended clearance
    C) The pilot has to accept the ATC clearance because it has been based on the flightplan filed with ATC

14. **The "VMC and own separation" ATC clearance is used for a controlled flight to cross the level of another controlled flight when:**
    A) Requested by the pilot in airspace classes A and B and authorised by ATC
    B) Requested by the pilot, during the day light and authorized by the state overflown
    C) Requested by the pilot and authorized by the state overflown

15. **A/c on same level converging track has separation**
    A) 15min
    B) 10min
    C) 5min

16. **What are the controlled IFR separation methods applied by ATC?**
    A) Vertical, horizontal and composite separation
    B) Time separation and track separation
    C) Composite separation

17. **The vertical IFR separation minimum being applied by ATC within a controlled airspace below FL 290 is:**
    A) 500ft (150m)
    B) 2000ft (600m)
    C) 1000ft (300m)

18. **The vertical IFR separation minimum being applied by ATC within a controlled airspace above FL 290 is:**
    A) 500ft (150m)
    B) 2000ft (600m)
    C) 1000ft (300m)

19. Longitudinal separation minima based on distance using DME for aircraft at the same cruising level and track, provided that each aircraft utilizes "on Track" DME stations and separation is checked by obtaining simultaneous DME readings, is:

A) 20NM
B) 25NM
C) 40NM

20. A "RNAV" distance based separation minimum may be used at the time the level is crossed, provided that each aircraft reports its distance to or from the same "on track"way-point. This minimum is:

A) 20NM
B) 80NM
C) 60NM

21. A VFR flight constitutes essential traffic to other VFR flights, when operating in controlled airspace classified as:

A) B
B) B, C, D and E
C) B and C

22. RCP 120 is the number of :

A) Transmissions loaded on aircraft FMS for data link exchange.
B) Minutes required to divert to a suitable aerdrome under ETOP conditions.
C) Seconds it takes for an instruction to travel from the ground to aircraft and acknowledgment back to the ground.

23. Vertical or horizontal separation shall be provided between:

A) All flights in class A, B and C airspaces
B) All flights in class A and B airspaces
C) All flights in class B, C and D airspaces

24. The separation method whereby the vertical and horizontal separation may be reduced till a maximum of half the standard criteria is called:

A) Composite separation
B) Reduced separation
C) Combined separation

25. ADS-B ground station is more than 110 NMs from two aircraft at same level. Only ADS-B is being used for separation in non radar environment. The minimum safe distance between these aircraft is _____ NMs.

A) 10
B) 5
C) 3

26. Cruising level IFR during cruise within controlled airspace shall be given as flight level (FL)

A) Above the transition altitude when applicable
B) Only in airspace class A
C) If the obstacle clearance is more than 2000ft

27. Aircraft flying along the same track may be separated by DME-distances from the same DME and it is confirmed that the aircraft have passed each other. Specify the shortest difference in DME-distance to make it possible for one aircraft to climb or descend

A) 10NM
B) 12NM
C) 15NM

28. Track separation between aircraft using the same VOR shall be applied requiring the aircraft to fly:

A) At least 15° separated at a distance of 15 miles or more from the facility
B) At least 15° separated at a distance of 15NM or more from the facility
C) At least 30° separated at a distance of 15NM or more from the facility

29. ATC clearances are solely issued for:

A) Alerting pilots about other aircraft in close vicinity
B) Making pilots follow laid down procedures
C) Expediting and separating air traffic

30. The longitudinal separation minima based on DME, and each aircraft "on track" uses DME stations, is:

A) 10NM provided that the leading aircraft maintains a true airspeed of 40kt or more faster than the succeeding aircraft
B) 10NM provided that the leading aircraft maintains a true airspeed of 20kt or more faster than the succeeding aircraft
C) 20NM provided that the leading aircraft maintains a true airspeed of 10kt or more faster than the succeeding aircraft

ANSWERS

1	2	3	4	5	6	7	8	9	10	11
C	A	B	C	A	C	B	B	A	B	A

12	13	14	15	16	17	18	19	20	21	22
C	B	B	A	A	C	B	A	B	A	C

23	24	25	26	27	28	29	30
B	A	A	A	A	B	C	B

7

APPROACH CONTROL SERVICE

SEPARATION IN THE VICINITY OF AERODROMES (Doc 4444, AIP, India)

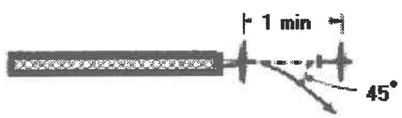
PROCEDURES FOR DEPARTING AIRCRAFT

GENERAL

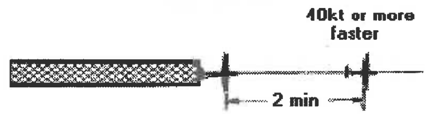
Clearances for departing aircraft shall specify, when necessary for the separation of aircraft, direction of takeoff and turn after take-off; heading or track to be made good before taking up the cleared departure track; level to maintain before continuing climb to assigned level; time, point and/or rate at which a level change shall be made; and any other necessary manoeuvre consistent with safe operation of the aircraft. At aerodromes where standard instrument departures (SIDs) have been established, departing aircraft should normally be cleared to follow the appropriate SID.

Minimum Separation between Departing Aircraft

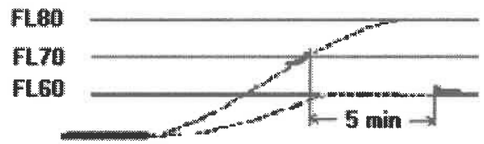
One-minute separation if aircraft are to fly on tracks diverging by at least 45 degrees immediately after take-off so that lateral separation is provided.



Two minutes between take-offs when the preceding aircraft is 40 kt or more faster than the following aircraft and both aircraft propose to follow the same track.



Five-minute separation while vertical separation does not exist if a departing aircraft will be flown through the level of a preceding departing aircraft and both aircraft propose to follow the same track. Action must be taken to ensure that the five-minute separation will be maintained or increased while vertical separation does not exist.



Separation of departing aircraft from arriving aircraft

The following separation shall be applied when take-off clearance is based on the position of an arriving aircraft:

If an arriving aircraft is making a complete instrument approach, a departing aircraft may take off:

a) in any direction until an arriving aircraft has started its procedure turn or base turn leading to final approach;

b) in a direction which is different by at least 45 degrees from the reciprocal of the direction of approach after the arriving aircraft has started procedure turn or base turn leading to final approach, provided that the take-off will be made at least three minutes before the arriving aircraft is estimated to be over the beginning of the instrument runway.

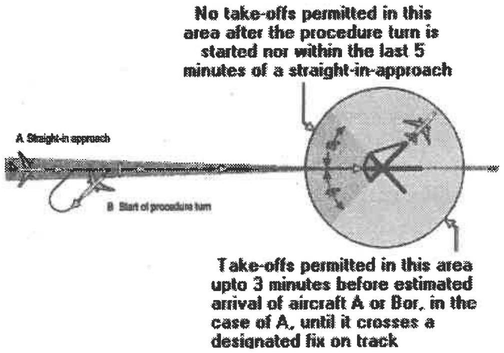
If an arriving aircraft is making a straight-in approach, a departing aircraft may take off:

a) in any direction until five minutes before the arriving aircraft is estimated to be over the instrument runway;

b) in a direction which is different by at least 45 degrees from the reciprocal of the direction of approach of the arriving aircraft:

   i) until three minutes before the arriving aircraft is estimated to be over the beginning of the instrument runway, or

ii) before the arriving aircraft crossing a designated fix on the approach track; the location of such fix to be determined by the appropriate ATS authority after consultation with the operators.



Seperation of Departing aircraft from Arriving aircraft

REDUCTION IN SEPARATION MINIMA IN THE VICINITY OF AERODROMES

In the vicinity of aerodromes, the separation minima may be reduced if:

a) adequate separation can be provided by the aerodrome controller when each aircraft is continuously visible to this controller; or

b) each aircraft is continuously visible to flight crews of the other aircraft concerned and the pilots thereof report that they can maintain their own separation; or

c) in the case of one aircraft following another. The flight crew of the succeeding aircraft reports that the other aircraft is in sight and separation can be maintained.

INFORMATION FOR DEPARTING AIRCRAFT

Meteorological Conditions

Information regarding significant changes in the meteorological conditions in the take-off or climb-out area, obtained by the unit providing approach control service after a departing aircraft has established communication with such unit, shall be transmitted to the aircraft without delay, except when it is known that the aircraft already has received the information.

Note:— Significant changes in this context include those relating to surface wind direction or speed, visibility, runway visual range or air temperature (for turbine-engine aircraft), and the occurrence of thunderstorm or cumulonimbus, moderate or severe turbulence, wind shear, hail, moderate or severe icing, severe squall line, freezing precipitation, severe mountain waves, sand storm, dust storm, blowing snow, tornado or waterspout.

Operational status of visual or non-visual aids

Information regarding changes in the operational status of visual or non-visual aids essential for take-off and climb shall be transmitted without delay to a departing aircraft, except when it is known that the aircraft already has received the information.

PROCEDURES FOR ARRIVING AIRCRAFT

General

At aerodromes where standard instrument arrivals (STARs) have been established, arriving aircraft should normally be cleared to follow the appropriate STAR. The aircraft shall be informed of the type of approach to expect and runway-in-use as early as possible.

After coordination with the approach control unit, the ACC may clear the first arriving aircraft for approach rather than to a holding fix.

Visual Approach:

Visual approach is an approach by an IFR flight when either part or all of an instrument approach procedure is not completed and the approach is executed in visual reference to terrain.

Clearance for an IFR flight to execute a visual approach may be requested by the pilot or initiated by the controller.

The controller shall not initiate a visual approach when there is a reason to believe that the flight crew concerned is not familiar with the aerodrome and its surrounding terrain.

Controller should take into consideration the prevailing traffic and meteorological conditions before initiating visual approach.

Aircraft may be cleared for direct base leg/ final, if there is reasonable assurance that visual approach and landing can be completed.

Separation shall be provided between an aircraft cleared to execute a visual approach and other arriving and departing aircraft.

When clearance to execute visual approach has been issued, it shall be the responsibility of pilot to maintain terrain clearance.

Visual approach by a flight crew:

A flight crew may request visual approach if he has runway in sight and the pilot can maintain visual reference to terrain subject to the following conditions only:

a. Ground visibility is not below the higher of aerodrome operating minima of associated non-precision approach or minimum visibility/RVR of 2800 m for Category A/B aeroplanes, 3200 m for Category C aeroplanes and 3600 m for Category D aeroplanes. If visual approach is requested for a runway which has only a circling approach, the ground visibility shall not be less than 5 Km, and
b. either, the reported ceiling is at or above the level of the beginning of the initial approach segment; or
c. the pilot reports at the level of the beginning of the initial approach segment or at any time during the instrument approach procedure that the meteorological conditions are such that with reasonable assurance a visual approach and landing can be completed.

The pilot at the time of requesting for visual approach should give position report.

The pilot shall advise the controller immediately when

a) weather has deteriorated and unable to keep the terrain in sight; or
b) unable to continue flight following the preceding aircraft; or
c) additional spacing is required from preceding aircraft.

Instrument Approach

The approach control unit shall specify the instrument approach procedure to be used by arriving aircraft. A flight crew may request an alternative procedure and, if circumstances permit, should be cleared accordingly.

CLEARANCE TO FLY MAINTAINING OWN SEPARATION WHILE IN VMC

When so requested by an aircraft and provided it is agreed by the pilot of the other aircraft and so authorised by the appropriate ATS authority, an ATC unit may clear a controlled flight, including departing and arriving flights, operating in airspace Classes Dand E in VMC during the hours of daylight to fly subject to maintaining own separation to one other aircraft and remaining in VMC. When a controlled flight is so cleared, the following shall apply:

a) The clearance shall be for a specified portion of the flight at or below 3050 m(10,000 ft), during climb or descent and subject to further restrictions as and when prescribed on the basis of regional air navigation agreements.
b) If there is a possibility that flight under VMC may become impracticable, an IFR flight shall be provided with alternative instructions to be complied with in the event that flight in VMC cannot be maintained for the term of the clearance.
c) The pilot of an IFR flight, on observing that conditions are deteriorating and considering that operation in VMC will become impossible, shall inform ATC before entering IMC and shall proceed in accordance with the alternative instructions given. Essential traffic information shall be given to controlled flights concerned whenever they constitute essential traffic to each other.

Expected Approach Time (EAT)

An expected approach time shall be determined for an arriving aircraft that will be subjected to a delay of 10 minutes or more. The expected approach time shall be transmitted to the aircraft as soon as practicable and preferably not later than at the commencement of its initial descent from cruising level. A revised expected approach time shall be transmitted to the aircraft without delay whenever it differs from that previously transmitted by 5 minutes or more, or such lesser period of time as agreed between the ATS units concerned.

An expected approach time shall be transmitted to the aircraft by the most expeditious means whenever it is anticipated that the aircraft will be required to hold for 30 minutes or more.

The holding fix to which an expected approach time relates shall be identified together with the expected approach time whenever circumstances are such that this would not otherwise be evident to the pilot.

Onwara Clearance Time

In the event an aircraft is held en route or at a location or aid other than the initial approach fix, the aircraft concerned shall, as soon as practicable, be given an expected onward clearance time from the holding fix . The aircraft shall also be advised if further holding at subsequent holding fix is expected.

Note:— "Onward clearance time" is the time at which an aircraft can expect to leave the fix at which it is being held.

INFORMATION FOR ARRIVING AIRCRAFT

As early as practicable after an aircraft has established communication with the unit providing approach control service, the following elements of information, in the order listed, shall be transmitted to the aircraft, with the exception of such elements which it is known the aircraft has already received:

a) type of approach and runway-in-use;

b) meteorological information, as follows:

c) current runway surface conditions, in case of precipitants or other temporary hazards;

d) changes in the operational status of visual and non visual aids essential for approach and landing.

If it becomes necessary or operationally desirable that an arriving aircraft follow an instrument approach procedure or use a runway other than that initially stated, the flight crew shall be advised without delay.

At the commencement of final approach, the following information shall be transmitted to aircraft:

a) significant changes in the mean surface wind direction and speed;

Note:— If the controller possesses wind information in the form of components, the significant changes are:

- Mean head-wind component: 10 kt
- Mean tail-wind component: 2 kt
- Mean cross-wind component: 5 kt

b) the latest information, if any, on wind shear and/or turbulence in the final approach area;

c) the current visibility representative of the direction of approach and landing or, when provided, the current runway visual range value(s) and the trend, if practicable, supplemented by slant visual range value(s), if provided.

During final approach, the following information shall be transmitted without delay:

a) the sudden occurrence of hazards (e.g. unauthorized traffic on the runway);

b) significant variations in the current surface wind, expressed in terms of minimum and maximum values;

c) significant changes in runway surface conditions;

d) changes in the operational status of required visual or non-visual aids;

e) changes in observed RVR value(s), in accordance with the reported scale in use, or changes in the visibility representative of the direction of approach and landing.

QUESTIONS

1. If an arriving aircraft is making a straight in approach a departing aircraft may take off in any direction

A) Until five minutes before the arriving aircraft is estimated to be over the instrument runway

B) Until ten minutes before the arriving aircraft is estimated to be over the instrument runway

C) Until two minutes before the arriving aircraft is estimated to be over the instrument runway

2. For controlled traffic that shall be separated in the vicinity of an airport, separation minima may be reduced:

A) At the discretion of the air traffic controller

B) When the commander in the following aircraft has the preceding aircraft in sight and is able to maintain own separation

C) If the commander of the involved aircraft so requests

3. At the commencement of final approach, if the controller possesses wind information in the form of components, significant changes in the mean surface wind direction and speed shall be transmitted to aircraft. The mean tail-wind component significant change is:

A) 3kt

B) 4kt

C) 2kt

4. The EAT has to be transmitted to the pilot as soon as possible, in case the expected delay is:

A) 5 minutes or more

B) 15 minutes or more

C) 20 minutes

5. A so called "Visual Approach" can be performed:

A) During VFR flight, there should be a visibility of 5km or more

B) During IFR flights, if the cloudbase is 1000ft more than the appropriate DA or MDA for that procedure

C) During IFR flights, if there is permanent sight on the movement area and the underlying ground

6. **"Time Approach Procedure" is used as necessary to expedite the approach of a number of arriving aircraft. This will be obtained requesting aircraft:**
   A) To maintain a specified speed during the approach procedure
   B) To pass the specified point inbound at the previously notified time
   C) To apply a step down descent between aircraft in the approach sequence

7. **During an arrival procedure under an IFR flight plan in VMC conditions, traffic avoidance is the responsibility of:**
   A) The radar controller
   B) The pilot in command
   C) The approach controller

8. **If the crew on an arriving aircraft approaching a controlled aerodrome will report "field in sight", a clearance for "visual approach" may be given under certain conditions**
   A) The meteorological visibility must not be less than 8km
   B) The approach must be passing the FAF
   C) The air traffic controller will provide separation to other controlled traffic

9. **Which statement is correct? During a "visual approach" in controlled airspace (class C):**
   A) ATC will apply separation with other traffic
   B) The pilot has to apply separation with other traffic
   C) ATC will apply separation with other arriving traffic

10. **One minute separation may be used between departing aircraft if they are to fly on tracks divering by atleast:**
   A) 30° immediately after take-off
   B) 15° immediately after take-off
   C) 45° immediately after take-off

ANSWERS

1	2	3	4	5	6	7	8	9	10
A	B	C	A	C	B	B	C	A	C

8

PROCEDURES FOR AERODROME CONTROL SERVICE

(Doc 4444, AIP, India)

FUNCTIONS OF AERODROME CONTROL TOWERS

Aerodrome control towers shall issue information and clearances to aircraft under their control to achieve a safe, orderly and expeditious flow of air traffic on and in the vicinity of an aerodrome with the object of preventing collision(s) between:

a) aircraft flying within the designated area of responsibility of the control tower, including the aerodrome traffic circuits;

b) aircraft operating on the manoeuvring area;

c) aircraft landing and taking off;

d) aircraft and vehicles operating on the manoeuvring area;

e) aircraft on the manoeuvring area and obstructions on that area.

Aerodrome controllers shall maintain a continuous watch on all flight operations on and in the vicinity of an aerodrome as well as vehicles and personnel on the manoeuvring area. Watch shall be maintained by visual observation, augmented in low visibility conditions by an ATS surveillance system when available. Traffic shall be controlled in accordance with the procedures set forth herein and all applicable traffic rules / Temporary Local Instructions (TLI) of the concerned airport. If there are other aerodromes within a control zone, traffic at all aerodro nes within such a zone shall be coordinated so that traffic circuits do not conflict.

The functions of an aerodrome control tower may be performed by different control or working positions, such as:

- **aerodrome controller,** normally responsible for operations on the runway and aircraft flying within the area of responsibility of the aerodrome control tower;
- **ground controller,** normally responsible for traffic on the manoeuvring area with the exception of runways;
- **Clearance delivery position,** normally responsible for delivery of start-up and ATC clearance to departing IFR flights.

Where parallel or near parallel runways are used for simultaneous operations, individual aerodrome controllers should be responsible for operations on each of the runways.

ALERTING SERVICE PROVIDED BY AERODROME CONTROL TOWERS

Aerodrome control towers are responsible for alerting the rescue and fire fighting services whenever:

a) an aircraft accident has occurred on or in the vicinity of the aerodrome; or,

b) information is received that the safety of an aircraft which is or will come under the jurisdiction of the aerodrome control tower may have or has been impaired; or

c) requested by the flight crew; or

d) when otherwise deemed necessary or desirable.

PROCEDURE FOR START-UP AND ASSIGNMENT OF FLIGHT LEVEL TO DEPARTING AIRCRAFT

➢ Before asking for startup or push back clearance, pilot of an aircraft must ensure that its step ladder or Aerobridge has been removed and doors are closed.

➢ Pilot shall intimate total number of persons on board including crew and security check completed to aerodrome control tower when requesting start-up clearance.

➢ The sequence of departure would be determined and intimated based on their taxiing sequence, sequence at holding point, except where a deviation is made to facilitate a VIP aircraft or change of order is resorted to for traffic reasons.

➢ Delays may be expected for the second aircraft to push-back when it is parked adjacent to another aircraft being pushed-back.

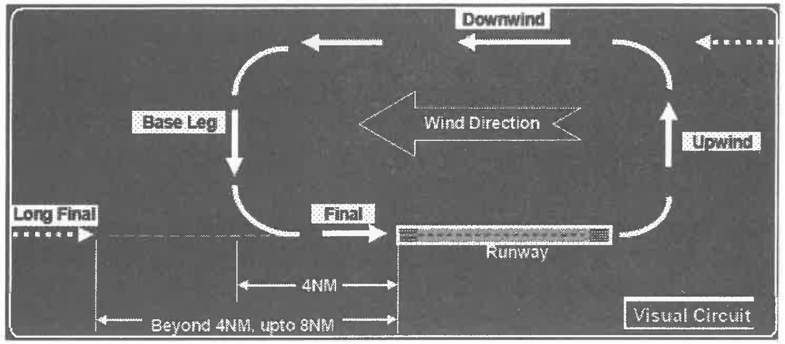
➢ Delay in take-off due to restrictions in the ATC clearance and over-flights or the appropriate ATS authority.

- There may be delay in take-off for an aircraft when it is proceeding on the same track/level, or climbing through the level or to climb at higher rate of climb behind a preceding traffic in order to establish the prescribed separation.
- A departing aircraft requesting the same cruising level as an over-flying aircraft may have to accept an alternate level or may have to delay its departure in order to establish the prescribed separation.
- Take-off and Landing
- The pilot-in-command shall not take-off or land without a clearance from the appropriate ATC unit.
- The pilot-in-command shall not run-up on the runway in use unless authorized by Aerodrome Control. Engine run ups in the holding pan or runway holding position clear of the runway in use may be carried out subject to approval by Aerodrome Control.
- To increase the runway capacity it is essential to minimize the runway occupancy time. The following procedure should be followed to ensure minimum runway occupancy time.
- As far as possible cockpit checks should be completed prior to lineup and any checks requiring completion while on the runway should be kept to the minimum required. Pilots should ensure that they are able to commence the take off run immediately after take off clearance is issued. Pilots not able to comply with this requirement must notify ATC prior to commencement of taxi.
- Pilots of arriving aircraft are reminded that rapid exits from the landing runway enable ATC to apply minimum spacing on final approach that will achieve maximum runway utilization.
- Cruise Climb is not permitted in Indian Flight Information Regions.
- Transonic and Supersonic phases of flight are not permitted over Indian airspace.

CONTROL OF AERODROME TRAFFIC

Designated positions of aircraft in the aerodrome traffic and taxi circuits

The following positions of aircraft in the traffic and taxi circuits are the positions where the aircraft normally receive aerodrome control tower clearances. Where practicable, all clearances should be issued without waiting for the aircraft to initiate the call.



Traffic on the manoeuvring area Control of Taxiing Aircraft

Taxi Clearance

a) Taxi clearances shall contain concise instructions and adequate information so as to assist the flight crew to follow the correct taxi routes, to avoid collision with other aircraft or objects and to minimize the potential for the aircraft inadvertently entering an active runway.

b) When a taxi clearance contains a taxi limit beyond a runway, it shall contain an explicit clearance to cross or an instruction to hold short of that runway.

Taxiing on a Runway-In-Use

a) For the purpose of expediting air traffic, aircraft may be permitted to taxi on the runway-in-use, provided no delay or risk to other aircraft will result.

b) If the control tower is unable to determine, either visually or via an ATS surveillance system that a vacating or crossing aircraft has cleared the runway, the aircraft shall be requested to report when it has vacated the runway. The report shall be made when the entire aircraft is beyond the relevant runway-holding position.

c) Pilot who require to back-track the runway for departure must notify ATC prior to commencement of taxi.

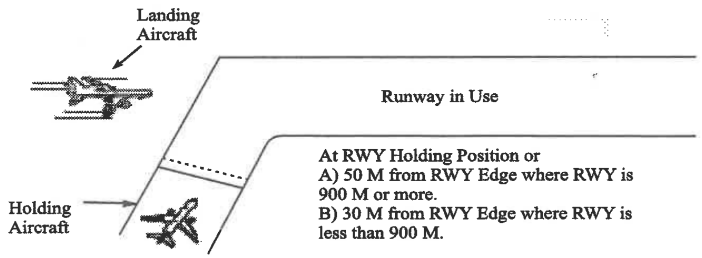
d) Unless prior permission has been obtained from ATC, the Pilot-in-Command shall not hold on the runway-in-use.

e) Only one aircraft will be cleared to land on the runway-in-use at any one time except formation flight by military aircraft.

Use of Runway-Holding Positions

a) Except as provided in b) below, aircraft shall not be held closer to a runway-in use than at a runway-holding position.

b) Aircraft shall not be permitted to line up and hold on the approach end of a runway-in-use whenever another aircraft is effecting a landing, until the landing aircraft has passed the point of intended holding.



INFORMATION TO AIRCRAFT BY AERODROME CONTROL TOWERS

INFORMATION RELATED TO THE OPERATION OF AIRCRAFT

Start-Up Time Procedures:

Start-up time procedures should be contained in the local instructions and should specify the criteria and conditions for determining when and how start-up times shall be calculated and issued to departing aircraft.

Aerodrome and Meteorological Information

Prior to taxiing for take-off, aircraft shall be advised of the following elements of information, in the order listed, with the exception of such elements which it is known the aircraft has already received:

a) the runway to be used;

b) the surface wind direction and speed, including significant variations;

c) the QNH altimeter setting and, either on a regular basis in accordance with local arrangements or if so requested by the aircraft, the QFE altimeter setting;

d) the air temperature for the runway to be used, in the case of turbine-engine aircraft;

e) the visibility representative of the direction of take-off and initial climb, if less than 10 km, or, when applicable, the RVR value(s) for the runway to be used;

f) the correct time.

Prior to take-off aircraft shall be advised of:

a) any significant changes in the surface wind direction and speed, the air temperature, and the visibility or RVR value(s)

b) significant meteorological conditions in the take-off and climb-out area, except when it is known that the information has already been received by the aircraft.

Note:— Significant meteorological conditions in this context include the occurrence or expected occurrence of cumulonimbus or thunderstorm, moderate or severe turbulence, wind shear, hail, moderate or severe icing, severe squall line, freezing precipitation, severe mountain waves, sand storm, dust storm, blowing snow, tornado or waterspout in the take-off and climb out area.

Prior to entering the traffic circuit or commencing its approach to land, an aircraft shall be provided with the following elements of information, in the order listed, with the exception of such elements which it is known the aircraft has already received:

a) the runway to be used;

b) the surface wind direction and speed, including significant variations there from;

c) the QNH altimeter setting and, either on a regular basis in accordance with local arrangements or, if so requested by the aircraft, the QFE altimeter setting

Essential Local Traffic Information

Essential local traffic shall be considered to consist of any aircraft, vehicle or personnel on or near the manoeuvring area or traffic operating in the vicinity of the aerodrome, which may constitute a hazard to the aircraft concerned.

Runway Incursion or Obstructed Runway

In the event the aerodrome controller observes, after a take-off clearance or a landing clearance has been issued, any obstruction on the runway likely to impair the safety of an aircraft taking off or landing, such as a runway incursion by an aircraft or vehicle, or animals or flocks of birds on the runway, appropriate action shall be taken as follows:

a) in all cases inform the aircraft concerned of the obstruction and its location on the runway;

b) cancel the take-off clearance for an aircraft which has not started to roll;

c) instruct a landing aircraft to go around.

Uncertainty of position on the manoeuvring area

A pilot in doubt as to the position of the aircraft with respect to the manoeuvring area shall immediately:

a) Stop the aircraft; and

b) Simultaneously notify the appropriate ATS unit of the circumstances (including the last known position).

In those situations where a pilot is in doubt as to the position of the aircraft with respect to the manoeuvring area, but recognizes that the aircraft is on a runway, the pilot shall immediately:

a) Notify the appropriate ATS unit of the circumstances (including the last known position);

b) If able to locate a nearby suitable taxiway, vacate the runway as expeditiously as possible, unless otherwise instructed by the ATS unit; and then,

c) Stop the aircraft.

A vehicle driver in doubt as to the position of the vehicle with respect to the manoeuvring area shall immediately:

a) Notify the appropriate ATS unit of the circumstances (including the last known position);

b) Simultaneously, unless otherwise instructed by the ATS unit, vacate the landing area, taxiway, or other part of the manoeuvring area, to a safe distance as expeditiously as possible; and then,

c) Stop the vehicle.

In the event the aerodrome controller becomes aware of an aircraft or vehicle that is lost or uncertain of its position on the manoeuvring area, appropriate action shall be taken immediately to safeguard operations and assist the aircraft or vehicle concerned to determine its position.

Wake Turbulence and Jet Blast Hazard

Aerodrome controllers shall, when applicable, apply the wake turbulence separation minima specified. Whenever the responsibility for wake turbulence avoidance rests with the pilot-in command, aerodrome controllers shall, to the extent practicable, advise aircraft of the expected occurrence of hazards caused by turbulent wake.

ESSENTIAL INFORMATION AERODROME CONDITIONS ON

Essential information on aerodrome conditions shall include information relating to the following:

a) construction or maintenance work on, or immediately adjacent to the movement area;

b) rough or broken surfaces on a runway, a taxiway or an apron, whether marked or not;

c) snow, slush or ice on a runway, a taxiway or an apron;

d) water on a runway, a taxiway or an apron;

e) snow banks or drifts adjacent to a runway, a taxiway or an apron;

f) other temporary hazards, including parked aircraft and birds on the ground or in the air;

g) failure or irregular operation of part or all of the aerodrome lighting system; h) any other pertinent information.

CONTROL OF OTHER THAN AIRCRAFT TRAFFIC

Entry to the Manoeuvring Area

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.

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 sensitive area(s) when Category II or Category III A precision instrument operations are in progress;

b) The vehicles shall remain at safe distance from taxiing aircraft.

Priority on the Manoeuvring Area

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

In emergency conditions or if the signals are not observed, the signal given hereunder shall be used for runways or taxiways equipped with a lighting system and shall have the meaning indicated therein .

Light signal Meaning

Flashing runway lights

Vacate the runway or taxiway and observe the tower for light signal

Priority Rules.

The following general rules, as detailed below, shall apply in determining the order of priority of aircraft operations:

a) An aircraft which is known or believed to be in emergency compelling it to land without delay; e.g. aircraft experiencing engine failure, acute shortage of fuel or total communication failure.

b) Military fighter flights invariably experience shortage of fuel if not allowed to proceed as per the planned operations. Any alteration to their optimum flight profile (flight path/level) should be avoided / minimized in general. The ground time limitations of military fighter aircraft entail that the departures are accommodated from intended Civil/Military aerodromes without any delay.

c) An aircraft engaged in a live scramble.

d) An aircraft carrying sick or injured persons, requiring urgent medical attention or carrying out approved medical evacuation (Medical Flights).

e) An aircraft carrying VVIP as laid down in procedures for their handling.

f) An aircraft proceeding on Search and Rescue missions.

g) Military flight carrying out large integrated formations in military exercises.

h) Aircraft / RPA in approved urgent operational military commitment which has been coordinated with appropriate ATC Centres.

i) Aircraft on large scale weather deviations.

j) Aircraft landing at alternate aerodromes after diversion due adverse operational or weather conditions at their intended destination.

SUSPENSION OF VISUAL FLIGHT RULES OPERATIONS

Any or all VFR operations on and in the vicinity of an aerodrome may be suspended by any of the following units, persons or authorities whenever safety requires such action:

a) the approach control unit or the appropriate ACC;

b) the aerodrome control tower;

c) the appropriate ATS authority.

All such suspensions of VFR operations shall be accomplished through or notified to the aerodrome control tower.

The following procedures shall be observed by the aerodrome control tower whenever VFR operations are suspended:

a) hold all VFR departures;

b) recall all local flights operating under VFR or obtain approval for special VFR operations;

c) notify the approach control unit or ACC as appropriate of the action taken;

d) notify all operators, or their designated representatives, of the reason for taking such action, if necessary or requested.

CONTROL OF TRAFFIC IN THE TRAFFIC CIRCUIT

Entry of Traffic Circuit

The clearance to enter the traffic circuit should be issued to an aircraft whenever it is desired that the aircraft approach the landing area in accordance with current traffic circuits but traffic conditions do not yet allow a landing clearance to be issued. Depending on the circumstances and traffic conditions, an aircraft may be cleared to join at any position in the traffic circuit.

An arriving aircraft executing an instrument approach shall normally be cleared to land straight in unless visual manoeuvring to the landing runway is required.

ORDER OF PRIORITY FOR ARRIVING AND DEPARTING AIRCRAFT

An aircraft landing or in the final stages of an approach to land shall normally have priority over an aircraft intending to depart from the same or an intersecting runway.

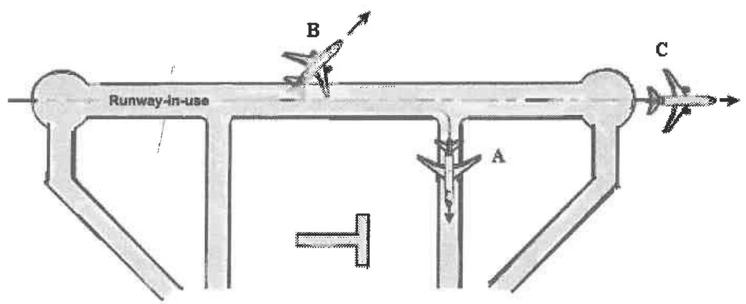
CONTROL OF DEPARTING AIRCRAFT

Departure Sequence

Departures shall normally be cleared in the order in which they are ready for take-off, except that deviations may be made from this order of priority to facilitate the maximum number of departures with the least average delay.

Separation of departing aircraft

A departing aircraft will not normally be permitted to commence take-off until the preceding departing aircraft has crossed the end of the runway-in-use or has started a turn or until all preceding landing aircraft are clear of the runway-in-use.



Position limits to be reached by a landed aircraft (A) or a departing aircraft (B or C) before an arriving aircraft may be cleared to cross the threshold of the runway-in-use or a departing aircraft may be cleared to take off, unless otherwise prescribed by the appropriate ATS authority.

Take-off Clearance

Take-off clearance may be issued to an aircraft when there is reasonable assurance that the separation will exist when the aircraft commences take-off.

The take-off clearance shall be issued when the aircraft is ready for take-off and at or approaching the departure runway, and the traffic situation permits. To reduce the potential for misunderstanding, the take-off clearance shall include the designator of the departure runway.

In the interest of expediting traffic, a clearance for immediate take-off may be issued to an aircraft before it enters the runway. On acceptance of such clearance the aircraft shall taxi out to the runway and take off in one continuous movement.

CONTROL OF ARRIVING AIRCRAFT

Separation of landing aircraft and preceding landing and departing aircraft using the same runway A landing aircraft will not normally be permitted to cross the runway threshold on its final approach until the preceding departing aircraft has crossed the end of the runway-in-use, or has started a turn, or until all preceding landing aircraft are clear of the runway-in-use

Clearance to Land

An aircraft may be cleared to land when there is reasonable assurance that the separation in will exist when the aircraft crosses the runway threshold, provided that a clearance to land shall not be issued until a preceding landing aircraft has crossed the runway threshold. To reduce the potential for misunderstanding, the landing clearance shall include the designator of the landing runway.

PROCEDURES FOR LOW VISIBILITY OPERATIONS

Control of aerodrome surface traffic in conditions of low visibility

In conditions where low visibility procedures are in operation, 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 sensitive area(s) when Category II or Category III A precision instrument operations are in progress.

AERONAUTICAL GROUND LIGHTS

General

All aeronautical ground lights shall be operated

a) during the time from sunset to sun rise;

b) during time from sunrise to sunset when visibility is 3000 m or less;

c) when requested by pilot;

d) at any other time when their use, based on meteorological conditions, is considered desirable for the safety of air traffic.

Lights on and in the vicinity of aerodromes that are not intended for en-route navigation purposes may be turned off, subject to further provisions hereafter, if no likelihood of either regular or emergency operation exists, provided that they can be again brought into operation at least one hour before the expected arrival of an aircraft.

At aerodromes equipped with lights of variable intensity a table of intensity settings, based on conditions of visibility and ambient light, should be provided for the guidance of air traffic controllers in effecting adjustment of these lights to suit the prevailing conditions. When so requested by an aircraft, further adjustment of the intensity shall be made whenever possible.

The lights of a visual approach slope indicator system shall be operated during the hours of daylight as well as of darkness and irrespective of the visibility conditions when the associated runway is being used.

Runway Lighting

Note:— Runway lighting includes such lights as edge, threshold, centre line, end, touchdown zone and wing bar lights.

Runway lighting shall not be operated if that runway is not in use for landing, take-off or taxiing purposes, unless required for runway inspections or maintenance.

If runway lighting is not operated continuously, lighting following a take-off shall be provided as specified below:

a) at aerodromes where air traffic control service is provided and where lights are centrally controlled, the lights of one runway shall remain lighted after take off as long as is considered necessary for the return of the aircraft due to an emergency occurring during or immediately after take-off;

b) at aerodromes without air traffic control service or without centrally controlled lights, the lights of one runway shall remain lighted until such time as would normally be required to reactivate the lights in the likelihood of the departing aircraft returning for an emergency landing, and in any case not less than fifteen minutes after takeoff.

WIND SHEAR ADVISORIES

Note:—Wind shear is a sustained change in the wind velocity along the aircraft flight path, which occurs significantly faster than the aircraft can accelerate or decelerate. It can occur at any level, but it is 'low level wind shear', occurring from the surface to a height of approximately 1500 feet, which can cause problems of sufficient magnitude to affect the control of aircraft in departure or final approach phases of flight.

Whenever a pilot reports wind shear conditions to ATC, the information shall be passed to subsequent arriving and departing aircraft until either confirmation is received that the condition no longer exists or wind shear information has been included in ATIS and flight crew of the concerned aircraft reports the receipt of the appropriate ATIS designator.

Reports on wind shear from aircraft should be passed to Meteorological office.

Designation of Hot Spot

The aerodrome operator shall whenever necessary designate a location or several locations on the movement area of the aerodrome as hot spot(s). The hot spot(s) shall be chartered in accordance with Annex 4.

Coefficient of Friction.

The table below with associated descriptive terms was developed from friction data collected only in compacted snow and ice and should not therefore be taken to be absolute values applicable in all conditions.

Measured coefficient μ	Estimated surface Friction	Code
0.4 and above	Good	5
0.39 to 0.36	Medium to good	4
0.35 to 0.30	Medium	3
0.29 to 0.26	Medium to poor	2
0.25 and below	Poor	1

It has been found necessary to provide assessed surface condition information, including estimated surface friction, for each third of a runway. When giving landing information to a pilot before landing, the sections are referred to as first, second or third part of the runway. The first part always means the first third of the runway as seen in the direction of landing.

QUESTIONS

1. When instructed by ATC to hold short of Runway pilot should stop:

A) With nose gear on hold line
B) So that no part of the A/c extends beyond hold line
C) So that the Flt Deck Area of A/c is even with the hold line

2. The following aircraft will be given priority to land:

A) An aircraft with VVIP on board
B) An aircraft with critical shortage of fuel
C) A scheduled aircraft

3. Apron is an area on aerodrome where following activities take place:

A) Loading /unloading of passengers, mail and cargo only.
B) Parking of aircraft only.
C) Loading/unloading of passengers, mail and cargo, fueling, parking or maintenance.

4. For safety reasons, a person should remain away from a jet engine by at least:

A) 100'
B) 200'
C) 300'

5. Movement area of an aerodrome constitutes the following

A) Area including runways / taxiways excluding apron
B) Area excluding taxiways but including runways and apron
C) Area including runways / taxiways / aprons

6. The maneuvering area of an airport is that area

A) Normally referred to as the ramp or apron.
B) Used for taxiing, taking off and landing.
C) Used when taxiing to and from the parking area.

7. An Aircraft shall report "long final" when it is at ____ from the approach end of the rwy

A) 8NMs
B) 4NMs
C) 1NMs

8. **What defines a controlled aerodrome?**
   A) It must be located within a CTR.
   B) It must have a control tower giving an ATC service.
   C) It must have a control tower and be in a CTR.

9. **Aerodrome traffic is considered to be**:
   A) Aircraft on the movement area and flying in the vicinity.
   B) Aircraft on the manoeuvring area and flying in the vicinity.
   C) Aircraft on the movement area only.

10. **Aircraft shall not be held closer to a runway-in-use**:
   A) Than at a runway-holding position.
   B) Than at runway edge.
   C) Than at 40m from the runway edge.

11. **Friction Co efficient due to snow - in how many segments is runway divided based on friction level.**:
   A) 1/2
   B) 1/3
   C) 1/4

12. **Runway friction coefficient 0.20 means estimated surface friction**:
   A) Good
   B) Medium to Good
   C) Poor

ANSWERS

1	2	3	4	5	6	7	8	9	10	11	12
B	B	C	B	C	B	A	B	B	A	B	C

9

USE OF AIR TRAFFIC SERVICES SURVEILLANCE SYSTEM

(DOC 4444 AND AIP, INDIA)

Introduction

ATS surveillance system. A generic term meaning variously, Automatic Dependence Surveillance-B (ADS-B), Primary Surveillance Radar (PSR), Secondary Surveillance Radar (SSR) or any comparable ground-based system that enables the identification of aircraft.

PSR systems should be used in circumstances where other ATS surveillance systems alone would not meet the air traffic services requirements.

SSR systems, especially those utilizing monopulse techniques or having Mode S capability, or MLAT may be used alone, including in the provision of separation between aircraft, provided:

a) the carriage of SSR transponders is mandatory within the area; and

b) identification is established and maintained.

ADS-B Applications.

Although the names are similar, ADS-C and ADS-B are two different applications.

Automatic dependent surveillance - broadcast (ADS-B), like primary surveillance radar (PSR) and secondary surveillance radar (SSR) is an ATS surveillance system which allows ATC to automatically and repeatedly access data from all suitably equipped aircraft and both use and re-broadcast it to suitably equipped other aircraft within range.

Automatic dependent surveillance - contract (ADS-C) uses the same systems on board the aircraft to automatically transmit similar information - aircraft position, altitude, speed, elements of navigational intent and meteorological data - only to one or more specific Air Traffic Services Unit (ATSU) or Aeronautical Operational Control (AOC) facilities for surveillance and/or route conformance monitoring.

Data provision by an aircraft is generated in response to a request within the terms of the ADS contract held by the ground system. This contract identifies the types of information and the conditions under which reports are to be sent by the aircraft. Some types of information are included in every report, while other types are provided only if specified in an ADS contract request. The aircraft can also send unsolicited ADS-C emergency reports to any ATSU that has an ADS contract with the aircraft.

Advantages of ADS-B.

ADS-B is an environmentally friendly technology that enhances safety and efficiency, and directly benefits pilots, controllers, airports, airlines, and the public. It forms the foundation for NextGen by moving from ground radar and navigational aids to precise tracking using satellite signals.

With ADS-B, pilots for the first time see what controllers see: displays showing other aircraft in the sky. Cockpit displays also pinpoint hazardous weather and terrain, and give pilots important flight information, such as temporary flight restrictions.

ADS-B reduces the risk of runway incursions with cockpit and controller displays that show the location of aircraft and equipped ground vehicles on airport surfaces – even at night or during heavy rainfall. ADS-B applications being developed now will give pilots indications or alerts of potential collisions.

ADS-B also provides greater coverage since ground stations are so much easier to place than radar. Remote areas without radar coverage now have surveillance with ADS-B.

Relying on satellites instead of ground navigational aids also means aircraft will be able to fly more directly from Point A to B, saving time and money, and reducing fuel burn and emissions.

MLAT Applications.

Multilateration is a technology to accurately locate aircraft using Time Difference of Arrival (TDOA). Multilateration employs a number of ground satations, whcih are placed in strategic locations around an airport.

Multilateration requires no additional avionics equipment, as it uses replies from Mode A, C and S transponders, as well as military IFF and ADS-B transponders. Since individual aircraft will be at different distances from each of the ground stations, their replies will be received by each station at fractionally different times. Using advanced computer processing techniques, these individual time differences allow an aircraft's position to be precisely calculated.

Radar Applications.

The improved accuracy, integrity and reliability of satellite signals over radar means controllers eventually will be able to safely reduce the minimum separation distance between aircraft and increase capacity in the nation's skies.

Radar vectors given to an aircraft will be related to magnetic headings only. Radar control procedures will be used by ATC in preference to non-radar control procedures whenever ATS or the aircraft served will gain operational advantage. The following types of radar services may be provided to aircraft operating within reliable radar coverage-

i) Radar control service - for aircraft operating within controlled airspaces.

ii) Radar advisory service - for aircraft operating within Class F airspace

iii) Radar flight information service - for identified aircraft operating in any part of FIR

The provision of any of the above types of radar service requires that aircraft remain in direct two-way communication with the unit providing the service. However, radar separation may be provided between two radar identified aircraft even when only one of the aircraft is in direct communication with the radar unit.

Use of ATS surveillance service in air traffic control service.

➢ Provide of radar service to-

i) Improve airspace utilization ii) Reduce delays iii) Enhance safety

➢ Provide radar vectoring to-

i) Departing aircraft for expeditious and efficient departure flow and expending climb to cruising level.
ii) Arriving aircraft for the purpose of expediting descent from cruising level and establishing an expeditious and efficient approach sequence
iii) Aircraft for the purpose of resolving potential conflict
iv) Assist pilot in their navigation

➢ Provide separation and maintain normal flow when an aircraft is experiencing communication failure is within area of ATS surveillance service coverage.

➢ Monitor the progress of air traffic in order to

i) Obtain improved position information regarding aircraft under control
ii) Obtain supplementary information regarding other traffic
iii) Detect significant deviations by aircraft from their assigned routings or level.

Use of Radar in Approach Control Service. Surveillance Radar is extensively used in approach control to sequence the traffic, vector aircraft to position for pilot interpreted approach aid and to do surveillance radar approaches.

Use of Radar in Aerodrome Control Service. Surveillance radar is used as an approach monitor aid. Surface Movement Radar is used to control traffic on ground in movement area.

Position indications may be displayed as:

a) individual position symbols, e.g. PSR, SSR, and ADS-B or MLAT symbols, or combined symbols;

b) PSR blips; and

c) SSR responses.

Use of SSR without primary radar. Secondary Surveillance Radar (SSR) information may be used alone in the provision of separation between aircraft provided; aircraft identification is established and maintained by use of discrete SSR codes.

Non-radar separation will be applied between transponder equipped aircraft and an aircraft without SSR transponder or with a non-functioning SSR transponder.

In the event of an aircraft transponder failure or ATC determining that transponder does not meet serviceability requirements, the aircraft (for whom carriage of transponder is mandatory) will normally be permitted to continue to operate to the next point of landing.

An aircraft (for whom carriage of transponder is mandatory) whose transponder failure is detected before departure may be specifically authorised by ATC to operate without serviceable transponder provided; a request is included in the flight plan.

ATS surveillance service Identification. Before providing ATS surveillance service to an aircraft, radar identification shall be established by one of the method in Doc 4444-PANS-ATM, and the pilot so informed. If identification is subsequently lost, the pilot shall be informed accordingly and instructions will be issued so as to restore non- ATS surveillance service separation.

ADS-B Identification Procedures. Where ADS-B is used for identification, aircraft may be identified by one or more of the following procedures:

a) direct recognition of the aircraft identification in an ADS-B label;
b) transfer of ADS-B identification;
c) observation of compliance with an instruction to TRANSMIT ADS-B IDENT;

SSR and/or MLAT Identification Procedures. Where SSR and/or MLAT is used for identification, aircraft may be identified by one or more of the following procedures:

a) recognition of the aircraft identification in a SSR and/or MLAT label;

b) recognition of an assigned discrete code, the setting of which has been verified, in a SSR and/or MLAT label;

c) direct recognition of the aircraft identification of a Mode S-equipped aircraft in a SSR and/or MLAT label;

d) by transfer of identification;

e) observation of compliance with an instruction to set a specific code;

f) observation of compliance with an instruction to squawk IDENT;

PSR IDENTIFICATION PROCEDURES

Position Report Method:

By correlating a particular radar position indication with an aircraft reporting its position over or as bearing and distance from, a point shown on the situation display; and by ascertaining that the track of the particular radar position is consistent with the aircraft path or reported heading.

Departing Aircraft Method:

By correlating an observed radar position indication with an aircraft which is known to have just departed, provided that the identification is established within 1 NM from the end of the runway used. Particular care should be taken to avoid confusion with aircraft holding over or overflying the aerodrome, or with aircraft departing from or making a missed approach over adjacent runways.

The Turn Method:

a) An aircraft may be identified by ascertaining the aircraft heading, if circumstances require, and following a period of track observation:

- instructing the pilot to execute one or more changes of heading of 30 degrees or more and correlating the movements of one particular radar position indication with the aircraft's acknowledged execution of the instructions given; or
- correlating the movements of a particular radar position indication with manoeuvres currently executed by an aircraft having so reported.

b) When using these methods, the radar controller shall:

i) verify that the movements of not more than one radar position indication correspond with those of the aircraft; and

ii) ensure that the manoeuvre(s) will not carry the aircraft outside the coverage of the radar or the situation display.

Separation Minima. The separation minima specified shall only be applied between identified aircraft when there is reasonable assurance that identification will be maintained.

Procedural separation minima will be applied-

i) In the event of ATS surveillance service failure.

ii) In the area outside the ATS surveillance service coverage

iii) To aircraft leaving ATS surveillance service coverage or entering adjacent FIR except where ATS surveillance service transfer is effected.

Separation minima based on ATS surveillance systems in India.

Please refer Chapter six for separation minima.

Separation minima based on ATS surveillance systems (ICAO).

Unless otherwise prescribed the horizontal separation minimum based on radar and/or ADS-B and/or MLAT systems shall be 9.3 km (5.0 NM).

The radar separation minimum may, if so prescribed by the appropriate ATS authority, be reduced, but not below:

a) 5.6 km (3.0 NM) when radar and/or ADS-B and/or MLAT capabilities at a given location so permit; and

b) 4.6 km (2.5 NM) between succeeding aircraft which are established on the same final approach track within 18.5 km (10 NM) of the runway end threshold. A reduced separation minimum of 4.6 km (2.5 NM) may be applied, provided local factors permit such reduction.

Wake turbulence radar separation minima. *Please see chapter Special Operational Procedures and Hazards.*

Speed Control Procedures. All aircraft (including arrivals and departures), operating below 10000 Ft will fly at IAS not greater than 250 Kt. All arriving aircraft, operating below 10000 Ft within 15NM radius of VOR/ DME serving the aerodrome will fly at IAS not greater than 220 Kt. Additional speed control restrictions may be imposed for arriving and en-route aircraft by ATC whenever traffic conditions so require. For further details, please refer AIP, India.

ATC may suspend speed control by using the phrase 'No Speed restriction' when traffic conditions permit.

Termination of ATS surveillance Service. An aircraft which has been informed that it is provided with ATS surveillance service should be informed immediately when for any reason ATS surveillance service is interrupted or terminated.

ATS surveillance service is automatically terminated when an arriving aircraft receiving ATS surveillance service has been instructed to contact tower frequency. Position of aircraft from touchdown should be given to the aircraft before changing over the aircraft to tower.

Procedure for operation of SSR transponder codes. All aircraft carrying serviceable transponder shall operate the transponder at all times during flight within Chennai, Delhi, Guwahati, Kolkata and Mumbai FIR regardless of whether the aircraft is within or outside airspace where SSR is used for ATS.

Operating Procedures. Except as provided, pilots hall operate transponders and select modes and codes in accordance with the following procedures-

i) Aircraft departing from an aerodrome located in Chennai, Delhi, Guwahati, Kolkata and Mumbai FIR shall be assigned an appropriate SSR code on departure. This SSR code setting shall continue unless instructed otherwise.

ii) Aircraft engaged in international flight, entering Chennai, Delhi, Guwahati, Kolkata and Mumbai FIR shall continue to maintain SSR code being squawked in the adjacent FIR.

iii) Aircraft engaged in domestic flight shall operate the transponder on the last assigned code.

iv) Aircraft not assigned a SSR code shall operate transponder on mode A3 code 2000 before entry into Chennai, Delhi, Guwahati, Kolkata and Mumbai FIR and maintain that code setting until otherwise instructed.

v) In order to avoid interference on radar display, the pilot shall not operate the transponder when the aircraft is on ground except when entering the runway for take-off or till vacating the runway after landing.

Verification of accuracy of mode C derived level information/ADS-B altitude data transmission:

The tolerance value used to determine that pressure-altitude-derived level information displayed to the controller is accurate shall be ±60 m (±200 ft) in RVSM airspace. In other airspace, it shall be ±90 m (±300 ft), except that the appropriate ATS authority may specify a smaller criterion, but not less than ±60 m (±200 ft), if this is found to be more practical. Geometric height information shall not be used for separation.

- All aircraft must report the level/altitude maintaining/passing on first contact with a radar unit to facilitate verification of Mode C altitude information/ ADS-B altitude data transmission.
- Verification of the accuracy of SSR derived altitude/ ADS-B altitude data transmission information displayed to the controller shall be effected at least once by each suitably equipped ATC unit on initial contact with the aircraft concerned or, if this is not feasible, as soon as possible thereafter. This verification shall be effected by simultaneous comparison with altimeter derived level information received from the specific aircraft by radio telephony. The pilot if the aircraft whose Mode C derived/ ADS-B altitude data transmission information is within the approved tolerance value will not be advised of such verification.

- If the displayed information is not within the approved tolerance value, or when a discrepancy in excess of the approved tolerance value is detected subsequent to verification, the pilot will be advised and requested to check his pressure setting and confirm his level.
- If, following confirmation of level and correct pressure setting, the discrepancy continues to exist the controller may request the pilot to stop his Mode C transmission. The phraseology used will be 'Stop SQUAWK CHARLIE. WRONG INDICATION"/STOP ADS-B altitude data transmission (wrong).

QUESTIONS

1. **The minimum radar separation to be provided to aircraft established on the localizer course shall be:**
   A) 2.0NM between aircraft on adjacent localizer course
   B) 2.5NM between aircraft on the same localizer course
   C) 5.0NM between aircraft on the same localizer course

2. **Unless otherwise prescribed by the appropriate ATS authority, the horizontal radar separation minimum prescribed by ICAO shall be:**
   A) 3.5NM
   B) 8NM
   C) 5.0NM

3. **Where ADS-B is used for identification, aircraft may be identified by the following procedure:**
   A) Asking him to sqwuak aasigned mode A code C.
   B) Direct recognition of the aircraft identification in an ADS-B label.
   C) Recognition of an assigned discrete code, the setting of which has been verified.

4. **An aircraft is considered to be maintaining its assigned level as long as the SSR mode C derived level information indicated that it is within:**
   A) +/- 500ft of the assigned level in non RVSM airspace
   B) +/- 200ft of the assigned level in RVSM airspace
   C) +/- 300ft of the assigned level in RVSM airspace

5. **An aircraft in climb or descent is considered to have crossed a level when the SSR mode C derived level information indicates that it has passed this level in the required direction by:**
   A) +/- 300ft
   B) More than 300ft
   C) 300ft

6. **Secondary Surveillance Radar (SSR) information may be used alone in the provision of separation between aircraft provided;**
   A) Instructions to pilot are acknowledged by him by making specific maneuver(s).
   B) Aircraft identification is established and maintained by use of discrete SSR codes.
   C) It can not be used for providing separation.

7. **Radar identification of a departing aircraft can be achieved if a radar blip is observed within a certain distance from the end of the runway. Identification has to be achieved within:**
   A) 1NM
   B) 3NM
   C) 5NM

8. **Separation based on the use of MLAT position symbols and PSR blips shall be applied so that**
   A) the distance between the centres of the position symbols and PSR blips, representing the positions of the aircraft concerned, is never less than a prescribed minimum.
   B) the distance between the edges of the position symbols and PSR blips, representing the positions of the aircraft concerned, is never less than a prescribed minimum.
   C) the distance between the furthest edges of the position symbols and PSR blips, representing the positions of the aircraft concerned, is never more than a prescribed minimum.

9. **The air traffic control unit has reported "radar contact". What does that mean to the pilot?**
   A) The aircraft is subject to positive control
   B) Position reports may be omitted
   C) The radar identify of the aircraft has been established

10. **When a RADAR operators says the following to an aircraft: "fly heading 030", the pilot must fly heading:**
    A) 030^0 magnetic in still air conditions (thereby flying the magnetic track)
    B) 030^0 compass in still air conditions (thereby flying the compass heading)
    C) 030^0 true, in still air conditions (thereby flying the true track)

11. **Which code shall be used on Mode "A" to provide recognition of an aircraft subjected to unlawful interference?**
    A) Code 7700
    B) Code 7600
    C) Code 7500

12. **Upon intercepting the assigned radial, the controller advises you that you are on the airway and to "resume own navigation". This phrase means that:**
    A) radar services are terminated and you will be responsible for position reports
    B) You are to assume responsibility for your own navigation
    C) You are to contact the center at the next reporting point

13. What does the ATC term "radar contact" signify?

A) Your aircraft has been identified on the radar display and radar flight instructions will be provided until radar identification is terminated

B) You will be given traffic advisories until advised that the service has been terminated or that radar contact has been lost

C) ATC is receiving your transponder and will furnish vectors and traffic advisories until you are advised that contact has been lost

14. Where a "Secondary Surveillance Radar" (SSR) is not available, radar identification may be achieved by one of the following procedures:

A) To instruct the pilot to execute one or more changes of 10°

B) To instruct the pilot to execute one or more changes of 45°

C) To instruct the pilot to execute one or more changes of 30° or more

15. When "Secondary Radar" is used, an aircraft may be identified by one of the following procedures:

A) To request pilot to set transponder on position "OFF"

B) To request pilot to switch from "ON" to "STBY"

C) Observation of compliance with an instruction to operate transponder from "ON" to "STBY" and back to "ON"

16. The Air Traffic Control Service: do not prevent collisions with terrain.

A) Wrong, they do prevent collisions with terrain

B) Except when an aircraft is flying IFR in IMC

C) Correct, except when an IFR flight is vectored by radar

17. Which code shall be used on mode "A" to provide recognition of an emergency aircraft?

A) Code 7600

B) Code 7500

C) Code 7700

18. One of the functions ensured by a radar control unit for the provision of approach control service is:

A) To conduct surveillance radar approaches

B) To apply a horizontal separation less than 5NM

C) To provide instructions in order to reduce separations minima, if accepted by the pilots

19. The primary duty provided by a radar unit is:

A) To assist aircraft on the location of storms

B) To provide radar separation

C) To assist aircraft where navigation appears unsatisfactory

20. What is meant when departure control instructs you to "resume own navigation" after you have been vectored to an airway?

A) Advisories will no longer be issued by ATC

B) You are still in radar contact, but must make position reports

C) You should maintain that airway by use of your navigation equipment

21. All aircraft carrying serviceable transponder shall operate the transponder:

A) At all times during flight, regardless of whether the aircraft is within or outside airspace where SSR is used for ATS purposes.

B) Only when the aircraft is flying within airspace where SSR is used for ATS purposes.

C) As and when required by the pilot.

ANSWERS

1	2	3	4	5	6	7	8	9	10
B	C	B	B	B	B	A	A	C	B

11	12	13	14	15	16	17	18	19	20	21
C	B	A	C	C	C	C	A	B	C	A

10

AERONAUTICAL INFORMATION SERVICES

(ICAO ANNEX 15, PANS-AIM (DOC 10066), AIP, INDIA AND CIVIL AVIATION REQUIREMENTS SECTION 9 – AIR SPACE AND AIR NAVIGATION STANDARDS SERIES 'I' PART I ISSUE II)

GENERAL

The object of the aeronautical information service (AIS) is to ensure the flow of aeronautical data and aeronautical information necessary for global air traffic management (ATM) system safety, regularity, economy and efficiency in an environmentally sustainable manner. The role and importance of aeronautical data and aeronautical information changed significantly with the implementation of area navigation (RNAV), performance-based navigation (PBN), airborne computer-based navigation systems, performance-based communication (PBC), performance-based surveillance (PBS), and data link systems and satellite voice communications (SATVOICE). Aeronautical information provided in a standardized presentation shall include the aeronautical information publication (AIP), AIP Amendments, AIP Supplements, AIC, NOTAM and aeronautical charts.

Responsibilities and Functions

Aeronautical information service (excluding publication of Aeronautical Information Circulars (AIC)) shall be provided by Airports Authority of India (AAI). AIC shall be published by DGCA.

AERONAUTICAL INFORMATION PUBLICATIONS (AIP)

AIP are intended primarily to satisfy international requirements for the exchange of aeronautical information of a lasting character essential to air navigation. When practicable, the form of presentation is designed to facilitate their use in flight.

AIP constitute the basic information source for permanent information and long duration temporary changes.

Contents

- An Aeronautical Information Publication shall contain, in three parts, sections and subsections uniformly referenced to allow for standardized electronic data storage and retrieval, current information relating to, and arranged under, those subjects enumerated in Annex 15.

General Specifications

- A checklist giving the current date of each page in the Aeronautical Information Publication series shall be reissued frequently to assist the user in maintaining a current publication. The page number/chart title and date of the checklist shall appear on the checklist itself.
- Operationally significant changes to the AIP shall be published in accordance with AIRAC procedures and shall be clearly identified by the acronym — AIRAC.
- AIP shall be amended or reissued at such regular intervals as may be necessary to keep them up to date. Recourse to hand amendments or annotations shall be kept to the minimum. The normal method of amendment shall be by means of replacement sheets.
- The regular interval referred to shall be specified in the AIP, Part 1 — General (GEN).

Specifications for AIP Amendments

- Permanent changes to the AIP shall be published as AIP Amendments.
- Each AIP Amendment shall be allocated a serial number, which shall be consecutive.
- Each AIRAC AIP Amendment page, including the cover sheet, shall display an effective date.
- When an AIP Amendment will not be published at the established interval or publication date, a NIL notification shall be originated and distributed by the monthly printed plain-language list of valid NOTAM.

Specifications for AIP Supplements

- Temporary changes of long duration (three months or longer) and information of short duration which contains extensive text and/or graphics shall be published as AIP Supplements.
- Each AIP Supplement shall be allocated a serial number which shall be consecutive and based on the calendar year.
- AIP Supplement pages shall be kept in the AIP as long as all or some of their contents remain valid.
- When an AIP Supplement is sent in replacement of a NOTAM, it shall include a reference to the serial number of the NOTAM.

- A checklist of valid AIP Supplements shall be issued at intervals of not more than one month. This information shall be issued through the medium of the monthly printed plain language list of valid NOTAM.
- AIP Supplement pages shall be coloured in order to be conspicuous, preferably in yellow.
- AIP Supplement pages shall be kept as the first item in the AIP parts.
- When an error occurs in an AIP Supplement or when the period of validity of an AIP Supplement is changed, a new AIP Supplement shall be published as a replacement.

Note. -- The requirements for NOTAM apply when time constraints do not allow sufficient time for the distribution of an AIP Supplement.

Electronic AIP (eAIP).

The AIP, AIP Amendment, AIP Supplement and AIC should also be published in a format that allows for displaying on a computer screen and printing on paper.

Note 1. -- This composite electronic document is named "Electronic AIP" (eAIP) and may be based on a format that allows for digital data exchange.

NOTAM

NOTAM (N): Notam new

NOTAM (R): Notam replacement

NOTAM (C): Cancellation of Notam

TRIGGER NOTAM

The intent of this NOTAM is to serve as a reminder in the pre-flight informationc bulletin (PIB) for the forthcoming operationally significant change in AIP (via AIP supplement), if applicable.

When an AIP Supplement is published in accordance with AIRAC procedures, a trigger NOTAM must be originated giving a brief description of the contents, the effective date/time and the serial number of the AIP

Supplement. This NOTAM must come into force on the same date as the supplement to which it refers. The text of the trigger NOTAM is included in the PIB to ensure that pilots and operators are reminded that changes of operational significance will take place as of a given effective date.

Origination

- A NOTAM shall be originated and issued promptly whenever the information to be distributed is of a temporary nature and of short duration or when operationally significant permanent changes, or temporary changes of long duration are made at short notice, except for extensive text and/or graphics.
- The need for origination of a NOTAM shall be considered in any circumstance which may affect the operations of aircraft.

- The following information shall not be notified by NOTAM:
  a) routine maintenance work on aprons and taxiways which does not affect the safe movement of aircraft;
  b) runway marking work, when aircraft operations can safely be conducted on other available runways, or the equipment used can be removed when necessary;
  c) temporary obstructions in the vicinity of aerodromes/ heliports that do not affect the safe operation of aircraft;
  d) partial failure of aerodrome/heliport lighting facilities where such failure does not directly affect aircraft operations;
  e) partial temporary failure of air-ground communications when suitable alternative frequencies are known to be available and are operative;
  f) the lack of apron marshalling services and road traffic control;
  g) the unserviceability of location, destination or other instruction signs on the aerodrome movement area;
  h) parachuting when in uncontrolled airspace under VFR, when controlled, at promulgated sites or within danger or prohibited areas;
  i) other information of a similar temporary nature.
- At least seven days' advance notice shall be given of the activation of established danger, restricted or prohibited areas and of activities requiring temporary airspace restrictions other than for emergency operations.
- Whenever possible, at least 24 hours' advance notice is desirable, to permit timely completion of the notification process and to facilitate airspace utilization planning.
- NOTAM notifying unserviceability of aids to air navigation, facilities or communication services shall give an estimate of the period of unserviceability or the time at which restoration of service is expected.

General Specifications

- Information concerning snow, slush, ice and standing water on aerodrome/ heliport pavements shall, when reported by means of a SNOWTAM, contain the information in the order shown in the SNOWTAM Format.
- Information concerning an operationally significant change in volcanic activity, a volcanic eruption and/or volcanic ash cloud shall, when reported by means of an ASHTAM, contain the information in the order shown in the ASHTAM Format.
- The NOTAM originator shall allocate to each NOTAM a series identified by a letter and a four-digit number followed by a stroke and a two-digit number for the year. The four-digit number shall be consecutive and based on the calendar year.

- Each NOTAM shall deal with only one subject and one condition of the subject.
- A checklist of valid NOTAM shall be issued as a NOTAM over the Aeronautical Fixed Service (AFS) at intervals of not more than one month using the NOTAM Format specified. One NOTAM shall be issued for each series.
- A checklist of NOTAM shall refer to the latest AIP Amendments, AIP Supplements and at least the internationally distributed AIC.
- A monthly printed plain-language list of valid NOTAM, including indications of the latest AIP Amendments, AIC issued and a checklist of AIP Supplements, shall be prepared with a minimum of delay and forwarded by the most expeditious means to recipients of the Integrated Aeronautical Information Package.

Distribution

- The originator shall select the NOTAM that are to be given international distribution.
- Selective distribution lists should be used when practicable.

AERONAUTICAL INFORMATION REGULATION AND CONTROL (AIRAC)

General Specifications

- Information concerning establishment, withdrawal or significant changes upon a series of common effective dates at intervals of 28 days, including 29 January 1998. The information notified therein shall not be changed further for at least another 28 days after the effective date, unless the circumstance notified is of a temporary nature and would not persist for the full period.
- The regulated system (AIRAC) shall also be used for the provision of information relating to the establishment and withdrawal of, and premeditated significant changes.

INFORMATION TO BE NOTIFIED BY AIRAC

PART 1

The establishment, withdrawal of, and premeditated significant changes (including operational trials) to:

- Limits (horizontal and vertical), regulations and procedures applicable to:
  a) flight information regions;
  b) control areas;
  c) control zones;
  d) advisory areas;
  e) ATS routes;
  f) permanent danger, prohibited and restricted areas (including type and periods of activity when known) and ADIZ;
  g) permanent areas or routes or portions thereof where the possibility of interception exists.
- Positions, frequencies, call signs, known irregularities and maintenance periods of radio navigation aids and communication facilities.
- Holding and approach procedures, arrival and departure procedures, noise abatement procedures and any other pertinent ATS procedures.
- Meteorological facilities (including broadcasts) and procedures.
- Runways and stop ways.

PART 2

The establishment and withdrawal of, and premeditated significant changes to:

- Position, height and lighting of navigational obstacles.
- Taxiways and aprons.
- Hours of service: aerodromes, facilities and services.
- Customs, immigration and health services.
- Temporary danger, prohibited and restricted areas and navigational hazards, military exercises and mass movements of aircraft.
- Temporary areas or routes or portions thereof where the possibility of interception exists.

Provision of Information in Paper Copy Form

- In all instances, information provided under the AIRAC system shall be published in paper copy form and shall be distributed by the AIS unit at least 42 days in advance of the effective date with the objective of reaching recipients at least 28 days in advance of the effective date.

- Whenever major changes are planned and where advance notice is desirable and practicable, information published in paper copy form should be distributed by the AIS unit at least 56 days in advance of the effective date.

AERONAUTICAL INFORMATION CIRCULARS (AIC)

Origination

- An AIC shall be originated whenever it is necessary to promulgate aeronautical information which does not qualify:
  - a) for inclusion in an AIP; or
  - b) for the origination of a NOTAM.
- An AIC shall be originated whenever it is desirable to promulgate:
  - a) a long-term forecast of any major change in legislation, regulations, procedures or facilities;
  - b) information of a purely explanatory or advisory nature liable to affect flight safety;
  - c) information or notification of an explanatory or advisory nature concerning technical, legislative or purely administrative matters.

General Specifications

- AIC shall be issued in printed form.
- Both text and diagrams may be included.
- Originator shall select the AIC that are to be given international distribution.
- Each AIC shall be allocated a serial number, which shall be consecutive and based on the calendar year.
- When AIC are distributed in more than one series, each series shall be separately identified by a letter.
- A checklist of AIC currently in force shall be issued at least once a year, with distribution as for the AIC.

Distribution

AIC selected for international distribution shall be the same as for the AIP.

Aeronautical Charts

The aeronautical charts shall, when available for designated international aerodromes/heliports, form part of the AIP, or be provided separately to recipients of the AIP.

Electronic aeronautical charts should be provided based on digital databases and the use of geographic information systems. The chart resolution of aeronautical data shall be that as specified for a particular chart.

PRE-FLIGHT AND POST-FLIGHT INFORMATION/DATA

Pre-flight Information

- At any aerodrome/heliport normally used for international air operations, aeronautical information essential for the safety, regularity and efficiency of air navigation and relative to the route stages originating at the aerodrome/heliport shall be made available to flight operations personnel, including flight crews and services responsible for pre-flight information.
- Aeronautical information provided for pre-flight planning purposes at the aerodromes/heliports shall include relevant:
  - a) elements of the Integrated Aeronautical Information Package;
  - b) maps and charts.
- The documentation listed in a) and b) may be limited to national publications and when practicable, those of immediately adjacent States, provided a complete library of aeronautical information is available at a central location and means of direct communications are available between the aerodrome AIS unit and that library.
- A recapitulation of current NOTAM and other information of urgent character shall be made available to flight crews in the form of plain-language pre-flight information bulletins (PIB).

TELECOMMUNICATION REQUIREMENTS

- NOTAM offices shall be connected to the aeronautical fixed-service (AFS).
- The connections shall provide for printed communications.
- Each NOTAM office shall be connected, through the aeronautical fixed service (AFS), to the following points within the territory for which it provides service:-
  - a) area control centres and flight information centres;
  - b) aerodromes/heliports at which an information service is established.

Digital Data Sets.

Digital data shall be in the form of the following data sets:

a) AIP data set;
b) terrain data sets;
c) obstacle data sets;
d) aerodrome mapping data sets; and
e) instrument flight procedure data sets.

Aeronautical Information Products.

Aeronautical data and aeronautical information provided either as digital data sets or as a standardized presentation in paper or electronic media. Aeronautical information products include AIP,AIC, NOTAMS, Aeronautical charts and Digital data sets. Aeronautical information products are intended primarily to satisfy international requirements for the exchange of aeronautical information.

NATIONAL PROVISIONS

The Aeronautical Information Service which forms part of Airports Authority of India ensures the flow of information necessary for the safety , regularity and efficiency of International and National Air Navigation within the areas of its responsibility as indicated below. It consists of AIS Headquarters , International Notam Office (NOF) and AIS units.

AIS HEADQUARTERS: Safdarjung Airport, New Delhi - 110 003

INTERNATIONAL NOTAM OFFICE (NOF)

Four International NOTAM offices are established at Mumbai , Calcutta , Delhi and Chennai .

AREA OF RESPONSIBILITY

The Aeronautical Information Service is responsible for the collection and dissemination of information for the entire territory of the India and for airspace over the high seas under the jurisdiction of the India for air traffic control purposes .

AERONAUTICAL PUBLICATIONS

The Aeronautical Information is provided in the form of the integrated Aeronautical Information Package consisting of the following elements

a. Aeronautical Information Publication (AIP)

b. Amendment service to the AIP (AIP AMDT)

c. Supplement to the AIP (AIP SUP)

d. NOTAM and pre-flight information bulletins (PIB)

e. Aeronautical information circulars (AIC) ; and

f. Check lists and summaries

NOTAMS and the related monthly checklists are issued via the Aeronautical fixed service (AFS) , while PIB are made available at ATS Reporting office. All other documents of the Package are distributed by mail.

Aeronautical Information Publication (AIP). The AIP is the basic aviation document intended primarily to satisfy international requirements for the exchange of permanent aeronautical information and long duration temporary changes essential for air navigation

Amendment service to the AIP (AIP AMDT). Amendment to the AIP are made by means of replacement sheets, once in the year in the month of April.

Supplement to the AIP (AIP SUP). The checklist of the AIP Supplements currently in force is issued in the month of January of each year.

AIP Parts. The AIP is published in loose leaf form in English for use in International and Domestic Operations .AIP India has been published in two volumes. Volume I contains Part 1 – General (Gen) and Part 2 – En-route (ENR). Volume II contains Part 3 – Aerodromes (AD). These parts contain following information:

AERONAUTICAL INFORMATION PUBLICATIONS SHALL INCLUDE IN PART 1 — GENERAL (GEN):

National Regulation And Requirements: Designated authorities, Entry, transit and departure of aircraft, Entry, transit and departure of Passengers and crew, Entry, transit and departure of Cargo, Aircraft Instruments, Equipment and Flight Documents, Summaries of Indian Regulations and International Agreements/ Conventions, Differences from ICAO Standards, Recommended Practices and Procedures.

Tables and Codes: Measuring systems, aircraft marking, holidays, Units of measurement Time System, Geodetic Reference, Aircraft Nationality and Registration Public Holidays, Abbreviation used in AIS publication, Chart symbols, Location indicators, List of radio navigation aids Conversion tables, Sunrise/Sunset tables.

Services: Aeronautical information services: Responsible services, Area of responsibility Aeronautical publication AIRAC System Pre-flight information service at aerodromes. Aeronautical charts: Responsible service(s), Maintenance of charts Purchase arrangements Aeronautical chart series available List of aeronautical charts available.

Air traffic services: Responsible service Area of responsibility Types of services, Minimum flight altitude ATS units address .

Communication services: Responsible service, Area of responsibility, Types of service Requirements and conditions.

Meteorological services: Responsible service, Area of responsibility, Meteorological observations and reports, Types of services, Notification required from operators, Aircraft reports, VOLMET service, SIGMET service, Other automated meteorological services.

Search and rescue: Responsible service(s), Area of responsibility, Types of services, SAR agreements, Conditions of availability, Procedures and signals.

Charges for Aerodromes/heliports and Air Navigation Services: Aerodrome / Heliport Charges, Air Navigation Services Charges.

AERONAUTICAL INFORMATION PUBLICATIONS SHALL INCLUDE IN PART 2 EN-ROUTE (ENR) :

General Rules and Procedures: Visual Flight Rules, Instrument Flight Rules, ATS Airspace Classification, Approach and Departure Procedures, ATS Surveillance Services, Altimeter Setting, Regional Supplementary Procedures, Air Traffic Flow and Capacity Management Service, Flight Plans (PLN), Addressing of Flight Plan Messages, Interception of Civil Aircraft Procedures, Unlawful Interference, Air Traffic Incidents.

FIR / CTA / TMA, Other Regulated Airspace. ATS Routes, RNAV Routes, Helicopter Routes, Other Routes, EN-ROUTE Holding.

Radio Navigation Aids/systems: Radio Navigation Aids & Systems, Special Navigation Systems, Global Navigation Satellite System (GNSS).

Navigation Warnings: Prohibited, Restricted and Danger Areas, Military Exercise and Training Areas, Other Activities of Dangerous Nature, Air Navigation Obstacles Enroute, Aerial Sporting and Recreational Activities.

EN-ROUTE Charts

AERONAUTICAL INFORMATION PUBLICATIONS SHALL INCLUDE IN PART 3 AERODROME (AD) :

- Aerodromes / Heliports - Introduction
- Aerodrome / Heliport Availability
- Rescue and Fire Fighting Services and Snow Plan
- List of Aerodromes, Heliports, Water Aerodromes
- Grouping of Aerodromes / Heliports
- Status of Aerodrome Licensing
- Aerodromes

NOTAM and Pre-flight Information Bulletins (PIB)

NOTAMs are originated by the International NOTAM Office Mumbai, Kolkata, Delhi and Chennai. NOTAMs are distributed in five series identified by the letters A, B, C, D and G as follows:

Series A : Contain information in respect of Changes / unserviceability etc of aeronautical facilities , likely to last for more than 2 hours , in respect of locations of direct importance to International aircraft operations , requiring General International Distribution .

Series B : Contain information in respect of Changes / unserviceability etc, of aeronautical facilities , likely to last for more than 30 minutes but less than two hours in respect of locations of direct importance to international aircraft operations , requiring limited distribution to adjacent stations only.

Series C : Contain information in respect of changes / unserviceability , etc, of aeronautical facilities in respect, of locations utilized by domestic flights only and for which no separate. A' series International distribution is given .

Series D : Contain information in respect of changes / unserviceability etc , of aeronautical facilities in respect of locations of military controlled airfields utilized by domestic flights the information of which is issued by AHQ through a VVO broadcast .

Series G : Contain information of general and lasting character affecting aircraft operations in general. The series is operated only by the International NOTAM Office, Delhi and issued under the authority of the The NOTAM of each series are allocated a serial number by the respective NOTAM offices , Commencing with No.0001 preceded by the designated letter of series A,B,C,D&G as the case may be at 0000UTC on 1st January every year.

Checklist and Summary of NOTAM

A checklist of all NOTAM current on the 1st of each month is originated by the respective NOTAM office and transmitted over the AFTN to all the addresses on the distribution list of their NOTAMs. In addition a monthly checklist and summary of NOTAM in force at the end of the month is compiled and posted to those addresses.

The complete summary is prepared once a year on the 1st January, but the summary for the subsequent months shall contain the text of only those NOTAMs, which have been promulgated during the month of issue, and remain current on the date of compilation.

Pre-Flight Information Bulletin (PIB)

Contains recapitulation of current NOTAMs and other information of urgent character for the operator/ flight crews.Pre-flight Information is available at the following aerodromes :

1.	Kolkata	2.	Chennai
3.	Delhi	4.	Mumbai

At any aerodrome normally used for international air operations, aeronautical information essential for the safety, regularity and efficiency of air navigation and relative to the route stages originating at the aerodrome shall be made available to flight operations personnel, including flight crews and services responsible for pre-flight information. The information provided includes information on departure aerodrome, elements of the Integrated Aeronautical Information Package and maps and charts.

Post-flight information. The purpose of post-flight information is to ensure that malfunctioning/unserviceability of visual or non-visual aids or Airports Authority of India Manual of Aeronautical information services any other facility essential to the safety of flight operations observed by the Pilot during the flight are reported without delay to the authorities responsible for those facilities. Similarly, presence of birds and wild life hazards on or around the airport constituting a potential hazards to aircraft operations, observed by a Pilot during the flight should be reported without delay. This is to ensure that this information is made available for distribution as the circumstances necessitate.

Automatic Self Briefing System (ASBS). Provides an automatic method of receiving, storing and retrieving the data, essentially required for pilot's pre-flight briefing. It has the capability to include information pertaining to the stations and routes concerned

QUESTIONS

1. **Detailed description of meteorological information provided at the aerodrome and an indication of which meteorological office is responsible, is in the following part of the AIP**
   A) AD
   B) RAC
   C) MET

2. **A checklist of AIP supplements currently in force shall be issued at intervals of:**
   A) Not more than 2 months
   B) Not more than 28 days
   C) Not more than one month

3. **Which of the following is information that is not given in AIP approach and landing charts?**
   A) OCH or OCA
   B) Visibility minima
   C) DME- frequencies

4. **An integrated aeronautical information package consists of the following elements**
   A) AIP, supplements to AIP; NOTAM and PIB, AIC and checklist summaries
   B) AIP, including amendment service; supplements to AIP, NOTAM and pre-flight information bulletin (PIB), AIC, checklists and summaries
   C) AIP, including amendment service; supplements to AIP, NOTAM, AIC and checklist summaries

5. **Temporary changes on specifications for AIP supplements of long duration and information of short duration which contains extensive text and/or graphics shall be published as AIP supplements. It is considered a long duration.**
   A) Three months or longer
   B) Two months or longer
   C) One year or longer

6. **Operationaly significant changes to the AIP shall be published in accordance with:**
   A) AIC procedures and identified by the acronym AIC followed by a number
   B) NOTAM procedures and identified by acronym NOTAM followed by a number
   C) AIRAC procedures and identified by the acronym AIRAC

7. A checklist of NOTAM currently in force shall be issued at the AFTN at intervals of:

A) Not more than 28 days
B) Not more than one month
C) Not more than 10 days

8. Change in frequency or location of navigational aids on short notice is notified through:

A) Notams
B) AIRAC
C) AIP

9. The contents of Aeronautical Information Publication (AIP) are:

A) GEN, ENR (en-route) and AD (aerodromes)
B) GEN, ENR, RAC, AD
C) GEN, AGA, COM, ENR, FAL

10. The SIGMET service, is in the AIP, in the following part:

A) AGA
B) GEN
C) MET

11. In which chapter of the AIP can you find a list with "location indicators"?

A) AGA
B) GEN
C) ENR

12. The informations on holding, approach and departure procedures, are found in the following part of the AIP:

A) ENR
B) MAP
C) AD

13. The closure of a runway for a year, because of maintenance, will be published:

A) Only in AIP
B) In NOTAM and AIP, inclusive Supplement
C) Only in NOTAM

14. An AIRAC is:

A) An acronym for a system aimed at advance notification based on common effective dates, of circumstances necessitating significant changes in operating procedures
B) 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
C) A package which consists of the following elements: AIP, supplements to the AIP, NOTAM, AIC, checklists and summaries

15. Select the acronym corresponding to the following definition: an special NOTAM series notifying, by means of a specific format, an important change for the aircraft operations, due to a volcano activity, a volcano eruption or a volcanic ash cloud.

A) GVATAM
B) ASHTAM
C) NAVTAM

16. The system notifying in advance the circumstances requiring important changes in the methods of operation, based on common effective dates, is identified by the acronym:

A) AIRAC
B) EATCHIP
C) IFPS

17. The temporary, long-term modification (3 months or more) and the short-term extensive or graphical information are published as follows:

A) AIP Supplements
B) Trigger NOTAM
C) NOTAM

18. The informations concerning charges for aerodromes/heliports and Air Navigation Services are on the following part of the AIP:

A) AD
B) GEN
C) FAL

19. A notice providing information on Rules of the Air, Traffic Services and Air Navigation Procedures and distributed in advance of its effective date is:

A) An AIRAC
B) An ATS NOTAM
C) An Advisory NOTAM

20. A notice containing information concerning flight safety, air navigation, technical, administration or legislative matters and originated at the AIS of a state is called:

A) NOTAM
B) AIRAC
C) Aeronautical Information Circular (AIC)

21. In which section of AIP are contained information elements relating to prohibited, restricted and dangerous areas?

A) AGA
B) ENR
C) GEN

22. In which section of AIP are contained information elements to refueling facilities and limitations on refuelling services?

A) AD
B) GEN
C) SAR

23. In which section of the AIP are contained information elements relating to areas and/or routes for which meteorological service is provided?

A) MET
B) GEN
C) RAC

24. Each contracting state shall provide an Aeronautical Information Service (AIS) in its territory and for areas in which the state is responsible for the Air Traffic Services outside its territory, and this shall include the preparation and origination of:

A) Only AIP and NOTAM's
B) AIP, NOTAM's, Circular and AIRAC
C) Integrated Aeronautical Information Package

25. The identification of each prohibited, restricted and danger area shall be composed by:

A) The nationality letters for location indicators assigned to the state or territory, followed the letters P, R and D and figures
B) The letters P (Prohibited), R (Restricted) and D (Dangerous) for the area concerned and figures
C) The letters P (Prohibited), R (Restricted) and D (Dangerous) followed by figures

26. NOF in India are established at:

A) All major aerodromes.
B) All international Airports
C) International Airports at Delhi, Mumbai, Kolkatta and Chennai only.

ANSWERS

1	2	3	4	5	6	7	8	9	10
A	C	B	B	A	C	B	A	A	B

11	12	13	14	15	16	17	18	19	20
B	A	B	A	B	A	A	B	A	C

21	22	23	24	25	26
B	A	B	C	A	C

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SEARCH AND RESCUE

(Annex 12, AIP, India, CIVIL AVIATION REQUIREMENTS SECTION 9 AIR SPACE AND AIR NAVIGATION STANDARDS SERIES 'S', PART I ISSUE II)

Search and Rescue Services

Contracting States shall, individually or in cooperation with other States, arrange for the establishment and prompt provision of search and rescue services within their territories to ensure that assistance is rendered to persons in distress. Such services shall be provided on a 24-hour basis.

Those portions of the high seas or areas of undetermined sovereignty for which search and rescue services will be established shall be determined on the basis of Regional Air Navigation Agreements.

Search And Rescue Regions

Contracting States shall delineate the search and rescue regions within which they will provide search and rescue services. Such regions shall not overlap and neighboring regions shall be contiguous.

Rescue Coordination Centres And Rescue Sub Centres

NATIONAL PROVISIONS

Indian Government has assumed the responsibility of providing Search and Rescue (SAR) cover in Indian Search & rescue regions (SRR). Search and rescue services are provided over land areas by the National Aeronautical Search & Rescue Coordination Committee (NASARCC) designating Secretary, Ministry of Civil Aviation as its chairman & over oceanic areas by National Maritime SAR Board (NMSARB) designating Director General, Indian Coast Guard as its Chairman.

Such services shall be provided within the entire Indian Territory including territorial waters. Such services shall also be provided over those portions of the high seas or areas of undetermined sovereignty for which responsibility of providing Search & Rescue services has been delegated to India. The boundary of Indian Aeronautical SRR coincides with Indian FIR boundary, excluding the portion of FIR over the sovereign territory of Kingdom of Bhutan.

Airports Authority of India coordinates SAR services through four rescue Coordination Centres established at Delhi Mumbai, Kolkata & Chennai FIRs.

In areas over high seas, SAR services are provided by Indian Coast Guard through three maritime Rescue coordination centres (MRCCs) located at Mumbai, Chennai & Port Blair as promulgated in National Maritime Search & rescue manual.

Search & Rescue services over Indian Airspace excluding the oceanic areas are coordinated by Airports Authority of India with the SAR agencies.

Search & Rescue services over Oceanic areas which form part of Kolkata, Mumbai & Chennai FIR are provided by Indian Coast Guard.

In addition, various other departments of the Central and State Governments such as Railways, Post & Telegraph, All India Radio, Police and District Collectors/ Magistrates, Municipal and Local bodies, Airline operators, Flying clubs, Professional Pilots, Mercantile Marine, Port Trust and Armed Forces are available for search and rescue missions when required.

Search And Rescue Equipment

Search and rescue units shall be provided with equipment for locating promptly, and for providing adequate assistance at, the scene of an accident.

Each search and rescue aircraft shall be equipped to be able to communicate on the aeronautical distress and on scene frequencies and on such other frequencies as may be prescribed.

Each search and rescue aircraft shall be equipped with a device for homing on distress frequencies.

Each search and rescue aircraft, when used for search and rescue over maritime areas, shall be equipped to be able to communicate with vessels.

Many vessels can communicate with aircraft on 2182 kHz, 4125 kHz and 121.5 MHz. However, these frequencies, and in particular 121.5 MHz, may not be routinely monitored by vessels.

Each search and rescue aircraft, when used for search and rescue over maritime areas shall carry a copy of the International Code of Signals to enable it to overcome language difficulties that may be experienced in communicating with ships.

Survival equipment, dropped by SAR and containing food and water will be packed in containers and indicated by streamers of Blue colour.

OPERATING PROCEDURES

Procedures for pilots-in-command at the scene of an accident

When a pilot-in-command observes that either another aircraft or a surface craft is in distress, the pilot shall, if possible and unless considered unreasonable or unnecessary:

a) keep the craft in distress in sight until compelled to leave the scene or advised by the rescue coordination centre that it is no longer necessary;

b) determine the position of the craft in distress;

c) as appropriate, report to the rescue coordination centre or air traffic services unit as much information as possible:

If the first aircraft to reach the scene of an accident is not a search and rescue aircraft, it shall take charge of on-scene activities of all other aircraft subsequently arriving until the first search and rescue aircraft reaches the scene of the accident.

Procedures for a pilot-in-command intercepting a distress transmission

Whenever a distress transmission is intercepted by a pilot-in command of an aircraft, the pilot shall, if feasible:

a) acknowledge the distress transmission;

b) record the position of the craft in distress if given;

c) take a bearing on the transmission;

d) inform the appropriate rescue coordination centre or air traffic services unit of the distress transmission, giving all available information; and

e) at the pilot's discretion, while awaiting instructions, proceed to the position given in the transmission.

SEARCH AND RESCUE SIGNALS

Signals with Surface Craft

The following man oeuvres performed in sequence by an aircraft mean that the aircraft wishes to direct a surface craft towards an aircraft or a surface craft in distress:

a) circling the surface craft at least once;

b) crossing the projected course of the surface craft close ahead at low altitude and:

1) rocking the wings; or
2) opening and closing the throttle; or
3) changing the propeller pitch.

Note:– Due to high noise level on board surface craft, the sound signals in 2) and 3) may be less effective than the visual signal in 1) and are regarded as alternative means of attracting attention.

c) heading in the direction in which the surface craft is to be directed.

Repetition of such man oeuvres has the same meaning.

The following man oeuvres by an aircraft means that the assistance of the surface craft to which the signal is directed is no longer required:

— crossing the wake of the surface craft close astern at a low altitude and:

1) rocking the wings; or
2) opening and closing the throttle; or
3) changing the propeller pitch.

Note:– The following replies may be made by surface craft to the signal:

— for acknowledging receipt of signals:

1) the hoisting of the "code pennant" (vertical red and white stripes) close up (meaning understood);
2) the flashing of a succession of "T's" by signal lamp in the Morse code;
3) the changing of heading to follow the aircraft.

— for indicating inability to comply:

1) the hoisting of the international flag "N" (a blue and white checkered square);
2) the flashing of a succession of "N's" in the Morse code.

Ground-air Visual Signal Code for use by Survivors

No.	Message Code Symbol	Code Symbol
1	Require Assistance	V
2	Require Medical Assistance	X
3	No or Negative	N
4	Yes or Affirmative	Y
5	Proceeding in this direction	↑

Ground-air Visual Signal Code for use by Rescue Units

No.	Message Code Symbol	Code Symbol
1	Operation Completed	LLL
2	We have found all personnel	LL
3	We have found only some personnel	++
4	We are not able to continue. Returning to base	XX
5	Have divided into two groups. Each proceeding in direction indicated	⇄
6	Information received that aircraft is in this direction	→ →
7	Nothing found. Will continue to search	NN

Symbols shall be at least 2.5 metres (8 feet) long and shall be made as conspicuous as possible. Provide as much colour contrast as possible between signals and background.

Note 1:— Symbols may be formed by any means such as: strips of fabric, parachute material, pieces of wood, stones or such like material; marking the surface by tramping, or staining with oil.

Note 2:— Attention to the above signals may be attracted by other means such as radio, flares, smoke and reflected light.

Air-to-ground signals

The following signals by aircraft mean that the ground signals have been understood:

a) during the hours of daylight:

— by rocking the aircraft's wings;

b) during the hours of darkness:

— flashing on and off twice the aircraft's landing lights or, if not so equipped, by switching on and off twice its navigation lights.

Lack of the above signal indicates that the ground signal is not understood.

SATELLITE-AIDED SEARCH AND RESCUE

India has evolved a Satellite-aided Search and Rescue programme participation in the COSPAS/SARSAT systems. It operates on 406MHz. Location accuracy is normally within 5Km. The system will detect transmissions on this frequency throughout the Indian Search and Rescue Region (SRR) and also SRR of Bangladesh, Myanmar, Bhutan, Indonesia, Kenya, Malaysia, Maldives, Mauritius, Nepal, Seychelles, Singapore, Somalia, Sri Lanka, Thailand and Tanzania.

Under this programme two local user terminals (LUT) have been established, at Bangalore and Lucknow, with the Indian Mission Control Centre (INMCC) at Bangalore, which would be responsible for coordination with Rescue Coordination Centres and other International Mission Control Centres.

The INMCC at Bangalore is connected with the RCCs at Mumbai, Delhi, Kolkata and Chennai through AFS network. Any distress alert received from the areas covered is automatically transmitted to the RCC.

SAR agreements. At present India has SAR Arrangement with Royal Government of Bhutan. India can seek SAR assistance from adjoining RCCs of other nations in accordance with the bi-lateral agreement. For the purpose of SAR, the authorities of the other State who wish their SAR units to enter the territory of India shall transmit a request, giving full details of the projected missions and the need for it.

