JOINT AVIATION AUTHORITIES
AIRLINE TRANSPORT PILOT'S LICENCE
Theoretical Knowledge Manual

Akademická knižnica
Vojenská letecká akadémia
KOŠICE
Ev. AK 9-2022

010 AIR LAW

Second Edition, First Impression.

APPROVED

This learning material has been approved as JAA compliant by the United Kingdom Civil Aviation Authority.

CIVIL AVIATION AUTHORITY

OXFORD Aviation Training

JEPPESEN®

© Oxford Aviation Services Limited 2001
All Rights Reserved

This text book is to be used only for the purpose of private study by individuals and may not be reproduced in any form or medium, copied, stored in a retrieval system, lent, hired, rented, transmitted or adapted in whole or in part without the prior written consent of Oxford Aviation Services Limited.

Copyright in all documents and materials bound within these covers or attached hereto, excluding that material which is reproduced by the kind permission of third parties and acknowledged as such, belongs exclusively to Oxford Aviation Services Limited.

Certain copyright material is reproduced with the permission of the International Civil Aviation Organisation, the United Kingdom Civil Aviation Authority and the Joint Aviation Authorities (JAA).

This text book has been written and published as a reference work to assist students enrolled on an approved JAA Air Transport Pilot Licence (ATPL) course to prepare themselves for the JAA ATPL theoretical knowledge examinations. Nothing in the content of this book is to be interpreted as constituting instruction or advice relating to practical flying.

Whilst every effort has been made to ensure the accuracy of the information contained within this book, neither Oxford Aviation Services Limited nor the publisher gives any warranty as to its accuracy or otherwise. Students preparing for the JAA ATPL theoretical knowledge examinations should not regard this book as a substitute for the JAA ATPL theoretical knowledge training syllabus published in the current edition of 'JAR-FCL 1 Flight Crew Licensing (Aeroplanes)' (the Syllabus). The Syllabus constitutes the sole authoritative definition of the subject matter to be studied in a JAA ATPL theoretical knowledge training programme. If you elect to subscribe to the amendment service offered with this book please note that there will be a delay between the introduction of changes to the Syllabus and your receipt of the relevant updates. No student should prepare for, or is currently entitled to enter himself/herself for, the JAA ATPL theoretical knowledge examinations without first being enrolled in a training school which has been granted approval by a JAA-authorised national aviation authority to deliver JAA ATPL training.

Oxford Aviation Services Limited excludes all liability for any loss or damage incurred or suffered as a result of any reliance on all or part of this book except for any liability for death or personal injury resulting from Oxford Aviation Services Limited's negligence or any other liability which may not legally be excluded.

Cover picture by courtesy of the Boeing Company

Published by: Jeppesen GmbH, Frankfurt, Germany

Contact Details:

Pilot Ground Training Department
Oxford Aviation Training
Oxford Airport
Kidlington
Oxford OX5 1RA
England

Tel: ++44 (0)1865 844290
E-mail: ddd@oxfordaviation.net

Sales and Service Department
Jeppesen GmbH
Frankfurter Strasse 233
63263 Neu-Isenburg
Germany

Tel: ++49 (0)6102 508240
E-mail: fra-services@jeppesen.com

For further information on products and services from Oxford Aviation Training and Jeppesen visit our web sites at: www.oxfordaviation.net and www.jeppesen.com

ISBN: 0-88487-277-7

FOREWORD

Joint Aviation Authorities (JAA) pilot licences were first introduced in 1999. By the end of 2002, all 33 JAA member states will have adopted the new, pan-European licensing system. Many other countries world-wide have already expressed interest in aligning their training with the syllabi for the various JAA licences. These syllabi and the regulations governing the award and the renewal of licences are defined by the JAA's licensing agency, known as "Joint Aviation Requirements-Flight Crew Licensing", or JAR-FCL.

The introduction of JAA licences is, naturally, accompanied by associated JAR-FCL practical skill tests (tests of flying ability) and theoretical knowledge examinations corresponding to each level of licence: Private Pilot Licence (PPL), Commercial Pilot Licence (CPL), CPL with Instrument Rating and Air Transport Pilot Licence (ATPL). The JAR-FCL skill tests and the ground examinations, though similar in content and scope to those conducted by many national authorities, are inevitably different in detail from the tests and examinations set by any individual JAA member state under its own national scheme. Consequently, students who wish to train for JAA licences need access to study material which has been specifically designed to meet the requirements of the new licensing system.

As far as the JAA ATPL ground examinations are concerned, the subject matter to be tested is set out in the ATPL training syllabus contained in the JAA publication, 'JAR-FCL 1 (Aeroplanes)'. Inevitably, this syllabus represents a compromise between the differing academic contents of the national ATPL training syllabi it replaces. Thus, it follows that the advent of the new examinations has created a need for completely new reference texts to cover the requirements of the new syllabus. This series of manuals, prepared by Oxford Aviation Training and published by Jeppesen, aims to cover those requirements and to help student pilots prepare for the JAA ATPL theoretical knowledge examinations.

Oxford Aviation Training (OAT) is one of the world's leading professional pilot schools. It has been in operation for over thirty years and has trained more than 12,000 professional pilots for over 80 airlines, world-wide. OAT was the first pilot school in the United Kingdom to be granted approval to train for the JAA ATPL. As one of the most active members of the European Association of Airline Pilot Schools, OAT has been a leading player in the pan-European project to define, in objective terms, the depth and scope of the academic content of JAA ATPL ground training as outlined in 'JAR-FCL 1 (Aeroplanes)'. OAT led and coordinated this joint-European effort to produce the JAA ATPL Learning Objectives which are now published by the JAA itself as a guide to the theoretical knowledge requirements of ATPL training.

In less than two years since beginning JAA ATPL training, and despite the inevitable teething problems that national aviation authorities have experienced in introducing the new examination system, OAT has achieved an unsurpassed success rate in terms of the passes its students have gained in the JAA ATPL examinations. This achievement is the result of OAT's whole-hearted commitment to the introduction of the new JAA licensing system and of its willingness to invest heavily in the research and development required to make the new system work for its students. OAT has not only been at the forefront of the effort made to document JAA ATPL theoretical knowledge requirements, but it has also produced associated academic notes of the highest quality and created computer-generated and web-based ATPL lessons which ensure that its students are as well-prepared as possible to succeed in the ground examinations. OAT's experience and expertise in the production of JAA ATPL training material make this series of manuals the best learning material available to students who aspire to hold a JAA ATPL.

continued....

Jeppesen, established in 1934, is acknowledged as the world's leading supplier of flight information services, and provides a full range of print and electronic flight information services, including navigation data, computerised flight planning, aviation software products, aviation weather services, maintenance information, and pilot training systems and supplies. Jeppesen counts among its customer base all US airlines and the majority of international airlines world-wide. It also serves the large general and business aviation markets.

The combination of Jeppesen and OAT expertise embodied in these manuals means that students aiming to gain a JAA ATPL now have access to top-quality, up-to-date study material at an affordable cost.

Manuals are not, of course, the complete answer to becoming an airline pilot. For instance, they cannot teach you to fly. Neither may you enter for the new JAA ATPL theoretical knowledge examinations as a "self-improver" student. The new regulations specify that all those who wish to obtain a JAA ATPL must be enrolled with a flying training organisation (FTO) which has been granted approval by a JAA-authorised national aviation authority to deliver JAA ATPL training. The formal responsibility to prepare you for both the flying tests (now known as "skill tests") and the ground examinations lies with your FTO. However, these OAT/Jeppesen manuals represent a solid foundation on which your formal training can rest.

For those aspirant airline pilots who are not yet able to begin formal training with an FTO, but intend to do so in the future, this series of manuals will provide high-quality study material to help them prepare themselves thoroughly for their formal training. The manuals also make excellent reading for general aviation pilots or for aviation enthusiasts who wish to further their knowledge of aeronautical subjects to the standard required of airline pilots.

At present, the JAA ATPL theoretical knowledge examinations are in their infancy. The examinations will inevitably evolve over the coming years. The manuals are supported by a free on-line amendment service which aims to correct any errors and/or omissions, and to provide guidance to readers on any changes to the published JAA ATPL Learning Objectives. The amendment service is accessible at http://www.oxfordaviation.net/shop/notes.htm

OAT's knowledge of and involvement in JAR-FCL developments are second to none. You will benefit from OAT's expertise both in your initial purchase of this text book series and from the free amendment service. OAT and Jeppesen have published what they believe to be the highest quality JAA ATPL theoretical knowledge manuals currently available. The content of these manuals enables you to draw on the vast experience of two world-class organisations, each of which is an acknowledged expert in its field of the provision of pilot training and the publication of pilot training material, respectively.

We trust that your study of these manuals will not only be enjoyable but, for those of you undergoing training as airline pilots, will also lead to success in the JAA ATPL ground examinations.

Whatever your aviation ambitions, we wish you every success and, above all, happy landings.

Oxford, England. January 2002

PREFACE TO EDITION TWO, FIRST IMPRESSION

Edition Two of this work has been recompiled to give a higher quality of print and diagram. The opportunity has also been taken to update the contents in line with Oxford Aviation Training's experience of the developing JAA ATPL Theoretical Knowledge Examinations.

Oxford, England. September 2002

Textbook Series

Book	Title	JAR Ref. No.	Subject
1	010 Air Law		
2	020 Aircraft General Knowledge 1	021 01	Airframes & Systems
		021 01 01/04	Fuselage, Wings & Stabilising Surfaces
		021 01 07	Hydraulics
		021 01 05	Landing Gear
		021 01 06	Flight Controls
		021 01 08/09	Air Systems & Air Conditioning
		021 01 09/10	Anti-icing & De-icing
		021 04 00	Emergency Equipment
		021 01 11	Fuel Systems
3	020 Aircraft General Knowledge 2	021 02	Electrics – Electronics
		021 02 01	Direct Current
		021 02 02	Alternating Current
		021 02 05	Basic Radio Propagation.
4	020 Aircraft General Knowledge 3	021 00	Powerplant
		021 03 01	Piston Engines
		021 03 02	Gas Turbines
5	020 Aircraft General Knowledge 4	22	Instrumentation
		022 01	Flight Instruments
		022 03	Warning & Recording
		022 02	Automatic Flight Control
		022 04	Power Plant & System Monitoring Instruments
6	030 Flight Performance & Planning 1	031	Mass & Balance
		032	Performance
7	030 Flight Performance & Planning 2	033	Flight Planning & Monitoring
8	040 Human Performance & Limitations		
9	050 Meteorology		
10	060 Navigation 1	061	General Navigation
11	060 Navigation 2	062	Radio Navigation
12	070 Operational Procedures		
13	080 Principles of Flight		
14	090 Communications		
15	Reference Material		

AIR LAW

TABLE OF CONTENTS

Chapter 1	Definitions
Chapter 2	International Agreements and Organisations
Chapter 3	Airworthiness of Aircraft
Chapter 4	Aircraft Nationality and Registration Marks
Chapter 5	Personnel Licensing
Chapter 6	Rules of the Air
Chapter 7	Procedures for Air Navigation Services/Aircraft Operations
Chapter 8	Air Traffic Services
Chapter 9	Procedures for Air Navigation Services/Rules of the air and Air Traffic Procedures
Chapter 10	Area Control Service
Chapter 11	Approach Control Service
Chapter 12	Aerodrome Control, Radar Services, Advisory Service and Alerting Service
Chapter 13	Aeronautical Information Service
Chapter 14	Aerodromes
Chapter 15	Aerodrome Lighting and Signs
Chapter 16	Aerodrome Obstacles and Emergency Services
Chapter 17	Facilitation
Chapter 18	Search and Rescue
Chapter 19	Security
Chapter 20	Aircraft Accident and Investigation
Chapter 21	UK National Law

CHAPTER ONE - DEFINITIONS

Contents

		Page
1.1	INTRODUCTION	1 - 1
1.2	ABBREVIATIONS	1 - 1
1.3	DEFINITIONS	1 - 5
1.4	BIBLIOGRAPHY	1 - 22

1.1 INTRODUCTION

The content of the Oxford Aviation College Aviation Law course meets the requirements of the JAA-FCL syllabus (Subject 010- Air Law). The main reference document is JAR-OPS 1, other reference material is drawn from various ICAO documents and annexes to conventions, agreements and other organisations with specialist interest in aviation.

1.2 ABBREVIATIONS

The following is a list (not exhaustive) of abbreviations commonly used in aviation.