QUESTIONS

1. **The units responsible for promoting efficient organization of search and rescue service are:**
   A) Area control centre, flight information centre and rescue coordination centre
   B) Rescue coordination centre and rescue sub-centres
   C) Alerting centre and rescue coordination centre

2. **Three aircraft, (1), (2) and (3) arrive successively at ten minute intervals, overhead the scene of a recent aircraft accident.**
   - aircraft (1) is unable to establish contact with the Search and Rescue Centre
   - aircraft (2) is able to contact the Search and Rescue Centre
   - aircraft (3) is a Search and Rescue helicopter
   The command of the situation is the responsibility of
   A) (1), then by mutual consent (2) and then (3)
   B) (1), and then by mutual consent to (3)
   C) (1), then by mutual consent (2) until the completion of operations

3. **What is the meaning of the symbol "V" in the ground air visual signal code for use by survivors?**
   A) Landing here impossible
   B) Require assistance
   C) Require medical assistance

4. **What is the meaning of the symbol "LLL" in the ground air visual signal code for use by rescue units?**
   A) Operation completed
   B) We are returning to base
   C) We have found all personnel

5. **Which of the following is NOT an international distress frequency?**
   A) 243.0MHz
   B) 2182KHz
   C) 2430KHz

6. **An aircraft is flying over a mountainous region in which a search is being carried out to find the survivors of an aircraft accident. The pilot sees a ground signal in the form of an "X". This indicates:**
   A) "All occupants alive"
   B) "Need mechanical assistance"
   C) "Need medical assistance"

7. **At night an aircraft observes a luminous signal requesting help. To indicate that he has received these ground signals, the pilot must:**
   A) Make at least one complete turn over the group of people in difficulty
   B) Transmit, by luminous Morse signal, a series of the letter "R" using his navigational lights
   C) Switch his landing lights on and off twice or, if he is not so equipped, his navigation lights twice

8. **The color identification of the contents of droppable containers and packages containing survival equipment should take the form of coloured streamers according to the following code:**
   A) Red for medical supplies and first aid equipment
   B) Black for food and water
   C) Blue for blankets and protective clothing

9. **COSPAS-SARSAT is:**
   A) A communication system linking all aircraft
   B) A space system for the search of vessels in distress
   C) A SAR satellite-aided tracking system

10. **You are flying in Mumbai FIR when you intercept a distress call. You record the message and tell Mumbai FIC. The radio operator at Mumbai tells you to standby. What should you consider doing whilst awaiting instructions?**
    A) Make a general call on 121.5 asking other airplanes to assist
    B) Descend to low level and carry out a surface search for ships
    C) Proceed to the position given in the distress message

11. **Search and Rescue services within the territory of ICAO contracting states are provided:**
    A) On a 24 hour basis
    B) When the authority of the contracting state decides to do so
    C) From sunset to sunrise

12. **Contracting States shall establish a rescue co-ordination centre:**
    A) At every ATS facility.
    B) In each search and rescue region.
    C) If they are adjacent to the sea.

13. A Rescue Unit is:

A) A unit assisting a RCC in SAR duties.
B) A unit composed of trained personnel and provided with equipment suitable for the expeditious conduct of SAR.
C) A unit responsible for SAR service in co-operation with a RCC.

14. Which of the following statements regarding Alerting service is correct?

A) Aircraft in the vicinity of an aircraft known or believed to be the subject of unlawful interference, shall be informed about this;
B) The Alert phase is established when no communication has been received from an aircraft within a period of thirty minutes after the time a communication should have been received;
C) Alerting Service and Flight Information Service are often provided by the same ATS unit

15. Whenever a distress signal and/or message or equivalent transmission is intercepted by the PIC of an aircraft, he shall:

A) Record the position of the craft in distress if given and if possible take a bearing on the transmission
B) If possible take a bearing on the transmission
C) Record the position of the craft in distress if given

16. What is the meaning of SAR signal "N" when used by survivors on the ground:

A) Negative
B) Require medical assistance
C) Require assistance

17. Survival equipment, dropped by SAR and containing food and water will be packed in containers and indicated by streamers of following colour:

A) green
B) blue
C) yellow

ANSWERS

1	2	3	4	5	6	7	8	9	10	11	12	13	14
B	A	B	A	C	C	C	A	C	C	A	B	B	C

15	16	17
A	A	B

12

VISUAL AIDS FOR NAVIGATION

(ICAO ANNEX 14, CAR SECTION-4, AERODROME STANDARDS & LICENSING SERIES 'B', PART I ISSUE II)

INDICATORS AND SIGNALLING DEVICES WIND DIRECTION INDICATORS (WDI)

Application

An aerodrome shall be equipped with at least one wind direction indicator.

Location

A wind direction indicator shall be located so as to be visible from aircraft in flight or on the movement area and in such a way as to be free from the effects of air disturbances caused by nearby objects.

Characteristics

Recommendation: Provision should be made for illuminating at least one wind indicator at an aerodrome intended for use at night.

LANDING DIRECTION INDICATOR (LDI)

Location

Where provided, a landing direction indicator shall be located in a conspicuous place on the aerodrome.

Characteristics

Recommendation: The landing direction indicator should be in the form of a 'T'.

SIGNALING LAMP

Application

A signaling lamp shall be provided at a controlled aerodrome in the aerodrome control tower.

Characteristics

Recommendation: A signaling lamp should be capable of producing red, green and white signals.

SIGNAL PANELS AND SIGNAL AREA

Location of signal area

Recommendation: The signal area should be located so as to be visible from all angles of azimuth above an angle of 10° above the horizontal when viewed from a height of 300 m.

Characteristics of signal area

The signal area shall be an even horizontal surface at least 9 m square.

Recommendation: The colour of the signal area should be chosen to contrast with the colours of the signal panels used, and it should be surrounded by a white border not less than 0.3 m wide.

MARKINGS

GENERAL

INTERRUPTION OF RUNWAYS MARKINGS

At an intersection of two (or more) runways, the markings of the more important runway, except for the runway side stripe marking, shall be displayed and the markings of the other runway(s) shall be interrupted. The runway side stripe marking of the more important runway may be either continued across the inter¬section or interrupted.

Recommendation: The order of importance of runways for the display of runway markings should be as follows:

1st: precision approach runway;

2nd: non-precision approach runway; and

3rd: non-instrument runway.

At an intersection of a runway and taxiway the markings of the runway shall be displayed and the markings of the taxiway interrupted, except that runway side stripe markings may be interrupted.

Colour and Conspicuity

Runway markings shall be white.

Notes:—1. On runway surfaces of light colour, the conspicuity of white markings can be improved by outlining them in black.

2. It is preferable that the risk of uneven friction characteristics on markings be reduced in so far as practicable by the use of a suitable kind of paint.

3. Markings may consist of solid areas or a series of longitudinal stripes providing an effect equivalent to the solid areas.

Taxiway markings, runway turn pad markings and aircraft stand markings shall be yellow.

Apron safety lines shall be of a conspicuous colour which shall contrast with that used for aircraft stand markings. Apron safety lines shall be located so as to define the areas intended for use by ground vehicles and other aircraft servicing equipment, etc., to provide safe separation from aircraft.

Apron safety lines shall be of red colour in India.

Recommendation: At aerodromes where operations take place at night, pavement markings should be made with reflective materials designed to enhance the visibility of the markings.

RUNWAY DESIGNATION MARKING

Application

A runway designation marking shall be provided at the thresholds of a paved runway.

Recommendation: A runway designation marking should be provided, so far as practicable, at the thresholds of an unpaved runway.

Location

A runway designation marking shall be located at a threshold as shown in Fig. 1, as appropriate.

Note:– If the runway threshold is displaced from the extremity of the runway, a sign showing the designation of the runway may be provided for aeroplanes taking off.

Characteristics

A runway designation marking shall consist of a two-digit number and on parallel runways shall be supplemented with a letter. On a single runway, dual parallel runways and triple parallel runways, the two-digit number shall be the whole number nearest the one-tenth of the magnetic North when viewed from the direction of approach. On four or more parallel runways, one set of adjacent runways shall be numbered to the nearest one-tenth magnetic azimuth and the other set of adjacent runways numbered to the next nearest one-tenth of the magnetic azimuth. When the above rule would give

a single-digit number, it shall be preceded by a zero.

In the case of parallel runways, each runway designation number shall be supplemented by a letter as follows, in the order shown from left to right when viewed from the direction of approach:

— for two parallel runways: 'L', 'R';
— for three parallel runways: 'L', 'C', 'R';
— for four parallel runways: 'L', 'R', 'L', 'R';
— for five parallel runways: 'L', 'C', 'R', 'L', 'R'; or 'L', 'R', 'L', 'C', 'R';
— for six parallel runways: 'L', 'C', 'R', 'L', 'C', 'R'.

RUNWAY CENTRE LINE MARKING

Application

A runway centre line marking shall be provided on a paved runway.

Location

A runway centre line marking shall be located along the centre line of the runway between the runway designation markings as shown in Fig. 1, except when interrupted at the intersection of two or more runways.

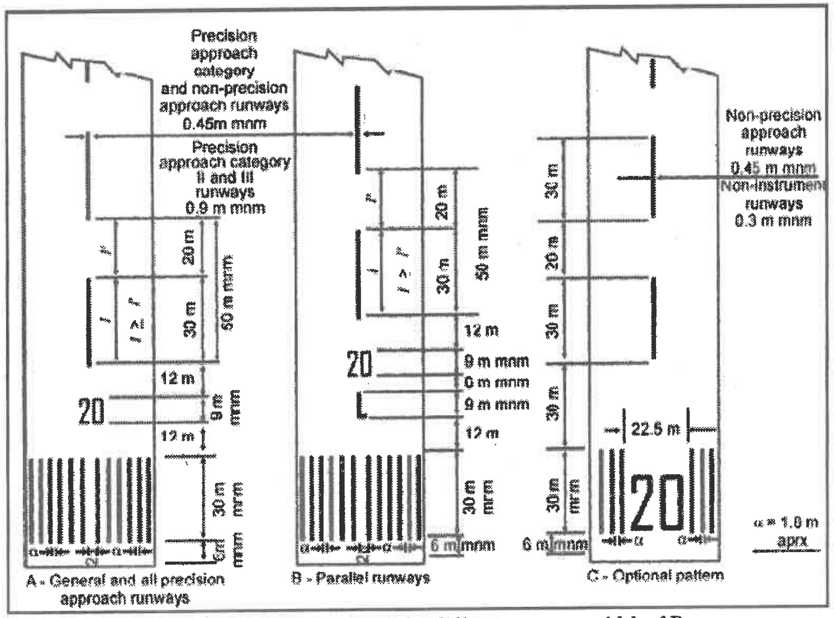


Fig. 1 Runway threshold markings for different runway width of Runways

Characteristics

A runway centre line marking shall consist of a line of uniformly spaced stripes and gaps. The length of a stripe plus a gap shall be not less than 50 m or more than 75 m. The length of each stripe shall be at least equal to the length of the gap or 30 m, whichever is greater.

The width of the stripes shall be not less than:

— 0.90 m on precision approach category II and III runways;

— 0.45 m on non-precision approach runways where the code number is 3 or 4, and precision approach category I runways; and

— 0.30 m on non-precision approach runways where the code number is 1 or 2, and on non-instrument runways.

THRESHOLD MARKING

Application

A threshold marking shall be provided at the threshold of a paved instrument runway, and of a paved non-instrument runway where the code number is 3 or 4 and the runway is intended for use by international commercial air transport.

Recommendations:

1. A threshold marking should be provided at the threshold of a paved non-instrument runway where the code number is 3 or 4 and the runway is intended for use by other than international commercial air transport.
2. A threshold marking should be provided, so far as practicable, at the thresholds of an unpaved runway.

Location

The stripes of the threshold marking shall commence 6 m from the threshold.

Characteristics

A runway threshold marking shall consist of a pattern of longitudinal stripes of uniform dimensions disposed symmetrically about the centre line of a runway as shown in Fig. 1(A) and 1(B) for a runway width of 45 m. The number of stripes shall be in accordance with the runway width as follows:

Runway Width	Number of Stripes
18 m	4
23 m	6
30 m	8
45 m	12
60 m	16

Except that on non-precision approach and non-instrument runways 45 m or greater in width, they may be as shown in Fig. 1(C).

TRANSVERSE STRIPE

Recommendation: Where a threshold is displaced from the extremity of a runway or where the extremity of a runway is not square with the runway centre line, a transverse stripe as shown in Fig. 2(B) should be added to the threshold marking.

A transverse stripe shall be not less than 1.80 m wide.

ARROWS

Where a runway threshold is permanently displaced, arrows conforming to Fig. 2(B) shall be provided on the portion of the runway before the displaced threshold.

When a runway threshold is temporarily displaced from the normal position, it shall be marked as shown in Fig. 2(A) or 2(B) and all markings prior to the displaced threshold shall be obscured except the runway centre line marking, which shall be converted to arrows.

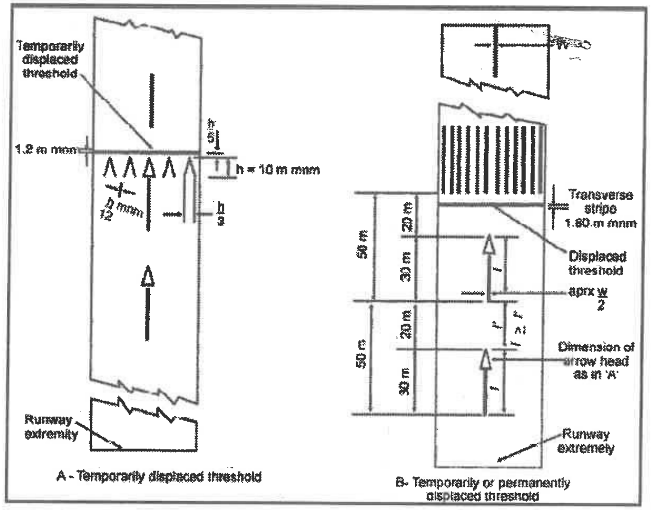


Fig 2 Displaced threshold markings

AIMING POINT MARKING

Application

An aiming point marking shall be provided at each approach end of a paved instrument runway where the code number is 2, 3 or 4.

Recommendation: An aiming point marking should be provided at each approach end of:

(a) a paved non-instrument runway where the code number is 3 or 4,

(b) a paved instrument runway where the code number is 1

when additional conspicuity of the aiming point is desirable.

Location

The aiming point marking shall commence no closer to the threshold than the distance indicated in the appropriate column of Table 1, except that, on a runway equipped with a visual approach slope indicator system, the beginning of the marking shall be coincident with the visual approach slope origin.

An aiming point marking shall consist of two conspicuous stripes. The dimensions of the stripes and the lateral spacing between their inner sides shall be in accordance with the provisions of the appropriate column of Table 1. Where a touchdown zone

Table 1. Location and dimensions of aiming point marking

Location and dimensions	Landing distance available			
	Less than 800m	**800m up to but not including 1200m**	**1200m up to but not including 2400m**	**2400m and bove**
Distance from threshold to beginning of marking	150m	250m	300m	400m
Length of stripe*	30-45m	30-45m	45-60m	45-60m
With of stripe	4m	6m	6-10m**	6-10m**
Lateral spacing between inner sides of stripes	6m***	9m***	18-22.5m	18-22.5m

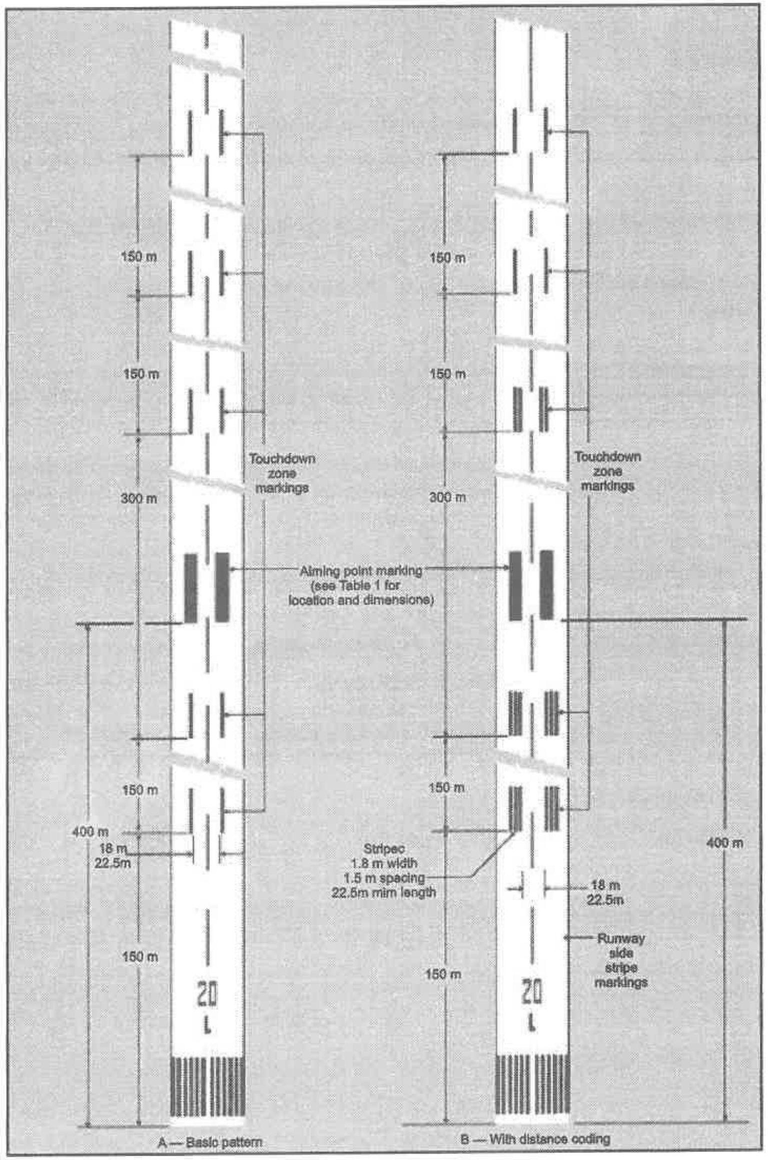


Fig 3 Aiming point and touchdown zone markings

TOUCHDOWN ZONE MARKING

Application

A touchdown zone marking shall be provided in the touchdown zone of a paved precision approach runway where the code number is 2, 3 or 4.

Recommendation: A touchdown zone marking should be provided in the touchdown zone of a paved non-precision approach or non-instrument runway where the code number is 3 or 4 and additional conspicuity of the touchdown zone is desirable.

Location and characteristics

A touchdown zone marking shall consist of pairs of rectangular markings symmetrically disposed about the runway centre line with the number of such pairs related to the landing distance available and, where the marking is to be displayed at both the approach directions of a runway, the distance between the thresholds, as follows:

Landing distance available or the distance between thresholds	Pair(s) of markings
less than 900m	1
900m up to but not including 1 200 m	2
1 200m up to but not including 1 500 m	3
1 500m up to but not including 2 400m	4
2 400m or more	6

RUNWAY SIDE STRIPE MARKING

Application

A runway side stripe marking shall be provided between the thresholds of a paved runway where there is a lack of contrast between the runway edges and the shoulders or the surrounding terrain.

Recommendation: A runway side stripe marking should be provided on a precision approach runway irrespective of the contrast between the runway edges and the shoulders or the surrounding terrain.

Location

Recommendation: A runway side stripe marking should consist of two stripes, one placed along each edge of the runway with the outer edge of each stripe approximately on the edge of the runway, except that, where the runway is greater than 60 m in width, the stripes should be located 30 m from the runway centre line.

Characteristics

Recommendation: A runway side stripe should have an overall width of at least 0.9 m on runways 30 m or more in width and at least 0.45 m on narrower runways.

TAXIWAY CENTRE LINE MARKING

Application

Taxiway centre line marking shall be provided on a paved taxiway, de-icing/anti-icing facility and apron where the code number is 3 or 4, in such a way as to provide continuous guidance between the runway centre line and aircraft stands.

Recommendation: Taxiway centre line marking should be provided on a paved taxiway, de-icing/anti-icing facility and apron where the code number is 1 or 2, in such a way as to provide continuous guidance between the runway centre line and aircraft stands.

Taxiway centre line marking shall be provided on a paved runway when the runway is part of a standard taxi-route and:

(a) there is no runway centre line marking; or

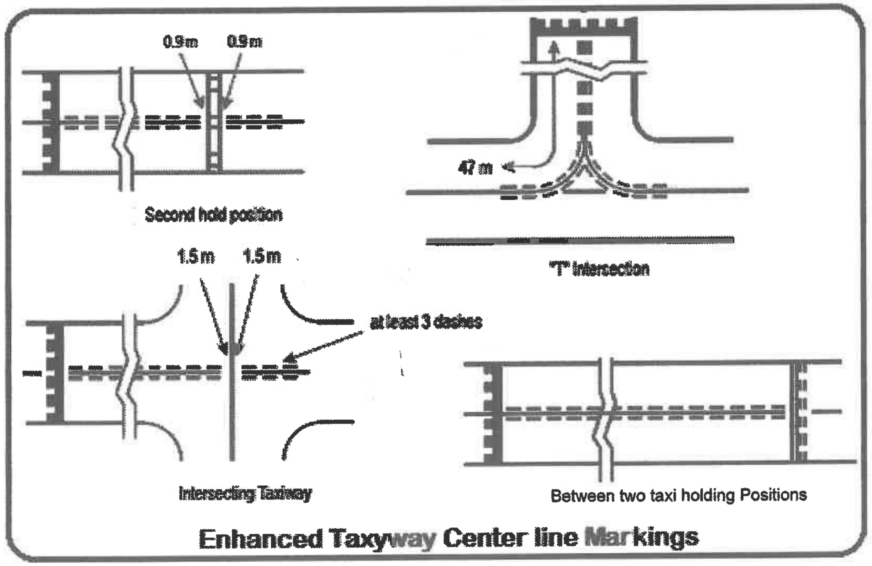
(b) where the taxiway centre line is not coincident with the runway centre line.

Location

Recommendations:

1. Where it is necessary to denote the proximity of a runway-holding position, enhanced taxiway centre line marking should be provided. The provision of enhanced taxiway centre line marking may form part of runway incursion prevention measures. Where provided, enhanced taxiway centre line marking shall be installed at each taxiway/runway intersection. An enhanced taxiway centre line marking shall extend from the runway-holding position Pattern A to a

distance of up to 47 m in the direction of travel away from the runway.



2. On a straight section of a taxiway the taxiway centre line marking should be located along the taxiway centre line. On a taxiway curve the marking should continue from the straight portion of the taxiway at a constant distance from the outside edge of the curve.
3. At an intersection of a taxiway with a runway where the taxiway serves as an exit from the runway, the taxiway centre line marking should be curved into the runway centre line marking, as shown in Fig. 4.

Characteristics

A taxiway centre line marking shall be at least 15 cm in width and continuous in length except where it intersects with a runway-holding position marking or an intermediate holding position marking, as shown in Fig. 4.

ISOLATED AIRCRAFT PARKING POSITION

An isolated aircraft parking position shall be designated or the aerodrome control tower shall be advised of an area or areas suitable for the parking of an aircraft which is known or believed to be the subject of unlawful interference, or which for other reasons needs isolation from normal aerodrome activities.

Recommendation: The isolated aircraft parking position should be located at the maximum distance practicable and in any case never less than 100 m from other parking positions, buildings or public areas, etc. Care should be taken to ensure that the position is not located over underground utilities such as gas and aviation fuel and, to the extent feasible, electrical or communication cables.

RUNWAY-HOLDING POSITION MARKING

Application and location

A runway-holding position marking shall be displayed along a runway-holding position.

Characteristics

At an intersection of a taxiway and a non-instrument, non-precision approach or takeoff runway, the runway holding position marking shall be as shown in Fig. 4, pattern A.

Where a single runway-holding position is provided at an intersection of a taxiway and a precision approach category I, II or III runway, the runway-holding position marking shall be as shown in Fig. 4, pattern A. Where two or three runway-holding positions are provided at such an intersection, the runway-holding position marking closer (closest) to the runway shall be as shown in Fig. 4, pattern A and the markings further from the runway shall be as shown in Fig. 4, pattern B.

The runway-holding position marking displayed at a runway-holding position established at a position other than normal position, i.e. to avoid infringement of obstacle limitation surface or interference with radio/navaids, it shall be as shown in Fig. 4, pattern A.

INTERMEDIATE HOLDING POSITION MARKING

Application and location

Recommendations

1. An intermediate holding position marking should be displayed along an intermediate holding position.
2. An intermediate holding position marking should be displayed at the exit boundary of a remote de-icing/anti-icing facility adjoining a taxiway.

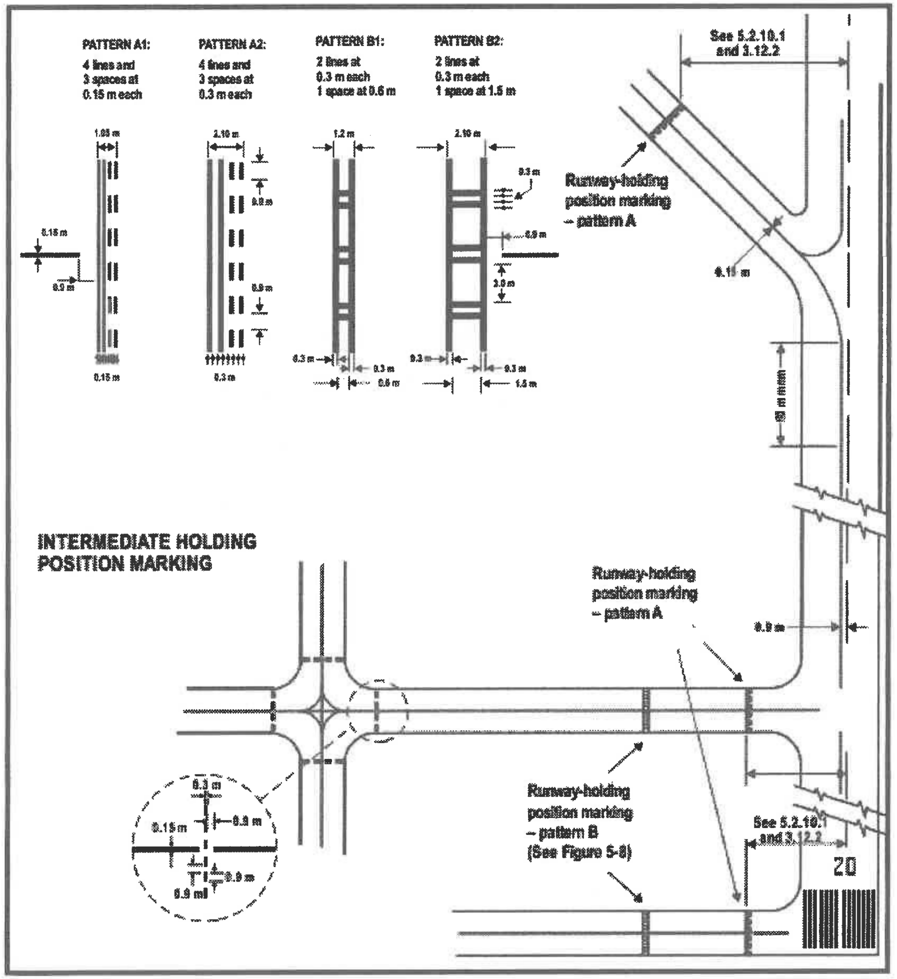


Figure 4. Runway-holding position markings

Note.— Patterns A1 and B1 are no longer valid after 2026.

VOR AERODROME CHECKPOINT MARKING

Characteristics

A VOR aerodrome checkpoint marking shall consist of a circle 6 m in diameter and have a line width of 15 cm (See Fig. 5(A)).

Recommendations

1. When it is preferable for an aircraft to be aligned in a specific direction, a line should be provided that passes through the centre of the circle on the desired azimuth. The line should extend 6 m outside the circle in the desired direction of heading and terminate in an arrowhead. The width of the line should be 15 cm (See Fig. 5(B)).
2. A VOR aerodrome checkpoint marking should preferably be white in colour but should differ from the colour used for the taxiway markings.

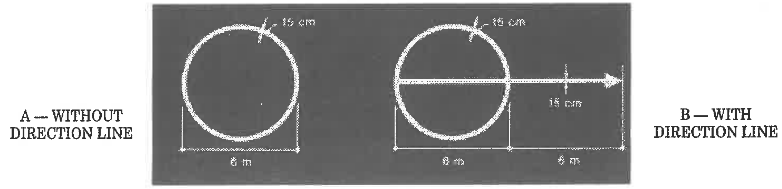


Fig 5 VOR aerodrome check-point marking

AIRCRAFT STAND MARKINGS

Application

Recommendation: Aircraft stand markings should be provided for designated parking positions on a paved apron and on a de-icing/anti-icing facility.

Characteristics

Recommendations:

1. Aircraft stand markings should include such elements as stand identification, lead-in line, turn bar, turning line, alignment bar, stop line and lead-out line, as are required by the parking configuration and to complement other parking aids.
2. An aircraft stand identification (letter and/or number) should be included in the lead-in line a short distance after the beginning of the lead-in line. The height of the identification should be adequate to be readable from the cockpit of aircraft using the stand.

Lead-in, turning and lead-out lines should normally be continuous in length and have a width of not less than 15 cm. Where one or more sets of stand markings are superimposed on a stand marking, the lines should be continuous for the most demanding aircraft and broken for other aircraft.

APRON SAFETY LINES

Application

Recommendation: Apron safety lines should be provided on a paved apron as required by the parking configurations and ground facilities.

Location

Apron safety lines shall be located so as to define the areas intended for use by ground vehicles and other aircraft servicing equipment, etc., to provide safe separation from aircraft.

Characteristics

Recommendations:

1. Apron safety lines should include such elements as wingtip clearance lines and service road boundary lines as required by parking configurations and ground facilities.
2. An apron safety line should be continuous in length and at least 10 cm in width.

ROADHOLDING POSITION MARKING

Application

A roadholding position marking shall be provided at all road entrances to a runway.

Location

The roadholding position marking shall be located across the road at the holding position.

Characteristics

The roadholding position marking shall be in accordance with the local road traffic regulations.

MANDATORY INSTRUCTION MARKING

Application

Where it is impracticable to install a mandatory instruction sign, a mandatory instruction marking shall be provided on the surface of the pavement.

Recommendation: Where operationally required, such as on taxiways exceeding 60 m in width, a mandatory instruction sign should be supplemented by a mandatory instruction marking.

Location

The mandatory instruction marking shall be located on the left-hand side of the taxiway centre line marking and on the holding side of the runway-holding position marking, as shown in Fig. 6. The distance between the nearest edge of the marking

and the runway-holding position marking or the taxiway centre line marking shall be not less than 1 m.

Recommendation: Except where operationally required, a mandatory instruction marking should not be located on a runway.

Characteristics

A mandatory instruction marking shall consist of an inscription in white on a red background. Except for a NO ENTRY marking, the inscription shall provide information identical to that of the associated mandatory instruction sign.

A NO ENTRY marking shall consist of an inscription in white reading NO ENTRY on a red background.

Where there is insufficient contrast between the marking and the pavement surface, the mandatory instruction marking shall include an appropriate border, preferably white or black.

Recommendations

1. The character height should be 4 m.
2. The background should be rectangular and extend a maximum of 0.5 m laterally and vertically beyond the extremities of the inscription.

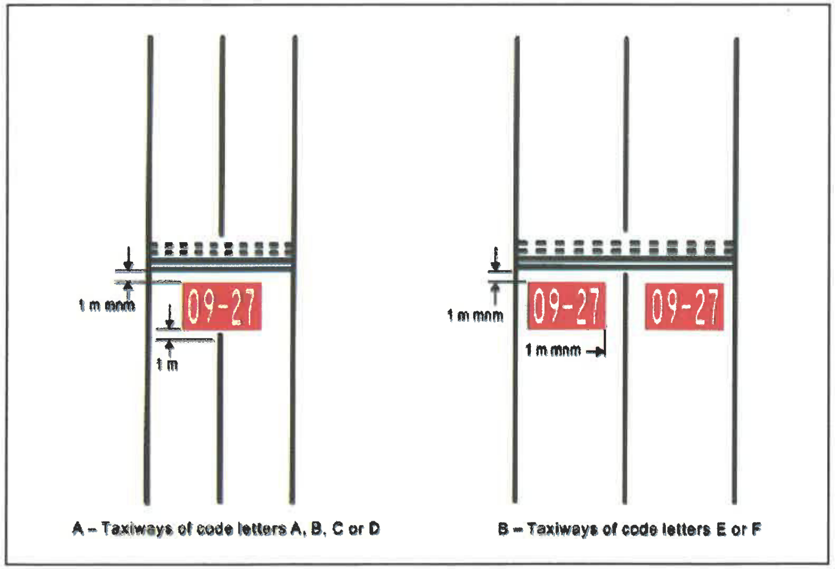


Fig 6 Mandatory Instruction Marking

INFORMATION MARKING

Application

Where an information sign would normally be installed and it is physically impossible to install a sign, an information marking shall be displayed on the surface of the pavement.

Recommendation: Where operationally required, an information sign should be supplemented by an information marking.

Location

Recommendation: The information marking should be displayed across the surface of the taxiway or apron where necessary, and positioned so as to be legible from the cockpit of an approaching aircraft.

Characteristics

An information marking shall consist of:

(a) an inscription in yellow, when it replaces or supplements a location sign; and

(b) an inscription in black, when it replaces or supplements a direction or destination sign.

Where there is insufficient contrast between the marking and the pavement surface, the marking shall include:

(a) a black background where the inscriptions are in yellow; and

(b) a yellow background where the inscriptions are in black.

LIGHTS

GENERAL

Laser emissions which may endanger the safety of aircraft

To protect the safety of aircraft against the hazardous effects of laser emitters, the following protected zones should be established around aerodromes.

— a laser-beam free flight zone (LFFZ)
— a laser-beam critical flight zone (LCFZ)
— a laser-beam sensitive flight zone (LSFZ)

Lights which may endanger the safety of aircraft

A non-aeronautical ground light near an aerodrome which might endanger the safety of aircraft shall be extinguished, screened or otherwise modified so as to eliminate the source of danger.

Lights which may cause confusion

Recommendation: A non-aeronautical ground light which, by reason of its intensity, configuration or colour, might prevent, or cause confusion in, the clear interpretation of aeronautical ground lights, should be extinguished, screened or otherwise modified so

as to eliminate such a possibility. In particular, attention should be directed to a non-aeronautical ground light visible from the air within the areas described hereunder:

(a) Instrument runway code number 4: within the areas before the threshold and beyond the end of the runway extending at least 4500 m in length from the threshold and runway end and 750 m either side of the extended runway centre line in width.

(b) Instrument runway code number 2 or 3: as in (a), except that the length should be at least 3000 m.

(c) Instrument runway code number 1 and non-instrument runway:

within the approach area.

EMERGENCY LIGHTING

Application

Recommendation: At an aerodrome provided with runway lighting and without a secondary power supply, sufficient emergency lights should be conveniently available for installation on at least the primary runway in the event of failure of the normal lighting system.

Note: Emergency lighting may also be useful to mark obstacles or delineate taxiways and apron areas.

Location

Recommendation: When installed on a runway the emergency lights should, as a minimum, conform to the configuration required for a non-instrument runway.

AERONAUTICAL BEACONS

AERODROME BEACON

An aerodrome beacon shall be provided at an aerodrome intended for use at night if one or more of the following conditions exist:

(a) aircraft navigate predominantly by visual means;

(b) reduced visibilities are frequent; or

(c) it is difficult to locate the aerodrome from the air due to surrounding lights or terrain.

Location

The aerodrome beacon shall be located on or adjacent to the aerodrome in an area of low ambient background lighting.

Recommendation: The location of the beacon should be such that the beacon is not shielded by objects in significant directions and does not dazzle a pilot approaching to land.

Characteristics

The aerodrome beacon shall show either coloured flashes alternating with white flashes, or white flashes only. The frequency of total flashes shall be from 20 to 30 per minute. Where used, the coloured flashes emitted by beacons at land aerodromes shall be green and coloured flashes emitted by beacons at water aerodromes shall be yellow. In the case of a combined water-and-land aerodrome, coloured flashes, if used, shall have the colour characteristics of whichever section of the aerodrome is designated as the principal facility.

IDENTIFICATION BEACON

Characteristics

An identification beacon shall show flashing green at a land aerodrome and flashing yellow at a water aerodrome.

The identification characters shall be transmitted in the International Morse Code.

APPROACH LIGHTING SYSTEMS

Application

Non-instrument runway

Recommendation: Where physically practicable, a simple approach lighting system should be provided to serve a non-instrument runway where the code number is 3 or 4 and intended for use at night, except when the runway is used only in conditions of good visibility, and sufficient guidance is provided by other visual aids.

Note:– A simple approach lighting system can also provide visual guidance by day.

Non-precision approach runway

Where physically practicable, a simple approach lighting system shall be provided to serve a non-precision approach runway, except when the runway is used only in conditions of good visibility or sufficient guidance is provided by other visual aids.

Note:– It is advisable to give consideration to the installation of a precision approach category I lighting system or to the addition of a runway lead-in lighting system.

Precision approach runway category I

Where physically practicable, a precision approach category I lighting system shall be provided to serve a precision approach runway category I.

Precision approach runway categories II and III

A precision approach category II and III lighting system shall be provided to serve a precision approach runway category II or III.

SIMPLE APPROACH LIGHTING SYSTEM

Location

A simple approach lighting system shall consist of a row of lights on the extended centre line of the runway extending, whenever possible, over a distance of not less than 420 m from the threshold with a row of lights forming a crossbar 18 m or 30 m in length at a distance of 300 m from the threshold. (Fig. 7)

The lights forming the crossbar shall be as nearly as practicable in a horizontal straight line at right angles to, and bisected by, the line of the centre line lights. The lights of the crossbar shall be spaced so as to produce a linear effect, except that when a crossbar of 30 m is used, gaps may be left on each side of the centre line. These gaps shall be kept to a minimum to meet local requirements and each shall not exceed 6 m.

The lights forming the centre line shall be placed at longitudinal intervals of 60 m, except that when it is desired to improve the guidance, an interval of 30 m may be used. The innermost light shall be located either 60 m or 30 m from the threshold, depending on the longitudinal interval selected for the centre line lights.

The system shall lie as nearly as practicable in the horizontal plane passing through the threshold, provided that:

(a) no object other than an ILS or MLS azimuth antenna shall protrude through the plane of the approach lights within a distance of 60 m from the centre line of the system; and

(b) no light other than a light located within the central part of a crossbar or a centre line barrette (not their extremities) shall be screened from an approaching aircraft.

Any ILS or MLS azimuth antenna protruding through the plane of the lights shall be treated as an obstacle and marked and lighted accordingly.

Characteristics

The lights of a simple approach lighting system shall be fixed lights. The colour of the lights shall be such as to ensure that the system is readily distinguishable from other aeronautical ground lights and from extraneous lighting, if present. Each centre line light shall consist of either:

(a) a signal source; or

(b) a barrette at least 3 m in length.

PRECISION APPROACH CATEGORY I LIGHTING SYSTEM

Location

A precision approach category I lighting system shall consist of a row of lights on the extended centre line of the runway extending, wherever possible, over a distance of 900 m from the runway threshold, with a row of lights forming a crossbar 30 m in length at a distance of 300 m from the runway threshold.(Fig. 8).

Note:– The installation of an approach lighting system of less than 900 m in length may result in operational limitations on the use of the runway.

The lights forming the crossbar shall be, as nearly as practicable, in a horizontal straight line at right angles to, and bisected by, the line of the centre line lights. The lights of the crossbar shall be spaced so as to produce a linear effect, except that gaps may be left on each side of the centre line. These gaps shall be kept to a minimum to meet local requirements and each shall not exceed 6 m.

Note:– Spacing for the crossbar lights between 1 m and 4 m is in use. Gaps on each side of the centre line may improve directional guidance when approaches are made with a lateral error, and facilitate the movement of rescue and fire fighting vehicles.

The lights forming the centre line shall be placed at longitudinal intervals of 30 m, with the innermost light located 30 m from the threshold.

The system shall lie, as nearly as practicable, in the horizontal plane passing through the threshold, provided that:

(a) no object other than an ILS or MLS azimuth antenna shall protrude through the plane of the approach lights within a distance of 60 m from the centre line of the system; and

(b) no light other than a light located within the central part of a crossbar or a centre line barrette (not their extremities) shall be screened from an approaching aircraft.

Any ILS or MLS azimuth antenna protruding through the plane of the lights shall be treated as an obstacle and marked and lighted accordingly.

Characteristics

The centre line and crossbar lights of a precision approach category I lighting system shall be fixed lights showing variable white. Each centre line light position shall consist of either:

(a) a signal light source in the innermost 300 m of the centre line, two light sources in the central 300 m of the centre line and three light sources in the outer 300 m of the centre line to provide distance information; or

(b) a barrette.

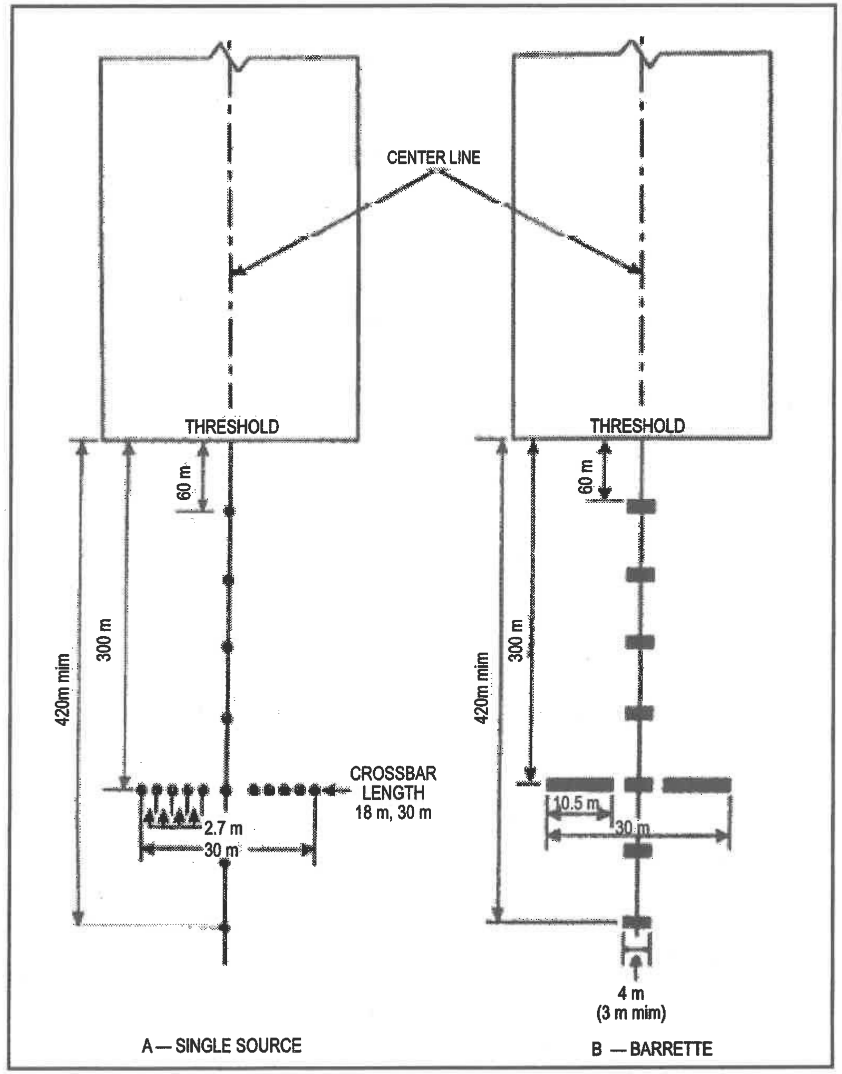


Fig. 7 Simple Approach Lighting System

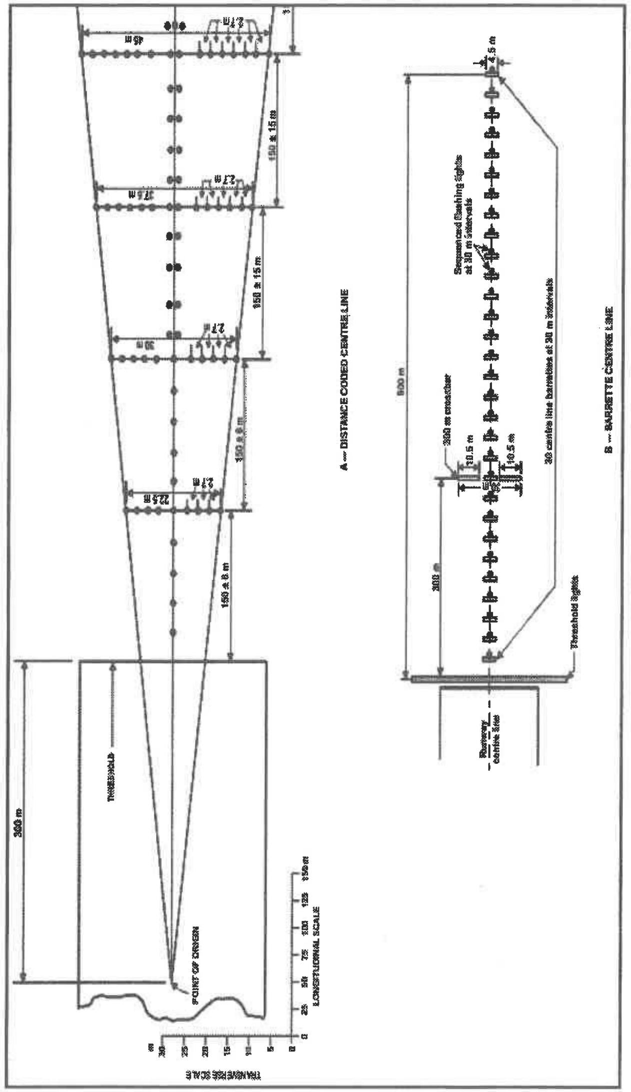


Fig. 8 Precision App. Cat I Lighting System

PRECISION APPROACH CATEGORY II AND III LIGHTING SYSTEM

Location

The approach lighting system shall consist of a row of lights on the extended centre line of the runway, extending, wherever possible, over a distance of 900 m from the runway threshold. In addition, the system shall have two side rows of lights, extending 270 m from the threshold, and two crossbars, one at 150 m and one at 300 m from the threshold, as shown in Figs. 9 and 10.

The lights forming the centre line shall be placed at longitudinal intervals of 30 m, with the innermost lights located 30 m from the threshold.

The lights forming the side rows shall be placed on each side of the centre line, at a longitudinal spacing equal to that of the centre line lights and with the first light located 30 m from the threshold.

The crossbar provided at 150 m from the threshold shall fill in the gaps between the centre line and side row lights.

The crossbar provided at 300 m from the threshold shall extend on both sides of the centre line lights to a distance of 15 m from the centre line.

The system shall lie, as nearby as practicable, in the horizontal plane passing through the threshold, provided that:

(a) no object other than an ILS or MLS azimuth antenna shall protrude through the plane of the approach lights within a distance of 60 m from the centre line of the system; and

(b) no light other than a light located within the central part of a crossbar or a centre line barrette (not their extremities) shall be screened from an approaching aircraft.

Any ILS or MLS azimuth antenna protruding through the plane of the lights shall be treated as an obstacle and marked and lighted accordingly.

Characteristics

The centre line of a precision approach category II and III lighting system for the first 300 m from the threshold shall consist of barrettes variable white, except that, where the threshold is displaced 300 m or more, the centre line may consist of signal light sources showing variable white.

Beyond 300 m from the threshold each centre line light position shall consist of either:

(a) a barrette as used on the inner 300 m; or

(b) two light sources in the central 300 m of the centre line and three light sources in the outer 300 m of the centre line all of which shall show variable white.

The side row shall consist of barrettes showing red. The length of a side row barrette and the spacing of its lights shall be equal to those of the touchdown zone light barrettes.

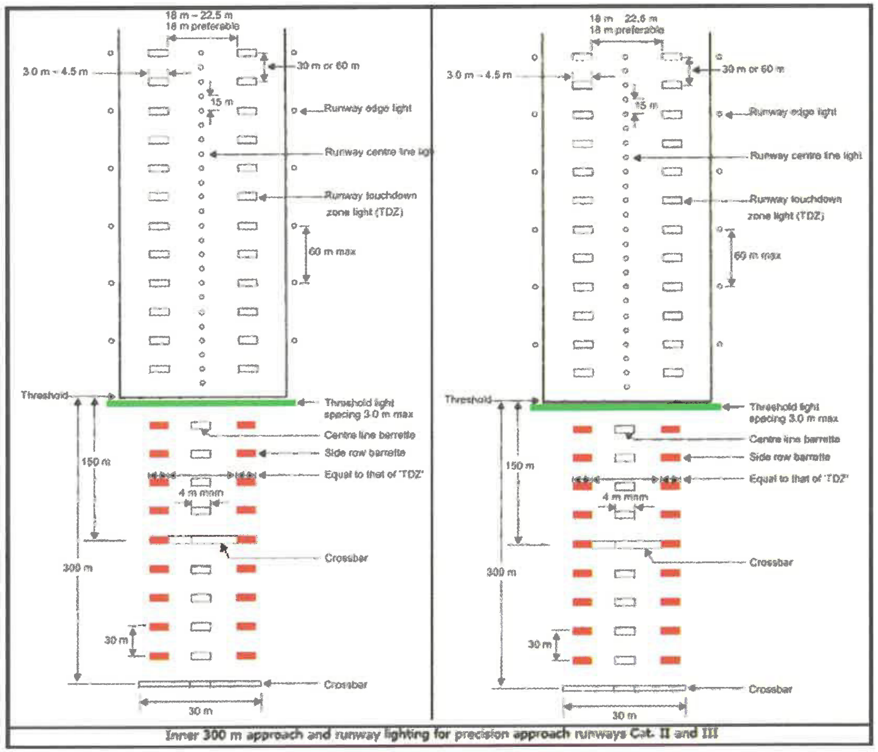


Fig. 9 Cat II and III Precision Approach lighting systems

VISUAL APPROACH SLOPE INDICATOR SYSTEMS

Application

A visual approach slope indicator system shall be provided to serve the approach to a runway whether or not the runway is served by other visual approach aids or non-visual aids, where one or more of the following conditions exist:

(a) The runway is used by turbojet or other aeroplanes with similar approach guidance requirements.

(b) The pilot of any type of aeroplane may have difficulty in judging the approach due to:

   (i) inadequate visual guidance such as is experienced during an approach over water or featureless terrain by day or, in the absence of sufficient extraneous lights in the approach area by night, or

   (ii) misleading information such as is produced by deceptive surrounding terrain or runway slopes.

(c) The presence of objects in the approach area may involve serious hazard if an aeroplane descends below the normal approach path, particularly if there are no non-visual or other visual aids to give warning of such objects.

(d) Physical conditions at either end of the runway present a serious hazard in the event of an aeroplane undershooting or overrunning the runway.

(e) Terrain or prevalent meteorological conditions are such that the aeroplane may be subjected to unusual turbulence during approach.

The standard visual approach slope indicator systems shall consist of PAPI and APAPI systems. (See Fig. 10).

PAPI and APAPI

Description

The PAPI system shall consist of a wing bar of four sharp transition multi-lamp (or paired single lamp) units equally spaced. The system shall be located on the left side of the runway unless it is physically impracticable to do so (See Fig. 10).

Note:– Where a runway is used by aircraft requiring visual roll guidance which is not provided by other external means, a second wing bar may be provided on the opposite side of the runway.

The APAPI system shall consist of a wing bar of two sharp transition multi-lamp (or paired single lamp) units. The system shall be located on the left side of the runway unless it is physically impracticable to do so (See Fig. 10).

Note:– Where a runway is used by aircraft requiring visual roll guidance which is not provided by other external means, a second wing bar may be provided on the opposite side of the runway.

The wing bar of a PAPI shall be constructed and arranged in such a manner that a pilot making an approach will:

(a) when on or close to the approach slope, see the two units nearest the runway as red and two units farthest from the runway as white;

(b) when above the approach slope, see the one unit nearest the runway as red and the three units farthest from the runway as white; and when further above the approach slope, see all the units as white; and

(c) when below the approach slope, see the three units nearest the runway as red and the unit farthest from the runway as white; and when further below the approach slope, see all the units as red.

The wing bar of an APAPI shall be constructed and arranged in such a manner that a pilot making an approach will:

(a) when on or close to the approach slope, see the unit nearer the runway as red and the unit farther from the runway as white;

(b) when above the approach slope, see both the units as white; and

(c) when below the approach slope, see both the units as red.

Characteristics of the light units

The system shall be suitable for both day and night operations.

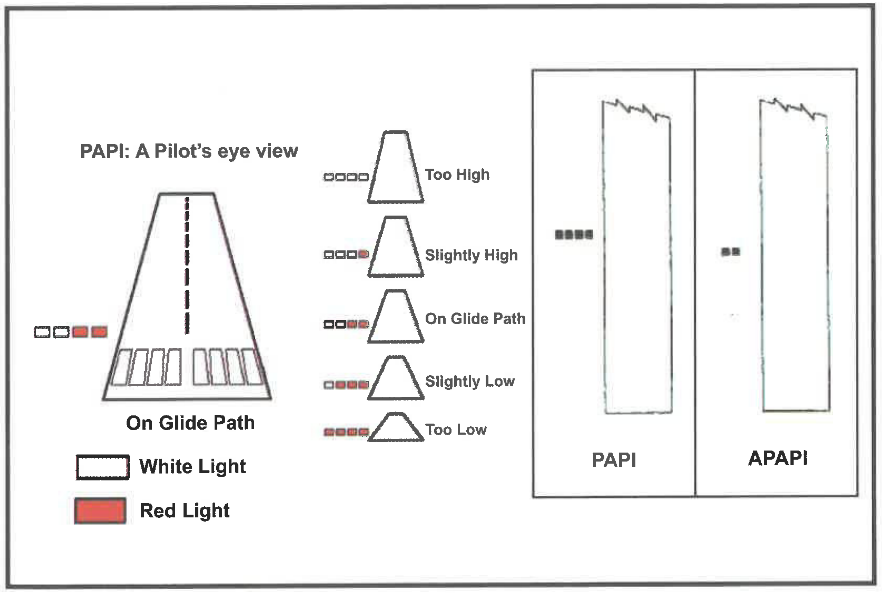


Fig. 10 : Precision App. Path Indicator Systems

RUNWAY LIGHTING

Circling Guidance Lights

Circling guidance lights should be provided when existing approach and runway lighting systems do not satisfactorily permit identification of the runway and/or approach area to a circling aircraft in the conditions for which it is intended the runway be used for circling approaches.

Circling guidance lights shall be fixed or flashing lights of an intensity and beam spread adequate for the conditions of visibility and ambient light in which it is intended to make visual circling approaches. The flashing lights shall be white, and the steady lights either white or gaseous discharge lights.

Runway Lead-in Lighting Systems

A runway lead-in lighting system should be provided where it is desired to provide visual guidance along a specific approach path, for reasons such as avoiding hazardous terrain or for purposes of noise abatement.

Each group of lights of a runway lead-in lighting system shall consist of at least three flashing lights in a linear or cluster configuration. The system may be augmented by steady burning lights where such lights would assist in identifying the system. The flashing lights and the steady burning light shall be white. Where practicable, the flashing lights in each group shall flash in sequence towards the runway.

RUNWAY THRESHOLD IDENTIFICATION LIGHTS

Application

Recommendation: Runway threshold identification lights should be installed:

(a) at the threshold of a non-precision approach runway when additional threshold conspicuity is necessary or where it is not practicable to provide other approach lighting aids; and

(b) where a runway threshold is permanently displaced from the runway extremity or temporarily displaced from the normal position and additional threshold conspicuity is necessary.

Location

Runway threshold identification lights shall be located symmetrically about the runway centre line, in line with the threshold and approximately 10 m outside each line of runway edge lights.

Characteristics

Recommendation: Runway threshold identification lights should be flashing white lights with a flash frequency between 60 and 120 per minute.

The lights shall be visible only in the direction of approach to the runway.

RUNWAY EDGE LIGHTS

Application

Runway edge lights shall be provided for a runway intended for use at night or for a precision approach runway intended for use by day or night.

Recommendation: Runway edge lights should be provided on a runway intended for takeoff with an operating minimum below an RVR of the order of 800 m by day.

Location

Runway edge lights shall be placed along the full length of the runway and shall be in two parallel rows equidistant from the centre line.

Runway edge lights shall be placed along the edges of the area declared for use as the runway or outside the edges of the area at a distance of not more than 3 m.

Recommendation: Where the width of the area which could be declared as runway exceeds 60 m, the distance between the rows of lights should be determined taking into account the nature of the operations, the light distribution characteristics of the runway edge lights, and other visual aids serving the runway.

The lights shall be uniformly spaced in rows at intervals of not more than 60 m for an instrument runway, and at intervals of not more than 100 m for a non-instrument runway. The lights on opposite sides of the runway axis shall be on lines at right angles to that axis. At intersections of runways, lights may be spaced irregularly or omitted, provided that adequate guidance remains available to the pilot.

Characteristics

Runway edge lights shall be fixed lights showing variable white, except that:

(a) in the case of a displaced threshold, the lights between the beginning of the runway and the displaced threshold shall show red in the approach direction; and

(b) a section of the lights 600 m or one-third of the runway length, whichever is less, at the remote end of the runway from the end at which the takeoff run is started, may show yellow.

RUNWAY THRESHOLD AND WING BAR LIGHTS

Application of runway threshold lights

Runway threshold lights shall be provided for a runway equipped with runway edge lights except on a non-instrument or non-precision approach runway where the threshold is displaced and wing bar lights are provided.

Location of runway threshold lights

When a threshold is at the extremity of a runway, the threshold lights shall be placed in a row at right angles to the runway axis as near to the extremity of the runway as possible and, in any case, not more than 3 m outside the extremity.

When a threshold is displaced from the extremity of a runway, threshold lights shall be placed in a row at right angles to the runway axis at the displaced threshold.

Threshold lighting shall consist of:

(a) on a non-instrument or non-precision approach runway, at least six lights;

(b) on a precision approach runway category I, at least the number of the lights that would be required if the lights were uniformly spaced at intervals of 3 m between the rows of runway edge lights; and

(c) on a precision approach runway category II or III, lights uniformly spaced between the rows of runway edge lights at intervals of not more than 3 m.

Recommendation: The lights on a non-precision and precision approach runway Cat. I should be either:

(a) equally spaced between the rows of runway edge lights, or

(b) symmetrically disposed about the runway centre line in two groups, with the lights uniformly spaced in each group and with a gap between the groups equal to the gauge of the touchdown zone marking or lighting, where such is provided, or otherwise not more than half the distance between the rows of runway edge lights.

Application of wing bar lights

Recommendation: Wing bar lights should be provided on a precision approach runway when additional conspicuity is considered desirable.

Wing bar lights shall be provided on a non-instrument or non-precision approach runway where the threshold is displaced and runway threshold lights are required but are not provided.

Location of wing bar lights

Wing bar lights shall be symmetrically disposed about the runway centre line at the threshold in two groups, i.e. wing bars. Each wing bar shall be formed by at least five lights extending at least 10 m outward from, and at right angles to, the line of the runway edge lights, with the innermost light of each wing bar in the line of the runway edge lights.

Characteristics of runway threshold and wing bar lights

Runway threshold and wing bar lights shall be fixed unidirectional lights showing green in the direction of approach to the runway. The intensity and beam spread of the lights shall be adequate for the conditions of visibility and ambient light in which use of the runway is intended.

RUNWAY END LIGHTS

Application

Runway end lights shall be provided for a runway equipped with runway edge lights.

Note:– When the threshold is at the runway extremity, fittings serving as threshold lights may be used as runway end lights.

Location

Runway end lights shall be placed on a line at right angles to the runway axis as near to the end of the runway as possible and, in any case, not more than 3 m outside the end.

Recommendation: Runway end lighting should consist of at least six lights. The lights should be either:

(a) equally spaced between the rows of runway edge lights, or

(b) symmetrically disposed about the runway centre line in two groups, with the lights uniformly spaced in each group and with a gap between the groups of not more than half the distance between the rows of runway edge lights.

For a precision approach runway category III, the spacing between runway end lights, except between the two innermost lights if a gap is used, should not exceed 6 m.

Characteristics

Runway end lights shall be fixed unidirectional lights showing red in the direction of the runway. The intensity and beam spread of the lights shall be adequate for the conditions of visibility and ambient light in which use of the runway is intended.

RUNWAY CENTRE LINE LIGHTS

Application

Runway centre line lights shall be provided on a precision approach runway category II or III.

Recommendation: Runway centre line lights should be provided on a precision approach runway category I, particularly when the runway is used by aircraft with high landing speeds or where the width between the runway edge lights is greater than 50 m.

Runway centre line lights shall be provided on a runway intended to be used for takeoff with an operating minimum below an RVR of the order of 400 m.

Recommendation: Runway centre line lights should be provided on a runway intended to be used for takeoff with an operating minimum of an RVR of the order of 400 m or higher when used by aeroplanes with a very high takeoff speed, particularly where the width between the runway edge lights is greater than 50 m.

Location

Runway centre line lights shall be located along the centre line of the runway, except that the lights may be uniformly offset to the same side of the runway centre line by not more than 60 cm where it is not practicable to locate them along the centre line. The lights shall be located from the threshold to the end at longitudinal spacing of approximately 15 m.

Note:– Existing centre line lighting where lights are spaced at 7.5 m need not be replaced.

Recommendation: Centre line guidance for takeoff from the beginning of a runway to a displaced threshold should be provided by:

(a) an approach lighting system if its characteristics and intensity settings afford the guidance required during takeoff and it does not dazzle the pilot of an aircraft taking off; or

(b) runway centre line lights; or

(c) barrettes of at least 3 m length and spaced at uniform intervals of 30 m, designed so that their photometric characteristics and intensity setting afford the guidance required during takeoff without dazzling the pilot of an aircraft taking off.

Where necessary, provision should be made to extinguish centre line lights or reset the intensity of the approach lighting system or barrettes when the runway is being used for landing. In no case should only the single source runway centre line lights show from the beginning of the runway to a displaced threshold when the runway is being used for landing.

Characteristics

Runway centre line lights shall be fixed lights showing variable white from the threshold to the point 900 m from the runway end; alternate red and variable white from 900 m to 300 m from the runway end; and red from 300 m to the runway end, except that for runways less than 1800 m in length, the alternate red and variable white lights shall extend from the midpoint of the runway usable for landing to 300 m from the runway end.

Note:– Care is required in the design of the electrical system to ensure that failure of part of the electrical system will not result in a false indication of the runway distance remaining.

RUNWAY TOUCHDOWN ZONE LIGHTS

Application

Touchdown zone lights shall be provided in the touchdown zone of a precision approach runway category II or III.

Location

Touchdown zone lights shall extend from the threshold for a longitudinal distance of 900 m, except that, on runways less than 1800 m in length, the system shall be shortened so that it does not extend beyond the midpoint of the runway. The pattern shall be formed by pairs of barrettes symmetrically located about the runway centre line. The lateral spacing between the innermost lights of a pair of barrettes shall be equal to the lateral spacing selected for the touchdown zone marking. The longitudinal spacing between pairs of barrettes shall be either 30 m or 60 m.

Note:– To allow for operations at lower visibility minima it may be advisable to use a 30 m longitudinal spacing between barrettes.

Characteristics

A barrette shall be composed of at least three lights with a spacing between the lights of not more than 1.5 m.

Recommendation:— A barrette should be not less than 3 m nor more than 4.5 m in length.

Touchdown zone lights shall be fixed unidirectional lights showing variable white.

SIMPLE TOUCHDOWN ZONE LIGHTS

The purpose of simple touchdown zone lights is to provide pilots with enhanced situational awareness in all visibility conditions and to help enable pilots to decide whether to commence a go-around if the aircraft has not landed by a certain point on the runway. Except where TDZ lights are provided at an aerodrome where the approach angle is greater than 3.5 degrees and/or the Landing Distance Available combined with other factors increases the risk of an overrun, Simple Touchdown Zone Lights should be provided. Lights shall be a pair of fixed unidirectional lights showing variable white, located on each side of the runway centerline, aligned so as to be visible to the pilot of a landing aeroplane in the direction of approach.

STOPWAY LIGHTS

Application

Stopway lights shall be provided for a stopway intended for use at night.

Location

Stopway lights shall be placed along the full length of the stopway and shall be in two parallel rows that are equidistant from the centre line and coincident with the rows of the runway edge lights. Stopway lights shall also be provided across the end of a stopway on a line at right angles to the stopway axis as near to the end of the stopway as possible and, in any case, not more than 3 m outside the end.

Characteristics

Stopway lights shall be fixed unidirectional lights showing red in the direction of the runway.

TAXIWAY LIGHTS

TAXIWAY CENTRE LINE LIGHTS

Application

Taxiway centre line lights shall be provided on an exit taxiway, taxiway, de-icing/ anti-icing facility and apron intended for use in runway visual range conditions less than a value of 350 m in such a manner as to provide continuous guidance between the runway centre line and aircraft stands, except that these lights need not be provided where the traffic density is light and taxiway edge lights and centre line marking provide adequate guidance.

Recommendation: Taxiway centre line lights should be provided on a taxiway intended for use at night in runway visual range conditions of 350 m or greater, and particularly on complex taxiway intersections and exit taxiways, except that these lights need not be provided where the traffic density is light and taxiway edge lights and centre line marking provide adequate guidance.

Note:– Where there may be a need to delineate the edges of a taxiway, e.g. on a rapid exit taxiway, narrow taxiway or in snow conditions, this may be done with taxiway edge lights or markers.

Recommendation: Taxiway centre line lights should be provided on an exit taxiway, taxiway, de-icing/ anti-icing facility and apron in all visibility conditions where specified as components of an advanced surface movement guidance and control system in such a manner as to provide continuous guidance between the runway centre line and aircraft stands.

Taxiway centre line lights shall be provided on a runway forming part of a standard taxi-route and intended for taxiing in runway visual range conditions less than a value of 350 m, except that these lights need not be provided where the traffic density is light and taxiway edge lights and centre line marking provide adequate guidance.

Recommendation: Taxiway centre line lights should be provided in all visibility conditions on a runway forming part of a standard taxi-route where specified as components of an advanced surface movement guidance and control system.

Characteristics

Taxiway centre line lights on taxiway other than an exit taxiway and on a runway forming part of standard taxi-route shall be fixed lights showing green with beam dimensions such that the light is visible only from aeroplanes on or in the vicinity of the taxiway.

Taxiway centre line lights on an exit taxiway shall be fixed lights. Alternate taxiway centre line lights shall show green and yellow from their beginning near the runway centre line to perimeter of the ILS/MLS critical/sensitive area or the lower edge of the inner transitional surface, whichever is farthest from the runway; and thereafter all lights shall show green (See Fig. 11). The light nearest to the perimeter shall always show yellow. Where aircraft may follow the same centre line in both directions, all the centre line lights shall show green to aircraft approaching the runway.

Location

Recommendation: Taxiway centre line lights should normally be located on the taxiway centre line marking, except that they may be offset by not more than 30 cm where it is not practicable to locate them on the marking.

TAXIWAY CENTRE LINE LIGHTS ON TAXIWAYS

Location

Recommendation: Taxiway centre line lights on a straight section of a taxiway should be spaced at longitudinal intervals of not more than 30 m, except that:

(a) larger intervals not exceeding 60 m may be used where, because of the prevailing meteorological conditions, adequate guidance is provided by such spacing;

(b) intervals less than 30 m should be provided on short straight sections; and

(c) on a taxiway intended for use in RVR conditions of less than a value of 350 m, the longitudinal spacing should not exceed 15 m.

Recommendation: Taxiway centre line lights on a taxiway curve should continue from the straight portion of the taxiway at a constant distance from the outside edge of the taxiway curve. The lights should be spaced at intervals such that a clear indication of the curve is provided.

TAXIWAY EDGE LIGHTS

Application

Taxiway edge lights shall be provided at the edges of the holding bay, de-icing/anti-icing facility, apron, etc. intended for use at night and on a taxiway not provided with taxiway centre line lights and intended for use at night, except that taxiway edge lights need not be provided where, considering the nature of the operations, adequate guidance can be achieved by surface illuminated or other means.

Taxiway edge lights shall be provided on a runway forming part of a standard taxi-route and intended for taxiing at night where the runway is not provided with taxiway centre line lights.

Location

Recommendations:

1. Taxiway edge lights on a straight section of a taxiway and on a runway forming part of a standard taxi-route should be spaced at uniform longitudinal intervals of not more than 60 m. The lights on a curve should be spaced at intervals less than 60 m so that a clear indication of the curve is provided.
2. Taxiway edge lights on a holding bay, de-icing/anti-icing facility, apron, etc. should be spaced at uniform longitudinal intervals of not more than 60 m.

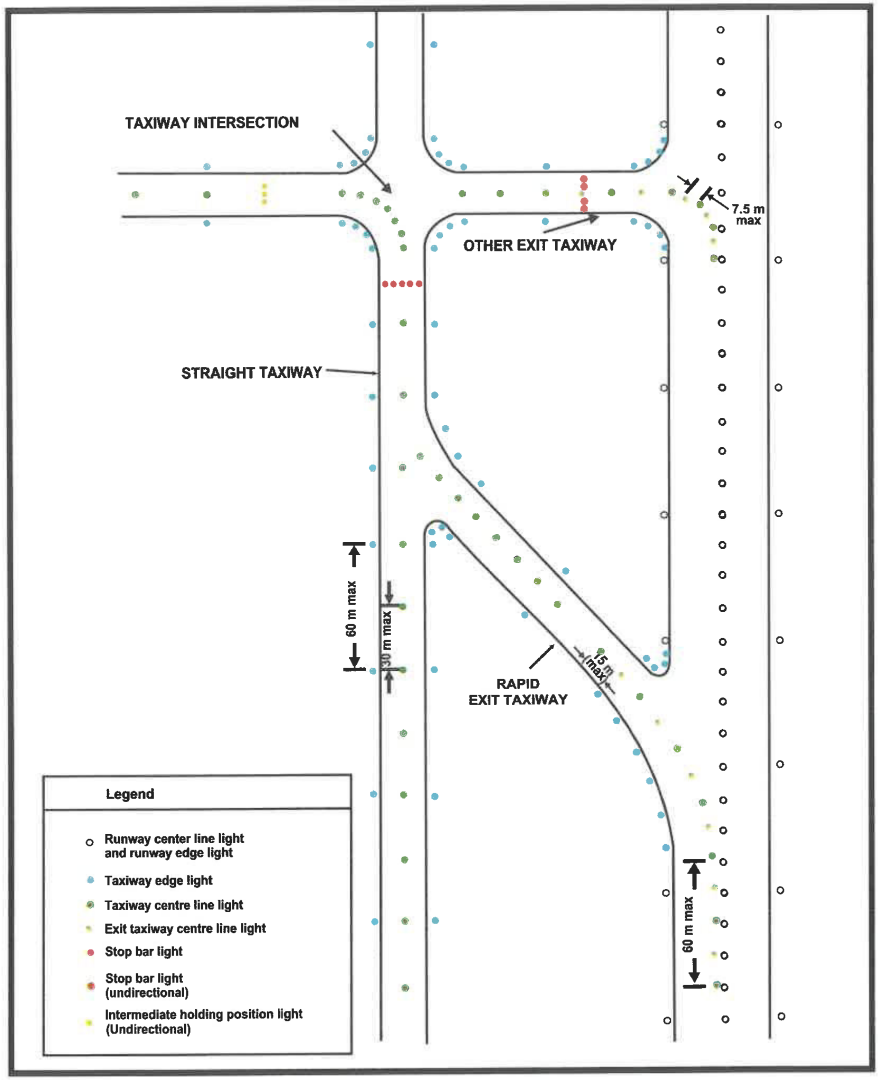


Fig 11-Taxiway lighting

3. The lights should be located as near as practicable to the edges of the taxiways, holding bay, de-icing/anti-icing facility, apron or runway, etc. or outside the edges at a distance of not more than 3 m.

Characteristics

Taxiway edge lights shall be fixed lights showing blue. The lights shall show up to at least 30° above the horizontal and at all angles in azimuth necessary to provide guidance to a pilot taxiing in either direction. At an intersection, exit or curve the lights shall be shielded as far as practicable so that they cannot be seen in angles of azimuth in which they may be confused with other lights.

AIRCRAFT STAND MANOEUVRING GUIDANCE LIGHTS

Application

Recommendation: Aircraft stand maneuvering guidance lights should be provided to facilitate the positioning of an aircraft on an aircraft stand on a paved apron or on a de-icing/anti-icing facility intended for use in poor visibility conditions, unless adequate guidance is provided by other means.

Location

Aircraft stand maneuvering guidance lights shall be collocated with the aircraft stand markings.

Characteristics

Aircraft stand maneuvering guidance lights, other than those indicating a stop position, shall be fixed yellow lights, visible throughout the segments within which they are intended to provide guidance.

Recommendation: The lights used to delineate lead-in, turning and lead-out lines should be spaced at intervals of not more than 7.5 m on curves and 15 m on straight sections.

The lights indicating a stop position shall be fixed, unidirectional lights, showing red.

RAPID EXIT TAXIWAY INDICATOR LIGHTS (RETILS)

RETILs provide guidance on distance to go to the nearest rapid exit taxiway.

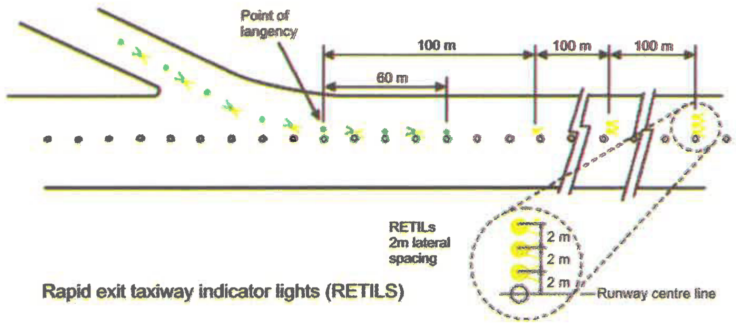


Fig 12-RETILS

RUNWAY TURN PAD LIGHTS

These provide continuous guidance on a runway turn pad to complete a 180-degree turn and align with runway centre line.

Stop Bars

Note:– Runway incursions may take place in all visibility or weather conditions. The provision of stop bars at runway holding positions and their use at night and in visibility conditions greater than 550m runway visual range can form part of effective runway incursion prevention measures. A stop bar is intended to be controlled either manually or automatically by air traffic services.

A stop bar shall be provided at every runway-holding position serving a runway when it is intended that the runway will be used in runway visual range conditions less than a value of 350 m.

Intermediate holding position lights

Except where a stop bar has been installed, intermediate holding position lights shall be provided at an intermediate holding position intended for use in runway visual range conditions less than a value of 350 m.

Runway status lights and Autonomous runway incursion system

ARIWS shall provide autonomous detection of a potential incursion or of the occupancy of an active runway and a direct warning to a flight crew or vehicle. When an aircraft is departing from a runway (rolling) or arriving at a runway (short final), red warning lights at the entrances will illuminate, indicating that it is unsafe to enter or cross the runway. When an aircraft is aligned on the runway for take-off and another aircraft or vehicle enters or crosses the runway, red warning lights will illuminate at the threshold area, indicating that is unsafe to start the take-off roll.

Runway status lights (RWSL) is a type of autonomous runway warning system (ARIWS).

The two basic visual components of RWSL are runway entrance lights (RELs) and take-off hold lights (THLs).

Either components may be installed by itself, but the two components are designed to be complementary to each other. Where provided, RELs shall consist of a single line of fixed in patement lights showing red in the direction of aircraft approaching the runway.

Runway Guard Lights

Note:– The purpose of runway guard lights is to warn pilots, and drivers of vehicles when they are operating on taxiways, that they are about to enter runway.

If stop bars are not provided, Runway guard lights, Configuration A, shall be provided at each taxiway/runway intersection associated with a runway intended for use in:

a) runway visual range conditions less than a value of 550 m where a stop bar is not installed

b) runway visual range conditions of values between 550 m and 1,200 m. where the traffic density is heavy.

Signs

Signs shall be provided to convey a mandatory instruction, information on a specific location or destination on a movement area or to provide other information to meet the requirements .

A variable message sign should be provided where:

a) the instruction or information displayed on the sign is relevant only during a certain period of time; and/or

b) there is a need for variable pre-determined information to be displayed on the sign to meet the requirements .

Signs shall be frangible. Those located near a runway or taxiway shall be sufficiently low to preserve clearance for propellers and the engine pods of jet aircraft. The installed height of the sign shall not exceed the dimension specified with the longer side horizontal.

The only signs on the movement area utilizing red shall be mandatory instruction signs.

Signs shall be retro reflective and/or illuminated when intended for use at night in association with non-instrument runways where the code number is 1 or 2.

Mandatory Instruction Signs

A mandatory instruction sign shall be provided to identify a location beyond which an aircraft taxiing or vehicle shall not proceed unless authorized by the aerodrome control tower.

Mandatory instruction signs shall include runway designation signs, category I, II or III holding position signs, runway-holding position signs, road-holding position signs and NO ENTRY signs.

A NO ENTRY sign shall be provided when entry into an area is prohibited.

A mandatory instruction sign shall consist of an inscription in white on a red background.

Where, owing to environmental or other factors, the conspicuity of the inscription on a mandatory instruction sign needs to be enhanced, the outside edge of the white inscription shall be supplemented by a black outline measuring 10 mm in width for runway code numbers 1 and 2, and 20 mm in width for runway code numbers 3 and 4.

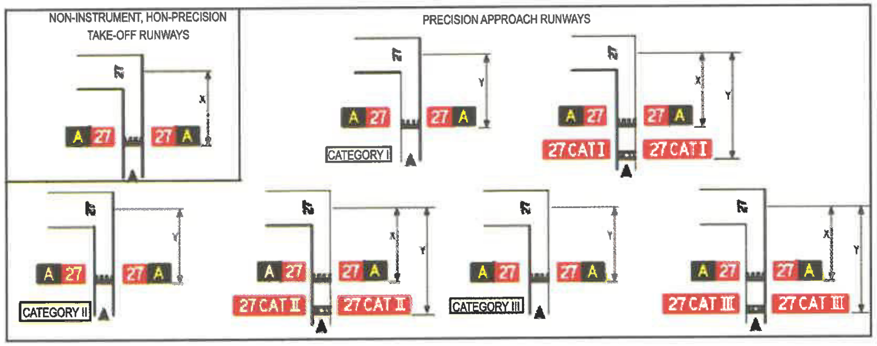


Fig 13-Mandatory Instruction Signs

Information Signs

An information sign shall be provided where there is an operational need to identify by a sign, a specific location, or routing (direction or destination) information.

Information signs shall include: direction signs, location signs, destination signs, runway exit signs, runway vacated signs and intersection take-off signs.

A runway exit sign shall be provided where there is an operational need to identify a runway exit.

A runway vacated sign shall be provided where the exit taxiway is not provided with taxiway centre line lights and there is need to indicate to a pilot leaving a runway the perimeter of the ILS/MLS critical/sensitive area or the lower edge of the inner

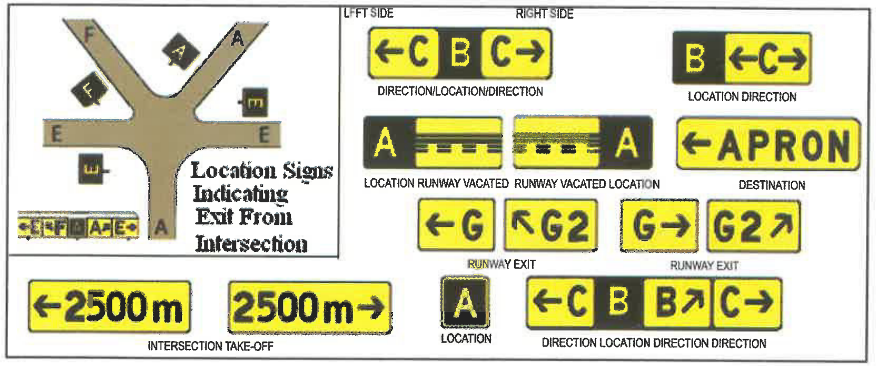


Fig 14-Information Signs

transitional surface whichever is farther from the runway centre line.

An intersection take-off sign shall be provided when there is an operational need to indicate the remaining take-off run available (TORA) for intersection take-offs.

Where necessary, a destination sign should be provided to indicate the direction to a specific destination on the aerodrome, such as cargo area, general aviation, etc.

A combined location and direction sign shall be provided when it is intended to indicate routing information prior to a taxiway intersection.

A direction sign shall be provided when there is an operational need to identify the designation and direction of taxiways at an intersection.

Location Sign

A location sign should be provided at an intermediate holding position.

A location sign shall be provided in conjunction with a runway designation sign except at a runway/runway intersection.

A location sign shall be provided in conjunction with a direction sign, except that it may be omitted where an aeronautical study indicates that it is not needed.

Where a taxiway ends at an intersection such as a "T" and it is necessary to identify this, a barricade, direction sign and/or other appropriate visual aid shall be used.

An information sign other than a location sign shall consist of an inscription in black on a yellow background.

A location sign shall consist of an inscription in yellow on a black background and where it is a stand-alone sign shall have a yellow border. Remember **"Black Square, you are there."**

The use of numbers alone on the maneuvering area shall be reserved for the designation of runways.

VOR aerodrome check-point sign

When a VOR aerodrome check-point is established, it shall be indicated by a VOR aerodrome check-point marking and sign.

A VOR aerodrome check-point sign shall consist of an inscription in black on a yellow background.

Aerodrome identification sign

An aerodrome identification sign shall be provided at an aerodrome where there is insufficient alternative means of visual identification of aerodrome.

The aerodrome identification sign shall be placed on the aerodrome so as to be legible, in so far as is practicable, at all angles above the horizontal.

The aerodrome identification sign shall consist of the name of the aerodrome.

The colour selected for the sign shall give adequate conspicuity when viewed against its background.

The characters shall have a height of not less than 3 m.

Aircraft stand identification signs

An aircraft stand identification marking shall be supplemented with an aircraft stand identification sign where feasible.

An aircraft stand identification sign shall consist of an inscription in black on a yellow background.

Road-holding position sign

A road-holding position sign shall be provided at all road entrances to a runway.

The road-holding position sign shall be located 1.5 m from one edge of the road (left or right as appropriate to the local traffic regulations) at the holding position.

A road-holding position sign shall consist of an inscription in white on a red background.

MARKERS

General

Markers shall be frangible. Those located near a runway or taxiway shall be sufficiently low to preserve clearance for propellers and for the engine pods of jet aircraft.

Unpaved runway edge markers

Markers shall be provided when the extent of an unpaved runway is not clearly indicated by the appearance of its surface compared with that of the surrounding ground.

Stopway Edge Markers

Stopway edge markers should be provided when the extent of a stopway is not clearly indicated by its appearance compared with that of the surrounding ground.

The stopway edge markers shall be sufficiently different from any runway edge markers used to ensure that the two types of markers cannot be confused.

Edge Markers for snow-covered Runways

Edge markers for snow covered runways should be used to indicate the usable limits of a snow-covered runway when the limits are not otherwise indicated.

Taxiway Edge Markers

Taxiway edge markers should be provided on a taxiway where the code number is 1 or 2 and taxiway centre line or edge lights or taxiway centre line markers are not provided.

Unpaved Taxiway Edge Markers

Where the extent of an unpaved taxiway is not clearly indicated by its appearance compared with that of the surrounding ground, markers should be provided.

Boundary Markers

Boundary markers shall be provided at an aerodrome where the landing area has no runway. The markers shall be coloured to contrast with the background against which they will be seen. A single colour, orange or red, or two contrasting colours, orange and white or alternatively red and white, shall be used, except where such colours merge with the background.

VISUAL AIDS FOR DENOTING OBSTACLES

Objects to be marked and/or lighted

A fixed obstacle that extends above a take-off climb surface within 3,000 m of the inner edge of the take-off climb surface shall be marked and, if the runway is used at night, lighted.

A fixed object, other than an obstacle, adjacent to a take-off climb surface shall be marked and, if the runway is used at night, lighted.

A fixed obstacle above a horizontal surface shall be marked and, if the aerodrome is used at night, lighted.

A fixed object that extends above an obstacle protection surface shall be marked and, if the runway is used at night, lighted.

Vehicles and other mobile objects, excluding aircraft, on the movement area of an aerodrome are obstacles and shall be marked and, if the vehicles and aerodrome are used at night or in conditions of low visibility, lighted, except that aircraft servicing equipment and vehicles used only on aprons may be exempt.

Elevated aeronautical ground lights within the movement area shall be marked so as to be conspicuous by day. Obstacle lights shall not be installed on elevated ground lights or signs in the movement area.

All obstacles within the distance specified, from the centre line of a taxiway, an apron taxiway or aircraft stand taxi lane shall be marked and, if the taxiway, apron taxiway or aircraft stand taxi lane is used at night, lighted.

Obstacles should be marked and lighted, except that the marking may be omitted when high-intensity obstacle lights by day light the obstacle.

Marking of Objects

All fixed objects to be marked shall, whenever practicable, be colored, but if this is not practicable, markers or flags shall be displayed on or above them, except that objects that are sufficiently conspicuous by their shape, size or colour need not be otherwise marked.

All mobile objects to be marked shall be coloured or display flags.

An object shall be coloured to show a chequered pattern if it has essentially unbroken surfaces and its projection on any vertical plane equals or exceeds 4.5 m in both dimensions.

The pattern should consist of rectangles of not less than 1.5 m and not more than 3 m on a side, the corners being of the darker colour. The colours of the pattern should contrast each with the other and with the background against which they will be seen. Orange and white or alternatively red and white should be used, except where such colours merge with the background. (See Figure 15)

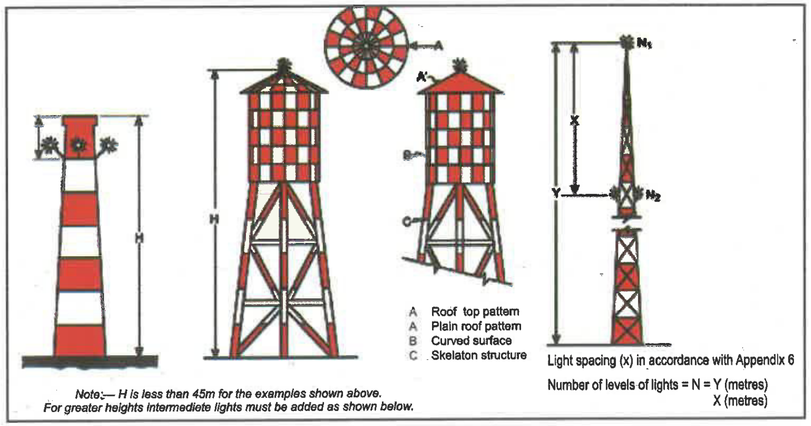


Fig 15-Obstacle Marking

An object should be coloured in a single conspicuous colour if its projection on any vertical plane has both dimensions less than 1.5 m. Orange or red should be used, except where such colours merge with the background.

When mobile objects are marked by red colour for emergency vehicles and yellow for service vehicles shall be used.

USE OF MARKERS

Markers displayed on or adjacent to objects shall be located in conspicuous positions so as to retain the general definition of the object and shall be recognizable in clear weather from a distance of at least 1000 m for an object to be viewed from the air and 300 m for an object to be viewed from the ground in all directions in which an aircraft is likely to approach the object. The shape of markers shall be distinctive to the extent necessary to ensure that they are not mistaken for markers employed to convey other information, and they shall be such that the hazard presented by the object they mark is not increased.

LIGHTING OF OBJECTS

Use of obstacle lights

The presence of objects which must be lighted, shall be indicated by low-, medium- or high-intensity obstacle lights, or a combination of such lights.

Location of obstacle lights

One or more low-, medium- or high-intensity obstacle lights shall be located. The lights should be so arranged as to depict the outline of the object.

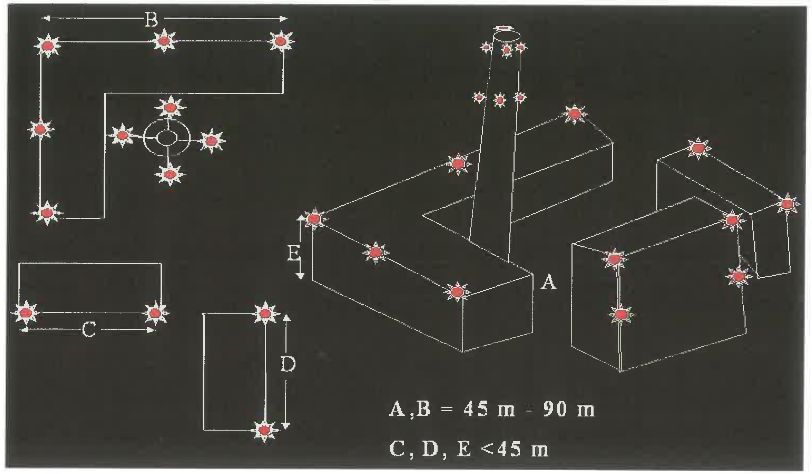


Fig 16-Obstacle Lighting

Low-intensity obstacle light

Low-intensity obstacle lights on fixed objects, shall be fixed-red lights, they shall be spaced at longitudinal intervals not exceeding 45 m.

Low-intensity obstacle lights, displayed on vehicles associated with emergency or security shall be flashing-blue and those displayed on other vehicles shall be flashing-yellow.

Low-intensity obstacle lights displayed on follow-me vehicles shall be flashing yellow.

Medium-intensity obstacle light

They shall be spaced at longitudinal intervals not exceeding 900 m. Medium-intensity obstacle lights, Type A, shall be flashing-white lights, Type B shall be flashing- red lights and Type C shall be fixed-red lights.

High-intensity obstacle light

High-intensity obstacle lights shall be flashing-white lights.

Wind Turbines

A wind turbine shall be marked and/or lighted if it is determined to be an obstacle.

Lighting

When lighting is deemed necessary, medium intensity obstacle lights shall be used.

VISUAL AIDS FOR DENOTING RESTRICTED USE AREAS

Closed Runways and Taxiways, or Parts thereof

A closed marking shall be displayed on a runway or taxiway, or portion thereof, which is permanently closed to the use of all aircraft.

A closed marking should be displayed on a temporarily closed runway or taxiway or portion thereof, except that such marking may be omitted when the closing is of short duration and adequate warning by air traffic services is provided.

When a runway or taxiway or portion thereof is permanently closed, all normal runway and taxiway markings shall be obliterated.

Lighting on a closed runway or taxiway or portion thereof shall not be operated, except as required for maintenance purposes.

Pre-threshold Area

When the surface before a threshold is paved and exceeds 60 m in length and is not suitable for normal use by aircraft, the entire length before the threshold shall be marked with a chevron marking.

A chevron marking shall point in the direction of the runway and be placed as shown in Figure 17.

A chevron marking shall be of yellow colour It shall have an overall width of 0.9 m.

Unserviceable Areas

Unserviceability markers shall be displayed wherever any portion of a taxiway, apron or holding bay is unfit for the movement of aircraft but it is still possible for aircraft to bypass the area safely. On a movement area used at night, unserviceability lights shall be used.

Unserviceability markers and lights shall be placed at intervals sufficiently close so as to delineate the unserviceable area.

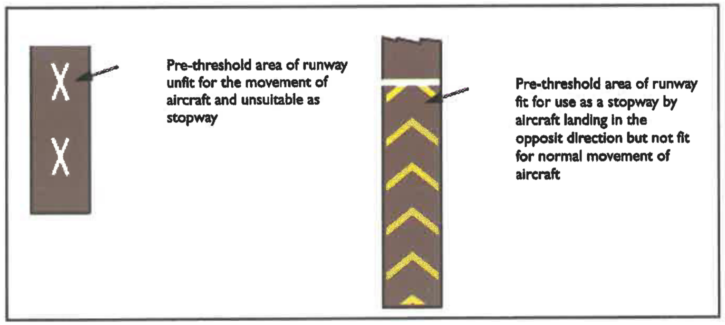


Fig 17-Unserviceable areas

Characteristics of unserviceability markers

Unserviceability markers shall consist of conspicuous upstanding devices such as flags, cones or marker boards.

Characteristics of unserviceability lights

An unserviceability light shall consist of a red fixed light. The light shall have an intensity sufficient to ensure conspicuity considering the intensity of the adjacent lights and the general level of illumination against which it would normally be viewed.

Rescue and fire fighting

General

The principal objective of a rescue and fire fighting service is to save lives in the event of an aircraft accident or incident occurring at, or in the immediate vicinity of, an aerodrome. Rescue and fire fighting equipment and services shall be provided at an aerodrome.

Emergency And Other Services : Rescue And Fire Fighting

Level of protection to be provided

The level of protection provided at an aerodrome for rescue and fire fighting shall be appropriate to the aerodrome category determined using the principles given below, except that, where the number of movements of the aeroplanes in the highest category normally using the aerodrome is less than 700 in the busiest consecutive three months, the level of protection provided shall be not less than one category below the determined category.

Note: — Either a take-off or a landing constitutes a movement.

The level of protection provided at an aerodrome for rescue and fire fighting shall be equal to the aerodrome category determined using the principles below.

Extinguishing Agents

Both principal and complementary agents shall be provided at an aerodrome.

The principal extinguishing agent should be foam.

The complementary extinguishing agent should be a dry chemical powder suitable for extinguishing hydrocarbon fires.

Aerodrome category for rescue and fire fighting		
Aerodrome category (1)	Aeroplane overall length (2)	Maximum Fuselage Width (3)
1	0m up to but not including 9m	2m
2	9m up to but not including 12m	2m
3	12m up to but not including 18m	3m
4	18m up to but not including 24m	4m
5	24m up to but not including 28m	4m
6	28m up to but not including 39m	5m
7	39m up to but not including 49m	5m
8	49m up to but not including 61m	7m
9	61m up to but not including 76m	7m
10	76m up to but not including 90m	8m

The complementary agents shall comply with the appropriate specifications of the Bureau of India Standards (BIS) / International Organization for Standardization (ISO).

Response Time

A response time not exceeding three minutes shall be maintained by the rescue and fire fighting services for any point of each operational runway and for any other part of the movement area.

The operational objective of the rescue and fire fighting service shall be to achieve a response time not exceeding two minutes to any point of each operational runway, in optimum visibility and surface conditions.

Emergency Access Roads

Emergency access roads should be provided on an aerodrome where terrain conditions permit their construction, so as to facilitate achieving minimum response times. Particular attention should be given to the provision of ready access to approach areas up to 1,000 m from the threshold, or at least within the aerodrome boundary. Where a fence is provided, the need for convenient access to outside areas should be taken into account.

Fire Stations

All rescue and fire fighting vehicles should normally be housed in a fire station. Satellite fire stations should be provided whenever the response time cannot be achieved from a single fire station.

The fire station should be located so that the access for rescue and fire fighting vehicles into the runway area is direct and clear, requiring a minimum number of turns.

Communication and Alerting Systems

A discrete communication system should be provided linking a fire station with the control tower, any other fire station on the aerodrome and the rescue and fire fighting vehicles.

An alerting system for rescue and fire fighting personnel, capable of being operated from that station, shall be provided at a fire station, any other fire station on the aerodrome and the aerodrome control tower.

Radio altimeter operating area. A radio altimeter operating area shall be established in the pre-threshold area of a precision approach category II & III runway.

Declared Distances:

a) **Takeoff run available (TORA):** The length of runway declared available and suitable for the ground run of an aeroplane taking off.

b) **Takeoff distance available (TODA):** The length of the takeoff run available plus the length of the clearway, if provided.

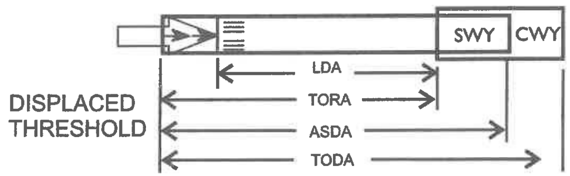
c) **Accelerate-stop distance available (ASDA):** The length of the takeoff run available plus the length of the stopway, if provided.

d) **Landing distance available (LDA):** The length of runway which is declared available and suitable for the ground run of an aeroplane landing.

Clearway(CWY): A defined rectangular area on the ground or water under the control of the appropriate authority, selected or prepared as a suitable area over which an aeroplane may make a portion of its initial climb to a specified height. A clearway should extend laterally to a distance of at least 75 m on each side of the extended centre line of the runway.The ground in a clearway should not project over a plane having an upward slope of 1.25%. An object situated on a clearway which may endanger aeroplanes in the air should be regarded as an obstacle and should be removed.

Stopway (SWY): A defined rectangular area on the ground at the end of takeoff run available prepared as a suitable area in which an aircraft can be stopped in the case of an abandoned takeoff.

A stopway shall have the same width as the runway with which it is associated. A stopway should be prepared or constructed so as to be capable, in the event of an abandoned takeoff, of supporting the aeroplane which the stopway is intended to serve, without inducing structural damage to the aeroplane.



QUESTIONS

1. **Which of the following Annexes to the Chicago convention contains minimum specifications for the design of aerodromes?**
   A) Annex 14
   B) Annex 11
   C) Annex 6

2. **"Clearway" is a defined rectangular area established to:**
   A) Reduce the risk of damage to aircraft running off a runway
   B) Protect aircraft during take-off or landing operations
   C) Permit aircraft to make a portion of its initial climb to a specific height

3. **The STOPWAY is a defined rectangular area on the ground at the end of take-off run available prepared as a suitable area where:**
   A) A landing aircraft can be stopped if overcoming the end of runway
   B) An aircraft can be stopped in the case of an abandoned take-off
   C) A landing aircraft can be stopped only in emergency

4. **"ASDA" (Accelerate Stop Distance Available) is:**
   A) The length of the take-off run available plus the length of stopway and clearway (if provided)
   B) The length of the take-off run available plus the length of stopway (if stopway provided)
   C) The length of the runway plus the length of stopway available (if stopway provided)

5. **"instrument runways" are the following runways intended for the operation of aircraft using instrument approach procedures:**
   A) Non precision approach runways, precision approach runways category I, II and III
   B) Instrument approach runways, precision approach runways category I, II and III
   C) Precision approach runways category I, II and III

6. **"TODA" take-off distance available is:**
   A) The length of the take-off run available plus the length of the clearway (if provided)
   B) The length of the take-off run available plus the length of stopway and clearway (if provided)
   C) The length of the take-off run plus the length of the stopway

7. **The light shown by an "Aerodrome Identification Beacon" at a land aerodrome shall be:**
   A) White and green colour identification given by Morse Code
   B) Green colour identification given by Morse Code
   C) Blue colour identification given by Morse Code

8. **Taxiway edge lights shall be:**
   A) Fixed showing green
   B) Fixed showing yellow
   C) Fixed showing blue

9. **In the case of parallel runways, each runway designation number shall be supplemented:**
   A) By a letter- for example 2 parallel runways "L" and "R"- for 3 "L","C" and "R"
   B) By a letter for 2 parallel runways
   C) By a number like "0" and "01" for 2 parallel runways

10. **In the "PAPI" system the pilot during an approach will see the two units nearest the runway as red and the two units farthest from the runway as white when:**
    A) Above the approach slope
    B) On or close to the approach slope
    C) Only on the approach slope

11. **Runway threshold identification lights, when provided, should be:**
    A) Fixed green
    B) Fixed white
    C) Flashing white

12. **What is a "barrette"?**
    A) Three or more ground lights closely spaced together to appear as a bar of lights
    B) A frangible structure on which approach lights are fixed
    C) A CAT 2 or 3 holding position

13. **What is the length of an approach lighting system of a precision-approach runway CAT II :**
    A) 600m
    B) 900m
    C) 300m

14. Runway end lights shall be:

A) Fixed lights showing variable red
B) Fixed unidirectional lights showing red in the direction of the runway
C) Fixed lights showing variable white

15. Aerodromes signs should be in the following configuration:

A) mandatory instruction signs, black backgrounds with red inscriptions
B) information signs, yellow or black background with black or yellow inscriptions
C) mandatory instruction signs, red background with black inscriptions

16. The "PAPI" shall consist of:

A) Two wing bars of 4 sharp transition multi-lamp or paired units equally spaced
B) A wing bar of 4 sharp transition multi-lamp or paired units equally spaced
C) Two wing bars of 6 sharp transition multi-lamp or paired units equally spaced

17. Runway threshold lights shall be:

A) Fixed lights green colours
B) Fixed lights showing green or white colours
C) Fixed unidirectional lights showing green in the direction of approach to the runway

18. Taxiway centerline lights other than an exit taxiway shall be:

A) Fixed lights showing blue
B) Fixed lights showing green
C) Fixed lights showing yellow

19. How many red lights must a pilot see, whose aircraft, in final approach, is following a normal glide path defined by a PAPI?

A) 2
B) None
C) 3

20. Runway edge lights expected in the case of a displaced threshold shall be:

A) Fixed lights, white or yellow colour
B) Flashing white
C) Fixed lights showing variable white

21. The abbreviation PAPI stands for:

A) Precision Approach Path Indicator
B) Precision Approach Power Index
C) Precision Approach Path Index

22. High intensity obstacle lights should be:

A) Flashing red
B) Flashing white
C) Fixed orange

23. Low intensity obstacle lights on mobile objects shall be:

A) Fixed red or preferably orange
B) Flashing blue
C) Flashing red or preferably yellow

24. Low intensity obstacle lights on fixed objects shall be:

A) Flashing red
B) Fixed red
C) Flashing yellow

25. The runway edge lights shall be:

A) Red
B) White
C) Green

26. The aerodrome category for rescue and fire fighting is based on:

A) The over-all length of the longest aeroplane normally using the aerodrome and its maximum fuselage width
B) The over-all length of the longest aeroplane
C) The longest aeroplane maximum width only

27. Regarding declared airfield distances the ASDA is:

A) The distance from the start of the take-off run to the last point capable of bearing the full weight of the aircraft under normal operating conditions
B) The distance from the start of the take-off run to the end of the stopway
C) The area beyond the end of the prepared surface only available to aircraft stopping in an emergency

28. "A defined rectangular area on the ground at the end of take-off run available prepared as a suitable area in which an aircraft can be stopped in the case of an abandoned take-off" is the definition for:

A) Runway strip
B) Runway end safety area
C) Stopway

29. Where a parking bay is provided at an aerodrome suitable for the parking of an aircraft which is known of believed to be the subject of unlawful interference, what is the minimum distance that this parking bay needs to be separated form any other parking areas, buildings.

A) 100 m
B) 50 m
C) 200 m

30. Crash/Rescue (emergency) services provision is categorised according to physical characteristics of the type of aeroplane using the aerodrome. Upon what are the categories based?

A) Overall length and maximum takeoff mass
B) Overall length and fuselage width
C) Maximum number of passengers on board

31. How is a paved pre-threshold area which is greater than 60 m in length but not suitable for any use by aircraft, marked?

A) By white arrows directing approaching aircraft to the displaced threshold
B) By a yellow X
C) By a white X

32. Which of the following systems describes an abbreviated precision approach path indicator:

A) Ten light units arranged on one side of the runway in the form of a single wing bar of four light units, with a bisecting longitudinal line of six lights
B) Twenty light units symmetrically disposed about the runway centre line in the form of two wing bars of four light units each, with bisecting longitudinal lines of six lights
C) A wing bar of 2 sharp transition multi-lamp units normally located on the left side of the runway unless it is physically impracticable to do so

33. What colour are emergency vehicles painted that are used on the manoeuvring area of an aerodrome?

A) A single conspicuous colour, preferably red or yellowish green
B) Green
C) Orange

34. Alternate yellow/green centre line lights of a taxiway indicate:

A) The proximity of a runway
B) An ILS/MLS critical/sensitive area
C) A stopway

35. When taxiing on a surface with white markings, you are rolling on a:

A) Movement Area
B) Runway
C) Clearway

36. What colour are apron safety line markings?

A) White
B) Red
C) A contrasting colour from the taxiway markings

37. Runway centre line lights shall be fixed lights showing variable... from the threshold to the point 900m from the runway end, alternate... and variable... from 900m to 300m from runway end, and... from 300m to the runway end.

A) White, red and white, red
B) White, yellow, red
C) Green, yellow, red

38. What colour is an aerodrome beacon at a land aerodrome?

A) Yellow or yellow/white
B) Green or green/white
C) White or white/green

39. Which of the following describes a location sign?

A) Red writing on a white background
B) Yellow writing on a black background
C) Black writing on a yellow background

40. When on or close to the approach slope, the wing bar of a PAPI shows:

A) Two red lights and two white lights
B) Four red lights
C) Three white lights and one red light

41. Which of the following is not a mandatory instruction sign:

A) Taxi-holding position sign
B) Road holding position sign
C) Direction sign

42. The number of stripes on each side of the centre line of a runway which has a width of 45m is:

A) 3
B) 6
C) 4

43. Mandatory instructions signs on an aerodrome shall have the following colours:

A) White inscription on a red background
B) Yellow inscription on a black background
C) Black inscription on a yellow background

44. Taxiway markings and aircraft stand markings are:

A) Red
B) Yellow
C) White

45. Taxiway centre line lights other than an exit taxiway shall be:

A) Fixed lights showing green.
B) Fixed lights showing yellow.
C) Fixed lights showing blue.

46. ARIWS is a system used for:

A) warning a pilot about bird activity on take off path
B) cautioning a pilot about wind shear on finals in real time
C) warning a pilot about runway incursion in near real time

47. You see a board painted in white with letters in red on taxytrack edge. This board is a

A) information sign
B) mandatory instruction sign
C) holding position sign

48. An aiming point marking shall be provided at

A) each approach end of paved instrument runway
B) paved taxy track joining precision approach runway
C) paved runways not provided with touch down zone markings

49. LFFZ is established around an aerodrome to;

A) protect aircraft from low flying aircraft
B) protect aircraft from laser emitters
C) protect aircraft from low flying fighter aircraft in military areas

50. VASIS shall be provided to serve the approach to a runway:

A) not served by visual approach aids
B) not served by non visual approach aids
C) whether or not the runway is served by visual approach aids or by non-visual aids, where turbo jet operations take place

ANSWERS

1	2	3	4	5	6	7	8	9	10	11	12	13	14
A	C	B	B	A	A	B	C	A	B	C	A	B	B

15	16	17	18	19	20	21	22	23	24	25	26	27	28
B	B	C	B	A	C	A	B	C	B	B	A	B	C

29	30	31	32	33	34	35	36	37	38	39	40	41	42
A	B	C	C	A	B	B	C	A	C	B	A	C	B

43	44	45	46	47	48	49	50
A	B	A	C	B	A	B	C

13

PROCEDURES FOR AIR NAVIGATION SERVICES

AIRCRAFT OPERATIONS

(DOC 8168, Vol 1-Flight Procedures)

INTRODUCTION:

The *Procedures for Air Navigation Services — Aircraft Operations* (PANS-OPS) – Doc 8168 consists of two volumes as follows:

Volume I — *Flight Procedures* describes operational procedures recommended for the guidance of flight operations personnel and flight crew. It also outlines the various parameters on which the criteria in Volume II are based so as to illustrate the need to adhere strictly to the published procedures in order to achieve and maintain an acceptable level of safety in operations.

Volume II — *Construction of Visual and Instrument Flight Procedures* is intended for the guidance of procedures specialists and describes the essential areas and obstacle clearance requirements for the achievement of safe, regular instrument flight operations. It provides the basic guidelines to States, and those operators and organizations producing instrument flight charts that will result in uniform practices at all aerodromes where instrument flight procedures are carried out.

GENERAL CRITERIA FOR DEPARTURE PROCEDURES

Procedures contained in PANS-OPS assume that all engines are operating.

Note:— Development of contingency procedures is the responsibility of the operator.

All procedures depict tracks. Pilots should attempt to maintain the track by applying corrections to heading for known wind.

All examples of calculations in this document are based on an altitude of 600 m (2 000 ft) above mean sea level (MSL) and a temperature of international standard atmosphere (ISA) +15°C unless otherwise stated.

OBSTACLE CLEARANCE

Obstacle clearance is a primary safety consideration in the development of instrument flight procedures. The criteria used and the detailed method of calculation are covered in PANS-OPS, Volume II.

AREAS

Where track guidance is provided in the design of a procedure, each segment comprises a specified volume of airspace, the vertical cross-section of which is an area located symmetrically about the centre line of each segment.

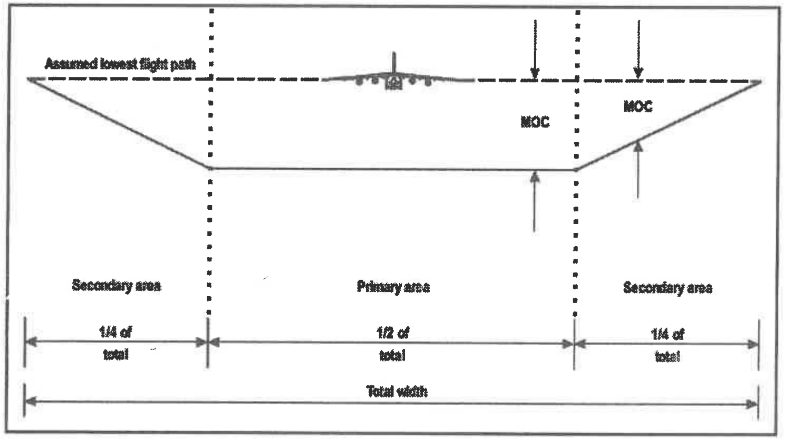
The vertical cross-section of each segment is divided into primary and secondary areas. Full obstacle clearances are applied over the primary areas reducing to zero at the outer edges of the secondary areas (see Figure).

On straight segments, the width of the primary area at any given point is equal to one-half of the total width.

The width of each secondary area is equal to one-quarter of the total width.

Where no track guidance is provided during a turn specified by the procedure, the total width of the area is considered primary area.

The minimum obstacle clearance (MOC) is provided for the whole width of the primary area. In the secondary area, MOC is provided at the inner edges reducing to zero at the outer edges (see Figure).



Relationship of minimum obstacle clearances in primary and secondary areas in cross-section

INSTRUMENT DEPARTURE PROCEDURE

Design Considerations

The design of an instrument departure procedure is, in general, dictated by the terrain surrounding the aerodrome. It may also be required to provide for air traffic control (ATC) requirements in the case of SID routes. These factors in turn influence the type and siting of navigation aids in relation to the departure route. Airspace restrictions may also affect the routing and siting of navigation aids.

Aerodrome operating minima

Where obstacles cannot be cleared by the appropriate margin when the aeroplane is flown on instruments, aerodrome operating minima are established to permit visual flight clear of obstacles.

Wherever possible, a straight departure is specified which is aligned with the runway centre line.

When a departure route requires a turn of more than 15° to avoid an obstacle, a turning departure is constructed

Establishment of a departure procedure

A departure procedure is established for each runway where instrument departures are expected to be used. It will include procedures for the various categories of aircraft.

Wind Effect

The procedures assume that pilots will not compensate for wind effects when being radar vectored. They also assume that pilots will compensate for known or estimated wind effects when flying departure routes which are expressed as tracks to be made good.

OBSTACLE CLEARANCE

The minimum obstacle clearance equals zero at the departure end of the runway (DER). From that point, it increases by 0.8 per cent of the horizontal distance in the direction of flight assuming a maximum turn of 15°.

In the turn initiation area and turn area, a minimum obstacle clearance of 90 m (295 ft) is provided.

Where precipitous and mountainous terrain exist, consideration is given by the procedures designer to increasing the minimum obstacle clearance.

PROCEDURE DESIGN GRADIENT (PDG)

The procedure design gradient (PDG) is intended as an aid to the procedures designer, who adjusts the route with the intention of minimizing the PDG consistent with other constraints.

Unless otherwise published, a PDG of 3.3 per cent is assumed.

Basis of the PDG

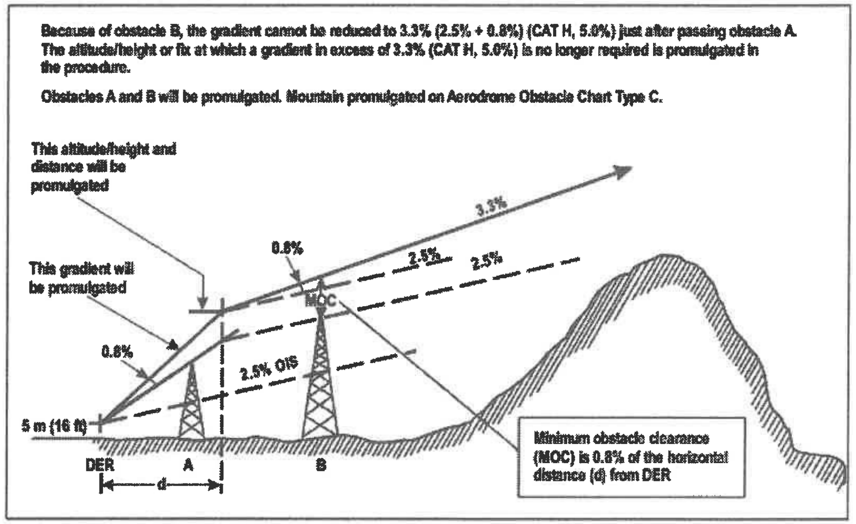
The PDG is based on an obstacle identification surface (OIS) having a 2.5 per cent gradient or a gradient determined by the most critical obstacle penetrating the surface, whichever is the higher an additional margin of 0.8 per cent.

Gradient Specification

Published gradients are specified to an altitude/height after which the minimum gradient of 3.3 per cent is considered to prevail. The final PDG continues until obstacle clearance is ensured for the next phase of flight (i.e. en-route, holding or approach). At this point, the departure procedure ends and is marked by a significant point.

FIXES AS AN AID IN OBSTACLE AVOIDANCE

Whenever a suitably located DME exists, additional specific height/distance information intended for obstacle avoidance may be published. RNAV waypoint or other suitable fixes may be used to provide a means of monitoring climb performance.



RADAR VECTORS

Pilots should not accept radar vectors during departure unless:

a) they are above the minimum altitude(s)/height(s) required to maintain obstacle clearance in the event of engine failure. This relates to engine failure between V1 and minimum sector altitude or the end of the contingency procedure as appropriate; or

b) the departure route is non-critical with respect to obstacle clearance.

STANDARD INSTRUMENT DEPARTURES

SID Termination

The SID terminates at the first fix/facility/waypoint of the en-route phase following the departure procedure.

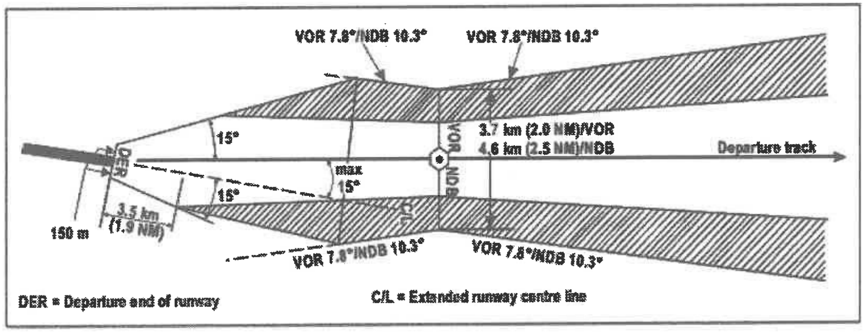
STRAIGHT DEPARTURES

Alignment

A straight departure is one in which the initial departure track is within 15° of the alignment of the runway centre line.

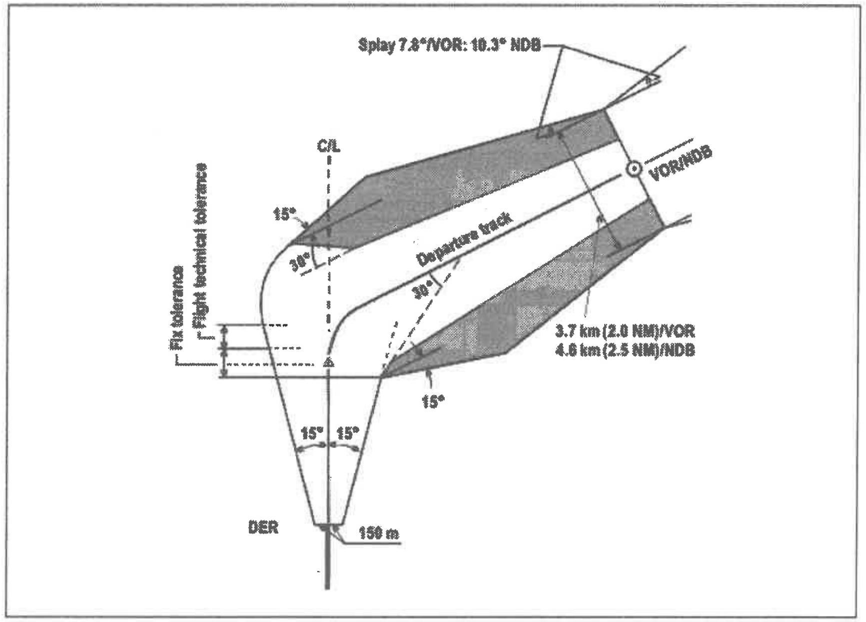
When obstacles exist which affect the departure route, procedure design gradients (PDGs) greater than 3.3 per cent may be specified. When such a gradient is specified, the altitude/height to which it extends shall be promulgated. After this point, the PDG of 3.3 per cent (Category H, 5.0 per cent) resumes.

Gradients to a height of 60 m (200 ft) or less, caused by close-in obstacles, are not specified. A note will be published stating that the close-in obstacles exist.



TURNING DEPARTURES

When a departure route requires a turn of more than 15°, it is called a turning departure. Straight flight is assumed until reaching an altitude/height of at least 120 m (394 ft), or 90 m (295 ft) for helicopters.



OMNIDIRECTIONAL DEPARTURES

GENERAL

In cases where no track guidance is provided, departure procedures are designed using the omnidirectional method.

Where obstacles do not permit development of omnidirectional procedures, it is necessary to:

a) fly a standard instrument departure (SID) route; or

b) ensure that ceiling and visibility will permit obstacles to be avoided by visual means.

BEGINNING OF DEPARTURE

The departure procedure begins at the departure end of the runway (DER), which is the end of the area declared suitable for take-off (i.e. the end of the runway or clearway as appropriate).

Since the point of lift-off will vary, the departure procedure assumes that a turn at 120 m (394 ft) above the elevation of the aerodrome is not initiated sooner than 600 m from the beginning of the runway.

Procedures are normally designed/optimized for turns at a point 600 m from the beginning of the runway.

However, in some cases turns may not be initiated before the DER (or a specified point), and this information will be noted on the departure chart.

For Category H procedures, procedure turns can be initiated 90 m (295 ft) above the elevation if the DER and the earliest initiation point are at the beginning of the runway/FATO.

PROCEDURE DESIGN GRADIENT (PDG)

Unless otherwise specified, departure procedures assume a 3.3 per cent (helicopters, 5 per cent) PDG and a straight climb on the extended runway centre line until reaching 120 m (394 ft) (helicopters, 90 m (295 ft)) above the aerodrome elevation.

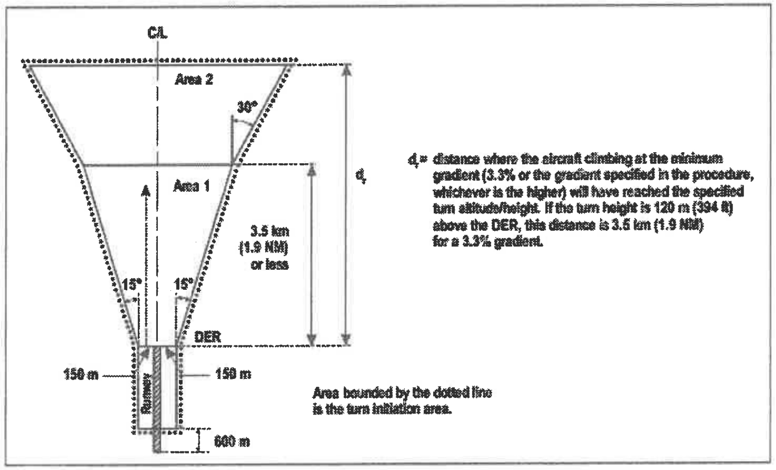
The basic procedure ensures:

a) the aircraft climbs on the extended runway centre line to 120 m (394 ft) before turns can be specified; and

b) at least 90 m (295 ft) of obstacle clearance is provided before turns greater than 15° are specified.

The omnidirectional departure procedure is designed using any one of a combination of the following:

a) **Standard Case:** Where no obstacles penetrate the 2.5 per cent obstacle identification surface (OIS), and 90 m (295 ft) of obstacle clearance prevails, a 3.3 per cent climb to 120 m (394 ft) will satisfy the obstacle clearance requirements for a turn in any direction.

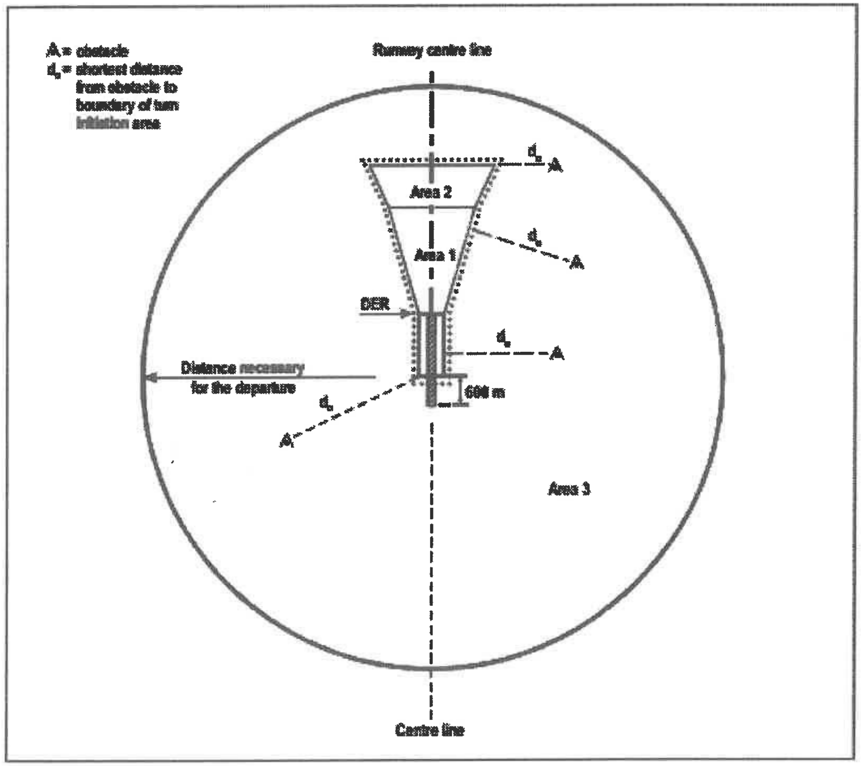


Areas 1 and 2 and turn initiation area for omnidirectional departures

b) ***Specified turn altitude/height:*** Where obstacle(s) preclude omnidirectional turns at 120 m (394 ft), the procedure will specify a 3.3 per cent climb to an altitude/height where omnidirectional turns can be made.

c) ***Specified procedure design gradient:*** Where obstacle(s) exist, the procedure may define a minimum gradient of more than 3.3 per cent to a specified altitude/ height before turns are permitted.

d) ***Sector departures:*** Where obstacle(s) exist, the procedure may identify sector(s) for which either a minimum gradient or a minimum turn altitude/height is specified (e.g. "climb straight ahead to altitude/height ... before commencing a turn to the east/the sector 0°–180° and to altitude/height ... before commencing a turn to the west/the sector 180°–360°").



Area 3 for omnidirectional departures

GENERAL INFORMATION FOR RNAV SYSTEMS

In RNAV guidance systems, a computer converts navigation data inputs into aircraft position, calculates track and distance and provides steering guidance to the next waypoint. The limitations of RNAV systems are those of the computers on which they are based.

The computer is programmed so that calculation errors are minimal and do not affect the accuracy of the output significantly. The computer, however, cannot identify data input errors.

BASIC GNSS RECEIVERS

Straight Departures

Where the alignment of the initial departure track (α15°) is determined by the position of the first waypoint located after the DER, there are no unique requirements for the basic GNSS receiver.

Turning Departures

Turns are specified as a "turn at a fly-by waypoint", "turn at a flyover waypoint" or "turn at an altitude/height". For some systems, turns at an altitude/height cannot be coded in the database, and in this case, such turns must be executed manually.

Sattelite -Based Augmentation System (SBAS)

An SBAS augments core satellite constellations by providing ranging, integrity and correction information via geostationary satellites. The system comprises a network of ground reference stations that observe satellite signals, and master stations that process observed data and generate SBAS messages for uplink to the geostationary satellites, which broadcast the SBAS message to the users.

Straight Departure

From the DER to the turn initiation point of the first waypoint in the departure procedure, the SBAS receiver provides a nominal full-scale deflection (FSD) of 0.3 NM. Larger FSDs may be acceptable with augmentations, such as an autopilot, that can control the flight technical error.

Turning Departure

The criteria are dependent on whether the first waypoint is a fly-by or flyover waypoint. For a fly-by waypoint, turn anticipation is always provided. At turn initiation, FSD and integrity performance transitions are as described in, "Straight departure". For a flyover waypoint, there is no turn anticipation. FSD and integrity performance transitions occur when the waypoint is sequenced. The SBAS receiver will not transition to en-route integrity performance until the final waypoint in the departure procedure is sequenced.

Ground -Based Augmentation System (GBAS)

No departure criteria specifically designed for GBAS exists. Departure operations based upon basic GNSS or SBAS may be flown by aircraft with a GBAS receiver using

the optional GBAS positioning service.

RNP-Based Departure Procedures

Departures may be based on RNAV VOR/DME, RNAV DME/DME, basic GNSS or RNP criteria. Most FMS-equipped aircraft are capable of following RNAV procedures based on more than one of the above systems.

There are four kinds of turns:

a) turn at a fly-by waypoint;

b) turn at a flyover waypoint;

c) turn at an altitude/height; and

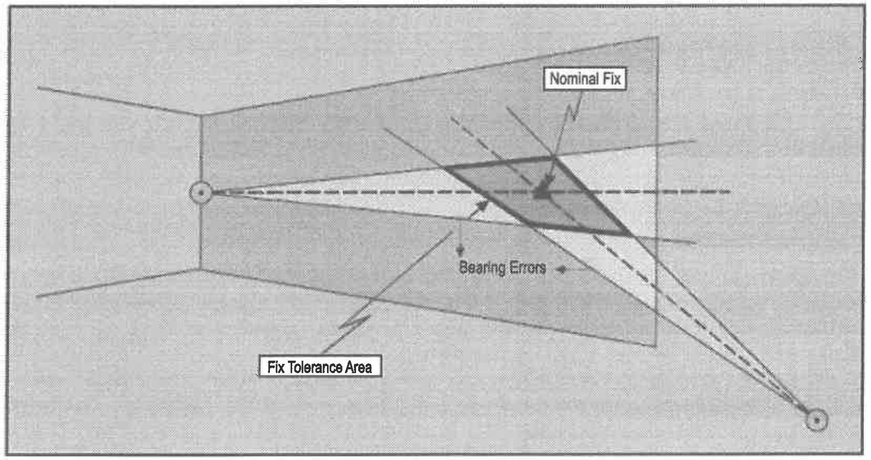
d) fixed radius turn (generally associated with procedures based on RNP).

GENERAL CRITERIA FOR ARRIVAL AND APPROACH PROCEDURES

ACCURACY OF FIXES

Fix Formed By Intersection

Because all navigation facilities and waypoints have accuracy limitations, the geographic point which is identified is not precise but may be anywhere within an area called the fix tolerance area which surrounds its plotted point of intersection. Figure illustrates the intersection of two radials or tracks from different navigation facilities.



Fix tolerance area

FIX TOLERANCE FOR OTHER TYPES OF NAVIGATION SYSTEMS

Surveillance Radar

Radar fix tolerances are based on radar mapping accuracies, azimuth resolution, flight technical tolerance, controller technical tolerances, and the speed of aircraft in the terminal area. The fix tolerances are listed below:

a) terminal area surveillance radar (TAR) within 37 km (20 NM): fix tolerance is ±1.5 km (0.8 NM); and

b) en-route surveillance radar (RSR) within 74 km (40 NM): fix tolerance is ±3.1 km (1.7 NM).

Distance measuring equipment (DME)

Fix tolerance is ±0.46 km (0.25 NM) + 1.25 per cent of distance to the antenna.

75 MHz marker beacon

Determine the fix tolerance for instrument landing system (ILS) and "z" markers for use with instrument approach procedures.

TYPES OF APPROACH

Straight-in Approach

Wherever possible, a straight-in approach will be specified which is aligned with the runway centre line. In the case of non-precision approaches, a straight-in approach is considered acceptable if the angle between the final approach track and the runway centre line is 30° or less.

Circling Approach

A circling approach will be specified in those cases where terrain or other constraints cause the final approach track alignment or descent gradient to fall outside the criteria for a straight-in approach. The final approach track of a circling approach procedure is in most cases aligned to pass over some portion of the usable landing surface of the aerodrome.

CATEGORIES OF AEROPLANES

Category A:	less than 169 km/h (91 kt) indicated airspeed (IAS
Category B:	169 km/h (91 kt) or more but less than 224 km/h (121 kt) IAS
Category C:	224 km/h (121 kt) or more but less than 261 km/h (141 kt) IAS
Category D:	261 km/h (141 kt) or more but less than 307 km/h (166 kt) IAS
Category E:	307 km/h (166 kt) or more but less than 391 km/h (211 kt) IAS

The five categories of typical aeroplanes have been established based the indicated airspeed at threshold (Vat) which is equal to the stall speed Vso multiplied by 1.3 or stall speed Vs1g multiplied by 1.23 (whichever is higher) in the landing configuration at maximum certificated landing mass.

Speeds for procedure calculations in knots (kt)

Aircraft category	V_{at}	Range of speed for initial approach	Range of final approach speeds	Maximum speeds for visual manoeuvring (circling)	Maximum speeds for missed approach	
					Intermediate	Final
A	<91	90/150(110*)	70/100	100	100	110
B	91/120	120/180(140*)	85/130	135	130	150
C	121/140	160/240	115/160	180	160	240
D	141/165	185/250	130/185	205	185	265
E	166/210	185/250	155/230	240	230	275
H	N/A	70/120**	60/90***	N/A	90	90
CATH (PinS)***	N/A	70/120	60/90	N/A	70 or 90	70 or 90

V_{at} — Speed at threshold based on 1.3 times stall speed V_{so} or 1.23 times stall speed V_{slg} in the landing configuration at maximum certificated landing mass. (Not applicable to helicopters.)

* Maximum speed for reversal and racetrack procedures.

** Maximum speed for reversal and racetrack procedures up to and including 6000 ft is 100 kt, and maximum speed for reversal and racetrack procedures above 6000 ft is 110 kt.

*** Helicopter point-in-space procedures based on basic GNSS may be designed using maximum speeds of 120 KIAS for initial and intermediate segments and 90 KIAS on final and missed approach segments, or 90 KIAS for initial and intermediate segments and 70 KIAS on final and missed approach segments based on operational need. Refer to PANS-OPS, Volume II, Part IV, Chapter 1, "Area navigation (RNAV) point-in-space (PinS) approach procedures for helicopters using basic GNSS receivers."

Note:— The V at speeds given in Column 1 of Table 1-4-1-1 are converted exactly from those in this table, since they determine the category of aircraft. The speeds given in the remaining columns are converted and rounded to the nearest multiple of five for operational reasons and from the standpoint of operational safety are considered to be equivalent.

Segments of the Approach Procedure

The approach segments begin and end at designated fixes. However, under some circumstances certain of the segments may begin at specified points where no fixes are available. For example, the final approach segment of a precision approach may start where the intermediate flight altitude intersects the nominal glide path (the final approach point).

DESCENT GRADIENT

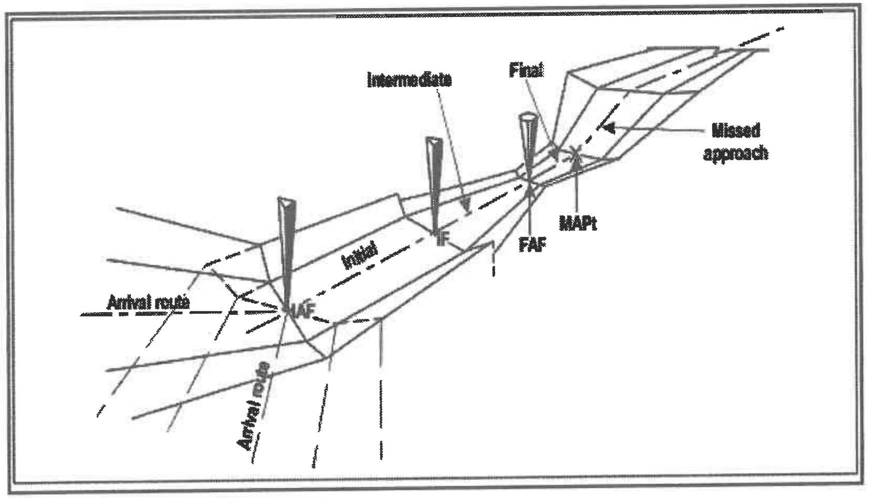
In instrument approach procedure design, adequate space is allowed for descent from the facility crossing altitude/height to the runway threshold for straight-in approach or to OCA/H for circling approaches.

Adequate space for descent is provided by establishing a maximum allowable descent gradient for each segment of the procedure. The minimum/optimum descent gradient/angle in the final approach of a procedure with

FAF is 5.2 per cent/3.0° (52 m/km (318 ft/NM)). Where a steeper descent gradient is necessary, the maximum permissible is 6.5 per cent/3.7° (65 m/km (395 ft/NM)) for Category A and B aircraft, 6.1 per cent/3.5° (61 m/km (370 ft/NM)) for Category C, D and E aircraft, and 10 per cent (5.7°) for Category H.

CONTINUOUS DESCENT FINAL APPROACH (CDFA)

This technique requires a continuous descent, flown either with VNAV guidance calculated by on-board equipment or based on manual calculation of the required rate of descent, without level-offs. The rate of descent is selected and adjusted to achieve a continuous descent to a point approximately 15 m (50 ft) above the landing runway threshold or the point where the flare manoeuvre should begin for the type of aircraft flown. The descent shall be calculated and flown to pass at or above the minimum altitude at any stepdown fix. CDFA with advisory VNAV guidance calculated by on-board equipment.



Segments of instrument approach

ARRIVAL SEGMENT

A standard instrument arrival (STAR) route permits transition from the en-route phase to the approach phase.

When necessary or where an operational advantage is obtained, arrival routes from the en-route phase to a fix or facility used in the procedure are published.

PROTECTION OF THE ARRIVAL SEGMENT

The width of the protection area decreases from the "en-route" value until the "initial approach" value with a maximum convergence angle of 30° each side of the axis.

This convergence begins at 46 km (25 NM) before the initial approach fix (IAF) if the length of the arrival route is greater than or equal to 46 km (25 NM). It begins at the starting point of the arrival route if the length of the arrival route is less than 46 km (25 NM).

The arrival route normally ends at the IAF. Omnidirectional or sector arrivals can be provided taking into account minimum sector altitudes (MSA).

MINIMUM SECTOR ALTITUDES (MSA)/TERMINAL ARRIVAL ALTITUDES (TAA)

Minimum sector altitudes or terminal arrival altitudes are established for each aerodrome and provide at least 300 m (1 000 ft) obstacle clearance within 46 km (25 NM) of the navigation aid, initial approach fix or intermediate fix associated with the approach procedure for that aerodrome.

TERMINAL AREA RADAR (TAR)

When terminal area radar is employed, the aircraft is vectored to a fix, or onto the intermediate or final approach track, at a point where the approach may be continued by the pilot by referring to the instrument approach chart.

INITIAL APPROACH SEGMENT

The initial approach segment begins at the initial approach fix (IAF) and ends at the intermediate fix (IF). In the initial approach, the aircraft has left the en-route structure and is manoeuvring to enter the intermediate approach segment.

Aircraft speed and configuration will depend on the distance from the aerodrome, and the descent required.

Maximum angle of interception of initial approach segment

Normally track guidance is provided along the initial approach segment to the IF, with a maximum angle of interception of:

a) 90° for a precision approach; and
b) 120° for a non-precision approach.

Minimum Obstacle Clearance

The initial approach segment provides at least 300 m (1 000 ft) of obstacle clearance in the primary area, reducing laterally to zero at the outer edge of the secondary area.

TYPES OF MANOEUVRES

Where no suitable IAF or IF is available to construct the instrument procedure, a reversal procedure, racetrack or holding pattern is required.

Reversal Procedure

The reversal procedure may be in the form of a procedure or base turn. Entry is restricted to a specific direction or sector. In these cases, a specific pattern — normally a base turn or procedure turn — is prescribed.

The directions and timing specified should be strictly followed in order to remain within the airspace provided. It should be noted that the airspace provided for these procedures does not permit a racetrack or holding manoeuvre to be conducted unless so specified.

There are three generally recognized manoeuvres related to the reversal procedure, each with its own airspace characteristics:

a) 45°/225° procedure turn (see Figure).

b) 80°/260° procedure turn (see Figure).

The duration of the initial outbound leg of a procedure may be varied in accordance with aircraft speed categories in order to reduce the overall length of the protected area. In this case, separate procedures are published.

c) Base turn, (see Figure).

The outbound track and/or the timing may be different for the various categories of aircraft. Where this is done, separate procedures are published.

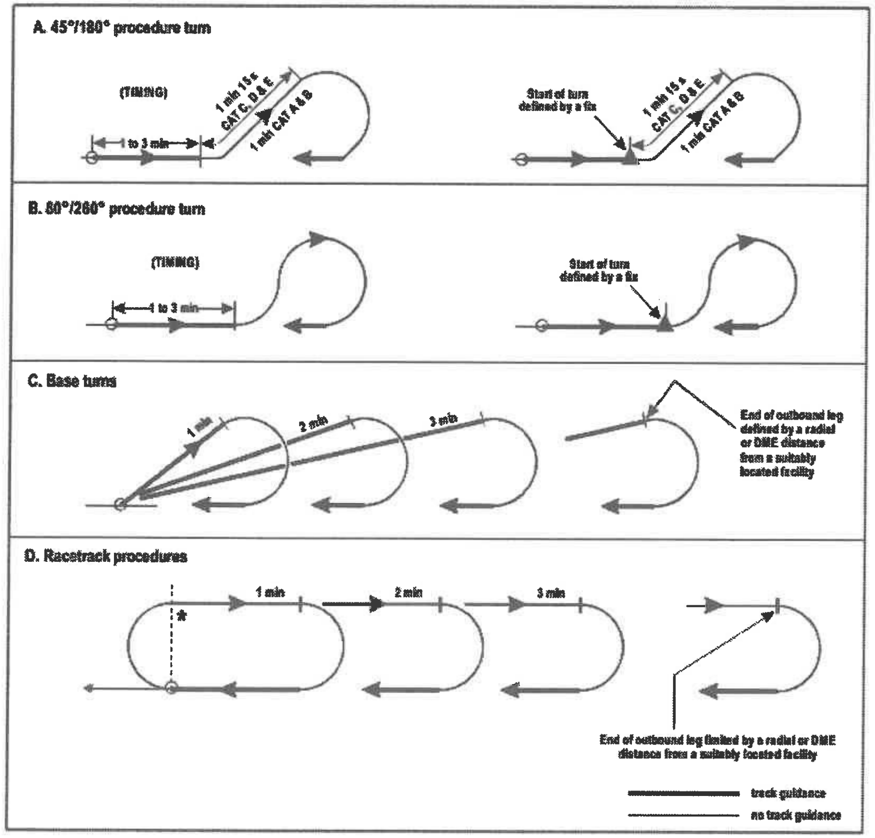
Racetrack Procedure

A racetrack procedure consists of:

a) a turn from the inbound track through 180° from overhead the facility or fix on to the outbound track, for 1, 2 or 3 minutes; followed by

b) a 180° turn in the same direction to return to the inbound track (see Figure).

As an alternative to timing, the outbound leg may be limited by a DME distance or intersecting radial/bearing.



Types of reversal and racetrack procedures

INTERMEDIATE APPROACH SEGMENT

This is the segment during which the aircraft speed and configuration should be adjusted to prepare the aircraft for final approach. For this reason, the descent gradient is kept as shallow as possible.

Minimum Obstacle Clearance

During the intermediate approach, the obstacle clearance requirement reduces from 300 m (984 ft) to 150 m (492 ft) in the primary area, reducing laterally to zero at the outer edge of the secondary area.

Beginning and end of the Segment

Where a final approach fix (FAF) is available, the intermediate approach segment begins when the aircraft is on the inbound track of the procedure turn, base turn or final inbound leg of the racetrack procedure. It ends at the FAF or final approach point (FAP), as applicable.

Note:— Where no FAF is specified, the inbound track is the final approach segment.

FINAL APPROACH SEGMENT

This is the segment in which alignment and descent for landing are made. Final approach may be made to a runway for a straight-in landing, or to an aerodrome for a visual manoeuvre.

Types of final approach

The criteria for final approach vary according to the type. These types are:

a) Non-precision approach (NPA) with final approach fix (FAF);
b) NPA without FAF;
c) Approach with vertical guidance (APV); and
d) Precision approach (PA).

NPA WITH FAF

FAF Location

This segment begins at a facility or fix, called the final approach fix (FAF) and ends at the missed approach point (MAPt) (see Figure). The FAF is sited on the final approach track at a distance that permits selection of final approach configuration, and descent from intermediate approach altitude/height to the appropriate MDA/H either for a straight-in approach or for a visual circling. The optimum distance for locating the FAF relative to the threshold is 9.3 km (5.0 NM). The maximum length should not normally be greater than 19 km (10 NM).

Stepdown Fixes

A stepdown fix may be incorporated in some non-precision approach procedures. In this case, two OCA/H values are published:

a) a higher value applicable to the primary procedure; and

b) a lower value applicable only if the stepdown fix is positively identified during the approach.

NPA WITHOUT FAF

Sometimes an aerodrome is served by a single facility located on or near the aerodrome, and no other facility is suitably situated to form a FAF. In this case, a procedure may be designed where the facility is both the IAF and the MAPt.

These procedures indicate:

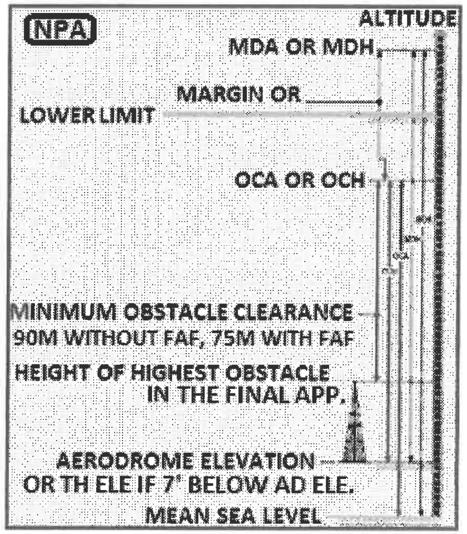
a) a minimum altitude/height for a reversal procedure or racetrack; and

b) an OCA/H for final approach.

In the absence of a FAF, descent to MDA/H is made once the aircraft is established inbound on the final approach track. Procedure altitudes/heights will not be developed for non-precision approach procedures without a FAF.

In procedures of this type, the final approach track cannot normally be aligned on the runway centre line.

Whether OCA/H for straight-in approach limits are published or not depends on the angular difference between the track and the runway and position of the track with respect to the runway threshold.



Relationship of obstacle clearance altitude/height (OCA/H) to minimum descent altitude / height (MDA/H) for non-precision approaches (example with a controlling obstacle in the final approach)

Margin or Lower limit. Based on operational consideration of: category of operation, ground/airborne equipment characteristics, aircraft performance, meteorological conditions, aerodrome characteristics, terrain profile/radio altimeter, pressure error/pressure altimeter, etc. and crew qualifications.

PRECISION APPROACH

Final approach point (FAP)

The final approach segment begins at the final approach point (FAP). This is a point in space on the final approach track where the intermediate approach altitude/ height intercepts the nominal glide path/microwave landing system (MLS) elevation angle.

Final Approach Length

The intermediate approach altitude/height generally intercepts the glide path/ MLS elevation angle at heights from 300 m (1 000 ft) to 900 m (3 000 ft) above runway elevation. In this case, for a 3° glide path, interception occurs between 6 km (3 NM) and 19 km (10 NM) from the threshold.

The intermediate approach track or radar vector is designed to place the aircraft on the localizer or the MLS azimuth specified for the final approach track at an altitude/ height that is below the nominal glide path/MLS elevation angle.

Outer Marker/DME fix

The final approach area contains a fix or facility that permits verification of the glide path/MLS elevation angle/altimeter relationship. The outer marker or equivalent DME fix is normally used for this purpose. Prior to crossing the fix, descent may be made on the glide path/MLS elevation angle to the altitude/height of the published fix crossing.

Descent below the fix crossing altitude/height should not be made prior to crossing the fix.

It is assumed that the aircraft altimeter reading on crossing the fix is correlated with the published altitude, allowing for altitude error and altimeter tolerances.

Note: FAF is associated with Non Precision Approach and FAP with Precision Approach.

FINAL APPROACH FIX (FAF)

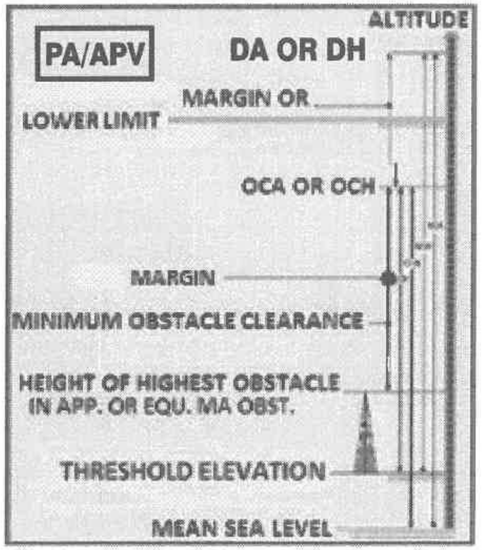
A specified point on a non-precision instrument approach which identifies the commencement of the final segment.

FINAL APPROACH POINT (FAP)

A specified point on the glide path of a precision instrument approach which identifies the commencement of the final segment.

DETERMINATION OF DECISION ALTITUDE (DA) OR DECISION HEIGHT (DH)

Margin. The margin is dependent on aircraft approach speed, height loss and altimetry and is adjustable for the steep glide paths and high level aerodromes.



Relationship of obstacle clearance altitude/height (OCA/H) to decision altitude/height (DA/H) for precision approaches

MISSED APPROACH SEGMENT

The design of the missed approach has been kept as simple as possible and consists of three phases (initial, intermediate and final).

Only one missed approach procedure is established for each instrument approach procedure. It is designed to provide protection from obstacles throughout the missed approach manoeuvre. It specifies a point where the missed approach begins, and a point or an altitude/height where it ends.

The missed approach should be initiated not lower than the decision altitude/height (DA/H) in precision approach procedures, or at a specified point in non-precision approach procedures not lower than the minimum descent altitude/height (MDA/H).

The MAPt in a procedure may be defined by:

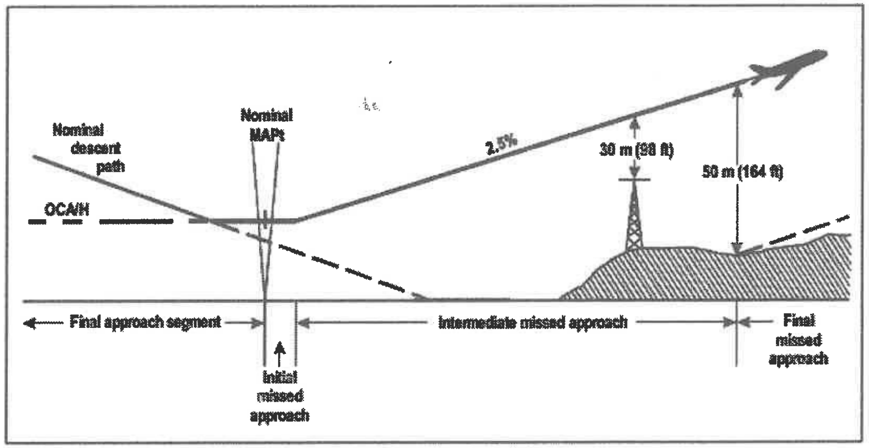
a) the point of intersection of an electronic glide path with the applicable DA/H in APV or precision approaches;

or

b) a navigation facility, a fix, or a specified distance from the final approach fix (FAF) in non-precision approaches. If upon reaching the MAPt the required visual reference is not established, the procedure requires that a missed approach be initiated at once in order to maintain protection from obstacles.

Missed Approach Gradient

Normally procedures are based on a minimum missed approach climb gradient of 2.5 per cent.



Missed approach phases

INITIAL PHASE

The initial phase begins at the MAPt and ends at the start of climb (SOC). This phase requires the concentrated attention of the pilot on establishing the climb and the changes in aeroplane configuration. It is assumed that guidance equipment is not extensively utilized during these manoeuvres, and for this reason, no turns are specified in this phase.

INTERMEDIATE PHASE

The intermediate phase begins at the SOC. The climb is continued, normally straight ahead. It extends to the first point where 50 m (164 ft) obstacle clearance is obtained and can be maintained.

The intermediate missed approach track may be changed by a maximum of 15° from that of the initial missed approach phase. During this phase, it is assumed that the aircraft begins track corrections.

FINAL PHASE

The final phase begins at the point where 50 m (164 ft) obstacle clearance is first obtained (for Category H procedures, 40 m (131 ft)) and can be maintained. It extends to the point where a new approach, holding or a return to en-route flight is initiated. Turns may be prescribed in this phase.

Turning Missed Approach

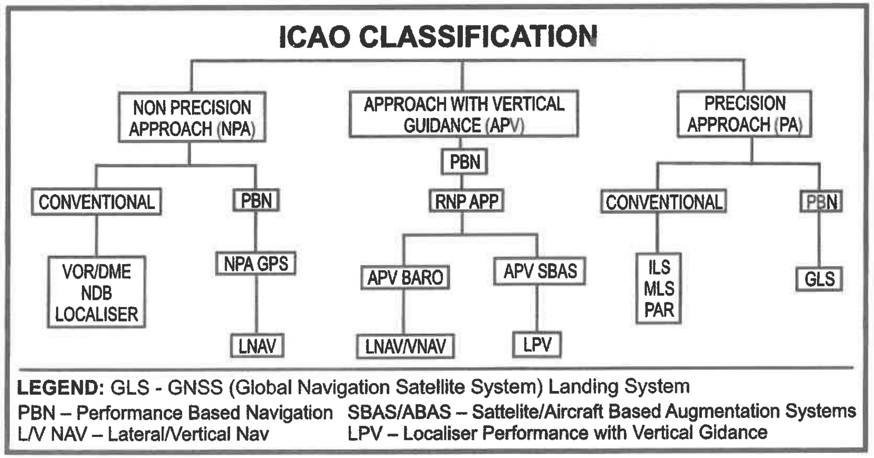
Turns in a missed approach procedure are only prescribed where terrain or other factors make a turn necessary.

Airspeed

The protected airspace for turns is based on the speeds for *final missed approach.*

Approach and landing operations using instrument approach procedures.

Instrument approach and landing operations are classified as follows:



Instrument approach procedure (IAP).

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

Instrument approach operations.

An approach and landing using instruments for navigation guidance based on an instrument approach procedure. There are two methods for executing instrument approach operations:

a) a two-dimensional (2D) instrument approach operation, using lateral navigation guidance only; and
b) a three-dimensional (3D) instrument approach operation, using both lateral and vertical navigation guidance.

Lateral and vertical navigation guidance refers to the guidance provided either by:

a) a ground-based radio navigation aid; or
b) computer-generated navigation data from ground-based, space-based, self-contained navigation aids or a combination of these.

Instrument approach operations shall be classified, based on the designed lowest operating minima below which an approach operation shall only be continued with the required visual reference as follows:

a) **Type A:** a minimum descent height or decision height at or above 75 m (250 ft); and
b) **Type B:** a decision height below 75 m (250 ft). Type B instrument approach operations are categorized as:
   1) **Category I (CAT I):** a decision height not lower than 60 m (200 ft) and with either a visibility not less than 800 m or a runway visual range not less than 550 m;
   2) **Category II (CAT II):** a decision height lower than 60 m (200 ft), but not lower than 30 m (100 ft) and a runway visual range not less than 300 m;
   3) **Category IIIA (CAT IIIA):** a decision height lower than 30 m (100 ft) or no decision height and a runway visual range not less than 175 m;
   4) **Category IIIB (CAT IIIB):** a decision height lower than 15 m (50 ft), or no decision height and a runway visual range less than 175 m but not less than 50 m; and
   5) **Category IIIC (CAT IIIC):** no decision height and no runway visual range limitations.

Category II and Category III instrument approach operations shall not be authorized unless RVR information is provided.

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

Terminal Instrument Flight Procedures are classified as one of the following types:

Non-precision approach (NPA) procedure. An instrument approach procedure designed for 2D instrument approach operations Type A.

Non-precision approach procedures may be flown using a continuous descent final approach technique (CDFA). CDFA with advisory VNAV guidance calculated by on-board equipment are considered 3D instrument approach operations. CDFA with manual calculation of the required rate of descent are considered 2D instrument approach operations.

(a) **Conventional: Non-precision Approach (Ground-based);** Non-precision approach runway. A runway served by visual aids and non-visual aid(s) intended for landing operations following an instrument approach operation type A and a visibility not less than 1 000 m.
(b) **PBN: Non-precision Approach (RNP APCH);** RNP APCH is the PBN navigation specification dealing with approach procedure using GNSS. Those approaches are generally charted under the name RNAV(GNSS) or RNAV(GPS). Three approaches under this category are RNP App, NPA GPS and Lateral Nav App.(LNAV).

Approach procedure with vertical guidance (APV). A performance-based navigation (PBN) instrument approach procedure designed for 3D instrument approach operations Type A.

(a) **PBN: Required Navigation Performance Authorization Required Approach (RNP AR APCH);** APV offers 3D guidance, but with lower performance than specified for Precision App. APV covers four possible types of approach procedures: APV BaroVNAV approach, APV SBAS approach, LNAV/VNAV App and LPV App.

Precision approach (PA) procedure.

An instrument approach procedure based on navigation systems (ILS, MLS, GLS and SBAS Cat I) designed for 3D instrument approach operations Type A or B.

(a) **Conventional: Precision Approach (Ground-based);** conventional 3D approaches using ILS, MLS or PAR.
(b) **PBN: Precision Approach (GBAS);** GBAS Landing System (GLS). A system for a 3D approach and landing operations using GNSS, augmented by

a ground-based Augmentation system (GBAS), as the primary navigational reference. GBAS provides ILS Cat I equivalent service.

Obstacle clearance altitude (OCA) or obstacle clearance height (OCH).

The lowest altitude or the lowest height above the elevation of the relevant runway threshold or the aerodrome elevation as applicable, used in establishing compliance with appropriate obstacle clearance criteria.

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

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

Minimum descent altitude (MDA) or Minimum descent height (MDH). A specified altitude or height in a non precision approach or circling approach below which descent must not be made without the required visual reference.

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

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

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

Decision altitude/height (DA/H). A specified altitude or height in the precision approach or approach with vertical guidance at which a missed approach must be initiated if the required visual reference to continue the approach has not been established.

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

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

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

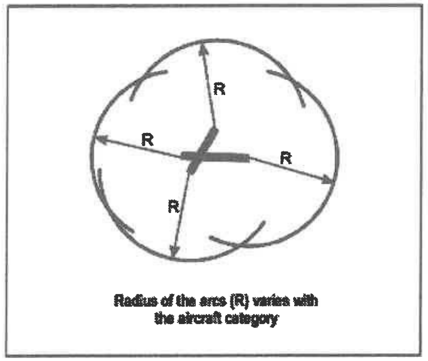
VISUAL MANOEUVRING (CIRCLING) IN THE VICINITY OF THE AERODROME:

Visual manoeuvring (circling) is the term used to describe the phase of flight after an instrument approach has been completed. It brings the aircraft into position for landing on a runway which is not suitably located for straight-in approach, i.e. one where the criteria for alignment or descent gradient cannot be met.

THE VISUAL MANOEUVRING (CIRCLING) AREA

The visual manoeuvring area for a circling approach is determined by drawing arcs centred on each runway threshold and joining those arcs with tangent lines (see Figure). The radius of the arcs is related to:

a) ***aircraft category;***
b) ***speed:*** speed for each category;
c) ***wind speed:*** 46 km/h (25 kt) throughout the turn; and
d) ***bank angle:*** 20° average or 3° per second, whichever requires less bank.



Visual manoeuvring (circling approach) area

Obstacle Clearance

When the visual manoeuvring (circling) area has been established, the obstacle clearance altitude/height (OCA/H) is determined for each category of aircraft.

Minimum descent altitude/height (MDA/H)

When the OCA/H is established, an MDA/H is also specified to allow for operational considerations. Descent below MDA/H should not be made until:

a) visual reference has been established and can be maintained;
b) the pilot has the landing threshold in sight; and

c) the required obstacle clearance can be maintained and the aircraft is in a position to carry out a landing.

Visual manoeuvring (circling) area not considered for obstacle clearance

Visual manoeuvring (circling) area exclusions

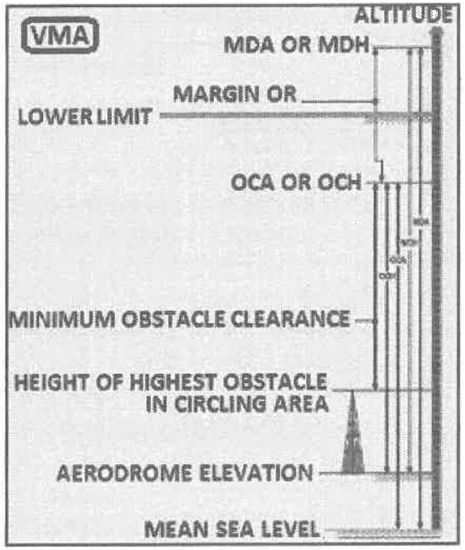
A sector in the circling area where a prominent obstacle exists may be ignored for OCA/H calculations if it is outside the final approach and missed approach areas.

MISSED APPROACH PROCEDURE WHILE CIRCLING

If visual reference is lost while circling to land from an instrument approach, the missed approach specified for that particular procedure must be followed. The pilot will make an initial climbing turn toward the landing runway and overhead the aerodrome. At this point, the pilot will establish the aircraft climbing on the missed approach track.

The circling manoeuvre may be carried out in more than one direction. For this reason, different patterns are required to establish the aircraft on the prescribed missed approach course depending on its position at the time visual reference is lost.

VISUAL MANOEUVRING (CIRCLING)



Relationship of obstacle clearance altitude/height (OCA/H) to minimum descent altitude/height (MDA/H) for visual manoeuvring (circling)

HOLDING PROCEDURES

IN-FLIGHT PROCEDURES ENTRY, HOLDING

Speeds

Holding patterns shall be entered and flown at or below the airspeeds given in Tables.

Bank angle/rate of turn

All turns are to be made at a bank angle of 25° or at a rate of 3° per second, whichever requires the lesser bank.

Allowance for known wind

All procedures depict tracks. Pilots should attempt to maintain the track by making allowance for known wind by applying corrections both to heading and timing. This should be done during entry and while flying in the holding pattern.

Start of outbound timing

Outbound timing begins over or abeam the fix, whichever occurs later. If the abeam position cannot be determined, start timing when the turn to outbound is completed.

Outbound leg length based on a DME distance

If the outbound leg length is based on a DME distance, then the outbound leg terminates as soon as the limiting DME distance is reached.

Limiting radials

In the case of holding away from the station, where the distance from the holding fix to the VOR/DME station is short, a limiting radial may be specified. A limiting radial may also be specified where airspace conservation is essential.

If the limiting radial is reached before the limiting DME distance, this radial should be followed until a turn inbound is initiated. The turn should be initiated at the latest where the limiting DME distance is reached.

ATC notification

If for any reason a pilot is unable to conform to the procedures for normal conditions, air traffic control should be advised as early as possible.

ENTRY

The entry into the holding pattern shall be according to heading in relation to the three entry sectors shown in Figure, recognizing a zone of flexibility of 5° on either side of the sector boundaries.

For holding on a VOR intersection, the entry track is limited to the radials forming the intersection.

For holding on a VOR/DME fix, the entry track is limited to:

a) the VOR radial;

b) the DME arc; or

Note:— A DME arc entry procedure is specified only when there is a specific operational difficulty which makes the use of other entry procedures impossible.

c) the entry radial to a VOR/DME fix at the end of the outbound leg, as published.

Sector 1 entry

Sector 1 procedure (parallel entry):

a) at the fix, the aircraft is turned left onto an outbound heading for the appropriate period of time; then

b) the aircraft is turned left onto the holding side to intercept the inbound track or to return to the fix; and then

c) on second arrival over the holding fix, the aircraft is turned right to follow the holding pattern.

Sector 2 entry

Sector 2 procedure (offset entry):

a) at the fix, the aircraft is turned onto a heading to make good a track making an angle of 30° from the reciprocal of the inbound track on the holding side; then

b) the aircraft will fly outbound:

   1) for the appropriate period of time, where timing is specified; or

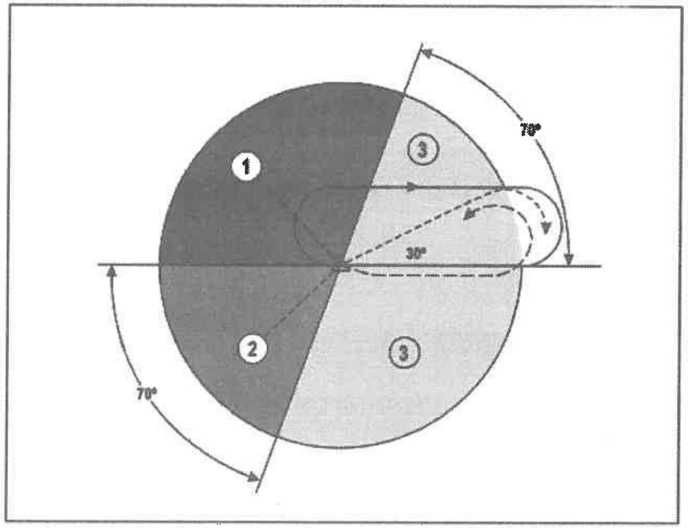
   2) until the appropriate limiting DME distance is reached, where distance is specified. If a limiting radial is also specified, then the outbound distance is determined either by the limiting DME distance or the limiting radial, whichever comes first;

c) the aircraft is turned right to intercept the inbound holding track; and

d) on second arrival over the holding fix, the aircraft is turned right to follow the holding pattern.

Sector 3 entry

Sector 3 procedure (direct entry): Having reached the fix, the aircraft is turned right to follow the holding pattern.



Entry sectors

Holding speeds — Categories A through E

Levels	Normal Conditions	Turbulence conditions
Up to 4 250 m (14 000 ft)	425 km/h (230 kt)2 315 km/h (170 kt)4	520 km/h (280 kt)3 315 km/h (170 kt)4
Above 4 250 m (14 000 ft) to 6 100 m (20 000 ft) inclusive	445 m/h (240 kt)5	520 km/h (280 kt) or 0.8 Mach, whichever is less3
Above 6 100 m (20 000 ft) to 10 350 m (34 000 ft) inclusive	490 km/h (265 kt)5	
Above 10 350 m (34 000 ft)	0.83 Mach	0.83 Mach

1. The levels shown represent altitudes or corresponding flight levels depending upon the altimeter setting in use.
2. When the holding procedure is followed by the initial segment of an instrument approach procedure promulgated at a speed higher than 425 km/h (230 kt), the holding should also be promulgated at this higher speed wherever possible.
3. The speed of 520 km/h (280 kt) (0.8 Mach) reserved for turbulence conditions shall be used for holding only after prior clearance with ATC, unless the relevant publications indicate that the holding area can accommodate aircraft flight at these high holding speeds.
4. For holdings limited to CAT A and B aircraft only.
5. Wherever possible, 520 km/h (280 kt) should be used for holding procedures associated with airway route structures.

DME ARC ENTRY

DME Arc Entry: At the fix, the aircraft shall enter the holding pattern in accordance with either the Sector 1 or Sector 3 entry procedure.

Time/distance outbound

The still air time for flying the outbound entry heading should not exceed:

a) one minute if at or below 4 250 m (14 000 ft); or

b) one and one-half minutes if above 4 250 m (14 000 ft).

Where DME is available, the length of the outbound leg may be specified in terms of distance instead of time.

MINIMUM HOLDING LEVEL

The minimum permissible holding level provides a clearance of at least 300 m (984 ft) above obstacles in the holding area.The minimum holding altitude to be published shall be rounded up to the nearest 50 m or 100 ft as appropriate.

Over high terrain or in mountainous areas, additional obstacle clearance up to a total of 600 m (1 969 ft) is provided to accommodate the possible effects of turbulence, down drafts and other meteorological phenomena on the performance of altimeters.

SIMULTANEOUS ILS OPERATIONS ON PARALLEL OR NEAR-PARALLEL RUNWAYS

MODES OF OPERATION

There can be a variety of modes of operation associated with the use of parallel or near-parallel instrument runways.

Modes One and Two — Simultaneous parallel instrument approaches

There are two basic modes of operation for approaches made to parallel runways:

Mode 1, Independent parallel approaches: In this mode, radar separation minima between aircraft using adjacent ILS and/or MLS are not prescribed.

Mode 2, Dependent parallel approaches: In this mode, radar separation minima between aircraft using adjacent ILS and/or MLS are prescribed.

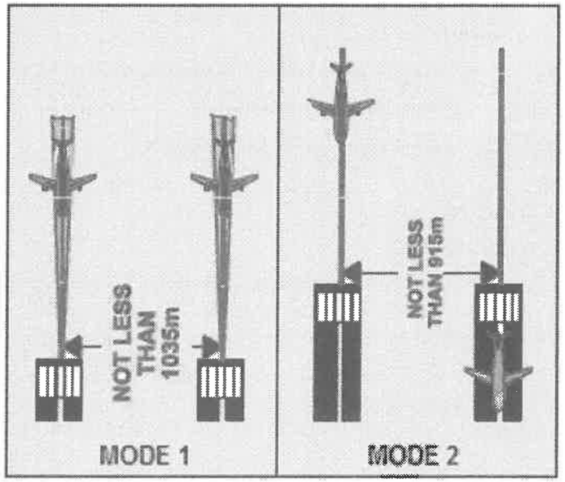
Mode 3 — Simultaneous instrument departures

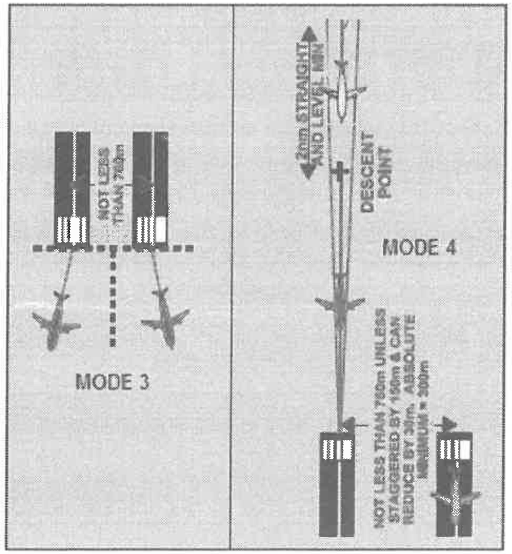
Mode 3, Independent parallel departures: In this mode, aircraft are departing in the same direction from parallel runways simultaneously.

Note:— When the minimum distance between two parallel runway centre lines is less than the specified value dictated by wake turbulence considerations, the parallel runways are considered as a single runway in regard to separation between departing aircraft. A simultaneous dependent parallel departure mode of operation is therefore not used.

Mode 4 — Segregated parallel approaches/departures

Mode 4, Segregated parallel operations: In this mode, one runway is used for approaches and one runway is used for departures.





AREA NAVIGATION (RNAV) ARRIVAL AND APPROACH PROCEDURES BASED ON VOR/DME

The term "flight management computer (FMC)" is used to denote the general category of multi-sensor RNAV systems.

Area navigation (RNAV) approach procedures based on VOR/DME are assumed to be based on one reference facility composed of a VOR and collocated DME equipment. The reference facility will be indicated. The VOR/DME RNAV approach procedure is a non-precision approach procedure.

ARRIVAL SEGMENT

Standard instrument arrivals (STARs) can be based on RNP criteria (limited to RNP 1 or better) or on specific RNAV criteria. When specific criteria are used, the same principles apply to the protection of all of the arrival phase. The FTT (Flight Technical Tolerance), however, is assumed to be equal to:

a) 3.7 km (2.0 NM) until at 46 km (25 NM) from the IAF; and

b) 1.9 km (1.0 NM) after this point.

INITIAL APPROACH SEGMENT

When the procedure requires a track reversal, a racetrack pattern may be established.

FINAL APPROACH SEGMENT

The final approach segment is generally aligned with the runway. The minimum obstacle clearance in the primary area of the final approach segment is 75 m (246 ft).

Waypoints in the final approach

The FAF is defined by a fly-by waypoint. A flyover waypoint is also provided at the runway threshold.

MISSED APPROACH SEGMENT

The missed approach waypoint (MAPt) is defined by a flyover waypoint. From the earliest MAPt, the area splays at 15° on each side of the missed approach track, at least until the SOC is reached. This allows for the limitations of some RNAV systems, and the pilot's workload at the beginning of the missed approach phase.A missed approach holding fix (MAHF) defines the end of the missed approach segment. It is located at or after the point where the aircraft, climbing at the minimum prescribed gradient, reaches the minimum altitude for en route or holding, whichever is appropriate.

ALTIMETER SETTING PROCEDURES

These procedures describe the method for providing adequate vertical separation between aircraft and for providing adequate terrain clearance during all phases of a flight. This method is based on the following basic principles:

a) States may specify a fixed altitude known as the transition altitude. In flight, when an aircraft is at or below the transition altitude, its vertical position is expressed in terms of altitude, which is determined from an altimeter set to sea level pressure (QNH).

b) In flight above the transition altitude, the vertical position of an aircraft is expressed in terms of flight levels, which are surfaces of constant atmospheric pressure based on an altimeter setting of 1 013.2 hPa.

c) The change in reference from altitude to flight levels, and vice versa, is made:

   1) at the transition *altitude,* when climbing; and
   2) at the transition *level,* when descending.

d) The transition level may be nearly coincident with the transition altitude to maximize the number of flight levels available. Alternatively, the transition level may be located 300 m (1000 ft) above the transition altitude to permit the transition altitude and the transition level to be used concurrently in cruising flight, with vertical separation ensured. The airspace between the transition level and the transition altitude is called the transition layer.

e) Where no transition altitude has been established for the area, aircraft in the en-route phase shall be flown at a flight level.

f) The adequacy of terrain clearance during any phase of a flight may be maintained in any of several ways, depending upon the facilities available in a particular area. The recommended methods in the order of preference are:

   1) the use of current QNH reports from an adequate network of QNH reporting stations;
   2) the use of such QNH reports as are available, combined with other meteorological information such as forecast lowest mean sea level pressure for the route or portions thereof; and
   3) where relevant current information is not available, the use of values of the lowest altitudes or flight levels, derived from climatological data.

g) During the approach to land, terrain clearance may be determined by using:

   1) the QNH altimeter setting (giving altitude); or
   2) under specified circumstances a QFE setting (giving height above the QFE datum).

These procedures apply to all IFR flights and to other flights which are operating at specific cruising levels.

System of flight levels: Flight level zero shall be located at the atmospheric pressure level of 1 013.2 hPa. Consecutive flight levels shall be separated by a pressure interval corresponding to at least 500 ft (152.4 m) in the standard atmosphere.

This does not preclude reporting intermediate levels in increments of 30 m (100 ft).

Transition altitude: A transition altitude shall normally be specified for each aerodrome by the State in which the aerodrome is located. Lowest transition altitude in India is 4000 feet.

The height above the aerodrome of the transition altitude shall be as low as possible but normally not less than 900 m (3 000 ft).

The calculated height of the transition altitude shall be rounded up to the next full 300 m (1 000 ft).

PRE-FLIGHT OPERATIONAL TEST

QNH/QFE Setting:

1. With the aircraft at a known elevation on the aerodrome, set the altimeter pressure scale to the current QNH/QFE setting.
2. Vibrate the instrument by tapping unless mechanical vibration is provided.

A serviceable altimeter indicates the elevation/height of the point selected, within a tolerance of:

a) ±20 m or 60 ft for altimeters with a test range of 0 to 9 000 m (0 to 30 000 ft); and

b) ±25 m or 80 ft for altimeters with a test range of 0 to 15 000 m (0 to 50 000 ft).

SECONDARY SURVEILLANCE RADAR (SSR)

DEFINITIONS

Airborne collision avoidance system (ACAS). 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.

Note:— SSR transponders referred to above are those operating in Mode C or Mode S.

Secondary surveillance radar (SSR). A surveillance radar system which uses transmitters/ receivers (interrogators) and transponders.

Surveillance Radar. Radar equipment used to determine the position of an aircraft in range and azimuth.

Interrogation modes (ground-to-air) : The uses of each mode shall be as follows:

1) **Mode A** – to elicit transponder replies for identity and surveillance.

2) **Mode C** – to elicit transponder replies for automatic pressure-altitude transmission and surveillance.

TRANSPONDER OPERATING PROCEDURES

OPERATION OF TRANSPONDERS

GENERAL

When an aircraft carries a serviceable transponder, the pilot shall operate the transponder at all times during flight, regardless of whether the aircraft is within or outside airspace where secondary surveillance radar (SSR) is used for ATS purposes.

Squawk codes are four-digit octal numbers; the dials on a transponder read from zero to seven, inclusive. Thus the lowest possible squawk is 0000 and the highest is 7777.

Except in case of emergency, communication failure or unlawful interference, the pilot shall:

a) operate the transponder and select Mode A codes as directed by the ATC unit with which contact is being made; or

b) operate the transponder on Mode A codes as prescribed on the basis of regional air navigation agreements; or

c) in the absence of any ATC directions or regional air navigation agreements, operate the transponder on Mode A Code 2000.

When the aircraft carries serviceable Mode C equipment, the pilot shall continuously operate this mode, unless otherwise directed by ATC.

When requested by ATC to specify the capability of the transponder aboard the aircraft, pilots shall indicate this in item 10 of the flight plan by inserting the appropriate letter prescribed for the purpose.

When requested by ATC to CONFIRM SQUAWK (code), the pilot shall:

a) verify the Mode A code setting on the transponder;

b) reselect the assigned code if necessary; and

c) confirm to ATC the setting displayed on the controls of the transponder.

Pilots shall not SQUAWK IDENT unless requested by ATC.

EMERGENCY PROCEDURES

The pilot of an aircraft in a state of emergency shall set the transponder to Mode A Code 7700 unless ATC has previously directed the pilot to operate the transponder on a specified code. In the latter case, the pilot shall continue to use the specified code unless otherwise advised by ATC. However, a pilot may select Mode A Code 7700 whenever there is a specific reason to believe that this would be the best course of action.

COMMUNICATION FAILURE PROCEDURES

The pilot of an aircraft losing two-way communications shall set the transponder to Mode A Code 7600.

A controller who observes an SSR response indicating selection of the communications failure code will determine the extent of the failure by instructing the pilot to SQUAWK IDENT or to change code. If it is determined that the aircraft receiver is functioning, further control of the aircraft will be continued using code changes or IDENT transmission to acknowledge receipt of clearances. Different procedures may be applied to Mode S equipped aircraft in areas of Mode S coverage.

UNLAWFUL INTERFERENCE WITH AIRCRAFT IN FLIGHT

If there is unlawful interference with an aircraft in flight, the pilot-in-command shall attempt to set the transponder to Mode A Code 7500 in order to indicate the situation. If circumstances so warrant, Code 7700 should be used instead.

If a pilot has selected Mode A Code 7500 and has been requested to confirm this code by ATC, the pilot shall, according to circumstances, either confirm this or not reply at all.

If the pilot does not reply, ATC will take this as confirmation that the use of Code 7500 is not an inadvertent false code selection.

TRANSPONDER FAILURE PROCEDURES WHEN THE CARRIAGE OF A FUNCTIONING TRANSPONDER IS MANDATORY

In case of a transponder failure after departure, ATC units shall attempt to provide for continuation of the flight to the destination aerodrome in accordance with the flight plan. Pilots may, however, expect to comply with specific restrictions.

AIRBORNE COLLISION AVOIDANCE SYSTEM (ACAS)

GENERAL

Airborne collision avoidance system (ACAS) indications shall be used by pilots in the avoidance of potential collisions, the enhancement of situational awareness, and the active search for, and visual acquisition of, conflicting traffic.

Nothing in the procedures specified for "Use of ACAS indicators", shall prevent pilots-in-command from exercising their best judgment and full authority in the choice of the best course of action to resolve a traffic conflict or avert a potential collision.

USE OF ACAS INDICATORS

The indications generated by ACAS shall be used by pilots in conformity with the following safety considerations:

a) pilots shall not manoeuvre their aircraft in response to traffic advisories (TAs) only;

TAs are intended to alert pilots to the possibility of a resolution advisory (RA), to enhance situational awareness, and to assist in visual acquisition of conflicting traffic. However, visually acquired traffic may not be the same traffic causing a TA. Visual perception of an encounter may be misleading, particularly at night.

The above restriction in the use of TAs is due to the limited bearing accuracy and to the difficulty in interpreting altitude rate from displayed traffic information.

b) on receipt of a TA, pilots shall use all available information to prepare for appropriate action if an RA occurs; and

c) in the event of an RA, pilots shall:

1) respond immediately by following the RA as indicated, unless doing so would jeopardize the safety of the aeroplane;

   Stall warning, wind shear, and ground proximity warning system alerts have precedence over ACAS.

   Visually acquired traffic may not be the same traffic causing an RA. Visual perception of an encounter may be misleading, particularly at night.

2) follow the RA even if there is a conflict between the RA and an air traffic control (ATC) instruction to manoeuvre;

3) not manoeuvre in the opposite sense to an RA;

   In the case of an ACAS-ACAS coordinated encounter, the RAs complement each other in order to reduce the potential for collision. Manoeuvres, or lack of manoeuvres, that result in vertical rates opposite to the sense of an RA could result in a collision with the threat aircraft.

4) as soon as possible, as permitted by flight crew workload, notify the appropriate ATC unit of the RA, including the direction of any deviation from the current ATC instruction or clearance;

   Unless informed by the pilot, ATC does not know when ACAS issues RAs. It is possible for ATC to issue instructions that are unknowingly contrary to ACAS RA indications. Therefore, it is important that ATC be notified when an ATC instruction or clearance is not being followed because it conflicts with an RA.

5) promptly comply with any modified RAs;

6) limit the alterations of the flight path to the minimum extent necessary to comply with the RAs;

7) promptly return to the terms of the ATC instruction or clearance when the conflict is resolved; and

8) notify ATC when returning to the current clearance.

ACAS OPERATIONS

a) Surveillance:

1) ACAS interrogates other transponder-equipped aircraft within a nominal range of 26 km (14 NM); and

2) ACAS surveillance range can be reduced in geographic areas with a large number of ground interrogators and/or ACAS-equipped aircraft. A minimum surveillance range of 8.5 km (4.5 NM) is guaranteed for ACAS aircraft that are airborne.

b) Collision avoidance:

1) TAs can be issued against any transponder-equipped aircraft that responds to the ICAO Mode C interrogations, even if the aircraft does not have altitude-reporting capability;

2) RAs can be issued only against aircraft that are reporting altitude and in the vertical plane only;

3) RAs issued against an ACAS-equipped intruder are coordinated to ensure that complementary RAs are issued;

4) failure to respond to an RA deprives the aircraft of the collision protection provided by its ACAS. Additionally, in ACAS-ACAS encounters, it also restricts the choices available to the other aircraft's ACAS and thus renders the other aircraft's ACAS less effective than if the first aircraft were not ACAS-equipped; and

5) manoeuvring in a direction opposite to that indicated by an RA is likely to result in further reduction in separation. This is particularly true in the case of an ACAS-ACAS coordinated encounter.

QUESTIONS

1. PANS-OPS means:

A) Procedures for Air Navigation Services - Aircraft operations
B) Pilots Alternate Navigational Systems and Operational Procedures
C) Procedures for Air Navigation Systems - Airfield operations

2. The document that specifies the recommendations for instrument procedures is called...

A) PANS OPS Doc 8168
B) The Convention of Chicago
C) The Air Navigation bulletin

3. Which of the following defines transition altitude?

A) The altitude above which the vertical position of an aircraft is determined by reference to local QHN
B) The altitude below which the vertical position of an aircraft is determined by reference to QNH
C) The altitude at which 1013 hPa is set and vertical position then reported as a flight level

4. The Transition Level:

A) Is published for the aerodrome in the Section ENR of the AIP
B) Shall be the lowest flight level available for use above the transition altitude
C) Is calculated and declared for an approach by the Pilot-in command

5. During flight through the transition layer the vertical position of the aircraft should be expressed as

A) Altitude above mean sea level during climb.
B) Either altitude above mean sea level or flight level during climb
C) Altitude above mean sea level during descent

6. Transition from altitude to flight level, and vice-versa is done:

A) At transition level during climb and transition altitude during descent
B) At transition altitude during climb and transition level during descent
C) Only at transition altitude

7. Which of the following cruising levels would you select under the following conditions: True track 358°, variation 3°E, deviation 2°W?

A) FL 65
B) FL 75
C) FL 70

8. In the vicinity of an aerodrome that is going to be used by the aircraft the vertical position of the aircraft shall be expressed in:

A) Altitude above sea level on or above the transition altitude
B) Flight level on or below the transition level
C) Altitude above sea level on or below the transition altitude

9. The vertical position of an aircraft at or below the transition altitude will be reported:

A) As flight level
B) As altitude
C) As height

10. The transition altitude of an aerodrome should not be below:

A) 4000ft
B) 1000ft
C) 1500ft

11. The pilot of a departing aircraft flying under IFR shall change the altimeter setting from QNH to standard setting 1013.25hPA when passing:

A) Transition layer
B) The level specified by ATC
C) Transition altitude

12. In the standard atmosphere FL150 is equivalent to:

A) 15 000 metres
B) 4 550 metres
C) 455 metres

13. A pre-flight altimeter check should be carried out:

A) On the apron
B) On the manoeuvring area
C) At a known elevation on the aerodrome

14. Which of the following correctly lists special purpose codes that are to be used in conjunction with Secondary Surveillance Radar (SSR)?

A) Distress 7600, Hijacking 7500, Communication failure 7700
B) Distress 7500, Hijacking 7700, Communication failure 7600
C) Distress 7700, Hijacking 7500, Communication failure 7600

15. When acknowledging mode/code setting instructions, pilots shall:

A) Use only the word ROGER
B) Use only the word WILCO
C) Read back the mode and code to be set

16. Pilots shall not operate the SSR special position indicator (IDENT) feature unless:

A) Requested by ATC
B) They operate a transponder with Mode C
C) They operate within controlled airspace

17. When the aircraft carries serviceable Mode C equipment, the pilot:

A) Shall continuously operate this mode only when the aircraft is within controlled airspace
B) Shall continuously operate this mode regardless of ATC instructions
C) Shall continuously operate this mode unless otherwise directed by ATC

18. When an aircraft carries a serviceable transponder, the pilot shall operate the transponder:

A) At all times during flight, regardless of whether the aircraft is within or outside airspace where SSR is used for ATS purposes
B) Only when the aircraft is flying within controlled airspace
C) Only when the aircraft is flying within airspace where SSR is used for ATS purposes

19. Your transponder code assigned by ATC is 5320. In flight, in case of radio communications failure, you will squawk code:

A) A 7620 Mode C
B) A 7600 Mode C
C) A 0020 Mode C

20. The pilot of an aircraft losing two-way communication shall set the transponder to Mode A Code:

A) 2000
B) 7700
C) 7600

21. When the aircraft carries serviceable Mode C transponder, the pilot shall continuously operate this mode:

A) Regardless of ATC instructions
B) Unless otherwise directed by ATC
C) Only when directed by ATC

22. During a pre-flight a SSR transponder is found to be inoperative and immediate repair is not possible:

A) A flight to the closest airport, where a repair can be made is allowed
B) A flight can not be made
C) It is necessary to specify this failure in the appropriate field of the flight plan

23. When an aircraft is subjected to unlawful interference, the pilot-in-command shall indicate the situation by setting the transponder to:

A) 7500.
B) 7700.
C) 7000.

24. On receipt of a TA, pilots shall:

A) Respond immediately by following the TA as indicated
B) Not manoeuvre their aircraft in response to traffic advisories (TAs) only
C) Notify the appropriate ATC unit of the TA

25. Airborne collision avoidance system (ACAS) indications shall be used by pilots in:

A) Both B) and C) are correct.
B) The enhancement of situational awareness,
C) The active search for, and visual acquisition of, conflicting traffic.

26. What are the two main objective of altimeter setting?

A) To read height and barometric pressure
B) QNH to be set in the vicinity of the aerodrome and QFE en route
C) To provide adequate terrain clearance and vertical separation

27. Which of the following correctly defines altitude?

A) Vertical position with reference to MSL
B) Vertical position with reference to aerodrome elevation
C) Vertical position with reference to touchdown

28. Which of the following correctly defines height?

A) Vertical position with reference to MSL
B) Vertical position with reference to aerodrome elevation
C) Vertical position with reference to touchdown

29. Which of the following correctly defines flight level?

A) Vertical position with reference to MSL
B) Vertical position with reference to aerodrome elevation
C) Vertical position with reference to the standard pressure level

30. If the QNH is 991 Mb where is FL? (Assume 1 Mb= 30 ft)

A) Below sea level!
B) 660 ft above mean sea level
C) 660 ft above the transition level

31. Which of the following is the location of FL?

A) The first flight level above the transition level
B) The level defined with reference to a QNH of 1013.25mb
C) The atmospheric pressure level of 1013.25mb

32. What is the relationship between IFR and VFR flight level?

A) For given mag track, the VFR level is the IFR level plus 500' if below FL290
B) IFR levels are flown on mag tracks from 000 to 179 an VFR levels from 180 to 359
C) VFR levels may be flown in VMC or IMC, but IFR levels must only be flown in IMC

33. At what point in a flight is the QNH communicated to the pilot by ATC?

A) On engine start
B) In the taxi elearance
C) In the ATC clearance

34. If you are flying outside an aerodrome traffic zone, what are you required to set on your altimeter sub scale ?

A) Regional QFF
B) The lowest forecast pressure setting with respect to MSL for the area in which you are flying
C) The local QNH obtained from FIS or the nearest aerodrome

35. If you are flying en route below the transition level but are well briefed with regard to safety altitude, from where would you get altimeter setting information whilst airborne?

A) You only need the departure aerodrome and destination aerodrome QNH and then interpolate the difference whilst en route
B) Ask the met man to forecast the QNH for the route before you take off
C) Ask the FIS controller for local aerodrome QNHs

36. You are approaching an aerodrome to land and call the approach controller at 10nm from the edge of the ATZ. Your flight conditions are VMC and you are flying VFR. When would you expect to be advised to set the aerodrome QNH?

A) On initial contact the app controller will pass QNH and tell you what altitude to fly at
B) On clearance to enter the traffic pattern established for a visual join to land
C) When descending below the transition altitude

37. You test your altimeter with aerodrome QNH set. What would a serviceable altimeter read?

A) The height of the aeroplane above the datum
B) The elevation of the position of the aeroplane plus the height of the altimeter static vent
C) The altitude of the aeroplane above the datum

38. In selecting a flight level for a flight, which of the following should be taken into consideration ?

1. Adequate terrain clearance is ensured
2. ATC requirements (Danger Areas, restricted airspace etc.) are complied with
3. Minimum traffic separation is ensured
4. Adequate separation from VFR traffic is ensured (differential flight levels applied)
5. The appropriate flight level in accordance with the table of flight levels

The level chosen complies with the table of cruising levels

A) 1, 2 and 5
B) All the above
C) 1, 2, 3 and 5

39. What is the minimum gradient for missed approach procedure?

A) 3.3%
B) 2.8%
C) 2.5%

40. You are entering a FIR where SSR is used from an area where SSR is not used. What would you squawk?

A) Standby
B) A/1234+C
C) A/2000+C

41. Your aircraft is subjected to unlawful interference (hi jacking). Without upsetting the man with the gun, what would you squawk?