AAIB	Air Accident Investigation Board
AAL	Above Aerodrome Level
ABN	Aerodrome Beacon
A/c	Aircraft
ACC	Area Control Centre
ADA	Advisory Airspace
ADF	Automatic Direction Finding
ADR	Advisory Route
ADT	Approved Departure Time
AFI	Assistant Flying Instructor
AFIS	Aerodrome Flight Information Service
AFS	Aeronautical Fixed Service
AFTN	Aeronautical Fixed Telecommunications Network
AGL	Above Ground Level
AIC	Aeronautical Information Circular
AIP	Aeronautical Information Publication
AIREP	Air Report
AIS	Aeronautical Information Service
AME	Authorised Medical Examiner
AMSL	Above Mean Sea Level
ANO	Air Navigation Order
AOC	Air Operator's Certificate
ARP	Aerodrome Reference Point
ARN	ATS Route Network
ASDA	Accelerate-Stop Distance Available
ASR	Altimeter Setting Region
ATAS	Air Traffic Advisory Service
ATC	Air Traffic Control
ATCC	Air Traffic Control Centre
ATCU	Air Traffic Control Unit
ATCRU	Air Traffic Control Radar Unit

© Oxford Aviation Services Limited

ATFM	Air Traffic Flow Management
ATIS	Automatic Terminal Information Service
ATS	Air Traffic Service
ATSU	Air Traffic Service Unit
ATZ	Air Traffic Zone
AUW	All up Weight
AWD	Airworthiness Division
AWY	Airway
CAA	Civil Aviation Authority
CANP	Civil Aviation Notification Procedure
CAS	Controlled Airspace
CofA	Certificate of Airworthiness
CTR	Control Zone
DA	Decision Altitude
DF	Direction Finding
DH	Decision Height
DME	Distance Measuring Equipment
DR	Dead Reckoning
EAT	Expected Approach Time
ECAC	European Civil Aviation Authority
ED	Emergency Distance
EET	Estimated Elapse Time
ELT	Emergency Location Transmitter
EPIRB	Emergency Position Indicating Radio Beacon
ETA	Estimated Time of Arrival
ETOPS	Extended Twin Jet Operations
FAL	Facilitation Of Air Transport
FCL	Flight Crew Licensing
FI	Flying Instructor
FIR	Flight Information Region
FIS	Flight Information Service
FL	Flight Level
FLPFM	Foot Launched Powered Flying Machine
FTL	Flight Time Limitations
GASIL	General Aviation Safety Information Leaflet
GCA	Ground Controlled Approach
H24	Day and Night Operating Hours
HF	High Frequency
Hz	Hertz Radio Frequency
IAS	Indicated Air Speed
Ibn	Identification Beacon

© Oxford Aviation Services Limited

ICAO	International Civil Aviation Organisation
IFR	Instrument Flight Rules
ILS	Instrument Landing System
IMC	Instrument Meteorological Conditions
IR	Instrument Rating
IRE	Instrument Rating Examiner
IRVR	Instrument Runway Visual Range
ISA	International Standard Atmosphere
JAA	Joint Aviation Authority
JAR	JAA Regulations
KHz	Kilo Hertz
Kt	Knots
LARS	Lower Airspace Radar Service
LATCC	London air Traffic Control Centre
LDA	Landing Distance Available
LF	Low Frequency
MATZ	Military Air Traffic Zone
MDH	Minimum Descent Height
MEHT	Minimum Eye Height (PAPIs)
MEL	Minimum Equipment List
METAR	Aviation Routine Weather Report
MF	Medium Frequency
MHz	Megahertz
MNPS	Minimum Navigation Performance Specification
MoD	Ministry of Defence
MOTNE	Meteorological Operational Telecommunications Network
MRSA	Mandatory Radar Service Area
MTWA	Maximum Take-off Weight Authorised
NAPs	Noise Abatement Procedures
NATS	National Air Traffic Services
NDB	Non-Directional Beacon
NOH	Notified Operating Hours
NOSIG	No Significant Change
NOTAM	Notice to Airmen
OCA	Oceanic Control Area
OCA	Obstacle Clearance Altitude
OCH	Obstacle Clearance Height
OCL	Obstacle Clearance Limit
PANS	Procedures for Air Navigation
PAR	Precision Approach Radar

© Oxford Aviation Services Limited

PAPI	Precision Approach Path Indicator
Pax	Passengers
Pi/c	Pilot in Charge
PT	Public Transport
RCC	Rescue Co-ordination Centre
RIS	Radar Information Service
RLCE	Request level change en-route
RNOTAM	Royal NOTAM
RTF	Radio Telephony
RTOW	Regulated Take-off Weight
RTG	Radio Telegraphy
RVR	Runway Visual Range
RVSM	Reduced Vertical Separation Minima
Rwy	Runway
SAR	Search and Rescue
SARP	Standard and Recommended Practice (ICAO)
SARSAT	Search and Rescue Satellite Tracking System
SELCAL	Selective Calling
Sfc	Surface
SID	Standard Instrument Departure
SIGMET	Significant Meteorological Warning
SNOCLO	Closed by Snow
SPECI	Special Met Report
SPL	Supplementary Flight Plan
SSR	Secondary Surveillance Radar
STAR	Standard Instrument Arrival
SVFR	Special Visual Flight Rules
TAF	Aerodrome Meteorological Forecast
TAS	True Airspeed
TCA	Terminal Control Area
TMA	Terminal Maneuvering Area
TODA	Take-off Distance Available
TOM	Take-off Minima
TORA	Take-off Run Available
TR	Type Rating
TRE	Type Rating Examiner
TL	Transition Level
TVOR	Terminal VHF Omni Ranging
Twr	Tower (Aerodrome Control)
UHF	Ultra High Frequency
UIR	Upper Information Region

© Oxford Aviation Services Limited

U/s	Unserviceable
UTC	Co-ordinated Universal Time
VASI	Visual Approach Slope Indicator
VFR	Visual Flight Rules
VHF	Very High Frequency
VMC	Visual Meteorological Conditions
VOR	VHF Omni-ranging
VSTOL	Very Short Take-off and Landing
WEF	With effect from
WIP	Work in Progress
Wpt	Waypoint

1.3 DEFINITIONS

The student must be able to identify the correct definition from a list of offered alternatives.

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

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

Aerial work aircraft means an aircraft (other than a public transport aircraft) flying, or intended by the operator to fly, for the purpose of aerial work.

Aerial work undertaking means an undertaking whose business includes the performance of aerial work.

Aerobatic manoeuvres includes loops, spins, rolls, bunts, stall turns, inverted flying and any other similar manoeuvre;

Aerodrome means any area of land or water designed, equipped, set apart or commonly used for affording facilities for the landing and departure of aircraft and includes any area or space, whether on the ground, on the roof of a building or elsewhere, which is designed, equipped or set apart for affording facilities for the landing and departure of aircraft capable of descending or climbing vertically, but shall not include any area the use of which for affording facilities for the landing and departure of aircraft has been abandoned and has not been resumed;

Aerodrome control service means an air traffic control service for any aircraft on the manoeuvring area or apron of the aerodrome in respect of which the service is being provided or which is flying in, or in the vicinity of, the aerodrome traffic zone of that aerodrome by visual reference to the surface;

© Oxford Aviation Services Limited

Aerodrome flight information unit means a person appointed by the Authority or by any other person maintaining an aerodrome to give information by means of radio signals to aircraft flying or intending to fly within the aerodrome traffic zone of that aerodrome and aerodrome flight information service shall be construed accordingly;

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

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

Aerodrome operating minima in relation to the operation of an aircraft at an aerodrome means the cloud ceiling and runway visual range for take-off, and the decision height or minimum descent height, runway visual range and visual reference for landing, which are the minimum for the operation of that aircraft at that aerodrome.

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

Aerodrome Traffic Zone Airspace of defined dimensions established around an aerodrome for the protection of aerodrome traffic.

UK Definition:

Aerodrome traffic zone means the airspace specified below being airspace in the vicinity of an aerodrome which is notified for the purposes of the Rules of the Air:

a) in relation to such an aerodrome other than the one which is an offshore installation:

i) at which the length of the longest runway is notified as 1850 metres or less;

1) subject to sub paragraph ii, the airspace extending from the surface to a height of 2000ft above the level of the aerodrome within the area bounded by a circle centred on the notified midpoint of the longest runway and having a radius of 2 nautical miles.

2) where such an aerodrome traffic zone would extend less than 1½ nautical miles beyond the end of the runway at the aerodrome and this sub paragraph is notified as being applicable, sub paragraph (ii) shall apply as though the length of the longest runway is notified as greater than 1850 metres.

© Oxford Aviation Services Limited

ii) at which the length of the longest runway is notified as greater than 1850 metres, the airspace extending from the surface to a height of 2000 ft above the level of the aerodrome within the area bounded by a circle centred on the notified midpoint of the longest runway and having a radius of 2½ nautical miles;

b) in relation to such an aerodrome which is on an offshore installation, the airspace extending from mean sea level to 2000ft above mean sea level and within 1½ nautical miles of the offshore installation;

except any part of that airspace which is within the aerodrome traffic zone of another aerodrome which is notified for the purposes as being the controlling aerodrome;

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

Aeronautical radio station means a radio station on the surface, which transmits or receives signals for the purpose of assisting aircraft.

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.

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.

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

Aircraft category Classification of aircraft according to specified basic characteristics e.g. aeroplane, helicopter, glider, free balloon.

Aircraft certified for single pilot operation A type of aircraft which the State of Registry has determined, during the certification process, can be operated safely with a minimum crew of one pilot.

Aircraft - type of All aircraft of the same basic design including all modifications thereto except those modifications which result in change in handling or flight characteristics

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

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.

© Oxford Aviation Services Limited

Air Traffic Control Clearance Authorisation for an aircraft to proceed under conditions specified by an air traffic control unit. **Note 1** - For convenience, the term "air traffic control clearance" is frequently abbreviated to "clearance" when used in appropriate contexts. **Note 2.** - The abbreviated team "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:

i) between aircraft
ii) on the manoeuvring area between aircraft and obstructions; and

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

Air Traffic Control Unit A generic term meaning variously, area control centre, approach control office or aerodrome control tower.

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 A unit established for the purpose of receiving reports concerning air traffic services and flight plans submitted before departure. **Note**.- An air traffic reporting office may be established as separate unit or combined with an existing unit, such as another air traffic services unit, or a unit of the aeronautical information

Air Traffic Services Unit A generic term meaning variously, air traffic control unit, flight information centre or air traffic services reporting office .

Air transport undertaking means an undertaking whose business includes the undertaking of flights for the purposes of public transport of passengers or cargo;

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.

Airway A control area or portion thereof established in the form of a corridor equipped with radio navigation aids.

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

© Oxford Aviation Services Limited

Alternate Aerodrome 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:

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

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

c) **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 en-route or a destination alternate aerodrome for that flight.

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

Annual costs in relation to the operation of an aircraft means the best estimate reasonably practicable at the time of a particular flight in respect of the year commencing on the first day of January preceding the date of the flight, of the cost of keeping and maintaining and the indirect costs of operating the aircraft, such costs in either case excluding direct costs and being those actually and necessarily incurred without a view to profit;

Annual flying hours means the best estimate reasonably practicable at the time of a particular flight by an aircraft of the hours flown or to be flown by the aircraft in respect of the year commencing on the first day of January preceding the date of the flight;

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

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

Approach to landing means that portion of the flight of the aircraft, when approaching to land, in which it is descending below a height of 1000 ft above the relevant specified decision height or minimum descent height;

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

© Oxford Aviation Services Limited

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 overflown.

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

Area Control Centre means an air traffic control unit established to provide an area control service to aircraft flying within a notified flight information region which are not receiving an aerodrome control service or an approach control service;

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

Area navigation equipment (RNAV) meas equipment carried on board an aircraft which enables the aircraft to navigate on any desired flight path within the coverage of appropriate ground based navigation aids or within the limits of that on-board equipment or a combination of the two.

ATS Route A specified route designed for channelling the flow of traffic as necessary for the provision of air traffic services. **Note**.- The term "ATS route" is used to mean variously, airway, advisory route, controlled or uncontrolled route, arrival or departure route, etc.

Authorised person means;

a) any constable;

b) any person authorised by the Secretary of State (whether by name, or by class or description) either generally or in relation to a particular case of class of cases; and

c) any person authorised by the Authority (whether by name or class or description) either generally or in relation to a particular case or class of cases.

Beneficial interest has the same meaning as in 'Section 57 of the Merchant Shipping Act 1984.