A) Either A/7700 or A/7500 depending upon the situation
B) A/7600+C
C) A/7500+C

42. What are you required to do if you become aware that your transponder has failed?

A) Switch the set off
B) Try recycling the transponder and set 7777 to maximise the response
C) Tell ATC

43. Which of the following is an invalid squawk?

A) A/7777+C
B) A/8765+C
C) A/2000+C

44. On a single SSR control box/selector system (ie no changeover switch), what is the correct procedure for changing squawk?

A) Squawk 'standby', then change the code; then squawk 'normal'.
B) Squawk 'off', then change the code; then Squawk 'normal'.
C) Only change one digit at a time

45. What does the abbreviation ACAS mean?

A) Advisory, Counselling and Arbitration Service
B) Airborne Collision Avoidance System
C) Automatic Collision Avoidance System

46. What does the abbreviation OIS mean?

A) Obstacle identification surface
B) Obstacle in surface
C) Obstacle identification slope

47. What does the abbreviation DER mean?

A) Departure end of runway
B) Distance end of runway
C) Departure end of route

48. The MSA, which must be established around a navigation facility, is in general valid within a sector of:

A) 25NM
B) 30NM
C) 10NM

49. What is defined as the portion of a flight in which the aircraft descends below 1000 ft above the relevant DH or MDH?

A) Glide path
B) Approach to landing
C) Go around / Missed Approach

50. A radial is:

A) A magnetic bearing to or from a VOR station, depending on whether the aircraft is inbound or outbound to or from the VOR
B) A magnetic bearing to a VOR station
C) A magnetic bearing extending from a VOR station

51. A circling approach is:

A) A flight manoeuvre to be performed only under radar vectoring
B) A contact flight manoeuvre
C) A visual flight manoeuvre keeping the runway in sight

52. What is the meaning of MEHT?

A) Maximum eye height
B) Minimum eye height
C) Mean height over threshold

53. OCH for a precision approach is defined as:

A) The lowest height above mean sea level of the relevant runway used in establishing compliance with appropriate obstacle clearance requirements
B) The lowest altitude above the aerodrome elevation used in establishing compliance with appropriate obstacle clearance requirements
C) The lowest height above the elevation of the relevant runway threshold , at which a missed approach must be initiated to ensure compliance with the appropriate obstacle clearance criteria

54. The approach categories of aircraft are based upon:

A) 1.3 times the stalling speed in clean configuration at minimum certified landing mass
B) 1.3 times the stalling speed in the landing configuration at minimum certified landing mass
C) 1.3 times the stalling speed in the landing configuration at maximum certified landing mass

55. Maximum permissible bank angle in a holding pattern is_____degrees:

A) 35
B) 30
C) 25

56. The term used to describe the visual phase of flight after completing an instrument approach, to bring an aircraft into position for landing on runway which is not suitably located for straight-in approach, is:

A) Visual manoeuvring (circling).
B) Contact approach.
C) Aerodrome traffic pattern.

57. In a straight departure, the initial departure track is of the alignment of the runway centreline within:

A) 25^0
B) 12.5^0
C) 15^0

58. In an instrument departure procedure the minimum obstacle clearance at the departure end of runway equals:

A) 0ft
B) 3.3% gradient
C) 35ft

59. We can distinguish two types of departure routes. During a straight departure the initial departure track is within:

A) 15^0 of the alignment of the runway centreline
B) 10^0 of the alignment of the runway centreline
C) 25^0 of the alignment of the runway centreline

60. If in an instrument departure procedure the track to be followed by the aeroplane is published, the pilot is expected:

A) To correct for known wind to remain within the protected airspace
B) To request from ATC different heading for wind correction
C) To ignore the wind and proceed on a heading equal to the track

61. In general, which is the main factor that dictates the design of an instrument departure procedure?

A) Navigation aids
B) The terrain surrounding the airport
C) ATC requirements

62. During an omni-directional departure, what height are you required to climb to before turning onto the desired track?

A) Transition altitude
B) 120 m (394 ft)
C) 1000 ft

63. The main factor that dictates in general the design of an instrument departure procedure is:

A) ATC availability and requirements
B) availability of navigation aids
C) the terrain surrounding the aerodrome

64. SID terminates at:

A) the first fix of the en-route phase.
B) point 15 nms from DER on departure leg.
C) fix decided by the pilot before reaching TOC

65. A public transport aircraft shall not take-off unless the following minima for the departure airfield are satisfactory:

A) cloud ceiling and RVR
B) cloud base and RVR
C) MDH and RVR

66. Obstacle clearance for an ILS approach is based on the assumption that the pilot does not deviate from the centreline more than:

A) half scale deflection of the localizer indicator
B) full scale deflection of the localizer indicator
C) half scale deflection of the glidepath indicator and horizontal 35° off the centreline

67. Who establishes the OCA/H (Obstacle Clearance Altitude/Height) for an approach procedure?

A) the operator
B) the pilot in command
C) the state

68. If visual reference is lost while circling to land from an instrument approach, it is expected that the pilot will make an initial climbing turn towards the:

A) Final missed approach track
B) MAP
C) Landing runway

69. A circling approach is:

A) A visual flight manoeuvre keeping the runway in sight
B) A visual flight manoeuvre to be conducted only in IMC
C) A flight manoeuvre to be performed only under radar vectoring

70. When the visual manoeuvring (circling) area has been established the obstacle clearance altitude/height (OCA/H) is determined:

A) Only for categories C, D and E aircraft
B) For each category of aircraft, and it may be different for each one of them
C) For all categories of aircraft, and it is the same for all of them

71. On a non-precision approach a so-called "straight-in-approach" is considered acceptable, if the angle between the final approach track and the runway centreline is:

A) 30 degrees or less
B) 40 degrees or less
C) 20 degrees or less

72. If contact is lost with the runway on the downwind leg of a circling manoeuvre, what actions should be taken?

A) Initiate a missed approach
B) Turn towards the inner marker for the runway in use, maintaining circling altitude
C) If you have other visual cues, continue with ground contact

73. Minimum sector altitudes are determined by the inbound radial in relation to the IAF. These sectors are established for a distance from the IAF of:

A) 20NM
B) 5NM
C) 25NM

74. A "precision approach" is a direct instrument approach...

A) using bearing, elevation and distance information
B) carried out by a crew of at least two pilots trained with a specific working method
C) using at least one source of bearing information and one source of elevation or distance information

75. The term used to describe the visual phase of flight after completing an instrument approach, to bring an aircraft into position for landing on runway which is not suitably located for straight-in approach is:

A) Visual approach
B) Visual manoeuvring (circling)
C) Aerodrome traffic pattern

76. In a precision approach (ILS), the final approach segment begins at the:

A) IF
B) FAF
C) FAP

77. Under which conditions may an aircraft on a straight-in-VOR approach continue its descend below the OCA?

A) When the aircraft has the control tower in sight
B) When the aircraft is in visual contact with the ground and with the runway lights in sight
C) When the aircraft is in contact with the ground but not with the runway in sight yet

78. 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 is a:

A) Procedure turn
B) Base turn
C) Race track

79. A manoeuvre in which a turn is made away from a designated track followed by a turn in the opposite direction to permit the aircraft to intercept and proceed along the reciprocal of the designated track is called a:

A) Procedure turn
B) Reversal track
C) Race track

80. You are on an IFR flight executing a circling approach. A descend below the MDA should not be made until:

1 the pilot has the landing threshold in sight
2 visual reference has been established and can be maintained
3 the required obstacle clearance can be maintained and a landing can be made
The combination regrouping all the correct statements is:

A) 1, 2
B) 1, 2, 3
C) 2, 3

81. In an offset entry into an omni directional racetrack procedure, the time on the 30° offset track is limited to:

A) 1 minutes 30 seconds
B) 2 minutes
C) 1 minute

82. In an approach procedure, a descent or climb conducted in a holding pattern is called:

A) Procedure turn
B) Based turn
C) Shuttle

83. Which are the phases of a missed approach procedure?

A) Arrival, initial, intermediate and final
B) Initial, intermediate and final
C) Initial and final

84. When determining the OCA for a precision approach, obstacle height is referenced to:

A) MSL
B) Threshold
C) highest obstacle within 25 nm of aerodrome

85. What is gradient for departure runway?

A) 2.5%
B) 2.8%
C) 3.3%

86. The ILS glide path is normally intercepted between:

A) 3 and 7NM
B) 3 and 10NM
C) 5 and 10NM

87. The factors considered in the calculations of DA /DH are:

A) The OCA/H based on the highest obstacle in the final approach path only, plus a margin for height loss on any go around
B) The OCA/H based on the highest obstacle in the missed approach path only plus an allowance for height loss on any go around
C) The OCA/H based on the highest obstacle in the approach or missed approach paths including an allowance for aircraft speed and height loss on any go around, plus a margin for operational factors

88. What is the obstacle clearance in the intermediate approach segment?

A) 300 m (984 ft)
B) 200 m (656 ft)
C) Reducing from 300 m to 150 m

89. Who is establishing the aerodrome operational minima for instrument approaches?

A) The appropriate authority of the State of the aircraft operator
B) The operator
C) The appropriate authority of the State of the aerodrome

90. What is the primary area during the intermediate section of an instrument approach?

A) 3/4 of the total width of the airspace used to determine the minimum obstacle clearance for the approach
B) 1/2 of the total width of the airspace used to determine the minimum obstacle clearance for the approach
C) 10 NM either side of the approach path

91. In relation to the three entry sectors, the entry into the holding pattern shall be according to:

A) Course
B) Track
C) Heading

92. Related to the three entry sectors in a holding pattern, there is a zone of flexibility on either side of the sectors boundaries of:

A) 5°
B) 20°
C) 10°

93. What is the outbound timing in a holding pattern above FL 140?

A) 2 minutes
B) 1 minute
C) 1 minute 30 seconds

94. In a holding pattern all turns are to be made at a:

A) Rate of 3°/sec or at a bank angle of 25°, which ever requires the lesser bank
B) Rate of 3°/sec
C) Rate of 3°/sec or at a bank angle of 20°, which ever requires the lesser bank

95. In a standard holding pattern turns are made:

A) To the left
B) To the right
C) In a direction depending on the wind direction

96. What is the rate of turn/bank angle required for turns in a holding pattern?

A) 15 degrees bank angle maximum
B) 3 degrees per second
C) 5 degrees per second

97. What obstacle clearance is guaranteed at a range of 5 nm from the edge of the holding area?

A) Nil
B) 100 m
C) 300 m

98. An expected approach time is given:

A) When an aircraft is instructed to hold
B) Once an aircraft has been holding for 20 minutes
C) On all flights

99. When you are asked to hold on a non standard holding fix (eg en route) what direction are the turns made?

A) At pilots discretion
B) Right
C) Left

100. Standard airway holding pattern below 14 000 ft ?

A) Right hand turns / 1.5 minutes outbound
B) Left hand turns / 1 minute outbound
C) Right hand turns / 1 minute outbound

ANSWERS

1	2	3	4	5	6	7	8	9	10	11	12	13	14
A	A	C	B	C	B	A	C	B	A	C	B	C	C

15	16	17	18	19	20	21	22	23	24	25	26	27	28
C	A	C	A	B	C	B	A	A	B	A	C	A	B

29	30	31	32	33	34	35	36	37	38	39	40	41	42
C	A	C	A	B	C	C	B	B	A	C	C	A	C

43	44	45	46	47	48	49	50	51	52	53	54	55	56
B	A	B	A	A	A	B	C	C	B	C	C	C	A

57	58	59	60	61	62	63	64	65	66	67	68	69	70
C	A	A	A	B	B	C	A	A	A	C	C	A	B

71	72	73	74	75	76	77	78	79	80	81	82	83	84
A	A	C	A	B	C	B	B	A	B	A	C	B	A

85	86	87	88	89	90	91	92	93	94	95	96	97	98
C	B	C	C	C	B	C	A	C	A	B	B	A	A

99	100
C	C

14

NATIONAL LAW

THE AIRCRAFT ACT, 1934

It extends to the whole of India and applies also-

(a) to citizens of India wherever they may be;

(b) to, and to the persons on, aircraft registered in India wherever they may be;

(c) to, and to the persons on, aircraft registered outside India but for the time being in or over India; and

(d) to an aircraft operated by a person who is not a citizen of India but has his principal place of business or permanent residence in India.

3. Power of Central Government to exempt certain aircraft:—

The Central Government may, by notification in the Official Gazette, exempt from all or any of the provisions of this Act any aircraft or class of aircraft and any person or class of persons, or may direct that such provisions shall apply to such aircraft or persons subject to such modifications as may be specified in the notification.

8. Power to detain aircraft:—

(1) Any authority authorised in this behalf by the a[Central Government] may detain any aircraft, if in the opinion of such authority-

(a) having regard to the nature of an intended flight, the flight of such aircraft would involve danger to persons in the aircraft or to any other persons or property, or

(b) such detention is necessary to secure compliance with any of the provisions of this Act or the rules applicable to such aircraft; or such detention is necessary to prevent a contravention of any rule made under clause (h) or clause (i) of sub-section(2) of section 5 or to implement any order made by any Court.

(2) Subject to the provisions of section 14, the Central Government] may, by notification in the Official Gazette make rules regulating all matters incidental or subsidiary to the exercise of this power.

9. Wreck and Salvage:—

The provisions of Part XIII of the Merchant Shipping Act, 1958 relating to Wreck and Salvage shall apply to aircraft on or over the sea or tidal waters as they apply to ships, and the owner of an aircraft shall be entitled to a reasonable reward for salvage services rendered by the aircraft in like manner as the owner of a ship.

10. Penalty for act in contravention of rule made under this Act:—

(1) If any person contravenes any provision of any rule made under clause (l) of sub-section (2) of section 5 prohibiting or regulating the carriage in aircraft of arms, explosives or other dangerous goods, or when required under the rules made under that clause to give information in relation to any such goods gives information which is false and which he either knows or believes to be false or does not believe to be true he, and if he is not the owner, the owner also (unless the owner proves that the offence was committed without his knowledge, consent or connivance) shall be punishable with imprisonment which may extend to two years and shall also be liable to fine which may extend to ten lakh rupees

(1A) If any person contravenes any provision of any rule made under clause (qq) of sub-section (2) of section 5 prohibiting the slaughter and flaying of animals and of depositing rubbish, filth and other polluted and obnoxious matter within a radius of ten kilometers from the aerodrome reference point, he shall be punishable with imprisonment which may extend to three years, or with fine which may extend to ten lakh rupees, or with both.

(2) In making any other rule under section 5 or in making any rule under section 4, section 7, section 8, section 8A or section 8B, the Central Government may direct that a breach of it shall be punishable with imprisonment for a period which may extend to two years, or with fine which may extend to ten lakh rupees, or with both.

11A. Penalty for failure to comply with directions issued under section 5A:—

If any person willfully fails to comply with any direction issued under section 5A, he shall be punishable with imprisonment for a term which may extend to two years or with fine which may extend to ten lakh rupees, or with both.

11B. Penalty for failure to comply with directions issued under section 9A:—

(1) If any person willfully fails to comply with any direction contained in any notification issued under section 9A, he shall be punishable with imprisonment for a term which may extend to two years, or with fine which may extend to ten lakh rupees, or with both.

(2) Without prejudice to the provisions of sub-section(1), if any person fails to demolish any building or structure or cut any tree or fails to reduce the height of any building, structure or tree in pursuance of any direction contained in any notification issued under sub-section (1) of section 9A within the period specified in the notification, then, subject to such rules as

the Central Government may make in this behalf, it shall be competent for any officer authorised by the Central Government in this behalf to demolish such building or structure or cut such tree or reduce the height of such building, structure or tree:

17. Bar of certain suits:—

No suit shall be brought in any Civil Court in respect of trespass or in respect of nuisance by reason only of the flight of aircraft over any property at a height above the ground which having regard to wind, weather and all the circumstances of the case is reasonable, or by reason only of the ordinary incidents of such flight.

18. Saving for acts done in good faith under the Act:—

No suit, prosecution or other legal proceeding shall lie against any person for anything in good faith done or intended to be done under this Act.

AIRCRAFT RULES, 1937

1. Short title and extent:—

(1) These rules may be called the Aircraft Rules, 1937.

(2) They extend to the whole of India and apply also (unless the contrary intention appears) -

(a) to, and to persons on, aircraft registered in India wherever they may be, except cases falling under sub-rule(4);

(b) to, and to persons on, all aircraft for the time being in or over India :

Provided that in the case of aircraft registered in a country other than India, the regulations of that country relating to registration, license of personnel, airworthiness and log books shall apply in place of the provisions contained in Parts IV, V, VI and IX of these Rules :

Provided further that the foregoing proviso shall not apply to aircraft registered in any country whose regulations are not based on standards at least equal to the minimum standards established from time to time under the Convention on International Civil Aviation opened for signature at Chicago on the 7th December, 1944, and the cases falling under sub-rule(3).

(2A) In case of aircraft registered in a contracting State other than India and operated pursuant to an agreement for the lease, charter or interchange of the aircraft or any similar arrangement by an operator who has his principal place of business, or, if has no such place of business, his permanent residence in another contracting State than India, the regulations of the other contracting State relating to registration, licensing of personnel, airworthiness and log books shall apply in place of the provisions contained in Parts IV, V, VI and IX of these rules, provided that an agreement has been reached between the Government of State of registry of aircraft and the government of the other contracting State relating to transfer of functions and duties pursuant to Article 83 of the Convention and the same has been officially notified to the Government of India or the International Civil Aviation Organisation. The extent of application of these rules to such aircraft shall be as per the agreement between the two Governments.

(3) These rules shall also apply to aircraft registered in a contracting State and operated pursuant to an agreement for the lease, charter or interchange of the aircraft or any similar arrangement by an operator who has his principal place of business, or, if he has no such place of business, his permanent residence in India, provided that an agreement has been reached between the government of the State of registry of the Aircraft and the Government of India in regard to transfer of functions and duties pursuant to Article 83 of the convention. The extent of application of these rules to such aircraft shall be as per the agreement between the two Governments.

(4) These rules shall not apply to aircraft registered in India and operated pursuant to an agreement for the lease, charter or interchange of aircraft or any similar arrangement by an operator who has his principal place of business or if he has no such place of business, his permanent residence in a contracting State, provided that an agreement has been reached between the Government of India and the Government of that contracting state in regard to transfer of functions and duties pursuant to Article 83 of the Convention. The extent of non-application of these rules to such aircraft shall be as per the agreement between the two Governments.

2. Nationality of aircraft :—

An aircraft shall be deemed to possess the nationality of the State on the register of which it is entered.

3. Definitions and Interpretation :— See chapter 1.

4. Use and operation of aircraft:—

No person shall use or operate or assist in using or operating an aircraft save in accordance with these rules.

5. Registration and nationality and registration marks:—

Subject to the provisions of rule 33, no person shall fly, or assist in flying, any aircraft unless -

(a) it has been registered, and

(b) it bears its nationality and registrations marks and the name and residence of the owner affixed or painted thereon in accordance with rule 37 or, in the case of aircraft registered elsewhere than in India, in accordance with the regulations of the State in which it is registered:

Provided that the prohibition imposed by this rule shall not apply to aircraft flown in accordance with the special permission in writing of the Central Government and subject to any conditions and limitations which may be specified in such permission.

5A. Prohibited Flight:—

Except under, and in accordance with the terms and conditions of, a permit issued by the Director-General of Civil Aviation -

(1) no aircraft registered in India shall leave India for the purpose of a flight to a place outside India;

(2) no aircraft shall undertake a flight to any territory which the Central Government may, by notification in the Official Gazette, declare to be a prohibited territory.

Note:– For the purpose of this rule, foreign aircraft falling under sub-rule(3) of rule 1 shall be deemed as aircraft registered in India and Indian aircraft falling under sub-rule(4) of rule 1 shall be deemed as aircraft not registered in India.

6. Licensing of personnel:—

Every aircraft shall carry and be operated by the personnel prescribed in Part V and such personnel shall be licensed in the manner prescribed in that part and in Schedule II.

Provided that in the case of an aircraft not registered in India, such personnel shall be licensed in accordance with the regulations in force in the State in which the aircraft is registered.

6A. Type of aircraft to be included in rating:—

No person shall fly as pilot of an aircraft which is not included or entered in the aircraft rating of the licence except as provided in rules 6B and 6C.

6B. Flights to qualify for extension of a licence:—

The holder of a pilot's licence may fly within the Indian territory as pilot of an aircraft of type which is not included in the aircraft rating of his licence for the purpose of qualifying for the inclusion of such type.

6C. Flights for testing and other non-revenue specific special purposes:—

The Director-General may authorise the holder of a licence to fly an aircraft not entered in the aircraft rating of the licence, for the purpose of testing or non-passenger-carrying flight subject to the terms and conditions of such authorisation, and the authorisation shall be limited in validity to the time needed to complete the testing or the specific flight.

7. Documents to be carried on aircraft:—

(1) No person shall fly an aircraft unless valid documents, as required by the law of the country in which the aircraft is registered, are carried on board and are kept in such form and manner as laid down by that country.

(2) An aircraft registered in India shall carry on board valid documents as required by these rules:

7A. Prohibition of carriage of persons without passport:—

(1) No person-in-charge of any aircraft shall allow such aircraft to enter India from a place outside India unless all persons on board the aircraft are in possession of valid passports as required by rules for the time being in force made under the Indian Passport Act, 1920 (XXXIV of 1920).

(2) Where an aircraft is brought into India in contravention of sub-rule (1), any authority empowered by the Central Government generally or specially in this behalf may direct the owner or the person in-charge of the aircraft to take on board and remove from India, or otherwise arrange for the immediate removal from India of the person or persons without valid passports, and the owner, or as the case may be, the person-in-charge, of the aircraft shall comply with such directions.

7B. Carriage of Cock-pit Check Lists in aircraft:—

Every aircraft registered in India shall carry Cock-pit Check Lists and Emergency Check Lists specified by the Director-General for that particular type of aircraft. Such lists shall be carried in the cock-pit of the aircraft readily accessible to the pilot in flight.

8. Carriage of arms, ammunition, explosives, military stores, etc.:-

No person shall carry or cause or permit to be carried in any aircraft to, from, within or over India, any arms, ammunitions, munitions of war, implements of war, explosives and military stores, except with the written permission of the Central Government and subject to the terms and conditions of such permission.

8A. Security check of persons boarding aircraft at aerodrome:—

For the purpose of securing the safety of aircraft operations, every person boarding an aircraft at an aerodrome and his hand-baggage, if any, shall be liable to be searched at the aerodrome, by an officer authorised in this behalf by the Central Government, before such person proceeds to the aircraft for embarkation.

9. Radio-telegraph Apparatus :—

No person shall operate radio transmitting apparatus in any aircraft registered in India unless he holds a licence of the type required by the provisions of Part V in respect of aircraft required by these rules to carry radio-telegraph or radio-telephone apparatus, as the case may be, and issued in accordance with those provisions.

10. Mails:—

No person shall carry mails or allow mails to be carried in any aircraft except with the consent in writing of the Director-General of Posts and Telegraphs.

11. Aerodromes:—

No pilot or person-in-charge of any aircraft carrying passengers for hire or reward shall use any place for a series of landings and departures, and no pilot or person-in-charge of any aircraft employed on a scheduled air transport service shall use any place as a regular place of landing or departure other than an aerodrome licensed or approved for the purpose in accordance with the provisions of Part XI.

12. Prohibited Areas:—

(1) No person shall fly or assist in flying an aircraft over any of the areas specified in Schedule I save in accordance with the conditions specified in that schedule.

(2) Every pilot who, when flying an aircraft, finds himself above a prohibited area in contravention of sub-rule (1), shall, as soon as he is aware of the fact, give the signal of distress and shall land the aircraft as soon as possible outside the prohibited area at one of the nearest aerodromes in India :

Provided that he shall not, unless compelled by stress of weather or other unavoidable cause, fly further into the prohibited area nor commence to

descend while still above the prohibited area.

(3) When the signals to warn an aircraft that it is flying in the vicinity of restricted, prohibited or danger area are given, the pilot of the aircraft shall immediately change his course and fly away from the prohibited area.

(4) When the signals from aerodrome control tower are given, the pilot shall immediately give the signal referred to in sub-rule (2) of this rule and land the aircraft in accordance with that sub-rule.

Areas over which flight by aircraft is prohibited :

(See rule 12). Extent of Prohibition In all the areas specified is absolute.

(1) The area included within a radius of one mile from the Towers of Silence on Malabar Hills, Bombay.

(2) The area near Baroda aerodrome extending vertically from ground level to an unlimited upper level.

(3) The Area around Rashtrapati Bhavan extending vertically from ground level to an unlimited upper level.

(4) The Area included within a radius of ten kilometers from Mathura Refineries extending vertically from ground level to an unlimited upper level.

(5) The Area near Bhubaneshwar extending vertically from ground level to upper level of 50,000 feet.

(6) The Area included within a radius of ten kilometers from Kalpakkam nuclear extending vertically from ground level upto an upper level of 10,000 feet.

13. Photograph at aerodromes or from aircraft in flight:—

No person shall take, or cause or permit to be taken, at a Government aerodrome or from an aircraft in flight, any photograph except in accordance with and subject to the terms and conditions of a permission in writing granted by the Director-General, a Joint Director General, a Deputy Director-General or the Director of Regulations and Information of the Civil Aviation Department :

14. Aerial work and public transport reserved for certain aircraft:—

No aircraft registered in accordance with Part IV in Category B shall be used as an aerial work aircraft or as a public transport aircraft:

Provided that the Central Government may, from time to time, permit and impose restrictions on the performance of aerial work or public transport by aircraft other than those registered in accordance with Part IV in Category A, and such restrictions shall be deemed to have been effectively imposed if they have been notified in writing to the owner or operator of such aircraft or by notification in the Official Gazette.

15. Conditions to be complied with by aircraft in flight :—

No aircraft shall be flown unless the following conditions are complied with, namely:–

(i) the aircraft possesses a valid certificate of airworthiness or special certificate of airworthiness issued by the Director-General;

(ii) the aircraft shall be certified as airworthy and shall be maintained in accordance with the provisions of Part VI or in the case of an aircraft not registered in India, in accordance with the regulations of the State in which the aircraft is registered;

(iii) all the terms or conditions on which the certificate of airworthiness or special certificate of airworthiness was granted shall be duly complied with;

(iv) the aircraft shall carry on board its certificate of airworthiness or special certificate of airworthiness and any other certificate prescribed by Part VI, or by the regulations of the State in which the aircraft is registered, which it is required to carry on board:

Provided that an aircraft not in compliance with the aforesaid conditions may be flown under a special flight permit issued by the Director-General under rule 55A subject to such conditions as may be specified in the special flight permit.

15A. Operation of Remotely Piloted Aircraft System.

No remotely piloted aircraft of all-upweight more than 250 grams shall be flown unless such aircraft has been allotted a Unique Identification Number by the Director-General.

A remotely piloted aircraft with all up weight exceeding a limit as specified by the Director-General from time to time shall not be flown by the operator, save, as per the conditions of the permit issued by the Director-General.

16. Rules of the Air:—

Every person shall comply with the Rules of the Air issued by the Director-General in accordance with Annex 2 to the Convention as may be applicable to that person.

17. Production of licences, etc. :—

Any licence (other than a licence issued under Part XIII), certificate, authorisation and approval, log book or document granted or required to be maintained under these rules shall, on demand for the purpose of inspection, by any magistrate, any police officer above the rank of sub-inspector, any Customs officer, any commissioned officer of the Naval, Military or Air Force of the Union, any gazetted officer of the Civil Aviation Department in Government of India or any other person authorised by the Central Government by special or general order in writing in this behalf, be produced by the licensee or, in the case of an aircraft or of a licensed aerodrome, by the owner, hirer or person-in-charge thereof ;

Provided that any such licence, certificate, authorisation and approval, log book or document relating to an aircraft or its personnel which is not by these rules required to be carried in the aircraft shall be produced within seven days of the making of the demand.

18. Prevention of flights in contravention of the rules:—

An authority authorised under section 8 of the Aircraft Act, 1934, to detain aircraft may do so by the issue of a written direction to the pilot or other persons for the time being in-charge of the aircraft to be detained, or by taking or causing to be taken such other steps as may, in the opinion of such authority, be necessary to make the detention effective, including the use of force, denial of access by any person to the aircraft, removal of parts and components of the aircraft, defuelling of the aircraft or otherwise interfering with the aircraft. If an aircraft detained by a person so authorized is housed or kept at a Government aerodrome, the housing or picketing charges normally applicable shall be payable in respect of the whole period during which it is detained.

19. Cancellation, suspension or endorsement of licences, certificates, authorisation and approval :—

Where any person is convicted of a contravention of, or failure to comply with, these rules or any direction issued under rule 133A in respect of any aircraft, the Central Government may cancel or suspend any certificate of registration granted under these rules relating to that aircraft.

The Central Government may cancel or suspend any certificate granted under these rules relating to airworthiness of an aircraft or a Type Certificate of an aircraft component, or item of equipment, if the Central Government is satisfied that a reasonable doubt exists as to the -

(a) safety of the aircraft or the type of aircraft; or

(b) the airworthiness of the aircraft.

19A. Restrictions on licence, certificate, authorisation or approval.

The Director-General may impose restrictions, as deemed fit, on any licence, certificate, authorisation or approval:

(a) in the event of non-compliance with any condition imposed on the said licence, certificate, authorisation or approval;

(b) if any safety concern that emerged during an inspection has remained unresolved beyond the period specified by the Director-General.

20. Certain rules not applicable to Gliders, Kites and Remotely Piloted Aircraft System.

The rule 7 shall not apply to gliders, and rules 5, 6, 7, 12, 15, 17, 19 and the rules in Part III, with the exception of rule 26, shall not apply to kites. The rules 5, 6, 15 in Part II, all rules in Part III with the exception of rules 21, 21A, 26 and all rules in Part IV, Part V, Part VI and Part VII, shall not apply to remotely piloted aircraft system.

21. Dangerous flying:—

No person shall fly any aircraft in such circumstances as, by reason of low altitude or proximity to persons or dwellings or for other reason, to cause unnecessary danger to any person or property. Refer rule 21A for General Ssafety and 21B for aircraft in distress.

22. Assault and other acts of interference against a crew member :—

No person shall, on board an aircraft, —

a) assault, intimidate or threaten, whether physically or verbally, a crew member which may interfere with the performance of the duties of the crew member or lessens the ability of the crew member to perform those duties;

b) refuse to follow a lawful instruction given by the Pilot-in-Command, or on behalf of the Pilot-in-Command by a crew member, for the purpose of ensuring the safety of the aircraft or of any person or property on board or for the purpose of maintaining good order and discipline on board.

23. Assault and other acts endangering safety or jeopardizing good order and discipline:—

No person shall, on board an aircraft,—

(a) assault, intimidate or threaten, whether physically or verbally, any person,

(b) intentionally cause damage to or destroy any of property,

(c) consume alcoholic beverages or drugs, which is likely to endanger the safety of the aircraft or of any person or jeopardizes the good order and discipline on board the aircraft.

24. Prohibition on consumption of intoxicating and psychoactive substances:—

No person acting as, or carried in aircraft for the purpose of acting as pilot, commander, navigator, engineer, cabin crew or other operating member of the crew thereof, shall have taken or used any alcoholic drink, sedative, narcotic or stimulant drug or preparation within twelve hours of the commencement of the flight or take or use any such preparation in the course of the flight, and no such person shall, while so acting or carried, be in a state of intoxication or have detectable blood alcohol whatsoever in his breath, urine or blood alcohol analysis or in a state in which by reason of his having taken any alcoholic, sedative, narcotic or stimulant drug or preparation, his capacity so to act is impaired, and no other person while in a state of intoxication shall enter or be in aircraft.

No operator operating a domestic air transport service in India shall serve any alcoholic drink on board such an air transport service and no passenger traveling on such a service shall consume any alcoholic drink while on board.

The holders of licences shall not exercise the privileges of their licences and

related ratings while under the influence of any psychoactive substance which might render them unable to safely and properly exercise the privileges of the licences and ratings.

The holders of licences shall not engage in problematic use of substances.

24A. Carriage of persons suffering from mental disorders or epillepsy in aircraft:—

No person shall knowingly carry or permit to be carried, or connive at the carriage of, a person suffering from any mental disorder or epillepsy in any aircraft:

Provided that this prohibition shall not apply if the person to be carried is certified by a registered medical practitioner to be fit to travel by air without being a risk to other passengers or to the aircraft, and in addition :-

(a) has not taken or used any alcoholic drink or preparation within twelve hours of the commencement of the flight;

(b) is kept under proper sedative, if in a state of excitement, during the flight and stops en route; and

(c) is accompanied by an attendant, provided that in case he has been in a state of excitement requiring sedation within the two weeks preceding the date of commencement of the flight, he shall be accompanied by a registered medical practitioner and adequate escort who shall individually and collectively be responsible for ensuring that no alcoholic drink or preparation is taken by the person in their charge and that such person is kept suitably sedated during the flight and stops en route.

24B. Carriage of prisoners in aircraft:—

No prisoner shall be taken aboard or carried on an aircraft except under and in accordance with a permit in writing issued by the Director-General, a Deputy Director-General, the Director of Regulations and Information or any other officer of the Civil Aviation Department authorized by the Central Government in this behalf and subject to such conditions, if any, as he may specify in the permit.

Explanation :— The term "prisoner" means a person who is confined in any prison and includes a person who is arrested under any law for the time being in force.

24C. Carriage of animals, birds and reptiles in aircraft:—

No animal, bird or reptile shall be taken aboard or carried on any aircraft to, from and within India, except under and in accordance with a general or special permit in writing issued by the Director-General in this behalf, and subject to such conditions, if any, as may be specified therein.

25. Smoking in aircraft:—

(1) The owner or the operator and the pilot-in-command of every aircraft registered in India, shall exhibit or cause to be exhibited in prominent place(s) in the aircraft notice(s) stating where and to what extent smoking

is prohibited or permitted therein.

(2) A notice permitting smoking in such aircraft may be exhibited therein only if smoking in the aircraft is permitted by the certificate of airworthiness of the aircraft or by the direction of the Central Government and only in accordance with the conditions relating to smoking contained in such certificate or direction.

25A. Fuelling of aircraft:—

(1) No person shall fill or replenish the fuel tanks of an aircraft from vehicles or vessels containing petroleum in bulk or from fuel hydrant installations except from vehicles or installations of a type approved by the Chief Inspector of Explosives or from barges licensed under the Petroleum Rules, 2002.

(2) During fuelling operations, which may include filling or draining of fuel tanks, the following precautions shall be observed :-

(a) Fuelling of aircraft shall be done outdoors and not less than 15 meters from any building.

(b) A " NO SMOKING" notice shall be prominently displayed.

(c) Smoking or use of an appliance employing naked flame or use of an appliance capable of producing a spark or in any other way igniting fuel vapours shall not be permitted within 30 meters of the aircraft or fuelling equipment.

(d) Aircraft engines shall not be started or turned and ignition switches shall be placed in the "OFF" position.

(e) Aircraft electrical radar and radio systems shall not be operated and the switches relating thereto shall remain in the "OFF" position:

Provided that this clause shall not apply to electrical switches controlling the following circuits :

(i) power and light essential for fuelling operations;

(ii) minimum amount of cabin lighting; and

(iii) steady parking lights. Such switches shall not be operated during the fuelling operations.

(f) The use of ground power supply units, air-conditioning units, tractors and similar equipment shall be permissible subject to compliance with the following conditions:-

(i) Flexible training cables suitable for use in hazardous areas shall be used.

(ii) They shall be located outside the Danger Zone. "Danger Zone" is defined as the area within the largest polygon obtainable by joining points 3 meters away from the wings and the fuelling vehicle. This rule shall not apply to the use of ground batteries as an auxiliary source of electric supply to the aircraft provided they are not connected or disconnected during fuelling operation.

(iii) The units, including the associated electrical equipment, shall be flame-proof and of a type approved by the Chief Inspector of Explosives, otherwise they shall be stationed at a distance of not less than 15 meters, in the case of gasoline or wide out fuels and 6 meters in the case of straight kerosene, from the aircraft and the fuelling vehicle.

(iv) They shall not be switched "ON" or "OFF" during fuel transfer.

(g) The fuelling equipment and the aircraft shall be bonded to each other and both shall be earthed.

(h) No person other than the staff of the operator, fuelling company and officials of the Civil Aviation Department, Customs and Police, shall be permitted within 15 meters of the aircraft.

(i) Passengers may be permitted to embark, disembark, or remain in the cabin subject to the following conditions :-

(i) an attendant shall remain on duty in the cabin of the aircraft. The attendant shall ensure that no smoking takes place or other source of ignition is allowed to occur and shall assist in the removal of passengers in the event of fire;

(ii) the passenger loading ramp shall be correctly positioned at the cabin exit door and adequate provision shall be made to maintain the equilibrium of the aircraft in case all passengers attempt to leave by one exit;

(iii) in case of marine aircraft, adequate means of water transport shall be stationed at cabin exit door.

(j) The handling of freight and baggage in and around the aircraft shall not proceed simultaneously with fuelling unless adequate precautions have been taken to eliminate fire risk.

(k) No aircraft maintenance shall be conducted which may provide a source of ignition for fuel vapour during fuelling operations.

(l) Fire extinguishers of adequate capacity and of suitable type, approved by the Director-General shall be available for immediate use near the aircraft.

(m) In the event of fuel being spilled, fuelling must cease and the engine of the ground power supply units must be stopped, but the electrical circuits and switches should on no account be touched except for the purpose of stopping the power unit. Prior to recommencing fuelling, action must be taken to clean the spilled fuel. Fuel must not be washed into sewers or drains.

(n) Fuelling operations shall cease when a turbo-jet aircraft manouvres so as to bring the rear jet outlets within 43 meters of the fuelling equipment or the aircraft.

25B. Housing of aircraft:—

(1) No aircraft containing dangerous petroleum in bulk in any of its tanks may be housed in a hanger unless such hangar is constructed of uninflammable material and is effectively and safely ventilated to the open air.

(2) Every such hangar shall be in charge of a competent person who shall be responsible for taking all proper precautions against fire and shall prevent unauthorized persons from having access to the building.

26. Dropping of articles and descent by parachutes:—

(1) No person shall drop or project or cause or permit to be dropped or projected from an aircraft in motion anything except ballast in the form of fine sand or water:

Provided that nothing in this rule shall be construed as preventing -

(a) in an emergency, the dropping of liquid fuel;

(b) in an emergency, the dropping of cargo over areas where hazard to persons or property outside the aircraft is not thereby created;

(c) the dropping of message bags, smoke producing or other apparatus or materials dropped for the purpose of navigating an aircraft or communicating messages from an aircraft subject to the observance of such precautions as to the nature of the articles dropped and the place of dropping as will avoid risk of injuring persons or damaging property on the ground or water;

(d) the dropping of separate sheets of paper containing printed matter or separate petals of flowers in any place if :-

i. the prior written permission of the District Magistrate or the Commissioner of Police is obtained in each case;

ii. the aircraft is suitable for dropping these articles;

iii. the minimum safe heights specified in these rules are observed; and

iv. necessary precautions are taken to avoid injury or damage to persons or property.

(e) the dropping of ropes used for towing aircraft.

(2) No person shall, except in an emergency, descend by means of a parachute from an aircraft and no person shall drop or cause or permit to be dropped from an aircraft in flight any article, whether attached to a parachute or not, unless the descent is made or the article is dropped in accordance with the subject to any conditions or limitations contained in general or special

order of the Central Government in writing in that behalf.

27. Carriage of persons in unauthorised parts of aircraft:—

No person shall at any time be carried on the wings or undercarriage of the aircraft, or on or in any other part thereof which is not designed for the accommodation of the personnel or passengers, or on or in anything attached externally to the aircraft:

Provided that -

(a) nothing in this rule shall prevent a person having temporary access -

(i) to any part of the aircraft for the purpose of executing repairs to the aircraft or adjusting the machinery, or equipment thereof or for the purpose of doing anything which may be necessary for the safety of the aircraft or persons or goods carried therein; or

(ii) to any part of the aircraft in which goods or stores are being carried and to which proper means of access is provided; and

(b) a person may be carried on or in any part of the aircraft, or anything attached thereto, with the permission in writing of the Central Government and subject to any conditions which may be specified in such permission.

28. Minimum age for sole control of aircraft:—

No person being under 16 years of age shall have sole control of an aircraft in motion and no person shall cause or permit any other person to have sole control of an aircraft in motion unless he knows or has reasonable cause to believe such other person to have attained the age of 16 years.

28A. Maximum age limit for professional pilots:—

(1) No person, holding a pilot's licence issued under these rules and having attained the age of sixty-five years, shall act as Pilot-in-Command or Co-pilot of an aircraft engaged in commercial air transport operations.

(2) No person holding a pilot's licence issued under these rules and having attained the age of sixty years , shall act as Pilot-in-Command or Co-pilot of an arcraft engaged in commercial air transport operations unless it is operated in a multi-crew environment and the other pilot is less than sixty years of age.

Provided that the provisions of sub-rule (2) shall not apply in respect of aircraft certified for single pilot operations and not exceeding an all up weight of 5700 kilograms engaged in commercial air transport operations within the territory of India and while operating in a multi-crew environment.

29. Acts likely to imperil the safety of aircraft:—

No person shall interfere with the pilot or with a member of the operating crew of an aircraft, or tamper with the aircraft or its equipment or conduct himself in a disorderly manner in an aircraft or commit any act likely to imperil the safety of an aircraft or its passengers or crew.

29A. Prohibition of operating civil aircraft causing sonic boom:—

No person shall operate a civil aircraft at a true flight mach number greater than one over the territory of India or over the high seas in a manner which may cause or is likely to cause sonic boom over the territory of India.

29B. Prohibition on the use of portable electronic devices:—

No person shall operate, nor shall the operator or the pilot-in-command of an aircraft allow the operation of any portable electronic device on board an aircraft in flight:

Provided that the Pilot-in-Command may permit the use of cellular telephone by the passengers of a flight after the aircraft has landed and cleared active runway, except when the landing takes place in low visibility conditions as may be determined by the Director-General from time to time.

The provisions of this rule shall not apply to portable voice recorders, hearing aids, heart pacemaker, electric shavers or other portable electronic devices.

Provided further that the Pilot-in-Command may permit the use of mobile communication and internet services through Wi-Fi on board an aircraft certified by the Director-General for such services and subject to the procedures specified by the Director-General in that behalf.

29C. Adoption of the Convention and Annexes:—

(1) The Director-General may lay down standards and procedures not inconsistent with the Aircraft Act, 1934 (22 of 1934) and the rules made thereunder to carry out the Convention and any Annex thereto.

(2) The Director-General shall formulate the State Safety Programme and oversee its implementation.

29D. Safety Management Systems:—

Every organisation engaged in the operation of aircraft and aerodromes, provision of air traffic services, training of personnel, maintenance, design and manufacture of aeronautical products shall, –

(a) establish and maintain Safety Management Systems; and

(b) prepare a Safety Management Systems Manual in such form and manner as may be specified by the Director-General and submit the same to the Director-General for approval.

30. Certificate of Registration:—

An aircraft may be registered in India in either of the following categories, namely:

(a) Category A – Where the aircraft is wholly owned either –

(i) by citizens of India; or

(ii) by a company or corporation registered and having its principal place

of business within India; or

(iii) by the Central Government or any State Government or any company or any corporation owned or controlled by either of the said Governments; or

(iv) by a company or corporation registered elsewhere than in India, provided that such company or corporation has given the said aircraft on lease to any person mentioned in sub-clause (i), sub-clause (ii) or sub-clause (iii); and

(b) Category B – Where the aircraft is wholly owned either –

(i) by persons resident in or carrying on business in India, who are not citizens of India; or

(ii) by a company or corporation registered elsewhere than in India and carrying on business in India.

The registration of an aircraft registered in India may be cancelled at any time by the Central Government, if it is satisfied that –

(i) such registration is not in conformity with the provisions of categories A and B above; or

(ii) the registration has been obtained by furnishing false information; or

(iii) the aircraft could more suitably be registered in some other country; or

(iv) the lease in respect of the aircraft, registered in pursuance of sub-clause (iv) of clause (a) of sub-rule (2), is not in force; or

(v) the certificate of airworthiness in respect of the aircraft has expired for a period of five years or more; or

(vi) the aircraft has been destroyed or permanently withdrawn from use; or

(vii) it is inexpedient in the public interest that the aircraft should remain registered in India.

The registration of an aircraft registered in India, to which the provisions of the Cape Town Convention and Cape Town Protocol apply, shall be cancelled by the Central Government, within five working days, without seeking consent or any document from the operator of the aircraft or any other person.

33. Change in ownership:—

In the event of any change in the ownership of a registered aircraft, or if a registered aircraft ceases to be owned wholly either by a person or by a company or corporation fulfilling the conditions set out in rule 30, then -

(a) the registered owner of the aircraft shall forthwith notify to the Director-General such change of ownership or, as the case may be, that the aircraft has ceased to be so owned;

(b) any person, company or corporation who becomes the owner of an aircraft registered in India (hereinafter referred to as the New Owner) shall forthwith inform the Director-General in writing of the fact of his ownership of the aircraft and may make an application for a certificate of registration;

(c) the registration and the certificate there-of shall remain valid until such registration and certificate have been cancelled by the Director-General.

37A. Use of State Marks:—

(1) An aircraft shall not bear on any part of its exterior surface any advertisement or any sign or lettering except those under these rules and as required or permitted by the Director-General.

(2) The name of an aircraft and the name and emblems of the owner of the aircraft may be displayed on the aircraft if the location, size, shape and colour of the lettering and signs do not interfere with easy recognition of, and are not capable of confusion with, the nationality and registration marks of the aircraft.

(3) An aircraft other than a State aircraft shall not bear any mark or sign prescribed for use by a State aircraft.

(4) National flags or colours may be displayed on the aircraft in such a manner that they are distinct and are not likely to create confusion with the markings used by military aircraft.

38. Licensing Authority:—

The authority by which the licences and ratings specified may be granted, renewed or varied shall be the Central Government, which may withhold the grant or renewal of a licence or a rating, if for any reason it considers it desirable to do so.

38A. Carriage of operating crew:—

Subject to the provisions of rules 6, 6A and 6B, every aircraft resigtered in India shall comply with such of the following requirements in respect of the personnel which it carries and by which it is operated as are applicable to the aircraft and type of operation concerned, namely :-

(1) Pilot

(a) Private Aircraft – Every private aircraft shall be flown by a person holding a valid pilot's licence issued in accordance with Schedule II:

Provided that:

(i) a private aircraft shall not be flown by a person holding a Student Pilot's Licence;

(ii) a private aircraft shall not be flown by a person holding a Private Pilot's Licence for remuneration or hire of any kind;

(iii) a private aircraft carrying passengers at night, shall not be flown by a person holding a Private Pilot's Licence, without having a

valid Instrument Rating.

(b) Public transport and Aerial Work Aircraft – Every Public transport or aerial work aircraft (other than a microlight or a glider or a balloon) shall be flown by a person holding an appropriate professional pilot's licence, i.e. a Commercial or Airline Transport Pilot's Licence issued in accordance with Schedule II:

(2) Flight Instructor or Assistant Flight Instructor –

(a) Every aircraft which is being used for the purpose of giving dual instructions in piloting shall carry a person holding an appropriate professional pilot's licence, that is, a Commercial or Airline Transport Pilot's Licence or Pilot's Licence (Microlight, Gliders and Balloons) as the case may be, which has an appropriate Flight Instructor's or Assistant Flight Instructor's rating in accordance with Schedule II, or an authorization issued in writing by the Director-General.

(b) No person other than a person having a Flight Instructor's or Assistant Flight Instructor's rating shall impart instructions in piloting an aircraft, unless he has been specifically authorized in writing by the Director-General to impart such instructions.

(3) Flight Navigator:—

Every public transport aircraft engaged on a flight without landing over a great circle distance of more than six hundred NMs and not equipped with the navigational equipment capable of providing instant and continuous ground position of the aircraft with adequate stand-by arrangements, shall carry on board a Flight Navigator licenced in accordance with Schedule II, if the total distance between any two consecutive radio navigational fixing aids located within thirty NMs of the route of the proposed flight and capable of being used by the aircraft is more than six hundred NMs:

Provided that the Director-General may require a Flight Navigator to be carried on board an aircraft on any flight.

(4) Flight Engineer - Where a Flight Engineer is required to be carried on board an aircraft as flight crew member under sub-rule (7), he shall be a person holding the appropriate licence in accordance with Schedule II. (5) Deleted

(6) Flight Radio Telephone Operator – An aircraft which is equipped or required to be equipped with radio apparatus in accordance with rule 63 and which communicates by radio telephony, shall carry a person holding a Flight Radio Telephone Operator's Licence or Flight Radio Telephone Operator's Licence (Restricted), as the case may be, issued in accordance with Schedule II, to operate radio apparatus on such aircraft.

(7) Minimum crew for any flight – The number and description of the flight crew members operating any flight of an aircraft registered in India shall be as per the certificate of airworthiness.

38B. Carriage of Cabin Crew:—

No aircraft registered in India shall be operated for public transport of passengers unless the following minimum number of cabin crew are on board the aircraft for the purpose of performing such duties as may be assigned in the interest of the safety of passengers, by the operator or the Pilot-in-command of the aircraft, namely:-

(i) For an aeroplane having a seating capacity of not less than 10 and not more than 50 passengers.	One cabin crew
(ii) For a helicopter having a seating capacity of not less than 20 and not more than 50 passengers.	One cabine crew
(iii) For an aeroplane or a helicopter having a seating capacity of more than 50 passengers.	Two cabine crew plus one cabin crew for each unit (or part of a unit) of 50 passangers seats above a seating capacity of 99 passengers.

39A. Disqualification from holding or obtaining a licence :-

(1) Where the licensing authority is satisfied, after giving him an opportunity of being heard, that any person –

(a) is habitually intemperate in the use of alcohol, or is an addict of narcotics, drugs and the like, or

(b) is using, has used or is about to use an aircraft in the commission of a cognizable offence or in contravention of these rules, or

(c) has, by his previous conduct as member of the crew of an aircraft, shown that he is irresponsible in the discharge of his duties connected with his employment or is likely to endanger the safety of the aircraft or any person or thing carried therein, or of other aircraft or persons or things on the ground, or

(d) is a habitual criminal or has been convicted by a Court in India for an offence involving moral turpitude or an offence which amounts to heinous crime, or

(e) has obtained the licence, rating, aircraft type rating or extension of aircraft type rating, or renewal of any of them, by suppression of material information or on the basis of wrong information, or

(f) has unauthorisedly varied or tampered with the particulars entered in a licence or rating, the licensing authority may, for reasons to be recorded in writing, make an order disqualifying that person for a specified period from holding or obtaining a licence.

(2) The Central Government may debar a person permanently or temporarily from holding any licence or rating mentioned in rule 38 if in its opinion it is necessary to do so in the public interest.

39B. Medical standards:—

No licence or rating referred to in rule 38, required for any of the personnel of the aircraft, shall be issued or renewed unless the applicant undergoes a medical examination with an approved medical authority and satisfies the medical standards as notified by the Director-General.

40. Signature of Licence Holder:—

On the issue of a licence to an applicant he shall forthwith sign his name on the licence as the holder thereof with his ordinary signature.

41. Proof of competency:—

Applicants for licences and ratings shall produce proof of having acquired the flying experience and having passed satisfactorily the test and examinations specified in Schedule II in respect of the licence or rating concerned :

Provided that a person who is a qualified pilot from the Indian Air Force, Indian Navy, Indian Army or Indian Coast Guard and who produces satisfactory evidence to show that he possesses the necessary flying experience, competency and standards of physical fitness as required under these rules may be exempted by the Director-General, by general or special order in writing, and subject to such conditions, if any, as may be specified in such order, from all or any of the flying tests and from medical or other technical examinations required for the issue of the licences under these rules.

41A. Checks, Tests and Examinations:—

The Director-General may conduct examinations specified in Schedule II, may fix examination centres within India, appoint invigilators and lay down the procedure for conducting the examinations.

The Director-General may appoint Examiners for carrying out flying tests and technical examinations required under Schedule II and may also appoint a Board to conduct oral examinations when necessary.

42. Licences and their renewal :—

(1) The licences and ratings mentioned in Rule 38 may be issued or renewed for any period not exceeding the period specified in rule 39C and Schedule II in respect of each licence or rating:

Provided that if, on the date of application for renewal, the licence or rating has expired for the periods specified below, the applicant may be required to qualify in the examinations and skill tests specified against them and such other examinations and tests as the Director-General may consider necessary to assess the applicant's competency to hold that licence or rating :-

(a) For a period exceeding 2 years but not exceeding 3 years. Test of skill and Air Regulations.

(b) For a period exceeding 3 years. All examinations and tests required for the issue of the licence or rating.

(2) The holder of a licence shall not exercise the privileges of his licence without being declared fit after a fresh medical examination in the event of his having-

(a) a sickness or injury involving incapacity for a period of fifteen days or more for the work for which he is licensed; or

(b) an injury sustained in any accident occurring during the exercise of the privileges of his licence or otherwise and which is likely to cause incapacity or impair his efficiency in the discharge of his duties.

The licence holder or his employer shall immediately notify all the relevant details of the sickness or injury to the Director-General.

44. Aircraft not registered in India:—

An aircraft not registered in India shall carry the personnel prescribed by the laws of the State in which it is registered and such personnel shall be licenced in accordance with the laws of that State.

45. Validation of Foreign Licences:—

When a licence has been granted by the duly competent authority in any foreign State and is for the time being in force, the Central Government may, subject to such conditions and limitations and for such periods as it shall think fit, render such licence valid by an authorisation for flying aircraft registered in India and a licence so validated shall be subject to the provisions of rule 19 and such validation of a licence shall cease if the licence is revoked or suspended.

50. Certificate of airworthiness:—

The owner or operator of an aircraft may apply to the Director-General for the issue or renewal of a certificate of airworthiness or a special certificate of airworthiness in respect of the aircraft or for the validation of a certificate of airworthiness issued elsewhere in respect of the aircraft.

The Director-General may validate a certificate of airworthiness in respect of any aircraft that may be imported.

Subject to these rules, a certificate of airworthiness shall remain in force for such period as may be specified in the certificate and may from time to time be renewed by the Director-General.

52. Modification and repairs:—

(1) A person shall not carry out any modification or repair affecting safety of any aircraft in respect of which there is a valid certificate of airworthiness unless he has been required to do so in pursuance of these rules or unless he has obtained the prior approval of the Director-General.

(2) (a) Modifications issued by the manufacturer of an aircraft, aircraft component or item of equipment of that aircraft which have been issued a Type Certificate by the Director-General or elsewhere may be deemed as approved modifications, unless otherwise specified by the Director General.

(b) Repair schemes issued by the manufacturer of an aircraft, aircraft component or item of equipment of that aircraft issued with a Type Certificate by the Director-General or elsewhere and other repairs carried out in accordance with standard aeronautical engineering practice may be deemed as approved unless otherwise specified by the Director-General.

55. Suspension or cancellation of Certificate of Airworthiness and its continued validity:— ***See chapter 16***

65. Aeronautical beacon and aeronautical ground lights:—

(1) No aeronautical beacon or aeronautical ground light shall be established or maintained within India nor shall the character of the light exhibited there from be altered except with the approval in writing of the Central Government and subject to such conditions as may be prescribed.

(2) No person shall willfully or negligently endanger or interfere with any aeronautical beacon or aeronautical ground light established or maintained by or with the approval of the Central Government or any light exhibited therefrom.

67A. Log Books of Flight Crew Personnel and logging of flight time:—

(1) Every member of the Flight Crew licensed under these rules shall maintain a personal log book, in the form prescribed by the Director-General and all flight times shall be logged therein.

(2) All entries in log books shall be made in ink.

(3) Log Books shall be preserved for not less than 5 years after the date of the last entry therein.

(4) Every member of the Flight Crew shall certify the accuracy of the entries in his log book with respect to flight time at least at the end of each calendar month. The pilot-in-command during dual instruction shall certify entries with respect to flight time during such dual instruction. At the end of every quarter in a year, that is, at the end of March, June, September and December, log books shall be certified for correctness of entries therein –

(a) by competent authorities, such as, the Operations Manager, Deputy Operations Manager, or Chief Pilot of the Air Transport Undertaking concerned, in the case of professional pilots,

(b) by the Chief Flying Instructor, in the case of members of the Flying Training Organisation, and

(c) by Officers designated by Director-General of Civil Aviation in the case of all other persons;

(5) Flight time during which a pilot is under dual instruction shall be entered in his log book as "dual" and the pilot giving instruction shall make entries in the log book of the pilot under instruction showing the nature of the instruction given.

(6) Flight time spent in performing, under supervision of a pilot-in-command, the duties and functions of a pilot-in-command may be logged as pilot-in-command provided the person is entitled and authorized to fly in command of that type of aeroplane by virtue of the ratings and privileges of his pilot's licence. In all other cases, such flight time shall be logged as co-pilot with appropriate indication in the remarks column.

(7) The holder of a Student Pilot's Licence may log as pilot-in-command only that portion of the flight time during which he is the sole occupant of an aircraft provided that, in the case of an aircraft which requires more than one pilot in accordance with sub (7) of rule 38A and rule 6B, he may log as pilot-in-command that portion of the flight time during which he acts as pilots-in-command of the aircraft.

(8) The holder of a Private Pilot's Licence may log as pilot-in-command only the flight time during which he acts as pilot-in-command.

(9) The holder of a Commercial or Airline Transport Pilot's Licence may log as pilot-in-command the flight time during which he acts as pilot-in-command. He shall log as co-pilot the flight time during which he acts as co-pilot.

(10) A Flight Instructor may log as pilot-in-command the flight time during which he acts as an Instructor but the log entries shall indicate in the remarks column that the flight time was flown as an Instructor.

(11) Instrument flight time may be logged by the pilot manipulating the controls of an aircraft in flight only when the aircraft is flown solely by reference to instruments, either under actual or simulated instrument flight conditions. Over-the-top flying shall not be logged as instrument flying time.

(12) Instrument ground time may be logged in full by the pilot while flying solely by reference to instruments, in any recognized synthetic device which simulates instrument flight conditions.

(13) A pilot who acts as Examiner may log as pilot-in-command the flight time during which he so acts, provided he is entitled and authorized to fly in command of that type of flying machine by virtue of the ratings and

privileges of his pilot's licence.

(14) A Flight Navigator shall log the flight time as a Flight Navigator during which he is engaged in actual navigational duties. Flight time during which a Flight Navigator performs actual navigational duties under supervision of a licensed Flight Navigator shall be logged as a Flight Navigator with the indication "under supervision" in the remarks column.

(15) A Flight Engineer shall log the flight time as a Flight Engineer during which he is engaged in actual Flight Engineer's duties. Flight time during which a Flight Engineer performs a actual Flight Engineer's duties under supervision of a licensed Flight Engineer shall be logged as a Flight Engineer with indication "under supervision" in the remarks column.

(16) A Flight Radio Telephone Operator shall log the flight time during which he actually performs the duties of a Flight Radio Telephone Operator.

67B. No person shall destroy, mutilate, alter or render illegible any entry made, or wilfully make or procure or assist in the making of any false or fraudulent entry in or omission from any log book referred to in rules 67 and 67A.

79. Qualifications of Licensee:—

A licence for an aerodrome shall not be granted to any person other than –

(a) a citizen of India; or

(b) a Company or a body corporate:

Provided that —

(i) it is registered and having its principal place of business in India;

(ii) it meets the equity holding criteria specified by the Central Government from time to time; or

(c) the Central Government or a State Government or any company or any corporation owned or controlled by either of the said Governments; or

(d) a society registered under the Societies Registration Act, 1860. (21 of 1860).

80. Procedure for Grant of Licence:—

(1) An application for the grant of licence for an aerodrome shall be made to the Director- General along with the Aerodrome Manual.

(2) The application under sub-rule (1) shall be in such form and contain such particulars as may be specified by the Director-General.

(3) The Director-General may, for disposal of the application, require the applicant to furnish any additional information which he considers necessary

(4) The Director-General may also require the applicant to produce evidence in support of any information furnished in the application.

133A.Directions by Director-General:—

(1) The Director-General may, through Notices to Airmen (NOTAMS), Aeronautical Information Publication, Aeronautical Information Circulars (AICs), Notices to Aircraft Owners and Maintenance Engineers and publication entitled Civil Aviation Requirements, issue special directions not inconsistent with the Aircraft Act, 1934 (22 of 1934) or these rules, relating to the operation, use, possession, maintenance or navigation of aircraft flying in or over India or of aircraft registered in India.

(2) The Civil Aviation Requirements under sub-rule(1) shall be issued after placing the draft on the website of the Directorate General of Civil Aviation for a period of thirty days for inviting objections and suggestions from all persons likely to be affected thereby;

134. Scheduled Air Transport Services:—

No person shall operate any Scheduled air transport service from, to, in, or across India except with the permission of the Central Government, granted under and in accordance with and subject to the provisions contained in Schedule XI.

The Central Government may permit any air transport undertaking of which the principal place of business is in any country outside India to operate a scheduled air transport service from, to, or across India in accordance with the terms of any agreement for the time being in force between the Government of India and the Government of that country, or, where there is no such agreement, of a temporary authorization by the Government of India.

140. Minimum requirements to be complied with by the operators:—

All aircraft owners and operators shall comply with the engineering, inspection and manual requirements contained in Part XIII-A and with the safety requirements in respect of air routes, aircraft and aircrew, as may be specified by the Director-General.

140A.Director-General's sanction to introduction of any new routes or alteration in any existing routes of scheduled air transport services:—

Before operating a scheduled air transport service on a new route or making a substantial alteration in, or effecting the discontinuance of, any of the existing routes of such services, or introducing a new time-table for such service, the Corporation shall obtain the concurrence of the Director-General, in so far as such operation or, as the case may be, such discontinuance affects, or is likely to affect, the air route or aerodrome facilities, and give at least seven days' previous notice to the Director-General before the date proposed for the operation of the new route, or for the substantial alteration of an existing route or for the introduction of a new time-table or, as the case may be, for the discontinuance of an existing route.

140B. Operations Manual:—

(1) An Operations Manual in the form approved by the Director-General, shall be maintained by the Corporation.

(2) The Operations Manual shall, in addition to any other relevant information, contain the following that is to say :-

- (a) instructions outlining the responsibilities of operations personnel pertaining to the conduct of flight operations,
- (b) the flight crew for each stage of all routes to be flown including the designation of the succession of command,
- (c) in-flight procedure,
- (d) emergency flight procedure,
- (e) the minimum safe flight altitude for each route to be flown,
- (f) the circumstances in which a radio listening watch is to be maintained,
- (g) a list of the navigational equipments to be carried.

(3) A copy of the Operations Manual, or such part of the Manual as may be prescribed by the Director-General, shall be carried in all aircraft engaged in scheduled air transport services.

140C. Route Guide:—

All aircraft of the Corporation engaged in scheduled air transport services shall carry a Route Guide, which shall, in addition to any other relevant information, contain the following that is to say:-

- (a) communication facilities, navigation aids and a list of aerodromes, available on the route to be flown,
- (b) instrument 'let down' procedure for aerodromes on the route, or those likely to be used as 'alternates',
- (c) meteorological minima for each of the aerodromes on the route to be flown and that are likely to be used as regular or alternate aerodromes, and
- (d) specific instructions for computation of the quantities of fuel and oil to be carried on each route, having regard to all circumstances of the operation, including the possibility of the failure of one or more engines of the aircraft.

161. Penalties:—

(1) Any person who has contravened or failed to comply with any of these rules or any direction issued under rule 133A shall, where no punishment is provided for such contravention in the Aircraft Act, 1934 (22 of 1934), be punishable to the extent laid down in Schedule VI of these rules.

(2) It shall be a defence to any proceedings for contravention of or failure to comply with these rules if the contravention or failure is proved to have been due to accident, stress of weather or other unavoidable cause; and it shall be a defence to any proceedings under these rules against the owner, hirer, operator, pilot or commander of an aircraft that the alleged contravention took place without his actual fault or privity.

THE INDIAN AIRCRAFT RULES, 1920

53. Customs Aerodromes and Customs Officers:—

The Central Government may for the purposes of this part,

(a) by notification in the Official Gazette declare any aerodrome in India to be a customs aerodrome, and

(b) appoint persons to be Chief Customs Officers and Customs Collectors, and define the areas within which each such person shall exercise the powers and perform the duties conferred and imposed upon him hereunder.

54. Arrival and departure:—

(1) No person incharge of an aircraft entering India shall cause it to be landed in India for the first time in any journey except at a customs aerodrome, unless the aircraft is compelled to land before arriving at a customs aerodrome by accident, stress of weather or other unavoidable cause.

(2) No person in-charge of an aircraft shall fly the same or allow it to be flown to a place outside India save from a customs aerodrome unless compelled to land after departure from customs aerodrome by accident, stress of weather or other unavoidable cause.

55. Import and export of goods:—

(1) No person in any aircraft entering or departing from India shall carry or allow to be carried in the aircraft any goods of which the import or export by sea or by land is prohibited by or under any law for the time being in force.

(2) No person in any aircraft entering India shall break or alter any seal placed upon any part of the aircraft or upon any goods therein by an officer of customs at the aerodrome at which such aircraft departed for India.

62. Examination:—

(1) The person in-charge or any -aircraft shall permit any Customs Collector or other officer authorized in this behalf by the Customs Collector at any time to board and examine the aircraft and any ;goods laden thereon.

(2) The importer or exporter of any goods shall produce such goods to the Customs Collector at the customs aerodrome of importation or exportation, as the case may be" and permit him to examine such goods.

AIRCRAFT MANUAL (INDIA) VOL I

This manual contains act and rules. An act is an act of parliament and the rules are rules made by the Government of India under the act. Following act/rules govern civil aviation activity in India:

The Aircraft Act,1934. An act for the control of manufacture, possession, use, operation, sale, import and export of aircraft.

The Aircraft Rules, 1937. Rules made under the Act for regulating Civil Aviation activity in India. For details see Vol II,Air Regulations.

The Indian Aircraft Rules, 1920. These are custom rules governing aircraft arriving in or departing from India.

AIRCRAFTMANUAL (INDIA) VOL II

Part I of the manual contains National Conventions/Rules/Acts.

Part II contains International Conventions.

THE AIRCRAFT (PUBLIC HEALTH RULES), 1954

Rules made to protect public health. The salient features of the rules are:

- The Commander of an aircraft on way to India shall inform the health officer at destination atleast 2 hrs in advance on R/T details of any person suffering from any sickness, quaranatinable or infectious disease.
- Incubation period for infectious diseases is:

  5 Days- Influenzal Pneumonia, Cholera

  6 Days- Yellow fever, plague

  7 Days- Diphtheria

  8 Days- Relapsing fever

  10 Days- Cerebrospinal Meningitis

  14 Days- Small pox, Chicken Pox, Typhus
- Dead bodies/human remains of persons who have died with diseases which cannot be brought into India:

  Yellow fever, Plague, Anthrax, Glanders

  (However ashes of properly cremated bodies/remains can be brought).

Dead bodies/remains of persons who have died of any other reason can be brought provided they are properly enclosed in suitable coffin and other procedures are followed.

The Aircraft (Demolition of Obstructions caused by Building and Trees etc) Rules, 1994.
Procedure for demolition of obstructions around aerodromes are outlined in these rules.

The Aircraft (Carriage of Dangerous Goods) Rules, 2003.

Procedures for carriage of dangerous goods are outlined in these rules.

Aircraft (Security) Rules 2011.
Deals with airport security.

Aircraft (Investigation of Accidents and Incidents) Rules 2017.
Deals with accidents and incidents investigations.

QUESTIONS

1. **A pilot can fly an aircraft which is not entered in the aircraft rating of his licence for endorsement on his licence**
   A) With in 5 nm of an aerodrome
   B) With in Local Flying Area of the aerodrome
   C) Any where

2. **A pilot can fly in 30 consecutive days**
   A) 100 hrs PIC & 50 hrs as Co pilot
   B) 100 hrs PIC & 30 hrs as Co pilot
   C) 120 hrs PIC & 20 hrs as Co pilot

3. **When an aircraft is being refueled, the refueling must be stopped if a jet aircraft crosses with in a distance of:**
   A) 15 meters
   B) 30 meters
   C) 43 meters

4. **Mathura Refinery is a:**
   A) Danger Area
   B) Restricted area
   C) Prohibited area.

5. **A passenger visited a yellow fever infected area on the previous six days, but is not in possession of valid yellow fever certificate, then action taken by PIC of the flight is:**
   A) Send a radio message two hours before the arrival about the state of the health of the passenger
   B) No action required
   C) Inform Airlines office after landing

6. **Prisoners on Board an aircraft can be carried with the permission of**
   A) DGCA
   B) Controller of Aerodrome
   C) Director General of Prisons

7. **Smoking on a private aircraft is permitted:**
   A) Provided the owner has no objection.
   B) Only if the certificate of airworthiness of the aircraft permits.
   C) Without restriction if no passengers are carried.

8. **An aircraft without registration markings can be flown only**
   A) If the sale deed is not yet completed
   B) For purpose of test flight only, prior to purchase.
   C) If specially permitted in writing by the central govt.

9. **The member of operating crew shall not have taken alcoholic drinks:**
   A) 6 hrs before commencement if flight.
   B) 12 hrs before commencement of flight.
   C) 24 hrs before commencement of flight.

10. **Photography at an aerodrome can be done with prior permission in writing from :**
    A) Aerodrome officer
    B) DGCA
    C) Central Govt.

11. **While refueling is in progress, no naked light be brought within ____________ mts:**
    A) 35
    B) 30
    C) 100

12. **A pilot flying low due to thunder showers for safety reasons can be sued by:**
    A) State Govt.
    B) Cannot be sued.
    C) Owner of the property over which it is flying.

13. **A person can bring to India human remains of a person who has died of plague:**
    A) Cannot bring.
    B) If enclosed in a shell of zinc.
    C) If enclosed in a hermetically sealed shell of zinc after permission id obtained from proper authority.

14. An aerial work aircraft on a IFR plan to Jaipur departs at 1032 hrs UTC. Sunset time at Jaipur is 1318 UTC. Night landing facilities are not available at Jaipur. The flying time available to him to reach Jaipur is :

A) 3 hrs & 06 minutes.
B) 2 hrs & 26 min
C) 2 hrs & 46 min

15. Minimum crew required on private aircraft is:

A) One pilot.
B) Two pilots
C) As specified in the certificate of the Airworthiness

16. A person dies of cholera, his body can be brought to India if:

A) Packed in a wooden box.
B) Cannot be brought.
C) Sealed in zinc and packed in a wooden box. Closed in a shell of zinc, joints sealed, shell enclosed in a teak wooden box which is enclosed in zinc lined box, filled with saw dust impregnated with carbolic powder.

17. Dropping of paper leaf lets require the permission of:

A) Aerodrome
B) Local District Magistrate.
C) Operator.

18. A certificate of registration is valid from the date of registration to.

A) 1 year
B) Till the aircraft is destroyed in an accident
C) Till it is cancelled by DGCA

19. Before arrival in India a health report is to be sent.

A) Before take off
B) 7 days prior to arrival
C) 2 hours before arrival

20. If your aircraft is carrying cargo for remuneration, it will be known as a:

A) Private aircraft
B) Aerial work aircraft
C) Public transport aircraft

21. One pilot will be designated as PIC of a public transport aircraft for each flight by:

A) The operator
B) DGCA
C) Flying contract unit

22. The privileges of a license can be exercised by a pilot involved in an incident after:

A) He is cleared by the medical authority
B) He is cleared by the DGCA
C) He is cleared by the ATS authority

23. No of cabin crew is required according to

A) No. of passengers excluding crew members
B) No. of persons on board including crew members
C) No of seats

24. Succession of command is given:

A) In Operation manual
B) by Operator
C) by DGCA

25. An international flight from India can take off:

A) from any aerodrome in India.
B) from any major aerodrome in India.
C) from any custom aerodrome only.

26. PIC of an aeroplane shall

A) Be responsible for safe conduct of navigation
B) Be responsible for safe conduct of flight at all times
C) All above is correct

27. An a/c with seating capacity of 150, what is the number of flight attendants required to be carried on the flight:

A) 2
B) 3
C) 4

28. Every member of the Flight Crew shall get his log book certified for correctness by the competent authority;

A) At the end of each calendar month
B) At the end of every quarter
C) At an half yearly interval ending Jun and Dec.

29. If a passenger falls sick on board an a/c and he is suspected of any infectious disease then PIC's action is:

A) To land immediately.
B) To inform health officer of destination aerodrome at least two hrs before landing.
C) To inform DGCA.

30. The incubation period of relapsing fever is______ days:

A) 6
B) 7
C) 8

31. Incubation period of yellow fever is _______ days:

A) 6
B) 7
C) 8

32. No authorized person must be present within ______ mts of a/c while refueling is on

A) 15
B) 30
C) 50

33. Pilots log book is to be preserved for

A) 5 years from the date of starting the log book
B) 5 years from the date of last entry
C) 3 yrs from the date of last entry

34. Medical for a CPL holder is valid for

A) 2 years
B) 1 year
C) 1 year if age is less than 40 years

35. Operational Manual is:

A) Prepared by the operator and authorized by the DGCA
B) Prepared by the DGCA and authorized by operator
C) Prepared by the operator and authorized by manufacturer

ANSWERS

1	2	3	4	5	6	7	8	9	10	11	12	13	14
B	B	C	C	A	A	B	C	B	B	B	B	A	A

15	16	17	18	19	20	21	22	23	24	25	26	27	28
C	C	B	C	C	C	A	B	C	A	C	C	C	B

29	30	31	32	33	34	35
B	C	A	A	B	C	A

15

PERSONNEL LICENSING

(Annex 1, Aircraft Rules,1937)

Introduction: Standards and Recommended Practices for the licensing of flight crew members (pilots, flight engineers and flight navigators), air traffic controllers, aeronautical station operators, maintenance technicians and flight dispatchers, are provided by Annex 1 to the Convention on International Civil Aviation. Related training manuals provide guidance to States for the scope and depth of training curricula which will ensure that the confidence in safe air navigation, as intended by the Convention and Annex 1, is maintained. These training manuals also provide guidance for the training of other aviation personnel such as aerodrome emergency crews, flight operations officers, radio operators and individuals involved in other related disciplines. The medical standards of the Annex, in requiring periodic health examinations, serve as an early warning for possible incapacitating medical conditions and contribute to the general health of flight crews and controllers.

NATIONAL PROVISIONS

Licensing Authority:

The authority by which the licences and ratings may be granted, renewed or varied shall be the Central Government, which may withhold the grant or renewal of a licence or a rating, if for any reason it considers it desirable to do so.

Educational Qualification:

(a) The minimum educational qualification for the following licences shall be a pass in Class Ten from a recognised Board or its equivalent examination:

Student Pilot's Licence (Aeroplanes/Helicopters/Gliders/Balloons and Microlight aircraft); Private Pilot's Licence (Aeroplanes); Private Pilot's Licence (helicopters); Pilot's Licence (Gliders/Balloons/Microlight aircraft); Flight Radio Telephone Operator's Licence.

(b) The minimum educational qualification for the following licences shall be a pass in class Ten plus Two, with Physics and Mathematics, from a recognised Board/ university or its equivalent examination :

Commercial Pilot's Licence (Aeroplanes); Commercial Pilot's Licence (Helicopters); Airline Transport Pilot's Licence (Aeroplanes); Airline Transport Pilot's Licence (Helicopters); Student Navigator's Licence; Flight Navigator's Licence; Student Flight Engineer's Licence; Flight Engineer's Licence and Flight Radio Telephone Operator's Licence.

Cross-country flight:

(a) A cross-country flight unless otherwise stated, means a flight to a point beyond a radius of one hundred nautical miles from the aerodrome of departure whether over land or sea.

(b) A cross-country flight, for the purpose of PPL and Pilot Licence Microlight shall mean a flight to a point beyond a radius of fifty nautical miles from the aerodrome of departure.

Langauage Proficiency:

An applicant for the PPL, CPL, ATPL, Flt Navigator and Flt Engg licences shall have the ability to speak and understand the English language used for radiotelepohony communications to the level of proficiency specified by the Director General.

Validity of Medical Fitness:

Medical assessment is valid for 24 months for PPL, Pilot's Licence, all Student licences, Flt Engg Licence and FRTOL (Restricted).It is valid for 12 months for ATPL, CPL, Flt Nav Licence and FRTOL. Where ever 12 months validity is specified, it is reduced to six months after the age of 40 yrs for single crew commercial operations and after 60 yrs for multi crew commercial operations. In cases of PPL,Pilot licence,FRTO and Flt Engg licence, validity of medical will reduce to 12 months after attaining the age of 50 years.

DGCA will be informed and a fresh medical required for a sickness or injury involving incapacity for a period of fifteen days or more for the work for which he is licensed, or an injury sustained in any accident resulting in incapacity to perform duties.

Validity of Licences:

Licences are valid from the date of issue. Renewal will be done from the date of expiry provided the application is made with in one month of date of expiry.

PPL, Pilot Licence, FRTO and Flt Engg licence are valid for 10 years. All other licences are valid for 5 years.

The holder of a pilot's licence should inform the Authority of any illness which they are suffering which involves incapacity to undertake those functions to which the licence relates throughout a period of 15 days or more.

Minimum Age:

No person being under 16 years of age shall have sole control of an aircraft in motion and no person shall cause or permit any other person to have sole control of an aircraft in motion unless he knows or has reasonable cause to believe such other person to have attained the age of 16 years. Minimum age for SPL is 16 yrs, PPL 17 yrs, CPL 18 yrs and ATPL 21 yrs.

Maximum age limit for professional pilots. -

(1) No person, holding a pilot's licence having attained the age of sixty-five years, shall act as Pilot-in-Command or Co-pilot of an aircraft engaged in commercial air transport operations.

(2) No person holding a pilot's licence having attained the age of sixty years , shall act as Pilot-in-Command or Co-pilot of an arcraft engaged in commercial air transport operations unless it is operated in a multi-crew environment and the other pilot is less than sixty years of age. Provided that the provisions of sub-rule (2) shall not apply in respect of aircraft certified for single pilot operations and not exceeding an all up weight of 5700 kilograms engaged in commercial air transport operations within the territory of India and while operating in a multi-crew environment.

STUDENT PILOT'S LICENCE (AEROPLANES/HELICOPTERS/GLIDERS)

Knowledge —

He shall pass oral examination in Air Regulations, Air Navigation, Aviation Meteorology and Aircraft and Engines as per the syllabus prescribed by the Director-General unless he previously held a pilot's licence of a higher category, or is able to produce evidence in the manner prescribed by the Director-General that he is well-versed with the aforesaid subjects.

Security Clearance—

Security clearance for the Student Pilot/Pilot will be obtained from the concerned State Police authorities by the Flying Club/Government Flying Training School before the commencement of flying training and furnished to the Director-General.

Renewal—

The licence may be renewed for a period not exceeding twelve months from the date of fresh medical examination subject to the total validity of the licence not exceeding twenty four months from the date of issue.

Aircraft Rating—

The licence shall indicate the class and the types of aeroplanes or helicopters or gliders the holder is entitled to fly. Only those types of aircraft may be entered in the licence in respect of which the candidate has passed the examination in Aircraft and Engines.

Privileges—

The privileges of the holder of a Student Pilot's Licence shall be to fly within Indian territory only, as Pilot-in-Command of any aeroplane, helicopter or glider

entered in the aircraft rating of his licence :

Provided that :

(a) he shall fly at all times under the authority and supervision of a Flight Instructor or an Approved Examiner;

(b) he shall fly under Visual Flight Rules only ;

(c) he shall not carry passengers, animals and goods or fly for hire, reward or remuneration of any kind;

(d) he shall not undertake cross-country flights unless he has a minimum of ten hours of solo flight time and has passed the examinations in Air Navigation and Aviation Meteorology.

The Student Pilot's Licence shall be issued by a Flying Club/Government Flying Training School specifically authorised in this regard and subject to the conditions as laid down by the Director-General.

PRIVATE PILOT'S LICENCE (AEROPLANES)

Knowledge—

He shall pass a written examination in Air Regulations, Air Navigation, Aviation Meteorology and Aircraft and Engines as per the syllabus prescribed by the Director-General.

Provided that an applicant in possession of a valid Private Pilot's Licence (Helicopters) or a Commercial/Airline Transport Pilot's Licence (Helicopters) shall pass an examination in Aircraft and Engines only.

Experience—

He shall produce evidence of having satisfactorily completed as a pilot of an aeroplane not less than forty hours of flight time which shall include—

(i) not less than twenty hours of solo flight time;

(ii) not less than five hours of cross-country flight time in as the sole occupant of an aeroplane including a flight of not less than one hundred and fifty nautical miles in the course of which full stop landings at two different aerodromes shall have been made;

(iii) not less than ten hours of solo flight time completed within a period of twelve months immediately preceding the date of application for the issue of licence;

(iv) fifty percent of solo flying experience on microlight aircraft acquired during the preceding twenty four months from the date of application subject to a maximum of ten hours, may be credited towards the total experience required for the issue of the licence.

(v) fifty percent of solo gliding experience shall count towards total flying experience requirement subject to a maximum of ten hours towards total flight time.

Flying Training—

He shall have completed flying training in accordance with the syllabus prescribed by the Director-General.

Skill—

He shall have demonstrated his competency to perform as a Pilot-incommand or a Co-pilot of an aeroplane, the procedures and manoeuvres prescribed in the syllabus, to the satisfaction of an Examiner, on the type of aeroplane to which the application for the licence relates, within a period of six months immediately preceding the date of application.

Renewal—

The licence may be renewed on receipt of satisfactory evidence of the applicant:—

(a) having undergone a medical examination; and

(b) having satisfactorily completed not less than five hours of flight time as Pilot-incommand of an aeroplane within a period of twelve months immediately preceding the date of application for renewal or in lieu thereof, having satisfactorily completed the flying test within a period of six months immediately preceding the date of application.

Ratings—

(a) **Aircraft Rating—** The licence shall indicate the class and the types of aeroplanes the holder is entitled to fly. An open rating for all single piston engine types of aeroplanes having an all-up weight not exceeding one thousand five hundred Kgs. may also be granted if he has completed not less than two hundred and fifty hours as Pilot-in-command and has at least four different types of aeroplanes entered in the aircraft rating of his licence :

Provided that the privileges of the open rating shall be exercised only after having undergone a ground and flight familiarisation with a Flight Instructor or an approved Examiner for the type of aircraft and a certificate to this effect shall be recorded by the Flight Instructor/Examiner in the Pilot's Log Book before the Pilot is released to exercise the privileges of his open-rating.

(b) **Night Rating—** Night Rating entitles the holder of the licence to carry passengers at night. Conditions for the issue of this rating are detailed below:

(i) he must have completed not less than fifty hours of flight time as Pilot-incommand and as sole manipulator of the controls including not less than five hours by night, which must include a minimum of five take-offs and five landings carried out within the preceding six months of the date of application;

(ii) he must have completed a dual cross-country flight by night of at least one hundred nautical miles before he can be permitted to undertake sole cross country flights by night, and

(iii) he must have completed not less than five hours of dual instructions in

instrument flying which may include not more than two and a half hours on an approved synthetic flight trainer.

(c) **Instrument Rating—** Instrument rating entitles the holder of the licence to fly under the Instrument Flight Rules.

Extension of Aircraft Rating—

For extension of Aircraft Rating to include an additional type of aeroplane, an applicant shall be required to produce evidence of —

(a) having passed written examination in Aircraft and Engines ;

(b) having undergone adequate dual instructions and solo flying to gain competency on the type;

(c) having satisfactorily completed the flight test on the type within a period of six months immediately preceding date of application for the extension of Aircraft Rating.

Privileges—

The privileges of the holder of a Private Pilot's Licence shall be to act, but not for remuneration, as Pilot-oncommand or as Co-pilot of any aeroplane which is entered in the Aircraft Rating of his licence and carry passengers therein :

Provided that —

(i) no flight is undertaken for hire or remuneration of any kind, whatsoever;

(ii) the passengers are carried by night only when the holder of licence is in possession of a valid night rating and has carried out not less than five take-offs and five landings by night as Pilot-in-command within a period of six months immediately preceding the date of intended flight; and

(iii) no flight shall be undertaken under the Instrument Flight Rules without being in possession of a valid Instrument Rating.

COMMERCIAL PILOT'S LICENCE (AEROPLANES)

Knowledge—

He shall pass a written examination in Air Regulations, Air Navigation Meteorology and aircraft and Engines and Signals (practical) examination for interpretation of aural and visual signals, as per the syllabus prescribed by the Director-General.

Provided that the holder of a current Commercial Pilot's Licence (Helicopters) shall be required to pass an examination in Aircraft and Engines only.

Experience—

He shall produce evidence of having satisfactorily completed as a pilot of an aeroplane on the date of application for licence not less than two hundred hours of flight time, which shall include—

(i) not less than one hundred hours of flight time as Pilot-in-Command of which not less than fifteen hours shall have been completed within a period of six months immediately preceding the date of application for licence;

(ii) not less than twenty hours of cross-country flight time as Pilot-in-Command including a cross-country flight of not less than three hundred nautical miles in the course of which full stop landings at two different aerodromes shall be made;

(iii) not less than ten hours of instrument time of which not more than five hours may be on an approved simulator; and

(iv) not less than five hours of flight time by night including a minimum of ten takeoffs and ten landings as Pilot-in-Command as (sole manipulator of controls) carried out within six months immediately precedings the date of application for licence.

Provided that in case of an applicant who is in possession of a Commercial Pilot's Licence (Helicopters/Airline Transport Pilot's Licence (Helicopters) and who has satisfactorily completed not less than 1000 hours of flight time as Pilot-in-Command of a helicopter, the above experience requirement of two hundred hours as pilot of an aeroplane shall be reduced to one hundred hours, which shall include –

(i) Not less than seventy five hours of flight time as pilot-in-command including a minimum of twenty five hours of cross country flight time and ten hours of instrument time of which not less than five hours may be on approved simulator;

(ii) Not less than five hours of flight time by night including ten takeoffs and landing patterns; and

(iii) Not less than ten hours of flight time on aeroplane within a period of six months immediately preceding the date of application for issue of licence.

Flying Training—

He shall have completed the flying training in accordance with the syllabus prescribed by the Director-General.

Other Requirements—

He shall be in possession of a current Flight Radio Telephone Operator's Licence for operation of radio telephone apparatus on board an aircraft issued by the Director-General.

Skill—

He shall have demonstrated his competency to perform the procedures and manoeuvres prescribed in the syllabus to the satisfaction of an examiner, on the type of aeroplane to which the application for licence relates, within a period of six months immediately preceding the date of application. The Director General may, however, allow Skill Test or part thereof to be carried out on aircraft/ approved Zero Flight Time Training simulator level 'D' for the type of aircraft. The competency shall be demonstrated as in —

(i) general flying test by day;

(ii) general flying test by night;

(iii) a cross-country flight test by day consisting of a flight of not less than two hundred fifty nautical miles in the course of which at least one full stop landing at an aerodrome other than the aerodrome of departure shall be made; and

(iv) a cross-country flying test by night consisting of a flight of not less than one hundred twenty nautical miles returning to the place of departure without landing elsewhere.

Renewal—

The licence may be renewed on receipt of satisfactory evidence of the applicant—

(a) having undergone a medical examination;

(b) having satisfactorily completed not less than ten hours of flight time as Pilot-in Command (Fifty percent of flight time as Co-Pilot may be counted towards the requirement of flight time as Pilot-in-Command) within a period of six months immediately preceding the date of application for renewal; or in lieu thereof, having satisfactorily completed the general flying test by day and night within the same period;

(c) having a current Flight Radio Telephone Operator's Licence for operation of radio telephone apparatus on board an aircraft, issued by the Director-General.

Aircraft Rating—

(a) The licence shall indicate the types of aeroplane the holder is entitled to fly.

(b) An open rating for all single piston engine type of aeroplane having an all up weight not exceeding one thousand five hundred Kgs. may also be granted if he has completed not less than one thousand hours of flight time on such types of aeroplanes including not less than five hundred hours as Pilot-in-Command and has at least four different types of aircraft entered in the aircraft rating of his licence:

Provided that the privileges of the open rating shall be exercised only after having undergone a ground and flight familiarisation with a flight Instructor or an approved Examiner and a certificate to this effect shall be recorded by the Examiner in the pilot's log book, before the pilot is released to exercise the privileges of open rating on that type of aircraft.

(c) **Instructor's Rating—** Instructor's Rating entitles the holder to impart flying instructions.

(d) **Instrument Rating—** Instrument Rating entitles the holder to fly under Instrument Flight Rules.

Extension of Aircraft Rating—

For extension of aircraft rating to include an additional type of aeroplane, an applicant shall be required to produce evidence of –

(i) having passed a written examination in Aircraft and Engines and of having gained, under appropriate supervision, experience in flying the aircraft of such type or on approved flight simulator in respect of the following, namely:-

  (a) normal flight procedures and manoeuvres during all phases of flight;

  (b) abnormal and emergency procedures and manoeuvres in the event of failures and malfunctions of equipment, such as power plant, systems and airframe;

  (c) where applicable, instrument procedures, including instrument approach, missed approach and landing procedures under normal, abnormal and emergency conditions, including simulated engine failure;

  (d) procedures for crew incapacitation and crew coordination including allocation of pilot tasks crew cooperation and use of check lists; and

(ii) having satisfactorily completed the general flying tests by day and night in respect of the type of aircraft for which the extension of aircraft rating is desired. Such flying tests shall have been completed within a period of six months immediately preceding the date of the application for extension of the aircraft rating.

Proficiency Check—

(a) In order to act as a co-pilot of transport aeroplanes having an all-up weight exceeding five thousand seven hundred kilograms, the licence holder shall be required to undergo an appropriate proficiency check as specified by the Director-General, in respect of the type of aircraft to be flown.

(b) The proficiency check carried out shall be valid for a period of six months from the date of the check and shall be renewed for a further period of six months at a time.

(c) In the case of renewal, the period of validity shall commence from the date of expiry of the previous validity provided that the check has been carried out within two months preceding the date of expiry.

Privileges—

The privileges of the holder of a Commercial Pilot's Licence shall be :—

(a) to exercise all the privileges of Private Pilot's Licence;

(b) to act as Pilot-in-Command of any aeroplane having an all-up-weight not exceeding five thousand seven hundred Kgs. and which is entered in the aircraft rating of his licence provided that when passengers are to be carried at night, he shall have carried out within a period of six months immediately preceding the date of the intended flight not less than ten take-offs and ten landings by night as Pilot-in-Command:

(c) to act as Co-Pilot of any aeroplane where a Co-Pilot is required to be carried and which is entered in the aircraft rating of his licence : Provided that for all flights under the Instrument Flight Rules, either as Pilot-in- Command or as Co-Pilot, he shall have a current Instrument Rating:

Provided also that on attainment of the age of sixty-five years, such privileges shall be restricted to that of Private Pilot's Licence Aeroplanes).

COMMERCIAL PILOT'S LICENCE (AEROPLANES) WITH INSTRUMENT RATING

Knowledge –

He shall pass a written examination in Air Regulations, Air Navigation, Meteorology and Aircraft and Engines and Signals (practical) examination for interpretation of aural and visual signals, as per the syllabus prescribed by the Director-General:

Provided that the holder of a current Commercial Pilot's Licence (Helicopters) shall be required to pass an examination in Aircraft and Engines and Instrument Rating only.

Experience –

He shall produce evidence of having satisfactorily completed as a pilot of an aeroplane within a period of five years immediately preceding the date of application for licence not less than two hundred hours of flight time, which shall include –

(i) not less than hundred hours of flight time as Pilot-in-Command out of which not less than thirty hours flight time as Student Pilot-in-Command which shall include not more than twenty hours of cross country flight time and not more than ten hours circuits-landings with minimum ten landings;

(ii) not less than fifteen hours time as Pilot-in-Command flight time within a period of six months immediately preceding the date of application;

(iii) not less than fifty hours cross-country flight time as Pilot-in-Command including a cross-country flight of not less than three hundred nautical miles in the course of which full stop landings at two different aerodromes shall be made;

(iv) not less than fifty hours of instrument time of which not more than twenty hours may be on an approved simulator, out of which minimum of five hours of instrument time shall have been completed within a period of six months immediately preceding the date of application for the Instrument Rating; and

(v) not less tha five hours time by night including a minimum of ten take offs and ten landings as Pilot-in-Command (as sole manipulator of controls) carried out within six months immediately preceding the date of application for licence:

Provided that in case of an applicant who is in Possession of á Commercial Pilot's Licence (Helicopters) and who has satisfactorily completed not less than one thousand hours of flight time as Pilot-in-Command of a helicopter, the above experience requirement of two hundred hours as pilot of an airplane shall be reduced to hundred hours.

Note- The student-pilot-in- command flight time shall not be logged by instructor in his own log book. Student log book shall indicate student pilot-incommand flight time in remarks column as SPIC with the name of the instructor.

Flying Training –

He shall have completed the flying training in accordance with the syllabus prescribed by the Director-General.

Other Requirements –

He shall be in possession of a current Flight Radio Telephone Operator's Licence for operation of radio telephone apparatus on board an aircraft Issued by the Director-General.

Skill –

He shall have demonstrated his competency to perform the procedures and manoeuvres prescribed in the syllabus to the satisfaction of an examiner, on the type of aeroplane to which the application for licence relates, within a period of six months immediately preceding the date of application. The competency shall be demonstrated in –

(i) general flying test by day;

(ii) general flying test by night;

(iii) a cross-country flight test by day consisting of a flight of not less than two hundred fifty nautical miles in the course of which at least one full stop landing at an aerodrome other than the aerodrome of departure shall be made;

(iv) a cross-country flying test by night consisting of a flight of not less than one hundred twenty nautical miles returning to the place of departure without landing elsewhere; and

(v) ability to fly an aeroplane is respect of which Instrument Rating is desired, solely with the aid of instruments by undergoing an instrument flying test within a period of six months immediately preceding the date of application for the rating. The flying test shall be carried out in accordance with the syllabus prescribed by the Director-General. The Director-General may, however, allow such tests or part thereof to be carried out on an approved simulator for the type of aircraft.