Cabin attendant in relation to an aircraft means a person on a flight for the purpose of public transport carried for the purpose of performing in the interests of the safety of passengers duties to be assigned by the operator or the commander of the aircraft but who shall not act as a member of the flight crew;

Captive flight means flight by an uncontrollable balloon during which it is attached to the surface by a restraining device;

© Oxford Aviation Services Limited

Cargo includes mail and animals.

Certificate of release to service issued under JAR - 145.

Certified for single pilot operation means an aircraft which is not required to carry more than one pilot by virtue of one or more of the following;

Change-over point The point at which an aircraft navigating on an ATS route segment defined by reference to very high frequency omnidirectional radio ranges (VOR) 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 levers to be used and to ensure a common source of azimuth guidance for all aircraft operating along the same portion of a route segment.

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

Cloud ceiling in relation to an aerodrome means the vertical distance from the elevation of the aerodrome to the lowest part of any cloud visible from the aerodrome which is sufficient to obscure more than one-half of the sky so visible;

Commander in relation to an aircraft means the member of the flight crew designated as commander of that aircraft by the operator thereof, or, failing such a person, the person who is for the time being the pilot in command of the aircraft.

Commercial Pilot Licence (CPL) A licence held by a professional pilot which permits the holder to:

a) Exercise all the privileges of a PPL

b) Act as PIC in any aeroplane engaged in operations other than commercial air transport

c) Act as PIC in commercial air transport in any aeroplane certificated for single pilot operation; and

d) To act as co-pilot in commercial air transport in aeroplanes required to be operated with a co-pilot.

Competent authority means in relation to the United Kingdom, the Authority, and in relation to any other country the authority responsible under the law of that country for promoting the safety of civil aviation.

Contracting State means any state which is party to the Convention on International Civil Aviation signed at Chicago on the 7 December 1944.

© Oxford Aviation Services Limited

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

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 to IFR flights and to VFR flights in accordance with the airspace classification. **Note.** - Controlled airspace is a generic term which covers ATS airspace Classes A, B, C, D and E.

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

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

Configuration (as applied to the aeroplane) A particular combination of the positions of the moveable elements, such as wing flaps, landing gear, etc., which affect the aerodynamics of the aeroplane.

Co-pilot A licenced 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.

CPL (Current Flight Plan) The Flight Plan, including changes if any, brought about by subsequent clearances.

Crew means a member of the flight crew, a person carried on the flight deck who is appointed by the operator of the aircraft to give or to supervise the training, experience, practice and periodical tests as required and in respect of the flight crew or as a cabin attendant.

Critical Power- Units(s) The power-unit(s), failure of which gives the most adverse effect on the aircraft characteristics relative to the case under consideration.

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

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

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

Day means the time from half an hour before sunrise until half and hour after sunset (both times exclusive), sunset and sunrise being determined at surface level.

© Oxford Aviation Services Limited

Decision height in relation to the operation of an aircraft at an aerodrome means the height in a precision approach at which a missed approach must be initiated if the required visual reference to continue that approach has not been established;

Declared distances has the meaning which has been notified;

Design landing mass The maximum mass of the aircraft at which, for structural design purposes, it is assumed to be planned to land.

Design take-off mass The maximum mass at which the aircraft , for structural design purposes, is assumed to be planned to be at the start of the take-off run.

Design taxiing mass The maximum mass of the aircraft, at which the structural provision is made for load liable to occur during the use of the aircraft, on the ground prior to the start of take-off.

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.

Dual instruction time Flight time during which a person is receiving flight instruction from a properly authorised pilot on board the aircraft.

En-route Clearance Where an ATC clearance is issued for the initial part of a flight solely as a means of expediting departing traffic, the subsequent clearance to the aerodrome of intended landing is an en-route clearance.

Estimated Off Blocks Time The estimated time at which the aircraft will commence movement associated with departure.

Estimated Time of Arrival 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.

Expected Approach Time The time at which ATC expects that an arriving aircraft, following a delay, will leave the holding point to complete its approach to landing. **Note**.-The actual time of leaving a holding point will depend on the approach clearance.

Final approach and take-off area/FATO (except helicopters) 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 and, where the FATO is to be used by performance class 1 helicopters, includes the rejected take-off area available.

© Oxford Aviation Services Limited

Filed Flight Plan The flight plan as filed with an ATS unit by the pilot or a designated representative, without any subsequent changes. **Note**.- When the word "message" is used as a suffix to this term, it denotes the content and format of the filed flight plan data as transmitted.

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

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

Flight Level A surface of constant atmospheric pressure which is related to a specific pressure datum, 1 013.2 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 QNH altimeter setting, will indicate altitude;

b) when set to QFE altimeter setting, will indicate height above the QFE reference datum.

c) when set at a pressure of 1 013.2 hPa, may be used to indicate flight levels.

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

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

Flight Procedures Trainer *See* Synthetic flight trainer.

Flight Simulator *See* Synthetic flight trainer.

Flight recording system means a system comprising either a flight data recorder or a cockpit voice recorder or both.

Flight Time The total time from the moment an aircraft first moves under its own power for the purpose of taking off until the moment it first comes to rest at the end of the flight. **Note 1.** - Flight time as here 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 aircraft moves from the loading point until it stops at the unloading point. **Note 2**.- Whenever helicopter rotors are engaged, the time will be included in the flight time.

Flight Time as Student Pilot In Command Flight time during which the flight instructor will only observe the student acting as PIC and shall not influence or control the flight of the aircraft.

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

© Oxford Aviation Services Limited

Free balloon means a balloon which when in flight is not attached by any form of restraining device to the surface.

Free controlled flight means flight during which a balloon is not attached to the surface by any form of restraining device (other than a tether not exceeding 5 metres in length which may be used as part of the take-off procedure) and during which the height of the balloon is controllable by means of a device attached to the balloon and operated by the commander of the balloon or by remote control.

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

Government aerodrome means any aerodrome in the United Kingdom which is in the occupation of any Government Department or visiting force.

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

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

IFR The symbol used to designate the instrument flight rules.

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

IMC The symbol used to designate instrument meteorological conditions.

Instrument Approach Procedure 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 clearance criteria apply.

Instrument Meteorological Conditions Meteorological conditions expressed in terms of visibility, distance from cloud, and ceiling, less than the minima specifies for visual meteorological conditions. **Note** In a a control zone, a VFR flight may proceed under instrument meteorological conditions of and as authorised by air traffic control.

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

Instrument ground time Time during which a pilot is practising, on the ground, simulated instrument flight in a synthetic flight trainer approved by the Licensing Authority.

Instrument time Instrument flight time or instrument ground time.

© Oxford Aviation Services Limited

JAA means the Joint Aviation Authorities, an associated body of the European Civil Aviation Conference.

JAR means a joint aviation requirement of the JAA bearing that number as it has effect under the Technical Harmonisation Regulation and reference to a numbered JAR is a reference to such a requirement.

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

Landing surface That part of the surface of an aerodrome which the aerodrome authority has declared available for the normal ground or water run of aircraft landing in a particular direction.

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

Lifejacket includes any device designed to support a person individually in or on the water;

Log book in the case of an aircraft log book, engine log book or variable pitch propeller log book, or personal flying log book includes a record kept either in a book, or by any other means approved by the Authority in the particular case;

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

Maintenance Tasks required to ensure the continued airworthiness of an aircraft including any one or combination of overhaul, repair, inspection, replacement, modification or defect rectification.

Medical Assessment The evidence issued by a Contracting State that the licence holder meets specific requirements of medical fitness. It is issued following an evaluation by the Licensing Authority of the report submitted by the designated medical examiner who conducted the examination of the applicant for the licence.

Minimum descent height in relation to the operation of an aircraft at an aerodrome means the height in a non-precision approach below which descent may not be made without the required visual reference.

Multiple Pilot Aeroplanes Aeroplanes certificated for operation with a minimum crew of at least two pilots.

Multi-crew Co-operation The function of the flight crew as a team of co-operating members led by the pilot-in-command.

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).

© Oxford Aviation Services Limited

Nautical mile means the International Nautical Mile, that is to say, a distance of 1852 metres.

Night The 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. **Note.** - 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-precision approach means an instrument approach using non-visual aids for guidance in azimuth or elevation but which is not a precision approach.

Private Pilot's Licence (PPL) The licence held by a pilot which prohibits the piloting of an aircraft for which remuneration is given.

(To) Pilot To manipulate the flight controls of an aircraft during flight time.

Pilot-In-Command The pilot responsible for the operation and safety of the aircraft during flight time.

Power-unit A system of one or more engines and ancillary parts which are together necessary to provide thrust, independently of the continued operation of any other power unit(s), but not including short period thrust-producing devices.

Precision approach means an instrument approach using Instrument Landing System, Microwave Landing System or Precision Approach Radar for guidance in both azimuth and elevation;

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

Proficiency Check Demonstration of skill to revalidate or renew ratings, and including such oral examinations as the examiner may require.

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

Rating An authorisation entered on or associated with a licence and forming part thereof, stating special conditions, privileges or limitations pertaining to such licence.

Renewal The administrative action taken after a rating

Rendering a Licence valid The action taken by a Contracting State, as an alternative to issuing its own licence, in accepting a licence issued by any other state as an equivalent of its own licence.

© Oxford Aviation Services Limited

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 A specified geographical location in relation to which the position of an aircraft can be reported.

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

Re-validation The administrative action taken within the period of validity of a rating or approval that allows the holder to continue to exercise the privileges of a rating or approval for a further specified period consequent upon the fulfilment of specified requirements.

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

Runway visual range in relation to a runway means the distance in the direction of take-off or landing over which the runway lights or surface markings may be seen from the touchdown zone as calculated bu either human observation or instruments in the vicinity of the touchdown zone or where this is not reasonably practicable in the vicinity of the mid-point of the runway; and the distance, if any, communicated to the commander of an aircraft by or on behalf of the person in charge of the aerodrome as being the runway visual range for the time being.

Scheduled journey means one of a series of journeys which are undertaken between the same two places and which together amount to a systematic service.

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

Skill test Demonstration of skill for licence or rating issue including such oral examinations as the examiner may require.

Solo flight time Flight time during which a student 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.

© Oxford Aviation Services Limited

Standard atmosphere (general concept only) An atmosphere defined as follows:

a) the air is a perfect dry gas;

b) the physical constants are;

i) sea level mean molar mass:
$M_0 = 28.964420 \times 10^{-3}$ kg mol^{-1}

ii) Sea level atmospheric pressure:
$P_0 = 1013.250$ hPa

iii) Sea level temperature:
$t_0 = 15°C$
$T_0 = 288.15$ K

iv) Sea level atmospheric density:
$\rho_0 = 1225$gm M^{3-1}

v) Universal gas constant:
$R^* = 8.31432$ $JK^{-1}mol^{-1}$

c) the temperature gradients are:

Geopotential altitude (km)		*Temperature gradient (Kelvin per standard geopotential kilometre)*
From	*To*	
-5.0	11.0	-6.5
11.0	20.0	0.0
20.0	32.0	+1.0
32.0	47.0	+2.8
47.0	51.0	0.0
51.0	71.0	-2.8
71.0	80.0	-2.0

Note 1. - The standard geopotential metre has the metre has the value 9.80665 m^2 s^{-2}

Note 2.- See Doc 7488 for the relationship between the variables and for tables giving the corresponding values of temperature, pressure, density and geopotential.

Note 3.- Doc 7488 also gives the specific weight, dynamic viscosity and speed of sound at various altitudes.

© Oxford Aviation Services Limited

State of design The state having jurisdiction over the organisation responsible for the type design

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

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

Simulator

b) **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 control functions; the normal environment of flight crew members, and the performance and flight characteristics of that type of aircraft are realistically simulated;

c) **A flight procedures trainer**. Which provides a realistic flight deck environment, and which simulates instrument responses, simple control functions of mechanical, electric, electronic etc aircraft systems, and the performance and flight characteristics of aircraft of a particular class;

d) **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.

Take-off surface That part of the surface of an aerodrome which the aerodrome authority has declared available for the normal ground or water run of aircraft taking off in a particular direction.

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

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

a) **Aircraft stand taxi-lane**. A portion of an apron designated as a taxiway and Intended to provide access to aircraft stands only.

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

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

© Oxford Aviation Services Limited

Terminal Control area A control area normally established at the Confluence of ATS routes in the vicinity of one or more major aerodromes.

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 than 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.

Track 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 Service Advice provided by an air traffic service unit specifying manoeuvres to assist a pilot to avoid a collision.

Traffic Information Information issued by an air traffic service 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.

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

VFR The symbol used to designate the visual flight rules.