Renewal –

The licence may be renewed on receipt of satisfactory evidence of the applicant.

(a) having undergone a medical examination

(b) having satisfactorily completed not less than ten hours of flight time as Pilot-in-Command (Fifty percent of flight time as Co-Pilot may be counted towards the requirement of flight time as Pilot-in-Command) within a period of six months immediately preceding the date of application for renewal, or in lieu thereof, having satisfactorily completed the general flying test by day and night within the same period; and

(c) having a current Flight Radio Telephone Operator's Licence for operation of radio telephone apparatus on board an aircraft, issued by the Director-General.

Rating –

(a) The licence shall indicate the types of aeroplane the holder is entitled to fly.

(b) **Open Rating -** An open rating for all single piston engine type of aeroplanes having an all-up-weight not exceeding one thousand five hundered Kgs. may also be granted if he has completed not less than one thousand hours of flight time on such types of aeroplanes including not less than five hundred hours as Pilot-in-Command and has at least four different types of aircraft entered in the aircraft rating of his licence:

Provided that the privileges of the open rating shall be exercised only after having undergone a ground and flight familiarization with a flight Instructor or an approved Examiner and a certificate to this effect shall be recorded by the Examiner in the pilot's log book, before the pilot is released to exercise the privileges of open rating on that type of aircraft.

(c) **Instructor's Rating –** Instructor's Rating entitles the holder to impart flying instructions.

(d) **Instrument Rating—** No separate Instrument Rating is provided in the licence. The privileges of instrument rating are included in the privileges of this licence provided that the instrument rating flying tests have been carried out as per the conditions laid down by the Director-General.

Extension of Aircraft Rating –

For extension of aircraft rating to include an additional type of aeroplane, an applicant shall be required to produce evidence of -

(i) having passed a written examination in Aircraft and Engines as mentioned in para 1(d) and of having gained, under appropriate supervision, experience in flying the aircraft of such type or on approved flight simulator in respect of the following, namely:-

- (a) normal flight procedures and manoeuvres during all phases of flight;
- (b) abnormal and emergency procedures and manoeuvers in the event of failures and malfunctions of equipment, such as power plant, systems and airframe;

(c) where applicable, instrument procedures, including instrument approach, missed approach and landing procedures under normal, abnormal and emergency conditions, including simulated engine failure;

(d) procedures for crew incapacitation and crew coordination including allocation of pilot task, crew cooperation and use of check lists; and

(ii) having satisfactorily completed the general flying tests by day and night in accordance with para 1(h) in respect of the type of aircraft for which the extension of aircraft rating is desired. Such flying tests shall have been completed within a period of six months immediately preceding the date of application for extension of the aircraft rating.

Proficiency Check—

(a) In order to act as a co-pilot of transport aeroplanes having an all-up weight exceeding five thousand seven hundred kilograms, the licence holder shall be required to undergo an appropriate proficiency check as specified by the Director-General, in respect of the type of aircraft to be flown.

(b) The proficiency check carried out shall be valid for a period of six months from the date of the check and shall be renewed for a further period of six months at a time.

(c) In the case of renewal, the period of validity shall commence from the date of expiry of the previous validity provided that the check has been carried out within two months preceding the date of expiry.

Privileges -

The privileges of the holder of a Commercial Pilot's Licence (Aeroplanes) shall be:

(a) to exercise all the privileges of Private Pilot's Licence (Aeroplanes);

(b) to act as Pilot-in-Command of any aeroplane having an all-upweight not exceeding five thousand seven hundred Kgs. And which is entered in the aircraft rating of his licence provided that when passengers are to be carried at night, he shall have carried out within a period of six months immediately preceding the date of the intended flight not less than ten take-offs and ten landings by night as Pilot-in-Command:

(c) to act as Co-Pilot of any aeroplane where a Co-pilot is required to be carried and which is entered in the aircraft rating of his licence:

Provided that for all flights under the Instrument Flight Rules, either as Pilot-in-Command or as Co-pilot, he shall have demonstrated his competency.

AIRLINE TRANSPORT PILOT'S LICENCE (AEROPLANES)

Knowledge—

He shall pass a written and oral examination in Air Regulations, Air Navigation, Avionics (Radio Aids and Instruments), Aviation Meteorology and Aircraft and Engines, and Signals (Practical) examination for interpretation of aural and visual signals as per the syllabus prescribed by the Director-General.

Note: — Holder of a current Commercial Pilot's Licence, shall not be required to pass the examination in Air Regulations and that of Senior Commercial Pilot's Licence shall not be required to pass any of the examinations.

Experience—

He shall produce evidence of having satisfactorily completed as a Pilot of an aeroplane not less than one thousand five hundred hours of flight time and his total flying experience shall include —

(i) not less than two hundred and fifty hours of flight time as Pilot-in-Command or as CoPilot performing, under the supervision of a pilot who fulfills the flying experience requirements of a check pilot, the duties and functions of a pilot-in-command provided that at least one hundred hours out of these shall be cross-country flight time, including not less than fifty hours of flight time by night.

Note— Where an aeroplane is required to be operated with a co-pilot in accordance with the provisions of the Flight Manual of the aeroplane, not more than fifty percent of the co-pilot flight time shall be credited towards the total flight time required for the issue of the licence, but not more than fifty percent of the co-pilot flight time under supervision shall be credited towards pilot-in-command flight experience required for issue of the licence, and full credit for such flight time shall be given towards total flight time required for issue of the licence.

(ii) not less than five hundred hours of total cross-country flight time;

(iii) not less than seventy five hours of flight time by night;

(iv) not less than one hundred hours of instrument time under actual or simulated instrument conditions of which not less than fifty hours shall be in actual flight;

(v) not less than twenty hours of flight time completed within a period of six months immediately preceding the date of application for the licence.

Other Requirements—

(i) He shall be the holder of a Commercial or a Senior Commercial Pilot's Licence. However, this will not be applicable for the issue of Airline Transport Pilot's Licence to a pilot from Armed Forces who otherwise meets the requirements;

(ii) He shall have a current Instrument Rating on multi-engine aircraft;

(iii) He shall be in possession of a current Flight Radio Telephone Operator's Licence for operation of radio telephone apparatus on board an aircraft issued by the Director-General.

Skill—

He shall have demonstrated his competency to perform by day and by night the procedures and manoeuvres prescribed in the syllabus to the satisfaction of the Examiner, on the type of multi-engine aeroplane to which the application for licence relates within a period of six months immediately preceding the date of application.

The Director General may, however, allow skill tests or part thereof to be carried out on aircraft/approved Zero flight Time Training simulator level 'D' for the type of aircraft.

Note :— The holder of a current Commercial Pilot's Licence (Aeroplanes)/Senior Commercial Pilot's Licence (Aeroplanes) issued by the Director-General shall not be required to undergo general flying tests for the issue of Airline Transport Pilot's Licence (Aeroplanes) provided that the licence is issued on the type or types of multi-engine aeroplane or aeroplanes, as the case may be, included in the aircraft rating of Commercial Pilot's Licence (Aeroplanes) or Senior Commercial Pilot's Licence (Aeroplanes) and the pilot possesses ten hours of flying experience as Pilot-in-Command or twenty hours as Copilot at least on one such multi-engine type within the preceding six months.

Renewal—

The Licence may be renewed on receipt of satisfactory evidence of the applicant—

(a) having undergone a medical examination.

(b) having satisfactorily completed not less than ten hours flight time as Pilot-in-Command (fifty percent of flight time as Co-Pilot may be counted towards the requirements of flight time as Pilot-in-Command) within a period of six months immediately preceding the date of application for renewal, or in lieu thereof ; having satisfactorily completed the flying tests by day and by night.

(c) having a current flight Radio Telephone Operator's Licence, for operation of radio telephone apparatus on board an aircraft, issued by the Director-General.

(d) having a current Instrument Rating on a multi-engine aircraft.

Ratings—

(a) **Aircraft Rating—** The licence shall indicate the class and the types of aeroplanes the holder is entitled to fly. An open rating for all types of aeroplanes having all-up-weight not exceeding five thousand seven hundred Kgs. may also be granted if he has completed not less than one thousand hours of flight time as a Pilot-in-Command on any aeroplane having an all-up-weight of fourteen thousand Kgs. or above.

(b) **Instructor's Rating—** Instructor's Rating entitles the holder to impart flying instructions.

(c) **Instrument Rating—** No separate Instrument Rating is provided in the licence. The privileges of instrument rating are included in the privileges of the licence provided that the instrument rating flying tests have been carried out as per the conditions laid down by the Director-General. Conditions for validity and renewal of instrument rating shall be as are laid down in Section O of this Schedule.

Extension of Aircraft Rating—

For extension of aircraft rating to include an additional type of aeroplane, an applicant shall be required to produce evidence of

(i) having passed a written examination in Aircraft and Engines and of having gained, under appropriate supervision, experience in flying the aircraft of such type or on approved flight simulator in respect of the following, namely:

  (a) normal flight procedures and manoeuvres during all phases of flight;

  (b) abnormal and emergency procedures and manoeuvres in the event of failures and malfunctions of equipment, such as power plant, systems and airframe;

  (c) where applicable, instrument procedures, including instrument approach, missed approach and landing procedures under normal, abnormal and emergency conditions, including simulated engine failure;

  (d) procedures for crew incapacitation and crew coordination including allocation of pilot tasks, crew cooperation and use of check lists; and

(ii) having satisfactorily completed the general flying tests by day and night in accordance with para 1(h) in respect of the type of aircraft for which the extension of aircraft rating is desired. Such flying tests shall have been completed within a period of six months immediately preceding the date of the application for extension of the aircraft rating.

Proficiency Check—

(a) In order to act as a pilot-in-command or co-pilot of transport aeroplanes having an all-up weight exceeding five thousand seven hundred kilograms, the licence holder shall be required to undergo an appropriate proficiency check as specified by the Director-General, in respect of the type of aircraft to be flown.

(b) The proficiency check carried out as per para (a) shall be valid for a period of six months from the date of the check and shall be renewed for a further period of six months at a time.

(c) In the case of renewal, the period of validity shall commence from the date of expiry of the previous validity provided that the check has been carried out within two months preceding the date of expiry.

Privileges—

The privileges of the holder of an Airline Transport Pilot's Licence shall be :—

(a) to exercise the privileges of a private, a Commercial and a Senior Commercial Pilot's Licence;

(b) to act as Pilot-in-Command or as Co-Pilot of any aeroplane where a Co-Pilot is required to be carried and which is entered in the aircraft rating of his licence :

Provided that he shall not act as Pilot-in-Command of an aeroplane having a all-upweight exceeding five thousand seven hundred Kgs. unless he has completed on that type of aeroplane not less than one hundred hours of flight time as a Co-Pilot, followed by ten consecutive satisfactory route checks of which not less than five shall be by night under the supervision of a Check Pilot, performing the duties and functions of a Pilot-in-command and has demonstrated his competency to fly as a Pilot-in-Command to the satisfaction of the Director-General.

Provided also that for all IFR flights as Pilot-in-Command or as Co-pilot, he shall be required to have current Instrument Rating.

Provided also that on attainment of the age of sixty-five years, such privileges shall be restricted to that of Private Pilot's Licence (Aeroplanes).

INSTRUMENT RATING (AEROPLANES)

Knowledge—

He shall pass a written and oral examination in Air Regulations, Air Navigation, Aviation Meteorology and Instrument Rating as per syllabus prescribed by the Director-General for issue of Commercial Pilot's Licence. He shall also pass a practical test on interpretation of aural and visual signals as per the syllabus prescribed by the Director-General.

Experience—

He shall produce evidence of having satisfactorily completed as a pilot of an aeroplane—

(i) not less than one hundred hours of flight time as a Pilot-in-Command including not less than fifty hours of cross-country flight time;

(ii) not less than forty hours of instrument time of which not more than twenty hours shall be instrument ground time. A minimum of five hours of instrument time shall have been completed within a period of six months immediately preceding the date of application for the Instrument Rating :

Provided that in the case a pilot who holds a current Instrument Rating (Helicopters), he shall have not less than one hundred hours of flight time as Pilot-in-Command of an aeroplane including not less than twenty five hours of cross country flight time and not less than twenty hours of instrument time of which not more than ten hours may be on an approved simulator.

Other Requirements —

He shall be :

(i) holder of a current Pilot's Licence (Aeroplanes);

(ii) holder of a current Flight Radio Telephone Operator's Licence for operation of

radio telephone apparatus on board an aircraft issued by the Director-General.

Flying Training—

He shall have completed the flying training in accordance with the syllabus as prescribed by the Director-General.

Skill—

He shall have demonstrated to the satisfaction of the Examiner his competency to fly an aeroplane in respect of which Instrument Rating is desired, solely with the aid of instruments by undergoing an instrument flying test within a period of six months immediately preceding the date of application for the rating. The flying test shall be carried out in accordance with the syllabus as prescribed by the Director-General. The Director General may, however, allow such tests or part thereof to be carried out on an approved simulator for the type of aircraft.

Validity—

(a) The rating shall be valid for a period of twelve months from the date of the instrument rating flying test.

(b) It shall be renewed for a further period of twelve months at a time from the date of expiry provided that the instrument rating flying test has been carried out within two months preceding the date of expiry and all other requirements for renewal are met.

(c) In other cases, the validity of renewal of the rating shall commence from the date of the test.

Renewal—

The Instrument Rating may be renewed on receipt of satisfactory evidence of the applicant :

(a) having satisfactorily completed the Instrument Rating Flight Test

(b) having a valid Flight Radio Telephone Operator's Licence issued by the DirectorGeneral for operation of radio telephone apparatus on board an aircraft.

Extension of Instrument Rating—

For extension of Instrument Rating to include an additional type of aeroplane, an applicant shall be required to produce evidence of having satisfactorily completed the flight test in accordance with para 1(e) in respect of the type of aeroplane for which the extension of Instrument Rating is desired. The flight test shall have been completed within a period of six months immediately preceding the date of application for the extension of Instrument Rating.

Privileges—

Subject to the validity of the Instrument Rating, the privileges of the holder thereof shall be to fly under the Instrument Flight Rules, the types of aeroplanes on which he has demonstrated his competency. Provided that a pilot, who has demonstrated his competency by undergoing an Instrument Rating Flight test on a single-engine aeroplane not exceeding an all-up-weight of five thousand seven hundred Kgs., shall exercise the privileges of his Instrument Rating on all single engine aeroplanes within the aforesaid weight category:

Provided further that a pilot, who has demonstrated his competency by undergoing an Instrument Rating Flight test on a Multi-engine aeroplane not exceeding an all-up-weight of five thousand seven hundred Kgs., shall exercise the privileges of his Instrument Rating on all multiengine aeroplanes within the aforesaid weight category. Notwithstanding anything said here-in-before, the holder of an Instrument Rating on any transport aeroplane, shall exercise his privileges only on the type of aeroplane on which the Instrument Rating Flight test has been satisfactorily carried out;

Provided further that the holder of an Instrument Rating on aeroplanes having an all-upweight exceeding five thousand seven hundred Kgs. shall exercise the privileges of his Instrument Rating only on the type of aeroplane on which the Instrument Rating Flight test has been satisfactorily carried out.

Provided also that, notwithstanding anything said herein before, the holder of an Instrument Rating on any multi-engine aeroplane may exercise the privileges of Instrument Rating on any single engine aeroplane entered in the aircraft rating of his licence.

QUESTIONS

1. **An applicant for an Airline Transport Pilot Licence shall have completed in aeroplanes not less than:**
   A) 100 hours of instrument time, of which not more than 50 hours may be instrument ground time
   B) 150 hours of instrument time, of which not more than 75 hours may be instrument ground time
   C) 100 hours of instrument time, of which not more than 30 hours may be instrument ground time

2. **The holder of a pilot's licence should inform the Authority of any illness which they are suffering which involves incapacity to undertake those functions to which the licence relates throughout a period of a certain number of days or more. The number of days is:**
   A) 15
   B) 20
   C) 30

3. **The International Civil Aviation Convention Annex containing standards and recommended practices for Personnel Licensing is:**
   A) Annex 1
   B) Annex 2
   C) Annex 11

4. **The holder of a commercial pilot licence, when acting as copilot of an aircraft required to be operated with a copilot, shall be entitled to be credit with not more than:**
   A) 40% of the copilot flight time towards the total flight time required for a higher grade of a pilot licence
   B) 50% of the copilot flight time towards the total flight time required for renewal of a commercial pilot licence
   C) 100 hours of flying time required for a higher grade of a pilot licence

5. **The minimum age of obtaining a PPL is:**
   A) 18 years
   B) 17 years
   C) 21 years

6. **The privileges of the holder of a Commercial Pilot Licence-aeroplane shall be:**
   A) to act as pilot-in-command in any aeroplane engaged in commercial air transportation
   B) to act as pilot-in-command in any aeroplane certificate for single pilot operation other than in commercial air transportation
   C) to act as Pilot-in-Command of any aeroplane having an all-up-weight not exceeding five thousand seven hundred Kgs. and which is entered in the aircraft rating of his licence

7. **The duration of the period of currency of a medical assessment shall begin on the date:**
   A) the license is issued or renewed
   B) reckoned from the date of medical examination
   C) the license is delivered to the pilot

8. **Type ratings shall be established**
   A) for any type of aircraft whenever considered necessary by the authority
   B) all the answers are correct
   C) only aircraft certificated for operation with a minimum crew of at least two pilots

9. **The holder of a commercial pilot licence when as Co-Pilot performing under the supervision of a pilot who fulfills the flying experience requirements of a check pilot, the duties and functions of a pilot-in-command shall be entitled to be credited:**
   A) in full with his flight time but not more than 300 hours towards the total time required for a higher grade of pilot licence
   B) 50% of the flight time towards the total time required for higher grade of pilot licence in accordance with the requirements of the licensing authority
   C) in full with his flight time towards the total time required for higher grade of pilot licence

10. **An applicant holding a private or commercial pilot license aeroplane for the issue of an instrument rating, shall have completed....hours of cross-country flight time as pilot-in-command of aircraft in categories acceptable to the licensing Authority**
    A) 20 hours
    B) 40 hours
    C) 50 hours

11. **An applicant for an Airline Transport Pilot Licence shall have completed in aeroplanes not less than:**
    A) 75 hours of night flight as pilot-in-command or as copilot
    B) 100 hours of night flight as pilot-in-command or as copilot
    C) 100 hours of night flight only as pilot-in-command

12. **For Commercial Pilot Licence aeroplane the applicant shall have completed in aeroplanes not less than..... if the privileges of the licence are to be expected at:**
    A) 5 hours of night flight time including 3 take-offs and 3 landings as pilot-in-command
    B) 5 hours of night flight time including 5 take-offs and 5 landings as pilot-in-command
    C) 5 hours of night flight time including 10 take-offs and 10 landings as pilot-in-command

13. **An applicant for a Commercial Pilot License aeroplane shall have completed in aeroplanes not less than:**
    A) 150 hours of flight time and 100 hours as pilot-in-command
    B) 200 hours of flight time and 70 hours as pilot-in-command
    C) 200 hours of flight time and 100 hours as pilot-in-command

14. **An applicant for a Commercial Pilot Licence shall have completed in aeroplanes not less than:**
    A) 20 hours of instrument instruction time of which not more than 10 hours may be instrument ground time
    B) 20 hours of instrument instruction time of which not more than 5 hours may be instrument ground time
    C) not less than ten hours of instrument time of which not more than five hours may be on an approved simulator

15. **When the holders of aircraft transport pilot licenses aeroplane and helicopter have passed their 40th birthday the medical examination shall be reduced to:**
    A) 6 months for single crew commercial operations
    B) 6 months for all commercial operations
    C) 6 months for all operations

16. **The applicant to exercise the functions of an Instrumental Flight Rating in ____aeroplanes shall prove, according to ANNEX 1, PERSONNEL LICENSING, his/her capability to pilot such aircraft only by instrumental rules and an engine____.**
    A) Multi-engine/ inoperative or simulated inoperative
    B) Land/ inactive
    C) Amphibious/ inactive or simulated inactive

17. The applicant for an Airline Transport Pilot License shall have completed in aeroplanes not less than ....hours of cross-country flight time, including not less than .... hours of flight time by night as Pilot-in-Command or as Co-Pilot performing, under the supervision of a pilot who fulfills the flying experience requirements of a check pilot, the duties and functions of a pilot-in-command.

A) 200 hours and 50 hours
B) 250 hours and 50 hours
C) 200 hours and 75 hours

18. An applicant for a Commercial Pilot Licence-aeroplane shall have completed not less than....hours of cross country flight time as pilot-in-command including a cross country flight totaling not less than.... km(....NM), in the course of which full stop landings at two different aerodromes shall be made. The hours and distance referred are:

A) 15 hours and 540km (300NM)
B) 20 hours and 540km (300NM)
C) 10 hours and 270km (150NM)

19. An applicant for a Commercial Pilot Licence shall hold a current

A) class 1 medical assessment
B) class 3 medical assessment
C) class medical assessment as prescribed by the state issuing the licence

20. The age of an applicant for a Commercial Pilot Licence shall not be less than:

A) 17 years of age
B) 18 years of age
C) 16 years of age

21. To be able to execute a public transport flight, the minimum and maximum age (with ATPL) is:

A) 21 and 65 years
B) 16 and 60 years
C) 18 and 60 years

22. Which of the following Annexes to the Chicago convention contains minimum specifications for a crew licence to have international validity?

A) Annex 1
B) Annex 3
C) Annex 4

23. An applicant for the---------licences shall have the ability to speak and understand the English language used for radiotelepohony communications to the level of proficiency specified by the Director General.

A) PPL, CPL, ATPL, Flt Navigator and Flt Engg
B) PPL, CPL, ATPL only
C) PPL only

24. The privileges of the holder of a Private Pilot's Licence shall be to act as

A) Pilot-in-command or as Co-pilot of any aeroplane provided no passengers are carried
B) Pilot-in -command or as Co-pilot of any aeroplane and carry passengers therein with out remunerations
C) Pilot-in -command or as Co-pilot of any aeroplane employed on aerial work for remuneration

25. If the age of a CPL holder flying a single pilot helicopter for charters is more than 40 years the validity of medical is for_________.

A) 6 months.
B) 12 months.
C) 12 months if he is not carrying VIPs.

ANSWERS

1	2	3	4	5	6	7	8	9	10	11
A	A	A	B	B	C	B	A	C	C	B

12	13	14	15	16	17	18	19	20	21	22
C	C	C	B	A	A	B	A	B	A	A

23	24	25
A	B	A

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AIRWORTHINESS OF AIRCRAFT

(Annex 8, Rules of the Air,1937)

Introduction: In the interest of safety, an aircraft must be designed, constructed and operated in compliance with the appropriate airworthiness requirements of the State of Registry of the aircraft. Consequently, the aircraft is issued with a Certificate of Airworthiness declaring that the aircraft is fit to fly.

Compatibility: Standards of Annex 6, Part I dealing with aeroplane performance operating limitations contains Standards that are complementary to the airworthiness Standards of Annex 8. Both state broad objectives, Annex 8 deals airworthiness from engeneering point of view whereas Annex 6 covers the subject from operational and safety point of view.

International Obligations: The Council has urged Contracting States not to impose on visiting aeroplanes operational requirements other than those established by the State of Registry, provided those requirements are not lower than the Standards of Annex 6, Part I.

To facilitate the import and export of aircraft, as well as the exchange of aircraft for lease, charter or interchange, and to facilitate operations of aircraft in international air navigation, ICAO places the burden on the State of Registry to recognize and render valid an airworthiness certificate issued by another Contracting State, subject to the condition that the airworthiness requirements under which such a certificate is issued or rendered valid are equal to or above the minimum standards which may be established by ICAO from time to time.

It is recognized that ICAO Standards would not replace national regulations and that national codes of airworthiness containing the full scope and extent of detail considered necessary by individual States would be required as the basis for the certification of individual aircraft. Each State is free to develop its own comprehensive and detailed code of airworthiness or to select, adopt or accept a comprehensive and detailed code established by another Contracting State.

Annex 8 includes broad standards which define, for application by the national airworthiness authorities, the minimum basis for the recognition by States of Certificates

of Airworthiness for the purpose of flight of aircraft of other States into and over their territories, thereby achieving, among other things, protection of other aircraft, third parties and property. The level of airworthiness required to be maintained by a national code is indicated by the broad standards of Annex 8 supplemented, where necessary, by guidance material provided in ICAO's Airworthiness Technical Manual (Doc 9760).

Type Certificate. The State of Design, upon receipt of satisfactory evidence that the aircraft type (or engine type or propeller type, if certificated separately) is in compliance with the design aspects of the appropriate airworthiness requirements, shall issue a Type Certificate to define the type design and to signify its approval.

Applicability: The technical standards dealing with certification of aeroplanes are limited at present to multi-engined aeroplanes of over 5 700 kg maximum certificated takeoff mass. These standards include requirements related to performance, flying qualities, structural design and construction, engine and propeller design and installation, systems and equipment design and installation, and operating Annex 8 is divided into four parts. Part I includes definitions; Part II deals with procedures for certification and continuing airworthiness of aircraft; Part III includes technical requirements for the certification of new large aeroplane designs; Part IV deals with helicopters.

Special Security features: Following the recent events of high jacking and terrorist acts on board aircraft, special security features have been included in aircraft design to improve the protection of the aircraft. These include special features in aircraft systems, identification of a least-risk bomb location, and strengthening of the cockpit door, ceilings and floors of the cabin crew compartment.

NATIONAL PROVISIONS

Issue of Certificate of airworthiness or Special Certificate of Airworthiness and Airworthiness Review Certificate.

The owner or operator of an aircraft may apply to the Director General for the issue of a certificate of airworthiness or a special certificate of airworthiness in respect of the aircraft or for the validation of a certificate of airworthiness issued elsewhere in respect of the aircraft.

The Director-General may issue a certificate of airworthiness or special certificate of airworthiness in respect of an aircraft when—

(a) the applicant furnishes such documents or other evidence relating to the airworthiness of the aircraft as may be specified by the Director-General; and

(b) the Director-General is satisfied that it is airworthy or in a condition for safe operation.

Modification and repairs.

A person shall not carry out any modification or repair affecting safety of any aircraft in respect of which there is a valid certificate of airworthiness unless he has been required to do so in pursuance of these rules or unless he has obtained the prior approval of the Director-General.

Suspension or cancellation of certificate of airworthiness or special certificate of airworthiness and its continued validity.

The certificate of airworthiness or special certificate of airworthiness of an aircraft shall be deemed to be suspended when an aircraft-

(a) ceases or fails to conform with the requirement of these rules, in respect of operation, maintenance, modification, repair, replacement, overhaul, process or inspection, applicable to that aircraft; or

(b) is modified or repaired other wise than in accordance with the provisions of these rules; or

(c) suffers major damage; or

(d) develops a major defect which would affect the safety of the aircraft or its occupants in subsequent flights.

If, at any time, the Director-General is satisfied that reasonable doubt exists as to the safety of an aircraft or as to the safety of the type to which that aircraft belongs, he may -

(a) suspend or cancel the certificate of airworthiness or special certificate of airworthiness in respect of the aircraft; or

(b) require the aircraft or an aircraft component or an item of equipment of that aircraft to undergo such modification, repair, replacement, overhaul, inspection including flight tests and examination under the supervision of an approved person as the Director-General may specify, as a condition of the certificate of airworthiness remaining in force.

(3) An aircraft shall not be flown during any period for which its certificate of airworthiness or special certificate of airworthiness is suspended or deemed to be suspended.

(4) Where the certificate of airworthiness or the special certificate of airworthiness of an aircraft is suspended or deemed to be suspended, the Director-General may, upon an application by the owner or operator, issue a special flight permit.

Flight Manual –

Where a flight manual is required to be kept in relation to an aircraft in accordance with provisions of these rules, the Director-General shall endorse the certificate of airworthiness of the aircraft accordingly.

Instruments and Equipment-

Every aircraft shall be fitted and equipped with the instrument and equipment including radio apparatus and special equipment as may be specified according to the use and circumstances under which the flight is to be conducted.

QUESTIONS

1. The continuing airworthiness of an aircraft, according to ICAO Annex 8, shall be determined by:

A) ICAO
B) The operator's state
C) The state of registry

2. According to ICAO Annex 8, a certificate of airworthiness shall be renewed or shall remain valid subject to the:

A) Laws of the state of registry and operation
B) Laws of the state of registry
C) Requirements laid down by ICAO

3. The technical standards dealing with certification of aeroplanes are at present limited to multi engine aircraft of:

A) Up to 5700Kg maximum certificated take-off and landing mass
B) Over 5700Kg maximum certificated take-off mass
C) Up to 5700Kg maximum certificated take-off mass

4. When an aircraft has sustained damage, the aircraft shall be allowed to resume its flight, if

A) The state of registry, the state of design and the state of manufacture consider that the aircraft is still airworthy
B) The state of manufacture informs the state of registry that the damage sustained is of a nature such that the aircraft is still airworthy
C) The state of registry considers that the damage sustained is of a nature such that the aircraft is still airworthy

5. Jet Airways flight is to take off from London to Bosnia. C of A will be as per the rules of:

A) UK
B) India
C) Bosnia

ANSWERS

1	2	3	4	5
C	B	B	C	B

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OPERATIONAL PROCEDURES

(ICAO ANNEX 6, CAR SECTION 2, AIRWORTHINESS SERIES 'X', PART VII, CAR SECTION 8 – AIRCRAFT OPERATIONS SERIES 'C' PART I AIRCRAFT OPERATIONS, SERIES 'O', PART II AIRCRAFT OPERATIONS SERIES 'O' PART III, SECTION 7 - FLIGHT CREW STANDARDS, TRAINING AND LICENSING SERIES 'J' FDTL, ETC.)

ICAO ANNEX 6, PARTS I, II AND III (AS APPLICABLE)

Applicability. The Standards and Recommended Practices contained in Annex 6, Part I, shall be applicable to the operation of aeroplanes by operators authorized to conduct international commercial air transport operations. A second part to Annex 6, dealing exclusively with international general aviation, became applicable in September 1969. A third part, dealing with all international helicopter operations, became applicable in November 1986.

GENERAL REQUIREMENTS

Quality System: An operator shall establish one quality system and designate one quality manager to monitor compliance with, and adequacy of, procedures required to ensure safe operational practices and airworthy aeroplanes. Compliance monitoring must include a feed-back system to the accountable manager to ensure corrective action as necessary.

Methods of Carriage of Persons

An operator shall take all reasonable measures to ensure that no person is in any part of an aeroplane in flight which is not a part designed for the accommodation of persons unless temporary access has been granted by the commander to any part of the aeroplane:

- For the purpose of taking action necessary for the safety of the aeroplane or of any person, animal or goods therein; or
- In which cargo or stores are carried, being a part which is designed to enable a person to have access thereto while the aeroplane is in flight.

Admission to Flight Deck

An operator must ensure that no person, other than a flight crew member assigned to a flight, is admitted to, or carried in, the flight deck unless that person is:

- An operating crew member;
- A representative of the Authority responsible for certification, licensing or inspection if this is required for the performance of his official duties; or
- Permitted by, and carried in accordance with instructions contained in the Operations Manual.

The final decision regarding the admission to the flight deck shall be the responsibility of the commander.

Unauthorized carriage. An operator shall take all reasonable measures to ensure that no person secretes himself or secretes cargo on board an aeroplane.

Portable electronic devices. An operator shall not permit any person to use, and take all reasonable measures to ensure that no person does use, on board an aeroplane, a portable electronic device that can adversely affect the performance of the aeroplane's systems and equipment.

Documents to be carried

No person in charge of any aircraft shall allow such aircraft to be flown unless the following valid documents, as applicable (in original or attested copies), are carried on board the aircraft:

- Certificate of Registration;
- Certificate of Airworthiness;
- Airworthiness Review Certificate (ARC);
- A document attesting Noise Certification of the aeroplane/ helicopter;
- Air Operator's Permit;
- Appropriate Licences for each member of the flight crew;
- Aeromobile Radio operation Licence for Radio Communication apparatus;
- Journey Log Book or equivalent documents approved by the DGCA;
- Operations Manual;
- Minimum Equipment List;
- Flight Manual;
- Cabin Crew Manual;

- Cockpit and Emergency Check List unless these form part of Flight Manual, carried on board; Checklists for take off, cruise and landing phases shall be displayed in the cockpit unless the lists form a part of the Flight Manual, carried on board.
- Aeroplane/ Helicopter search procedure checklist;
- Maintenance Release/Certificate to release to service;
- LOPA (Layout of Passenger Arrangement);
- Emergency and Safety Equipment Layout;
- Route guides;
- Current and suitable navigation charts/maps for the planned flight route and all other routes along which it is reasonable to expect that the flight may be diverted;
- Weight Schedule;
- Load and Trim Sheet;
- If carrying passengers, a list of their names and places of embarkation and destination;
- If carrying cargo, a manifest and detailed declarations of the cargo; and
- If carrying dangerous goods, a list of such goods. This list must be specifically brought to the notice of Pilot-in-Command, before the flight.

Note:— Checklists for take off, cruise and landing phases shall be displayed in the cockpit unless the lists form a part of the Flight Manual, carried on board.

All operators of passenger aircraft shall provide passenger safety information briefing card at every passenger seat location. Such card shall make use of symbology to convey the instructions in a clear and concise manner.

Information Retained on Ground

An operator shall ensure that:

At least for the duration of each flight or series of flights;

- Information relevant to the flight and appropriate for the type of operation is preserved on the ground; and
- The information is retained until it has been duplicated at the place at which it will be stored in accordance with rules or, if this is impracticable,
- The same information is carried in a fireproof container in the aeroplane.

Power to Inspect

An operator shall ensure that any person authorized by the Authority is permitted at any time to board and fly in any aeroplane operated in accordance with an AOC issued by that Authority and to enter and remain on the flight deck provided that the

commander may refuse access to the flight deck if, in his opinion, the safety of the aeroplane would thereby be endangered.

Leasing

A description of the operational arrangements for leasing, associated procedures and management responsibilities.

(a) Dry lease – Is when the aeroplane is operated under the AOC of the lessee.

(b) Wet lease – Is when the aeroplane is operated under the AOC of the lessor.

OPERATOR CERTIFICATION

Air operator Permit/ certificate (AOC):

A Permit /Certificate authorizing an operator to carry out specified commercial air transport operations.

State of the Operator:

The State in which the operator's principal place of business is located or, if there is no such place of business, the operator's permanent residence.

Contracting States shall recognize as valid an air operator certificate issued by another Contracting State, provided that the requirements under which the certificate was issued are at least equal to the applicable Standards specified in Annex 6.

Issue

The issuance of an air operator certificate (AOC) is "dependent upon the operator demonstrating" to the State that its organization, training policy and programmes, flight operations, ground handling and maintenance arrangements are adequate considering the nature and extent of the operations to be conducted. The certification process involves the State's evaluation of each operator and a determination that the operator is capable of conducting safe operations before initial issuance of an AOC or the addition of any subsequent authorizations to an AOC.

Validity of an AOC

The validity of an AOC shall depend upon the operator maintaining the original certification standards under the supervision of the State of the Operator. This supervision requires that a system of continued surveillance be established to ensure the required standards of operations are maintained.

OPERATIONAL REQUIREMENTS

Operational Benefit:

Aeroplanes equipped with automatic landing systems, a head-up displays (HUD) and/or or equivalent displays, enhanced vision systems (EVS), synthetic vision systems (SVS) and/or combined vision systems (CVS) or any combination of those systems into a hybrid system, the use of such systems to gain operational benefit for the safe operation of an aeroplane shall be approved by the State of the Operator.

Electronic flight bags (EFBs) :

An electronic information system, comprised of equipment and applications, for flight crew which allows for storing, updating, displaying and processing of EFB functions to support flight operations or duties.

Operational control and supervision

An operator shall:

- Establish and maintain a method of exercising operational control approved by the Authority; and
- Exercise operational control over any flight operated under the terms of his AOC.

Use of Air Traffic Services

An operator shall ensure that Air Traffic Services are used for all flights whenever available.

An aeroplane shall be provided with navigation equipment which will enable it to proceed:

- in accordance with its operational flight plan; and
- in accordance with the requirements of air traffic services

Instrument departure and approach procedures

- An operator shall ensure that instrument departure and approach procedures established by the State in which the aerodrome is located are used.
- A commander may accept an ATC clearance to deviate from a published departure or arrival route, provided obstacle clearance criteria are observed and full account is taken of the operating conditions. The final approach must be flown visually or in accordance with the established instrument approach procedure.

Carriage of Person with Reduced Mobility

No airline shall refuse to carry persons with disability or persons with reduced mobility and their assistive aids/devices, escorts and guide dogs including their presence in the cabin, provided such persons or their representatives, at the time of booking and /or check-in for travel, inform the airlines of their requirement.

Carriage of inadmissible passengers, deportees, or persons in custody

An operator shall establish procedures for the transportation of inadmissible passengers, deportees or persons in custody to ensure the safety of the aeroplane and its occupants. The commander must be notified when the above-mentioned persons are to be carried on board.

Stowage of Baggage and Cargo

The operator shall ensure that all baggage carried onto an aeroplane and taken into the passenger cabin is adequately and securely stowed.

- An operator shall establish procedures to ensure that only such hand baggage is taken into the passenger cabin as can be adequately and securely stowed.
- An operator shall establish procedures to ensure that all baggage and cargo on board, which might cause injury or damage, or obstruct aisles and exits if displaced, is placed in stowages designed to prevent movement.

Passengers Seating

An operator shall establish procedures to ensure that passengers are seated where, in the event that an emergency evacuation is required, they may best assist and not hinder evacuation from the aeroplane.

Security of passenger cabin and galley(s)

- An operator shall establish procedures to ensure that before taxying, take-off and landing all exits and escape paths are unobstructed.
- The commander shall ensure that before take-off and landing, and whenever deemed necessary in the interest of safety, all equipment and baggage is properly secured.

Smoking on Board

(a) The commander shall ensure that no person on board is allowed to smoke:

  - Whenever deemed necessary in the interest of safety;
  - While the aeroplane is on the ground unless specifically permitted in accordance with procedures defined in the Operations Manual;
  - Outside designated smoking areas, in the aisle(s) and in the toilet(s);
  - In cargo compartments and/or other areas where cargo is carried which is not stored in flame resistant containers or covered by flame resistant canvas; and
  - In those areas of the cabin where oxygen is being supplied.

Take-off Conditions

Before commencing take-off, a commander must satisfy himself that, according to the information available to him, the weather at the aerodrome and the condition of the runway intended to be used should not prevent a safe take-off and departure.

Application of take-off minima's

Before commencing take-off, a commander must satisfy himself that the RVR or visibility in the takeoff direction of the aeroplane is equal to or better than the applicable minimum.

Requirements for extended diversion time operations (EDTO).

EDTO may be referred to as ETOPS in some documents.

Unless the operation has been specifically approved by DGCA, an aeroplane with two or more turbine engines shall not be operated on a route where the diversion time to an en-route alternate aerodrome from any point on the route, calculated in ISA and still-air conditions at the one-engine-inoperative cruise speed for aeroplanes with two turbine engines and at the all engines operating cruise speed for aeroplanes with more than two turbine engines, exceeds a threshold time established for such operations by DGCA. When the diversion time exceeds the threshold time, the operation is considered to be an extended diversion time operation (EDTO).

RVSM

For flights in defined portions of airspace where, based on Regional Air Navigation Agreement, a reduced vertical separation minimum (RVSM) of 300 m (1 000 ft) is applied between FL 290 and FL 410 inclusive, an aeroplane:

a) shall be provided with equipment which is capable of:
- indicating to the flight crew the flight level being flown;
- automatically maintaining a selected flight level;
- providing an alert to the flight crew when a deviation occurs from the selected flight level. The threshold for the alert shall not exceed ± 90 m (300 ft); and
- automatically reporting pressure-altitude;

b) shall be authorized by DGCA for operation in the airspace concerned; and

c) shall demonstrate a vertical navigation performance in accordance with rules.

Note:— An RVSM approval is valid globally on the understanding that any operating procedures specific to a given region will be stated in the operations manual or appropriate crew guidance.

ALL-WEATHER OPERATIONS (AWO)

Low Visibility

Low Visibility Procedures (LVP). Procedures applied at an aerodrome for the purpose of ensuring safe operations during Category II and III approaches and Low Visibility Take-offs.

Low visibility take-off (LVTO). A term used in relation to flight operations referring to a take-off on a runway where the RVR is less than 400 m.

Low visibility operations – General operating rules

(a) An operator shall not conduct Category II or III operations unless:
- Each aeroplane concerned is certificated for operations with decision heights below 200 ft, or no decision height, and equiped in accordance with equipment accepted by the Authority;
- A suitable system for recording approach and/ or automatic landing success and failure is established and maintained to monitor the overall safety of the operation;
- The operations are approved by the Authority;

- The flight crew consists of at least 2 pilots; and
- Decision Height is determined by means of a radio altimeter.

(b) An operator shall not conduct low visibility take-offs in less than 400 m RVR unless approved by DGCA. Scheduled operators may be authorized LVTO minima of up to 125 m. This requires that a 90 m visual segment shall be available from the cockpit at the start of the take-off run. Non-scheduled and general aviation operators shall not conduct take-offs below 500 m RVR.

(c) An operator shall not conduct take-off with RVR/visibility less than standard Category I conditions of 550m RVR/800 m visibility unless low visibility procedures are enforced.

Low visibility operations – Training and Qualifications

An operator shall ensure that low visibility training and checking is conducted in accordance with a detailed syllabus approved by FSD, DGCA and included in the Operations Manual.

Low visibility operations – Operating Procedures

(a) An operator must establish procedures and instructions to be used for Low Visibility Take Off and Category II and III operations. These procedures must be included in the Operations Manual and contain the duties of flight crew members during taxying, take off, approach, flare, landing, rollout and missed approach as appropriate.

(b) The commander shall satisfy himself that:
- The status of the visual and non visual facilities is sufficient prior to commencing a Low Visibility Take Off or a Category II or III approach;
- Appropriate LVPs are in force according to information received from Air Traffic Services, before commencing a Low Visibility Takeoff or a Category II or III approach; and
- The flight crew members are properly qualified and trained prior to commencing a low visibility take-off (in an RVR of less than 400 m), Category II or III approach.
- Full thrust take off rating is to be used for LVTO. Supervised take off and landing is not permitted during CAT II/III operations or LVTO.

Low visibility Operations – Minimum Equipment

An operator must include in the Operations Manual the minimum equipment that has to be serviceable at the commencement of a Low Visibility Takeoff or a Category II or III approach in accordance with the AFM or other approved document. The following aircraft systems equipment listed as applicable/installed which are critical for LVTO Operations shall be fully serviceable; Windshield wipers (where fitted) for both PIC and Co-pilot, Window heat system for all heated cockpit windows, Anti-skid system and Thrust reversers for all engines.

Aerodrome Operating Minima's – Landing

To enable Scheduled, Non-scheduled and General Aviation Operators to operate safely at an aerodrome under limiting weather conditions, Aerodrome Operating Minima (AOM) are established. There are two sets of Aerodrome Operating Minima for application by Indian operators and at Indian aerodromes; Normal Aerodrome Operating Minima and Restricted Aerodrome Operating Minima.

Normal AOM is to be applied by scheduled and general aviation operators.

Restricted AOM consists of additives of height and visibility to the normal AOM.

Non-scheduled and general aviation operators fulfilling the specified conditions for normal AOM will be given approval for specific crew, aeroplane and type of approach operations.

Normal Aerodrome Operating Minima shall be calculated based on the latest information of airport facilities, procedures and OCAs. Operators shall ensure that only information promulgated by the Airports Authority of India (AAI) through the Aeronautical Information Service is used for calculation of AOM at civil and defence aerodromes.

Restricted Aerodrome Operating Minima shall be based on additives applied to the Normal AOM as below;

Restricted AOM = Normal AOM DA(H)/MDA (H) + 100 ft and normal AOM Visibility/RVR + 400 m .

Commencement and Continuation of Approach (Approach Ban Policy).

The PIC shall not commence an instrument approach if the reported RVR/Visibility is below the applicable minimum. If, after commencing an instrument approach, the reported RVR/Visibility falls below the applicable minimum, the approach shall not be continued:

(a) below 1 000 ft above the aerodrome; or

(b) into the final approach segment.

Where the RVR is not available, RVR values may be derived by converting the reported visibility.

If, after entering the final approach segment or descending below 1000 ft above the aerodrome elevation, the reported RVR/visibility falls below the applicable minimum, the approach may be continued to DA/H or MDA/H.

The approach may be continued below DA/H or MDA/H and the landing may be completed provided that the required visual reference is established at the DA/H or MDA/H and is maintained.

The touch-down zone RVR is always controlling. If reported and relevant, the mid-point and stop-end RVR are also controlling. The minimum RVR value for the mid-point is 125 m or the RVR required for the touch-down zone if less, and 50 m for

the stop-end. For aeroplanes equipped with a stop-end (roll-out) guidance or control system, the minimum RVR value for the mid-point is 50 m. Note: "Relevant", in this context, means that part of the runway used during the high speed phase of the landing down to a speed of approximately 60 knots.

VFR Operating Minima

An operator is to ensure that VFR flights are conducted in accordance with the visual flight rules and in VMC. Special VFR flights are not permitted for commercial air transport aeroplanes.

INSTRUMENT AND SAFETY EQUIPMENT REQUIREMENTS

Circuit Protection Devices

An operator shall not operate an aeroplane in which fuses are used unless there are spare fuses available for use in flight equal to at least 10% of the number of fuses of each rating or three of each rating whichever is the greater.

Windshield Wipers

An operator shall not operate an aeroplane with a maximum certificated take-off mass of more than 5,700 kg unless it is equipped at each pilot station with a windshield wiper or equivalent means to maintain a clear portion of the windshield during precipitation.

Airborne Weather Radar Equipment

Pressurised aeroplanes when carrying passengers, should be equipped with operative weather radar whenever such aeroplane are operated in areas where thunderstorms or other potentially hazardous weather conditions regarded as detectable with airborne weather radar may be expected to exist along the route either at night or under Instrument Meteorological Conditions.

Flight recorders.

Crash protected flight recorders comprise one or more of the following systems: a flight data recorder (FDR), a cockpit voice recorder (CVR), an airborne image recorder (AIR) and/or a data link recorder (DLR). Image and data link information may be recorded on either the CVR or the FDR. Lightweight flight recorders comprise one or more of the following systems: an aircraft data recording system (ADRS), a cockpit audio recording system (CARS), an airborne image recording system (AIRS) and/or a data link recording system (DLRS). Image and data link information may be recorded on either the CARS or the ADRS.

All aeroplanes of a maximum certificated take-off mass of over 15 000 kg which are required to be equipped with both a CVR and an FDR, shall be equipped with two combination recorders (FDR/CVR). One recorder shall be located as close to the cockpit as practicable and the other recorder located as far aft as practicable.

All FDRs shall be capable of retaining the information recorded during at least the last 25 hours of their operation.CVRs and Data link recorders shall be capable of retaining the information recorded during at least the last two hours of their operation.

Pressure Altitude:

All aeroplanes shall be equipped with a data source that provides pressure altitude information with a resolution of 7.62 m (25 ft), or better.

Microphones:

All flight crew members required to be on flight deck duty shall communicate through boom or throat microphones below the transition level/altitude.

Turbo-jet aeroplanes — forward-looking wind shear warning system and GPWS:

All turbo-jet aeroplanes of a maximum certificated take-off mass in excess of 5 700 kg or authorized to carry more than nine passengers should be equipped with a forward-looking wind shear warning system and a ground proximity warning system which has a forward looking terrain avoidance function.

ACAS II :

All turbine-engined aeroplanes of a maximum certificated take-off mass in excess of 5,700 kg or authorized to carry more than 19 passengers shall be equipped with an airborne collision avoidance system (ACAS II).

Security of the flight crew compartment:

All passenger-carrying aeroplanes of a maximum certificated take-off mass in excess of 45,500 kg or with a passenger seating capacity greater than 60 shall be equipped with an approved flight crew compartment door that is designed to resist penetration by small arms fire and grenade shrapnel, and to resist forcible intrusions by unauthorized persons. This door shall be capable of being locked and unlocked from either pilot's station.

First Aid Kits

One or more first-aid kits as per the following table is carried for the use of cabin crew in managing incidents of ill health.

Passengers	First Aid Kits
0-100	1
101-199	2
200-299	3
300 or more	4

Emergency Medical Kit

Medical supplies should comprise:

- For aeroplanes required to carry cabin crew as part of the operating crew, one universal precaution kit (two for aeroplanes authorized to carry more

than 250 passengers) for the use of cabin crew members in managing incidents of ill health associated with a case of suspected communicable disease, or in the case of illness involving contact with body fluids; and

- For aeroplanes authorized to carry more than 100 passengers, on a sector length of more than two hours, a medical kit, for the use of medical doctors or other qualified persons in treating in-flight medical emergencies.

Oxygen Supply

Note:— Approximate altitudes in the Standard Atmosphere corresponding to the values of absolute pressure used in the text are as follows:

Absolute Pressure	Metres	Feet
700 hPa	3 000	10 000
620 hPa	4 000	13 000
376 hPa	7 600	25 000

A flight to be operated at flight altitude at which the atmospheric pressure in personnel compartments will be less than 700hPa shall not be commenced unless sufficient stored breathing oxygen is carried to supply:

a) all crew members and 10% passengers for any period in excess of 30 minutes that the pressure in the compartment occupied by them will be between 700 hPa and 620 hPa; and

b) the crew and passengers for any period that the atmospheric pressure in compartments occupied by them will be less than 620 hPa.

A flight to be operated with a pressurised aeroplane shall not be commenced unless a sufficient quantity of stored breathing oxygen is carried to supply all the crew members and passengers as is appropriate to the circumstances of the flight being undertaken, in the event of loss of pressurisation, for any period that the atmospheric pressure in any compartment occupied by them would be less than 700 hPa. In addition, when an aeroplane is operated at flight altitudes at which the atmospheric pressure is less than 376 hPa, or which, if operated at flight altitudes at the atmospheric pressure is more than 376 hPa and cannot descend safely within four minutes to a flight altitude at which the atmospheric pressure is equal to 620 hPa, there shall be no less than a 10-minute supply for the occupants of the passenger compartment.

Pressurised aeroplanes which are intended to be operated at flight altitude at which the atmospheric pressure would be less than 376 hPa., shall be equipped with the device to provide positive warning to the flight crew of any dangerous loss of pressurisation.

Crew Protective Breathing Equipment

An operator shall not operate a pressurized aeroplane or, an unpressurised aeroplane with a maximum certificated take-off mass exceeding 5 700 kg or having a maximum approved seating configuration of more than 19 seats unless:

(1) It has equipment to protect the eyes, nose and mouth of each flight crew member while on flight deck duty and to provide oxygen for a period of not less than 15 minutes. The supply for Protective Breathing Equipment (PBE) may be provided by the supplemental oxygen required . In addition, when the flight crew is more than one and a cabin crew member is not carried, portable PBE must be carried to protect the eyes, nose and mouth of one member of the flight crew and to provide breathing gas for a period of not less than 15 minutes; and

(2) It has sufficient portable PBE to protect the eyes, nose and mouth of all required cabin crew members and to provide breathing gas for a period of not less than 15 minutes.

MINIMUM FUEL REQUIREMENTS

All Aeroplanes (except Helicopters)

The amount of usable fuel to be carried shall, as a minimum, be based on the following data:

Current aeroplane-specific data derived from a fuel consumption monitoring system, if available; or, if current aeroplane-specific data are not available, data provided by the aeroplane manufacturer; and the operating conditions for the planned flight including anticipated aeroplane mass; Notices to Airmen; current meteorological reports or a combination of current reports and forecasts; air traffic services procedures, restrictions and anticipated delays; and the effects of deferred maintenance items and/ or configuration deviations.

The pre-flight calculation of usable fuel required shall include:

a) **taxi fuel,** which shall be the amount of fuel expected to be consumed before take-off taking into account local conditions at the departure aerodrome and auxiliary power unit (APU) fuel consumption;

b) **trip fuel,** which shall be the amount of fuel required to enable the aeroplane to fly from take-off or the point of in-flight re-planning, until landing at the destination aerodrome taking into account the operating conditions.

c) **contingency fuel,** which shall be the amount of fuel required to compensate for unforeseen factors. It shall be 5 per cent of the planned trip fuel or of the fuel required from the point of in-flight re-planning based on the consumption rate used to plan the trip fuel but, in any case, shall not be lower than the amount required to fly for five minutes at holding speed at 450 m (1 500 ft) above the destination aerodrome in standard conditions;

Note. -- Unforeseen factors are those which could have an influence on the fuel consumption to the destination aerodrome, such as deviations of an individual aeroplane from the

expected fuel consumption data, deviations from forecast meteorological conditions, extended delays and deviations from planned routings and/or cruising levels.

d) **destination alternate fuel,** which shall be:

1) where a **destination alternate aerodrome is required,** the amount of fuel required to enable the aeroplane to:

i) perform a missed approach at the destination aerodrome;

ii) climb to the expected cruising altitude;

iii) fly the expected routing;

iv) descend to the point where the expected approach is initiated; and

v) conduct the approach and landing at the destination alternate aerodrome; or

2) where **two destination alternate aerodromes are required,** the amount of fuel, as calculated, required to enable the aeroplane to proceed to the destination alternate aerodrome which requires the greater amount of alternate fuel; or

3) where a flight is operated **without a destination alternate aerodrome,** the amount of fuel required to enable the aeroplane to fly for 15 minutes at holding speed at 450 m (1 500 ft) above destination aerodrome elevation in standard conditions; or

4) where the aerodrome of intended landing is an **isolated aerodrome:**

vi) for a reciprocating engine aeroplane, the amount of fuel required to fly for 45 minutes plus 15 per cent of the flight time planned to be spent at cruising level, including final reserve fuel, or two hours, whichever is less; or

vii) for a turbine-engine aeroplane, the amount of fuel required to fly for two hours at normal cruise consumption above the destination aerodrome, including final reserve fuel;

e) **final reserve fuel,** which shall be the amount of fuel calculated using the estimated mass on arrival at the destination alternate aerodrome, or the destination aerodrome when no destination alternate aerodrome is required:

5) for a **reciprocating engine aeroplane,** the amount of fuel required to fly for 45 minutes, under speed and altitude conditions specified by the State of the Operator; or

6) for a **turbine-engine aeroplane,** the amount of fuel required to fly for 30 minutes at holding speed at 450 m (1 500 ft) above aerodrome elevation in standard conditions;

f) **additional fuel,** which shall be the supplementary amount of fuel required if the minimum fuel calculated is not sufficient to:

7) allow the aeroplane to descend as necessary and proceed to an alternate aerodrome in the event of engine failure or loss of pressurization, whichever requires the greater amount of fuel based on the assumption that such a failure occurs at the most critical point along the route;

viii) fly for 15 minutes at holding speed at 450 m (1 500 ft) above aerodrome elevation in standard conditions; and

ix) make an approach and landing;

8) allow an aeroplane engaged in EDTO to comply with the EDTO critical fuel scenario as established by the State of the Operator;

Extended diversion time operations (EDTO).

Any operation by an aeroplane with two or more turbine engines where the diversion time to an en-route alternate aerodrome is greater than the threshold time established by the State of the Operator.

9) meet additional requirements not covered above;

g) **discretionary fuel,** which shall be the extra amount of fuel to be carried at the discretion of the pilot-in-command.

Hand Fire Extinguishers

Portable fire extinguishers provided shall be of a type which, when discharged, will not cause dangerous contamination of the air within the aeroplane. At least one shall be located in:

- the pilot's compartment; and
- each passenger compartment that is separate from the pilot's compartment and that is not readily accessible to the flight crew.

Any portable fire extinguisher so fitted in accordance with the Certificate of Airworthiness of the aeroplane may count as one prescribed.

Crash Axes and Crowbars

An operator shall not operate an aeroplane with a maximum certificated take-off mass exceeding 5 700 kg or having a maximum approved passenger seating configuration of more than 9 seats unless it is equipped with at least one crash axe or crowbar located on the flight deck. If the maximum approved passenger seating configuration is more than 200 an additional crash axe or crowbar must be carried and located in or near the most rearward galley area.

Marking of break-in points

Areas of the fuselage suitable for break-in by rescue crews in emergency are marked on an aeroplane. The colour of the markings shall be red or yellow, and if necessary they shall be outlined in white to contrast with the background.

Means for Emergency Evacuation

An operator shall, for each type of aeroplane, assign to all flight crew members the necessary functions they are to perform in an emergency or in a situation requiring emergency evacuation. Annual training in accomplishing these functions shall be contained in the operator's training programme and shall include instruction in the use of all emergency and lifesaving equipment required to be carried, and drills in the emergency evacuation of the aeroplane.

Megaphones

An operator shall not operate an aeroplane with a maximum approved passenger seating configuration of more than 60 and carrying one or more passengers unless it is equipped with portable battery-powered megaphones readily accessible for use by crew members during an emergency evacuation, to the following scales:

Passenger Seating Configuration	**Number of Megaphones Required**
61 to 99	1
100 or more	2

Emergency Lightings

An operator shall not operate a passenger carrying aeroplane which has a maximum approved passenger seating configuration of more than 9 unless it is provided with an emergency lighting system having an independent power supply to facilitate the evacuation of the aeroplane.

Automatic Emergency Locator Transmitter

All aeroplanes shall carry an automatic ELT.

All aeroplanes authorized to carry more than 19 passengers shall be equipped with at least two ELTs, one of which shall be automatic.

Life Jackets

An operator shall ensure that passengers are made familiar with the location and use of:

- seat belts;
- emergency exits;
- life jackets, if the carriage of life jackets is prescribed;
- oxygen dispensing equipment, if the provision of oxygen for the use of passengers is prescribed; and
- other emergency equipment provided for individual use including passenger emergency briefing card.

Life rafts and survival ELTs for extended over-water flights

On overwater flights, an operator shall not operate an aeroplane at a distance away from land, which is suitable for making an emergency landing, sufficient life-rafts to carry all persons on board. Unless excess rafts of enough capacity are provided, the buoyancy and seating capacity beyond the rated capacity of the rafts must accommodate all occupants of the aeroplane in the event of a loss of one raft of the largest rated capacity. The life-rafts shall be equipped with:

- A survivor locator light; and
- Life saving equipment including means of sustaining life as appropriate to the flight to be undertaken and at least two survival Emergency Locator Transmitters (ELT(S)) capable of transmitting on the distress frequencies.

Survival Equipment

Operators shall at all times have available for immediate communication to rescue coordination centers, lists containing information on the emergency and survival equipment carried on board any of their aeroplanes engaged in international air navigation. The information shall include, as applicable, the number, colour and type of life rafts and pyrotechnics, details of emergency medical supplies, water supplies and the type and frequencies of the emergency portable radio equipment.

COMMUNICATION AND NAVIGATION EQUIPMENT REQUIREMENTS

Communication Equipment

An aeroplane shall be provided with radio communication equipment capable of:

- conducting two-way communication for aerodrome control purposes;
- receiving meteorological information at any time during flight; and
- conducting two-way communication at any time during flight with at least one aeronautical station and with such other aeronautical stations and on such frequencies as may be prescribed by the appropriate authority.

The radio communication equipment shall provide for communications on the aeronautical emergency frequency 121.5 MHz.

For flights in defined portions of airspace or on routes where an RCP type has been prescribed, an aeroplane shall:

- be provided with communication equipment which will enable it to operate in accordance with the prescribed RCP type(s); and
- be authorized by the State of the Operator for operations in such airspace.

Navigation Equipment

An aeroplane shall be provided with navigation equipment which will enable it to proceed:

- in accordance with its operational flight plan; and
- in accordance with the requirements of air traffic services; except when navigation

for flights under the visual flight rules is accomplished by visual reference to landmarks.

For operations where a navigation specification for PBN has been prescribed, an aeroplane shall:

- be provided with navigation equipment which will enable it to operate in accordance with the prescribed navigation specification(s); and
- be authorized by DGCA for operations in such operations.

  For flights in defined portions of airspace where based on Regional Air Navigation agreement, minimum navigation performance specifications (MNPS) are prescribed, an aeroplane shall be provided with navigation equipment which:

  - continuously provides indications to the flight crew of adherences to or departures from track to the required degree of accuracy at any point along with the track; and
  - has been authorised by DGCA for MNPS operations concerned.

Radio Equipment

Aeroplane when operated across land areas which may be designated by AAI as areas in which search and rescues would be especially difficult, shall be equipped with at least one survival radio equipment, stowed so as to facilitate its ready use in an emergency which operates on VHF. The equipment shall be portable, not dependent for operation upon the aircraft power supply and capable of being operated away from the aircraft by unskilled persons. Aeroplane shall also be equipped with such signaling devices and life-saving equipment (including means of sustaining life), as may be appropriate to the area over flown.

Audio Selector Panel

An operator shall not operate an aeroplane under IFR unless it is equipped with an audio selector panel accessible to each required flight crew member.

FLIGHT CREW

Flight and Duty Time Limitations and Rest Requirements

CIVIL AVIATION REQUIREMENT SECTION 7 – FLIGHT CREW STANDARDS TRAINING AND LICENSING SERIES J in three parts prescribes the Maximum Limits of Flight Time, Flight Duty Period, Duty Period and Minimum Rest Period applicable to all flight crew and cabin crew of Scheduled, Non Scheduled, general aviation and Scheduled Commuter Air Transport Services.

Cabin Crew Member.

Cabin Crew member are crew who perform duties in the interest of safety of passengers, duties assigned by the operator and the pilot-in-command of the aircraft but who shall not act as flight crew member.

Flight Crew Member.

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

Scheduled Commuter Operators.

Are operators permitted to operate aircraft weighing upto 40,000 kg. They are permitted to operate commercial flights between two or more local destinations except Category I cities which include Mumbai Int'l, Kolkata Int'l, Delhi Int'l, Bangalore Int'l, Hyderabad Int'l, Thiruvananthapuram, and Chennai.

Duty Period, Flight Duty Period, Flight Time Limitations and Prescribed Rest Periods for Flight crew engaged in Scheduled Air Transport Operations

In subsequent paras, high lights of SERIES J PART III ISSUE III, DATED 24TH APRIL 2019 dealing exclusively with Scheduled Air Transport Operations will be covered.

DEFINITIONS

Acclimatized. It means a state in which a crew member's circadian biological clock is synchronised to the time zone where the crew member is. A crew member is considered to be acclimatized to a 3 hour wide time zone surrounding the local time at the point of departure. When the local time at the place where a flight duty commences (departure time zone) differs by more than 3 hours from the local time at the place where the next duty starts, the crew member, for the calculation of the maximum daily flight duty period, is considered to be acclimatized to the departure time zone for the first 48 hour. After 48 hours, the crew member shall be considered acclimatized to the local time where the crew member starts his/her next duty.

Accommodation. Means, for the purpose of standby and split duty, a quiet and comfortable place not open to the public, with the ability to control light and temperature, equipped with adequate furniture that provides a crew member with the possibility to sleep, with enough capacity to accommodate all crew members present at the same time and with access to food and drink.

Suitable Accommodation. Means, for the purpose of standby, split duty and rest, a separate room for each for crew member located in a quiet environment and equipped with a bed, which is sufficiently ventilated, has a device for regulating temperature and light intensity, and access to food and drink.

Augmented Flight Crew. Means, a flight crew, which comprises more than the minimum number required to operate the aircraft, allowing each flight crew member to leave the assigned post, for the purpose of in-flight rest, and to be replaced by another flight crew member with equal or higher qualification.

Duty. Any task that flight crew members are required by the operator to perform, including, for example, flight duty, administrative work, training, positioning and

standby when it is likely to induce fatigue.

Duty Period. A period which starts when a flight crew member is required by an operator to report for, or to commence a duty and ends when that person is free from all duties.

Flight Duty Period. A period which is intended to cover continuous period of duty that always includes a flight or series of flight for a flight crew member. It commences when a flight crew member is required to report for duty and finishes at engine(s) off at the end of the last flight on which he/she is a flight crew member.

Flight Time. The total time from the moment an aeroplane first moves for the purpose of taking off until the moment it finally comes to rest at the end of the flight.

Note: "Flight time" as defined here is synonymous with the term "block-to-block" time or "chocks-to-chocks" time in general usage, which is measured from the time an aeroplane first moves for the purpose of takeoff until it finally stops at the end of the flight.

Mixed Duty. When a crew member is required to report for a duty in advance of the stipulated reporting time, for a scheduled flight or series of flight, to carry out a duty at the behest of Operator, the time spent on that duty shall be part of the subsequent FDP.

Fatigue. A physiological state of reduced mental or physical performance capability resulting from sleep loss or extended wakefulness, circadian phase, or workload (mental and/or physical activity) that can impair a crew member's alertness and ability to safely operate an aircraft or perform safety related duties.

Home Base. The location nominated by the Operator, having high degree of permanence from which the crew member normally starts and ends a flight duty or a series of flight duty periods.

Temporary Home Base. The place of posting by the operator where the crew operates and starts a series of Duty Cycles, and which is not the same as Home Base.

Local Day. Means a 24-hour period, commencing at 00:00 local time.

Local Night. A period of 8 hours falling between 2200 hours and 0800 hours local time.

Long Range (LR). Continuous non-stop flights involving any sector having a continuous flight time of over 12 hrs and up to 14 hrs and Flight duty periods upto 18 hrs.

Night Duty. Any Duty Period encroaching upon any portion of the time period between 0000 hrs and 0500 hrs in the time zone to which the crew is acclimatized.

Operating Crew Member. Is a crew member, carrying out duties in an aircraft, during a sector.

Positioning. The transferring of a non-operating flight crew member from place to place at the behest of the operator.

Note: "Positioning" as here defined is synonymous with the term "Deadheading".

Reporting Time. The time at which flight crew member is required by an operator to report for duty.

Rest Period. A continuous, uninterrupted and defined period of time, subsequent to or prior to duty, during which a flight crew member is free from all duties, standby and reserve.

Rest Facility. Means a bunk or seat with leg and foot support suitable for crew members' sleeping on board an aircraft.

Roster. A list provided by an operator of the times when a flight crew member is required to undertake duties.

Note: "Roster" as here defined is synonymous with "Schedule", "Line of Time", "Pattern", and "Rotation".

Split Duty (Break). A period free of all duties, which counts as duty, being less than a rest period.

Break. Means a period of time within a flight duty period, shorter than a rest period, counting as duty and during which a crew member is free of all tasks.

Standby. It is a defined period of time during which a flight crew member is required by the operator to be available to receive an assignment for a specific duty without an intervening rest period.

Sector. Means the segment of a Flight Duty Period (FDP) between an aircraft first moving for the purpose of taking off until it comes to rest after landing on the designated parking position.

Time Zone. Means a defined region of the earth with a uniform local time which differs by one hour, or by part of one hour from the uniform local time of an adjoining region of the earth, irrespective of season.

Training Flights. Flights for the purpose of Base Training, Familiarization, Conducting Aircraft Training and Checks (Skill Test/IR/PPC).

Unforeseen Operational Circumstance. An unplanned event, such as unforeseen weather, natural calamity, medical emergency, national requirement for relief and rescue operations (mission oriented), equipment malfunction, runway closure, passenger, aircraft security, etc., that is beyond the control of the operator.

Ultra Long Range (ULR) Operations. Continuous non-stop flights between a specific city pair involving any sector having a flight time of over 14 hrs and flight duty periods up to 22 hrs at any time during a calendar year taking into account the mean and seasonal wind changes. The ULR operations apply to both sectors of a city pair.

In-flight Rest Period. Means a period of time with in a flight duty time, which is to give a crew member an opportunity to rest before recommencing duty.

Window Of Circadian Low (WOCL). WOCL means a period between 0200h and 0600h in the time zone to which a crew member is acclimatized. This estimate of the window is calculated from scientific data on the circadian low of performance, alertness, subject report (i.e. peak fatigue) and body temperature.

OPERATOR'S RESPONSIBILITY

Every operator shall establish a scheme for complying with the limitations for Flight Time, Flight Duty Periods, Duty Periods and Rest Periods specified in this CAR in respect of flight crew members.

Each Operator shall prepare the Flight Crew Roster sufficiently in advance. Roster should be published at least for a 7 day period and the weekly rest shall be printed on the published roster.

Every operator shall assign a Home Base to each flight crew member.

RESPONSIBILITY OF FLIGHT CREW MEMBER

No flight crew member may accept an assignment, which shall exceed the prescribed limitation.

Flight crew members shall make best use of facilities and opportunities that are available or provided for rest and for the consumption of meals, and shall plan and use rest periods to ensure that they are fully rested.

A flight crew member shall not perform flight crew duties on a flight if it is known or suspected that the flight crew member is fatigued to the extent that the safety of flight may be adversely affected.

FLIGHT TIME AND FLIGHT DUTY PERIOD LIMITS: TWO PILOT OPERATION

The maximum flight time and maximum flight duty period during any 24 hrs are indicated in the following Table.

Maximum Flight Time	Maximum Flight Duty Period (in Hours)	Maximum No. of Landings
8 hrs	11:00#	6
	11.30#	5
	12:00#	4
	12.30 #	3
9 hrs	13:00#	2
10 hrs	13.00#	1

FLIGHT TIME AND FLIGHT DUTY PERIOD LIMITS : AUGMENTED CREW

The maximum flight time and maximum flight duty period during any 24 hrs are indicated in the following Table.

Maximum Flight Time	Maximum Flight Duty Period (in Hours)	Maximum No. of Landings
12 hrs (For 3 Crew Operation)	14:00# **	1
14 hrs (Long Range - 4 Crew Operations)	18:00	1
(ULR)* Above 14 hrs For 4 Crew Operation)	22:00	1

(*) For ULR operations approvals to be sought from DGCA on case-to-case basis for specific city pairs and the departure windows of the flights.

(#) When the FDP starts in the WOCL, the maximum FDP stated in the Tables shall be reduced by 100% of its encroachment up to a maximum of 2 hours. When the FDP ends in or fully encompasses the WOCL, the maximum FDP stated in the table shall be reduced by 50% of its encroachment.

(**) The maximum flight duty period may be extended for three crew operation by 2 hrs if rest in seat is available and 3 hrs in case of rest in bunk.

MAXIMUM CUMULATIVE FLIGHT TIME AND DUTY PERIOD LIMITATIONS

Sub Para	Maximum Cumulative Flight Time Limitations	Maximum Flight Time Limitation (in Hours)	Maximum Cumulative Duty Period
8.1	In 7 consecutive days	35	60
8.2	In 14 consecutive days	65	100
8.3	In 28 consecutive days	100	190
8.4	In 90 consecutive day	300	600
8.5	In 365 consecutive days	1000	1800

UNFORSEEN OPERATIONAL CIRUMSTANCES

Flight Time', 'Flight Duty Period' and "landing" may be extended due to unforeseen operational circumstances as follows:

a) Flight Time by maximum of 11/2 hours.

b) FDP by maximum of 3 hours.

c) Only one extra landing may be carried out in the event of a diversion to complete the flight, including a consecutive night for completion of the flight.

d) The above is subject to a cumulative limit of maximum of 4.30 hours (Flight Time), maximum of 9 hrs (FDP) and 02 landings during any period of 28 consecutive days.

e) Whenever the Flight duty period or flight time gets extended, the rest period shall be pro-rata increased by twice the amount of extended time of Flight duty period.

f) Extension of the maximum basic FDP shall not be combined with split duty in the same duty period.

g) In case of not utilizing any flight time after commencement of FDP (Reporting) the crew can be utilized after a minimum of twice the time period spent after reporting subject to a minimum limit of 8 hours of rest.

PIC in consultation with other Flight Crew members will convey their willingness or consent to the Head of Operations for operating the flight.

Records

Records shall be kept for 18 months of the duties performed and the rest periods provided so as to facilitate inspection by the operator's authorized personnel and surveillance/audit by DGCA officers. The records may be made available to flight crew on request.

QUESTIONS

1. **Flight Duty Period and Flight Time Limit for 2 crew international scheduled flight is ______ hrs and _____ landing.**
   A) 10 hrs and 1 landings
   B) Three hrs and 9 landings
   C) 9 hrs and 3 landings at night

2. **Route guides are required to be carried in**
   A) All aircraft
   B) All private aircraft
   C) Aircraft involved in scheduled transport services

3. **The duty time of the trainee pilot:**
   A) Is calculated as per the Flight Time And Flight Duty Period Limit
   B) Is not affected by the Flight Duty Period and Flight Time Limit
   C) Is the time calculated from take off to landing

4. **A pilot can fly in 30 consecutive days**
   A) 100 hrs PIC & 50 hrs as Co pilot
   B) 100 hrs PIC & 30 hrs as Co pilot
   C) 120 hrs PIC & 20 hrs as Co pilot

5. **Flight Manual is to be carried by**
   A) All aircraft
   B) Scheduled aircraft only
   C) If C of A states so

6. **A pvt. Aircraft from Chennai to Colombo is required to carry on board.**
   A) Journey log book.
   B) Route Guide
   C) All of the above

7. **The maximum duty time limit per day extension for a scheduled flight is**
   A) 1.5 hrs
   B) 2 hrs
   C) 3 hrs

8. **Max flying hours for a flight crew in one year is:**
   A) 200 hrs.
   B) 1000 hrs
   C) 1200 hrs

9. **With regard to flight time limitations, “flight time “means:**
   A) The total time from when an aircraft first moves under its own power for the purpose of taking off until it comes to rest after the flight
   B) The time between take-off and landing
   C) The time between an aircraft starting to move and coming to a complete stop plus one and a half hours

10. **The maximum permitted flight time for flight crew is :**
    A) 69 hours in the 27days prior to the flight
    B) 100 hours in the 27days before the current flight
    C) 1000 hours in 365 consecutive days

11. **A flight to be operated with a pressurized aeroplane will not be commenced unless a sufficient quantity of stored breathing oxygen is carried to supply;**
    A) All crew members
    B) All crew members and passengers
    C) All crew members and passengers, when the atmospheric pressure in any compartment occupied by them is less then 700 hPa

12. **Emergency and cockpit check list is to be carried by**
    A) All a/c
    B) Scheduled a/c
    C) None scheduled a/c

13. **Number of first aid kits to be carried on board an aircraft carrying 250 passengers is:**
    A) 1
    B) 2
    C) 3

14. **No person, other than a flight crew member assigned to a flight, is admitted to, or carried in, the flight deck unless that person is:**
    A) A security staff
    B) An operating crew member
    C) Representative of the Operator

15. Low Visibility Procedures (LVP) procedures are applied at an aerodrome for the purpose of ensuring safe operations during

A) Category I, Category II and III approaches
B) Low Visibility Take-offs
C) Severe thunder showers

16. For an unplanned event, such as unforecast weather, equipment malfunction, or air traffic delay that is beyond the control of the operator 'Flight Time' and 'Flight Duty Period' may be extended as follows:

A) Flight Time by maximum of 2 hours and FDP by maximum of 4 hours subject to a cumulative limit of maximum of 8 hours and maximum of 16 hours respectively in 30 consecutive days.
B) Flight Time by maximum of 4 hours and FDP by maximum of 8 hours.
C) Flight Time by maximum of 1½ hours and FDP by maximum of 3 hours

17. Minimum trip fuel required shall be the amount of fuel required to enable the aeroplane to fly from take-off or the point of in-flight re-planning,

A) until landing at the destination aerodrome taking into account the operating conditions.
B) until overhead at the destination aerodrome taking into account the operating conditions.
C) until over head at the destination aerodrome taking into account the fuel required to go to a diversion.

18. Scheduled operators may be authorized LVTO minima of up to:

A) 400 m
B) 200 m
C) 125m

19. If, after commencing an instrument approach, the reported RVR/Visibility falls below the applicable minimum, the approach shall not be continued:

A) below MDA/DA, as applicable
B) below AOM published for the aerodrome.
C) below 1 000 ft above the aerodrome.

20. All FDRs shall be capable of retaining the information recorded during at least the last ____ hours of their operation. CVRs atleast _____hrs and Data link recorders shall be capable of retaining the information recorded during at least the last____ hours of their operation.

A) 24,2,4
B) 25,2,2
C) 25,3,2

21. Filed minima is 300 m. Touch down zone RVR is 400 m. Relevant mid-point RVR is 100m and stop-end RVR 300m. The runway is:

A) Below minima
B) With in minima
C) Equal to minima.

ANSWERS

1	2	3	4	5	6	7	8	9	10	11	12	13	14
A	A	A	B	A	C	C	B	A	C	C	A	C	B

15	16	17	18	19	20	21
B	C	A	C	C	B	A

18

SPECIAL OPERATIONAL PROCEDURES AND HAZARDS (GENERAL ASPECTS)

Minimum Equipment List

The operator shall include in the Operations Manual a minimum equipment list (MEL), approved by the DGCA which will enable the pilot-in-command to determine whether a flight may be commenced or continued from any intermediate stop should any instrument, equipment or system become inoperative.

DGCA may require the minimum equipment list of an operator approved to specify the operating equipment required for night and/or IMC operations, and for day/VMC operations.

The Master Minimum Equipment List (MMEL) defines the equipment on which certain in-flight failures can be allowed and the conditions under which this allowance can be accepted. This MMEL is drawn up by the manufacturer and approved by the DGCA.

Aeroplane Flight Manual (AFM);

Aeroplanes shall be operated in accordance with the provisions of the Flight Manual approved by the State of design.

An aeroplane shall be operated in compliance with the terms of its certificate of airworthiness and within the approved operating limitations contained in its flight manual.

Account shall be taken of all factors that significantly affect the performance of the aeroplane, (including, but not limited to: the mass of the aeroplane, the operating procedures, the pressure-altitude appropriate to the elevation of the aerodrome, the ambient temperature, the wind, the runway slope, and surface conditions of runway i.e., presence of snow, slush, water, and/or ice; for landplanes, water surface condition for seaplanes).

Ground de-icing

A flight to be planned or expected to operate in suspected or known ground icing conditions shall not take off unless the aeroplane has been inspected for icing and, if necessary, has been given appropriate de icing /anti icing treatment. Accumulation of ice or other naturally occurring contaminants shall be removed so that the aeroplane is kept in an airworthy condition prior to take off.

Definition and recognition, on ground/in-flight

(a) An operator shall not operate an aeroplane in expected or actual icing conditions unless it is certificated and equipped to operate in icing conditions.

(b) An operator shall not operate an aeroplane in expected or actual icing conditions at night unless it is equipped with a means to illuminate or detect the formation of ice. Any illumination that is used must be of a type that will not cause glare or reflection that would handicap crew members in the performance of their duties.

De-icing, anti-icing, types of de-icing fluids

The most common techniques for removing frozen precipitation from aircraft critical surfaces and protecting the aircraft against re-contamination are accomplished with aircraft deicing and anti-icing fluids respectively.

Deicing is a procedure by which frost, ice, snow or slush (i.e. the frozen contamination) is removed from an aircraft by use of a heated Aircraft Deicing Fluid (ADF), to provide clean surfaces. Anti-icing is a procedure in which an Aircraft Anti-Icing Fluid (AAF) is applied to a surface free of frozen contaminants in order to protect the surface from the accumulation of frozen contaminants for a limited period of time.

De/anti-icing fluids are only required until the aircraft becomes airborne, after which the on-board de/anti-icing system then operate.

Performance Deterioration, on Ground/in-flight

A very small amount of roughness, in thickness as low as 0.40 mm (1/64 in.), caused by ice, snow or frost, disrupts the air flow over the lift and control surfaces of an aircraft. The consequence of this roughness is severe lift loss, increased drag and impaired maneuverability, particularly during the take off and initial climb phases of flight. Ice can also interfere with the movement of control surfaces or add significantly to aircraft weight. The ice formation can severely affect instruments by blocking static and Pitot vents or angle of attack vanes. Wind screens may be obscured, undercarriage obstructed, ice can form skin friction. There is no such thing as an insignificant amount of ice.

Ice can form even when the Outside Air Temperature (OAT) is well above 0°C (32°F). An aircraft equipped with wing fuel tanks may have fuel that is at a sufficiently low temperature such that it lowers the wing skin temperature to below the freezing point. This phenomenon is known as cold-soaking. This situation can also occur when an aircraft has been cruising at high altitude for a period of time followed by a quick descent to a landing in a humid environment. Liquid water coming in contact with a wing, which is at a below freezing temperature, will then freeze to the wing surfaces.

Cold-soaking can also be caused by fueling an aircraft with cold fuel. If there is rain or high humidity, ice can form on the cold-soaked wing and accumulate over time. This ice can be invisible to the eye and is often referred to as clear ice. This ice can be detected by performing a tactile inspection or by using specially designed ice detecting systems such as a Ground Ice Detection System (GIDS).

Sheets of clear ice dislodged from the wing or fuselage during takeoff or climb can be ingested by aft fuselage mounted engines, thereby causing a flameout or damage. Sheets of dislodged clear ice can also cause impact damage to critical surfaces such as the horizontal stabilizer.

Bird Strike Risk and Avoidance

Bird strike prevention apart the airfield is most effectively conducted by warning procedures. As there is no direct interference possible to influence bird activity aloft, the only chance to minimize the risk of bird strikes is to avoid flying through high bird concentrations in the air. The presence of hazardous bird concentrations are well known during migration periods in the large temporal and spatial scale.

But they also occur occasionally throughout the year on a local or regional scale, mainly governed by the diurnal cycle. Monitoring, modeling, warning, predicting, forecasting are the major aspects of handling the problem and result in a certain advise, that is passed to the aviation community.

The most effective method for scaring birds is shell crackers. 90% of bird strikes occur under 500 m.

The observations and studies conducted on the behavior of birds on the ground, ahead of an aircraft taking off and having reached an average speed of 135 kts, show that birds fly away about two seconds beforehand.

Departure Climb

Aeroplane operating procedures for the departure climb shall ensure that the safety of flight operations is maintained while minimizing exposure to noise on the ground. The following requirements need to be satisfied:

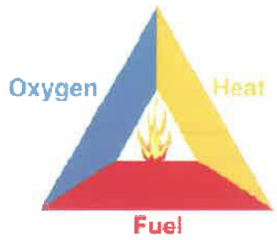
- Noise abatement procedures shall not be executed below a height of 240 m (800 ft) above aerodrome elevation.
- The noise abatement procedure specified by an operator for any one aeroplane type should be the same for all aerodromes.
- Noise abatement climb procedures are not to be used in conditions where wind shear warnings exist, or the presence of wind shear or downburst activity is suspected.
- The maximum acceptable body angle specified for an aeroplane type shall not be exceeded.

Aeroplane Operating Procedures — Approach

- Procedures for noise attenuation during landing will not involve use of reverse thrust.
- During an approach procedure which involves noise abatement, the aeroplane is to be in the final landing configuration at any point after passing the outer marker or at a point 5 NM from the threshold of the landing runway, whichever is earlier.
- Noise preferential routes are established to ensure that departing and arriving aeroplanes avoid over flying noise-sensitive areas in the vicinity of the aerodrome as far as practicable.
- Noise abatement shall not be the determining factor in the designation of a runway, under the following circumstances:
  - a) when cross wind component, including gust, exceeds 15kt
  - b) when the tailwind component, including gust, exceeds 5 kt
  - c) when the runway is not clear or dry
- In establishing noise preferential routes no turns should be required coincident with a reduction of power associated with a noise abatement procedure.
- No ILS or visual guidance precludes a runway being used for noise abatement procedures if landing in VMC.

Fire/smoke

Combustion consists of three elements: oxygen, heat, and fuel. Together, these elements create a chemical chain reaction and result in a fire. The goal of firefighting is to eliminate at least one element from the fire, in order to extinguish it.



The Fire Triangle

A fire will continue, unless:

- The fuel supply has been cut off
- There is no more oxygen available
- The temperature has been cooled below the flammability temperature.

Class A : Fires that involve wood, paper, cloth, or plastic. Class A fires needed to be cooled. A water extinguisher, or liquid containing a large percentage of water, for example, coffee, tea, juice will extinguish a class A fires.

~ Do not use liquid containing alcohol !

~ Water/glycol extinguishers are the most effective for class A fires.

Smoke: Usually gray/brown in color. Can be quite thick, depending on the quantity of fuel.

Class B: Fires that involve flammable liquid, hydraulic fluid, oil, tar or aircraft fuel.

This type of fire cannot be extinguished with water. Foam or Halon fire extinguishers should be used to extinguish class B fires.

Smoke: Usually black in color. Very thick, with a distinct oil/petrol-like odor.

Class C: Fires that involve electrical equipment. This type of fire must be extinguished with a non-conducting mixture, in order to avoid electrocution and damage to electrical circuitry. Halon fire extinguishers are effective for class C fires.

Smoke: Usually light grey or white, with a bluish tinge. Very fine and can disperse rapidly. Has a distinct acrid odor.

Class D: Fires that involve flammable metals, such as sodium, magnesium, lithium and potassium. Special powder extinguishers are effective on class D fires, because of the possible chemical reaction between the burning and extinguishing agents.

~ Never use Halon fire extinguishers on class D fires.

~ Class A and C fires are the most commonly encountered fires onboard aircraft.

Fire Extinguishers: Hand-held fire extinguishers discharge an extinguishing agent for 8 to 25 seconds, depending on their type and capacity. Due to this short period, it is essential to select and use the appropriate fire extinguisher immediately.

There are different types of fire extinguishers:

» Halon/ BCF (Green) – is the generic name for the group of bromochlorodifluoromethane (BCF) extinguishers that can be used for class A, B, and C fires

» Carbon dioxide (CO_2) (Black) for class B and C fires

» Dry powder (DP) (Blue) for class D fires

» Dry chemicals (Blue) for class A, B, and C fires

» Water solution (H_2O) (Red) for class A fires.

- A halon extinguisher is three times as effective as CO_2 extinguishers that contain the same amount of extinguishing agent.
- Because of its chemical composition, some precautions must be taken when using Halon fire extinguishers:
  - ~ When a Halon fire extinguisher has been used on a Class A fire, the fire and the surrounding area must be cooled down with a non-alcoholic liquid.
  - ~ When halon is used in crew compartments or confined areas, Portable Breathing Equipment (PBE) should be used.

Location:

- Atleast one Halon 1211 type extinguisher should be located on flight deck. Galleys, personnel and cargo compartments should be equipped with proper extinguishers.

The ICAO Standards mandate the use of an alternative agent to halon due it's impact on environment as it depletes the ozone layer. As of now Halon use is permitted only in Cargo compartments till 28 Nov 2024.

Actions in case of overheated brakes after aborted take-off and landing :

- Overheated brakes - The kinetic energy lost by slowing an aircraft down is usually translated into heat by friction and could result in:
  - » Loss of braking performance
  - » Fire
  - » Tyre deflation / tyre burst
- Brake failure and subsequent poor directional control and deceleration in turn could result in:
- Runway excursion
- Uncommanded aircraft ground movements / taxiway excursion
- Collision with objects on the ground/other aircraft
- A wide range of practical problems could arise following brake related problems:
  - o **High level of stress and increased workload -** caused by directional control and deceleration problems resulting from brake failure during landing, or during high speed rejected take off (RTO);
  - o **Lack of awareness -** Crew might be not aware of fire, tyre burst or deflation that could result from heavy braking upon landing, RTO, or from smoke coming from the undercarriage;
    - ~ **Request fire and rescue services -** hot brake incidents could be considered by the crew a reason to request attendance of fire and rescue;
    - ~ **Decision for emergency evacuation -** the cockpit crew could take the decision for emergency evacuation if fire is detected following a high energy brake application.

Decompression of Pressurized Cabin

Cabin Pressurization is the pumping of compressed air into an aircraft cabin to maintain a safe and comfortable environment for crew and passengers when flying at altitude. Loss of pressurisation is a serious emergency in an aircraft flying at the high cruising altitude for most passenger aircraft.

Causes:

- **Structural Failure.** Failure of a window, door, or pressure bulkhead for example, or in-flight explosion. An in-flight explosion may be due to a system failure, dangerous cargo, or a malicious act such as an explosive device carried on board by a terrorist.
- **Pressurisation system failure.** Failure of some part of the pressurisation system such as an outflow valve perhaps.
- **Deliberate Act** A drastic measure but one which an aircraft captain might consider, for example, as a way of clearing the cabin of smoke.

Rapid or Explosive Decompression

Decompression which occurs rapidly and at a rate which is greater than the rate the lungs can decompress by will cause lung damage. The likelihood of the rate of decompression reaching a level where lung damage is possible is increased for any particular size of pressure hull breach by the size of the pressure hull overall.

A decompression of an aircraft which takes less than 0.5 seconds is considered by most authorities to be "explosive". The cabin air may fill with dust and debris, and fog caused by an associated drop in temperature and change in relative humidity. Crew may be momentarily dazed or shocked, especially if the event was unexpected, and may therefore be slow to fit oxygen masks.

Slow Decompression

It is similar to Rapid decompression. The only difference is in severity and availability of reaction time. In both cases the actions by the crew remain same.

Crew and Passenger Incapacitation:

The great danger of depressurisation is crew incapacitation due to Hypoxia. Depending on the altitude of the aircraft when depressurisation takes place, loss of pressurisation can very quickly lead to the incapacitation of the crew and passengers unless they receive supplementary oxygen. The Time of Useful Consciousness is reduced by the explosive nature of the decompression.

Depressurization warning is required when cabin altitude exceeds 10,000 feet. Passenger oxygen masks will drop when cabin altitude rises to between 13,200 and 14,000 feet, but no higher than 15,000 feet.

If the cause of the decompression is structural failure, failure of a window for example, there may be a risk of some crew or passengers being buffeted by strong winds, hit by debris, and extreme cold temperatures, or even being sucked out of the aircraft - another reason for wearing a seat belt or harness when seated.

Actions:

- **Oxygen.** In the event of loss of pressurisation, it is essential that the crew don Oxygen equipment as soon as possible. In the case of a deliberate de-pressurisation, the crew should be on oxygen before the de- pressurisation commences.
- **Emergency Descent.** In the case of an emergency depressurisation, the crew will want to descend immediately to an altitude at which they and the passengers can breathe without supplementary oxygen - conventionally 10,000 ft.

Wind Shear, Microburst :

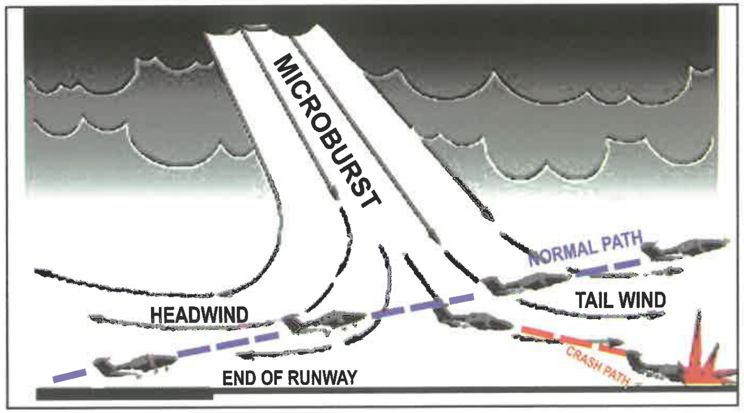
Intense down drafts, typically associated with thunderstorms, produce strong vertical and horizontal wind shear components that are a hazard to aviation for aircraft in the approach, landing or takeoff phase of flight. Aircrew capable of reporting the wind and altitude, both above and below the shear layer, from Flight Management Systems (FMS) are to do so. Pilots without this equipment should report wind shear by stating the loss or gain of airspeed and the altitude at which it was encountered. Pilots not able to report wind shear in these specific terms should do so in terms of its general effect on the aircraft.

The following guidelines are used to establish whether significant non-convective wind shear hazardous to aircraft exists:

- vector magnitude exceeding 25 kts within 500 ft AGL;
- vector magnitude exceeding 40 kts within 1 000 ft AGL;
- vector magnitude exceeding 50 kts within 1 500 ft AGL;
- a pilot report of loss or gain of IAS of 20 kts or more within 1 500 ft AGL.

Microburst

Relatively recent meteorological studies have confirmed the existence of the "burst" phenomena. These are small scale, intense downdrafts which, on reaching the surface, spread outward from the down flow centre. This causes the presence of both vertical and horizontal wind shear that can be extremely hazardous to all types and categories of aircraft. Wind shear may create a severe hazard for aircraft within 1 000 ft AGL, particularly during the approach to landing and in the takeoff phases. On takeoff, the aircraft may encounter a headwind (performance increasing) (1) followed by a downdraft (2), and tailwind (3) (both performance decreasing).



Characteristics of Microbursts Include:

(a) Size - Approximately 1 NM in diameter at 2 000 ft AGL with a horizontal extent at the surface of approximately 2 to 2 1/2 NM.

(b) Intensity - Vertical winds as high as 6 000 ft per minute. Horizontal winds giving as much as 45 KT at the surface (i.e., 90 KT shear).

(c) Types - Microbrusts are normally accompanied by heavy rain in areas where the air is very humid. However, in drier areas, falling raindrops may have sufficient time and distance to evaporate before reaching the ground. This is known as VIRGA.

(d) Duration - The life-cycle of a microburst from the initial downburst to dissipation will seldom be longer than 15 minutes with maximum intensity winds lasting approximately 2 - 4 minutes. Sometimes microbursts are concentrated into a line structure and under these conditions, activity may continue for as long as an hour.

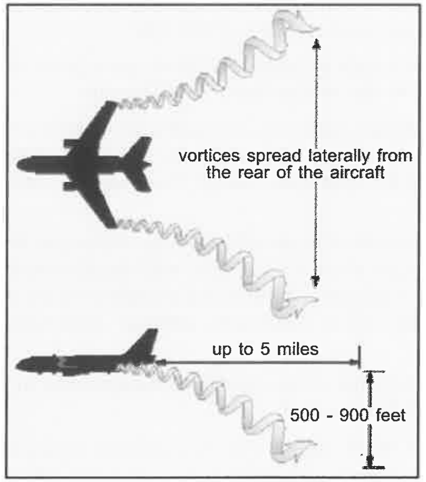
Once microburst activity starts, multiple microbursts in the same general area are common and should be expected.

Actions to counter Wind Shear: The best defence against wind shear is to avoid it altogether because it could be beyond your or your aircraft's capabilities. However, should you recognize a wind shear encounter, prompt action is required. In all aircraft, the recovery could require full power and a pitch attitude consistent with the maximum angle of attack for your aircraft. Remember, should you experience a wind shear, warn others, as soon as possible.