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

Visibility The ability, as determined by atmospheric conditions and expressed in units of distance, to see and identify prominent unlighted objects by day and prominent lighted objects by night.

Visual Meteorological Conditions 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.

© Oxford Aviation Services Limited

1.4 BIBLIOGRAPHY

1.4.1 References. In compiling these notes, the learning objectives for subject 010 have been followed. However, examination feedback from students has indicated that the learning objectives are very much an outline of the subject matter. Unfortunately, the syllabus taken from JAR-FCL 1 for the subject, is also only an outline. As JAR Air Law does not follow exactly the law of any one state, for instance the Air Navigation Order of the United Kingdom, and as it is a fact that only the requirements of JAR FCL have been embodied into national law of the JAA states, it has been assumed that the majority of the subject references are therefore ICAO publications. The primary references are therefore Annexes 1 - 18; PANS OPS; PANS RAC; JAR-FCL 1 and 3; JAR-OPS 1.

1.4.2 Interpretation. The manner in which ICAO SARPs and PANS are written does not offer explanations for the establishment of rules and procedures, they merely state the standards and procedures, and assume that the reader understands why these are necessary. In many circumstances, this is not the case and where explanatory expansion has been included, this is the considered product of the courseware authors relying on their experience, or from reference to external bodies such as ECAC, commercial operators, NATS and Eurocontrol. Of course, in the first instance, help and advice has been sought from the UK Civil Aviation Authority which has always proved invaluable. Where it is considered that no additional expansion is necessary, the SARPs have been copied verbatim.

© Oxford Aviation Services Limited

CHAPTER TWO - INTERNATIONAL AGREEMENTS AND ORGANISATIONS

Contents

Page

2.1 THE CHICAGO CONVENTION ..... 2 - 1

2.1.2 INTERNATIONAL LAW ..... 2 - 2

2.1.3 COMMERCIAL CONSIDERATIONS ..... 2 - 3

2.1.4 CUSTOMS AND EXCISE, AND IMMIGRATION ..... 2 - 5

2.2 INTERNATIONAL OBLIGATIONS OF CONTRACTED STATES ..... 2 - 5

2.3 DUTIES OF ICAO MEMBER STATES ..... 2 - 6

2.4 STATUS OF ANNEX COMPONENTS ..... 2 - 7

2.5 THE INTERNATIONAL CIVIL AVIATION ORGANISATION (ICAO) ..... 2 - 8

2.6 THE ORGANISATION OF ICAO ..... 2 - 9

2.7 REGIONAL STRUCTURE OF ICAO ..... 2 - 10

2.8 REGIONAL STRUCTURE AND OFFICES ..... 2 - 11

2.9 ICAO PUBLICATIONS ..... 2 - 11

2.10 OTHER INTERNATIONAL AGREEMENTS ..... 2 - 12

2.11 THE CONVENTIONS OF TOKYO, THE HAGUE AND MONTREAL ..... 2 - 14

2.12 EUROPEAN ORGANISATIONS ..... 2 - 16

2.13 THE JOINT AVIATION AUTHORITIES (JAA) ..... 2 - 19

2.14 EUROCONTROL ..... 2 - 24

2.15 THE WARSAW CONVENTION AND ASSOCIATED DOCUMENTS ..... 2 - 24

2.16 THE AUTHORITY OF THE COMMANDER ..... 2 - 26

2.17 THE RESPONSIBILITY OF THE OPERATOR AND THE PILOT REGARDING DAMAGE TO PERSONS AND GOODS ON THE GROUND ..... 2 - 27

2.18 COMMERCIAL PRACTICES AND ASSOCIATED RULES **(LEASING)** ... 2 - 27

APPENDIX 1 SUMMARY OF RELEVANT INTERNATIONAL CONVENTIONS AND AGREEMENTS
..... 2 - 33

© Oxford Aviation Services Limited

2.1 THE CHICAGO CONVENTION

2.1.1 Historical Background. As far as modes of transport is concerned, Civil Aviation has been the fastest growing and the most technically innovative of any. From the first attempts at powered manned flight to regular space flight we have only just exceeded 100 years of aviation. What is incredible is that the first scheduled international air service started in 1919. In this day and age of information technology, computerised ticketing systems and computerised flight plans, how did they cope in those early days? It is probably no co-incidence that the first International Conference on Civil Aviation also took place in 1919 at Paris. Since then, the field of our chosen profession has been subjected to far more international legislation and agreements, than any other. The overriding need, which is recognised by all, regardless of political inclination, is for higher and higher safety standards. The degree of international co-operation in this respect is outstanding and shows that where there is a genuine desire to achieve international agreement, it is forthcoming.

2.1.2 The Second World War. The Second World War had a major effect upon technical development of the aeroplane telescoping a quarter of a century of normal peacetime development into six years. A vast network of passenger and freight carriage was set up but there were many problems to which solutions had to be found to benefit and support a world at peace. There was the question of commercial rights - what arrangements would be made for the airlines of one country to fly into and through the territories of another? There were other concerns with regard to the legal and economic conflicts that might come with peace-time flying across national borders such as how to maintain existing air navigation facilities, many of which were located in sparsely populated areas. For these reasons the government of the United States conducted exploratory discussions with other allied nations during the early months of 1944. Subsequently, invitations were sent to 55 allied and neutral states to meet in Chicago in November 1944.

2.1.3 The Meeting at Chicago. For five weeks, the delegates of the 52 nations who attended considered the problems of international civil aviation. The outcome was the Convention on International Civil Aviation, the purpose of which was to foster the future development of International Civil Aviation, to help to create and preserve friendship and understanding among peoples of the world, so as to prevent its abuse becoming a threat to the general security thus promoting co-operation between peoples. The 52 states agreed on certain principles and arrangements so that civil aviation may be developed in a safe and orderly manner and that international air transport services might be established on the basis of equality of opportunity and economically sound operation. A permanent body was subsequently charged with the administration of the principles, the International Civil Aviation Organisation (known throughout the world by the acronym ICAO pronounced eye-kay-oh).

© Oxford Aviation Services Limited

2.1.4 The "Chicago" Convention. The Chicago Convention, consisting of ninety-six articles (legislative items of agreement), accepts the principle that every state has complete and exclusive sovereignty over the airspace above its territory and provides that no scheduled international air service may operate over or into the territory of a contracting state without that state's previous consent.

It established the privileges and restrictions of all contracting states, to provide for the adoption of International Standards and Recommended Practices for:

a. Regulating air navigation

b. The installation of navigation facilities by contracting states

c. The facilitation of air transport by the reduction of customs and immigration formalities.

2.1.2 INTERNATIONAL LAW

2.1.2.1 Applicable law. There is no world parliament or global legislative body so there is no such thing as international law. However, at conventions of states (meetings for the purpose of reaching consensus between states), agreements are made to regulate activities affecting more than one state. The agreements themselves are not legally enforceable as there is no global police force, and all states are entitled to their sovereignty (see definition). What happens is that the national delegation to the convention places before the national parliament (or legislative body) a bill to make the text of the agreement (and any codicils, appendices, protocols etc..) the law of that state. This process is known as adoption and subsequent ratification. In this manner what has been agreed inter-nationally, becomes enforceable law by the states concerned. An offence committed against such law would be try-able and punishable under national penal legislation.

2.1.2.2 Territorial airspace. The application of national law is only applicable to the territory over which that state has jurisdiction. In aviation, the extent of jurisdiction is limited by the lateral limits of territorial airspace, but unlimited vertically. (An interesting situation regarding satellites and space craft!). Lateral territorial limits have been agreed internationally where such a limit is not coincident with a land boundary. The airspace of Switzerland is easily defined because the country is land-locked. For the UK, the limit is defined by the limit of territorial waters, which was agreed at the Geneva Convention on the Territorial Sea and Contiguous Zone (1958).

© Oxford Aviation Services Limited

2.1.2.3 High Seas. The early international maritime agreements concerned the right to use the "high seas" unhindered. The right of free aviation operation over the high seas was embodied in the Geneva Convention on the High Seas (also of 1958), in which the high seas are defined as '..all the seas outside of territorial seas'. In these (and other) conventions, the established privileges and freedoms of mariners, including those of the Flag State (the State in which a vessel is registered and the flag of which the vessel is allowed to fly), were applied to aeroplanes. The rights of non-coastal states to ply the seas under the flag of that country requires the co-operation of coastal states to allow free access to the sea. In aviation, similar freedoms are embodied in the Chicago Convention to allow contracting states to fly over the territory of other contracting states for the purpose of civil aviation operations. At the subsequent UN Convention on the Law of the Sea (1982) the original agreements were updated and reinforced.

2.1.2.4 Territory, as defined in international legislation, in aviation terms applies to the airspace existing over the defined limits of a country's territory at ground level.

2.1.2.5 Sovereignty is the right of a country (or contracting ICAO state) to impose national law to users of the State's territorial airspace.

2.1.2.6 Suzerainty (from the French "Suzerain" - Feudal overlord) is the acceptance by a State of rules and regulations agreed by common consent at international conventions, where there is a requirement for a state to adopt such agreements which previously did not exist. In other words, for a state to be a contracting member of ICAO, that state "contracts" to adopt the rules and regulations of ICAO and embodies such laws as the law of that State. This is the philosophy that underpins ICAO thus allowing "standard" practices and procedures to be implemented on a truly international basis for the enhancement of safety regarding civil aviation.

2.1.3 COMMERCIAL CONSIDERATIONS

2.1.3.1 International Civil Aviation. A matter to which the Chicago Conference attached great importance was the question of exchange of commercial rights in international civil aviation. The states addressed the subject, resulting in contracting states agreeing, **bilaterally**, to grant each other certain rights regarding the commercial exploitation of civil aviation. These rights are now known as the **Freedoms of the Air**, and are detailed at 2.10.2 - 2.10.4. The freedoms gave rights to transit the airspace of contracting states to both **scheduled and non-scheduled flights**.

2.1.3.2 Bilateral Agreements. It was not found possible to reach an agreement satisfactory to all 52 States, but two supplementary bilateral agreements were set up:

a) The **International Air Services Transit Agreement** (providing for aircraft of any signatory State to fly over or land for technical reasons in the territory of any other signatory)

© Oxford Aviation Services Limited

b) The **International Air Transport Agreement** (concerning the carriage of traffic between the State of registration and any other signatory state)

2.1.3.3 Definitions. The following definitions are required knowledge.

a. **A Scheduled Flight** is a flight, for which agreement has been reached between states (at government level), concerning the schedule. For instance, how many flights would be allowed in any period, what aerodromes could be used, what time of day the flights would be allowed, and what reciprocal arrangements were required. No state is obliged to grant permission for an operator to operate a schedule.

b. **Non-scheduled flights** are those to which a schedule is not attached. i.e. One-off flights or charter flights that are not flown on a regular basis. It is an embodiment of the freedoms that a state cannot refuse, on political or economic grounds, to accept a non-scheduled flight.

c. **Cabotage**. In aviation, the term cabotage is used in association with internal (domestic) scheduled commercial air transport. Historically, cabotage means 'coastal navigation' and refers to the right of a state with a coastline to restrict shipping carrying cargo and passengers between ports on that coastline to ships registered in that state only. In other words, if a French ship brings goods to Southampton destined for Hull, the French ship would have to unload the goods at Southampton; the goods would then be carried to Hull in a British ship, or the French ship would have to go directly to Hull from France. In this case, the UK is applying **cabotage**. In international aviation, cabotage is permitted and the US is a typical example. No foreign carrier is permitted to operate internally in the US. In the EC, the treaty of Rome demands free access to territory of all EC states and cabotage in aviation within individual EC states is forbidden. This is why Ryanair (an Irish airline) is permitted to operate scheduled services within the UK (both are EC states). However, the EC applies cabotage and doesn't permit non-EC states to operate internally within the EC! In accepting ICAO contracting status, a state (State A) agrees not to enter into an agreement with another state (State B) to allow exclusive rights of internal scheduled operations within state A by an airline registered in State B (article 7 of the Chicago Convention).

© Oxford Aviation Services Limited

2.1.4 CUSTOMS AND EXCISE, AND IMMIGRATION

2.1.4.1 Facilitation. Under international law, the imposition of customs tariffs and the prohibition of the importation of proscribed items is allowed. In order to allow contracting states to maintain national Customs and Excise regulations, international flights are required to make the first point of landing in a contracting state at a recognised **international airport** which provides customs, health and immigration facilities. (In the UK these are known as **customs airports)**. Within the EU the removal of restrictions to free trade now allows flights from one EU state to another to make the first point of landing at a non-customs aerodrome providing certain rules are observed. These rules are explored in the section of this manual concerning **Facilitation**. Other rules apply to immigration.