WAKE TURBULENCE

All airfoils produce a wake when they are producing lift. The higher-pressure air under the wing flows around the wingtip and tries to displace the lower-pressure -- and consequently lower-energy -- air on the top of the wing. The greater the pressure differential between the top and bottom of the wing, the stronger the flow around the wingtip. This airflow from the bottom of the wing tends to disturb the airflow on the top of the wing -- that's part of the increase in induced drag you notice with increased lift!

The air curling up around the wing tip forms a horizontal tornado that trails behind the airplane and tends to sink somewhat below the producing aircraft's flight path -- if that aircraft is in level flight. The vortices produced during a descent are somewhat less predictable. The vortex produced by the left wing rotates in a clockwise direction when seen from behind. The one from the right rotates counterclockwise. Larger airplanes produce stronger vortices because the wings produce more lift to support the weight of the airplane. The vortices settle behind the aircraft to an altitude about 1,000 below the aircraft's flight path, where they tend to remain.



CATEGORIES:

Super Heavy (S): A separate designation that currently only refers to the Airbus A380-800, MCTOW(Maximum Certified Take Off Weight) 5,60,000 kgs.

Heavy (H): All aircraft types of 136,000 kg MCTOW or more. Some examples of these are: Boeing B777, B767, B747, B 787, A 300, A 310, A 330, A 340, A 350, McDonnell Douglas DC–8, McDonnell Douglas DC-10, MD–11, IL 86, IL 96, AN 225, Lockheed L-1011 etc.

Medium (M): Aircraft types of more than 7,000 kg and less than 136,000 kg MCTOW. Some examples of these are: Boeing B727, B737 and B757, A 320, A 321, Bombardier : Global Express, Challenger, CRJ, Fokker Friendship, Metro 4 , BAe–146, Dash 8, ATR–72, Hercules, DC–3, Saab 340 etc.

Light (L): Aircraft types of less than 7,000 kg MCTOW. Some of the examples of these are: Bandeirante, Metro 3 , Cessna 402 and 421, Islander, Nomad, Piper Navajo, King air Beech 99 etc.

WAKE TURBULENCE LONGITUDINAL SEPARATION MINIMA

TIME BASED

ARRIVING AIRCRAFT

A Minimum separation as given in Table shall be applied

S. No.	Leading Aircraft	Following Aircraft	Separation Minima
1.	A380-800	MEDIUM	3 Minutes
2.	A380-800	LIGHT	4 Minutes
3.	HEAVY	MEDIUM	2 Minutes
4.	HEAVY OR MEDIUM	LIGHT	3 Minutes

DEPARTING AIRCRAFT

A minimum separation as given in Table shall be applied when the aircrafts are using:

a) the same runway;

b) parallel runways separated by less than 760 m (2500 ft);

c) crossing runways if the projected flight path of the second aircraft will cross the projected flight path of the first aircraft at the same altitude or less than 1000 ft below;

d) parallel runways separated by 760 m (2500 ft) or more, if the projected flight path of the second aircraft will cross the projected flight path of the first aircraft at the same altitude or less than 1000 ft below.

S. No.	Leading Aircraft	Following Aircraft	Separation Minima
1.	A380-800	Non A380-800 HEAVY	2 Minutes
2.	A380-800	MEDIUM or LIGHT	3 Minutes
3.	HEAVY	LIGHT or MEDIUM	2 Minutes
4.	MEDIUM	LIGHT	2 Minutes

A minimum separation as given shall be applied when the aircraft are departing from:

a) an intermediate part of the same runway; or

b) an intermediate part of a parallel runway separated by less than 760 m (2500 ft).

S. No.	Leading Aircraft	Following Aircraft	Separation Minima
1.	A380-800	MEDIUM or LIGHT	4 Minutes
2.	HEAVY	MEDIUM or LIGHT	3 Minutes
3.	MEDIUM	LIGHT	3 Minutes

DISPLACED LANDING THRESHOLD

A separation minimum as specified in Table shall be applied between aircraft operating on a runway with a displaced landing threshold.

S. No.	Leading Aircraft	Following Aircraft	Separation Minima
1.	A380-800 Arrival	LIGHT or MEDIUM	3 Minutes
2.	A380-800 Departure	LIGHT or MEDIUM	3 Minutes
3.	HEAVY Arrival	LIGHT or MEDIUM Departure	2 Minutes
4.	MEDIUM Arrival	LIGHT Departure	2 Minutes
5.	HEAVY Departure	LIGHT or MEDIUM Arrival	2 Minutes
6.	MEDIUM Departure	LIGHT Arrival	2 Minutes

The distance based wake turbulance separation minima as given in Table shall be applied to aircraft being provided with an ATS surveillance service in the approach and departure phases of flight.

i) an aircraft is operating directly behind another aircraft at the same altitude or less than 1000 ft below; or

ii) both aircrafts are using the same runway, or parallel runways separated by less than 760 m; or

iii) an aircraft is crossing behind anoher aircraft, at the same altitude or less than 1000 ft below.

Preeceding Aircaft	Succeeding Aircraft	Distance Base Wake Turbulance Separation Minima
A380-800/ Non A380-800 HEAVY	A380-800	Not required+
A380-800	Non A380-800 HEAVY	6 NM*
	MEDIUM	7 NM*
	LIGHT	8 NM*
HEAVY	HEAVY	5 NM*
	MEDIUM	5 NM*
	LIGHT	6 NM*
MEDIUM	HEAVY	Not required+
	MEDIUM	Not required+
	LIGHT	5 NM*
LIGHT	HEAVY	Not required+
	MEDIUM	Not required+
	LIGHT	Not required+

+ When a wake turbulance restriction is not required, then separation reverts to prescribed radar separation minimum.

** In the airspace wherein prescribed radar separation minimum is more than applicable wake turbulance separation minimum, prescribed radar separation minimum will have precedence over wake turbulance separation minimum.*

DEALING WITH WAKE TURBULENCE

Wake Turbulence Characteristics: Wake turbulence is created only when an airplane develops lift. It is greatest when generating airplane is heavy, clean and slow. In wake turbulence the circulation of vortex is outward, upward and around each wing tip.

Handling Wake Turbulence:

- Fly upwind rather than downwind of the flight path of a large aircraft.
- The most dangerous wind while landing or taking off behind large aircraft is light quartering tailwind.
- When taking off behind a larger aircraft, lift off before the larger aircraft's liftoff point and climb above its climb path.
- When landing behind a larger aircraft, touch down past its touchdown point.
- Vortices will stay on the runway longer in light or calm winds.
- In light crosswinds, the upwind vortex will tend to drift onto and remain on the runway.
- Vortices from a large aircraft landing on a parallel runway can be blown onto your runway by a strong crosswind.
- When flying or crossing behind a larger aircraft, maintain your flight path above the large aircraft's path rather than below.
- When approaching behind a larger aircraft on an ILS, stay at or above the glide slope to avoid wake encounters.

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- When flying or crossing behind a larger aircraft, maintain your flight path above the large aircraft's path rather than below.
- When approaching behind a larger aircraft on an ILS, stay at or above the glide slope to avoid wake encounters.

SECURITY

Reporting acts of unlawful interference

Following an act of unlawful interference on board an aeroplane the commander or, in his absence the operator, shall submit, without delay, a report of such an act to the designated local authority and the Authority in the State of the operator.

Emergency and precautionary landings operations in various terrain –

The **forced landing** is defined as an immediate landing, on or off an airport, necessitated by the inability to continue further flight. A typical example would be an airplane forced to land due to engine failure.

The **precautionary landing** is a premeditated landing, on or off the airport, when further flight is possible but inadvisable. Examples might include making a landing due to deteriorating weather, being lost, fuel shortage, and gradually developing engine trouble.

Ditching is defined as a forced or precautionary landing on water.

FUEL JETTISONING

General

An aircraft in an emergency or other urgent situations may need to dump fuel so as to reduce to maximum landing weight in order to effect a safe landing.

When an aircraft operating within controlled airspace requires to dump fuel, the flight crew shall advise ATC. The ATC unit should then coordinate with the flight crew the following:

(a) the route to be flown which, if possible, should be clear of cities and towns, preferably over water and away from areas where thunderstorms have been reported or are expected;

(b) the level to be used, which should be not less than 1800 m (6000 ft); and

(c) duration of the fuel dumping.

SEPARATION

Other known traffic should be separated from the aircraft dumping fuel by:

(a) at least 19 km (10 NM) horizontally, but not behind the aircraft dumping fuel;

(b) vertical separation if behind the aircraft dumping fuel within 15 minutes flying time or a distance of 93 km (50 NM) by:

  (i) at least 300 m (1000 ft) if above the aircraft dumping fuel; and

  (ii) at least 900 m (3000 ft) if below the aircraft dumping fuel.

Note:— The horizontal boundaries of the area within which other traffic requires appropriate vertical separation extend for 19 km (10 NM) either side of the track flown by the aircraft which is dumping fuel from 19 km (10 NM) ahead, to 93 km (50 NM) or 15 minutes along track behind it (including turns).

COMMUNICATIONS

If the aircraft will maintain radio silence during the fuel dumping operation, the frequency to be monitored by the flight crew and the time when radio silence will terminate should be agreed.

Transport of dangerous goods

More than half of the cargo carried by all modes of transport in the world is dangerous cargo – explosive, corrosive, flammable, toxic and even radioactive. These dangerous goods are essential for a wide variety of global industrial, commercial, medical and research requirements and processes. Because of the advantages of air transport, a great deal of this dangerous cargo is carried by aircraft.

Dangerous goods forbidden for transport by air unless exempted

The dangerous goods described hereunder shall be forbidden on aircraft unless exempted by the States concerned :

a) articles and substances that are identified in the Technical Instructions as being forbidden for transport in normal circumstances; and

b) infected live animals.

Contaminated Runways

Braking action, brake co-efficient

Runway surface friction is directly relevant to the braking action which will be available to an aircraft decelerating after touch down, or after a decision to reject a take off.

For most multi crew aircraft, anti skid braking systems will be fitted which prevent wheel locking and can allow more aggressive brake input for wheels which are rotating on wet or otherwise slippery runways, without inducing dynamic or viscous Aquaplaning.

Aircraft braking coefficient is dependent upon the surface friction between surface and aircraft tires. Less friction means less aircraft braking coefficient. and less aircraft braking.

Landing – Wet and contaminated runways

An operator shall ensure that when the appropriate weather reports or forecasts, or a combination thereof, indicate that the runway at the estimated time of arrival may be wet, the landing distance available is at least 115% of the required landing distance, determined .

DYNAMIC HYDROPLANING :

Aquaplaning also known as hydroplaning, is a condition that exists when landing on a surface with standing water deeper than the tread depth of the tires. When the brakes are applied, there is a possibility that the brake will lock up and the tire will ride on the surface of the water, much like a water ski. When the tires are hydroplaning, directional control and braking action are virtually impossible. An effective anti-skid system can minimize the effects of hydroplaning.

QUESTIONS

1. MMEL is drawn up by:

A) The operator and approved by the certification authority
B) The manufacturer and approved by the DGCA
C) The operator from a main list drawn up by the manufacturer

2. The Minimum Equipment List (MEL) is established by:

A) The airline operator
B) The aeronautical authority the airline operator depends on
C) The manufacturer

3 A piece of equipment on your public transport airplane fails while you are still parked. The reference document you use in the first place to decide on the procedure to follow is:

A) The minimum equipment list
B) The flight manual
C) The operation manual's chapter "Abnormal and Emergency Procedures"

4. The minimum equipment list of a public transport airplane is to be found in the:

A) Flight manual
B) Operation manual
C) CAR OPS

5. In public transport, prior take-off in icing conditions, the captain must check that:

A) External surfaces are free from any ice accretion which may impede the airplane performance and manoeuvrability, except within the limits specified by the flight manual
B) External surfaces are free from any ice accretion greater than 5mm
C) Possible ice accretions do not cause to exceed weight and balance limits

6. The accumulation of snow or ice on an aircraft in flight induces an increase in the:

A) Value of the stall angle of attack
B) Roll rate
C) Stalling speed

7. **Which of the following requirements should be met when planning a flight with icing conditions:**
   A) The flight should be planned so that a change of cruising level can be initiated rapidly
   B) The aircraft shall before flight sprayed with anti-icing fluid
   C) The aircraft shall be equipped with approved ice-protection systems

8. **You are the captain of a commercial airplane and you notice, after take-off, a flock of birds which may present a bird strike hazard, you must:**
   A) Immediately inform the appropriate ground station
   B) Draft a bird strike hazard report upon arrival and within at most 48 hours
   C) Inform the appropriate ground station within a reasonable period of time

9. **What is the most effective method for scaring birds?**
   A) Land rover with loudspeaker.
   B) Shell crackers.
   C) Making movement.

10. **90% of bird strikes occur:**
   A) Under 500 m.
   B) Between 500 and 1 500 m.
   C) Above 1 000 m.

11. **The observations and studies conducted on the behaviour of birds on the ground, ahead of an aircraft taking off and having reached an average speed of 135 kt, show that birds fly away:**
   A) From the beginning of the takeoff roll.
   B) About ten seconds beforehand.
   C) About two seconds beforehand.

12. **Who has the responsibility for establishing operating procedures for noise abatement purposes during instrument flight in compliance with ICAO PANS OPS the:**
   A) Operator
   B) State in which the aeroplane is operating
   C) Commander

13. **About procedures for noise attenuation during landing:**
   A) Such procedures will not involve the prohibition of using reverse thrust
   B) Such procedures do not exist
   C) They prohibit the use of reverse thrust

14. **Noise abatement shall not be the determining factor in the designation of a runway, under the following circumstances:**
   1. when cross wind component, including gust, exceeds 15kt
   2. when the tailwind component, including gust, exceeds 5 kt
   3. when the runway is not clear or dry
   The combination of correct statements is:
   A) 1, 3
   B) 2, 3
   C) 1, 2, 3

15. **In accordance with (ICAO) DOC 8168 - OPS, noise preferential routes are established to ensure that departing and arriving aeroplanes avoid over flying noise-sensitive areas in the vicinity of the aerodrome as far as practicable. In establishing noise preferential routes:**
   A) No turns should be required coincident with a reduction of power associated with a noise abatement procedure.
   B) Turns during take-off and climb should not be required unless the bank angle for turns is limited to 28° (climbing at V2 + 10 to 20 Kt).
   C) Turns during take-off and climb should not be required unless the aeroplane has reached and can maintain throughout the turn a height of no less than 100 m above terrain and the highest obstacle.

16. **What precludes a runway being used for noise abatement procedures if landing in VMC?**
   A) Tailwind up to 3kts.
   B) No ILS or visual guidance.
   C) Crosswind including gusts of 10kts.

17. **During an approach procedure which involves noise abatement, the aeroplane is to be in the final landing configuration at any point after passing the ... or at a point ... from the threshold of the landing runway, whichever is earlier.**
   A) Final marker, 6NM
   B) Middle marker, 5NM
   C) Outer marker, 5NM

18. **In case of an engine nozzle fire while on ground you:**
   A) Pull the fire shut off handle and trigger the engines fire-extinguisher
   B) Carry out a dry cranking
   C) Carry out a damp cranking

19. To extinguish a fire in the cockpit, you use:

1. A water fire-extinguisher 2. A powder or chemical fire-extinguisher
3. A halon fire-extinguisher 4. A CO_2 fire-extinguisher
The combination of correct statements is:

A) 2, 3, 4
B) 1, 2
C) 3, 4

20. You will use a CO_2 fire-extinguisher for:

1. A paper fire 2. A plastic fire 3. A hydrocarbon fire 4. An electrical fire
The combination of correct statements is:

A) 3, 4
B) 1, 2, 3
C) 1, 2, 3, 4

21. You will use a dry chemical powder fire-extinguisher for:

1. A paper fire 2. A plastic fire 3. A hydrocarbon fire 4. An electrical fire
The combination of correct statements is:

A) 1, 4
B) 1, 2, 3
C) 1, 2, 3, 4

22. CO_2 type extinguishers are fit to fight:

1. Class A fires 2. Class B fires
3. Electrical source fires 4. Special fires: metals, gas, chemical product
The combination of correct statements is:

A) 1, 2, 3
B) 1, 3, 4
C) 2, 3, 4

23. To fight a fire in an air-conditioned cargo hold:

A) You turn off the cargo hold ventilation and extinguish fire
B) Extinguish fire only
C) Fire-fighting is not necessary, since the transport of combustible goods in an air-conditioned cargo hold is forbidden

24. In case of a fire due to the heating of the brakes, you fight the fire using:

1. A dry powder fire extinguisher 2. A water spray atomizer
3. A water fire-extinguisher 4. A CO_2 fire-extinguisher to the maximum
The combination of correct statements is:

A) 1, 2
B) 1, 4
C) 3, 4

25. A class A fire is a fire of:

A) Electrical origin
B) Solid material, generally of organic nature
C) Liquid or liquefiable solid

26. After landing, in case of high temperature of the brakes you:

A) Release the parking brake and you approach the wheels sidewards
B) Release the parking brake and you approach the wheels either from aft or fore
C) Apply the parking brake and approach the wheels sidewards

27. H_2O extinguishers are fit to fight:

A) Class A fires
B) Electrical source fires
C) Class B fires

28. The fire-extinguisher types which may be used on Class B fires are:

1. H_2O 2. CO_2 3. Dry-chemical 4. Halogen
The combination of correct statements is:

A) 3, 4
B) 1, 2, 3, 4
C) 2, 3, 4

29. The fire-extinguisher types which may be used on Class A fires are:

1. H_2O 2. CO_2 3. Dry-chemical 4. Halogen
The combination of correct statements is:

A) 3, 4
B) 1, 2, 3, 4
C) 2, 3, 4

30. A dry-chemical type fire extinguisher is fit to fight:
1. Class A fires 2. Class B fires
3. Electrical source fires 4. Special fires: metals, gas, chemicals
The combination of correct statements is:
A) 1, 2, 3, 4
B) 3, 4
C) 1, 2, 3

31. A fire occurs in a wheel and immediate action is required to extinguish it. The safest extinguishant to use is:
A) CO_2 (carbon dioxide)
B) Foam
C) Dry powder

32. To use passengers oxygen in case of severe cabin smoke is:
A) Useless because breathing oxygen would explode under smoke conditions
B) Useless because the toxical cabin smoke is mixed with the breathing oxygen
C) Possible and recommended

33. Following a heavy mass landing on a short runway, you should check the:
A) Temperature of the brakes
B) Pressure of the hydraulic fluid
C) Pressure of the pneumatic tyres

34. The correct statement about extinguishing agents on board aeroplanes is:
A) Water may only be used for minor fires
B) Burning cargo in cargo-aeroplanes is usually extinguished by using carbon dioxide
C) Halon is an effective extinguishing agent for use in aeroplanes

35. If smoke appears in the air conditioning, the first action to take is to:
A) Determine which system is causing the smoke
B) Begin an emergency descent
C) Put on the mask and goggles

36. Beneath fire extinguishers the following equipment for the fire fighting is on board:
A) A hydraulic winch and a big box of tools
B) A big bunch of fire extinguishing blankets
C) Crash axes or crowbars

37. A class B fire is a fire of:
A) Liquid or liquefiable solid
B) Solid material usually of organic nature
C) Special fire: metal, gas, chemical product

38. Fire fighting in the toilets must be performed with:
A) All available extinguishers simultaneously
B) All available extinguishers in sequence
C) All available liquids

39. The system which must be switched off in case of a belly compartment fire is generally the:
A) Ventilation of the cargo compartment
B) Trim air
C) Pressurization

40. You will use a water fire-extinguisher (straight jet) on a fire of:
1. Solid (fabric, carpet, ...) 2. Liquids (ether, gasoline, ...)
3 Gas 4. Metals (sodium, ...)
The combination of correct statements is:
A) 3
B) 1
C) 2

41. You will use a halon extinguisher for a fire of:
1. Solids (fabric, plastic, ...) 2. Liquids (alcohol, gasoline, ...)
3. Gas 4. Metals (aluminium, magnesium, ...)
The combination of correct statements is:
A) 1, 2, 4
B) 1, 2, 3, 4
C) 1, 2, 3

42. An engine fire warning will switch on the relevant fire shut-off-handle. The fire shut-off-handle will be switched off when:
A) Fire is no longer detected
B) The fire-extinguisher has been triggered
C) The fire shut-off handle has been pulled

43. A 1211 halon fire-extinguisher can be used for:

1. A paper fire 2. A fabric fire 3. An electric fire
4. A wood fire 5. A hydrocarbon fire
The combination of correct statements is:

A) 2, 4, 5
B) 2, 3, 4
C) 1, 2, 3, 4, 5

44. A CO_2 fire extinguisher can be used for:

1. A paper fire 2. A hydrocarbon fire 3. A fabric fire
4. An electrical fire 5. A wood fire
The combination of correct statements is:

A) 2, 4, 5
B) 1, 2, 3, 4, 5
C) 1, 3, 5

45. A water fire-extinguisher can be used without restriction for:

1. A paper fire 2. A hydrocarbon fire 3. A fabric fire
4. An electrical fire 5. A wood fire
The combination of correct statements is:

A) 2, 3, 4
B) 1, 2, 3, 4, 5
C) 1, 3, 5

46. After a landing, with overweight and over speed conditions, the tyres and brakes are extremely hot. The fireguards should approach the landing gear tyres:

A) Only from left or right sides
B) From any side
C) Only from front or rear side

47. For a flight deck fire which of the following do you use?

1. BCF.
2. Halon.
3. Dry Powder.
4. Water.

A) 1, 2 & 3.
B) 1, 2, 3 & 4.
C) 1 & 2.

48. An aircraft is configured for seating 61 to 200 passengers. What is the requirement for hand held fire extinguishers.

A) 4 conveniently located in the passenger compartment.
B) 2 conveniently located in the passenger compartment.
C) 3 conveniently located in the passenger compartment.

49. The number of hand fire extinguishers which must be conveniently located in the passenger compartment when the maximum approved passenger seating configuration is between 401 and 500 is:

A) 3.
B) 6.
C) 5.

50. Water fire extinguisher with a directed spray can be used on which fires?

A) Gas fires.
B) Liquid fires.
C) Solid fires.

51. You will use a Halon extinguisher for a fire of:

1. Solids (fabric, plastic, ...) 2. liquids (alcohol, gasoline, ...)
3. Gas 4. metals (aluminium, magnesium, ...)

A) 2, 3, 4
B) 1 ,2, 4
C) 1, 2, 3

52. Fire extinguishers should be located in the pilots compartment and...

A) At each passenger compartment that is separate from the pilots compartment and not readily accessible to the flight crew.
B) In the passenger cabin.
C) At each door.

53. In case of an engine jet pipe fire while on the ground you:

A) Carry out a wet motoring cycle.
B) Carry out a dry motoring cycle.
C) Pull the fire shut off handle and trigger the engines fire extinguishers.

54. If cabin altitude increases during level flight, the differential pressure:

A) Decreases
B) Remains constant
C) Increases

55. **The minimum requirements for Supplemental Oxygen to be supplied in pressurised aeroplanes during and following an emergency descent are that for pilots it shall be available for the entire flight time that the cabin pressure altitude exceeds a minimum of X feet. That minimum of X feet is:**
A) 13000ft
B) 14000ft
C) 15000ft

56. **A slow decompression may be caused by:**
A) loss of a cabin window
B) a leak in a door seal during normal pressurised flight
C) loss of a door

57. **When flying in straight and level flight at FL290 for some considerable time a small leak develops in the cabin which causes a slow depressurisation, this can be seen on the cabin rate of climb indicator which will indicate:**
A) A rate of climb
B) Zero
C) A rate of descent of approximately 300fpm

58. **An aeroplane suffers an explosive decompression at an altitude of 31000ft. What is the initial action by the operating crew?**
A) Place the seat belts signs to ON
B) To put on oxygen masks
C) Transmit a MAYDAY message

59. **A slow decompression may be caused by:**
1 a cracked window
2 a bad functioning of the pressurization
3 a minor leak in the fuselage
4 the loss of a door
The combination of correct statements is:
A) 1, 2
B) 3, 4
C) 1, 2, 3

60. **A fast decompression is recognizeable by the following elements:**
1. Mist in the cabin
2. Blast towards the exterior of the aircraft
3. Expansion of body gases
4. Blast of air released violently from the lungs
The combination of correct statements is:
A) 1, 4
B) 1, 2, 3, 4
C) 1, 2, 3

61. **Supplemental oxygen is used to:**
A) provide people on board with oxygen during a cabin depressurisation
B) protect a crew who fights a fire
C) assist a passenger with breathing disorders

62. **Oxygen should be used after rapid decompression in an emergency descent until what altitude?**
A) 14000ft.
B) 13000ft.
C) 10000ft.

63. **In case of an unexpected encounter with windshear, you will:**
1. set the maximum take-off thrust
2. increase the pitch-up attitude up to the limit actuating the stick shaker
3. pull in the drag devices (gear and flaps)
4. keep the airplane's current configuration
5. try to reach the maximum lift-to-drag ratio
The combination of correct statements is:
A) 1, 2, 4
B) 1, 3, 5
C) 3, 5

64. If you encounter a "microburst" just after taking-off, at the beginning you will have:

1. A head wind
2. A strong rear wind
3. Better climb performances
4. A diminution of climb gradient
5. An important thrust drop
The combination of correct statements is:

A) 1, 4
B) 1, 3
C) 4, 5

65. During a landing approach, the aircraft is subjected to windshear with an increasing tailwind. In the absence of a pilot action, the aircraft:

1. flies above the glide path
2. flies below the glide path
3. has an increasing true airspeed
4. has a decreasing true airspeed
The combination of correct statements is:

A) 2, 3
B) 1, 4
C) 2, 4

66. Wind shear may be described as a change in wind direction and/or speed in space, including up draughts and downdraughts. To counter the effects of windshear the amount of control action that is required is:

A) Substantial
B) Medium
C) Null

67. While approaching the outer-marker, the tower informs you about the presence of a "microburst". You will expect to encounter:

A) Convection motion of air mass
B) Supercooled water
C) Windshear (vertical and horizontal)

68. One of the main characteristics of windshear is that it:

A) Occurs only at a low altitude (2000ft) and never in the horizontal plane
B) Can occur at any altitude in both the vertical and horizontal planes
C) Can occur at any altitude and only in the horizontal plane

69. Which one of the following magnitudes will be the first to change its value when penetrating a wind shear?

A) Indicated airspeed
B) Groundspeed
C) Vertical speed

70. An aircraft which experiences a headwind of 40kt while making its way towards the centre of a microburst may expect, when crossing the microburst, to face a windshear of:

A) 40kt
B) 80kt
C) 20kt

71. When a commercial transport passenger airplane is equipped with a door in the flight crew compartment area, this door must include:

A) A locking system to prevent any unauthorized access
B) A sealing system allowing the maintenance for as long as possible of the pressure in the cockpit in case of a depressurization in the compartment area
C) Distinctive red or yellow colored markings indicating the access area (in case of a blocked door)

72. In addition to inform each State, whose citizens are known to be on board an aircraft, the State of the country in which an aircraft has landed after an act of unlawful interference must immediately notify the:

A) State of Registry of the aircraft, the State of the operator and ICAO
B) State of Registry of the aircraft and the State of the operator only
C) State of Registry of the aircraft and the DGCA

73. In case of a hi-jack, the squawk code is:

A) 2000
B) 7500
C) 7700

74. The flight deck door should be capable of being:

A) Remotely locked from either inside or outside the compartment
B) Remotely locked by cabin crew operation from outside the compartment
C) Locked from within the compartment

75. Who has the responsibility to take adequate measures for the safety of passengers and crew of an aircraft which is subjected to an act of unlawful interference until their journey can be continued? The:

A) Contracting State in which the unlawful interference occurs
B) Commander of the aircraft
C) DGCA

76. Following an act of unlawful interference on board an aeroplane, to whom the commander should submit a report of the act to:

A) Both the local authority and the Authority of the State of the operator
B) The local Authority only
C) The Authority of the State within which the aeroplane is operating at the time of the unlawful interference

77. When flight crew members are at their duty stations they must:

A) Wear a communications head set.
B) Keep the seat belts fastened.
C) Fully raise the seat.

78. In addition to informing each State, whose citizens are known to be on board an aircraft, the State of the country in which an aircraft has landed after an act of unlawful interference must immediately notify the:

A) State of Registry of the aircraft, the State of the operator and ICAO.
B) State of Registry of the aircraft and the State of the operator only.
C) State of the operator, the J.A.A. and ICAO.

79. In case of ditching, the cabin attendants will:

1. evacuate women and children first
2. have the passengers embark directly in the life rafts
3. prevent passenger movements which may impede the airplane's flotation ability
4. ensure the complete evacuation of the airplane

The combination of correct statements is:

A) 1, 4
B) 2, 3, 4
C) 2, 3

80. Mist in the cabin, pressure and temperature drop characterize:

A) A fast depressurization
B) A plastic fire
C) A slow depressurization

81. In the event of a precautionary landing, who is responsible for alerting the emergency services?

A) The operations dispatcher.
B) The commander.
C) ATC.

82. If ditching is inevitable:

A) Passengers should be briefed that even if they successfully evacuate the aeroplane it is inevitable that some of them will die from drowning.
B) The use of life jackets is to be reiterated before the ditching.
C) Life jackets are to be inflated before leaving the aeroplane.

83. From the following list:

1. Fuel jettisoning system and its operation are free from fire hazard
2. The fuel discharges clear of any part of the aeroplane
3. Fuel fumes do not enter any part of the aeroplane
4. The jettison operation does not adversely affect the controllability of the aeroplane

Which of the above are requirements that must be shown to exist during fuel jettisoning tests:

A) 1, 4
B) 1, 2, 3, 4
C) 2, 3

84. Fuel Jettison should be carried out:

A) Anywhere if unavoidable.
B) Above 6,000ft AGL.
C) All answers are correct.

85. Fuel Jettison:

A) May be ordered by ATC to reduce aeroplane mass in an emergency situation.
B) Is a procedure to reduce mass in an emergency only.
C) Is a procedure that may be employed to reduce aeroplane mass where an overweight landing may result in damage to the aeroplane.

86. A list of dangerous goods, which may not be transported by air, can be found in:

A) The shipper's declaration for dangerous goods
B) The technical instructions for the safe transport of dangerous goods by air
C) Annex 18 to the Chicago convention

87. In compliance with the CAR-OPS, in order to carry hazardous materials on board a public transport airplane, they must be accompanied with a:

A) Representative of the company owning the materials
B) Specialized handling employee
C) Transport document for hazardous materials

88. The general information, instructions and recommendations on the transport of hazardous materials are specified in the:

A) AIP (Aeronautical Information Publication)
B) Operation manual
C) Flight manual

89. Products or materials are considered to be dangerous goods if the products or materials in question are defined as such by:

A) The IATA document entitled "Regulations governing the transportation of dangerous goods by air"
B) The directive of the Community Union
C) The ICAO document entitled "Technical Instructions for the safe transportation of dangerous goods by air"

90. ICAO Appendix 18 is a document dealing with:

A) The air transport of live animals
B) The safety of the air transport of hazardous materials
C) The noise pollution of aircraft

91. The dangerous goods transport document, if required, shall be drawn up by:

A) The shipper
B) The handling agent
C) The captain

92. Can dangerous goods be carried in the passenger cabin or on the flight deck?

A) Yes, provided they are non toxic.
B) Yes, if authorised by the authority.
C) Yes, but only goods specified in the technical instructions

93. Your flight manual does not include specific supplementary information on landing distances on wet runways and the service bulletins or weather reports indicate that the runway may be wet at the estimated time of arrival. The required landing distance on a dry runway must be increased by:

A) 15%
B) 18%
C) 17.6%

94. A runway is considered damp when:

A) Its surface is not dry, and when surface moisture does not give a shiny appearance
B) It is covered with a film of water of less than 3mm
C) Surface moisture gives it a shiny appearance

95. A runway is considered wet when:

1. It is covered with a quantity of water or loose or slushy snow less than or equal to the equivalent of 3mm of water
2. The amount of surface moisture is sufficient to modify its colour but does not give it a shiny appearance
3. The amount of surface moisture is sufficient to make it reflective, but does not create large stagnant sheets of water
4. It bears stagnant sheets of water

The combination of correct statements is:

A) 1, 2
B) 1, 2, 3
C) 1, 3

96. The presence of dynamic hydroplaning depends primarily on the:

A) Strength of the headwind
B) Aircraft's weight
C) Depth of the standing water of the runway

97. The braking efficiency is a piece of information presenting itself in the form of a:

A) Letter falling between A and E
B) Combination of the terms: poor, medium, good
C) Zero followed by two decimals

98. A runway covered with 4 mm thick water, is said to be:

A) Contaminated.
B) Flooded.
C) Damp.

99. A runway is considered damp when:

A) It is covered with a film of water of less than 1 mm.
B) Its surface is not dry, and when surface moisture does not give it a shiny appearance
C) It is covered with a film of water of less than 3 mm.

100. The effect whereby a tyre is lifted from the runway due to aeroplane speed along the runway is known as:

A) Surface tension.
B) Hydroplaning.
C) Aqua-skimming.

101. Viscous hydroplaning is caused by:

A) A smooth and dirty runway surface.
B) Bald tyres.
C) A rough runway surface.

102. What is the shortest distance in a sequence for landing between a "Heavy" aircraft preceeding a "Light" aircraft

A) 3NM
B) 6NM
C) 2km

103. A separation minimum shall be applied between a LIGHT or MEDIUM aircraft and a HEAVY aircraft and between a LIGHT aircraft and a MEDIUM aircraft when the heavier aircraft is making a low or missed approach and the lighter aircraft is landing on the same runway in the opposite direction or on a parallel opposite direction runway separated by:

A) Less than 730m
B) Less than 760m
C) 730m

104. A separation minimum shall be applied between a LIGHT or MEDIUM aircraft and a HEAVY aircraft and between a LIGHT aircraft and a MEDIUM aircraft when the heavier aircraft is making a low or missed approach and the lighter aircraft utilizing an opposite direction runway for take off, this minimum is:

A) 2 minutes
B) 3 minutes
C) 1 minute

105. In order to meet the wake turbulence criteria, what minimum separation should be applied when a MEDIUM aircraft is taking off behind a HEAVY aircraft and both are using the same runway?

A) 1 minute
B) 3 minutes
C) 2 minutes

106. In order to meet wake turbulence criteria, for arriving aircraft and using timed approaches, what minima shall be applied to aircraft landing behind a heavy or a medium aircraft?

A) Medium aircraft other medium aircraft- 2 minutes
B) Medium aircraft behind heavy aircraft- 3 minutes
C) Medium aircraft behind heavy aircraft- 2 minutes

107. What is the minimum wake turbulence separation criteria when a LIGHT aircraft is taking off behind a MEDIUM aircraft and both are using the same runway?

A) 1 minute
B) 3 minutes
C) 2 minutes

108. The letter "L" is written in the wake turbulence box of a flightplan form when the maximum certified take-off weight of an aircraft is less than or equal to:

A) 14000kg
B) 20000kg
C) 7000kg

109. Wake turbulence risk is highest:

A) If, just before landing a much lighter aircraft has landed at the same runway with heavy crosswind.
B) When a heavy aircraft has just performed a take-off at a closely situated parallel runway with a light crosswind.
C) When a preceding aircraft has briefly applied take-off thrust just prior to take off.

ANSWERS

1	2	3	4	5	6	7	8	9	10	11	12	13	14
B	A	A	B	A	C	C	A	B	A	C	A	A	C

15	16	17	18	19	20	21	22	23	24	25	26	27	28
A	B	C	B	C	C	C	A	A	A	B	B	A	C

29	30	31	32	33	34	35	36	37	38	39	40	41	42
B	A	C	B	A	C	C	C	A	A	A	B	C	A

43	44	45	46	47	48	49	50	51	52	53	54	55	56
C	B	C	C	C	C	B	C	C	A	B	A	A	B

57	58	59	60	61	62	63	64	65	66	67	68	69	70
A	B	C	B	A	C	A	B	C	A	C	B	A	B

71	72	73	74	75	76	77	78	79	80	81	82	83	84
A	A	B	C	A	A	B	A	B	A	C	B	B	C

85	86	87	88	89	90	91	92	93	94	95	96	97	98
B	B	C	B	C	B	A	C	A	A	C	C	B	A

99	100	101	102	103	104	105	106	107	108	109
B	B	A	B	B	A	C	C	C	C	B

19

COMMUNICATIONS

(Ref: ICAO ANNEXUTE10, DOC 4444, AIP INDIA)

VFR COMMUNICATIONS

Definitions

See chapter 1 of volume 1 for definitions and abbreviations.

Commonly Used Abbreviations Specific to R/T:

Some abbreviations, which by their common usage have become part of aviation terminology, may be spoken using their constituent letters rather than the spelling alphabet, for example, ILS, QNH, RVR, etc.

Q-code groups commonly used in RTF air-ground communications :

	Question	Answer or Advice
QDL	Do you intend to ask me for a series of bearings?	I intend to ask you for a series of bearings.
QDM	Will you indicate the MAGNETIC heading for me to steer towards you (or ...) with no wind?	The MAGNETIC heading for you to steer to reach me (or ...) with no wind was ... degrees (at ... hours).
QDR	What is my MAGNETIC bearing from you (or from ...)?	Your MAGNETIC bearing from me (or from...) was ... degrees (at ... hours).
QFE	What should I set on the subscale of my altimeter so that the instrument would indicate its height above the reference elevation being used?	If you set the subscale of your altimeter to read ... millibars, the instrument would indicate its height above aerodrome elevation (above threshold, runway number ...).
QFU	What is the magnetic direction (or number) of the runway to be used?	The magnetic direction (or number) of the runway to be used is ... Note:– The runway number is indicated by a two-figure group and the magnetic direction by a three-figure group.

	Question	Answer or Advice
QGH	May I land using ... (procedure or facility)?	You may land using ... (procedure or facility).
QNE	What indication will my altimeter give on landing at ... (place) at ... hours, my sub-scale being set to 1013.2 millibars (29.92 inches)?	On landing at ... (place) at ... hours, with your sub-scale being set to 1013.2 millibars (29.92 inches), your altimeter will indicate ... (figures and units).
QNH	What should I set on the subscale of my altimeter so that the instrument would indicate its elevation if my aircraft were on the ground at your station?	If you set the subscale of your altimeter to read ... millibars, the instrument would indicate its elevation if your aircraft were on the ground at my station at ... hours. Note:– When the setting is given in hundredths of inch the abbreviation INS is used to identify the units.
QTE	What is my TRUE bearing from you? or What is my TRUE bearing from ... (call sign)? or What is the TRUE bearing of ... (call sign) from ... (call sign)?	Your TRUE bearing from me is ... degrees at ... hours. or Your TRUE bearing from ... (call sign) was ... degrees at ... hours. or The TRUE bearing of ... (call sign) from ... (call sign) was ... degrees at ... hours.
QUJ	Will you indicate the TRUE track to reach you (or ...)?	The TRUE track to reach me (or ...) is degrees at ... hours.

Categories of Messages

a) Distress messages, distress calls, and distress traffic (MAY DAY).

b) Urgency messages: Urgency message, including message preceded by the medical transports signals (PAN PAN or PAN PAN MEDICAL).And securite (SECURITE, SECURITE, SECURITE).

c) Communications relating to direction finding

d) Flight safety messages

e) Meteorological messages

f) Flight Regularity messages

General Operating Procedures

Application	Example	Transmitted as	Pronounced as
Aircraft callsign	AI 235	Air India 235	Air India TOO TREE FIFE
	6E 146	IFLY 146	IFLY WUN FOWer SIX
Flight levels	FL 180	flight level one eight zero	flight level WUN AIT ZE-RO
	FL 200	flight level two zero zero	flight level TOO ZE-RO
	FL 70	flight level seven zero	flight level SEVen ZE-RO
Headings	150	heading one five zero	heading WUN FIFE ZE-RO
	080	heading zero eight zero	heading ZERO AIT ZE-RO
	300	heading three zero zero	heading TREE ZE-RO
Wind direction and speed	020 degrees 70 knots	wind zero two zero degrees seven zero knots	wind ZE-RO TOO ZE-RO degrees SEVen ZE-RO knots
	100 degrees 18 knots	wind one zero zero degrees one eight knots	wind WUN ZE-RO ZE-RO degrees WUN AIT knots
	210 degrees 18 knots gusting 30 knots	wind two one zero degrees one eight knots gusting three zero knots	wind TOO WUN ZE-RO degrees WUN AIT knots gusting TREE ZE-RO knots
Runway designator	19	runway one nine	runway WUN NINer
	06	runway zero six	runway ZE-RO SIX
	23L	runway two three left	runway TOO TREE left
Mach number	0.84	Mach decimal eight four	Mach DAY SEE MAL AIT FOWer
Altimeter setting	984 hPa	QNH nine eight four	QNH NINer AIT FOWer
	1027 hPa	QNH one zero two seven	QNH WUN ZE-RO TOO SEVen
Frequencies	128.3 MHz	one two eight decimal three	WUN TOO AIT DAY SEE MAL TREE
	135.75 MHz	one three five decimal seven five	WUN TREE FIFE DAY SEE MAL SEVen FIFE
	5643 kHz	five six four three	FIFE SIX FOWer TREE

All numbers used in the transmission of altitude, height, cloud height, visibility and runway visual range information which contain whole hundreds and whole thousands shall be transmitted by pronouncing each digit in the number of hundreds or thousands followed by the word HUNDRED or TOUSAND as appropriate. Combinations of thousands and whole hundreds shall be transmitted by pronouncing each digit in the number of thousands followed by the word THOUSAND and the number of hundreds followed by the word HUNDRED.

Transmission of Time:	**Time**	**Statement**
When transmitting time, only the minutes of the hour are normally required. However, the hour should be included if there is any possibility of confusion.	0920 (9:20 A.M.) 1643 (4:43 P.M.)	TOO ZE-RO or ZE-RO NIN-er TOO ZE-RO FOW-er TREE or WUN SIX FOW-er TREE
Time checks shall be given to the nearest half minute. Coordinated Universal Time (UTC) is to be used at all times, unless specified. 2400 hours designates midnight, the end of the day, and 0000 hours the beginning of the day.	**175321 (5:53:21 P.M.)**	**FIFE TREE AND A HALF or WUN SEVEN FIFE TREE AND A HALF**

Phrase	Meaning
ACKNOWLEDGE:	"Let me know that you have received and u derstood this message."
AFFIRM:	"Yes."
APPROVED:	"Permission for proposed action granted."
BREAK:	"I hereby indicate the separation between portions of the message." *To be used where there is no clear distinction between the text and other portions of the message.*
BREAK BREAK:	"I hereby indicate the separation between messages transmitted to different aircraft in a very busy environment."

Phrase	Meaning
CANCEL:	"Annul the previously transmitted clearance."
CHANGING TO:	When transferring to a pilot-to-controller channel: Aircraft: CHANGING TO . . . (air traffic services unit concerned)
CHECK:	"Examine a system or procedure." *Not to be used in any other context. No answer is normally expected.*
CLEARED:	"Authorized to proceed under the conditions specified.
CLEARED FOR IMMEDIATE TAKE OFF	Taxi immediately to runway and commence take off without stop.
CLIMB	"Climb to a FL, Altitude or Height."
CONFIRM:	"I request verification of: *clearance, instruction, action, information*".
CONTACT:	"Establish communications with..."
CORRECT:	"True" or "Accurate".
CORRECTION:	"An error has been made in this transmission (or message indicated). The correct version is.."
CORRECTION, I SAY AGAIN:	If a correction can best be made by repeating the entire message, the operator shall use the phrase "CORRECTION, I SAY AGAIN" before transmitting the message a second time.

Phrase	Meaning
DESCEND	"Descend to a FL, Altitude or Height." over Chennai.
DISREGARD:	"Ignore."
HOLD SHORT:	"Stop before reaching the specified location." *Only used in limited circumstances where no defined Point exists (e.g. Where there is no suitably located holding Point), or to reinforce a clearance limit.*
HOW DO YOU READ:	"What is the readability of my trans- mission?"
I SAY AGAIN:	"I repeat for clarity or emphasis."
LANDED:	After landing: Aircraft: LANDED . . . (location) . . . (time)
MAINTAIN:	"Continue in accordance with the condition(s) specified" or in its literal sense, e.g. "Maintain VFR".
MONITOR:	"Listen out on (frequency)."

Note: The phrase **"GO AHEAD"** *has been deleted. In its place the use of the calling aeronautical station's call sign followed by the answering aeronautical stations's call sign shall be considered the invitation to proceed with transmission by the station calling.*

Phrase	Meaning
NEGATIVE:	"No" *or* "Permission not granted" *or* "That is not correct" *or* "Not capable".
NEGATIVE, I SAY AGAIN:	If, in checking the correctness of a read back, an operator notices incorrect items, he shall transmit the words "NEGATIVE I SAY AGAIN" at the conclusion of the read back followed by the correct version of the items concerned.
OPERATIONS NORMAL:	When "operations normal" reports are transmitted by aircraft, they should consist of the prescribed call followed by the words "OPERATIONS NORMAL".
OVER:	"My transmission is ended, and I expect a response from you." *Not normally used in VHF communications*
OUT:	"This exchange of transmissions is ended and no response is expected." *Not normally used in VHF communications*
READ BACK:	"Repeat all, or the specified part, of this message back to me exactly as received."
RECLEARED:	"A change has been made to your last clearance and this new clearance supersedes your previous clearance or part thereof."
REPORT:	"Pass me the following information..."
REQUEST:	"I should like to know..." or "I wish to obtain..."

Phrase	Meaning
ROGER:	"I have received all of your last transmission." *Under no circumstances to be used in reply to a question requiring "READ BACK" or a direct answer in the affirmative (AFFIRM) or negative (NEGATIVE).*
SAY AGAIN: **SAY AGAIN...(item), SAY AGAIN all after, SAY AGAIN all before, SAY AGAIN all between...and...**	"Repeat all, or the following part, of your last transmission."
SPEAK SLOWER:	"Reduce your rate of speech."
STANDBY:	"Wait and I will call you." ***The caller would normally re-establish contact if the delay is lengthy. STANDBY is not an approval or denial.***
UNABLE / IMPOSSIBLE:	"I cannot comply with your request, instruction or clearance" *(normally followed by a reason.)* /"To indicate that a request can not be complied with, or that a requested maneuver can not be executed."
VERIFY	"Confirm from originator"
WILCO *(Abbreviation for "will comply")*:	"I understand your message and will comply with it."
WORDS TWICE:	"a) *As a request:* Communication is difficult. Please send every word, or group of words, twice." b) *As information:* "Since communication is difficult, every word, or group of words, in this message will be sent twice."

CALL SIGNS FOR AERONAUTICAL STATIONS:

Unit/Service available	Call sign suffix
Area Control Centre	CONTROL
Upper/Lower Control Area	UPPER/LOWER CONTROL
Approach Control	APPROACH
Approach Control Radar/ Area Control Radar	APPROACH RADAR/ CONTROL RADAR
Aerodrome Control	TOWER
Surface Movement Control	GROUND
Radar (in general)	RADAR
Precision Approach Radar	PRECISION
Direction-finding Station	HOMER
Flight Information Service	INFORMATION
Clearance Delivery	DELIVERY
Apron Control	APRON
Company Dispatch	DISPATCH
Aeronautical Station	RADIO
Flow Control	FLOW

READ BACK AND ACKNOWLEDGEMENT REQUIREMENTS

Read Back Requirements:

The flight crew shall read back to the air traffic controller safety-related parts of the clearances and instructions which are transmitted by voice. Information and items not included below may be acknowledged by Aircraft call sign or by an abbreviated read back.

QNH is always read back. Following items shall always be read-back:

a) ATC route clearance;

b) Clearances and instructions to enter, land on, take off on, hold short of, cross taxi and back track 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 broadcast, transition levels.

Transfer of Communication

An aircraft will normally be advised by the appropriate aeronautical station to change from one radio frequency to another in accordance with agreed procedures.

In the absence of such advice, the aircraft shall notify the aeronautical station before such a change takes place. Aircraft flying in controlled airspace must obtain permission from the controlling authority before changing frequency.

An aircraft may be instructed to standby on a frequency when it is intended that the ATSU will initiate communications, and to monitor a frequency on which information is being broadcast.

Test procedures including readability scale :

All radio transmissions for test purposes shall be of the minimum duration necessary for the test and shall not continue for more than 10 seconds. The recurrence of such transmissions shall be kept to the minimum necessary for the test.

When the tests are made, the following readability scale should be used:

Scale	Readability
1	Unreadable
2	Readable now and then
3	Readable but with difficulty
4	Readable
5	Perfectly readable

Type	Example
a) Character corresponding to the registration marking of the aircraft.	**VTEJP OR CESSNA VTEJP**
b) The telephony designator of the aircraft operating agency, followed by the last four characters of the registration marking of the aircraft.	**AIRINDIA TEJP**
c) The telephony designator of the aircraft operating agency, followed by the flight identification.	**AIRINDIA 809**

After satisfactory communication has been established, and provided that no confusion is likely to occur, aircraft call signs may be abbreviated as follows:

Type	Example
a) The first character of the registration and at least the last two characters of the call sign.	**VJP OR CESSNA VJP**
b) The telephony designator of the aircraft operating agency, followed by at least the last two characters of the call sign.	**AIRINDIA JP**
c) The telephony designator of the aircraft operating agency, followed by the flight identification.	**No abbreviated** form

RADAR PROCEDURAL PHRASEOLOGY

Radar Identification of Aircraft

An aircraft must be identified before it can be provided with a radar service. However, the act of identifying aircraft is not a service in itself and pilots should not assume that they are receiving a radar service, particularly when they are flying outside controlled airspace. When a controller has identified an aircraft he will inform the pilot, according to the circumstances, of the following:

- That the aircraft is identified, and
- Of the position of the aircraft.

The pilot will be warned if identification is lost, or about to be lost, and appropriate instructions given.

Secondary Surveillance Radar Phraseology:

The pilot must respond to SSR instructions, reading back specific settings.

Radar Service:

Where it is not self-evident pilots will normally be informed by the controller when they are under radar control, advisory or information service.

Radar Vectoring:

Aircraft may be given specific vectors to fly in order to establish separation. Pilots may be informed of the reasons for radar vectoring.

It may be necessary for a controller to know the heading of an aircraft as separation can often be established by instructing an aircraft to continue on its existing heading.

A controller may not know the aircrafts heading but does require the aircraft to fly a particular heading.

When vectoring is complete, pilots will be instructed to resume their own navigation, given position information and appropriate instructions as necessary.

Occasionally an aircraft may be instructed to make a complete turn (known as an orbit or a 360 degree turn) or given a heading, for delaying purposes or to achieve a required spacing behind preceding traffic.

Traffic Information and Avoiding Action Phraseology: Whenever practicable, information regarding traffic on a possible conflicting path should be given in the following form:

a) Relative bearing of the conflicting traffic in terms of the 12 hour clock; or, if the aircraft under service is established in a turn, the relative position of the conflicting traffic in relation to cardinal points i.e. northwest, south etc.;

b) Distance from the conflicting traffic;

c) Direction of flight of the conflicting traffic; and

d) Relative speed of the conflicting traffic or the type of aircraft and level if this is known.

Relative movement should be described by using one of the following terms as applicable:

closing, converging, parallel, same direction, opposite direction, diverging, overtaking, crossing left to right, crossing right to left; (if level is known) – 1000 above/below.

The controller will inform the pilot when the conflict no longer exists.

Avoiding action to be taken by the pilot is given when the controller considers that an imminent risk of collision will exist if action is not taken immediately.

RELEVANT WEATHER INFORMATION TERMS (VFR)

Aerodrome Weather

A pilot may obtain weather through many sources such as request from ATC, Meteorological offices, ATIS, Volmet etc.

Current Weather Message (METAR,SPECI and TREND) and Forecasts:

METAR: Aviation Routine weather report

SPECI: Aviation selected special weather report.

TREND: Expected changes in next two hours.

TAF: Aerodrome forecast.

ROFOR: Route forecast.

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

AIRMET Information: 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.

Clouds are reported as follows:

Few at 2000, Scattered at five hundred, scattered cumulonimbus at one thousand, broken at two thousand five hundred .

In the above example few equates 1-2 octas scattered equates to 3 or 4 Octas , broken equates to 5– 7 Octas and overcast means 8 octas.

CAV-OK: When the visibility is 10 km or more, there is no cloud below 1500 m (5000 ft) or below the highest minimum sector altitude, whichever is greater, and no cumulonimbus, and there is no precipitation, thunder storm, shallow fog or low drifting snow, the term "CAVOK" is used.

Format: METAR,SPECI and TREND:

VIDP 070200Z 12003KT 2000 BR SKC 10/08 Q1013 NOSIG

Delhi weather at 0200 on 07(date) surface wind 120 deg 03 kts visibility 2000 mts mist sky clear temp 10deg Celsius dew point 08 deg Celsius.QNH 1013. Trend no significant change.
VOBG 070030Z 12003KT 4000 HZ BKN004 18/16 Q1014 TEMPO 3000.

Bangaluru weather at 0030 on 07 (date) surface wind 120 deg 03 kts visibility 4000 mts in haze clouds 5-7 octa at 4000 temp 18 deg Celsius dew point 16 deg Celsius.QNH 1014 . Trend vis expected to decrease to 3000 mts.

Runway Visual Range (RVR)/Visibility/Absolute Minimum:

When transmitting the runway visual range the abbreviation RVR will be used without using the phonetic word for each letter, e.g. RVR runway 27, 800.The runway designator may be omitted if there is no possibility of confusion.

Where instrumented runway visual range (IRVR) observations are available, more than one reading may be transmitted.

Air /Ground Communications.

Air/ Ground communication between aircraft and Indian ATS units are provided on channels given below:

- Air/Ground (Voice) over High Frequency (HF) Radio.
- Air/Ground (Voice) over Very High Frequency (VHF) Radio.
- Air/Ground (Voice) over Ultra High Frequency (UHF) Radio.
- Remote Controlled Air – Ground communication (RCAG) – For the extended range of VHF/UHF Radio.
- ADS-CPDLC Service is available at Mumbai, Delhi, Kolkata and Chennai.

Automatic Terminal Information Service (ATIS).

ATIS is available in almost all airports in India. This broadcast is related to the terminal aerodrome and is continuous and repetitive.

Data Link – ATIS (D-ATIS) service is provided through Pre-FANS Data link. Please refer chapter 5 for details.

WEATHER BROADCAST

Voice Weather Broadcast (VOLMET)

Meteorological aerodrome reports for certain aerodromes are broadcast on specified HF frequencies. The callsign of the VOLMET, frequency, operating hours, aerodromes contained within the group, and contents are published in the AIP. Volmet is presently broadcast by Mumbai and Kolkata stations on HF frequencies.

The content of a VOLMET broadcast is as follows:

» Aerodrome identification (e.g. Mumbai/ Kolkata)
» Surface wind
» Visibility (Note 1)
» RVR (if applicable) (Note 1)
» Weather
» Cloud (Note 1)
» Temperature
» QNH
» Trend (if applicable)

Data Link VOLMET (D-VOLMET) service is provided through Pre-FANS Data link. Non essential words such as surface wind, visibility etc. are not spoken.

DISTRESS AND URGENCY PROCEDURES

Frequencies : Distress traffic shall normally be maintained on the frequency on which such traffic was initiated until it is considered that better assistance can be provided by transferring that traffic to another frequency. Any other freq shall be used to establish contact with any land/mobile or direction finding station.

- 121.5 / 243 MHz: International VHF/UHF distress frequency.
- 2182 KHz: International distress frequency. (MF band).
- 500 KHz: International Maritime distress frequency.
- Special Purpose SSR Codes are 7700 (Emergency), 7600 (Radio Failure) and 7500 (Hijack or Other Act of Violence)
- ELT Transmissions are on 121.5 Mhz, 243 Mhz and 406 Mhz

For further details on Distess and Urgency procedures please refer Chapter 4, Rules of the Air.

Interception Communications: See chapter 4, Rules of the Air.

IFR Communications

The procedures specified above for VFR flights are equally applicable to IFR flights. IFR flights will maintain two way communications with ground in all classes of airspaces.

An IFR flight operating outside controlled airspace shall maintain listening watch and establish two way communications with ATS unit providing Flight Information Service.

Wake Turbulence:

Aircraft in the heavy wake turbulence category shall include the word "HEAVY" immediately after the aircraft call sign in the initial call to each ATSU. The purpose of this call is to confirm the aircraft type and/or wake turbulence category is the same as that stated on the flight progress strip. For the A380 the word "SUPER" is to be included after the call sign on initial contact.

Level Reporting:

All messages relating to an aircrafts climb or descent to a HEIGHT (QFE) or ALTITUDE (QNH) are given in whole numbers. Furthermore, the initial message in any such RTF exchange will also include the appropriate QFE or QNH. When transmitting messages containing flight levels (1013.2 hPa) each digit shall be transmitted separately.

Once having been given an instruction to climb or descend, a further overriding instruction may be given to a pilot.

Content of the Voice Position Reports:

- aircraft identification
- position
- time
- flight level or altitude
- next position and time over
- ensuing significant point.

Routine Air Reports:

Pilots shall give the following meteorological information once in each FIR along with position report at designated MET reporting points on international and national ATS routes.

Meteorological Information:

- air temperature
- wind direction
- wind speed
- turbulence
- aircraft icing
- humidity (if available).

Special Air Reports:

Aircraft shall make routine air reports at the designated MET reporting points on designated ATS routes and special observations whenever requested by a meteorological office for specific observation or whenever encountered following weather phenomenon:

- ➤ moderate to severe turbulence,
- ➤ severe icing,
- ➤ hail,
- ➤ cumulonimbus clouds,
- ➤ low level wind shear
- ➤ any meteorological condition in the opinion of the pilot in command is likely to affect aircraft operation..

Contents:

- ➤ Call Sign, Position, Time, Level
- ➤ Special Met Conditions

COMMUNICATION FAILURE PROCEDURE

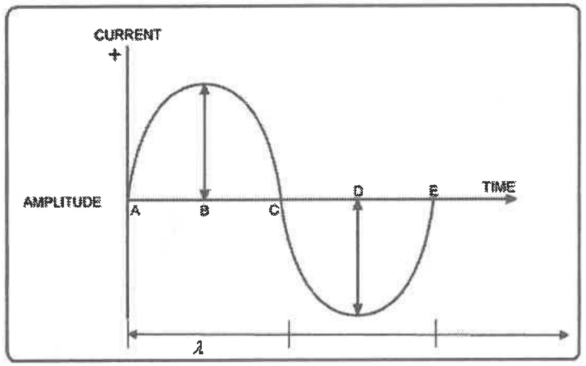
Please refer chapter 4 Rules of the Air.

General Principles of VHF propagation and allocation of frequencies :

Wave energy is of a continuous nature in that it consists of many waves, one following the other at regular intervals, with wave cycle repeating itself over and over again as the wave motion passes a given point. A cork floating on water would move up and down as the water waves pass. Note that the water itself does not move out horizontally with waves.

Wave motion can be discussed in fairly simple terms, the main ones being:

- **Wavelength(λ):** the length of one single wave (or of one complete cycle); it is also the distance traveled by the wave during transmission of one cycle;
- **Frequency(F):** the number of completed waves (or cycles) passing a point in one second;
- **Amplitude:** the distance from one extremity of the oscillation to the other, commonly referred to as 'peak to peak'.



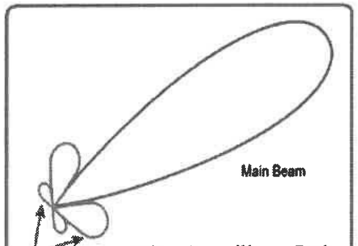
$F \alpha \frac{1}{\lambda}$ $\quad$ $F = \frac{C}{\lambda}$

Where $C = 3\times10^8$ m/ sec (speed of em waves/ light) higher the wavelength, lower the frequency and vise versa.

1 cycle= 1HZ	1 km = 1000 m
$1000 HZ = 1 KHZ = 10^3 HZ$	1 m = 100 cm
$1000 KHZ = 1MHZ = 10^6 HZ$	1 cm = 10 mm
$1000 MHZ = 1 GHZ = 10^9 HZ$	

Polarisation: In an E.M. wave two component i.e. electrical and magnetic component travel perpendicular to each other in a direction which is mutually perpendicular to both. The direction in which electrical component lies is called direction of polarization.

Polar Diagram: It gives aerial characteristics of a transmitter or a receiver. For a transmitter its drawn up to a distance where, signal strength reduces up to 50% of transmission.



Secondary Surveillance Radar Horizontal Polar Diagram

Modulation: Process of super imposing audio frequency or information on to carrier wave is called modulation.

Modulation is of 4 types:-

(i) Amplitude (ii) Frequency (iii) Pulse (iv) Phase

Properties of Radio Waves:

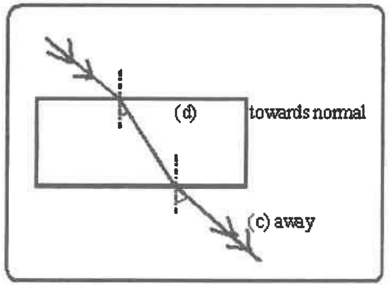
(i) E.M. waves travel at the speed of 3×10^8 m/s

(ii) They get refracted, reflected, diffracted and attenuated during their propagation (attenuation lessening of amplitude in time).

(iii) Their direction and velocity both change while passing from one medium to other.

While passing from medium of lower density to higher density they bend towards the normal and vice- versa. They always bend towards the denser medium.

Band	**Frequency Range**	**Wavelength Range**	**Wavelength Denomination**
VLF–Very Low Frequency	3 – 30 KHz	100 km – 10 km	Myriametric
LF– Low Frequency	30 – 300 KHz	10 km – 1 km	Kilometric
MF– Medium Frequency	300 KHz – 3 MHz	1 km – 100 km	Hectometric
HF– High Frequency	3 – 30 MHz	100 m – 10 m	Decametric
VHF– Very High Frequency	30 – 30 MHz	10 m – 1 m	Metric
UHF–Ultra High Frequency	300 MHz – 3 GHz	1 m – 10 cm	Decimetric
SHF–Super High Frequency	3 – 30 GHz	10 cm – 1 cm	Centimetric (Microwave
EHF– Extremely High Frequency	30 – 300 GHz	1 cm – 1 mm	Millimetric



Propagation of Radio Waves

EM waves travel from a transmitter to a receiver in two ways, i.e.

(i) Ground Waves

(ii) Sky Waves

Ground Wave: A wave received either directly from transmitter or after reflection from ground is called a ground wave.

Sky Wave: A wave received at receiver after getting refracted from atmosphere (ionosphere).

System	Frequency Range	Frequency Band
Decca	70 to 130 KHz	LF
Loran C	100 KHz	LF
ADF	190 to 1750 KHz	LF/MF
HF Communications	2 to 25 MHz	HF
ILS Markers	75 MHz	VHF
ILS Localiser	108.1 to 111.95 MHz	VHF
VOR	108.0 to 117.95 MHz	VHF
VHF Communications	118 to 137 MHz	VHF
ILS Glidepath	329.15 to 335.0 MHz	UHF
DME	960 to 1213 MHz	UHF
SSR	1030 and 1090 MHz	UHF
GPS	1575.42 MHz (L1)	UHF
	1227.6 MHz (L2)	UHF
Satcome (Inmarsat)	1500 to 1600 MHz (Aircraft to Satellite) 4000 to 6000 MHz (Satellite to Ground)	UHF SHF
Radio Altimeter	4200 to 4400 MHz	SHF
Weather Radar	9375 MHz	SHF
MLS	5031 to 5091 MHz	SHF
ATC Surveillance Radars	600 to 1300 MHz	UHF
ATC Ground Manoeuvre Radar	10 to 16 GHz	SHF

VLF, LF are absorbed by layers.VHF and above pass through the layers.Part of MF and HF are reflected back.

VLF LF	More range in ground wave
MF HF	Sky wave
VHF UHF SHF EHF	Line of sight

1. **Tx Power: Higher the transmission power, more is range. Hence to double the range, power is to be increased 4 times.**

   Range α $\sqrt{Txpower}$

2. **LOS (range)= 1.25 ($\sqrt{heightofTx} + \sqrt{HtofRx}$)**

   Ht = feet Range = nm

Required Communication Performance: The RCP concept characterizes the performance required for communication capabilities that support ATM functions without reference to any specific technology and is open to new technology. This approach is essential to evolving operational concepts using emerging technologies. An ATM function is an individual operational component of air traffic services. Examples of ATM functions include the application of separation between aircraft, the re-routing of aircraft, and the provision of flight information.

The number attached to your Required Communications Performance (RCP) is the number of seconds it takes for an instruction to travel from the ground to you and your acknowledgement back to the ground.

Controller Pilot Data Link Communications (CPDLC): CPDLC is a two-way data-link system by which controllers can transmit non urgent 'strategic messages to an aircraft as an alternative to voice communications. The message is displayed on a flight deck visual display.

When communicating with an aircraft that is operating within airspace beyond the range of DCPC VHF voice communication, CPDLC is available, and local ATC procedures do not state otherwise, the controller and flight crew would normally chose CPDLC as the means of communication.

The controller and flight crew would use voice as an alternative means of communication (e.g. VHF, HF or SATVOICE direct or via a radio operator). However, in any case, the controller and flight crew will determine the communication medium that they deem to be the most appropriate at any given time.

Messages from an aircraft to ATC may follow a standard format or may be free-text. Messages from a controller normally follow a standard format. Response is required to most messages.

Voice and data link shall co-exist as a means of ATS communication. Implementation of CPDLC is intended as a supplementary means of communication to the use of voice communication.

CPDLC shall only be used in the context of non-time-critical communications.

Automatic Dependent Surveillance (ADS).

Supports automatic reporting by the Aircraft Flight Management System (FMS) of aircraft position, intent Information and Meteorological Information (Spot wind and Temperature). The FMS reports the required information in accordance with parameters selected by the ground system. Messages will be transferred by VHF and satellite data links.

ADS/CPDLC is integrated with Flight Data Processing system (FDPS) at Chennai, Mumbai, Delhi and Kolkata. ADS-CPDLC Service is available through FANS-1A Data Link. All aircrafts aided with this facility shall login 10 min prior to entering the concerned FIR.

QUESTIONS

1. What does QDR mean?

A) Magnetic heading to the station (no wind)
B) True bearing from the station
C) Magnetic bearing from the station

2. If you are requested to report your height, to which Q-code-setting would you refer?

A) QFE
B) QNH
C) QBI

3. Which Q-code is used to report altitude?

A) QFF
B) QNJ
C) QNH

4. What does ATIS mean?

A) Automated Termination Information Service
B) Automatic Traffic Information Service
C) Automatic Terminal Information Service

5. What is the Q-code for "magnetic heading to the station (no wind)"?

A) QDM
B) QNE
C) QTE

6. What does CTR mean?

A) CONTOL REGION
B) CONTROL ZONE
C) CONTROL AREA

7. What is the Q-code for "true bearing from the station"?

A) QTE
B) QDR
C) QDM

8. **What is the Q-code for "magnetic bearing from the station"?**
   A) QDM
   B) QTE
   C) QDR

9. **QNH is the Q-code to indicate:**
   A) The atmospheric pressure referred to the highest obstacle located on the surface of an aerodrome.
   B) The atmospheric pressure measured at the aerodrome reference point (ARP).
   C) The altimeter sub-scale setting to obtain elevation when on the ground.

10. **What does QDL mean?**
   A) I intend to ask you for a series of bearings.
   B) True heading to the station (no wind).
   C) True bearing from the station.

11. **What does QNE mean?**
   A) What indication will my altimeter give on landing at ... (place) at ... hours, my sub-scale being set to 1013.2 millibars (29.92 inches)?
   B) What should I set on the subscale of my altimeter so that the instrument would indicate its height above the reference elevation being used?
   C) What should I set on the subscale of my altimeter so that the instrument would indicate its elevation if my aircraft were on the ground at your station?

12. **A radio direction finding station will use the following Q code to pass a true heading (no wind) to an aircraft to head for that station:**
   A) QUJ.
   B) QGE.
   C) QDM.

13. **The order of priority of the following messages in the aeronautical mobile service is:**
   A) Meteorological message, direction finding message, flight regularity message
   B) Distress message, flight safety message, urgency message
   C) Distress message, urgency message, direction finding message

14. **What is the correct way of transmitting the number 3500 when indicating an altitude or an height?**
   A) Three thousand five hundred
   B) Three five zero zero
   C) Three five double zero

15. **During the transmission of numbers containing a decimal point:**
   A) The term Decimal can be omitted if no chance of misunderstandings exists
   B) The term Decimal must always be transmitted
   C) The term Decimal must be spoken only if followed by three digits

16. **The time is 9:20 A.M. What is the correct way of transmitting this time if there is no possibility of confusion about the hour?**
   A) Nine twenty A.M.
   B) Two zero
   C) Twenty

17. **Which phrase shall be used if you want to say: AN ERROR HAS BEEN MADE IN THIS TRANSMISSION (or message indicated). THE CORRECT VERSION IS:**
   A) QNH 1017, negative QNH 1016
   B) QNH 1017, correction QNH 1016
   C) QNH 1017, negative I say again 1016

18. **A message preceded by the phrase TRANSMITTING BLIND DUE RECEIVER FAILURE shall be transmitted:**
   A) On the regional guard frequency.
   B) On the international emergency frequency.
   C) On the frequency presently in use.

19. **Which phraseology is to be used to ask the control tower for permission to taxi on a runway in the direction opposite to that in use?**
   A) "To enter back runway"
   B) "Backtrack clearance"
   C) "Request backtrack on runway"

20. **Which phrase shall be used if you want to say:" Yes":**
   A) Affirm
   B) Affirmative
   C) Roger

21. **The phrase used by ATC to instruct you to listen out on a frequency is:**
   A) MONITOR
   B) REPORT
   C) LISTEN

22. What is the radiotelephony call sign for the aeronautical station providing surface movement control of aircraft on the manoeuvring area:

A) TOWER
B) GROUND
C) CONTROL

23. What is the radiotelephony call sign for the aeronautical station providing approach control radar departures:

A) RADAR APPROACH
B) APPROACH
C) APPROACH RADAR

24. The initial call from an aircraft, callsign AIR INDIA 285 weighing more than than 136 tonnes would be:

A) AIR INDIA 285 HEAVY
B) HEAVY AIR INDIA 285
C) AIR INDIA 285

25. On the readability scale what does "Readability 3" mean:

A) Readable but with difficulty
B) Loud and clear
C) No problem to understand

26. A test call shall not continue for more than:

A) 8 seconds.
B) 12 seconds.
C) 10 seconds.

27. King air VT-ABC receives the following instruction:"V-BC climb straight ahead until 2500feet before turning right, wind 270 degrees 6 knots, cleared for take-off". What is the correct read back:

A) Straight ahead, 2500 feet right turn, wind west 6 knots, cleared for take-off, V-BC
B) Straight ahead, at 2500 feet right turn, cleared for take-off, V-BC
C) Wilco, cleared for take-off, V-BC

28. Which elements of instructions or information shall always be read back?

A) Runway in use, altimeter settings, SSR codes, level instructions, heading and speed instructions
B) Runway-in-use, visibility, surface wind, heading instructions, altimeter settings
C) Time check, runway in use, altimeter settings, level instructions, SSR codes

29. When the term "Overcast" is used in an aviation routine weather report (METAR), the amount of clouds covering the sky is:

A) No clouds but poor ground visibility
B) 100%
C) 50% or more

30. What is the correct way of expressing visibility?

A) Visibility 1.2 nautical miles
B) Visibility 1200 feet
C) Visibility 1200 metres

31. When the term "Cavok" is used in an aviation routine weather report (METAR), the values of visibility and clouds are:

A) Visibility 10 km or more, no clouds below 5000 feet/GND
B) Visibility more than 8 km, no clouds below 3000 feet/GND
C) Visibility 10 km or more, no clouds below 1500 feet/GND

32. When the term "Broken" is used in an aviation routine weather report (METAR), the amount of clouds covering the sky is:

A) 5 to 7 octas
B) 8 octas below 10000 feet
C) No clouds below 5000 feet

33. When the term "Scattered" is used in an aviation routine weather report (METAR), the amount of clouds covering the sky is:

A) No clouds below 5000 feet
B) Half or less than half (3 or 4 octas)
C) More than half but less than overcast (5 to 7 octas)

34. An aircraft station fails to establish radio contact with an aeronautical station on the designated frequency. What action is required by the pilot:

A) Return to the airport of departure
B) Land at the nearest airport without an ATC unit
C) Attempt to establish contact with the station on an alternative frequency

35. In the event that a pilot is required to make a blind transmission, this should be made:

A) During VFR flights only
B) Twice on the designated frequency
C) Only once on the designated frequency

36. Distress is defined as:

A) A condition concerning the attitude of an aircraft when intercepting the localizer during an ILSapproach

B) A condition concerning the safety of a person on board or within sight and requiring immediateassistance

C) A condition of being threatened by serous and/or imminent danger and requiring immediate assistance

37. Under which of the following circumstances shall an aircraft squawk 7700?

A) In distress

B) When following a SID

C) When passing the transition level

38. An aircraft in distress shall send the following signal by radiotelephony:

A) URGENCY, URGENCY, URGENCY

B) DETRESFA, DETRESFA, DETRESFA

C) MAYDAY, MAYDAY, MAYDAY

39. The frequency used for the transmission of a "MAYDAY" call shall be:

A) The frequency currently in use

B) Any frequency at pilot's discretion

C) The distress frequency 121.5 MHz

40. An urgency call content is to be as follows:

A) PAN PAN PAN, aircraft identification, the intention of the person in command, heading, height, position.

B) PAN PAN PAN (on 121,5 MHz). present position, heading aircraft, identification, the intention of the person in command, the identification of the station being called.

C) PAN PAN PAN (on the frequency in use), name of station addressed, the nature of the urgency condition, the intention of the person in command.

41. An "Automatic Terminal Information Service" provides:

A) Information concerning en-route weather phenomena which may effect the safety of aircraft operation

B) Routine information to arriving and departing aircraft by means of continuous and repetitive broadcast

C) Weather reports relating a specific number of aerodromes located within a flight information region (FIR)

42. When flying on a SW heading at 3500 feet you would report your heading and level as:

A) HEADING 225 AT THREE THOUASAND FIVE HUNDRED

B) SOUTHWEST AT THREE FIVE ZERO ZERO

C) HEADING 045 AT THREE THOUSAND FIVE HUNDRED

43. What is the radiotelephony call sign for the aeronautical station indicating area control centre (no radar):

A) ...CENTRE

B) ...CONTROL

C) ...APPROACH

44. What is the radiotelephony call sign for the aeronautical station indicating approach control radar arrivals:

A) ...ARRIVAL

B) ...RADAR

C) ...APPROACH

45. A BLIND TRANSMISSION is a transmission:

A) Where the transmitter is unable to see the receiver.

B) The transmitter of the called station is not functioning.

C) From one station to another when there is no communication but where it is believed that the caller station is able to receive the transmission.

46. To indicate that he is no longer occupying the active runway a pilot shall report to the controller:

A) Runway free

B) Clear of runway

C) Runway vacated

47. An aircraft encountering radio communication failure on an IFR flight in IMC is assumed to:

A) Execute a VMC approach at the nearest suitable aerodrome

B) Proceed in accordance with the current flight plan to the designated navigation aid serving the destination aerodrome

C) Divert to the most suitable aerodrome according to the route of flight

48. An aircraft encountering radio communication failure on an IFR flight in IMC has to commence descent over the designated navigation aid serving the destination aerodrome (no EAT received):

A) 5 minutes after the last expected approach time acknowledged
B) After 3 minutes, if an expected approach time is not acknowledged
C) At, or as close to, the ETA resulting from the current flight plan

49. A protected medical transport is identified by the prefix:

A) PAN PAN PAN PAN PAN PAN
B) AIR AMBULANCE
C) PAN PAN MEDICAL

50. Which of the following statements is correct?

A) The urgency communications have priority over all the other communications
B) The urgency communications have priority over all the other communications, except distress
C) ATC clearances have the same priority as urgency communications

51. The VOLMET broadcasts include information about:

A) METARs for selected airfields.
B) Arrival and departure details for selected airfields.
C) TAFs for selected airfields.

52. What is the correct way of transmitting the number 13500?

A) One three five zero zero
B) One three five hundred
C) One three thousand five hundred

53. What, if any, is the abbreviated call sign of Air India 5345?

A) Air India 345
B) Air India 45
C) No abbreviated form

54. The maximum theoretical range at which an aircraft at FL80 can obtain bearings from a ground VHF facility sited at 325ft above MSL is:

A) 107NM
B) 134NM
C) 158NM

55. A frequency of 295 KHz would be described as:

A) HF.
B) short wave.
C) LF.

56. In radio terms, frequency means:

A) The number of complete waveforms passing a spot in one second.
B) The number of waveforms in one hour.
C) The length of a complete waveform in metres.

57. The wavelength of HF is?

A) Centimetric
B) Decemetric.
C) Metric.

58. Weather radar is?

A) Centimetric
B) Decimetric
C) Metric.

59. What is the wavelength and waveband of a radio aid that uses a frequency of 19 cm.

A)	15.79 Hz.	ELF.
B)	1.579 Ghz.	UHF
C)	1.579 Mhz	VHF

ANSWERS

1	2	3	4	5	6	7	8	9	10	11	12	13	14
C	A	C	C	A	B	A	C	C	A	A	A	C	A

15	16	17	18	19	20	21	22	23	24	25	26	27	28
B	B	B	C	C	A	A	B	C	A	A	C	B	A

29	30	31	32	33	34	35	36	37	38	39	40	41	42
B	C	A	A	B	C	B	C	A	C	A	C	B	A

43	44	45	46	47	48	49	50	51	52	53	54	55	56
B	A	C	C	B	C	C	B	A	C	C	B	C	A

57	58	59
C	A	B

20

AIRCRAFT ACCIDENT AND INCIDENT

(ANNEX 13, Aircraft (Investigation of Accidents and Incidents) Rules, 2017 and CIVIL AVIATION REQUIREMENTS SECTION 5 – AIR SAFETY SERIES 'C' PART I)

Aircraft Accident and Incident Investigation

The causes of an aircraft accident or serious incident must be identified in order to prevent repeated occurrences. The identification of casual factors is best accomplished through a properly conducted investigation. The Annex spells out which States may participate in an investigation, such as the States of Occurrence, Registry, Operator, Design and Manufacture. It also defines the rights and responsibilities of such States.

Applicability:

Unless otherwise stated, the specifications in this Annex apply to activities following accidents and incidents wherever they occurred.

In this Annex the specifications concerning the State of the Operator apply only when an aircraft is leased, chartered or interchanged and when that State is not the State of Registry and if it discharges, in respect of this Annex, in part or in whole, the functions and obligations of the State of Registry.

Provisions

- Any State which, on request, provides information, facilities or experts to the State conducting the investigation shall be entitled to appoint an accredited representative to participate in the investigation.
- The accident investigation preliminary report shall be submitted to appropriate States and to the ICAO, in one of the working languages of ICAO.
- Upon receipt of the modification and a request by the state of occurence for participation, the state of design and the state of manufacture shall in the case of an accident or serious incident inform the state of occurence of the name of its representative to be present at the investigation when the aircraft has a maximum mass over 100000kg.

- The government of the state in which the accident took place is responsible, under Annex 13 of the Chicago convention for the initiation of an accident investigation.

NATIONAL PROVISIONS

Accident. An occurrence associated with the operation of an aircraft which

(i) 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

(ii) 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 as 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:
   - being in the aircraft, or
   - direct contact with any part of the aircraft, including parts which have become detached from the aircraft, or
   - 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:
   - adversely affects the structural strength, performance or flight characteristics of the aircraft, and
   - except for failure of engine 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.

For the purposes of this clause "fatally injured" means an injury resulting in death within thirty days of the date of the accident. For the purpose of this clause "aircraft is missing" means the wreckage of the aircraft has not been located when the official search has been terminated.

Serious incident. Means an incident involving circumstances indicating that there was a high probability of an accident associated with the operation of an aircraft under conditions as mentioned in the definition of accident given above. Examples are:

- Fires and smoke in the passenger compartment, in cargo compartments or engine fires, even though such fires were extinguished by the use of extinguishing agents, Events requiring the emergency use of oxygen by the flight crew, Aircraft structural failures or engine disintegrations not classified as an accident, Multiple malfunctions of one or more aircraft systems seriously affecting the operation of the aircraft, Flight crew incapacitation in flight. Collisions not classified as accidents, Fire and/or smoke in the cockpit, Fuel quantity level or distribution situations requiring the declaration of an emergency by the pilot, such as insufficient fuel, fuel exhaustion, fuel starvation, or inability to use all usable fuel on board, The unintentional or, as an emergency measure, the intentional release of a slung load or any other load carried external to the aircraft etc.

Serious injury. An injury which is sustained by a person in an accident and which:

a) requires hospitalization for more than 48 hours, commencing within seven days from the date the injury was received; or
b) results in a fracture of any bone (except simple fractures of fingers, toes or nose); or
c) involves lacerations which cause severe haemorrhage, nerve, muscle or tendon damage; or
d) involves injury to any internal organ; or
e) involves second or third degree burns, or any burns affecting more than 5 per cent of the body surface; or
f) involves verified exposure to infectious substances or injurious radiation.

Incident: in relation to an aircraft means an occurrence which takes place either on the ground or in flight , in which

a) The aircraft suffers damage or a person associated either with the maintenance or operation of aircraft, or both, suffers injury in circumstances other than those specified in the definition of "accident",
b) the aircraft makes a forced landing,
c) the aircraft lands at aerodrome in an un airworthy condition,
d) the aircraft is compelled to land at the aerodrome of departure without completing the scheduled flight,
e) the aircraft lands owing to conditions which make continuance of the flight inadvisable,
f) the position of the aircraft becomes "unknown for any period", or
g) the safety of the aircraft or its occupants or of any other person or property is jeopardised in any manner;

Air Traffic Incidents :

"Air traffic incidents" is used to mean a serious occurrence related to the provisions of air traffic services, such as:

- aircraft proximity (AIRPROX);
- serious difficulty resulting in a hazard to aircraft caused for example, by:
  - i) faulty procedures
  - ii) non-compliance with procedures, or
  - iii) failure of ground facilities

Reporting procedures (including in-flight procedures). The following are the procedures to be followed by a pilot who is or has been involved in an incident:

a) during flight, use the appropriate air/ground frequency for reporting an incident of major significance, particularly if it involves other aircraft, so as to permit the facts to be ascertained immediately;

b) As promptly as possible after landing, and in any case within 24 hours, submit a completed Air Traffic Incident Report Form by quickest means available to Director General of Civil Aviation (Attn: Director Air safety, HQ) with a copy to Executive Director (ATM), Airports Authority of India, Rajiv Gandhi Bhawan, Safdarjung Airport, New Delhi. 110003.
   - i) For confirming a report of an incident made initially by radio, or for making the initial report on such an incident if it had not been possible to report it by radio;
   - ii) For reporting an incident which did not require immediate notification at the time of occurrence.

An initial report made by radio should contain the following information:

a) aircraft identification;
b) type of incident, e.g. aircraft proximity;
c) the incident; (give information as laid down in Air Traffic Incident report form)
d) miscellaneous:

Investigation. In case of an accident or incident to an aircraft in the territory of India, notwithstanding its registration, the DG, Aircraft Accident Investigation Bureau(AAIB) shall institute an investigation into the circumstances of the accident or incident, and shall be responsible for conducting the investigation. "DG, AAIB" means the Director General who shall be the head of the Aircraft Accident Investigation Bureau.

Notification. Where an accident or incident occurs to an aircraft then the pilot-in-command of the aircraft or, if he be killed or incapacitated, the owner, the operator, the hirer or other person on whose behalf he was in command of the aircraft, or any relevant person, as the case may be, shall, as soon as is reasonably practicable but in any case not later than twenty-four hours after he becomes aware of the accident or the incident—

(a) send notice thereof to Aircraft Accident Investigation Bureau and Directorate General of Civil Aviation by the quickest means of communication available; and

(b) in the case of an accident of incident occurring in India, give information to the District Magistrate and the Officer-in-charge of the nearest Police Station of the accident or incident and of the place where it occurred.

The notification shall also be submitted to the Aircraft Accident Investigation Bureau by:

(a) Aerodrome operator;

(b) Air Traffic services in-charge concerned;

(c) DG,CA, wherever applicable.

Protection of evidence, custody, removal and preservation of damaged aircraft.

(1) In the case of an accident or a serious incident, which is required to be notified, the Investigator-in-Charge shall have unhampered access to the wreckage and all relevant material and information, including flight recorders and Air Traffic Services records, and shall have unrestricted control over it to ensure that a detailed examination can be made without delay by authorised personnel participating in the investigation.

(2) The aircraft and contents thereof shall not, except by a person under the authority of the DG, AAIB, be removed or otherwise interfered with:

Provided that-

(a) the aircraft or any parts or contents thereof may be removed or interfered with so far as may be necessary by persons authorized to conduct search and rescue operations for the purpose of extricating persons or animals dead or alive, or preventing the destruction of the aircraft and its contents by fire or other cause, or preventing any damage or obstruction to the public or to air navigation or to other transport;

(b) if the aircraft is wrecked on water, the aircraft or any parts or contents thereof may be removed to such extent as may be necessary for bringing it or them to a place of safety by persons authorised to conduct search and rescue operations;

(c) goods may be removed from the aircraft under the supervision and with the concurrence of an officer of the Aircraft Accident Investigation Bureau or a person authorised by the DG, AAIB;

(d) personal luggage of passengers and crew after photography, weighing, etc. may be removed from the aircraft under the supervision of a Police Officer, a Magistrate, an Officer of the Aircraft Accident Investigation Bureau or a person authorised by DG, AAIB; and

(e) mails photography, weighing etc. may be removed under the supervision of a Police Officer, a Magistrate, an Officer of the Department of Posts and Telegraphs or an Officer of the Aircraft Accident Investigation Bureau or a person authorised by DG, AAIB.

QUESTIONS

1. **The objective of the investigation of an accident or incident shall be the:**
   A) Prevention of accidents or incidents and to help the judges
   B) Prevention of accidents or incidents and to help the manufacturers in design
   C) Prevention of accidents or incidents

2. **Which of the following, according to ICAO Annex 13, shall be entitled to appoint an accredited representative to participate in the investigation?**
   A) State conducting the investigation and State of design and manufacturing
   B) All ICAO members States
   C) Any State which, on request, provides information, facilities or experts to the State conducting the investigation

3. **The accident investigation preliminary report shall be submitted to appropriate States and to the ICAO, in:**
   A) Any of the world's major languages
   B) One of the working languages of ICAO
   C) The language of the investigating State

4. **Upon receipt of the modification and a request by the state of occurence for participation, the state of design and the state of manufacture shall in the case of an accident or serious incident inform the state of occurence of the name of its representative to be present at the investigation when the aircraft:**
   A) Has a maximum mass over 100000kg
   B) Has a maximum mass over 27000kg
   C) Has a maximum mass over 5700kg

5. **Who is responsible, under Annex 13 of the Chicago convention for the initiation of an accident investigation?**
   A) The law enforcement authorities of the state in which the aircraft is registered
   B) The aircraft manufacturer
   C) The government of the state in which the accident took place

6. **Just before arriving on the apron, taxiing inadvertently on the grass, a wheel falls into a hole, which seriously damages the aircraft and obliges the crew to delay departure.**
   A) This is an accident and the crew must follow the procedure relevant to this case
   B) This is an irregularity in the operation, the crew must inform the operator of the delay caused by necessary repair
   C) Since no physical injury has been noticed and the flight is over, the actions to be taken are related only to insurance, to the repair man, the operator and the persons in charge of the runways and taxiways

7. **Where an accident or incident occurs to an aircraft in India, then the pilot-in-command of the aircraft shall send notice thereof to:**
   A) AAIB, DGCA, DM and O-i-C of nearest police station as soon as is reasonably practicable but in any case not later than twenty-four hours
   B) AAIB, DGCA, DM and O-i-C of nearest police station as soon as is reasonably practicable but in any case not later than forty eight hours
   C) AAIB, DGCA, DM and AAI as soon as is reasonably practicable but in any case not later than twenty-four hours

8. **In the case of an accident the aircraft or any parts or contents thereof may be removed without the authority of DG/AAIB:**
   A) To look for evidence
   B) If so directed by the P-i-C
   C) To extricate the body of a dead dog

ANSWERS

1	2	3	4	5	6	7	8
A	C	B	A	C	A	A	C

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FACILITATION

(ANNEX 9 AND AIP, INDIA)

Definitions:

Cargo : Any property carried on an aircraft other than mail, stores and accompanied or mishandled baggage.

Clearance of goods : The accomplishment of the customs formalities necessary to allow goods to enter home use, to be exported or to be placed under another customs procedure.

Commencement of journey: The point at which the person began his journey, without taking into account any airport at which he stopped in direct transit, either on a through-flight or a connecting flight, if he did not leave the direct tansit area of the airport in question.

Commissary supplies : Items, either disposable or intended for multiple use, that are used by the aircraft operator for provision of services during flights, in particular for catering, and for the comfort of passengers.

Deportee : A person who had legally been admitted to a State by its authorities or who had entered a State illegally, and who at some later time is formally ordered by the competent authorities to leave that State.

Direct transit area: A special area established in an international airport, approved by the public authorities concerned and under their direct supervision or control, where passengers can stay during transit or transfer without applying for entry to the State.

Disembarkation : The leaving of an aircraft a landing, except by crew or passengers continuing on the next stage of the same through-flight.

Embarkation : The boarding of an aircraft for the purpose of commencing a flight, except by such crew or passengers as have embarked on a previous stage of the same through-flight.

International Airport : Any airport designated by the Contracting State in whose territory it is situated as an airport of entry and departure for international air traffic, where the formalities incident to customs, immigration, public health, animal and plant quarantine and similar procedures are carried out.

Lading : The placing of cargo, mail baggage or stores on board an aircraft to be carried on a flight.

Unlading : The removal of cargo, mail, baggage or stores from an aircraft after a landing.

The SARPs pertain specifically to facilitation of landside formalities for clearance of aircraft and commercial traffic through the requirements of customs, immigration, public health and agriculture authorities. The Annex is a wide-ranging document which reflects the flexibility of ICAO in keeping pace with international civil aviation. ICAO is recognized as being the first international body to make a real start on facilitation by developing Standards which bind its Contracting States.

Initially, the main thrust of the Annex consisted of efforts to reduce paperwork, standardize internationally the documents that were to accompany traffic between States, and simplify the procedures required to clear aircraft, passengers and cargo. It was—as it still is—recognized that delays due to cumbersome formalities must be reduced, not just because they are unpleasant but, in practical terms, because they are costly to all of the "customer groups" in the community and because they interfere with the success of everyone.

ENTRY AND DEPARTURE OF AIRCRAFT

Description:

Contracting States shall adopt appropriate measures for the clearance of aircraft arriving from or departing to another Contracting State and shall implement them in such a manner as to prevent unnecessary delays.

In developing procedures aimed at the efficient clearance of entering or departing aircraft, Contracting States shall take into account the application of aviation security and narcotics control measures, where appropriate.

Purpose And Use of Aircraft Documents

Contracting States shall not require any documents, other than those provided for in this Chapter, for the entry and departure of aircraft.

Contracting States shall not require a visa nor shall any visa or other fee be collected in connection with the use of any documentation required for the entry or departure of aircraft.

Subject to the technological capabilities of the Contracting State, documents for the entry and departure of aircraft shall be accepted when presented:

a) in electronic form, transmitted to an information system of the public authorities;

b) in paper form, produced or transmitted electronically; or

c) in paper form, completed manually following the formats depicted in Annex 9.

When a particular document is transmitted by or on behalf of the aircraft operator and received by the public authorities in electronic form, the Contracting State shall not require the presentation of the same document in paper form.

A Contracting State requiring a General Declaration shall limit its information requirements to the elements indicated in Annex 9. The information shall be accepted in either electronic or paper form..

Contracting States shall not normally require the presentation of a Passenger Manifest.

When a Contracting States require the presentation of the Cargo Manifest in paper form, it shall accept the form shown in Annex 9.

Contracting States shall not require the presentation of a written declaration of stores remaining on board the aircraft.

Contracting States shall not require the presentation of a list of accompanied baggage or mishandled baggage laden on or unladen from the aircraft.

Contracting States shall not require the presentation of a written declaration of the mail other than the form(s) prescribed in the Acts in force of the Universal Postal Union.

Contracting States shall not require the aircraft operator to deliver to the public authorities more than three copies of any of the above - mentioned documents at the time of entry or departure of the aircraft.

If the aircraft is not embarking/disembarking passengers or lading/unlading cargo, stores or mail, the relevant documents(s) shall not be required, provided an appropriate notation is included in the General Declaration.

General Declaration

On those occasions when a General Declaration is required, the information required shall be limited to the format given in Annexture 9. The information is acceptable in electronic or paper form.

Entry And Departure Of Persons And Their Baggage – Entry Requirement And Procedures For Crew And Other Operator's Personnel

Contracting States shall establish measures, with the cooperation of aircraft operators and airport operators, to expedite the inspection of crew members and their baggages, as required at departure and upon arrival.

Contracting States shall facilitate and expedite the process under which aircraft operators based in their territories can apply for Crew Member Certificates (CMCs) for their crew members.

Note:– The CMC has developed as a card for use for identification purposes by crew members, leaving the crew licences to serve their primary purpose of attesting to the professional qualifications of the flight crew members.

Contracting States should put in place procedures which will enable any crew member issued with a Crew Member Certificate to examine and review the validity of the data held, and to provide for correction if necessary, at no cost to the crew member.

To the extent that aircraft operators issue crew identity cards, Contracting States should require the production of such identity documents in the format shown below i.e. in the same layout as the visual zone of the machine readable crew member certificate and having the capability to support machine assisted identity confirmation and document security verification.

Contracting States should ensure that a record of each crew member's certificates and other official identity document issued, suspended or withdrawn, is stored in an electronic database, secure from interference and unauthorised access.

Adequate controls shall be placed on the issuance of CMCs and other official crew identity documents to prevent fraud, for example, a background check and certification of employment status of an applicant prior to issuance, controls on blank card stock, and accountability requirements for issuing personnel.