2.2 INTERNATIONAL OBLIGATIONS OF CONTRACTED STATES

2.2.1 National and 'International' Law. In becoming an ICAO Contracting State, the State agrees to observe the International Standards specified by ICAO. From the standards, the international rules and regulations governing civil aviation are drawn. By accepting contracted status, each state accepts the responsibility for enforcement of the rules and regulations within its sovereign territory and airspace (through national law). Article 38 of the Chicago Convention requires each Sovereign State to notify ICAO of any differences between their national regulations and the International Standards adopted. Thus a situation is recognised where national legislation and regulations have precedent over international rules within the territorial airspace of that State. Where flights are conducted over the high seas, the international rules apply without exception. The International (ICAO) Rules of the Air are promulgated (Annex 2) to standardise the procedures for civil aviation specifically for the safety of aircrew and passengers. Other regulations are established to facilitate the smooth and expeditious flow of air traffic by the adoption of Standards and Recommended Practices (SARPS).

2.2.2 Right to Prosecute Offenders. Where an offence is committed in an aeroplane contrary to the 'international' law, the state, in the airspace of which the offence occurs, has the right to try and punish offenders. If the offence occurs over 'the high seas', the state of registration of the aeroplane has the right to prosecute the offender(s). Note: The international agreements **oblige** states to prosecute. If a state doesn't want to (for political reasons) another state may do so. For instance (hypothetically): A bomb is placed on an American aeroplane (contrary to the Montreal Convention and Protocols) by 2 Libyans, in Rome. The aeroplane explodes over Scotland. Who has the power to prosecute? The order is as follows:

a. The UK (under Scottish law) – the offence happened over Scotland
b. The United States – the aeroplane was registered in the USA
c. The Italians – because the bomb was placed on board in Rome
d. The Germans – because the aeroplane made an intermediate stop in Frankfurt
e. Any other state, the citizens of which were killed or injured.

© Oxford Aviation Services Limited

f. Libya – because the suspects are Libyan

Note: If the UK had not prosecuted, the US most certainly would have.

2.2.3 **Search and Rescue.** In accepting contracted State status, each State specifically undertakes to provide procedures and facilities for **Search and Rescue** (SAR) within the territory of that state. The provision of SAR services in areas of high seas, and areas of undetermined sovereignty, will be established on the basis of **Regional Air Navigation (RAN)** agreements. The standards governing the provision of SAR services oblige the state to provide at least the minimum service compatible with the type and frequency of the air traffic using the airspace for which the state is responsible, and that service is to be available 24 hours per day. The requirement also imposes upon the state the need to maintain a degree of co-operation with adjacent states and the readiness to assist with SAR operations if requested.

2.3 DUTIES OF ICAO MEMBER STATES

2.3.1 **Standards and Recommended Practices (SARPs)** The stated aim of the Convention on International Aviation and subsequently the aims of ICAO, are to ensure safety, regularity and efficiency on international civil aviation operations. In order to achieve this, the contracting states are required to comply with the **Standards and Recommended Practices (SARPs)**. There are 18 annexes to the Convention, 17 of which are applicable to air navigation. The SARPs are established after consultation with the contracting states and interested international organisation finalised by the ICAO Air Navigation Commission and submitted to the Council where a two-thirds majority is required for their adoption. The SARPs are considered binding on contracting states but if a state finds it impossible to implement the SARPs, then it must inform ICAO under the terms of Article 38, of any differences that will exist on the applicability date of the amendment. Such differences will be detailed in the national aeronautical information publication (AIP) and summarised in a supplement to each Annex of the Chicago Convention.

2.3.2 **Customs Duty and Excise.** ICAO has addressed taxation in the field of international aviation and member states are required to follow the resolutions and recommendation of the Council in this respect. States are asked to exempt fuel, lubricants, and other technical consumables taken on an aircraft in a state other than the State of registry, providing such supplies are for consumption in flight. Also to reduce or eliminate taxes on international air transport (fares) and to grant, reciprocally to air transport enterprises of other States, exemption from taxation on income and profits. Within the area of customs duty and excise charges, Annex 9 requires States to apply procedures, which allow expeditious handling of goods and cargo intended for import or which are passing through. The establishment of 'free zones' is encouraged.

© Oxford Aviation Services Limited

2.3.3 Aircraft Certificates and Licenses. Annex 7 of the convention deals with nationality and registration marks, and requires contracting states to apply standard procedures for registration. It includes the format of registration marks and nationality symbols, including where these are to be displayed on aircraft. The annex also calls for **the registration of all aircraft** and provides a sample of a certificate of registration for use by States. Annex 8 (Airworthiness of Aircraft) requires States to **provide of a Certificate of Airworthiness, for each registered aircraft**, declaring that the aircraft is fit to fly. Under the terms of Annex 1 (Personnel Licensing), SARPs are established requiring each state to apply standardisation in the licensing of personnel involved in international aviation including flight crew members (pilots, flight engineers), air traffic controllers and maintenance technicians. The overriding purpose of such standardisation is to ensure that all involved in air transport operations are licensed to common standards and able to operate throughout the world, thus generating greater trust in aviation on the part of the traveler. A licence issued by the authority in one state is not automatically valid in another State. In this instance, the Annex requires states to establish procedures for the validation of licences issued in other states and defines the method by which such validation shall be annotated.

2.3.4 Carriage of Dangerous Cargo. More than half the cargo carried by all modes of transport in the world is classified as dangerous. Because of the speed advantages of air transport, a great deal of this cargo is carried by aircraft. In Annex 18 (The Safe Transport of Dangerous Goods by Air), States are required to accept the SARPs associated with the carriage of dangerous goods and to implement the Technical Instructions for the Safe Transport of Dangerous Goods by Air.

2.3.5 Documentation and Certificates. Other duties of member states include the provisions for the carriage of photographic equipment in aircraft and specification of what documentation is required to be carried. Documentation includes:

a) Certificates of Airworthiness

b) Flight Crew licences

c) Load sheets

d) Maintenance documentation.

2.4 STATUS OF ANNEX COMPONENTS

2.4.1 Definition. An annex is made up of the following component parts, not all of which are necessarily found in every Annex. They have the status indicated:

2.4.2 Standards and Recommended Practices are adopted by the Council and are defined thus.

© Oxford Aviation Services Limited

a. A **Standard** is any specification for physical characteristics, configuration, materiel, performance, personnel or procedure, the uniform application of which is recognised as **necessary** for the safety or regularity of international air navigation and to which Contracting States will conform in accordance with the Convention. In the event of impossibility of compliance, notification to the Council is compulsory under article 38 of the Convention.

b. A **Recommended Practice** is any specification for physical characteristics, configuration, materiel, performance, personnel or procedure, the uniform application of which is recognised as **desirable** in the interest of safety, regularity or efficiency of international air navigation and to which Contracting States will endeavour to conform in accordance with the Convention.

2.5 THE INTERNATIONAL CIVIL AVIATION ORGANISATION (ICAO)

2.5.1 Status. ICAO, created by the Chicago Convention, is an inter-governmental organisation, which has become a specialised agency in relationship with the United Nations. The headquarters of ICAO is in Montreal and it provides the machinery to achieve standardisation and agreement between Contracting States of all technical, economic and legal aspects of international civil aviation.

2.5.2 ICAO Aims and Objectives. The aims and objectives of ICAO are to develop the principles and techniques of international civil air navigation and to foster the planning and development of international air transport so as to:

a. Ensure the safe and orderly growth of international civil aviation throughout the world.

b. Encourage arts of aircraft design and operation.

c. Encourage the development of airways, airports and air navigation facilities.

d. Meet the need for safe, regular, efficient and economical air transport.

e. Prevent waste caused by unreasonable competition.

f. Ensure the rights of Contracting States are fully respected.

g. Avoid discrimination between Contracting States.

h. Promote the safety of flight in international aviation.

i. Generally promote all aspect of international civil aeronautics.

© Oxford Aviation Services Limited

2.6 THE ORGANISATION OF ICAO

2.6.1 **The Assembly**. The sovereign body of ICAO, the Assembly, meets at least once every three years and is convened by the Council. Each Contracting State is entitled to one vote and decisions of the Assembly are by majority vote of the 185 Contracting States.

2.6.2 **The Council**. The Council of ICAO is a permanent body responsible to the Assembly and is composed of 33 Contracting States elected by the Assembly for a three-year term. The Council is the governing body of ICAO.

2.6.3 **The Commissions and Committees** of ICAO are composed of members, appointed by the Council, from nominations of Contracting states or elected from amongst Council members. They are:

a. The Air Navigation Commission.

b. The Air Transport Committee.

c. The Legal Committee.

d. The Committee on Joint Support of Air Navigation Services.

e. The Personnel Committee.

f. The Finance Committee.

g. The Committee on Unlawful Interference

2.6.4 **The ICAO Secretariat** is divided into sections, each corresponding to a Committee, and supplies technical and administrative aid to the Council. It is headed by a Secretary-General, appointed by the Council, and is divided into five main divisions:

a. Air Navigation Bureau.

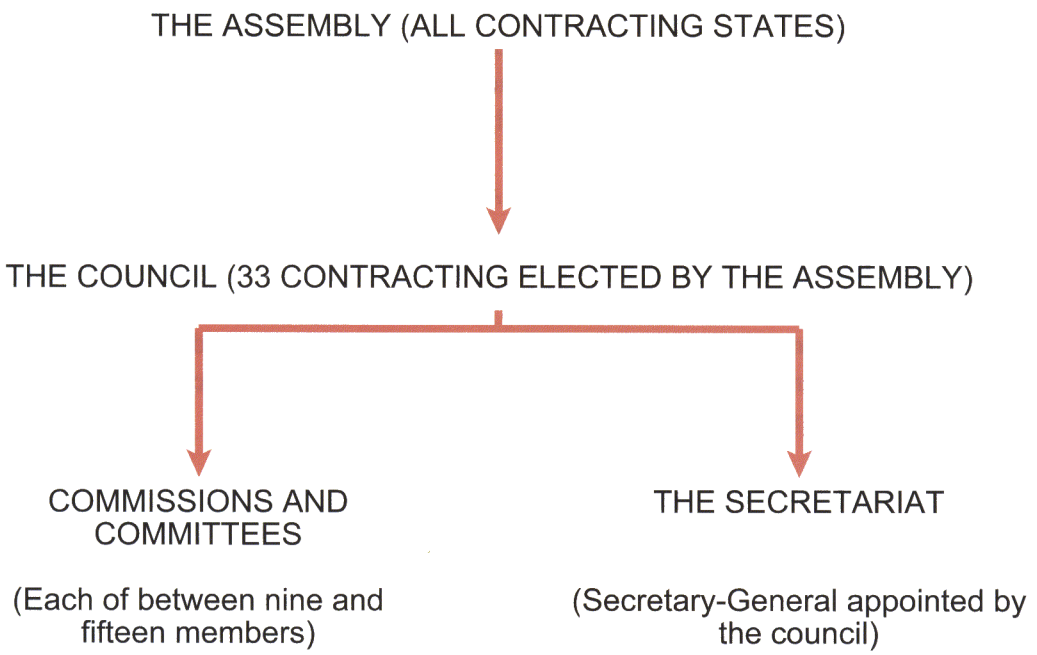
b. Air Transport Bureau.

c. Technical Assistance Bureau.

d. Legal Bureau.

e. Bureau of Administration and Services.

© Oxford Aviation Services Limited



2.7 REGIONAL STRUCTURE OF ICAO

2.7.1 Regions and Offices. ICAO maintains seven regional offices: Bangkok, Cairo, Dakar, Lima, Mexico City, Nairobi and Paris. Each regional office is accredited to a group of Contracting States (making up nine recognised geographic regions) and the main function of regional offices is maintaining, encouraging, assisting, expediting and following-up the implementation of air navigation plans. The nine geographic regions are:

AFI	Africa - Indian Ocean	NAM	North America	ASIA	Asia
CAR	Caribbean	NAT	North Atlantic		
EUR	Europe	PAC	Pacific		
MID	Middle East	SAM	South America		

2.7.2 The Need for a Regional Structure. In dealing with international civil aviation, there are many subjects which ICAO considers on a regional basis as well as on a worldwide scale. In order to facilitate:

a. the planning of facilities and services
b. the formulation of supplementary procedures to support increases in traffic density
c. new air routes
d. the introduction of new types of aircraft

© Oxford Aviation Services Limited

2.8 REGIONAL STRUCTURE AND OFFICES

2.8.1 **Regional Air Navigation (RAN)** meetings are held periodically to consider the requirements of air operations within specified geographic areas. The plan, which emerges from a regional meeting, is so designed that, when the states concerned implement it, it will lead to an integrated, efficient system for the entire region and contribute to the global system. In addition to the duties detailed above, the regional offices are responsible for keeping the regional plans up to date.