Contracting States shall waive the visa requirement for arriving crew members presenting CMCs, when arriving in a duty status on an international flight and seeking temporary entry for the period allowed by the receiving State in order to join their next assigned flight in a duty status.

Contracting States should waive the visa requirement for arriving crew members presenting CMCs, when arriving on another aircraft operator or another mode of transport and seeking temporary entry for the period allowed by the receiving State in order to join their assigned flight in a duty status.

Contracting States shall establish measures to provide for the temporary entry without delay into their territories, of technical personnel of foreign aircraft operators operating to or through such territories who are urgently required for the purpose of converting to an airworthy condition any aircraft which is, for technical reasons, unable to continue its journey.

Contracting States should incorporate biometric data in their machine readable travel documents in a contactless integrated circuit chip, as specified in Doc 9303, Machine Readable Travel Documents (MRTD).

Each Contracting State should consider the introduction of Automated Border Control (ABC) systems in order to facilitate and expedite the clearance of persons entering or departing by air.

Contracting States utilizing ABC systems should use the information available from the ICAO Public Key Directory (PKD) to validate eMRTDs, perform biometric matching to establish that the passenger is the rightful holder of the document, and query INTERPOL's Stolen and Lost Travel Documents (SLTD) database, as well as other border control records, to determine eligibility for border crossing.

NATIONAL PROVISIONS

International flights into, from or over Indian territory shall be subjected to the current Indian regulations relating to civil aviation and other national laws relating to immigrations, customs, passport and health etc. These regulations correspond in all essentials to the Standards and Recommended Practices contained in Annex 9 to the Convention on International Civil Aviation.

Additionally every aircraft entering or leaving India must comply with regulations relating to immigration, customs, quarantine and health as laid down by the Government from time to time.

Aircraft flying into or departing from Indian territory shall make their first landing at , or final departure from , an International Aerodrome . (see AIP India, AD 1.3 and AD2). Aircraft may be permitted to land or depart from any notified customs aerodrome.

International flights are not permitted to pick up passengers/load at any place in India and disembark/discharge at any other place in India.

Aircraft Document Required (Arrival/Departure)

Required by	General Declaration	Passenger Manifest	Cargo Manifest
Customs	1	1	1
Immigration	1	1	1
Health	1	1	1

No flight shall leave India without obtaining clearance of Immigration and Customs authorities on General Declaration.

Customs Duty on aircraft

No customs duty is levied on the aircraft not registered in India which is brought into India for purpose of a flight to or across India, which is not intended to be registered in India and is intended to be removed from India within six months from the date of entry, provided that the person-in-charge of the aircraft makes a written declaration to that effect to the Customs Collector on arrival.

GENERAL DECLARATION

(Outward/Inward)

Operator ....

Marks of Nationality and Registration* .... Flight No. .... Date ....

Departure from .... Arrival at .... (Place) ....

FLIGHT ROUTING

("Place" Columan always to list origin, every en-route stop and destination)

PLACE	TOTAL NUMBER OF CREW*	NUMBER OF PASSENGERS ON THIS STAGE**
		Departure Place : .... Embarking : .... Through on same flight : .... *Arrival Place* : .... Disembarking : .... Through on same flight : ....

*Declaration of Health**	For Official use only
Persons on board with illnesses other than airsickness or the effects of accidents (including persons with sysmptoms or signs of illness such as rash, (ever, chills, diarrhoes) as well as those cases of illness disembarked during the flight .... Any other conditions on board which may lead to the spread of disease .... Details of each disinsecting or sanitary treatment (place, date, time, method) during the flight. If no disinsecting has been carried out during the flight, give details of most recent disinsecting .... Signed, if required ______ Crew member concerned	

I declare that all statements and particulars contained in this General Declaration, and in any supplementary forms required to be presented with this General Declaration, are complete, exact and true to the best of my knowledge and that all through passengers will continue/have continued on the flight.

SIGNATURE ______

Authorised Agent or pilot-in-command

PASSENGER MANIFEST

Operator ....

Marks of Nationality and Registration* .... Flight No. .... Date ....

Point of embarkation .... (Place) Point of disembarkation .... (Place)

Surname and initials	For use by operator only	For official use only

CARGO MANIFEST				
Operator				
Marks of Nationality and Registration* .... Flight No. .... Date				
Point of lading .... (Place) Point of unloading .... (Place)				
Air Waybill Number	Number of packages	Nature of goods*	For use by operator only	For official use only

CUSTOMS REQUIREMENTS

Incoming Passengers

All the goods imported into India by air are subject to clearance by Customs authorities, except the goods within the limits of duty free allowance. For the purpose of Customs Clearance of arriving passengers, a two channel system has been adopted i.e. Green Channel for passengers not having any dutiable goods and Red Channel for passengers having dutiable goods.

Regulation for the airline crew

Crew member of aircraft are subject to submit correct declaration before customs authorities with respect to the currency gold ornaments and electronic goods etc. in their possession on arrival as well as departure.

Outgoing Passengers

All the passengers leaving India by Air are subject to clearance by Custom Authorities. Only bonafide baggage is allowed to be cleared by passengers. There is a procedure prescribed whereby the passengers leaving India can take the export certificate for the various high value items as well as jewellery from the Customs authorities.

Regulation for Transit Passengers

Transit passengers are kept in Customs area and Customs authorities keep watch on such passengers that they should not hand over anything to any other person. They are also not allowed to go outside the airport building.

Customs requirements concerning Cargo and other articles

Goods for export by air (including unaccompanied baggage) are required to be presented for examination to the Customs authorities sufficiently in advance for such goods to be examined before the departure of the aircraft on which they are consigned. As a general rule, such presentation should be made not less than four working hours before the scheduled time of departure.

QUESTIONS

1. The ICAO Annex which deals with entry and departure of persons and their baggage, cargo and other articles on international flights is:

A) Annex 9
B) Annex 15
C) Annex 8

2. In case of aircraft registered in other Contracting States, which are not engaged in schedule international services, and which are making flights across the territory of a Contracting State or stopping for non traffic purposes, such Contracting State shall accept the information contained in a flight plan as adequate advance notification. This information is to be received:

A) At least 2 hours in advance of arrival
B) At least 4 hours in advance of arrival
C) At least 1 hours in advance of arrival

3. A contracting state which continues to require the presentation of a cargo manifest shall, apart from the information indicated in the heading of the format of the cargo manifest, not require more than the following item(s):

A) The airway bill number and the number of packages related to the airway bill number
B) The airway bill number; the number of packages related to each airway bill number and the nature of the goods
C) The airway bill number and the nature of goods

4. An aircraft which is not engaged in scheduled international air services and which is making a flight to or through any designated airport of a Contracting State and is admitted temporarily free of duty shall be allowed to remain within that State without security for customs duty.

A) For a period of 12 hours
B) For a period of 48 hours
C) For a period to be established by that State

5. Which one of the statements is correct?

A) Contracting states may not accept oral declaration of baggages
B) Contracting states shall accept an oral declaration of baggage from passengers and crew
C) Contracting states shall accept an oral declaration of baggage only from passengers

6. **An aircraft flying to another contracting state:**
   A) Is liable to pay customs duty on all unused fuel and oil carried
   B) Is admitted to that state temporarily free of customs duty in regard to oil and fuel remaining only
   C) Is admitted to that state temporarily free of customs duty

7. **Contracting states shall not require the authorized agent or pilot-in-command to deliver to the public authorities concerned, before departure of the aircraft, more than some copies of General Declaration, Cargo Manifest and stores list. The numbers of the copies are :**
   A) 2 copies of General Declarations and Cargo Manifest and one copie of a simple stores list.
   B) 2 copies of General Declaration and of Cargo Manifest and of a stores list
   C) 2 of each

8. **In cases where a visitor travelling by air holds a valid passport and no visa is required of him, contracting states**
   A) Shall not require him to obtain any other identity document from their consultates or operators prior to initiate the flight
   B) None of the answers are applicable
   C) In certain cases any other identity may be required

9. **The documents for entry and departure of aircraft:**
   A) Has to be typewritten or produced by electronic data processing techniques
   B) Are accepted in handwritten block lettering in ink
   C) Are accepted at the contracting state discretion

10. **On a general declaration form, the following data can be found:**
    A) Aircraft registration mark, flight number, date and place of departure, destination and, number of crew and passengers
    B) The nature of goods embarked on the aircraft (e.g. dangerous goods)
    C) A complete description of payload (passengers, cargo and mail)

11. **What is the purpose of a Crew Member's Certificate (CMC)?**
    A) To allow flight crew to be exempted from customs, health and immigration formalities when disembarking.
    B) To permit access to the air side of an aerodrome for aircrew.
    C) To provide identification of aircrew.

12. **What documentation is required by persons travelling by air, for entry into a state?**
    A) Passport and confirmation of inclusion on the general declaration passenger manifest
    B) The same as would be required if the person arrived by ship
    C) Passport, visa and any necessary health documentation (vaccination certificates)

13. **The crew member certificate (CMC) shall be accepted by each Contracting State for identification purposes:**
    A) Together with a valid flight crew license.
    B) None of the above.
    C) Together with a valid passport.

14. **Except in special circumstances determined by the public authorities concerned, when a passenger is passing through the territory of a contracting state and has to stay in that contracting state until the next flight for lack of facilities or any other circumstances, the contracting state where the international airport is located shall permit such a passenger to remain within its territory without requiring visas prior to the arrival when**
    A) The passenger is to leave that state within two (2) days from the day of his (her) arrival
    B) The passenger is to leave that state within one (1) day from the day of his (her) arrival
    C) The passenger is to leave that state within two (2) weeks from the day of his (her) arrival

ANSWERS

1	2	3	4	5	6	7	8	9	10	11	12	13	14
A	A	B	C	B	C	C	A	B	A	C	B	B	A

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SECURITY - SAFEGUARDING INTERNATIONAL CIVIL AVIATION AGAINST ACTS OF UNLAWFUL INTERFERENCE

(ANNEX 17 and Aircraft (Security) Rules, 2011)

The dramatic increase in crimes of violence which adversely affected the safety of civil aviation during the late 1960's, resulted in an Extraordinary Session of the ICAO Assembly in June 1970. One of the resolutions of that Assembly called for specifications in existing or new Annexes to the Chicago Convention to specifically deal with the problem of unlawful interference, in particular with unlawful seizure of aircraft.

Annex 17 seeks to co-ordinate the activities of those involved in security programmes. It is recognized that airline operators themselves have a primary responsibility for protecting their passengers, assets and revenues, and therefore States must ensure that the carriers develop and implement effective complementary security programmes compatible with those of the airports out of which they operate.

Prior to 1985, the significant threat to civil aviation was seen as the hijacking. As a result, the Standards and Recommended Practices tended to focus on hijacking rather than sabotage, in-flight attack or facility attack. By modifying existing technology and applying agreed upon specifications and procedures, the worldwide aviation community established a reasonably effective screening system for passengers and their carry-on luggage. The annex was further amended to deal with reconciliation of baggage with passengers, controls over items left behind on the aircraft by disembarking passengers, security controls for commercial courier services and controls over cargo and mail under certain situations.

The later Amendment includes various definitions and new provisions in relation to the applicability of this Annex to domestic operations; international cooperation relating to threat information; national quality control; access control; measures

related to passengers and their cabin and hold baggage; in flight security personnel and protection of the cockpit; code-sharing/collaborative arrangements; human factors; and management of response to acts of unlawful interference.

Aims And Objectives

Each Contracting State shall establish an organization and develop and implement regulations, practices and procedures to safeguard civil aviation against acts of unlawful interference taking into account the safety, regularity and efficiency of flights.

Each Contracting State shall ensure that such an organization and such regulations, practices and procedures:

a) protect the safety of passengers, crew, ground personnel and the general public in all matters related to safeguarding against acts of unlawful interference with civil aviation; and

b) are capable of responding rapidly to meet any increased security threat.

- The contracting State will make provisions to ensure that an aircraft affected by an unlawful seizure act, which has landed in their territory, would be retained, unless its departure is justified to protect lives. A State shall take adequate measures for the safety of passengers and crew of an aircraft which is subjected to an act of unlawful interference, until their journey can be continued.
- When an aircraft subject to unlawful interference has landed it shall notify by the most expeditious means of the State of registry of the aircraft and the State of the operator of the landing and shall similarly transmit all other relevant information to the two aforementioned States, each State whose citizens suffered fatalities or injuries, each State whose citizens were detained as hostages, each State whose citizens are known to be on board the aircraft and the ICAO.
- A State shall provide assistance to an aircraft subjected to an act of unlawful seizure. This assistance includes provision of navigation aids, air traffic services, permission to land.
- For the transport of potentially disruptive passengers some supplementary safeguards are to be observed such as boarding prior to all passengers.
- When mixing or contact does take place between passengers subjected to security control and other persons not subjected to such control after the security screening points at airports serving international civil aviation have been passed the passengers concerned and their cabin baggage shall be re-screened before boarding an aircraft.
- When a member state allows police officers, security staff, bodyguards or other agents of foreign states to carry weapons in their territory for the protection of aircraft in flight, permission for the carriage of weapons should be conditional upon prior notification by the state of embarkation to the foreign state in which the weapons will be carried on the airport of arrival and notification of the pilot in command of a decision to permit a weapon to be carried on board his aircraft.

NATIONAL PROVISIONS

Aircraft and airport security in India is governed by Aircraft (Security) Rules, 2011. Commissioner of Security (Civil Aviation), Bureau of Civil Aviation Security, Ministry of Civil Aviation is the appropriate authority for the requirements of Annex 17. The commissioner shall establish, develop, implement, maintain and review the national civil aviation security programme consistent with the provisions of Annes-17 to the convention to safeguard civil aviation operations against acts of unlawful interference and threat perception taking into account the safety, regularity and efficiency of flights. All aircraft and airports are required to comply with the instructions issued by the Commissioner.

The Dte. of Security acts as the nodal agency of AAI to carry out its designated functions covering AAI airports only. At individual airports, the Airport Directors are responsible for these functions. The JVC/private airports e.g. DIAL, MIAL, CIAL, HIAL, BIAL are responsible for Delhi, Mumbai, Cochin, Hyderabad and Bangalore airports respectively. These airports have their own security set up to monitor and carry out security functions.

Reporting of security accident or incident. Every aircraft operator, aviation security group, aerodrome operator, regulated agent and owner or operator of catering establishment shall report the security accident or security incident to the Commissioner immediately on the occurrence of the security accident or security incident.

Investigation of security accident or incident. The Commissioner may order investigation of any security accident or security incident and appoint an officer not below the rank of Assistant Commissioner of security as Inquiry Officer.

QUESTIONS

1. **The ICAO Annex 17 comprises rules in order to establish security measures for passengers:**
   A) Checked baggage, cargo and other goods, access control and airport design
   B) Cabin baggage, checked baggage, cargo and other goods, access control and airport design
   C) And baggage

2. **A State shall take adequate measures for the safety of passengers and crew of an aircraft which is subjected to an act of unlawful interference,**
   A) Until their journey can be continued
   B) During a period of investigation
   C) And arrange for them to return to their country of origin

3. **When an aircraft subject to unlawful interference has landed it shall notify by the most expeditious means of the State of registry of the aircraft and the State of the operator of the landing and shall similarly transmit all other relevant information to the:**
   A) Two aforementioned States, each State whose citizens suffered fatalities or injuries, each State whose citizens were detained as hostages, each State whose citizens are known to be on board the aircraft and the ICAO
   B) Two aforementioned States, each State whose citizens suffered fatalities or injuries on board the aircraft and the ICAO
   C) Two aforementioned States, each State whose citizens suffered fatalities or injuries, each State whose citizens are known to be on board the aircraft and the ICAO

4. **Definition of "Security, the ICAO Annex 17", is a combination of measures:**
   A) Intended to safeguard international civil aviation against acts of unlawful interference
   B) And human and material resources intended to safeguard international civil aviation against acts of unlawful interference
   C) And human and material resources intended to safeguard international civil aviation

5. **A State shall provide assistance to an aircraft subjected to an act of unlawful seizure. This assistance includes:**
   A) Only permission to land
   B) Provision of navigation aids, air traffic services, permission to land and catering for passengers
   C) Provision of navigation aids, air traffic services, permission to land

6. For the transport of potentially disruptive passengers some supplementary safeguards are to be observed such as:

A) Boarding prior to all passengers
B) The boarding will be at the pilot in command discretion
C) The boarding has to be done at the state discretion

7. Referring to the operational aspects in the unlawful seizure acts, it can be said:

A) The contracting States will not assist with navigation aids, air transit services, etc, to an aircraft affected by an unlawful seizure act
B) The contracting State will make provisions to ensure that an aircraft affected by an unlawful seizure act, which has landed in their territory, would be retained in all cases
C) The contracting State will make provisions to ensure that an aircraft affected by an unlawful seizure act, which has landed in their territory, would be retained, unless its departure is justified to protect lives

8. When mixing or contact does take place between passengers subjected to security control and other persons not subjected to such control after the security screening points at airports serving international civil aviation have been passed

A) The persons not subjected to security control shall be identified
B) The passengers concerned and their cabin baggage shall be re-screened before boarding an aircraft
C) Only the passengers are to be re-screened

9. When a member state allows police officers, security staff, bodyguards or other agents of foreign states to carry weapons in their territory for the protection of aircraft in flight, permission for the carriage of weapons should be conditional upon:

A) prior notification by the state of embarkation to the foreign state in which the weapons will be carried on the airport of arrival and notification of the pilot in command of a decision to permit a weapon to be carried on board his aircraft
B) Notification of the pilot in command of a decision to permit a weapon to be carried on board his aircraft only
C) Agreement between the state of embarkation and the state of destination

10. A terrorist attack at an airport shall be reported to :

A) Commissioner of Police
B) DGCA
C) Commissioner of Security (Civil Aviation)

ANSWERS

1	2	3	4	5	6	7	8	9	10
B	A	A	B	C	A	C	B	A	C

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HUMAN PERFORMANCE AND LIMITATIONS

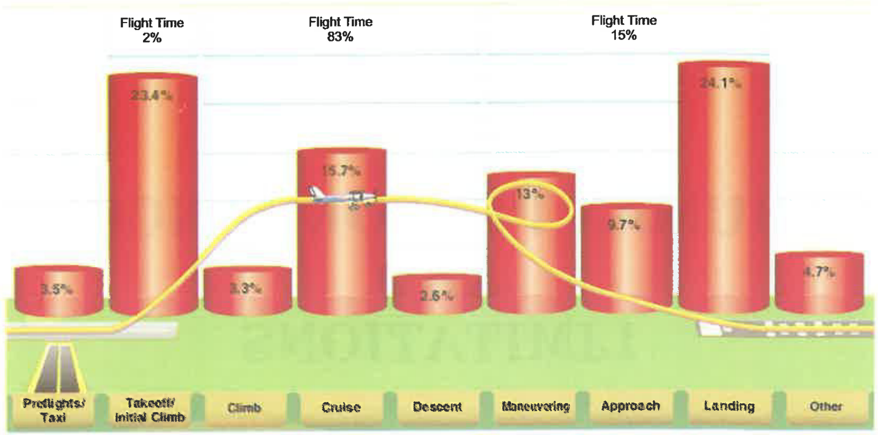
Human factors are cited as a major cause in over 73% of accidents, and it is necessary that a better understanding of human capabilities and limitations - both physical and psychological – are known to aviators. This figure has not changed since the 1950's. Human errors are now considered as being inherent to the cognitive function of human and are generally inescapable. A sound understanding of Human Performance and limitations will help enhance performance in the following areas:

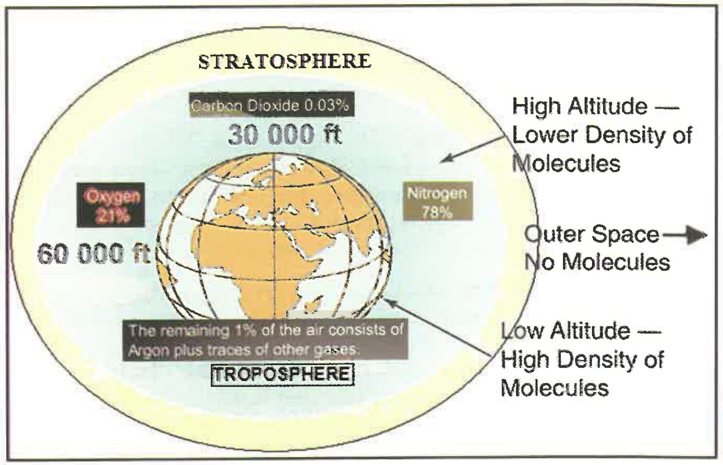
Qualities of a Professional Pilot.

Situation awareness, flexibility, task management, effective communications, threat and error management, high sense of responsibility, aircraft handling skills, sound knowledge of flying theory, motivation, physical fitness, reliability, balanced personality, team work, stress management, quick reflexes, risk assessment capabilities, decision making and crew resource management.

Causes of Aircraft Accidents.

The rate of accidents in commercial aviation (excluding sabotage and acts of terrorism) is approximatively 1 accident per million airport movements. Most aircraft accidents are linked to deficiencies in human performance. These deficiencies may involve a variety of factors. The factors include poor lookout, situation awareness (SA), decision-making, task organisation, communication, failure to recognise threats to safety and the commission of errors. Controlled Flight Into Terrain (CFIT) is the most common form of air accident. Details of different phases of flight are appended below:





Atmosphere:

Human beings live their lives in the lower reaches of the atmosphere where temperatures, pressures and oxygen supply are able to support life.

The Troposphere may be considered to stretch from the Earth's surface to an altitude of about 36,000ft. The Stratosphere reaches up to over 100,000ft.

The Troposphere contains almost all the weather.

Constituent Gases of the Atmosphere

The earth's atmosphere near the surface is composed primarily of Nitrogen and Oxygen. Together, the two comprise about 99% of the gas in the atmosphere. Here's a listing of the key components of the lower atmosphere...

Nitrogen - 78.084%	Oxygen - 20.95%
Argon - 0.934%	Carbon Dioxide - 0.036%
Neon - 0.0018%	Helium - 0.0005%
Methane - 0.00017%	Hydrogen - 0.00005%
Nitrous Oxide - 0.00003%	Ozone - 0.000004%

In addition, water vapor is variable but typically makes up about 1-4% of the atmosphere.

The relative proportions of these gases remains constant in the Troposphere and Stratosphere.

The Variation of Pressure and Temperature with Altitude

The International Standard Atmosphere (ISA) is used to show standardized values for temperature, pressure, density etc.

Pressure decreases with altitude throughout the atmosphere. Temperature decreases with altitude in the Troposphere. Sea level pressure in ISA is presumed to be 1013.25 hPa (or 1013.25 mb, or 14.7 lb per square inch, or 29.92 inches of Mercury or 760 millimeters)of Mercury. Temperature reduces at 1.98°C per 1000 ft up to 36,090 feet. There after it remains constant at (–) 56.5°.

The partial Pressure of Oxygen.

Partial pressures describe the distribution of certain gases in a mixture and follows Dalton´s law which states that the total pressure of a mixture of gases is equal to the sum of the partial pressures of the gases which compose the mixture.

ALTITUDE vs BLOOD OXYGEN

ALTITUDE % NORMAL PRESSURE	BAROMETRIC PRESSURE	WATER TENSION AT BODY TEMP.	CARBON DIOXIDE TENSION	REMAINDER	OXYGEN TENSION IN AIR	ARTERIAL OXYGEN TENSION	BLOOD SATURATION
SEA LEVEL 100%	760	47	40	673	140	100	96%
12,000 FEET 75%	570	47	40	483	100	75	94%
18,000 FEET 50%	380	47	40	300	62	46	80%
24,000 FEET 40%	300	47	40	210	45	33	65%
36,000 FEET 25%	190	47	40	103	21	16	20%

All pressures are in Torr or millimeters of mercury

Effects of Increasing Altitude.

Whatever the air pressure, Oxygen continues to make up 21% of the air by volume. In other words, the proportion of oxygen in the air always stays the same whatever the altitude.

The partial pressure of Oxygen decreases with altitude as does the total pressure of air.

Sea Level Air Density = 1.225 kg / m²

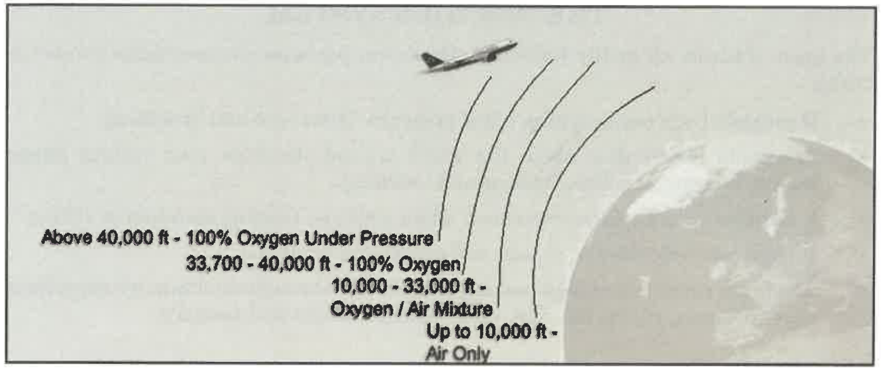
Air Density at 36,000' = 0.365 kg / m²

Therefore Density at 36,000' is one third of density at sea level. Hence the quantity of Oxygen available is proportionately low.

Physiological Zone:

Normal healthy human beings used to living near sea-level will need supplementary oxygen to function normally at altitude exceeding 10,000 to 12,000 feet.

Pilots will normally begin breathing supplementary oxygen from 10,000 feet above sea level.



Physiological Deficient Zone:

Exists from 12,000 feet to 50,000 feet. Body is not used to this environment. The adverse effects include-

- Middle ear and sinus blockage
- Shortness of breath
- Dizziness
- Headache

At 6 to 7000 feet altitude does the human organism start with remarkable measures to compensate for the drop in pO2 when climbing (threshold for compensatory reactions).

A pilot, climbing in a non-pressurised aircraft and without using supplemental oxygen will pass the "critical threshold" at approximately 22 000 feet.

Breathing 100% oxygen will lift the pilot's physiological safe altitude to approximately 38 000 ft.

Partial Space Equivalent Zone

This zone extends from 50,000' to 120nm.

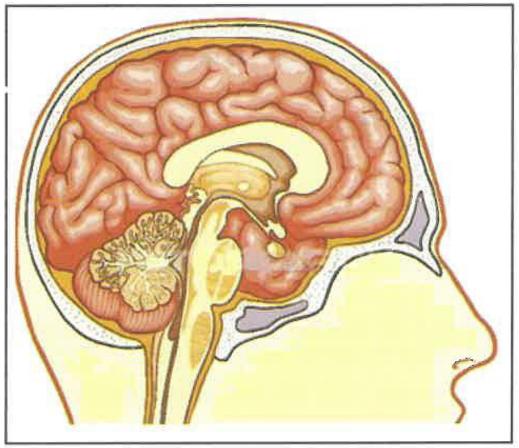
Total Space Equilant Zone extends outwards from 120nm.

- 100% Oxygen does not protect from Hypoxia.
- Sealed cabins and pressure suits are a must
- Blood and body fuels boil over 63,000 feet
- Gravitational changes affect the body

THE NERVOUS SYSTEM

The brain controls all bodily functions. The brain performs an incredible number of tasks:

- It controls body temperature, blood pressure, heart rate and breathing.
- It accepts information about the world around you from your various senses seeing, hearing, smelling, tasting and touching).
- It handles your physical movement when walking, talking, standing or sitting.
- It lets you think, dream, reason and experience emotions.
- The brain controls decision making and speech, through the brain we experience consciousness, vision, hearing, taste, smell, thought and memory.



The Nervous System is divided into three main parts:

The Central Nervous System

The central nervous system consists of the brain and the spinal cord. Brain, spinal cord and peripheral nerves make up a complex, integrated information-processing and control system known as **Central Nervous System.** In tandem, they regulate all the conscious and unconscious facets of your life. The scientific study of the brain and nervous system is called **neuroscience** or **neurobiology.** The brain functions to receive nerve impulses from the spinal cord and cranial nerves. The spinal cord contains the nerves that carry messages between the brain and the body.

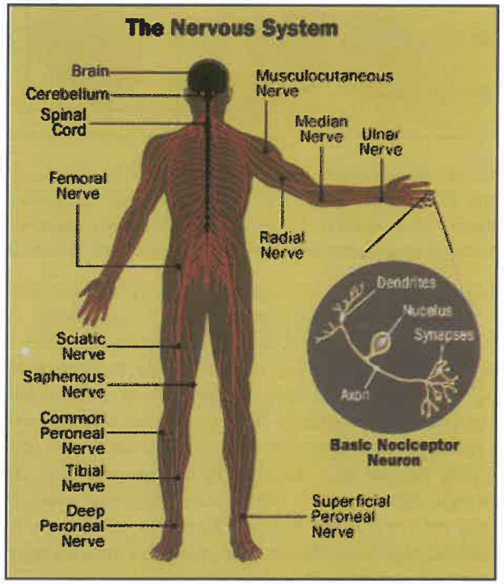
The Peripheral Nervous System

The peripheral nervous system includes all peripheral nerves. It connects the central nervous system to the organs and muscles of the body and regulates all purposeful and reflex actions. The peripheral nervous system controls organs and muscles like skin, eye, blood vessels, heart and stomach.

The Autonomic Nervous System.

The organs (the "viscera") of our body, such as the heart, stomach and intestines, are regulated by a part of the nervous system called the **Autonomic Nervous System** (ANS). The ANS is part of the peripheral nervous system and it controls many organs and muscles within the body. In most situations, we are unaware of the workings of the ANS because it functions in an involuntary, reflexive manner. For example, we do not notice when blood vessels change size or when our heart beats faster.

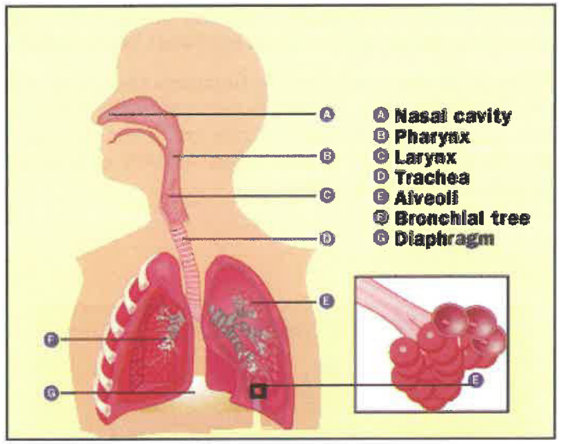
The autonomic Nervous System exercises its functions independently of the Central Nervous System to the extent that it controls parts of body without having to think about it. The autonomic Nervous System controls eye, heart, breathing, temperature, blood pressure, stomach, intestines and bladder, urinary output, sweating, glands, fight or flight response or reaction to stress.



THE RESPIRATORY SYSTEM

Lungs are complex organs, but what they do is to get rid of carbon dioxide and exchange it for oxygen.

The respiratory process consists mainly of the diffusion of oxygen through the respiratory membranes into the blood, transportation to the cells, diffusion into the cells and elimination of carbon dioxide from the body.



As you breathe air in through your nose or mouth, it goes past the **epiglottis** and into the **trachea.** It continues down the trachea through your **vocal cords** in the **larynx** until it reaches the **bronchi.** From the bronchi, air passes into each lung. The air then follows narrower and narrower **bronchioles** until it reaches the **alveoli**.

Within each air sac, the oxygen concentration is high, so oxygen passes or **diffuses** across the alveolar membrane into the **pulmonary capillary.** At the beginning of the pulmonary capillary, the hemoglobin in the red blood cells has carbon dioxide bound to it and very little oxygen. The oxygen binds to hemoglobin and the carbon dioxide is released. Carbon dioxide is also released from sodium bicarbonate dissolved in the blood of the pulmonary capillary. The concentration of carbon dioxide is high in the pulmonary capillary, so carbon dioxide leaves the blood and passes across the alveolar membrane into the air sac. This exchange of gases occurs rapidly (fractions of a second). The carbon dioxide then leaves the alveolus when you exhale and the oxygen-enriched blood returns to the heart. Thus, the purpose of breathing is to keep the oxygen concentration high and the carbon dioxide concentration low in the alveoli so this gas exchange can occur !

External Respiration

External Respiration takes place through the lungs and refers to the absorption of Oxygen from the air into the blood. And the excretion of Carbon Dioxide from the blood to the air.

Internal or Tissue Respiration

Internal or Tissue Respiration refers to the transfer of Oxygen from the blood to the tissues of the body. At the same time as this occurs, the tissues give up Carbon Dioxide to the blood.

Breathing.

Normal breathing is a purely automatic process under the unconscious control of the nervous system. The normal rate of respiration in adults 14 to 18 breaths per minute.

The level of carbon Dioxide in the blood effectively regulates the rate and depth of breathing.

THE CIRCULATORY SYSTEM

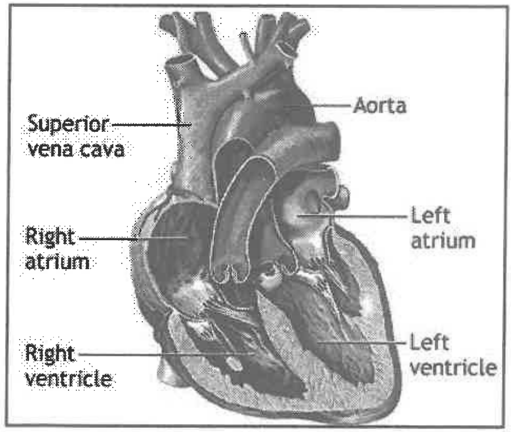
Blood supplies our organs with life-giving oxygen and carries away waste products.

The circulatory system consists of the heart and the blood vessels and maintains the flow of blood throughout the body.

The Heart

The arteries carry blood from the heart at high pressure and the veins return blood to the heart at low pressure. The heart is a pumping system which intakes deoxygenated blood through the veins, delivering it to the lungs for oxygenation and then pumping it into the various arteries to be transmitted to where it is needed throughout the body for energy.

At rest the cardial output (the quantity of blood the heart pumps in one minute) of an adult is approximately 5 liters/min.



The Circulatory System.

When the heart muscle contracts or beats (called **systole**), it pumps blood out of the heart. The heart contracts in two stages. In the first stage, the right and left atria contract at the same time, pumping blood to the right and left ventricles. Then the ventricles contract together to propel blood out of the heart. Then the heart muscle relaxes (called **diastole**) before the next heartbeat. This allows blood to fill up the heart again.

The right and left sides of the heart have separate functions. The right side of the heart collects oxygen-poor blood from the body and pumps it to the lungs where it picks up oxygen and releases carbon dioxide. The left side of the heart then collects oxygen-rich blood from the lungs and pumps it to the body so that the cells throughout your body have the oxygen they need to function properly.

Blood containing oxygen is pumped around the body from the left ventricle.

The oxygenated blood passes through the **aorta** into the arteries before arriving at the smallest vessels of the system, the **capillaries.**

The Oxygen-Carbon Dioxide exchange takes place through the walls of the capillaries.

The normal rate of the pulse is the rate of the heartbeat. A healthy person at rest, has a pulse rate of between 60 and 80 beats per minute. The rate is increased by exercise, emotional inputs and disease.

When the body experiences stress or fear, adrenaline is released into the bloodstream causing an immediate increase in the pulse rate.

Composition and Function of the Blood

Blood has two main components — **plasma** and **formed elements**. Nearly everything that blood carries, including nutrients, hormones and waste, is dissolved in the plasma, which is mostly water. **Formed elements,** which are cells and parts of cells, also float in the plasma.

Formed elements include **white blood cells (WBCs)**, which are part of the immune system, and **platelets**, which help form clots. White corpuscles produce antibodies to flight bacteria. Platelets are the smallest of the blood cells and assist in the blood clotting process.

Red blood cells (RBCs) are responsible for one of blood's most important tasks -- carrying oxygen and carbon dioxide.

RBCs are numerous; they make up more than 90 percent of the formed elements in the blood. Virtually everything about them helps them carry oxygen more efficiently.

A red blood cell's lack of nucleus also gives it more room for **hemoglobin (Hb),** a complex molecule that carries oxygen. It's made of a protein component called a **globin** and four pigments called **hemes.** The hemes use iron to bond to oxygen. Inside each RBC are about 280 million hemoglobin molecules.

If you lose a lot of blood, you lose a lot of your oxygen delivery system. The immune cells, nutrients and proteins that blood carries are important, too, but doctors are generally most concerned with whether your cells are getting enough oxygen.

In an emergency situation, doctors will often give patients **volume expanders,** like saline, to make up for lost blood volume. This helps restore normal blood pressure and lets the remaining red blood cells continue to carry oxygen. Sometimes, this is enough to keep the body going until it can produce new blood cells and other blood elements. If not, doctors can give patients **blood transfusions** to replace some of the lost blood. Blood transfusions are also fairly common during some surgical procedures.

The principal functions of the blood are:

- To carry oxygen to, and carbon dioxide from, the various tissues and organs of the body.
- To carry nutrients to tissues and remove waste products from these tissue.
- To carry chemical messengers, such as hormones including adrenaline, to regulate the actions and secretions of various organs.
- To transport cells which can attack and destroy invading micro-organisms enabling the body to resist disease.
- To assist in temperature control of the body.

The circulatory system can malfunction in two principal ways:

- The main component of the system, the heart and the blood vessels, may develop a fault.
- The blood may become unable to carry enough Oxygen for the need of the organs and tissues of the body.

Failures or Malfunctions of the Circulatory System – Angina and Heart Attack.

Lack of oxygen supply to the heart may give rise to symptoms of **Angina.** A heart attack is when low blood flow causes the heart to starve for oxygen. Heart muscle dies or becomes permanently damaged. Your doctor calls this a myocardial infarction.

Some cause of angina and heart attack

Most heart attacks are caused by a blood clot that blocks one of the coronary arteries. The coronary arteries bring blood and oxygen to the heart. If the blood flow is blocked, the heart starves for oxygen and heart cells die.

A clot most often forms in a coronary artery that has become narrow because of the build-up of a substance called plaque along the artery walls. Some times, the plaque cracks and triggers a blood clot to form.

Occasionally, sudden overwhelming stress can trigger a heart attack.

• Bad genes (hereditary factors)	• Unhealthy cholesterol levels, especially high LDL ("bad") cholesterol and low HDL ("good") cholesterol
• Being male	• Lack of exercise
• Diabetes	• Stress
• Getting older	• Obesity
• High blood pressure	• Alcohol
• Smoking	
• Too much fat in your diet	

Failures or Malfunctions of the Circulatory System – Insufficiency of Oxygen.

HYPOXIA

The term **cerebral hypoxia** technically refers to lack of oxygen supply to the cerebral hemispheres (the outer portion of the brain). However, it is more typically used to refer to a lack of oxygen supply to the entire brain.

The body organs and tissues may be deprived of the oxygen they need because of illness or disease.

But the pilot must know that oxygen deprivation or **hypoxia** can be caused by breathing air at the low pressures at high altitude.

Hypoxia will cause a pilot's intellectual and sensory judgment to become impaired. In mild cases, hypoxia causes only inattentiveness, poor judgment, and uncoordinated movement. Severe cases result in a state of complete unawareness and unresponsiveness (coma) — brain stem reflexes, including response to light and the breathing reflex, stop. Only blood pressure and heart function are maintained. If this persists, brain death is inevitable. If the lack of oxygen to the brain is limited to a very brief period of time, coma may be reversible with varying levels of return to function, depending on the extent of injury. Sometimes seizures may occur, which may be continuous with no stop between them (status epilepticus). Serious oxygen deprivation can kill a pilot within minutes

Hypoxia is classified into four different types

(a) Hypoxic hypoxia

Hypoxic hypoxia is the result of low oxygen levels in the bloodstream. In pilots, this most often occurs with exposure to altitude (hypobaric hypoxia). At low altitudes, the partial pressure of oxygen in the atmosphere is adequate to maintain brain function at peak efficiency. Atmospheric pressure and the partial pressure of oxygen both decline at higher altitudes.

(b) Anaemic hypoxia

Oxygen in blood is carried by haemoglobin, which is found in red blood cells. When the red blood cell count decreases, or the haemoglobin does not function properly, less oxygen can be carried by the blood. This can occur in conditions such as heavy bleeding, some cancers, sickle cell anaemia, or carbon monoxide poisoning, to name a few. A person suffering from anaemia may notice symptoms such as breathlessness, fatigue, or chest pain, and symptoms will worsen at higher altitudes, as the effects of hypoxia and anaemia are additive.

(c) Ischaemic hypoxia/stagnant hypoxia

The term ischaemia refers to inadequate supply of blood, and ischaemic hypoxia occurs when there is inadequate blood flow to body tissues. This can occur with constriction of blood vessels (for example, this is often seen in fingers and toes exposed to cold) as well as in situations of low blood pressure and cardiac output such as fainting, or during exposure to high sustained accelerations (stagnant hypoxia). Oxygen therapy is not very helpful in this form of hypoxia. The best remedy is to correct the underlying cause.

(d) Histotoxic Hypoxia

Histotoxic hypoxia refers to an inability of the cells of the body to use the oxygen available. This type of hypoxia is rare in pilots, but it can occur with certain conditions such as cyanide poisoning, chemical poisoning, and intoxication with certain drugs. Histotoxic hypoxia can also be caused by high blood alcohol levels.

Times of Useful Consciousness:

Altitude (ft)	Progressive Decompression		Rapid Decompression
	Sitting	Moderate Activity	
18,000	About 40 min.	About 30 min.	20 to 25 min.
20,000	10 min.	5 min.	3 min.
25,000	5 min.	3 min.	2 min.
30,000	1.5 min.	45 sec.	30 sec.
35,000	45 sec.	30 sec.	20 sec.
40,000	25 sec.	18 sec.	12 sec.
43,000	18 sec.	12 sec.	12 sec.

Hypoxia Causes:	Symptoms	Immediate Actions if Hypoxia is suspected:
• Drug overdose/ alcohol • Asphyxiation caused by smoke inhalation • Very low blood pressure • Strangulation • Cardiac arrest (when the heart stops pumping) • Carbon monoxide poisoning • High altitudes • Choking • Compression of the trachea • Diseases that paralyze the respiratory muscles • A tobacco smoker is likely to experience the effects of hypoxia at a lower then a non-smoke	• The symptoms are slow but progressive, insidious in onset, and are most marked at altitudes starting above 10,000 ft (3500 m). Night vision, however, can be impaired starting at altitudes 5000'. • Its onset may be accompanied by a feeling of well being, known as euphoria. • Even minor hypoxia impairs night vision and slows reaction time. • More serious hypoxia interferes with reasoning, gives rise to unusual fatigue and, finally, results in a loss of consciousness/ death. • Impaired Judgment • Headache • Tingling in hands & feet • Hyperventilation • Muscular Impairment • Memory Impairment • Sensory Loss • Tunnel Vision • Cyanosis (a bluing of the body extremities) • Fornication (A feeling of ants under the skin)	• Provide Oxygen. • Descend below 10,000 feet or Minimum Safe Altitude if it is higher than 10,000'.

Carbon Monoxide Poisoning

Carbon monoxide is a colourless, odourless, tasteless gas that is a product of incomplete combustion. Haemoglobin, the oxygen-carrying chemical in the blood, picks up carbon monoxide over 200 times more readily than it picks up oxygen. Thus, even minute quantities in the cockpit (often from improperly vented exhaust fumes) may result in pilot incapacitation. Exhaust gases from piston engines can consist of as much as 9% carbon monoxide. So gases from leaking exhausts can cause carbon monoxide poisoning in pilots.

Carbon Monoxide poisoning Symptoms:	Actions to be taken if carbon Monoxide poisoning is suspected:
• Initially, there is an inability to concentrate • Headache • Dizziness • Nausea • Impaired vision • Lethargy or weakness • Impaired judgment • Personality change • Impaired memory • Flushed cheeks and cherry-red lips • Convulsions	• Turn off cabin heating • Open cabin ventilators • Consider using oxygen if available • Land as soon as possible • Take medical aid. • Do not fly till cleared by doctor ***AT ALL TIMES WHEN THE CABIN HEATING IS USED , FRESH AIR MUST BE CIRCULATED TO REDUCE PRESENCE OF CO.***

Hyperventilation

"Hyperventilation" is another word for "over breathing" and may be defined as lung ventilation in excess of the body's needs. Good training is the best way to avoid Hyperventilation in pilots.

The chances of Hyperventilation effecting your passengers can be reduced by giving them a thorough pre-flight briefing on every aspect of the flying sortie.

At low altitude, the most common causes of hyperventi-lation are:	Symptoms of Hyperven tilation are:	Treatment of Hyperventilation
• Intense concentration on a difficult task • Fear • Anxiety. • Motion sickness. • Shock. • Vibration. • Heat. • High G-forces.	• Dizziness. • Tingling. • Visual disturbances. • Hot or cold sensation. • Anxiety. • Loss of muscular co-ordination. • Increased heart rate. • Spasms. • Loss of consciousness. • cramping and spasms of the hands and feet. • Cold clammy skin • Paleness	• Breathe oxygen at 100 percent. If hypoxia is the cause, the symptoms will improve markedly after three or four breaths. • If the symptoms persist, consciously slow the rate of breathing to 10–12 breaths per minute and do not breathe deeply. • If you are flying below 10,000 feet, hypoxia is unlikely and hyperventilation may be assumed. • If you suspect that any occupant of your aircraft is suffering from hyperventilation, try calm them down. Give them a simple task to fulfill that might take their mind off their anxiety. • One of the direct causes of hyperventilation is a reduction in the carbon dioxide level in the blood, the condition may be alleviated by getting the sufferer to breathe into a paper bag. This action will increase the blood's carbon dioxide level causing the brain to reduce the breathing rate.

Smoking

A pilot who is also a smoker may experience the symptoms of oxygen deprivation, or hypoxia, at a lower altitude (7,000') then a non-smoker (10,000').

A person who smokes one packet of cigarettes per day will reduce his capacity to carry oxygen by 5-8%.

A smoker also has increased susceptibility to Carbon Monoxide poisoning .

- Lung cancer.
- Breathing problems.
- Circulatory problems.
- Reduced tolerance to G forces.
- Increased risk of heart attack.
- Degradation of night vision.

Alcohol

Alcohol acts primarily as a depressant. Do not fly while under the influence of alcohol. An excellent rule is to allow twenty-four hours between the last drink and takeoff time. Even small amounts of alcohol in the system can adversely affect judgement and decision-making abilities.

Relatively small amounts of alcohol significantly decrease a pilot's tolerance to hypoxia (oxygen lack). At 6,000 feet (1800 m) the effect of one drink is that of two drinks at sea level. Even at sea level alcohol impairs judgement and reaction time. Therefore, alcohol and flying do not mix.

Remember that your body metabolises alcohol at a fixed rate, and no amount of coffee or medication will alter this rate. Alcohol is eliminated from the blood at a rate of approximately one unit per hour.

Also, do not fly with a hangover, or a 'masked hangover' (symptoms suppressed by aspirin, caffeine or other medication). High altitude, where oxygen is deficient aggravates these effects.

One unit of alcohol = half a pint of beer = a standard glass of wine = one measure of spirits.

Recommended maximum alcohol intake:

MEN – 5 units daily, 21 units per week.

WOMEN – 3 units daily, 14 units per week.

Blood alcohol concentrations of 40 mgs per 100 ml results in significant increases in errors committed by pilots.

- Impaired judgment and Impaired ability to reason.
- Degraded muscular coordination and Degraded vision.

- Lack of inhibitions and self-control.
- Increased susceptibility to Hypoxia.
- Damages to the liver, heart, brain and blood cells.
- Affects short and long-term memory.
- Slows reaction time.
- Sufferer may feel that performance is improved.
- Balance and sensory illusions.
- Irregular sleep patterns .

Blood Pressure

Blood-pressure depends on the cardiac output, the resistance of the capillaries (peripheral resistance), the elasticity of the arterial walls and the blood volume and viscosity.

- Blood pressure is the pressure exerted by blood on the walls of the main arteries.
- The blood-pressure which is measured during flight medical checks is the pressure in the artery of the upper arm (representing the pressure at heart level).
- The permanent pressure against the arterial wall is called diastolic pressure. The increased pressure occurring with each beat of the heart is called the systolic pressure.
- 120/80 is a normal blood pressure for a healthy young adult.
- High blood pressure or hypertension which is a major cause of unfitness in pilots.

Causes of Blood Pressure (Hypertension)

- Stress
- Smoking
- Poor diet (excess fat or salt)
- Obesity
- Lack of exercise
- Age
- Narrowing of the arteries

Donating Blood

In a completely healthy individual, the fluid reduction caused by donating one unit of blood is replaced within several hours. In some people, however, the loss of blood causes disturbances to the circulation that may last for several days. While the effects at ground level are minimal, flying during this period may entail a risk. Generally, active pilots should not donate blood, but if blood has been donated they should wait at least 48 hr before flying.

Cabin Pressurization

"Decompression" means the lowering of pressure.

The maximum altitude without oxygen at which flying efficiency is not impaired is 8000 feet. When flying at altitude below 10,000 feet, the risk of suffering from conditions related to decompression is low. At ground level the body tissues are saturated with nitrogen, the inert gas which makes up 80% of our atmosphere. As the aircraft climbs atmospheric pressure is reduced, and by 18 000 feet ASL (5 486 m) atmospheric pressure is halved. Decompression sickness symptoms may develop at 18000 feet and above. Pilots flying aircraft with unpressurized cabins at altitudes greater than 25 000 feet ASL (7 620 m) may be subject to the "bends". This condition is caused by bubbles of nitrogen forming in the tissues because the ambient (atmospheric) pressure is less than the pressure at ground level. (An example of this phenomenon is the bubbles formed when a bottle of soda pop is opened, and the pressure is reduced.) The bubbles may track into joint spaces causing a dull, sickening pain. More dangerously they may be released into the lungs or the brain, giving rise to chest pain and/or collapse. The tendency to develop the bends increases with high rates of climb, age, obesity, physical activity and low temperatures.

Airlines and high performance aircraft have cabin pressurization system to maintain an artificially "low altitude" within the cabin or cockpit. The pressurization of a commercial airliner flying at 30,000ft maintains an internal cabin pressure equivalent to about 6,000 ft, with a maximum pressure of 8,000 ft.

A fast decompression is recognizable by, mist in the cabin, blast towards the exterior of the aircraft, expansion of body gases and blast of air released violently from the lungs.

A slow decompression may be caused by a slight airtightness defect or a bad functioning of the pressurization.

Decompression Sickness

Without a cabin pressurization system, pilot and passengers in high flying aircraft would be exposed to high altitude, like hypoxia, low temperatures and Decompression Sickness/illness.

Henry's Law explains the occurrence of decompression sickness. The principle that at a constant temperature the concentration of a gas dissolved in a fluid with which it does not combine chemically is almost directly proportional to the partial pressure of the gas at the surface of the fluid. A rapid reduction in ambient pressure, may cause the nitrogen in our blood to come out of solution as small bubbles leading to decompression sickness. Symptoms of decompression sickness are bends, chokes, skin manifestations, neurological symptoms and circulatory shock. Symptoms may appear several hours after the exposure. Do not fly for at least 12 hrs after experiencing rapid decompression even though you may be feeling fit.

Effect of Nitrogen Bubbles

Joints : Bubbles in the joints cause rheumatic-like pain, called the Bends.

Skin : Nitrogen bubbles released under the skin cause the Creeps, a sensation of movement under the skin.

Respiratory System : Shortness of breath and a feeling of burning, gnawing and piercing pain. Known as the **Chokes.**

The Brain : Loss of mental functions and control of movement. Known as the Staggers.

Treatment of Decompression Sickness

- Keep patient warm and on 100% Oxygen.
- An immediate descent must be initiated.
- Land as soon as possible.
- Seek medical assistance immediately on landing.

Flying Following Diving

Decompression sickness can occur when flying at low altitude in individuals who have been diving, using compressed air breathing apparatus shortly before flight at a depth of 30 feet or more. As a general rule, individuals should not fly within 24 hours following diving and certainly not the same day.

Occasionally a 'medical emergency' arises as a result of compressed air diving, when a diver is in danger of developing air-embolism (bends) at the surface altitude, as a result of being unable to decompress before surfacing. In some of these cases air-evacuation is the only feasible method of getting the patient to a decompression chamber in time to treat this condition. Flight, however, should be at the lowest possible altitude to avoid aggravating the condition. Symptoms and signs usually appear within 15 minutes to 12 hours after surfacing; but in severe cases, symptoms may appear before surfacing or immediately afterwards. Delayed occurrence of symptoms is rare, but it does occur, especially if air travel follows diving.

Incapacitation in Flight.

The risk of seizure in flight is obvious. Incapacitation is in most cases is sudden, unpredictable, unavoidable, prolonged, complete, and potentially more frequent in the stressful flying environment, and constitutes a direct threat to the health and safety. Periodical medical examinations minimize the risk of incapacitation in flight. The frequency of medical checks increases with advancing age.

Obvious Incapacitation : Obvious incapacitation normally refers to a state in which all of a crew member's physical or mental functions are lost, including loss of consciousness or being unable to move while retaining consciousness, rendering them completely unable to carry out their duties. Obvious incapacitation can sometimes involve convulsions, or the victim may lapse into unconsciousness several minutes after the incapacitation occurs. Causes of obvious incapacitation include cardiac arrest, myocardial infection, intracerebral hemorrhage, cerebral apoplexy, and epilepsy.

Subtle / Insiduous incapacitation : Subtle (develops slowly and gradually), incapacitation refers to a state of a partial or temporary loss of physical or mental function which manifests itself in the form of a partial paralysis, a dulling of perception, judgment, or responses or lack thereof (a state of absence of mind, distraction of attention), trouble with speech, inadequate responses, meaningless utterances, etc. Particular attention must be paid to the fact that a crew member may become incapacitated even though their appearance is no different from normal. Possible causes of subtle incapacitation include a temporary hypoglycemia, reduction in blood pressure, cerebropathy or psychopathy, excessive muscular fatigue, excessive drinking, insufficient sleep, emotional instability, toothache, stomach ache, and headache. Since other crew members are often unable to detect subtle incapacitation quickly, from a flight safety point of view, it is possible that subtle incapacitation may lead to a situation of comparatively greater danger than obvious incapacitation.

FITS AND FAINTS

Epilepsy

A fit or seizure is usually referred to as "epilepsy". A fit or a seizure is not a specific disease but a set of signs or symptoms in response to a disturbance of the electrical activity in the brain.

A seizure may or may not be associated with a loss of consciousness. **Grand Mal Epilepsy** manifests as a generalized seizure and is associated with a transient loss of consciousness. Grand Mal Epilepsy may be associated with a prodromal phase. Grand Mals are normally accompanied by convulsions and uncontrolled physical movement.

Petit Mal Epilepsy is a generalized seizure, but is not associated with a loss of consciousness. Petit Mals are a minor attack. Any fit, major or minor, is associated with an unpredictable loss of consciousness and is therefore an absolute bar to the holding of a flying licence.

Faint

A faint is a common cause of a loss of consciousness in adults. The most common causes of faints are :

- Standing up quickly after prolonged sitting especially when hot or dehydrated.
- A sudden shock.
- Loss of blood after an accident.
- Lack of food or fluid,
- Other physiological stress.

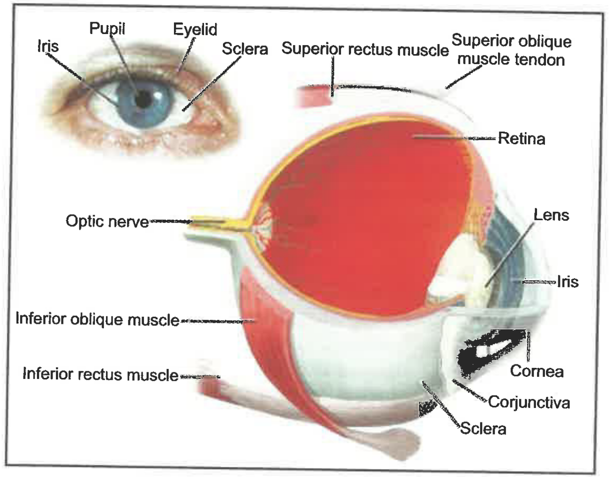
Syncope is a temporary but sudden loss of consciousness when blood flow to the brain is compromised. In young individuals, fear, anxiety, sight of blood, etc., can result in a temporary loss of consciousness. This is referred to as vasovagal syncope. Frequently, syncope is associated with symptoms like light headedness, muscle weakness, and dizziness before the actual fainting occurs. A faint has no significance as far as future flying is concerned, so long as the cause is clearly understood.

PHYSIOLOGY

"Physiology" is a technical term meaning the science of the organic functions of humans, animals and plants.

THE EYE

The eye delivers to the brain information about the outside world at a much faster rate then any other sensory organ. The eye is the organ of sight. The eye is the most sensitive of our sensory organs. Its basic structure is similar to a camera with an aperture (Iris), a lens (lens) and a light sensitive screen (Retina).



The Cornea

Light enters the eye through the Cornea, a clear window at the front of the eyeball. The Cornea is capable of contributing 70% and 80% towards total focusing ability of the eye.

The Iris and the Pupil

The amount of light allowed to enter the eye is controlled by the Iris. Pupil, the hole in the centre of the Iris adjusts to the flow of light.

The Lens

The shape of the lens is changed by muscles. This controls final focusing onto the fovea.

The Retina

The Retina is a light sensitive screen lining the inside of the eyeball. On this screen are light-sensitive cells. When light falls on them, it generates a small electrical

charge which is passed to the brain by nerve fibers (neurons) which combine to form the Optic Nerve.

The retina has rods on its peripheral zone and cones on its central zone. The retina contains the receptors for vision: about 100 million rods and 6 million cones.

The Rods

The Rods can only detect black and white but are much more sensitive at lower light levels. Rods are responsible for our peripheral vision.

The Fovea

The central part of the retina is called the Fovea. The fovea centralis is a small, central pit composed of closely packed cones in the eye. This is the area of best day vision and no night vision at all. Any object that needs to be examined in detail is automatically brought to focus on the fovea. This is called "Central Vision". The rest of the retina fulfils the function of attracting our attention to movement and change.

Eye Movement

To track an object successfully, or to focus on an object, the eyes need to move in harmony with one another. This means that the brain must co-ordinate control of the muscles of the two eyes. In a fatigued person, double vision can occur.

Binocular Vision

Binocular Vision means seeing with two eyes. With binocular vision each eye sees an object from two slightly different angles. The brain merges the two images into one and is thus able to perceive that the image has depth. A further advantage of binocular vision is that the blind spot of one eye is covered by the other eye. Depth perception when objects are close is achieved through binocular vision.

Visual Acuity

Visual acuity is a measure of the capacity of the eye to determine small detail, undistorted, at a given distance.

The sharpest visual acuity occurs when the retinal image is sharply focused on the fovea so that the pilot needs to look exactly in the direction of the on-coming aircraft to detect it. It is, thus essential for pilots to have normal visual acuity, either with the naked eye, or by wearing spectacles, in order that they may detect objects clearly at safe distance.

Accommodation

As well as being able to see objects clearly at a distance, pilots also need good near vision in order to read instruments and maps. Being able to focus on close objects is a function of the eye's ability to accommodate.

Reading Glasses

Pilots and drivers who have reached middle-age normally wear bi-focal spectacles to allow them to see clearly at a distance and to read their instruments and maps, while wearing the same spectacles.

Limitations of Acuity – The Sharpness of Central Vision

The sharpness of central vision drops as light falls on retina at increasing angles from the fovea.

- Angular distance from the fovea
- Amount of light available
- Physical imperfections within the visual system
- Size and contours of an object.
- Age
- Distance of the object from the viewer
- Hypoxia
- Contrast of an object with its surrounding
- Smoking
- Relative motion of a moving object.
- Alcohol
- Drugs or medication
- Visibility (dust, mist etc.)

LIMITATIONS OF THE VISUAL SYSTEM

Night Vision – Adaptation

Adaptation is the adjustment of the eyes to high or low levels of illumination. The time required for complete adaptation for high levels of illumination is 10 sec and for full dark adaptation 30 min. When passing from bright ambient surroundings into the dark, visual capacity is severely reduced until the eyes have adapted to the dark. It is especially important for pilots to allow sufficient time for dark adaptation to take place before flying at night. Dark adaptation takes time – about 7 minutes for the cones and 30 minutes for the rods.

Vision Under Dim and Bright Illumination

Under conditions of dim illumination, small print and colors on aeronautical charts and aircraft instruments become unreadable unless adequate cockpit lighting is available. Moreover, another aircraft must be much closer to be seen unless its navigation lights are on. In darkness, vision becomes more sensitive to light, a process called dark adaptation. Although exposure to total darkness for at least 30 minutes is required for complete dark adaptation, a pilot can achieve a moderate degree of dark adaptation within 20 minutes under dim red cockpit lighting. Since red light severely distorts colors, especially on aeronautical charts, and can cause serious difficulty in focusing the eyes on objects inside the aircraft, its use is advisable only where optimum outside night vision capability is necessary. Even so, white cockpit lighting must be available when needed for map and instrument reading, especially under IFR conditions. Dark adaptation is impaired by exposure to cabin pressure altitudes above 5,000 feet, carbon monoxide inhaled in smoking and from exhaust fumes, deficiency of Vitamin A in the diet, and by prolonged exposure to bright sunlight. Since any degree of dark adaptation is lost within a few seconds of viewing a bright light, a pilot should close one eye when using a light to preserve some degree of night vision. Look to the side (15 - 20 deg) of the object.

The Blind Spot

The blind spot is point on the retina where the optic nerve enters the eyeball. Here the retina has no covering of light-detecting cells. If the eye remains looking straight ahead it is possible for a closing aircraft to remain in the blind spot until a very short time before impact. To lessen the danger of collision, pilots are taught to carry out a systematic look out at all times. With both eyes open, the blind spot of one eye is covered by the other eye. But be aware of obstructions to your visual field such as passengers or canopy structures.

Empty Visual Field (Empty Field Myopia)

In the absence of anything to focus on (that is when your visual field is empty) the natural focus point of the eye is, on average, at a distance of between 1 and 2 meters in front of the eye. Pilots should minimize the risks associated with empty visual field by periodically and deliberately focusing on objects, both close and at a distance.

Damage to the Visual System

Very high light occurs at altitude. At altitude, light contains more of the high energy blue and ultra violet wavelengths then is experienced at sea level. Over a long period such light can cause cumulative damage to the retina and lens of the eye. However most harmful wavelengths are filtered out by the cockpit windows.

Vibrations.

Vibrations can cause blurred vision. This is due to tuned resonance oscillations of the eyeballs.

Protection of the Visual System – Sunglasses

When flying through a thunderstorm with lightning you can protect yourself from flash blindness by turning up the intensity of cockpit lights,by looking inside the cockpit,by wearing sunglasses and by using face blinds or face curtains when installed.

The requirement of good sunglasses is to absorb atleast 85% of visible light to eliminate glare without decreasing visual acuity, absorb UV and IR radiation and absorb all colors equally. Make sure you avoid using cheap sunglasses. Light sensitive lenses (Photo chromatic) are also generally forbidden for use in flight. Sunglasses should have the following characteristics:

- Be impact resistant.
- Have thin frames (minimum visual obstruction).
- Be coated with polycarbonate for strength.
- Be of good optical quality.
- Have a luminance transmittance of 10-15%.
- Possess appropriate filtration characteristics.

VISUAL DEFECTS

The most common visual defects are caused by the distorted shape of the eyeball.

Myopia

Myopia is more commonly known as short-sightedness. In a myopia eye, the eyeball is longer then normal causing the image to fall in front of the retina. A concave lens will correct Myopia by bending the light from distant objects outwards before it hits the cornea. Normal distance vision for pilots may be very approximately assessed as the ability to read a car number plate at 40 meters.

Hypermetropia

Hypermetropia is also known as long-sightedness, because only objects at a distance can be seen clearly.

A convex lens will overcome Hypermetropia by bending the light rays from near objects inwards before they meet the cornea.

Presbyopia

Presbyopia is the inability of the lens to change its shape to accommodate adequately, to focus as image from a near object onto the retina. This condition normally arises in people between the ages of 40 and 50. it is a form of long-sightedness and is corrected using a convex lens.

Astigmatism

Astigmatism is caused by a misshapen or oblong cornea. For a person with astigmatism objects will appear irregularly shaped.

The Wearing of Corrective Spectacles by pilots

Pilots who wear corrective spectacles or contact lenses, for whatever reason, must carry a spare pair at all times when they are exercising the privileges of their license.

Glaucoma.

Glaucoma is characterised by progressive narrowing of the visual field, insidious onset and concealed progression and an increase in intra-ocular pressure. Glaucoma can lead to total blindness and undetected reduction of the visual field. It reduces visual acuity in its final stage.

Colour Vision

Good colour vision is essential for pilots because of the use of colour associated with the items listed above.

- Navigation light of aircraft.
- Runways and airfields.
- Ground obstructions.
- Cockpit displays and instruments.
- Maps and charts.
- Emergency flares.
- Light signals.

Colour Blindness

Colour-blindness or, more accurately, colour-defective vision, is caused by a defect in the structure of the colour-sensitive cones in the retina.

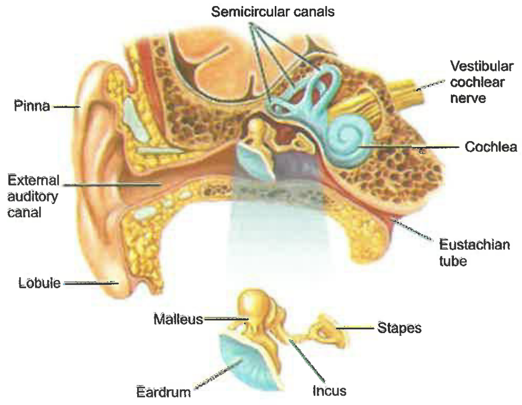
Vision and Speed – Reaction Times

Reaction time depends on the closing relative speed of two aircraft. If one of the aircraft were to be a fast jet, the closing speed would be much higher.

THE EAR

The ear performs two quite separate functions:

- To receive vibrations or sound waves in the air which it transmits to the brain.
- To act as a balance organ and acceleration director.



THE MIDDLE AND INNER EAR

The Tympanum and the Ossicles transmit sound waves to the inner ear.

The Eustachian Tube

The Eustachian tube allows pressure in the middle ear to equalize across the ear drum with outside or ambient pressure when climbing or descending. No one should fly if their Eustachian tube is blocked and they cannot "clear" their ears.

The Eustachian Tube. Effects of Altitude Change – Clearing the Ears.

It is during descent when difficulty in clearing the ears is most likely to be experienced.

Otis Barotraumas - Stretching of the ear drum caused by the expansion and contraction of gases trapped in the inner ear by a blocked Eustachian tube.

If you experience problems with pressure equalization during descent, swallow deliberately with the nostrils pinched closed, yawn, or blow down the nose, again with the nostrils pinched closed. If the problem is not resolved, the rate of descend should be decreased or stopped at intervals to allow more time for pressure to equalise. This is also known as step descend. Pilot may resort to even climb if pressure persists. Remember, never fly if your Eustachian tube becomes swollen or blocked and you cannot clear your ears.

Audible Range of the Human Ear

Sound has three main qualities:

Pitch – which depends on the frequency of the vibration.

Loudness or Intensity – which depends on the amplitude of the vibrations.

Quality – which can be either harmonious or just plain noisy.

The range of pitch or frequency of sounds that a fit young person can hear lies between 20 and 20,000 Hertz, or cycles per second. Detectable sound range also depends on loudness.

Noise and Hearing Loss

Hearing impairment can arise because of:

1. Exposure to loud noise.
2. Physical damage to the hearing mechanism.
3. Advanced age.
4. A build up of wax.

Conductive Deafness – is caused by damage to the ossicles or the ear drum.

Noise Induced Hearing Loss – Any prolonged exposure to noise in excess of 90 db can end up in noise induced hearing loss. This can damage the very sensitive membrane in the cochlea.

Presbycusis – is the name given to the deterioration of hearing with advanced age. High tones are cut off first.

PROTECTION OF HEARING

Noise induced hearing loss can be avoided or reduced to a minimum by wearing suitable ear protectors.

Always protect your ears if you know you are going to be exposed to excessive noise. In the cockpit, use the best quality headset you can afford in order to reduce background noise.

The Ear and Balance

"Orientation" refers to a human being's ability to maintain equilibrium and to interpret the body's position in space. The ear also provides us with our sense of balance. The primary and most reliable sense of spatial orientation is eyesight. The balance sensors situated in the ear provide us with a secondary system.

The Balance Mechanism

The Vestibular apparatus (Otoliths + Semi-circular canals) helps maintain spatial orientation. The Otoliths detect linear acceleration. The Semi-Circular Canals detect angular acceleration.

Orientation

Human beings maintain spatial orientation using a combination of three factors:

- The sense of vision.
- The Vestibular Apparatus.
- The Somatosensory system ("seat of the pants" feeling) / G-Force.

The most reliable sense is the sense of vision.

Our vestibular apparatus can detect accelerations but cannot determine what position we are in if no acceleration is present.

The **somatosensory system** is not reliable at all. Neither is the ear's balancing mechanism sufficiently reliable for a pilot to maintain spatial orientation using this sense alone.

Both the Otoliths Organs and the Semi-Circular Canals send signals to our brain by means of impulses arising from the body being subjected to accelerations.

Fluid flow occurs when the body is subject to angular acceleration.

The flow takes place in the apposite direction to the acceleration, moving sensory hairs which send signals to the brain that the body is in motion.

There is no fluid flow when the body is at rest or if linear or turning movement is taking place at a steady speed. In these situations, the vestibular apparatus alone cannot detect motion.

Only the eyes and instruments tell a pilot that he is in a steady turn.

Conflicts Between Ears and Eyes, Illusions and Disorientation / Vertigo.

Various complex motions and forces and certain visual scenes encountered in flight can create illusions of motion and position. Spatial disorientation from these illusions can be prevented only by visual reference to reliable, fixed points on the ground or to flight instruments.

Illusions – General

In aviation any mismatch between what we sense and what we expect is an illusion.

Because of the lack of stable visual references and the erroneous mental models that may be produced, the pilot is at a disadvantage.

Illusions may occur during all stages of the flight, and to pilots of every experience and skill level.

The pilot, therefore, should be aware of the possibility of misinterpreting the information received.

Visual illusions are particularly dangerous in aviation, as we normally consider our visual input to be the most reliable of our senses.

Atmospheric Perspective

The pilot who has flown mostly in relatively polluted air may use 'atmospheric perspective' as a cue to range. If he then flies in a very clear atmosphere he may believe distant objects, because of their clarity, to be much closer then they actually are.

Laws of Perceptual Organization

The 'Laws of perceptual organization of Gestalt Theory' deal with factors such as proximity, continuity, similarity, symmetry, simplicity and closure.

Gestalt laws formulate basic principles governing how objects are organized and perceived.

We must use extreme caution to ensure that we not construct our mental model according to our wishes or desires.

Illusions When Taxing – Relative Movement

When taxing into a headwind the blowing snow will give the illusion that the aircraft is taxing faster then it actually is.

Illusions on Take-off – Somatogravic Illusion

An acceleration gives the pilot an impression of the nose of the aircraft pitching up.

Outside References

Outside references may give false impression within the cockpit.

- Immediately after take-off.
- Over water.
- In hilly terrain.
- Gently sloping terrain.
- A bank of sloping cloud.
- The ground sloping down on the approach.

Illusions in the Cruise

Autogenesis. Staring at an isolated and stationary light when other visual references are inadequate or absent, may cause auto-kinetic movements of the eyes.

In the dark, a static light will appear to move about when stared at for many seconds. The disoriented pilot will lose control of the aircraft in attempting to align it with the light.

Vertical Separation

A common problem in flight is the evaluation of the relative altitude of approaching aircraft and the assessment of a potential collision risk.

Approach and Landing

In the final stages of a flight the pilot has to cope with the most critical visual tasks, and these may be divided into 3 stages:

a) Initial judgment of glideslope

b) Maintenance of the glideslope

c) Ground proximity judgments.

Initial judgment of Appropriate Glideslope

Visual Angle – To judge the approach path, the pilot is attempting to establish an angle. This angle is the 'Visual Angle', and is measured at the pilot's eye down from the horizon to the visual aiming point on the runway.

Width of Runways – The width of the runway may also cause incorrect height judgments on the final approach. A pilot used to a standard width runway may, when approaching an unfamiliar narrow runway, judge he is too high and therefore round out too low on approach.

The Black Hole Effect – The absence of visual cues leads to an illusion that the aircraft is too high, as a result the approach path may be flown at too shallow an angle, the aircraft may touch down short of the runway.

Visual Illusions On Approach

Ground lighting illusions. Lights along a straight path, such as a road, and even lights on moving trains can be mistaken for runway and approach lights. Bright runway and approach lighting systems, especially where few lights illuminate the surrounding terrain, may create the illusion of less distance to the runway. The pilot who does not recognize this illusion will fly a higher approach. Conversely, the pilot overflying terrain which has few lights to provide height cues may make a lower than normal approach.

(a) **Shallow Approaches:-** Upslope runway or terrain, narrower than usual runway, feature less terrain, rain on the wind screen and haze give an illusion of being high resulting in shallower approaches.

(b) **Steep Approaches:-** Down sloping runway or terrain, wider than usual runway and bright runway / app. lights give illusion of being low, resulting in high approaches.

Maintenance of the Glideslope

Aiming Pilot and Aircraft Attitude Pitch Angle – Ones established on the glide path, it is relatively easy to visually maintain the glide path by keeping the aiming point at a fixed position on the windscreen.

Inadvertent Speed Loss – On the approach, with an inadvertent speed loss and a gradual loss of altitude, the runway could remain in the same position on the windscreen, giving the impression of a safe approach, until touch down occurs some distance before the threshold.

Texture and Texture Flow

As long as visual texture flows away from the aiming point and the visual angle between this point and the horizon remains constant, the approach will progress normally.

Ground Proximity Judgments

The pilot will use a number of cues in his height assessment on the final stage of the approach, among which will be:

- That the apparent speed of objects on the ground will increase as the height reduces.
- That the size of objects, such as runway lights etc, will increase with decreasing distance.
- That the apparent width of the runway will increase.
- That the texture of the ground will change.

Protective Measures Against Illusions

Organized formal training is the best protective measure against illusions. It is recommended that this should be used to educate pilots to recognize:

- The illusions are natural phenomena.
- Know the different types of illusions and their effects.
- That the supplementation of other visual cues with information from other sources is the most effective counter to the effects of illusions.
- The need for comprehensive flight briefing should the occurrence of illusions be known to exist or are anticipated at particular geographic locations.
- Special care must be taken during accelerations and particular during instrument flying.
- Head movements, fatigue, night and conditions of reduced visibility are all factors that can promote visual illusions.

Disorientation / Vertigo

If you suspect disorientation, concentrate on and believe in aircraft Instruments in IMC. If in VMC, look out at the Horizon.

Air/Motion Sickness – this mismatch between vestibular and visual sensory input is the primary cause of spatial disorientation, and indeed of motion sickness. Vibrations within the frequency band of 1/10 to 2 Hertz are a factor contributing to air-sickness, because they upset the vestibular apparatus. Symptoms of Motion Sickness:

- Nausea and fear
- Hyperventilation
- Vomiting
- Pallor
- Cold sweating
- Headache
- Depression

Occasional Motion Sickness May be Relieved by:

- Keeping the head upright and still, if possible using the eyes to orientate one's self.
- Opening the cockpit ventilators to increase the flow of fresh air.
- Using smooth and coordinated control movements and avoiding manoeuvres which generate pronounced positive or negative G forces.

The Leans. An abrupt correction of a banked attitude, which has been entered too slowly to stimulate the motion sensing system in the inner ear, can create the illusion of banking in the opposite direction. The disoriented pilot will roll the aircraft back into its original dangerous attitude, or if level flight is maintained, will feel compelled to lean in the perceived vertical plane until this illusion subsides.

Coriolis Illusion. An abrupt head movement in a prolonged constant-rate turn that has ceased stimulating the motion sensing system can create the illusion of rotation or movement in an entirely different axis. The disoriented pilot will maneuver the aircraft into a dangerous attitude in an attempt to stop rotation. This most overwhelming of all illusions in flight may be prevented by not making sudden, extreme head movements, particularly while making prolonged constant-rate turns under IFR conditions.

Graveyard Spin. A proper recovery from a spin that has ceased stimulating the motion sensing system can create the illusion of spinning in the opposite direction. The disoriented pilot will return the aircraft to its original spin.

Graveyard Spiral. An observed loss of altitude during a coordinated constant-rate turn that has ceased stimulating the motion sensing system can create the illusion of being in a descent with the wings level. The disoriented pilot will pull back on the controls, tightening the spiral and increasing the loss of altitude.

Somatogravic Illusion. A rapid acceleration during takeoff can create the illusion of being in a nose up attitude. The disoriented pilot will push the aircraft into a nose low, or dive attitude. A rapid deceleration by a quick reduction of the throttles can have the opposite effect, with the disoriented pilot pulling the aircraft into a nose up, or stall attitude.

Inversion Illusion. An abrupt change from climb to straight and level flight can create the illusion of tumbling backwards. The disoriented pilot will push the aircraft abruptly into a nose low attitude, possibly intensifying this illusion.

Elevator Illusion. An abrupt upward vertical acceleration, usually by an updraft, can create the illusion of being in a climb. The disoriented pilot will push the aircraft into a nose low attitude. An abrupt downward vertical acceleration, usually by a downdraft, has the opposite effect, with the disoriented pilot pulling the aircraft into a nose up attitude.

False Horizon. Sloping cloud formations, an obscured horizon, a dark scene spread with ground lights and stars, and certain geometric patterns of ground light can create illusions of not being aligned correctly with the actual horizon. The disoriented pilot will place the aircraft in a dangerous attitude.

The Stroboscopic Effect (The Flicker Effect).

An additional type of vertigo is known as Flicker vertigo. Light, flickering at certain frequencies, from four to twenty times per second, can produce unpleasant and dangerous reactions in some persons. These reactions may include nausea, dizziness, unconsciousness, or even reactions similar to an epileptic fit. In a single-engine propeller aeroplane heading into the sun, the propeller may cut the sun to give this flashing effect, particularly during landing when the engine is throttled back. These undesirable effects may be avoided by not staring directly through the prop for more than a moment, and by making frequent but small changes in RPM. The flickering light traversing helicopter blades has been known to cause this difficulty, as has the bounce back from rotating beacons on aircraft which have penetrated clouds. If the beacon is bothersome, shut it off during these periods.

If a member of the crew or a passenger shows symptoms of the Stroboscopic Effect, the recommended preventative actions are:

- Turn the aircraft away from the sun.
- Move the person affected to the shade.
- Make the individual close eyes.

Disorientation Summary - Remember

- Without visual aid, a pilot often interprets centrifugal force as a sensation of rising or falling.

- Abrupt head movement during a prolonged constant rate turn in IMC or simulated instrument conditions can cause pilot disorientation.
- A sloping cloud formation, an obscured horizon, and a dark scene spread with ground lights and stars can create an illusion known as false horizons.
- An abrupt change from climb to straight and level flight can create the illusion of tumbling backwards
- A rapid acceleration during takeoff can create the illusion of being in a nose up attitude
- Symptoms of hypoxia may be difficult to recognize before the pilot's reactions are affected.

EXERCISE AND WEIGHT.

A person's Body Mass Index, or BMI, is simply a measure of a person's weight in relation to his height.

Normal : BMI 20 – 25 for men.

BMI 19 – 24 for women.

Body mass Index (BMI) = Weight (kgs) / Height^2 (m)

Regular exercise is beneficial to general health, but the most efficient way to lose weight is by reducing caloric consumption. To reduce the risk of coronary artery disease, exercise should be done to double the resting heart rate for at least 20 minutes, three times a week. Pilots should not try to lose weight by taking appetite suppressants.

Being badly overweight increases a pilot's susceptibility to the following conditions.

- Heart attack.
- Hypertension.
- Hypoxia at lower altitudes then normal.
- General circulation problems.
- Gout (swollen joints).
- Osteoarthritis (a form of arthritis characterized by gradual loss of cartilage of the joints).
- Diabetes.
- The inability to tolerate G forces.
- Problems with joints and limbs.
- Decompression sickness.
- Heavy sweating.

- Chest infections.
- Varicose veins (a vein that has become swollen and knotted as a result of faulty valves).

Nutrition and Food Hygiene

Never fly on an empty stomach. A balanced diet is the foundation of good health.

Sources of carbohydrates include: grains, vegetables, nuts, and fruit.

Vitamins. Vitamins are organic substances required by body to function properly. They help process other nutrients to form blood cells.

Minerals. Minerals are essential to many vital body processes – from building strong bones to transmitting nerve impulses. The three major minerals include:

» Calcium – for healthy bones and teeth

» Phosphorous – for body's chemical reaction

» Iron - For Haemoglobin

Contaminated Foodstuffs.

Major causes of food contamination are:

» Unhygienic (i.e unclean) food preparation.

» Undercooked or stale meats.

» Unwashed salads, fruit or vegetables.

» Seafood and locally made ice-creams and mayonnaise.

Pilots suffering from Gastroenteritis are not fit to fly, even though they may be taking medicine which is relieving the symptoms. Due to pressure differential, trapped gases escape at high altitudes resulting in extreme discomfort and sickness. Symptoms of Gastroenteritis include:

» Nausea

» Vomiting

» Abdominal pain

» Loss of appetite

» Diarrhea

PERSONAL HYGIENE

A high standard of personal hygiene must be practiced if the body is to remain healthy and free from infection.

COMMON AILMENTS

The in-flight environment can increase the severity of symptoms which may be minor whilst on the ground.

If there is any doubt whatsoever in a pilot's mind about his fitness to fly, he should stay on the ground.

DRUGS AND SELF MEDICATION

It is absolutely essential that pilots do not fly as part of the operating crew of an aircraft when taking drugs or medication, unless they have been cleared to do so by an Aviation medicine Specialist.

A pilot who flies on self-prescribed medication runs the risk of suffering side-effects and also faces the hazards associated with the underlying illness in the in-flight environment which can make the symptoms of any illness much more debilitating then they might be on the ground. The consumption of medicines or other substances may have consequences on qualification to fly for the following reasons:

- The disease requiring a treatment may be cause for disqualification
- Flight conditions may modify the reactions of the body to a treatment.
- Drugs may cause adverse side effects impairing flight safety.
- The effects of medicine do not necessarily immediately disappear when the treatment is stopped.

CAFFEINE

Caffeine is probably the most widely used drug in the world. It can easily lead to addiction.

Caffeine is present in coffee, tea, cocoa, chocolate, and fizzy drinks such as cola.

The recommended maximum caffeine intake per day is approximately 250 – 300 mg corresponding to 2 – 3 cups of coffee.

Anesthetics and Analgesics

A pilot should not fly for at least 12 hours after a local anesthetic and 48 hours following a general anesthetic.

The more potent forms of analgesics (pain killers) may produce a significant deterioration in human performance.

Tiredness and Fatigue.

Tiredness and fatigue, though related concepts, differ in their long term physical effect on the body. To deal with normal tiredness it is sufficient to ensure that periods of activity and periods of restful sleep comply with the normal pattern for a person's age and physical condition.

Ordinary tiredness results from normal physical and/or mental exertion over a normal waking period. If a person is tired, a good night's sleep is the only requirement for that person to be fit the following morning to continue with physical activity.

- Fatigue is a very deep tiredness due to the cumulative effects of a stressful lifestyle and/or living and working environment.
- The effects of fatigue can be insidious.
- They can creep up slowly on the sufferer.
- The sufferer may be unwilling to recognize or admit that he is suffering from fatigue.
- Tiredness and fatigue can kill, but fatigue is harder to recognize.

  Pilots must be conscious of the symptoms of fatigue and be prepared to both recognize them and admit to them.

Fatigue can be caused by the following circumstances:

- Long term ill health, either physical or mental.
- Regular sleep deprivation, for whatever reason.
- High levels of stress and/or anxiety over a prolonged period.
- A disturbed body cycle (e.g: jet lag, changing work shift patterns.)
- Long term difficulties in personal or work based relationships.
- A stressful living and /or working environment (e.g: high levels of noise, or unreasonable physical or mental demands.)

Symptoms of fatigue may be:

- Memory lapses.
- Frequent mistakes in speech and actions.
- Rapid changes of mood.
- Diminished awareness.
- Tiredness.
- Lack of coordination.

A minimum self-help programme could be:

- Accept the fact that you are fatigued.
- Eat a balanced diet and healthy food.
- Try to take the stress out of your life.
- Make sure that you get regular, undisturbed sleep.
- Avoid alcohol and caffeine.
- Always consult a doctor.

Hypothermia

Normal body temperature averages 98.6 degrees. With hypothermia, core temperature drops below 95 degrees. In severe hypothermia, core body temperature can drop to 82 degrees or lower.Hypothermia affects physical and mental abilities. Shivering makes it possible to combat the cold to a certain extent, but uses up a lot of energy. In a prolonged exposure, shivering will tend to cease, and be followed by the onset of apathy. Hypothermia is a potentially life-threatening condition that needs emergency medical attention.

Acceleration and 'G' Forces.

Flying can expose the human body to conditions for which it is not naturally suited. On the ground, the body is subject to normal gravitational acceleration: "1G". this is 32 ft/sec^2 or 9.81 m/sec^2. The reaction of the earth's surface to this acceleration gives us the sensation we call "weight". A pilot will experience 1G in straight and level flight.

At 60° of bank a pilot is subject to an acceleration of 2G acting vertically through his seat. His weight will also increase by a factor of 2. This is called the load factor. In a 70° level turn, the load factor increases to 3.

A typical light aircraft cleared for aerobatics would be stressed to withstand positive load factors of up to 6.

The adverse effects of increased "G" can be delayed or relieved by tensing the thigh and stomach and easing off the backward pressure on the control column.

During increased "G" manoeuvres the pilot will feel the following effects:

- Increase in body weight.
- Mobility is impaired.
- Internal organs displaced.
- Onset of tunnel vision.
- Grey out.
- Possible black out.

A tilted back seat can reduce the chance of a black-out during positive G-manoeuvres.

1.41G is the acceleration experienced in a level turn at 45° angle of bank. In normal flying, angles of bank greater then this are not usually necessary. Any physical disorder or immoderate consumption of alcohol or tobacco will reduce the body's tolerance to accelerations in excess of 1G.

Factors adversely affecting G tolerance.

- Alcohol.
- Smoking.
- Fatigue.
- Excessive heat.
- Obesity.
- Sickness.

Negative G

Most pilots can learn to tolerate moderate increases in positive "G", but many find even the smallest exposure to negative "G" to be unpleasant. During flight negative "G" is experienced if, after pulling out of a steep dive, the control column is instinctively and firmly moved forward because the pilot might feel that he has his nose too high in an attitude that may lead to a stall. Negative "G" manoeuvres increase the flow of blood to the head. Blood pressure there increases, the face becomes very flushed, and the eyes bulge. The combined effect of these symptoms causes what is described as a "Red out". To relieve symptoms select normal flying attitude.

Toxic Hazards

Even mild toxic effect can degrade a pilot's performance and lead to an accident. Prolonged exposure to toxic influences can damage a person's general health. Anyone who has been exposed to any toxic hazard should seek medical assistance as soon as possible. The following materials may produce toxic hazards:

- Furnishings and Baggage.
- Acetone and Turpentine.
- Fuels, Lubricants and propellants.
- Anti-icing Fluid.
- Fire Extinguishing Agents.
- Battery Fumes.

Dangerous Cargo

Pilots must be aware that they must not carry certain defined items on board their aircraft. Such items are referred to as dangerous cargo because of the possibility that their discharge, spillage or breakage may endanger the aircraft and/or crew in flight or on the ground.

Crew Resource Management

CRM - is the effective use of all available resources for flight crew personnel to assure a safe and efficient operation, reducing error, avoiding stress and increasing efficiency.

CRM is concerned not so much with the technical knowledge and skills required

to fly and operate an aircraft but rather with the cognitive and interpersonal skills needed to manage the flight within an organised aviation system. In this context, cognitive skills are defined as the mental processes used for gaining and maintaining situational awareness, for solving problems and for taking decisions. Interpersonal skills are regarded as communications and a range of behavioural activities associated with teamwork. In aviation, as in other walks of life, these skill areas often overlap with each other, and they also overlap with the required technical skills. Furthermore, they are not confined to multi-crew aircraft, but also relate to single pilot operations, which invariably need to interface with other aircraft and with various ground support agencies in order to complete their missions successfully.

Information Processing

We receive information from the world around us through our senses: sight, hearing, touch, smell and taste. The "gestalt laws" formulates basic principles governing how objects are mentally organized and perceived. The basic system by which we receive and process information in order to make decisions, and recognize where errors in the system may be the cause of accidents is discussed below.

Basic information processing – a Functional Model

We need to build a functional modal of the various stages of our reasoning. These stages are:

- Detection
- Perception
- Decision Making
- Action (responses are selected and executed)
- Feedback

The model is based on a series of stages that occur between receiving information and a response being made. The various sections of the model will be discussed both individually and as part of the full mechanism.

The brain, Central Decision Maker and Response Selection

Once information has been perceived a decision must be made as to the response. Information is continuously entered into and withdrawn from both the long and short term memories to assist the decision process. To enable us to carry out multi-tasks we must learn skills through Motor Programmes.

Motor Programmes (Skills)

Motor Programmes, or "Skills", are behavioral sub-routines which are learnt by practice and/or repetition and are held within the long Term Memory and can be carried out without conscious thought.

In the initial phase of flight training the pilot is competent enough to fly the aircraft at this stage, but does neither have a great deal of confidence in his/her abilities nor in the whole system. A pilot is skilled when he trains or practises regularly, knows how to manage himself/herself and knows how to keep resources in reserve for coping with the unexpected.

Developing Motor Programmes

There are three distinct phases to developing a Motor Programme or skill:

a) The cognitive phase.

b) The associative phase.

c) The automatic phase.

Reflexes

Reflexes occur with little or no involvement of the central nervous system.

Reaction Time

There is a delay between detection, stimulus and muscle contraction called reaction time. Reaction time depends on the type of reflex action being used. There are three types of reflex actions. These are:

- Unconditioned
- Conditioned
- Trained

Unconditioned Reflexes. Instinctive natural reflexes, such as blinking.

Conditioned Reflexes. Reflexes that may be learned.

Trained Reflexes. Reflexes that may be increased by repeated practice.

CONCEPTS OF SENSATION

Stimuli

The senses provide stimuli to our brain which has the ability to retain them for a short time, from the time they arrive. We may not have the processing capacity to deal with them.

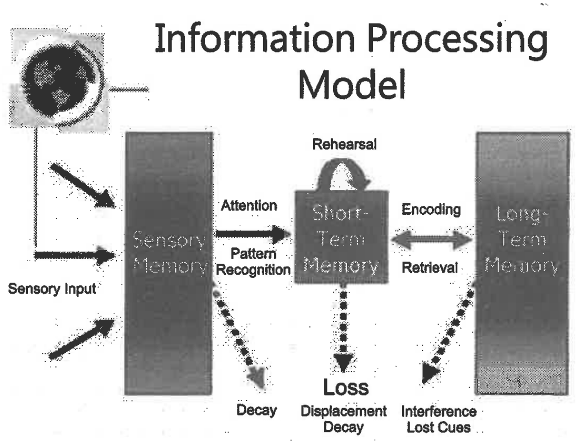
Types of Memory. There are three types of memory:

- Sensory memory.
- Short-term (or working) memory.
- Long-term memory.

Receptors & Sensory Memories. The key features of the sensory memories are:

- There is a separate memory store for each sensory system.
- The input decays rapidly.

The sensory stores for sight and sound are important, and knowledge of these is necessary.



SENSORY MEMORY FOR SIGHT

The iconic Memory. The iconic Memory is the visual sensory store, it only lasts for between 0.5 and 1 second. 70-80% of information processed by human is received through the visual channel.

Sensory Adaptation (Habituation). All sensory adapt, either partially or completely, to their stimuli after a period of time.

ANTICIPATION

Perception. Perception involves the conversion of the sensory information received into a meaningful structure.

Sensory information that we expect to receive is more easily perceived and integrated when it actually occurs, compared with totally unexpected information.

We can 'perceive' only that which we can 'conceive', but we perceive only a fraction of the information reaching our senses at any moment.

The process of perception is greatly assisted by our ability to form mental and three dimensional visual models.

Funneled Perception. Perception of a situation can differ depending upon the starting of an observer.

Attention. Attention is the deliberate devotion of the cognitive resources to a specific item.

Choice of Item. Although attention can move very quickly from item to item, it can only deal with one at a time and thus there is a need for the pilot to consciously prioritize.

Attention Mechanisms. The attention mechanism is required because of the two potentially limiting stages in processing information.

a) There is a limit to the number of items held or maintained in short term memory (or working memory).

b) Our channel capacity is limited.

The Cocktail Party Effect. 'The Cocktail Party Effect' relates to our ability to hear our own name in a background of many conversations.

Attention. Attention is the process of directing and focusing psychological resources to enhance perception, performance and mental experience.

Types of attention. There are two types of attention:

Selective Attention. When inputs are sampled continually to decide their relevance to the present task at hand.

Divided Attention. When our central decision making channel can time-share between a number of tasks, eg, to execute several mental activities at almost the same time (i.e. when switching attention from outside the aircraft to the airspeed indicator on the instrument panel) and to monitor the progress of a motor programme (i.e. flying or taxiing the airplane) on a relatively subconscious level, while making a radio call at the same time (requiring a rather conscious level).

Lack of Attention. The major danger for pilots is the poor management of attention.

AROUSAL

Arousal is a major aspect of many learning theories and is closely related to other concepts such as anxiety, attention, agitation, stress, and motivation.

Low Arousal. At times, such as in the cruise, our attention can wander with the result that information is either missed or misinterpreted.

Optimum Arousal. At this level the Central decision maker is at its most efficient. Too little arousal has an inert affect on the learner, while too much has a hyper affect. There are optimal levels of arousal for each task to be learned:

- lower for more difficult or intellectually (cognitive) tasks
- higher for tasks requiring endurance and persistence

High Arousal Overload. At times of high arousal, there is a real danger of attention becoming narrowed.