2.8.2 **Financial Assistance.** Through the regional offices, financial assistance is provide to assist states in specific circumstances. The provision of air traffic control, navigation aids and meteorological services in Greenland and Iceland are examples of this specific aid, where due to the intense air traffic using the airspace of those states such expenditure is disproportionate to the gross national product of those states.

2.9 ICAO PUBLICATIONS

2.9.1 One of the major duties of the ICAO Council is to **adopt** International Standards and Recommended Practices (SARPS) and incorporate these as annexes to the Convention on International Civil Aviation. There are now 18 annexes to the 1944 convention which are constantly under review to ensure that the content realistically meets the requirements of civil aviation now. You are required to be able to identify the annex and content. The 18 annexes are:

Annex 1)	Personnel Licensing
Annex 2)	Rules of the Air
Annex 3)	Meteorological Services for International Air Navigation
Annex 4)	Aeronautical Charts
Annex 5)	Units of Measurement to be used in Air and Ground Operations
Annex 6)	Operation of Aircraft
Annex 7)	Aircraft Nationality and Registration Marks
Annex 8)	Airworthiness of Aircraft
Annex 9)	Facilitation
Annex 10)	Aeronautical Telecommunications
Annex 11)	Air Traffic Services
Annex 12)	Search and Rescue
Annex 13)	Aircraft Accident Investigations
Annex 14)	Aerodromes
Annex 15)	Aeronautical Information Services
Annex 16)	Environmental Protection
Annex 17)	Security - Safeguarding International Civil Aviation Against Acts of Unlawful Interference
Annex 18)	The Safe Transport of Dangerous Goods by Air

© Oxford Aviation Services Limited

2.9.2 **Other major publications**. In addition to the Annexes to the Chicago Convention (above) which detail the SARPS, other publications by ICAO include:

a. **PANS OPS (Doc 8168)**. Procedures for Air Navigation - Aircraft Operations. This publication (in two parts) describes the Operational Procedures (Procedures For Air Navigation - **PANS**) recommended for the guidance of flight operations personnel (Vol 1) and procedures for specialists in the essential areas of obstacle clearance requirements for the production of instrument flight charts (approach plates) (Vol 2).

Note: PANS are **approved** by the Council, unlike SARPS which are **adopted** by the Council.

b. **PANS ATM (Doc 4444).** Procedures for Air Navigation – Air Traffic Management. Used to be called PANS RAC.

c. **Regional Supplementary Procedures (Doc 7030/4)**. Where navigational procedures, which differ from the worldwide procedures, are deemed necessary for a specific geographic region by the appropriate Regional Air Navigation Meeting, such procedures are recorded in the relevant region section of Doc 7030/4, and are known as Regional Supplementary Procedures (SUPPS). As in the case of PANS, SUPPS are approved by the Council, but only for regional use.

2.9.3 **Information publications**. ICAO publishes a variety of other publications in the form of circulars, pamphlets, manuals and the ICAO Journal, which cover technical, economic and legal subjects. In addition to the Annexes, PANS and SUPPS, ICAO also produces Training Manuals and videos, Regional Air Navigation Plans, Aircraft Accident Digests, a lexicon of terms used in international civil aviation, Digests of Statistics and documents of the Legal Committee.

2.10 OTHER INTERNATIONAL AGREEMENTS

2.10.1 **The International Air Services Transit Agreement and the International Air Transport Agreement.** The Chicago Convention attached great importance to the question of the exchange of commercial rights in international civil aviation. It was not found possible to reach an agreement satisfactory to all the original 52 states, but the conference set up two supplementary agreements - the **International Air Services Transit Agreement**, and the **International Air Transport Agreement**. The first, made provision for aircraft of any participating state to fly over or to land for technical reasons in the territory of any other participating state. The second provided further, among other things, for the carriage of traffic between the State of registration of the aircraft and any other participating state.

© Oxford Aviation Services Limited

2.10.2 The Freedoms of the Air. The Air Services Transit Agreement established two technical **freedoms** of the air (known as the first and second freedoms). In this context the word freedom refers to a privilege conferred by virtue of bilateral agreement. Because the two agreements require bilateral understandings between the parties, ICAO has produced the Chicago Standard Form for Bilateral Agreement for regular Air Transport based on the definitions for the Freedoms of the Air, as defined in the Air Services Transit and the International Air Transport Agreements.

2.10.3 The Technical Freedoms

a. **The First Freedom**: The privilege to fly across the territory of another participating state without landing.

b. **The Second Freedom**: The privilege to land in another participating state for non-traffic purposes (ie. refueling or repair) but not for uplift or discharge of traffic (passengers, cargo or mail).

2.10.4 The Commercial Freedoms. The International Air Transport Agreement established three further freedoms. These are defined as commercial and whilst still bilateral, are subject to inter-government negotiation.

a. **The Third Freedom**: The privilege to put down in another state (for example the USA), passengers, mail and cargo taken on in the state of registration (eg the UK).

b. **The Fourth Freedom**: The privilege to take on in another state (eg the USA), passengers mail and cargo destined for the state of airline registration (eg the UK).

c. **The Fifth Freedom**: The privilege for an airline registered in one state (eg the UK) and en-route to or from that state, to take on passengers, mail and cargo in a second state (eg Greece) and put them down in a third state (eg Italy).

2.10.5 Modern Freedoms. Due to the process of growth in air transport and the evolution of airlines operating on a global basis, further commercial freedoms have evolved.

a. **The Sixth Freedom**: The privilege for an airline registered in one participating state to take on passengers, mail and cargo in a second state, transport them via the state of registration, and put them down in a third participating state.

b. **The Seventh Freedom**: The privilege for an airline registered in one participating state to take on passengers, mail and cargo in a second participating state and put them down in any other participating state without the journey originating, stopping or terminating in the state of registration.

© Oxford Aviation Services Limited

c. **The Eighth Freedom**. With the establishment of the EU and the associated "open skies" policy which reflects the abolition of land frontiers, customs tariffs and immigration restrictions between EU states, a further freedom became necessary to allow the policy to work. This is the privilege of an aircraft registered in one EU State (eg Eire) to pick up passengers, mail and cargo in another EU State (eg the UK) and carry the same to a destination within that state (eg Ryanair).

d. **The Ninth Freedom (Code Sharing):** This freedom is a direct result of the IATA conference of Kuala Lumpur, and permits interlining or code sharing. This is a scheduled flight being flown by an operator other than the operator to whom the schedule has been granted or with whom the schedule is shared. In this situation, the flight code (identifying the carrier/operator and the schedule flight) is used by another operator. In this situation, the passenger must be informed who the actual carrier is.

2.11 THE CONVENTIONS OF TOKYO, THE HAGUE AND MONTREAL

2.11.1 The Tokyo Convention of 1963. This convention provides that the State of Registration of an aircraft is competent to exercise jurisdiction over offences and acts committed on board. Its object is to ensure that offences, wherever committed should not go unpunished. As certain acts committed on board an aircraft may jeopardise the safety of the aircraft or persons and property on board or may prejudice good order and discipline on board, the aircraft commander and others are empowered to prevent such acts being committed and to disembark the person concerned. In the case of an anticipated or actual unlawful or forcible seizure of an aircraft in flight by a person on board, the States party to the Convention are obliged to take all appropriate measures to restore and preserve control of the aircraft to its lawful commander.

2.11.2 The Hague Convention of 1970. After a spate of politically motivated terrorist hijackings of aircraft in the 1960's, the international community, under the auspices of ICAO, resolved to work together to prevent or deter (suppress) such acts. Otherwise known as the Convention for the Suppression of Unlawful Seizure of Aircraft, signed at the Hague in December 1970, the convention defines the Act of Unlawful Seizure of Aircraft, and lists which Contracting States have undertaken to make such offences punishable by severe penalties. The Convention contains detailed provisions on the establishment of jurisdiction by States over the offence, on the taking of the offender into custody and on the prosecution or extradition of the offender. This convention came into effect on 14 October 1971.

© Oxford Aviation Services Limited

2.11.3 The Montreal Convention of 1971. This Convention is correctly titled the Convention for the Suppression of Unlawful Acts Against the Safety of Civil Aviation. It makes it an offence to attempt any of the unlawful acts specified or to be an accomplice to such acts. The Contracting States have undertaken to make these offences punishable by severe penalties. The Convention contains similar detailed provisions regarding jurisdiction, custody, prosecution and extradition of the alleged offender as the Hague Convention of 1970. This convention came into force on 26 January 1973. It is mainly concerned with acts other than those pertaining to the unlawful seizure of aircraft. ie:

a. Acts of violence on board which endanger people and property and the safety of the aeroplane

b. The destruction of an aircraft in service or causing damage which renders it incapable of flight or which is likely to endanger its safety in flight

c. Placing in an aircraft any device likely to destroy, damage or render unfit for flight any aircraft

d. Destroying or damaging any air navigation facility or interference with its correct operation

e. The communication of information known to be false which endangers the safety of an aeroplane in flight

2.11.4 The Protocol Supplementary to the Montreal Convention of 1971. This protocol was adopted by a conference, which met at Montreal in 1988. It extends the definition of offence given in the 1971 Convention to include specified acts of violence at airports serving international civil aviation. Such acts include:

a. The intentional and unlawful use of any device, substance or weapon in performing an act of violence against a person at an airport **serving international civil aviation**, which causes or is likely to cause serious injury or death

b. The intentional and unlawful use of any device, substance or weapon to:

1) Destroy or seriously damage the facilities of an airport

2) Destroy or seriously damage aircraft not in service at the airport

3) Disrupt the services at an airport

2.11.5 Enforcement. Contracting States have undertaken to make these offences punishable by severe penalties. The protocol also contains provisions on jurisdiction.

© Oxford Aviation Services Limited

2.11.6 Annex 17. The measures taken by ICAO have resulted in the adoption of the SARPS detailed in Annex 17 - Security. The provisions of the SARPS are applicable to all Contracting States. The Annex requires all contracting States to:

a. Establish national civil aviation security programmes commensurate with the ICAO aims of safety, regularity and efficiency of flights;

b. To designate an authority responsible for security;

c. To keep the level of threat under constant review;

d. To co-ordinate activities with other relevant national agencies and liaise with the corresponding authority in other States.

2.11.7 Programmes and plans. In order to make such activities workable and efficient, States are also required to set up training programmes, establish airport security committees and to have contingency plans drawn up.

2.11.8 International co-operation. As an on-going commitment to security, each State is required to co-operate with other States in research and development of security systems and equipment which will better satisfy civil aviation security objectives.

2.11.9 The Authority of the Commander. The aircraft commander may require or authorise the assistance of other crew members and may request and authorise, but not require, the assistance of passengers to restrain any person he is required to restrain. The aircraft commander may, when he has reasonable ground to believe that a person has committed, or is about to commit, an act which may or does jeopardize the safety of the aircraft or persons or property on board or which jeopardize good order and discipline on board, impose reasonable measures, which may include restraint, necessary:

a. to protect the safety of the aircraft, or of persons or property on board;
b. to maintain good order and discipline on board; or
c. to enable him to deliver such a person to competent authorities or to disembark him in accordance with provision of the Convention.

2.12 EUROPEAN ORGANISATIONS

2.12.1 The European Union (EU). The driving force for a common civil aviation policy in Europe (and the European Aviation Authority!) has been the European Civil Aviation Conference (ECAC) set up under the auspices of the EU and ICAO. All the European Commission countries are members of ECAC, the main aim of which is to institute procedures which are consistent with those resulting from the EC Treaty and the Single European Act. In various documents of the European Working Group covering civil aviation (EWG 91/3922; 92/2407; 91/670; 94/56), the recommendations of the European Parliament and the Council of Europe define the approach of the EU towards:

© Oxford Aviation Services Limited

a. A general structure for civil aviation in Europe

b. Licensing

c. Safety

d. European Regional Air Traffic Control

e. A structure for civil aviation marketing within Europe

2.12.2 European Civil Aviation Conference (ECAC). ECAC is an inter-governmental organisation founded in 1955 from the Conference on the Co-ordination of Air Transport in Europe (CATE), with the aim of promoting the continued development of a safe, efficient and sustainable European air transport system. ECAC seeks to:

a. Harmonise civil aviation policies and practices amongst its member states; and

b. Promote understanding on policy matters between member states and other parts of the world.

2.12.3 Aims. Within Europe, because of its established position, ECAC is the only forum for consideration of major civil aviation topics relevant to all European states. The strength of ECAC is derived from:

a. Membership across Europe;

b. Active co-operation with institutions of the EU (including the EC and the European Parliament);

c. Close liaison with ICAO; and

d. Established relationships with organisations representing all parts of the air transport industry including consumer and airline interests.

2.12.4 Functions. ECAC issues resolutions, recommendations and policy statements, which are brought into effect by member states. Under the auspices of ECAC international agreements have been concluded and memoranda of understanding agreed with non-member states and regions. ECAC publishes documents, which describe its aims, work and agreements. Through ECAC news briefings are given and developments discussed. The Constitution and Rules of Procedure are published in ECAC Doc No 20, which also contains the history of ECAC.

© Oxford Aviation Services Limited

2.12.5 Multi-lateral Agreement on Commercial Rights of Non Scheduled Air Services in Europe. Again under the auspices of ICAO, the member states of ECAC made an arrangement that supplemented Article 5 of the Chicago Convention which applied to private and non-scheduled commercial flights. In summary, the contracting ECAC states agreed to free movement of aircraft registered in an ECAC State operated by a national of one of the contracting states duly authorised by the competent authority for the purpose of:

a. Humanitarian or emergency needs;

b. Taxi class passenger flights; and

c. Flights on which the entire space on the aeroplane is hired by a single individual or company

2.12.6 Supplementary agreement. It was also agreed that the same treatment shall be applied to similar cargo flights, and to flights transporting passengers between regions which have no direct connection by scheduled air services. The agreement is detailed in ICAO/ECAC doc 7695.

2.12.7 Multilateral Agreement Relating to Certificates of Airworthiness for Imported Aircraft. Another ICAO sponsored ECAC agreement considered the issue and validation of certificates of airworthiness for aircraft imported from one state to another. The agreement applies only to aircraft manufactured in one member State and imported into another member State. In this situation, the authority of a State into which the aircraft is being imported shall either render valid the existing certificate of airworthiness, or issue a new certificate of airworthiness.

Provided:

a. The aircraft has been constructed in accordance with the applicable laws, regulations and requirements relating to airworthiness in the State of construction;

b. The aircraft complies with the minimum acceptable standard for airworthiness established by ICAO;

c. The aircraft complies with the operating requirements of the State of import; and

d. The aircraft complies with any special conditions notified under this agreement.

Note: If the State of import decides to issue a new certificate of airworthiness, it may pending the issue of the new certificate, render valid the existing certificate for a period of six months or for the unexpired period of the existing certificate, which ever is the lesser. The details of the agreement are contained in ICAO/ECAC doc 8056.

© Oxford Aviation Services Limited

2.13 THE JOINT AVIATION AUTHORITIES (JAA)

2.13.1 Status. The Joint Aviation Authorities (JAA) are an associated body of ECAC representing the civil aviation regulatory authorities of a number of European States who have agreed to co-operate in developing and implementing common safety regulatory standards and procedures. This co-operation is intended to provide high and consistent standards of safety and a 'level playing field' for competition in Europe. The JAA Membership is based on signing the "JAA Arrangements" document originally signed by the then current member states in Cyprus in 1990.

2.13.2 Objectives. The JAA objectives and functions may be summarised as follows:

a. Objectives:

1. To ensure, through co-operation, common high levels of aviation safety within Member States.
2. Through the application of uniform safety standards, to contribute to fair and equal competition within Member States.
3. To aim for cost-effective safety and minimum regulatory burden so as to contribute to European industry's international competitiveness.

b. Functions:

1. To develop and adopt common standards - Joint Aviation Requirements (JARs), in the field of aircraft design and manufacture, aircraft operations and maintenance, and the licensing of aviation personnel.
2. To develop administrative and technical procedures for the implementation of JARs.
3. To implement JARs and related administrative and technical procedures in a co-ordinated and uniform manner.
4. To adopt measures to ensure, whenever possible, that pursuance of the JAA safety objective does not unreasonably distort competition between the aviation industries of Member States or place companies of Member Sates at a competitive disadvantage with those of non-Member States.
5. To provide the principle centre of professional expertise in Europe on the harmonisation of aviation safety regulations.
6. To establish procedures for joint certification of products and services and where it is considered appropriate to perform joint certification.
7. To co-operate on the harmonisation of requirements and procedures with other safety regulatory authorities, especially the US Federal Aviation Authority (FAA).
8. Where feasible, to co-operate with foreign safety regulatory authorities especially the FAA, on the certification of products and services.

© Oxford Aviation Services Limited

2.13.3 Member States. The following countries were the founder members of the JAA:

Austria	Belgium	Denmark	Finland
France	Germany	Greece	Iceland
Ireland	Italy	Luxembourg	Netherlands
Norway	Portugal	Spain	Sweden
Switzerland	United Kingdom		

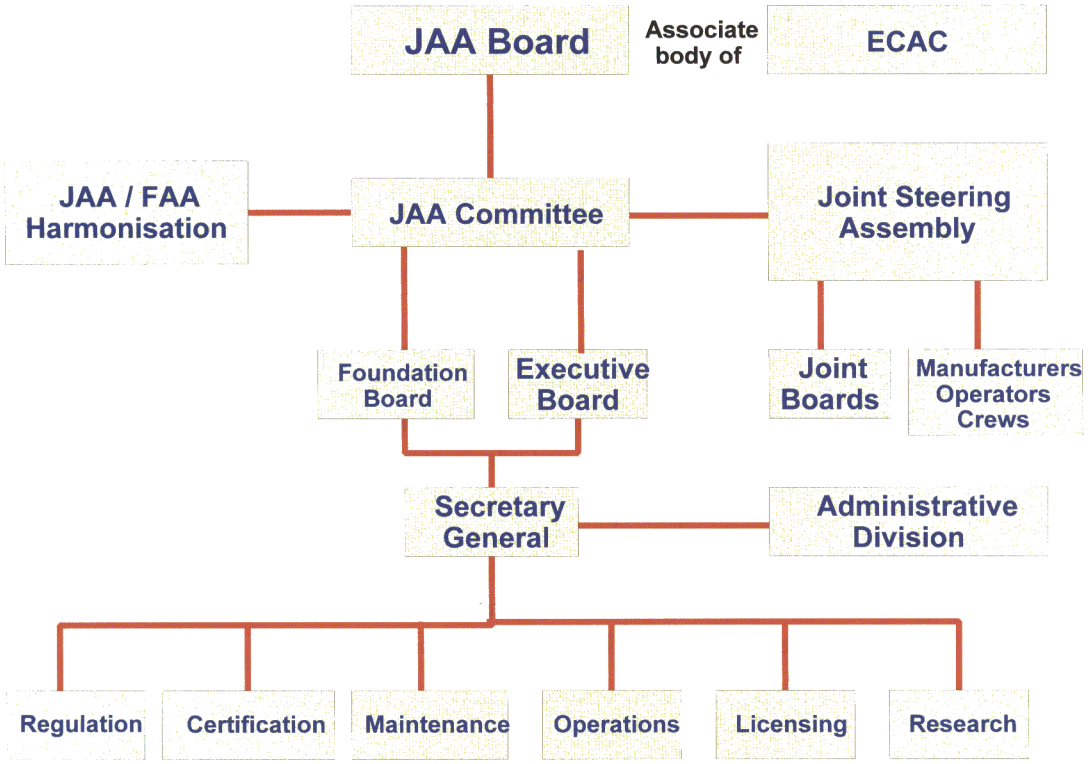
The following states were candidate members:

Cyprus	Czech Republic	Hungary	Malta
Slovakia	Slovenia	Turkey	Poland
Monaco			

2.13.4 JAA Organisation. The JAA is controlled by a Committee, which works under the authority of the Plenary Conference of ECAC and reports to the JAA Board of Directors General. The Board is responsible for review of general policy and long term objectives of the JAA. The JAA Committee is composed of one member from each Authority and is responsible for the administrative and technical implementation of the Arrangement. The Committee and the Board are supported by a Secretariat.

2.13.5 Intention. The intention is eventually to form the **European Aviation Authority**. This is in keeping with the aims of the EU and the Council of Europe. At that time the EAA will be the only body in Europe with responsibility for civil aviation. Until that time, the JAA will remain a regulatory body and will require the national authorities to provide the legislative mechanism within the individual member states. The national authorities will, in the interim, also provide the manpower for the JAA to implement and 'police' the regulations.

© Oxford Aviation Services Limited



2.13.6 The Structure of the JAA

© Oxford Aviation Services Limited

2.13.7 JAA/FAA Harmonisation. In order to facilitate the reduction in regulatory processes and to align existing procedures of the JAA and the Federal Aviation Administration (FAA) of the United States, an annual JAA/FAA Harmonisation Conference is held. At the 14th Conference held in Berlin, the JAA and the FAA signed and agreed to implement Documents for Type and Post Type Validation Principles, leading to a Joint Validation Procedure. Ultimately, the aim is to make European aviation industry products and services compatible with those in the USA, which will allow greater competition and enhance mutual markets without unfair regulatory control.

2.13.8 JAA Documentation. The Authorities agreed to co-operate to produce common comprehensive and detailed requirements and where necessary acceptable means of compliance with and interpretations of them (the Joint Aviation Requirements - JARs). JARs encompass both technical and administrative functions. In developing JAR, the JAA takes into account the duties and obligations under the Chicago Convention; consults the parties to whom the requirements apply and takes into account other aviation codes so as to facilitate exchange of products, services or persons or reliance on organisations, between the JAA countries and other countries in the world. The following table shows the JARs currently adopted:

JAR No	Title
JAR-1	Definitions and Abbreviations
JAR-21	Certification Procedures for Aircraft, products and related Parts
JAR-22	Sailplanes and Powered Sailplanes
JAR-23	Normal, Utility, Aerobatic and Commuter Category Aircraft
JAR-25	Large Aeroplanes
JAR-27	Small Rotorcraft
JAR-29	Large Rotorcraft
JAR-APU	Auxiliary Power Units
JAR-E	Engines
JAR-P	Propellers
JAR-OPS Pt 1	Commercial Air Transport (Aeroplanes)
JAR-OPS Pt 3	Commercial Air Transport (Helicopters)
JAR-TSO	Joint Technical Standard Orders

© Oxford Aviation Services Limited

JAR-AWO	All Weather Operations
JAR-VLA	Very Light Aeroplanes
JAR-145	Approved Maintenance Organisations
JAR-FCL Pt 1	Flight Crew Licensing (Aeroplane)
JAR-FCL Pt 2	Flight Crew Licensing (Helicopters)
JAR-FCL Pt 3	Flight Crew Licensing (Medical Requirements)
JAR-STD 1A	Aeroplane Flight Simulators
JAR-11	Rulemaking Procedures
JAR-26	Retroactive Airworthiness Requirements
JAR-34	Aircraft Emissions
JAR-36	Aircraft Noise
JAR-66	Certifying Staff
JAR-147	Maintenance Training Organisations
JAR-STD 3A	Flight and Navigation Procedure Trainers

© Oxford Aviation Services Limited

2.14 EUROCONTROL

2.14.1 History and Role. Eurocontrol was founded in 1960 with the objective of providing common ATC services in the upper airspace of Member States and strengthening co-operation between Member States in matters of air navigation. Eurocontrol was established under the International Convention Relating to Co-operation for the Safety of Air Navigation signed at Brussels in 13 December 1960. Initially, six countries signed the agreement: Germany (FDR); Belgium; France; United Kingdom; Luxembourg and the Netherlands. In 1999 there were 26 member states and the organisation was greatly reformed through the revised Eurocontrol Convention of June 1997. The Eurocontrol ATCC is at Maastricht, Holland. The role of Eurocontrol is now much wider than originally envisaged. The limit of operations, to just the upper airspace, was abandoned in 1986 and Eurocontrol now has a much wider remit, placed on the Organisation by ECAC, most notably in the area of Air Traffic Flow Management (ATFM) which led to the establishment of the Eurocontrol Central Flow Management Unit (CFMU) in 1988. Eurocontrol has a training centre in Luxembourg and an experimental research centre at Brétigny, France, with a new ATCC being built in Vienna.