Quantitative Overload. A very high workload can be interpreted as 'Stress'.

SYMPTOMS OF OVERLOAD

The workload may be said to be acceptable if it requires about 60% of the crew resources, depend on the pilot's expertise and correspond to the amount of resources available.

The most common symptoms are:

» A sharp degradation of performance.

» Funneling of attention or focus.

» Regression.

» Mental "blocking".

» Mood swings.

» Restlessness and trembling.

» Panic.

Human Reliability. The rate of human error during simple and repetitive tasks might be expected to be 1 in 100, but after practice, a rate of 1 in 1,000 could be achieved.

Human reliability can be defined as :- The individual functioning in the manner in which he or she is supposed to function.

Error Generation. Errors tend to be cumulative.

Short term Memory (Working Memory) 10 to 20 seconds. Short term memory enables information to be retained for a short period of time. That information will be lost in 10 to 20 seconds unless it is actively rehearsed and deliberately placed in our long term memory.

Auditory information is considered easier to retain then visual information as it is easier to rehearse sounds then data in a visual form.

Limitations of Short Term Memory. The capacity of our short term memory is limited. The maximum number of unrelated items which can be maintained in the short term memory is about 7 ± 2. Ones this limit is exceeded one or more of the items are likely to be lost or transposed.

Methods of Increasing Short Term Memory. There are two main tools which may be used to increase Short Term Memory, 'Chunking' and 'Association'.

Chunking. Breaking items to be remembered into small pieces and remembering them one at a time.

Association. This technique is used to remember spoken lists of items. A wild and bizarre association is imagined and attached to each item on the list.

LONG TERM MEMORY

Introduction. It is believed that information is stored in the Long Term Memory for an unlimited time period, although frequently there may be retrieval problems.

- **Semantic Memory.** Semantic memory stores general knowledge of the world.
- **Episodic Memory.** Episodic Memory is a memory of events or 'episodes' in our life.
- **Procedural Memory.** Skills are included within the make-up of the Long Term Memory.

The Learning Process. Learning is an internal process which allows the mental acquisition and retention of data Here are some of the types of learning and also brief examples of those types:

Insight. The data is intellectually and cognitively understood and is retained.

Observational Learning / Imitation. Data from an outside source is replicated.

Experience. Learning from our mistakes.

Skill Learning. Involves motivation, attention, observation, much practice and corrective feedback.

Retention of Information. This can be increased by the use of:

a) Mnemonics (The practice of improving or helping the memory, or the systems used to achieve this.)

b) Memory Training

Motivation. Motivation is the combination of a person's desire and energy directed at achieving a goal. It is the cause of action. Motivation can be intrinsic, such as satisfaction and feelings of achievement; or extrinsic, such as rewards, punishment, and goal obtainment. Not all people are motivated by the same thing and over time their motivations might change. The learning process is vastly improved with motivation, and high performance is rarely achieved without it.

Experience. We all have the ability to learn from our experience and mistakes, and from those of others.

Response. Any response will cause a detectable change which, in turn, will be noted by the senses. The feedback may alter the action being taken. Auditory stimuli (noises) are more likely to attract attention then visual stimuli but they are also more likely to be responded to in error. An increase in age between 20 and 60 years tends to lead to slower but more accurate responses.

Response Error (Error of Commission). If an unexpected stimulus occurs we will be more likely, under pressure, to make an error of commission.

Response Times. Response to reaction time is the interval between the onset of a given signal and the production of a response to that signal.

Cognition (the mental faculty or process of acquiring knowledge by the use of reasoning, intuition, or perception) in Aviation. Flight puts the pilot into an environment which can distort sense organs, and the changed perspective which is experienced in flight can result in information being presented which is outside the individual's expectations.

Hallucination. A hallucination is actually a false perception characterized by a distortion of real sensory stimuli.

Workload and Limitations. Too high or too low a workload can result in degraded performance.

Several types of situation may cause mental overload.

Stimuli and Attention. Our bodies are continuously receiving stimuli through our five senses. This information is stored briefly in our sensory memory and, if we perceive it to be important, it is transferred to our short-term memory or Central Decision Maker. Some stimuli are better then others at getting our attention. We can split our attention between several different things by concentrating on them in rapid succession.

Judgment & Decision Making. Making good decision is one of the important aspects of piloting an aircraft. Good decisions can help lead to safe, successful flights, whereas bad decisions and even indecision have led to many aircraft accidents. Talk to your instructor and other pilots about different flying situations to obtain advice about what a good decision would be in a given circumstance. When flying with another pilot, it is possible to increase the chance of a good decision being made by discussing the potential problems beforehand. If as an inexperienced pilot you are flying with someone of more experience and you see him doing something you consider to be dangerous, you should immediately question their course of action.

A good pilot is one who always realizes there is more to learn. When making a decision a pilot will be influenced by his previous experience, the probability of an occurrence and whether the information he is receiving matches that expected.

Risk Assessment. Risk assessment is based on the probability of the risk occurring and the impact of that risk if it did occur. You will have to weigh up risk and the possible consequences of the risk in order to determine your course of action.

Remember – Making good decisions is one of the most important aspects of piloting an aircraft.

Good decisions can help lead to safe, successful flight, whereas bad decisions and even indecision have led to many aircraft accidents. Always strive to make good decisions.

Personality, Attitude and Behavior. Someone who is too introvert or anxious may not make a good pilot. Examples of desirable characteristics in pilot are: the ability to cope with stress and adventure, and the ability to assess and control risks. As captain of an aircraft you will need to show good leadership skills.

While acting as pilot-in-command you should ensure that you stay in command, you should be properly organized and prepared.

Situational Awareness. A good leader displays good situational awareness and accurately assess his own performance. The following factors can interfere with accurate situational awareness:

1. Stress	2. Boredom	3. Fatigue
4. Emotional disturbance	5. Poor communication	6. Interruptions

In order to maintain good situational awareness, gather as much information as possible. Do not rush into making a decision. Make sure you consider all the options.

Do not make the mistake of seeing something that is not really there just because you want it to be there.

Mechanics of Decision-making. Pilots operate in a dynamic and constantly changing environment. A good decision reached a minute ago will not necessarily be the same good decision in two minutes time.

- **Recognize and identify the problem:** Decisions are responses to situations or problems that need addressing. Therefore is important to have a clear definition of what needs addressing before attempting to go further in the decision making process.
- **Consider the nature of the problem that you are trying to resolve:** What is the type issue, problem, or situation you need to address? Why does the problem need a decision? What are the results you are hoping to achieve by this decision?
- **Analyze or research the problem:** It is important to gather all the information involved in the problem or question, so that informed choices can be made.
- **Develop a list of possible solutions:** List the possible decisions that could be made, and what their consequences would be.
- **Select the best alternative:** Look at the list drawn up and choose the best solution for the situation.
- **Execute the best choice:** Sometimes the hardest part of making a decision is taking action. The best decisions are ones that deliver strong decision action.
- **Follow Up and communication:** A good decision needs to be followed throughout its process and constant communication made with those involved.
- **Feedback:** It is extremely important to gather feedback on a decision. This determines the overall success of and reaction to the decision.

Communication

When piloting an aircraft, whether with passenger, another pilot or an instructor, good verbal communication will help the flight go more smoothly and contribute to flight safety.

Concise and unambiguous communication is essential to the safe conduct of air

traffic. This lesson deals with possible barriers to good communication and good team work.

Barriers to Communication and Team Work

Several things can be done by team leaders to facilitate good teamwork. In the end, it is the team leader who takes the decisions on behalf of the team.

Sometimes certain attitudes on the part of both leader and team members build barriers to communication and can be especially dangerous when flying. Some of the barriers to communication and team work are:

» Aggressiveness

» Arrogance

» Anti-authoritarian behavior

» Impulsiveness

» Feelings of invulnerability

» Resignation

Expectation. Do not assume you have heard what you are expecting to hear. Actively Listen.

Clear, concise and unambiguous communication is essential to the safe conduct of aviation .

Stress

Event and circumstances which cause stress are known as Stress Factors or Stressors. Stress is recognized as being a natural condition of life. It is a normal reaction to demanding situations. A certain amount of stress keeps us aware and vigilant, but too much stress will degrade physical and intellectual performance.

Stress Tolerance and Arousal

The different stress levels generated within individual persons by a particular stressor will differ from one individual to another. A moderate level of stress may improve performance. Stress promotes an increase in physical strength rather than promoting mental performance.

- The response of a person to the event or circumstances to which he is exposed is known as arousal.
- Arousal is a measure of a person's readiness to respond effectively to a given stress factor.
- Personality, character, training and experience will influence levels of arousal in a given individual.

The Effects of Stress

In an active, outward-going, highly trained person, too little stimulation or stress arousal will lead to the onset of boredom and even drowsiness. An introspective, under-confident person, if highly aroused, might be unable to function at all, even in circumstances that he is competent to deal with. Flying in challenging meteorological conditions may be a welcome occurrence for a skilled and experienced pilot and stimulate him to demonstrate extraordinary skill. But such conditions may cause unbearable stress in an inexperienced pilot. Training and experience help to ward off stress and high levels of arousal. Successful completion of a stressful task will reduce the amount of stress experienced when a similar situation arises in the future.

Stress Factors or Stressors

Stress factors are cumulative. Stress occurs under various conditions like the pilot must revise his plan of action and does not immediately have a solution or inexperienced pilots when the situational demands exceed their individual capabilities. Stress may occur if a pilot is convinced that he will not be able to find a solution for the problem he just is confronted with.

Stress causes mental blocks, confusion, channelized attention, resignation, frustration, rage, deterioration in motor coordination, high pitch voice and fast speaking.

Thorough flight planning is the key to reducing cockpit workload.

Make sure that cockpit housekeeping is of a high order and that all documents, charts and associated equipment are appropriately stored and accessible, in accordance with the principles of flight safety.

High quality headsets will reduce cockpit noise levels. Temperature can often be regulated using the cabin heating or ventilation system.

To avoid stress, know your limits and fly well inside them. If you are aware that you are under stress consider whether it would not be wiser for you to stay on the ground rather then to fly when you are not up to it.

Life Stresses

Pilots suffering from life stresses should be aware that this can affect their concentration and performance when at the controls of an aircraft. The descending order in which the factors affect a person are: death of spouse/child, divorce, marital separation, death of a close family member, injury / illness, marriage, loss of job, retirement, pregnancy, sexual problems, birth, change of financial status, siblings leaving home, change of eating habits, change of residence, loan/debt/mortgage, vacations and minor violations of law.

Indications of stress

Easily observable indications of stress are perspiration, flushed skin, dilated pupils and fast breathing.

Automation

One of the definitions of automation is "The technique of controlling an apparatus, a process or a system by means of electronic and/or mechanical devices that replaces the human organism in the sensing, decision-making and deliberate output".

The safety philosophy behind the adoption of increasing onboard automation is based on the assumption that human error is the main cause of accidents. Therefore, since the human (liveware) component of the system is the flawed link in the accident chain, we ought to look for a substitute capable of handling the tasks once performed by pilots.

Pilots, computers and machines are not alternatives, but complementary factors in ensuring flight safety. Achieving the correct balance between these components of the aviation domain benefits safety.

Automation has undeniably led to an improvement in flight safety.

Nevertheless, a few accidents point to a mismatch between automation and the human element. Studies have been done to determine whether automation is suitable in it's present form or some thing more is to be done. Nine categories were identified to focus on. These are situation awareness, automation complacency, automation intimidation, captain's command authority, crew interface design, pilot selection, training and procedures, the role of pilots in automated aircrafts.

The studies have concluded that there is a scope for improvements in fields like human capabilities and limitations, ergonomics, cognitive suitability and instrument standardization.

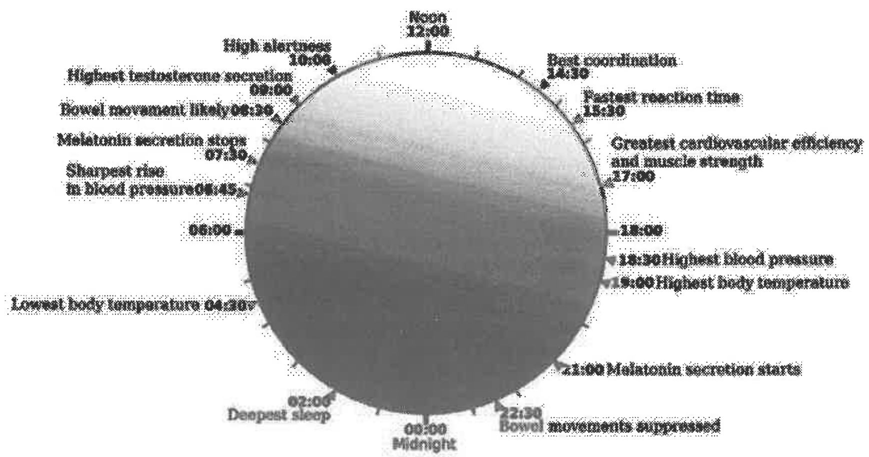
Although cockpit automation may provide pilots with more time to think, it may encourage pilots to reinvest only some of this mental free time in thinking flight-related thoughts.

A high degree of cockpit automation may therefore alter the traditional tasks of the pilots in a way, that the attention of the cockpit crew will become reduced with the consequence of 'being out of the loop'.

THE CIRCADIAN CIRCLE

The Circadian Circle represents our level of alertness throughout the day. Circadian rhythms are internally generated by a self-sustaining or autonomous biological clock located in the hypothalamus which functions as the main control centre for the autonomic nervous system by regulating sleep cycles, body temperature, appetite, etc., and that acts as an endocrine gland by producing hormones. It takes into account, biological elements such as our body temperature, heart rate and blood pressure. These elements effect our level of alertness during the course of a day. Human performance degradation at circadian lows is one of the major challenges for the aviation industry.

The picture below shows the normal results of an average person during a normal day. As we sleep, our heart rate is lowered and hence as seen on the graph, our level of alertness is reduced. Other things that may reduce our level of alertness also include that of our blood pressure which is often lowered after meal times. It is generally accepted that human performance declines at night, when the body and mind desire rest.



Pilots flying across different time zones through the night, are not able to fully apply the Circadian Cycle without understanding or adjusting it. By understanding how our alertness is effected, we can then make adjustments to our diet and sleep to ensure a safe level of alertness in the cockpit.

Following factors should be taken into account by pilots engaged in flights across several time zones:

- In the absence of all time cues (Free running circadian rhythms), the biological clock has a natural cycle of about 25 hours. With normal cues, however, the biological clock is reset each day such that it is a synchrony with the solar day. The human circadian rhythm is based on a cycle of about 24 hours.
- The biological clock and the associated circadian variations adapt slowly following changes in the work schedule and following trans meridian flights. Concerning circadian rhythm disruption (jet lag), the effects of adjustment to destination time may vary greatly between individuals.
- If a stop-over is more than 24 hours, the correct action is to move to the new time as soon as possible.
- In order to minimize the effects of crossing more than 3-4 time zones with a layover more than 24 hours, it is advisable to keep in swing with the rhythm of the departure country for as long as possible and maintain regular living patterns (waking, sleeping alternation and regular meal patterns).
- The physiological rhythms of a pilot in a new time zone will re-synchronise to this new time zone at a rate of about 1 - 1.5 hours a day.
- Adaption after eastbound travel is about 50 percent slower than after westbound flight -- adaption time following eastbound travel is about 1.5 days for each time zone change whereas adaption time following westbound travel is about one day for each time zone change.

- In order to completely re-synchronise with local time after zone crossing, circadian rhythms require less time when flying from east to west. The readjustment of the biological rhythms after a time shift is normally more difficult with flights towards the east.
- The duration of a period of sleep is governed primarily by the point within your circadian rhythm at which you try to sleep.
- Sensorimotor performance is better in the evening whereas intellectual performance is better in the morning.

SLEEP

Sleep is basically divided into two components. Rapid Eye Movement (REM) sleep and Non-Rapid Eye Movement (NREM) sleep. The purpose of NREM sleep is body restoration while that of the REM sleep is brain restoration by strengthening, refreshing and organizing memory. NREM sleep is further divided into four stages from the lightest to the deepest. Both type of sleeps are required to recoup physical and mental energy.

NREM SLEEP – STAGE 1

The transition phase between wakefulness and sleep takes 10 minutes each time. The brain activity, eye movement and muscle activity become slower. A person is easily awoken. Waking up in this stage of sleep will cause a person to feel that he/she has not slept.

NREM SLEEP – STAGE 2

Light sleep, first stage of true sleep lasts from 10-25 minutes each time. Occupies 50% of the sleep patterns, the brain activity, eye movement become even slower and the cardiac activity decreases.

NREM SLEEP – STAGE 3

The beginning of deep sleep, slow-wave delta sleep. The brain activity and eye movement are approaching zero. If a person is awoken in this stage of sleep, he/she may feel groggy and disoriented for a few minutes.

NREM SLEEP – STAGE 4

Deep sleep, slow-wave delta sleep. No eye movement or muscle activity. If a person is awoken in this stage of sleep, he/she may feel groggy or disoriented for a few minutes.

REM SLEEP (Paradoxical sleep)

Usually occurs 70-90 minutes into a sleep. Happens in cycles lasting for approximately 10 minutes initially to 1 hour. The eye moves rapidly from side to side and the brain wave form is similar to that when a person is awake. The dreams occur. As we grow older, the time spent in REM sleep declines from 50% of our sleep for infants, to 20% of our sleep for adults.

Understanding the different stages of sleep and the importance of sleep, we can plan ahead to ensure we receive the required amount of sleep for recovery. Remember:

- The effects of sleep deprivation on performance increase with altitude and with higher workload.
- During paradoxical sleep rapid eye movements can be observed.
- The duration of a period of sleep is governed primarily by the point within your circadian rhythm at which you try to sleep.
- Deep sleep allows for physical recovery and the reconstitution of neuron energy reserves.
- Lack of sleep increases fatigue, concentration and attention. It has risks of sensory illusions and mood disorders. The disruption of sleeping patterns can lead to symptoms of drowsiness, irritability and lack of concentration will make an individual more prone to make errors.
- A person experiencing sleep loss is unlikely to be aware of personal performance degradation. Performance loss may be present up to 20 minutes after awaking from a short sleep (nap).
- The sleep cycles repeat during the course of a night's sleep. Each succeeding cycle contains a greater amount of REP sleep. Frequent interruption of the REP sleep can harm a human being in the long run. REM sleep is more important for the regeneration of mental and physical functions than all the other sleep stages are.

THE SHEL MODEL IN AVIATION

The SHEL model is a conceptual model of human factors that clarifies the scope of aviation human factors and assists in understanding the human factor relationships between aviation system resources/environment (the flying subsystem) and the human component in the aviation system (the human subsystem).

The SHEL model provides a conceptual framework to help understand Human Factors. It illustrates the various constituents and the interfaces- or points of interaction- which comprise the subject. Human Factors elements can be divided into four basic conceptual categories:

S = Software – Procedures, manuals, checklist layouts, documents, zymology, computer programmes, maps and charts.

H = Hardware – Design of flight decks, physical structure of the aircraft, presentation of instruments, positioning and operating sense of controls, machinery, equipment, etc.

E = Environment – Both internal and external to the Workplace

L = Liveware – Man, the most critical, valuable and flexible component of the system.

L = Liveware – The second 'L' represents other humans in contact with the pilot.

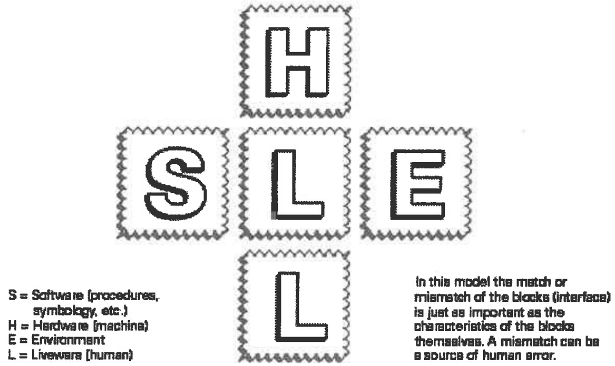
Interactions between human beings and other elements of the SHEL model are at the heart of Human Factors, which involves the interface between:

~ Humans and machines " Liveware-Hardware"

~ Humans and materials " Liveware –Software"

~ Humans and their colleagues " Liveware – Liveware"

~ Humans and the operating environment " Liveware- Environment".



The liveware (human element) is the hub of the SHEL model. The remaining components must be adapted and matched to this central component.

In this model the match or mismatch of the blocks (interface) is just as important as the characteristics of the blocks themselves. A mismatch can be a source of human error leading to an accident or an incident.

Humans are subjected to considerable variation in the performance and suffer many limitations, most of which are now predictable. The Liveware; the human element must be carefully matched to other components of the system to avoid the stress in the system and eventual breakdown.

Hence, the operation well being of the aviation personnel is an important industry need. Many factors influence the personnel, viz. Physical, physiological, psychological, psychological, psychosocial. However the effect of physiological and psychosocial factors is more pronounced.

Hardware, Design of Flight Decks, Size and Anthropometry. Murphy's law states if equipment is designed in such a way that it can be operated wrongly, then sooner or later, it will be. Therefore a great deal of attention is required to design the equipment.

Anthropometry. This is the study of the human measurement. The information is grouped into:

- Static measurements.
- Dynamic measurements.
- Contour surface measurements.

It is not practical to design a cockpit for both the very short and the very tall individual. Those in the central 90% of size distribution will be catered for.

Eye Datum. Cockpit space must be designed around a defined position of the pilot's eye. This may be called the **Eye Datum,** the **Design Eye Position** or the **Reference Eye Point**.

Too high, poor view of instruments, and obstructed high view. Good downward view. Just right, optimum view of outside and instruments.

Too low, good view of instruments but poor forward and downward view. Once the design eye position has been set, the size of the cockpit can be established.

Design of Cockpit Seats. It is of the utmost importance that the seating is comfortable and adjustable to the individual pilot's size and shape. Pilots should adjust their seats to establish a comfortable position giving full control movement, with optimum instrument scan and outside visibility. This position should be used for all phases of the flight. Restraint should be provided by a 5 point harness with a negative 'G' strap.

Hardware, Displays.

Presentation Requirements. The basic choice for type of instrument display is between a digital or an analogue display. Experiments have shown that for the display of purely quantitative information, digital displays give better results. For displaying qualitative information an analogue display provides more easily assessed information.

Conventional Analogue Standard 'T' Display. A standard 'T' layout has artificial horizon or attitude indicator at the centre with the altimeter, airspeed indicator and direction indicator grouped around it.

Digital Display and the Compass. The conventional analogue type compass card gives a better picture of the aircraft orientation then would a digital readout.

Combination or Analogue and Digital Displays. In some instances both digital information and analogue information can be combined in a single instrument.

The three Pointer Altimeter. The three pointer altimeter can easily be misread and produce significantly more reading errors than the single pointer altimeter.

Hardware, Controls, Basic Considerations. There are certain basic considerations which govern the way controls should be both designed and arranged.

Standardization. Control location and sense of use from one aircraft to another should be standardized.

Frequency of Use. Controls used frequently or for protracted periods should be located so that they do not require the pilot to adopt an awkward or fatiguing position.

Sequence of Use. Controls that should normally be used in a given order should be laid out so that the sequence of use is represented in that layout.

Importance. Important controls must be located in easily reached and unobstructed positions.

Visual / Tactile Dissimilarity. Switches and knobs that control different systems or functions should look and feel different from each other.

Symbolism. Controls, if possible, should be designed to contain some reference to their function.

Simultaneous Use. Those controls which may require simultaneous use should be located in order to enable this to take place.

Warnings. It is essential that all warnings should be 'attention getting' without being startling. The most conspicuous visual warnings rely on head and gaze orientation.

QUESTIONS

1. **The atmosphere contains the following gases:**
   A) 78% nitrogen, 21% oxygen, 0.03% carbon dioxide, rest rare gases
   B) 78% helium, 21% oxygen, 0.03% carbon dioxide, rest: rare gases
   C) 78% nitrogen, 21% oxygen, 1% carbon monoxide, rest: rare gases

2. **The volume percentage of oxygen in the atmosphere is 21% which**
   A) Is constant for all altitudes conventional airplanes can reach
   B) Decreases with increasing altitude
   C) Increases with increasing altitude

3. **Oxygen, combined with hemoglobin in blood is transported by**
   A) Platelets
   B) Red blood cells
   C) White blood cells

4. **One of the most dangerous symptoms of hypoxia concerning flight safety is:**
   A) Hyperventilation, causing emotional stress
   B) Impaired judgement, disabling the pilot to recognize the symptoms
   C) Reduced coordination of limb movements, causing the pilot to spin

5. **One of the most frequent symptom(s) of decompression sickness emerging after a decompression in airline operation**
   A) Are the bends
   B) Is a shock
   C) Are neurological damages to the CNS

6. **The cabin pressure in airline operation is**
   A) Normally not exceeding 4000 to 5000feet
   B) Normally not exceeding 2000 to 3000feet
   C) Normally not exceeding 6000 to 8000feet

7. **What is the Time of Useful Consciousness?**
   A) The length of time during which an individual can act with both mental and physical efficiency and alertness, measured from the moment at which he loses his available oxygen supply
   B) The time taken to become aware of hypoxia due to gradual decompression
   C) The period of time between the start of hypoxia and the moment that the pilot becomes aware of it

8. **You can overcome hyperventilation by breathing into a plastic or paper bag. The intention is:**
   A) To reduce blood pressure
   B) To increase the amount of nitrogen in the lung
   C) To raise the level of CO2 in the blood as fast as possible

9. **Which phenomenon is common to hypoxia and hyperventilation?**
   A) Severe headache
   B) Tingling sensations in arms or legs
   C) Cyanosis (blueing of lips and finger-nails)

10. **The risk of a barotrauma of the middle ear is more likely to occur**
    A) With colds and slow ascents
    B) With colds and rapid descents
    C) With colds and fast climbs

11. **The purpose of cabin pressurisation system is:**
    A) B and C are correct.
    B) Reduce gastrointestinal- trapped gas-, middle ear- and sinus- problems.
    C) To allow the crew and passengers to move about freely in a comfortable environment, unencumbered by oxygen masks or other life support equipment.

12. **Flickering light when reflected from spinning rotor blades**
    A) Can be neglected
    B) Can cause spatial disorientation and/or nausea, when looked at for a longer period of time
    C) Should be avoided, because it may destroy the optical nerve

13. **Presbyopia is:**
    A) Far sightedness linked with age
    B) Short sightedness
    C) Myopia

14. **Scanning at night should be performed by:**
    A) Scanning with one eye open
    B) Slight eye movement to the side of the object
    C) Concentrated fixation on an object (image must fall on the fovea centralis)

15. A pilot approaching a runway which is narrower than normal may feel he is at a greater height than he actually is. To compensate he may fly a

A) Flatter than normal approach with the tendency to undershoot
B) Higher than normal approach with the tendency to overshoot
C) Compensatory glide path and stall out

16. Spatial disorientation will be most likely to occur during flight:

A) When flying in and out of clouds and the pilot maintains good instrument cross check
B) When flying in light rain below the ceiling
C) If the brain receives conflicting informations and the pilot does not believe the instruments

17. Hypoxia will effect night vision:

A) At 5000 ft.
B) Less than day vision.
C) And causes the autokinetic phenomena.

18. What is meant by the term Incapacitation?

A) When situational awareness of the crew is too low.
B) The effect of gastro - intestinal upset.
C) The gradual or sudden loss of a crew members ability to function.

19. In the short-term-memory, information is stored for approximately

A) 20 seconds
B) a couple of days
C) 1 hour

20. Concerning the relation between performance and stress, which of the following statement(s) is (are) correct?

A) Domestic stress will not affect the pilot's performance because he is able to leave this type of stress on the ground
B) A moderate level of stress may improve performance
C) A student will learn faster and better under severe stress

21. The main preoccupation in modern airline operations should be:

A) Efficient utilisation of resources.
B) Maximum utilisation of resources.
C) Safety.

22. The elements of the SHEL model are:

A) Software, hardware, electronics and livewire.
B) Shareware, hardware, education and limitations.
C) Software, hardware, environment and liveware.

23. The rate and depth of breathing is primary regulated by the concentration of:

A) water vapour in the alveoli
B) oxygen in the cells
C) carbon dioxide in the blood

24. Pulse rate is influenced by the following factors:

1. Adrenalin 2. Cortisol 3. Physical exercise.

A) 1,3 are correct, 2 is false
B) 1,2,3 are correct
C) 2,3 are correct, 1 is false

25. Which of the following statements is true?

A) People are capable of living without stress.
B) Stressors accumulate thus increasing the likelihood to exhaustion.
C) Stressors are independent from each other.

26. Motor programmes are:

A) rules that enable us to deal with preconceived situations
B) stored routines that enable patterns of behaviour to be executed only under continuous conscious control
C) stored routines that enable patterns of behaviour to be executed without continuous conscious control

27. What optimises crew co-operation ?

1. Sharing and common task
2. Confidence in each others capability
3. Precise definition of functions associated with each crew members role

A) 1,2
B) 2,3
C) 1,2,3

28. What should a pilot do to keep his night vision (scotopic vision)?

A) Select meals with high contents of vitamin B and C
B) Not smoke before start and during flight and avoid flash blindness
C) Wait at least 60 minutes to night-adapt before he takes off

29. Between which components is an interface mismatch causing stress due to poor cockpit design, thus leading to reduced human performance?

A) Liveware – Software
B) Liveware – Liveware
C) Liveware - Hardware

30. Which of the following sentences concerning crew performance is correct?

A) Mistakes can always be detected and corrected by the individual, hence too much practice is not needed.
B) The quality of crew-performance is not dependent on the arousal level of the individual.
C) The quality of crew-performance depends on the practice done to improve reliability.

31. Pilots are more easily inclined to make mistakes when:

A) making decisions independently of others
B) they are not constrained by time
C) they are not able to assess and control the risks involved in a situation

32. Low levels of arousal are:

A) good on final approach
B) not good on final approach
C) good for general flying

33. The amount of light which strikes the retina is controlled by:

A) the cornea
B) the lens
C) the pupil

34. Which of the following statements in regard to motivation is correct?

A) Too much motivation may result in hypo vigilance and thus in a decrease in attention
B) Motivation will reduce the task automation process hence performance will degrade
C) The learning process is vastly improved with motivation

35. Five hours after a rapid decompression at FL 320 you experience pain in the joints. Which of following answers is correct?

A) This symptom indicates decompression sickness and will disappear with in 24 hours.
B) This phenomenon is treated by breathing 100% oxygen under pressure.
C) You should ask for medical advice (flight surgeon) since this is a symptom of decompression sickness.

36. A high degree of cockpit automation may alter the traditional tasks of the pilots in a way, that

A) the crew always maintains situational awareness by being more alert.
B) the crew pays more attention to be always in loop.
C) the attention of the cockpit crew will become reduced with the consequence of 'being out of the loop'.

37. Long-term memory is an essential component of the pilot's knowledge and expertise.

A) The information stored in long-term memory is always fresh and easy to retrieve.
B) It is desirable to pre-activate knowledge stored in long-term memory to have it available when required
C) The capacity of long-term memory is limited to a few weeks.

38. The human information processing system is highly efficient compared to computers because of its

A) speed
B) working memory capacity
C) flexibility

39. What are easily observable indications of stress?

A) Rising of the blood pressure, pupils narrowing, stabbing pain around the heart.
B) Perspiration, flushed skin, dilated pupils, fast breathing.
C) Faster, deep inhalation, stabbing pain around the heart.

40. CRM (Crew Resource Management) training is:

A) intended to develop effectiveness of crew performance by improving attitudes towards flight safety and human relationship management.
B) not intended to change the individual's attitude towards other crew members.
C) intended to alter an individual's stress management capabilities.

41. As a result of automation in cockpits,

A) coordination between the members is facilitated by the provision of more precise and more important information

B) communication and coordination call for an even greater effort on the part of the crew members

C) man-man communication has been significantly improved

42. Which statement is correct ?

A) Oxygen diffusion from the lungs into the blood does not depend on partial oxygen pressure.

B) Oxygen diffusion from the blood into the cells depends on their partial oxygen pressure gradient.

C) The gradient of diffusion is higher at altitude than it is at sea level

43. A pilot after pulling out of a steep dive, moves the control column instinctively and firmly forward may suffer a:

A) Grey Out

B) Black Out

C) Red Out

44. A pilot has flown an aircraft as a Captain for 1000 hrs. With what phase of motor programme he can be associated with?

A) Automatic

B) Cognitive

C) Associate

45. Too low a workload can:

A) Degrade performance

B) Enhance arousal

C) Help plan future activities better

46. In civil air transport, linear accelerations (Gx):- 1: do not exist; 2: have slight physiological consequences; 3: may, in the case of pull-out, lead to loss of consciousness; 4: cause sensory illusions on the pitch axis

A) 1,4

B) 2

C) 3,4

47. Thinking on human reliability is changing.

A) Human errors can be avoided. All it takes is to be vigilant and to extend one's knowledge

B) It is thought that it will be possible to eliminate errors in the near future

C) Human errors are now considered as being inherent to the cognitive function of human and are generally inescapable

48. Gases of physiological importance to man are:

A) oxygen and carbon dioxide

B) nitrogen and carbon dioxide

C) oxygen and carbon monoxide

49. You can survive at any altitude, provided that

A) enough oxygen, pressure and heat is available

B) 21% oxygen is available in the air you breath in

C) pressure respiration is guaranteed for that altitude

50. Fatigue and permanent concentration

A) increase the tolerance to hypoxia

B) lower the tolerance to hypoxia

C) do not affect hypoxia at all

51. An increase in the amount of carbon dioxide in the blood leads to:

A) a decrease of acidity in the blood

B) a reduction of red blood cells

C) shortness of breath

52. The total pressure of a mixture of gases is equal to the sum of the partial pressures of the gases which compose the mixture corresponds to:

A) Henry`s law

B) Dalton´s law

C) Graham´s law

53. The barometric pressure has dropped to 1/2 of the pressure at sea level at

A) 10 000 feet

B) 18 000 feet

C) 25 000 feet

54. Boyle's law is directly applicable in case of:

A) the expansion of trapped gasses in the human body with increasing altitude
B) the occurance of decompression sickness at high altitude
C) hyperventilation with increasing altitude

55. Dalton's law explains the occurance of :

A) bends
B) creeps
C) altitude hypoxia

56. The respiratory process consists mainly of

A) the diffusion of oxygen through the respiratory membranes into the blood, transportation to the cells, diffusion into the cells and elimination of carbon dioxide from the body
B) the transportation of oxygen to the cell and the elimination of carbon monoxide
C) the transportation of oxygen to the cell and the elimination of nitrogen

57. Carbon monoxide poisoning

A) occurs only above 15 degrees OAT
B) is more likely to occur in aeroplanes where the cabin heat is technically supplied by coating the exhaust
C) is more likely to occur in aeroplanes with twin-engines because of high engine efficiency

58. In the following list you will find several symptoms listed for hypoxia and carbon monoxide poisoning. Please mark those referring to carbon monoxide poisoning.

A) Muscular spasms, mental confusion, impairment of hearing.
B) High levels of arousal, increased error proneness, lack of accuracy.
C) Headache, increasing nausea, dizziness.

59. A pilot, climbing in a non-pressurised aircraft and without using supplemental oxygen will pass the "critical threshold" at approximately:

A) 16 000 ft
B) 18 000 ft
C) 22 000 ft

60. Breathing 100% OXYGEN will lift the pilot's physiological safe altitude to approximately:

A) 38 000 ft
B) 10 000
C) 22 000 ft

61. The most dangerous symptoms of hypoxia at altitude are

A) breathlessness and reduced night vision
B) euphoria and impairment of judgement
C) hyperventilation

62. To safely supply the crew with oxygen, at which altitude is it necessary to breathe 100% oxygen plus pressure after a rapid decompression?

A) Approximately 33 000 ft.
B) Approximately 38 000 ft.
C) Approximately 45 000 ft.

63. When the pilot suffers from hypothermia (loss of cabin heating):

A) his oxygen need will not be affected
B) his oxygen need will be raised and his tolerance to hypoxia will be increased
C) his need for oxygen will be increased as long as he stays conscious

64. "Tunnel vision" (loss of peripherical vision) can be observed if a pilot is subjected to more than:

A) + 3.5 Gy
B) - 3.5 Gz
C) + 3.5 Gz

65. "Grey out" can be observed if a pilot is subjected to more than:

A) + 3 Gz
B) - 3 Gz
C) + 3 Gy

66. How can a pilot increase his tolerance to +Gz ?

A) Relax the muscles, ducking the head and lean upper body forward.
B) Tightening of muscles, ducking the head and perform a kind of pressure breathing.
C) Take an upright seat position.

67. A passenger complains about a painful inflated belly at 8.000 feet. You advise him to: 1: unbuckle and massage the belly; 2: stand up and let go the gases out of the intestines; 3; eat less gas forming food and avoid carbonhydrated beverages before flight in the future; 4: drink a lot of water throughout the flight

A) 1, 2 and 4 are correct
B) 1, 2 and 3 are correct
C) 1 and 3 not advisable

68. In the pulmonary artery there is :

A) oxygen poor and carbon dioxide rich blood
B) oxygen poor and carbon dioxide poor blood
C) oxygen rich and carbon dioxide rich blood

69. The transfer of carbon dioxide from the blood to the alveoli can be described by:

A) Boyles Law
B) Dalton's Law
C) the law of diffusion

70. Some hours after a rapid decompression at FL 300 you experience pain in the joints. Which of following answers is correct?

A) This symptom indicates decompression sickness and will disappear when you take some exercise.
B) You should ask for medical advice since this is a symptom of decompression sickness.
C) This phenomenon is treated by breathing 100% nitrogen.

71. Which symptom does not belong to the following list:

A) leans
B) bends
C) chokes

72. Which of the following statements is correct?

A) Hearing is the sense which collects most information in man
B) 70% of information processed by man enters via the visual channel
C) 40% of information processed by man enters via the visual channel

73. Adaptation is

A) the adjustment of the crystalline lens to focus light on the retina
B) the change of the diameter of the pupil
C) the adjustment of the eyes to high or low levels of illumination

74. Scanning at night should be performed by:

A) slight eye movements to the side of the object
B) concentrated fixation on an object (image must fall on the fovea centralis)
C) avoiding food containing Vitamin A

75. To prevent the "autokinetic phenomena", the following can be done:

A) fixate the source of light, first with one eye, then with the other
B) look sideways to the source of light for better fixation
C) look out for additional references inside and/or outside the cockpit using peripheral vision also

76. The time an eye needs to adapt fully to the dark is about:

A) 30 minutes
B) 7 minutes
C) 15 minutes

77. The part(s) of the eye responsible for night vision

A) are the cones and rods
B) is the cornea
C) are rods

78. Empty field myopia is caused by:

A) atmospheric perspective
B) lack of distant focal points
C) flying over mountainous terrain

79. The human ear is capable of perceiving vibrations between the frequencies

A) 10 - 16 Hz
B) 16 - 20,000 Hz
C) 20,000 - 42,000 Hz

80. What is understood by air-sickness?

A) A sensory conflict within the vestibular system accompanied by nausea, vomiting and fear
B) An illness caused by evaporation of gases in the blood
C) An illness caused by an infection of the middle ear

81. Approaches at night without visual references on the ground and no landing aids (e.g. VASIS) can make the pilot believe of being

A) lower than actual altitude with the risk of ducking under
B) lower than actual altitude with the risk of overshooting
C) higher than actual altitude with the risk of landing short (“”ducking under””)

82. Orientation in flight is accomplished by 1: eyes; 2: utriculus and sacculus; 3: semicircular canals; 4: Seat-of-the-pants-Sense

A) only 1 and 4 are correct
B) 1, 2, 3 and 4 are correct
C) 1,2, 3 and 4 are false, only 1 is correct

83. What can a pilot do to avoid “Flicker vertigo” when flying in the clouds?

A) Switch strobe-lights off
B) Dim the cockpit lights to avoid reflections
C) Engage the autopilot until breaking the clouds

84. During flight in IMC, the most reliable sense which should be used to overcome illusions is the:

A) “Seat-of-the-pants-Sense”
B) visual sense by looking outside
C) visual sense, interpreting the attitude indicator

85. It is inadvisable to fly when suffering from a cold. The reason for this is:

A) the tissue around the nasal end of the Eustachian tube is likely to be swollen thus causing difficulty in equalising the pressure within the middle ear and the nasal/throat area. Pain and damage to the eardrum can result, particularly during fast descents
B) although the change in air pressure during a climb at lower altitudes is very small, it increases rapidly at high altitudes. If the tissue in the Eustachian tube of the ear is swollen, gentle descents at high alltitude would result in damage to the ear drum
C) swollen tissue in the inner ear will increase the rate of metabolic production resulting in hyperventilation

86. The metabolisation of alcohol

A) is quicker when used to it
B) is a question of time
C) can be influenced by easy to get medication

87. The first stage in the information process is

A) perception
B) the recognition of information
C) sensory stimulation

88. Motor programmes are:

A) stored routines that enable patterns of behaviour to be executed without continuous conscious control
B) rules that enable us to deal with preconceived situations
C) stored routines that enable patterns of behaviour to be executed only under continuous conscious control

89. Which of the following human error rates can be described as both realistic and pretty good, after methodical training

A) 1 in 10 times
B) 1 in 100 times
C) 1 in 1000 times

90. Acute stress quickly leads to

A) a decrease in the amount of resources mobilized to face the situation
B) a state of over activation beyond the control of willpower
C) the mobilizatioan of resources required to cope with the stressor

91. In a complex task high levels of arousal

A) reduce failures
B) lead to better decision-making
C) narrows the span of attention

92. If during flight a pilot is in a mental condition of “optimum arousal” he/she will be:

A) unprepared to handle a difficult situation
B) prepared best to cope with a difficult task
C) in a confused mental state

93. Experiencing stress depends on:

A) the individual interpretation of the situation
B) the fragility of individuals to certain types of stimulation
C) the individual’s state of tiredness

94. What is the effect of tiredness on attention?

A) It increases the ability to manage multiple matters
B) It leads to one's attention being dispersed between different centres of interest
C) It reduces the ability to manage multiple matters

95. In order to completely resynchronise with local time after zone crossing, circadian rhythms require

A) about one week per 2.5 hours of time shift
B) less time when flying from east to west
C) about one day per 2.5 hours of time shift

96. During paradoxical sleep

A) rapid eye movements can be observed
B) the tone of the muscles is similar to that in the waking state
C) the rhythm of the heart is very regular

97. The physiological rhythms of a pilot in a new time zone will resynchronise to this new time zone at a rate of about

A) 2 - 2.5 hours a day
B) 3 - 4.5 hours a day
C) 1 - 1.5 hours a day

98. The duration of a period of sleep is governed primarily by

A) the point within your circadian rhythm at which you try to sleep
B) the amount of time you have been awake
C) the number of points you have in your 'credit/deficit' system

99. A high degree of cockpit automation may alter the traditional tasks of the pilots in a way, that

A) it is guaranteed that the crew maintains always situational awareness
B) the attention of the cockpit crew will become reduced with the consequence of 'being out of the loop'
C) the crew can pay more attention to solve the problem in an abnormal situation without monitoring the automatic systems

100. Which of the following drawbacks are associated with automation? 1: Reduced in manually controlling the aircraft; 2: Increased likelihood of slips while programming automatic systems; 3: Difficulties in adapting to the use of a sidestick; 4: General decrease in technical reliability

A) 2,3,4
B) 1,3
C) 1,2

101. Attitudes are defined as:

A) tendencies to respond to people, institutions or events either positively or negatively
B) the conditions necessary for carrying out an activity
C) a synonym for behaviou

102. Disturbance of the biological clock appears after a: 1: bad night's sleep; 2: day flight Delhi-London; 3: day flight Delhi-Colombo; 4: night flight London-Delhi

A) 1,2 and 3 are correct
B) 1 and 3 are correct
C) 2 and 4 are correct

103. Flying from Bengaluru to Moscow you will have a lay-over of 4 days. What time measure is relevant for your circadian rhythm on the 3rd day?

A) ZT (zonal time).
B) LT (local time).
C) UTC (universal time coordinated).

104. Decompression leads to:

A) Hypoxia
B) Release of Nitrogen bubbles in the body
C) Instability of the aircraft

105. Decompression sickness is pronounced when the aircraft decompresses:

A) from MSL to 7000 feet
B) from 7000 feet to 35000 feet
C) from MSL to 15000 feet

106. Depth in vision is achieved through:

A) visual memory
B) peripheral vision
C) binocular vision

107. What is the role of RBCs in blood?

A) fight foreign bacteria bodies
B) clot blood
C) transport oxygen

108. Types of Hypoxia are:

A) stagnant hypoxia
B) anaemic hypoxia
C) both of these

109. A person who smokes one packet of cigarettes a day will reduce his capacity to transport oxygen effectively by:

A) 0.5% to 2%
B) 5% to 8%
C) 12% to 18%

110. Cold clammy skin is indicative of

A) hypoxia
B) decompression sickness
C) hyperventilatin

ANSWERS

1	2	3	4	5	6	7	8	9	10	11	12	13	14
A	A	B	B	A	C	A	C	B	B	A	B	A	B

15	16	17	18	19	20	21	22	23	24	25	26	27	28
A	C	A	C	A	B	B	C	C	A	B	C	C	B

29	30	31	32	33	34	35	36	37	38	39	40	41	42
C	C	C	B	C	C	C	C	B	C	B	A	B	B

43	44	45	46	47	48	49	50	51	52	53	54	55	56
C	A	A	B	C	A	A	B	C	B	B	A	C	A

57	58	59	60	61	62	63	64	65	66	67	68	69	70
B	C	C	A	B	B	C	C	A	B	B	A	C	B

71	72	73	74	75	76	77	78	79	80	81	82	83	84
A	B	C	A	C	A	C	B	B	A	C	B	A	C

85	86	87	88	89	90	91	92	93	94	95	96	97	98
A	B	C	A	B	C	C	B	A	C	B	A	C	A

99	100	101	102	103	104	105	106	107	108	109	110
B	C	A	C	B	B	B	C	C	C	B	C

24

SAMPLE QUESTION PAPERS

QUESTIONS

1

1. **Flt plan is to be filed in India in respect of:**
   A) All flights other than scheduled flights
   B) All flights other than local flights
   C) Only for scheduled flights

2. **What does the abbreviation OIS mean?**
   A) Obstacle identification surface
   B) Obstacle in surface
   C) Obstacle identification slope

3. **The minimum safest altitude that the aircraft can descend below the transition altitude within 25 NMs of an aerodrome area is given by:**
   A) MORA
   B) MOEA
   C) MSA

4. **Barotrauma of the middle ear is usually accompanied by:**
   A) Noises in the ear
   B) Pain in the joints
   C) A reduction in hearing ability and the feeling of increasing pressure

5. **Pilot in command of an aircraft on precision approach cannot execute a landing unless he has the runway visual references in contact before he can descend below:**
   A) MSA
   B) MDH
   C) DA

6. **Low visibility operations include:**
   A) LVTO, Cat II and Cat III approaches.
   B) Cat I, II and III approaches.
   C) Cat II and Cat III approaches.

7. **The registration mark shall consist of:**
   A) 1 to 3 letters and digits.
   B) A combination of letters and numbers.
   C) Letters only, no digits are permitted.

8. **Final reserve fuel, for a reciprocating engine aeroplane over destination alternate, shall be:**
   (A) the amount of fuel required to fly for 45 minutes, under speed and altitude conditions specified by the State of the Operator.
   (B) the amount of fuel required to fly for 45 minutes and do aan approach and missed approach.
   (C) the amount of fuel required to fly for two hours, under speed and altitude conditions specified by the State of the Operator.

9. **A white dumbbell with a black bar spaced perpendicularly indicates:**
   A) All aircraft are required to land, takeoff and taxi on taxiways and runways only.
   B) Are required to land and takeoff on runways only
   C) A white dumbbell when displayed requires a/c to land and takeoff and taxi on taxiways and runways only.

10. **A/c on same level converging track has separation:**
    A) 15min
    B) 10min
    C) 5min

11. **Aeronautical information circulars provide information that:**
    A) Timely knowledge of services, procedure or hazard which is essential to personnel concerned with flight operations
    B) Does not qualify as a NOTAM or an inclusion in AIP, but relates to flight safety, air navigation, administrative or legislative matters.
    C) Temporary changes to the information contained in the AIP which are published by means of special pages.

12. Night flying is logged for flying done between :

A) Sunset to sunrise
B) 30' after sunset to 30' before sunrise
C) 20' before sunrise to 20' after sunset

13. A pilot is used to land on wide runways only. When approaching a smaller and/ or narrower runway, the pilot may feel he is at:

A) Greater height than he actually is with the tendency to land short
B) Greater height and the impression of landing short
C) Lower than actual height with the tendency to overshoot

14. Identify touchdown zone lighting (TDZL).

A) Two rows of red transverse light bars disposed symmetrically about the runway centerline.
B) Two rows of transverse light bars disposed symmetrically about the runway centerline.
C) Flush centerline lights spaced at 50-foot intervals extending through the threshold zone.

15. Runway centre line lights are:

A) Green
B) Blue
C) White

16. Emergency distance available for stopping aircraft is:

A) From starting point to end of clearway
B) From starting point to end of paved overrun.
C) From threshold plus 50' to end of runway

17. Notams are distributed by means of :

A) Mail
B) Telecommunications
C) Telegrams

18. Transponder code for distress is:

A) 7700
B) 7600
C) 121.5

19. What type of flight is allowed in class A airspace:

A) IFR only
B) IFR and VFR
C) IFR and special VFR

20. An a/c with seating capacity of 150, what is the number of flight attendants required to be carried on the flight:

A) 2
B) 3
C) 4

21. Route designator for domestic routes is:

A) Alpha
B) Whiskey
C) Bravo

22. What lights would a pilot slightly above glide slope see on a PAPI?

A) 3 green and 1 white
B) 3 white and 1 red
C) 2 red and 2 white

23. A pilot is used to land on small and narrow runways only. Approaching a larger and wider runway can lead to:

A) An early or high "round out"
B) A steeper than normal approach dropping low
C) A flatter than normal approach with the risk of "ducking under"

24. At runway and taxiway holding lines:

A) White dashes lie towards nearest runway.
B) Yellow continuous lines lie towards runway.
C) Yellow dashes lie towards nearest runway.

25. Identifier TDZL is _________:

A) Green and white lights 75 mtr spacing.
B) White paired, flash lights at 150 mtr longitudinal.
C) White paired variable lights with 30 mtr longitudinal spacing.

26. **For the regeneration of mental and physical functions the most important sleep is:**
    A) REM
    B) NREM
    C) NREM -Stage 3

27. **Hyperventilation is caused due to:**
    A) Decreased breathing rate
    B) Emotional tension or anxiety
    C) Excessive carbon mono-oxide in the blood

28. **Abrupt head movement in a steep turn may cause:**
    A) Spatial disorientation
    B) False horizon
    C) Elevator illusion

29. **Centrifugal force without visual aids can be interpreted by a pilot as:**
    A) Motion reversal
    B) Turning
    C) Rising and falling

30. **Destination and information sings are:**
    A) Black letter in yellow background
    B) Yellow letter in black background
    C) White in back

31. **Cockpit lights are:**
    A) Red light as they help in reading contours on maps at night
    B) Bright lights
    C) Dim white light

32. **If a CPL holder is hospitalized for __________ day his medical becomes invalid:**
    A) 7 days
    B) 10 days
    C) 15 days

33. **Hypoxia:**
    A) Increases with altitude
    B) Is normally experienced below 8000 feet
    C) Is due to over breathing

34. **A pilot doing a test flight can carry passengers:**
    A) On payment
    B) Without payment
    C) Cannot carry

35. **If you see a white and flashing red light, ac is:**
    A) A/c flying away from you
    B) Right to left
    C) Left to right

36. **A/c passing from left to right you will see:**
    A) Red light
    B) Red and white light
    C) Green light

37. **Jet Airways flight is to take off from London to Bosnia. C of A will be as per the rules of:**
    A) UK
    B) India
    C) Bosnia

38. **One a/c is tracking 030 degree reporting over a point at 0412 hrs other on 100 degree cannot pass this point before:**
    A) 0422
    B) 0427
    C) 0417

39. **All International flights landing in India shall land at a :**
    A) Customs Airport only
    B) Any civil airport
    C) Any airport provided they have nothing to declare.

40. **ADC is not required if flying in:**
    A) 5 nm and below 3000'
    B) 3 nm and below 1000'
    C) 5 nm and below 1000' AGL

41. **Aerobatics with in 2 nm of airport can not be done below:**
    A) 2000'
    B) 6000'
    C) 3000'

42. In order to get rid of excess nitrogen following scuba diving, subsequent flights should be delayed:

A) 36 hours after any scuba diving
B) 3 hours after non decompression diving
C) 24 hours

43. Advertisements can be painted on the exterior of an aircraft:

A) Only for the company owning the aircraft.
B) Only if specifically permitted by DGCA.
C) Only for items not posing a health hazard.

44. Due to fog other a/c will appear to be:

A) Nearest than normal
B) Farther then normal
C) Will have no difference

45. Incubation period for relapsing fever is:

A) 6 days
B) 7 days
C) 8 days

46. Visibility required for VFR flight below 3000' or 1000' terrain clearance is:

A) 5 km
B) 1.6 km
C) 8 km

47. If flying on a south-easterly heading at 2500 feet and you are asked to report your heading and level, then you should reply with the message:

A) HEADING 215 AT 2500 FEET
B) HEADING 135 AT TWO THOUSAND FIVE HUNDRED
C) 045 AT 2 POINT 5

48. The determination of the aerodrome minimum operating conditions must take the following into account:

1. Equipment available for navigation
2. Dimensions and characteristics of the runways
3. Composition of the flight crew
4. Obstacles in the vicinity of approach and missed approach areas
5. Facilities for determining and communicating the weather conditions

The combination regrouping all the correct statements is:

A) 2, 4, 5.
B) 1, 2, 4, 5.
C) 1, 2, 3, 4, 5.

49. The minimum equipment list (MEL) gives the equipment which can be inoperative when undertaking a flight and the additional procedures to be observed accordingly. This list is prepared by:

A) The operator, and it is appended to the flight manual.
B) The operator, and it is inserted in the operations manual.
C) The manufacturer, and it is inserted in the operations manual.

50. The document that specifies the recommendations for instrument procedures is called...

A) PANS OPS Doc 8168
B) The Air Navigation bulletin
C) The Convention of Chicago

ANSWERS

1	2	3	4	5	6	7	8	9	10	11	12	13	14
B	A	C	C	C	A	B	A	B	A	B	B	A	B

15	16	17	18	19	20	21	22	23	24	25	26	27	28
C	B	B	A	A	C	B	B	A	C	C	A	B	A

29	30	31	32	33	34	35	36	37	38	39	40	41	42
C	A	C	C	A	C	A	C	B	B	A	C	B	C

43	44	45	46	47	48	49	50
B	B	C	A	B	C	B	A

2

1. **Inst. Chart procedures are given in:**
   A) AIP
   B) NOTAMS
   C) AIRAC

2. **Inst. Charts carried in aircraft are contained in:**
   A) Operation Manual
   B) Aircraft Manual
   C) Route guides

3. **Danger areas are given in:**
   A) AIRAC
   B) AIC
   C) AIP

4. **To know the current watch hours at an aerodrome, pilot should refer to:**
   A) NOTAMs
   B) AIP
   C) AIC

5. **Vertical separation applicable to non-RVSM aircraft operating in RVSM airspaces is:**
   A) 500'
   B) 1000'
   C) 2000'

6. **Weather below minima implies that:**
   A) RVR/ Visibility and weather below minima specified by the operator
   B) Weather below V M C
   C) RVR / VIS and weather below minima specified by ICAO

7. **Two digits in black over yellow back ground hanging from the tower indicates:**
   A) Time in UTC (hrs)
   B) Runway in use
   C) Location of ATS reporting point

8. Circling minima's are:
A) Higher than precision app minimas
B) Lower than precision app minimas
C) Same as precision app minimas

9. ARP is at the:
A) Geometric centre of an aerodrome
B) Highest elevation at an aerodrome
C) Designated point at the aerodrome.

10. SIDS are published in:
A) AIRAC
B) NOTAMs
C) AIP

11. White flashes from tower to aircraft in flight means:
A) Return to this aerodrome and proceed to apron
B) Land at this aerodrome and proceed to apron.
C) Land after green signal from Tower.

12. OCA is determined after taking into account margin for:
A) Terrain Clearance
B) Pilot Error
C) Operational Considerations

13. RVR/DH for cat II ILS ops is:
A) 550m/60
B) 300m/30m
C) 350m/30m

14. Green Light on an aircraft is visible if seen from the front:
A) At an arc of 110° to the port side
B) At an arc of 110° to the starboard side
C) At an arc of 140° to the starboard side

15. Position reports to be given by an aircraft, if no route is being followed will be at an interval of:
A) 30 mins
B) 60 mins
C) First report after 30 mins and subsequent reports after 60 mins

16. Oxygen is carried on board for all crew members and passengers when at atmospheric pressure will be less than:
A) 620 hPa
B) 700 hPa
C) 376 hPa

17. A twin engine p-i-c has decided to divert due to failure of one engine. It will be:
A) Uncertainty phase
B) Alert phase
C) Distress phase

18. An IFR flight will maintain a minimum altitude of:
A) 2000' above highest obstacle with in 8 kms of aircraft position in mountainous areas
B) Both A) and C) are correct
C) 1000' above highest obstacle with in 600m of aircraft position in mountainous areas.

19. Prisoners can be carried on board with the permission of:
A) Police commissioner
B) DGCA
C) DM

20. If cornea is curved more than normal, the person suffers from:
A) Myopia
B) Presbiopia
C) Hypermetropia

21. According to ICAO Annex 8, a certificate of airworthiness shall be renewed or shall remain valid subject to the:
A) Laws of the state of registry and operation
B) Laws of the state in which is operated
C) Laws of the state of registry

22. Flight Information Region (FIR) is an airspace within which the following services are provided:
A) Flight Information Service and Alerting Service
B) Flight Information Service and Advisory Service
C) Flight Information Service, Alerting Service and Advisory Service

23. VFR flights are not permitted:

A) Above FL 100
B) Above FL150
C) Above FL 50

24. Personnel are required to preserve their log books for a period of --- years after the date of last entry:

A) 2 years
B) 5 years
C) 1 year

25. Movement area of an aerodrome constitutes the following:

A) Area including runways / taxiways excluding apron
B) Area excluding taxiways but including runways and apron
C) Area including runways / taxiways / aprons

26. PIC of an aeroplane on Scheduled operations can fly for a maximum number of hours in a period of consecutive days:

A) 125 hours
B) 100 hours
C) 80 percent of time as co-pilot

27. Validity of ATPL medical and licence is:

A) 6 months and 5 years
B) 6 months and 2 years
C) 12 months and 5 years

28. Cabin crew required for a passenger plane with 83 seating capacity is:

A) 1
B) 2
C) 3

29. The common illusion created by linear acceleration or deceleration is:

A) A banking sensation due to disturbances in the fluid circulation in the inner ear
B) A combined pitch up and banking sensations
C) A pitch up feeling when the aircraft accelerates

30. Aircraft on flight gets an advisory and flight information service with in an FIR, it is provided by:

A) FIC
B) Approach control office
C) Area control center

31. Navigation lights of an aeroplane cover the following sectors:

A) Red on starboard, green on port 110 deg each
B) Green on starboard, red on port 110 deg each
C) Red on starboard, green on port 140 deg each

32. EDTO is applicable to:

A) Twin engine operations.
B) Aeroplane with two or more turbine engines.
C) Aeroplane with more than two reciprocating engines.

33. Control area is:

A) Controlled airspace extending upwards from a specified limit above the earth
B) Controlled airspace extending upwards from surface of the earth to a specified limit
C) Both A and B above

34. When refueling operations are in progress, unauthorized persons are prohibited within:

A) 15 mtrs
B) 30 mtrs
C) 43 mtrs

35. Linear accelerations when flying straight and level in IMC may give the illusion of:

A) Descending
B) Spinning
C) Climbing

36. Decompression sickness causes:

A) Lack of CO_2 in blood
B) Lack of O_2 in blood.
C) N_2 bubbles in tissues

37. Under normal circumstances, which gas will diffuse from the blood to the alveoli:

A) Carbon monoxide
B) Carbon dioxide
C) Oxygen

38. An aircraft incident and accident is to be reported within:

A) Incident 24 hrs, accident 24 hours
B) Incident 24 hrs, accident 48 hours
C) Incident 24 hrs, accident 12 hours

39. Emergency check list is to be carried by:

A) Scheduled flights
B) Non – scheduled operators
C) All aircraft

40. Which type of service is provided in Class F airspace?

A) Air traffic control service
B) Air traffic advisory service and FIS
C) Air traffic advisory service

41. As a PIC you find yourself over a prohibited area, you will:

A) Signal urgency and land at the nearest aerodrome
B) Signal distress and land at nearest aerodrome
C) As 'B' and land at aerodrome outside the prohibited area

42. The repeated switching on and off of the landing lights indicate:

A) urgency
B) distress
C) pan pan

43. A pressurized flight shall:

A) Carry oxygen for all crew members
B) Carry oxygen for all crew members and passengers
C) Carry oxygen for all crew members and passengers, in the event of loss of pressurization, pressure in the compartment would be less than 700 mb

44. General information of purely explanatory or advisory nature are promulgated through:

A) CAR
B) AIP
C) AIC

45. Succession of command is given by:

A) The operator to pilots by a circular
B) DGCA
C) Central Government

46. Doc 4444 relates to:

A) Flight level tables
B) Position reports
C) All above

47. What does the term EXPECTED APPROACH TIME mean:

A) The time at which an arriving aircraft expects to arrive over the appropriate designated navigation aid serving the destination aerodrome.
B) The holding time over the radio facility from which the instrument approach procedure for a landing will be initiated.
C) The time at which ATC expects that an arriving aircraft, following a delay, will leave the holding point to complete its approach for a landing.

48. When calculating the length of the runway available (TODA):

A) The stopway has to be taken into account.
B) The clearway has to be taken into account.
C) The runway slope has to be taken into account.

49. A circling approach is:

A) A visual flight manoeuvre keeping the runway in sight
B) A contact flight manoeuvre
C) A visual manoeuvre to be conducted only in IMC

50. For aircraft flying over the high seas, which rules shall be in force?

A) The rules established by the state of the operator of the aircraft
B) The rules established under the Convention of international civil aviation
C) The rules established by the state(s) adjacent to the high seas over flown

ANSWERS

1	2	3	4	5	6	7	8	9	10	11	12	13	14
A	C	C	B	C	A	B	A	A	C	B	A	B	A

15	16	17	18	19	20	21	22	23	24	25	26	27	28
C	B	B	B	B	A	C	A	B	B	C	B	C	B

29	30	31	32	33	34	35	36	37	38	39	40	41	42
C	A	B	B	A	A	C	C	B	A	C	B	C	A

43	44	45	46	47	48	49	50
C	C	A	C	C	B	A	B

3

1. **When "Secondary Radar" is used, an aircraft may be identified by one of the following procedures:**
   A) Observation of compliance with an instruction to operate transponder from "ON" to "STBY" and back to "ON"
   B) To request pilot to set transponder on position "ON"..
   C) To request pilot to set transponder on position "OFF"

2. **No of runway threshold stripes for a runway width of 23 meters is:**
   A) 4
   B) 5
   C) 6

3. **Pair of landing stripes for a runway LDA of 1500 meters is:**
   A) 2
   B) 3
   C) 4

4. **Filed minima 500m, RVR beginning 800m, RVR mid 300m. Aerodrome is:**
   A) Below minima
   B) At par with minima
   C) Above minima

5. **Flight manual is a manual associated with:**
   A) COA
   B) ICAO Standards
   C) DGCA CARs

6. **Number of cabin crew is required according to:**
   A) No. of passengers excluding crew members
   B) No. of persons on board including crew members
   C) No. of seats

7. **Track separation is:**
   A) Longitudinal
   B) Lateral
   C) Composite

8. Geographical separation is:

A) Longitudinal
B) Lateral
C) Composite

9. Alert phase is:

A) Aircraft is about to force land in a river
B) Aircraft is intercepted
C) Apprehension exists as to the safety of the ship and its occupants.

10. Appropriate way to cross a route.

A) Along the traffic flow at 45 degrees
B) 90 degrees to the route
C) Against the flow of traffic keeping a sharp lookout

11. Among the factors which affect night vision are:

A) Age, cabin altitudes above 8000 ft, smoking and alcohol.
B) Age, cabin altitudes above 8000 ft, smoking, alcohol and lack of vitamin D.
C) Age, cabin altitudes above 8000 ft, smoking, alcohol and lack of vitamin C.

12. Semi-circular system sectors are.

A) From 001° to 180° and 181° to 360°
B) From 000° 179° and 180° to 359°
C) From 090° to 260° and 270° to 089°

13. Aerodrome Traffic Zone for VFR flights is to be considered, if ATZ is not notified is:

A) With in 5 NM of ARP up to 3000 feet.
B) With in 25 NM of ARP up to 10,000 feet.
C) With in 10 NM of ARP up to 5000 feet.

14. Identify taxi leadoff lights associated with the centerline lighting system:

A) Alternate green and yellow lights curving from the centerline of the runway to the entry of the apron
B) Alternate green and yellow lights curving from the centerline of the runway to the edge of the taxiway
C) Alternate green and yellow lights curving from the centerline of the runway to the centerline of the taxiway

15. The following are appropriate when faced with symptoms of decompression sickness:

1. Climb to higher level
2. Descent to the higher of 10000 ft or MSA and land as soon as possible
3. Breathe 100% oxygen
4. Get medical advice about recompression after landing

The combination of correct statements is:

A) 1, 4
B) 1, 2, 3
C) 2, 3, 4

16. The circulation system, among other things, allows for:

1. Transportation of oxygen and carbon dioxide
2. Transportation of information by chemical substances

A) 1 and 2 are correct
B) 1 is correct, 2 wrong
C) both are wrong

17. Which of the following requirements should be met when planning a flight with icing conditions:

A) The flight should be planned so that a change of cruising level can be initiated rapidly
B) The aircraft shall before flight sprayed with anti-icing fluid
C) The aircraft shall be equipped with approved ice-protection systems

18. Red square with one yellow diagonal.

A) Landings are prohibited and that the prohibition is liable to be prolonged.
B) Special precautions must be observed in approaching to land or in landing.
C) Return to starting point on the aerodrome.

19. Notams series A are:

A) International notams for changes/ unserviceability likely to last more than 2 hrs.
B) Domestic notams for air routes
C) International notams for changes/ unserviceability likely to last less than 2 hrs.

20. The RCP concept characterizes the performance required for:

A) Computer capabilities that support ATM functions with reference to latest technology.

B) Command capabilities that support ATM functions with reference to satellite based technology

C) Communication capabilities that support ATM functions without reference to any specific technology .

21. If an aerodrome minima is not established for IFR/VFR operations the minima to be applied will be laid down by:

A) DGCA

B) AAI

C) Operator

22. OCA:

A) Is specified to facilitate safe holding heights

B) Used in establishing compliance with appropriate obstacle clearance criteri A)

C) Meets obstructions clearance criteria for take offs

23. Damage to eardrums or ossicles (middle ear bones) leads to:

A) Conductive hearing loss

B) Disorientation

C) Permanent loss of hearing dizziness

24. ARIWS consists of a surveillance system:

A) To alert ATC about runway incursions in real time basis

B) To alert ATC and flight crew about runway incursions in a timely manner.

C) To generate alerts independent from ATC directly to the flight crew and vehicle operators about runway incursions on real time basis.

25. Amendment to aircraft rules 1937 is given in:

A) AIP

B) AIC

C) AIRAC

26. Deviations from ICAO procedures are published in:

A) AIC

B) AIRAC

C) AIP

27. Precision approach (PA) procedure is an instrument approach procedure:

A) based on using both lateral and vertical navigation guidance systems designed for conventional 3D all weather approaches.

B) based on navigation systems (ILS, MLS,GLS and SBAS Cat I) designed for 3D instrument approach operations Type A or B.

C) based on PBN (GBAS and SBAS) designed for 3D instrument approach operations Type A, B or C.

28. Abrupt head movements in IMC operations may cause:

A) Disorientation

B) False horizon

C) Optical illusion

29. Flight Engg. Is carried on board:

A) If demanded by C of A

B) If operator feels so

C) If P-I-C desires so

30. A departing aircraft carrying sick or injured persons will get priority over:

A) An aircraft carrying VVIP

B) Military fighter flights

C) An aircraft engaged in a live scramble

31. UB67DFC stands for:

A) The nationality mark for unmanned aircraft registered in India

B) International route in Upper airspace class D, F and C

C) Way point in Upper airspace

32. Instrument flying time means:

A) Flying simulator

B) Flying in IMC

C) Flying a/c with sole reference to instruments

33. Outside controlled airspace above 3000'AMSL fly on:

A) 1013.2

B) QFE

C) QNH

34. ATPL who is 28 years old, medical is valid for:

A) 2 yrs
B) 1 yr
C) 6 months

35. ATC services are provided to IFR flights and traffic information to VFR flights as far as practical provided in class airspace:

A) B
B) E
C) D

36. Navigation light are to be displayed by all aircraft in flight:

A) From sunset to sunrise
B) From 30 mins after sunset till 30 mins before sunrise
C) At all time

37. IFR flight in VMC, weather changes to IMC:

A) Fly VMC and land at nearest convenient aerodrome.
B) Fly according to flight plan
C) Change to VFR plan

38. Person is killed on runway while landing after being hit by the wing of an aircraft. It is an:

A) Accident
B) Incident
C) Accident only if it was due to pilots fault

39. Aerodrome category for rescue and fire fighting is determined based on:

A) Maximum certified All Up Weight of aircraft.
B) Aeroplane over all length and maximum fuselage width.
C) Seating capacity of the aeroplane.

40. Series of red and green projection fired at an interval of 10 secs means:

A) Keep away from danger area
B) Exercise caution while landing
C) Do not land for the time being

41. Straight out departure is:

A) 10 degree
B) 15 degree
C) 30 degree

42. Aerodromes signs should be in the following configuration:

A) mandatory instruction signs; black background with red inscriptions.
B) Information signs; yellow or black background with black or yellow inscriptions
C) mandatory instruction signs; red background with black inscriptions.

43. If there is a minor damage to aircraft on a ferry flight, passengers:

A) Can not be carried
B) Can be carried
C) Can be carried with the permission of operator

44. An aircraft shall display, if so equipped, an anti-collision light:

A) Outside the daylight-period in flight, but not on the ground when it is being towed;
B) While taxing, but not when it is being towed;
C) On the ground when the engines are running

45. The transition level:

A) shall be the lowest available flight level above the transition altitude that has been established
B) shall be the highest available flight level below the transition altitude that has been established
C) is calculated and decided by the commander

46. A/c A at F390 reports at a point at 0210 wants to descend to F330, a/c B at F 360 estimates to reach the same reporting point at 0300. Before what time the first a/c should reach F330?

A) 0235
B) 0250
C) 0225

47. Which word or phrase shall be used in order to repeat for clarity or emphasis?

A) Read back.
B) I say again.
C) Confirm.

48. Who is responsible for approving methods of calculating minimum flight altitudes?

A) The DGCA.
B) The ICAO Council.
C) The State of the Operator.

49. The term used to describe the visual phase of flight after completing an instrument approach, to bring an aircraft into position for landing on runway which is not suitably located for straight-in approach, is:

A) Aerodrome traffic pattern
B) Visual manoeuvring (circling)
C) Visual approach

50. Where there is an amendment to an International Standard a State must give notice to:

A) The ICAO Council within 60 days of the adoption of the amendment
B) The ICAO Assembly within 30 days of the adoption of the amendment
C) The ICAO Assembly within 60 days of the adoption of the amendment

ANSWERS

1	2	3	4	5	6	7	8	9	10	11	12	13	14
A	C	C	C	A	C	B	B	C	B	A	B	A	C

15	16	17	18	19	20	21	22	23	24	25	26	27	28
C	A	C	B	A	C	A	B	A	C	B	C	B	A

29	30	31	32	33	34	35	36	37	38	39	40	41	42
A	A	A	C	A	B	B	A	B	A	B	A	B	B

43	44	45	46	47	48	49	50
A	C	A	C	B	C	B	A

4

1. **VT-AXC owned by a private citizen is on a flight to Sri Lanka from Chennai on sight seeing tour. The aircraft's required to carry________ among other things.**
   A) Manifest and detailed declarations of the cargo.
   B) Pilots Log Book
   C) MEL

2. **Vertical separation in CVSM airspaces above FL 290 is:**
   A) 1000'
   B) 2000'
   C) 4000'

3. **Altitude in transition layer is maintained by setting altimeter to.**
   A) QFE
   B) 1013.2
   C) QNH

4. **In relation to hypoxia, which of the following paraphrase(s) is (are) correct?**
   A) This is a physical condition caused by a lack of oxygen saturation in the blood while hyperventilating
   B) This is a condition of lacking oxygen in the brain causing the circulatory system to compensate by decreasing the heart rate
   C) This is a physical condition caused by a lack of oxygen to meet the needs of the body tissues, leading to mental and muscular disturbances, causing impaired thinking, poor judgment and slow reactions

5. **OCA is associated with:**
   (A) Oceanic Clearance Altitude, minimum altitude to fly over occeans
   (B) Minimum altitude to fly above Transition level.
   (C) Altitude calculated to ensure obstacle/terrain clearance

6. **Before arrival in India a health report is to be sent.**
   A) Before take off
   B) 7 days prior to arrival
   C) 2 hours before arrival

7. **If your aircraft is carrying cargo for remuneration, it will be known as a:**
   A) Private aircraft
   B) Aerial work aircraft
   C) Public transport aircraft

8. **A horizontal yellow diagonal on a red square panel indicates.**
   A) Special precautions to be take when approaching to land.
   B) Landing areas is unserviceable
   C) Check runway in use

9. **When radio contact is lost, an IFR flight in VMC should.**
   A) Continue in VMC and land at nearest suitable aerodrome
   B) Continue as per current flight plan
   C) Divert to alternate airfield

10. **Minimum vertical distance from cloud for VFR flight within controlled space is.**
    A) 1000 ft
    B) 500 ft
    C) 1000 m

11. **IFR flight within controlled airspace shall immediately report any deviations from flight plan resulting in;**
    A) Variation of TAS by 10 knots.
    B) Change in ETA over reporting point by more than 2 minutes
    C) All above are correct

12. **ICAO document dealing with Aerodromes is:**
    A) Doc 8168
    B) Annex 7
    C) Annex 14

13. **An airplane is planning a flight that will require a technical landing in a neighboring state. Which freedom of the air will be exercised?**
    A) 2nd freedom
    B) 3rd freedom
    C) 4th freedom

14. A situation wherein apprehension exists as to the safety of an aircraft and its occupants is;

A) Uncertainty (INCERFA)
B) Distress phase (DISTRESFA)
C) Alert Phose (ALERFA)

15. At holding point ATC transmits "cleared for immediate take off", what does it mean?

A) Take off immediately after completing all checks on runway.
B) Inform ATC when you are ready to take off with out waiting on runway.
C) Taxi immediately to runway and commence take off with out stop.

16. Hyperventilation is caused due to lack of __________ in blood system:

A) Carbon Dioxide
B) Oxygen
C) CO

17. Track separation is also known as separation:

A) Vertical
B) Lateral
C) Longitudinal

18. An aircraft manoeuvering in an airport's circuit receives a series of red flashes from the control tower. This signifies that the aircraft must:

A) not land because the airport is not available for landing
B) return to land and that clearance to land will be communicated in due course
C) not land for the moment regardless of previous instructions

19. Anti-collision lights on an aircraft must be switched on:

A) Between SS and SR or any other period specified by the appropriate authority
B) As soon as engines are running
C) By all aircraft operating on the movement area

20. All aircraft transiting from a foreign FIR to an Indian FIR should inform ATS units responsible for providing FIS at least:

A) 30 minutes prior to entry
B) 20 minutes prior to entry
C) 10 minutes before entry

21. Flt plan is prepared by:

A) Choosing routes as listed in AIP
B) Taking shortest distance to the destination
C) Taking any arbitrary points on route

22. For safety reasons, a person should remain away from a jet engine by at least:

A) 100'
B) 200'
C) 300'

23. Identify runway remaining lighting on centre line lighting systems;

A) Amber lights from 3000 ft to 1000 ft, then alternate red and white lights to the end.
B) Alternate red and white from 3000 ft to 1000 ft, then red lights to the end.
C) Alternate red and white lights from 3000 ft to the end of the runway.

24. Identify touchdown zone lighting (TDZL):

A) Two rows of transverse light bars disposed symmetrically about the runway centre line.
B) Flashing centre line lights spaced at 50 ft intervals extending through the touch down zone.
C) Alternate white and green centre line lights extending from 75 ft from the threshold through the touch down zone.

25. When instructed by ATC to "hold short of a runway (ILS critical area etc.)" the pilot should stop:

A) With the nose gear on the hold line.
B) So that no part of the aircraft extends beyond the hold line.
C) So that the flight deck area of the aircraft is even with the hold line.

26. Airport information signs, used to provide destination or information, have:

A) Yellow inscriptions on a black background.
B) White inscriptions on a black background.
C) Black inscriptions on a yellow background.

27. An aircraft which is being subjected to unlawful interference ('hijacked') and is forced to divert from the cleared track or cruising level without being able to communicate with ATS shall try to:

A) Declare an emergency

B) As soon as possible commence emergency descent in order minimize the difference between cabin pressure and outside pressure.

C) Continue at an altitude that differs from the semicircular rule with 1000 feet when above FL 290 and 500 feet when lower than FL 290..

28. Action required for rapid decompression recovery is:

A) Only the prompt supply of oxygen is necessary

B) Take prompt supply of oxygen, descend to the lowest possible level and land as soon as possible

C) Only medical treatment is of use

29. Damage to Tympanic membrane may be caused due to:

A) Flying with a severe cold due to changes in air pressure and blocked eustachian tubes resulting from the cold.

B) Pain in the joints

C) Lack of oxygen to meet the needs of the body tissues

30. One pilot will be designated as PIC of a public transport aircraft for each flight by:

A) The operator

B) DGCA

C) Flying contract unit

31. Enroute altitude will be determined for each stage of the route by taking 1000 ft terrain clearance within:

A) 10 nm

B) 10 km

C) 20 nm

32. Vicinity of the aerodrome for a VFR /IFR flight is:

A) 5 miles around up to 3000 ft AGL

B) 25 miles around

C) As in "A" above and instrument holding and approach procedure paths

33. Cruising level available on a magnetic track of 300° are:

A) 115, 135, 155, 175

B) 110, 130, 150, 160,

C) 125, 145, 165, 185

34. In a standard holding pattern turns are made:

A) to the right

B) in a direction depending on the entry;

C) in a direction depending on the wind direction.

35. The privileges of a license can be exercised by a pilot involved in an incident after:

A) He is cleared by the medical authority

B) He is cleared by the DGCA

C) He is cleared by the ATS authority

36. An Air India aircraft is on a dry lease to I.A.F. for military use. It will be known as a:

A) Civil aircraft

B) Military aircraft

C) International flight

37. In a category D airspace, ATC will provide separation between:

A) IFR flights and provides information on VFR flights and traffic avoidance on request to IFR flights and traffic information to VFR flights

B) IFR flights and IFR flights

C) IFR flights and IFR/VFR flights and VFR/VFR flights

38. Track separation ensures:

A) Vertical separation between aircraft.

B) Time separation between aircraft.

C) Lateral separation between aircraft.

39. VFR flights in class 'E' airspace are provided with?

A) Nil separation

B) Horizontal separation

C) Lateral separation

40. Aircraft takes off from a runway of 45 meter width and makes an approach on a 25 meter wide runway, the pilot may feel at:

A) Greater height and the impression of landing short
B) Greater height than he actually is with the tendency to land short
C) Ower than actual height with the tendency to overshoot

41. Aircraft flying in class 'D' airspace at 9000' will have following speed limit?

A) No speed limit
B) 250 kts TAS
C) 250 kts IAS

42. Your aircraft is intercepted by a military aircraft. The signals given by this aircraft conflict with ATC instructions.You should:

A) follow ATC instructions
B) select code A7500 on your transponder
C) follow the instructions of the intercepting aircraft

43. No domestic flight carrying passengers is permitted to fly with in _________ nautical miles of international border.

A) 15 km.
B) 15 nm
C) 10 nm

44. Unless otherwise indicated, the missed approach procedures published on the IAC charts are based on a minimum climb gradient of:

A) 2.5%
B) 3%
C) 5%

45. CO poisoning symptoms:

A) Tightening of forehead.
B) Loss of muscular power.
C) Bends

46. Tirupati aerodrome designator is?

A) VATP
B) VETP
C) VOTP

47. EDTO stands for:

A) Extended Diversion Time Operations (EDTO)
B) Expected Diversion Time Overhead (EDTO)
C) Expected Direction of Take Off (EDTO)

48. When reporting a frequency the use of the word DECIMAL can be omitted:

A) Never.
B) When there is no likelihood of confusion.
C) By the ground station only.

49. Which is the most complete list of documents that are to be carried on each flight:

A) Certificate of airworthiness, AOP, aircraft radio license, maintenance records and maintenance program.
B) Certificate of registration, certificate of airworthiness, AOP, aircraft radio license, crew licences.
C) Certificate of registration, aircrew log books and certificate of airworthiness.

50. The Transition Level:

A) Is calculated and declared for an approach by the Pilot-in command
B) Is published for the aerodrome in the Section ENR of the AIP
C) Shall be the lowest flight level available for use above the transition altitude.

ANSWERS

1	2	3	4	5	6	7	8	9	10	11	12	13	14
A	B	C	C	C	C	C	A	A	A	C	C	A	C

15	16	17	18	19	20	21	22	23	24	25	26	27	28
C	A	B	A	B	C	A	B	B	A	B	C	C	B

29	30	31	32	33	34	35	36	37	38	39	40	41	42
A	A	B	C	C	A	B	B	B	C	A	B	C	C

43	44	45	46	47	48	49	50
B	A	B	C	A	A	B	C

5

1. A P-i-C is:

A) The pilot who is competent to fly the aeroplane under all weather conditions.

B) The Pilot who for the time being is in charge of the controls of the aeroplane.

C) A pilot who is responsible for the operation and safety of the aeroplane during flight time.

2. Why PANS OPS are a separate document from the Annexes?

A) The procedures are outside of the scope of the SARPS.

B) The procedures are too complicated for pilots to understand.

C) The document is not relevant to air crew.

3. ARIWS stands for:

A) Automatic Runway Instrumented Weather Services.

B) Autonomous Runway Incursion Warning System.

C) Airborne Runway Instrument Warning System.

4. A Control Area is:

A) defined area of airspace in which all controlled flights are provided with an Air Traffic Service.

B) The confluence of airways adjacent to one or more aerodromes where ATC is provided to all air traffic.

C) A portion of airspace (between defined altitudes) where it has been determined that an ATC service will be provided to all IFR traffic and some VFR traffic.

5. The document 'Procedures for Air Navigation Services – Air Traffic Management' (PANS-ATM) is also commonly known by its ICAO document number. What is the document number?

A) Doc 8168

B) Doc 4444

C) Doc 7333

6. Who is responsible for the issuing of clearance to achieve the safe and expeditious flow of a traffic to aircraft on the maneuvering area and to prevent collisions between aircraft and obstructions on the movement area?

A) The aerodrome Controller

B) The approach Controller

C) The Ground Controller

7. **What Annex to the Chicago Convention covers 'Facilitation'?**
   A) Annex 6
   B) Annex 9
   C) Annex 15

8. **What is ICAO?**
   A) An organization only permitted to make recommendations which are not binding on member states.
   B) An organization of civil aviation operators, limited to 33 members.
   C) A specialized agency related to the United Nations.

9. **Two aircraft are departing from a reporting point defined by an NDB. What is the minimum track separation required before one aircraft would be permitted to climb/descend through the other aircraft's level?**
   A) 30° and a distance of 15 nm or more.
   B) 15° and a distance of 15 km or more.
   C) 30° and a distance of 15 km or more.

10. **What does the structure of ICAO consists of?**
   A) An Assembly, Council, Secretariat, committees and commissions.
   B) A Council; a Secretariat and committees and commissions.
   C) A ruling council of a small number of permanent states (like the UN security council) with committees and commissions reporting to the Council.

11. **Trip fuel, which shall be the amount of fuel required to enable the aeroplane to fly:**
   (A) from take-off, until landing at the destination aerodrome.
   (B) from take-off or the point of in-flight re-planning, until landing at the destination aerodrome.
   (C) from take-off , until landing at the destination aerodrome, including taxi fuel.

12. **Factors affecting night vision are:**
   A) Alcohol, smoking, cabin altitude above 8000' and age.
   B) Alcohol, smoking, cabin altitude above 5000' and instrument lights.
   C) Alcohol, smoking, age and lack of vitamin D.

13. **When do PANS-ATM procedures absolve pilots from the responsibility for terrain avoidance?**
   A) Never
   B) When under radar vectoring.
   C) During take off and landing.

14. **Vitamins are essential for good night vision, therefore:**
   A) Pilots should take excess intake of vitamin A to improve night vision significantly.
   B) Pilots should take balanced diet containing sufficient vitamin A)
   C) Vitamin A deficiency does not matter, so long the pilot has adequate vitamin D intake.

15. **What is the relevance of the OCH for a precision approach?**
   A) It is the MDH if the glide path information is lost.
   B) It is the lowest height at which a missed approach must be initiated.
   C) It is the height at which an aircraft correctly positioned on the glide must obtain the visual minima to land.

16. **When converging at approximately the same altitude :**
   A) balloons shall give way to hang gliders
   B) aeroplanes towing gliders shall give way to balloons
   C) balloons shall give way to gliders.

17. **Where traffic is flying in an established traffic pattern at an aerodrome where ATC is provided (a controlled aerodrome), who is responsible for collision avoidance?**
   A) It depends upon the class of airspace.
   B) The aerodrome controller.
   C) The pilots of the aeroplanes.

18. **Normal AOM RVR is 300m, Restricted AOM shall be:**
   A) 700M
   (B) 500M
   (C) 200M.

19. **Enroute flt levels are on:**
   A) QNE
   B) QNH
   C) QFE

20. **What is the International Aeronautical VHF Distress and Calling frequency?**
   A) 121.500MHz
   B) 123.450MHZ
   C) 406.000MHz

21. You are flying in VMC and you suffer a communications failure. What are you required to do

A) Land immediately.
B) Continue to fly in VMC and land at the nearest suitable aerodrome.
C) Turn round and head back to the aerodrome of departure.

22. If you are flying in IMC and you suffer a communications failure, which of the following is a correct course of action?

A) Proceed in accordance with the flight plan as filed.
B) Proceed in accordance with the current flight plan (the flight plan as cleared by ATC and any re-clearance subsequently obtained).
C) Turn around and go home.

23. What are the objectives of an ATC clearance?

A) To see how accurately the pilot can read the clearance back and test if he can spot errors.
B) To give route and altitude specific information when different from that flight planned.
C) Collision avoidance and air traffic flow management.

24. Capillaries:

A) Facilitate oxygen/carbon dioxide exchange.
B) Are the largest vessels carrying blood.
C) Control heart beats.

25. An instrument approach has:

A) Three segments
B) Five segments
C) Six segments

26. What is the principle objective of a rescue and fire fighting service?

A) To minimize the damage caused by fire.
B) To extinguish any with minimum delay.
C) To save lives.

27. Ascending order of stress is:

A) Family death, divorce, marriage, mortgage.
B) Mortgage, marriage, family death, divorce.
C) Mortgage, marriage, divorce, family death.

28. Who is responsible for the issue of a certificate of airworthiness?

A) ICAO
B) The DGCA
C) The authority of State of Registration.

29. While facing turbulent weather, a pilot reduces speed to:

A) Avoid stalling.
B) Achieve better maneuorobility.
C) Avoid structural damage.

30. Doc 4444 relates to:

A) Flight level tables.
B) Position reports.
C) All above.

31. Circadian Circle represents:

A) our level of alertness throughout the day.
B) our level of competence to undertake a challenging job.
C) our level of incompetence after the peak is achieved in a career.

32. Some one is calling you using a language which you cannot understand. You will indicate this by transmitting:

A) Can not comply
B) Unable to comply
C) Can not

33. An aircraft electing to change the conduct of its flight from IFR to VFR shall, if a flight plan was submitted, notify the appropriate ATS unit specifically by transmitting:

A) Cancelling my IFR flight plan.
B) Cancelling my IFR flight.
C) Cancelling my IFR plan.

34. An aircraft is flying under Instrument Flight Rules in an area where the visibility is unlimited and the sky is clear, when it totally loses radio communications. The procedure to be followed is:

A) land on the closest appropriate aerodrome, then advise Air Traffic Services of landing.

B) continue flight onto destination, complying with last received clearances then with filed flight plan.

C) descend to En-route Minimum Safe Altitude and join closest airfield open to IFR operations.

35. QNH at Mumbai is 1009. TL at Mumbai will be:

A) FL 45

B) FL 50

C) FL 55

36. To which aircraft is a flight information service (FIS) provided?

A) Only aircraft in receipt of ATC.

B) All controlled flight from engine start to final shut gown.

C) Al aircraft in receipt of an ATC service or known to ATC which are likely to be affected by the information.

37. What type of airspace is normally established at the confluence of ATS routes in the vicinity of one or more major aerodromes?

A) Terminal Control Area (TMA).

B) Control Zone (CTR).

C) Special Rules Area (SRA).

38. Hypoxic hypoxia is

A) The result of low oxygen levels in the bloodstream.

B) The result of low hemoglobin.

C) An inability of the cells of the body to use the oxygen available.

39. You see yellow runway edge lights, what does this mean?

A) You have run into the stop way.

B) They have run out of the normal colour bulbs.

C) You are within 600m of the end of the runway or have less then one third of the runway remaining.

40. What is the Annex of the Chicago Convention that covers SAR?

A) Annex 14

B) Annex 12

C) Annex 16

41. The minimum safest altitude that the aircraft can descent below the transition altitude within 25 NMs of an aerodrome area is given by:

A) MSA

B) MOEA

C) MORA

42. According to ICAO Annex 8, a certificate of airworthiness shall be renewed or shall remain valid subject to the:

A) Laws of the state of registry and operation.

B) Laws of the state in which is operation.

C) Laws of the state of registry.

43. Presbyopia is also known as:

A) Short sightedness

B) Cross sightedness

C) Long sightedness

44. If you are intercepted by a military aircraft over foreign territory, on what frequency should you attempt to speak to the military pilot?

A) The ATC frequency in use.

B) 121.500MHz (the VHF distress and calling frequency).

C) No specific frequency. Try the lot until get contact.

45. You are carrying out an instrument approach to land at Mumbai International. You are IMC at FL 70. The radar controller tells you set the Mumbai QNH 1007 and descend to and maintain 4500ft. The transition level is FL50. What do you do?

A) Tell the radar controller that you cannot accept his clearance as you are above the transition level.

B) Level 1013 set until at FL50 then set 1007 and descend to 4500ft.

C) Set 1007 immediately and advise leaving 7000ft for 4500ft.

46. Which of the following is NOT an approved method of radar identification using SSR?

A) Squawk handover from another radar controller.
B) Track observation and position reports.
C) Use of the IDENT function.

47. What information is contained in an AIC?

A) Major changes to Search and Rescue facilities.
B) Information that does not qualify for inclusion in the AIP.
C) A better printed version of a NOTAM.

48. Who is responsible when damage is caused by an aeroplane to persons or property on the ground?

A) The Operator.
B) The pilot actually flying or at the controls when the incident happened.
C) The commander is responsible providing that no other person can be held responsible.

49. ATIS is normally provided

A) to replace the FSS.
B) to relieve frequency congestion.
C) for the rapid updating weather forecasts.

50. "ASDA" (Acceleration Stop Distance Available) is:

A) The length of the take-off run available plus the length of the clearway.
B) The length of the take-off run available plus the length of stopway (if stopway is provided).
C) The length of the runway plus the length of stopway available (if stopway provided).

ANSWERS

1	2	3	4	5	6	7	8	9	10	11	12	13	14
C	A	B	C	B	A	B	C	A	A	B	A	B	B

15	16	17	18	19	20	21	22	23	24	25	26	27	28
B	B	C	A	A	A	B	B	C	A	B	C	B	C

29	30	31	32	33	34	35	36	37	38	39	40	41	42
C	C	A	C	B	A	C	C	A	A	C	B	A	C

43	44	45	46	47	48	49	50
C	B	C	B	B	A	B	B

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Title	Author	Price (Rs.)
Meteorology for ATPL		
Aviation Meteorology	IC Joshi	795.00
EASA ATPL GTS Meteorology B00k # 9	Oxford	6,317.50
Ground Studies For Pilot- Meteorology	Underdown & Standen	825.00
Meteorology	Nordian	7,418.40
Radio Aids & Instruments for ATPL		
Avionics and Flight Management for the Professional Pilot	David Robson	2,850.00
EASA ATPL GTS Instrumention Book # 5	Oxford	6,317.50
EASA ATPL GTS Radio Navigatio Book # 11	Oxford	4,175.25
Instrumentation Aircraft General Knowledge	Nordian	7,418.40
Radio Navigation 2017	Nordian	5,226.60
Radio Navigation and Instrument Flying	Trevor Thom	2,660.00
Technical General for ATPL/CPL		
Airframe & Systems 2017 (PB)	Nordian	6,069.60
EASA ATPL GTS Airframes & Systems Book # 2	Oxford	5,220.25
EASA ATPL GTS Electrics & Electronicss Book # 3	Oxford	5,220.25
EASA ATPL GTS Powerplant Book # 4	Oxford	5,220.25
EASA ATPL GTS Principles Of Flight Book # 13	Oxford	6,317.50
Electrics Aircraft General Knowledge	Nordian	5,058.00
Powerplant Aircraft General Knowledge	Nordian	5,479.50
Principle of Flight	Nordian	8,008.50
Test Guides		
2019 Airline Transport Pilot Test Prep : Study & Prepare	ASA	3,706.29
Air Pilot's Manual Vol 8: PPL Question & Answers to Accompany the Air Pilot's Manuals	P. Godwin	2,850.00
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