2.14.2 EATCHIP. In April 1990, ECAC Transport Ministers met in Paris and agreed a programme known as the European Air Traffic Control Harmonisation and Integration Programme (EATCHIP) which was formulated to introduce technology and procedures to take Eurocontrol into the 21st Century. The main aim of the programme is to set a standard for electronic equipment and associated procedures used in ATC throughout Europe. At the outset, each state had its own systems totally incompatible with that of neighbour states. Through software conversion, electronic interfacing and equipment and planned system replacement the common standard is being achieved. On time in 1998, the first digital data-link oceanic clearance was delivered to a KLM 747 en route from Amsterdam to New York whilst in the climb to its assigned level. EATCHIP activity covers 36 States, 65 ACCs and 19 major TMA Control Units.

2.15 THE WARSAW CONVENTION AND ASSOCIATED DOCUMENTS

2.15.1 Liability of the Carrier. The Warsaw Convention of 1929 concerned itself with responsibilities and liabilities of the Carrier and the Agents of aircraft together with matters of compensation for loss of life or injury to passengers. This limited the liability, except in cases of gross negligence, to 125,000 gold Poincar francs (about US$10,000). In 1955 an amendment to the Convention was adopted by a diplomatic conference at The Hague (known as The Hague Protocol) which doubled the existing limits of liability. The Warsaw Convention did not contain particular rules relating to international carriage by air performed by a person who is not a party to the agreement for carriage. Accordingly, as a result of work done by the ICAO Legal Committee, a diplomatic conference held at Guadalajara in 1961, adopted a convention, supplementary to the Warsaw Convention containing rules to apply in this circumstance. The 1971 Protocol signed at Guatemala City, among other things, provides for

© Oxford Aviation Services Limited

a. a regime of absolute liability of the air carrier;

b. an unbreakable limit of the carriers responsibility in a maximum amount of 1,500,000 Poincar gold francs (US$100,000) per person;

c. a domestic system to supplement, subject to specified conditions, the compensation payable to claimants under the Convention in respect of death or personal injury of passengers.

2.15.2 Gold Clause. Three additional protocols to the Warsaw Convention replaced the gold clause but retained it for States that are not members of the International Monetary Fund. A fourth protocol refers to the carriage of postal items and the international carriage of cargo.

2.15.3 Issue of a Ticket. The issuing of a passenger ticket, luggage ticket or cargo consignment note forms a contract between the carrier and the person receiving the ticket/note. The contract is defined by the Warsaw Convention including the previously mentioned exclusion or limitation of liabilities. If a carrier accepts a passenger, luggage or cargo without a ticket/note, then the carrier is liable without limit for any loss, which is occasioned. The loss, irregularity or absence of a ticket/not does not affect the existence or the validity of the contract. The operator is required to draw the passenger's attention to the Warsaw Convention where 'electronic' tickets are issued.

2.15.4 IATA and the Agreement of Kuala Lumpur 1995. The aim of Civil Aviation is to transport people and freight around the world by air. As was found with the early railway systems, standardisation was a major problem. In aviation the wide variety of aeroplanes is not a problem but the variation in ticketing, scheduling, conditions of carriage and the obligations of carriers (operators) has required international agreement firstly to protect the interest of the passenger or freight consignee and secondly, to prevent unfair competition and sub-standard service. Through international conventions, IATA developed, with ICAO, a procedure of standardisation of documentation for the smooth functioning of the world air transport network. Based on the Warsaw Convention of 1929, IATA helped develop the Conditions of Carriage, which is now recognised as a contract between the customer (passenger or freight consignee) and the transporting airline. A process of **interlining** has been developed where airlines divide the money from multi-airline journeys and settle their accounts with other airlines. This led to an agreement of standard ticketing procedure and agreement of charges. Today, that pioneering work is reflected in the currently applicable IATA Resolutions. Notable examples being:

a. The Multi-lateral Intercarrier Traffic Agreements: These are the basis for the airlines interline network. Nearly 300 airlines have signed the agreements accepting each others tickets and air-waybills and thus their passenger and cargo traffic on a reciprocal basis.

© Oxford Aviation Services Limited

b. **Passenger and Cargo Services Conference Resolutions**: These prescribe a variety of standard formats and technical specifications for tickets and air-waybills.

c. **Passenger and Cargo Agency Agreements and Sales Agency Rules**: These govern the relationship between IATA Member airlines and their accredited agents, both passenger and cargo.

2.16 THE AUTHORITY OF THE COMMANDER

2.16.1 Maritime Law. The first meeting of international states to consider matters relating to aviation was held in Paris in 1919. This meeting is known as the Paris Convention of 1919. At the meeting the position of Britain was adopted regarding territorial airspace and the use of airspace over the high seas. In taking the view that the law of the sea de facto applied to the air, the status of an aeroplane was assumed to be that of a ship. In maritime law, the captain of ship is empowered as the legal authority under the law of the Flag State. Thus the law of England extends to any vessel registered in England whilst that vessel is in English waters or is on the high sea (outside of any other territorial water). Once that vessel enters territorial waters of another state (or waters over which another state has authority), the vessel comes under the jurisdiction of that state. Maritime Law gave considerable authority to the Captain and whilst on board, all passengers and crew are subject to this authority.

2.16.2 Application of the Law of the State of Registry. Each aeroplane is required to be registered for the purpose of flying passengers and freight, and the registration authority is defined by international law. The law of the state of registration applies to aeroplanes in the same manner as ships at sea. The operator of an air transport operation is required by law to nominate a commander (captain) from one of the fully qualified and fully licensed pilots of a crew. In this respect the law is quite precise in that the commander must be a pilot. Annex 6 to the Chicago Convention details the duty of the Pilot in Command and places upon him the responsibility "... for the operation and safety of the aeroplane and for the safety of all persons on board during flight time".. Flight time is defined for an aeroplane as the period from when the aeroplane first moves under it own (or external) power for the purpose of taking off, until the time it comes to rest for the first time after landing for the purpose of discharging passengers. For a helicopter it is during the period that the rotors are turning.

2.16.3 Protocols to the Warsaw Convention. The protocols to the Warsaw Convention of 1929 (the latest – Montreal 1978) include measures to counter the unlawful interference with flight and the perpetration of unlawful acts on board aeroplanes. Each contracting state was required to embody the requirements of the protocols into national law. JAA, JAR-OPS 1.095 states: "An operator shall take all reasonable measures to ensure that all persons carried in the aeroplane obey the lawful commands given by the commander for the purpose of securing the safety of the aeroplane and of the persons or property carried therein."

© Oxford Aviation Services Limited

2.16.4 The Operations Manual. The Commander's authority, his duty and responsibilities are defined in Part 1 of the Operations Manual, which by virtue of the validation of the Operations Manual by the Authority is confirmed as being that as required by National Law.

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

2.17.1 The Rome Convention of 1952 dealt with damage caused by foreign aircraft to third parties on the ground. The economic aspects of this were considered by the Air Transport Committee of the Council of ICAO prior to acceptance by a diplomatic conference on private air law in Rome. The convention includes the principle of absolute liability of the aircraft operator for damage caused to third parties on the surface but places a limitation on the amount of compensation. It also provides for compulsory recognition and execution of foreign judgements.

2.18 COMMERCIAL PRACTICES AND ASSOCIATED RULES (LEASING)

2.18.1 Introduction. During the second half of the 20th century the global economy has been the subject of many international conferences and the setting up of regional alliances for the promotion of trade. In many cases free trade zones were set up between groups of countries where internal tariff barriers were removed and external barriers reinforced. Organisations like the EEC/EU, ASEAN, the now defunct COMECON, were established to preferentially serve the populations of the member States. On a global scale, this was seen as protectionism and unfair trading by limiting access to markets by non-member States. It was also a major factor in the increasing level of poverty and escalating debt in the "third world". In all cases the major economic powers dominated world trade with large multi-national companies evolving to breach local free-trade arrangements. International aviation did not escape this situation, with the highly profitable routes being monopolised by a small number of very large airlines. A major restriction on the growth of small airlines serving regional needs was the escalating cost of aeroplanes coupled with huge increases in the price of fuel resulting from OPEC pricing agreements and international crisis, especially in the Middle East.

2.18.2 Economic Considerations. Whilst the cost of fuel has, in real terms, decreased through inflation and competition, the cost of aeroplanes has consistently outstripped the ability of small and medium size air operations to purchase them. Even the large operators now share the cost of aeroplanes with financial institutions, and leasing of aeroplanes by smaller operations from larger airlines, banks and specially established financial institutions (aviation finance and leasing companies) is now common place. The need to control the leasing of aeroplanes, especially to ensure that the safety regulations are applied, was recognised by ICAO as early as 1948, through the Convention on the International Recognition of Rights in Aircraft.

© Oxford Aviation Services Limited

2.18.3 Leasing. Leasing, in aviation law, is the situation whereby an aeroplane is used by one operator, whilst the ownership title remains with another operator. The operator using the aeroplane pays the owner an agreed sum for the use of the aeroplane over a specified period. The type of leases are described below. They can range from an arrangement whereby an airline "borrows" an aeroplane to use whilst one of its own is unuseable, to the situation where an airline doesn't own any aeroplanes but operates a fleet of leased aeroplanes painted in the company livery, on a long term basis.

2.18.4 Terminology. The following terminology is generally used with regard to leasing of aeroplanes:

a. **Dry Lease**. This is when the leased aeroplane is operated under the AOC of the lessee (the operator borrowing the aeroplane).

b. **Wet Lease**. This is when the leased aeroplane is operated under the AOC of the lessor (the operator lending the aeroplane to the lessee).

2.18.5 Leasing Between JAA Operators. The following terminology has the meaning stated in the context of JAA operations:

a. **Wet Lease-Out.** This is the situation in which a JAA operator providing an aeroplane and complete crew to another JAA operator, remains the operator of the aeroplane. (The aeroplane is operated under the AOC of the lessor)

b. **Other Leasing**. A JAA operator utilising an aeroplane from, or providing it to another JAA operator, must obtain prior approval from his respective authority. Any conditions, which are part of this approval, must be included in the lease agreement. Those elements of lease agreements which are approved by the authority, other than lease agreements in which an aeroplane and complete crew are involved and no transfer of functions and responsibility is intended, are all to be regarded, with respect to the leased aeroplane, as variations of the AOC under which the flights will be operated.

2.18.6 Leasing Between a JAA Operator and Any Other Entity (other than a JAA Operator).

a. **Dry Lease-In**. Before a JAA operator is permitted to dry lease in an aeroplane from a non JAA source, the approval of the Authority is required. Any conditions of this approval are to form part of the leasing agreement. Where an aeroplane is dry leased-in, the JAA operator is to notify the authority of any differences to the requirements of JAR-OPS 1 with regard to Instruments and Communications equipment fitted to the aeroplane, and receive confirmation from the authority that the differences are acceptable.

© Oxford Aviation Services Limited

b. **Wet Lease-In.** No JAA Operator shall wet lease-in an aeroplane from a non JAA source without the approval of the authority. Concerning wet leased-in aeroplanes, the JAA operator is to ensure:

i. the safety standards of the lessor with respect to maintenance are equivalent to JARs;
ii. the lessor is an operator holding an AOC issued by a state which is a signatory of the Chicago Convention;
iii. the aeroplane has a standard C of A issued in accordance with ICAO Annex 8. A C of A issued by a JAA member State other than the State responsible for issuing the AOC, will be accepted without further showing when issued in accordance with JAR-21); and
iv. Any JAA requirement made applicable by the lessee's Authority is complied with.

c. **Dry Lease-out.** A JAA operator may dry lease-out an aeroplane for any purpose of commercial air transport to any operator of a State which is a signatory of the Chicago Convention providing that the following conditions are met:

i. The Authority has exempted the JAA operator from the relevant provisions of JAR-OPS Part 1 and, after the foreign regulatory authority has accepted responsibility in writing for surveillance of the maintenance and operation of the aeroplane(s), has removed the aeroplane from its AOC; and
ii. The aeroplane is maintained in accordance with an approved maintenance programme.

d. **Wet Lease-out.** A JAA operator providing an aeroplane and complete crew and retaining all the functions and responsibilities described in JAR-OPS 1 Sub Part C (Operator Certification and Supervision), shall remain the operator of the aeroplane.

2.18.7 Leasing of Aeroplanes at Short Notice. In circumstances where a JAA operator is faced with an immediate, urgent and unforeseen need for a replacement aeroplane, the approval required to wet lease-in from a non-JAA source may be deemed to have been given, provided that:

a. the lessor is an operator holding an AOC issued by a State which is a signatory of the Chicago Convention; and

b. the lease-in period does not exceed 5 consecutive days; and

c. the Authority is immediately notified of the use of this provision.

© Oxford Aviation Services Limited

2.18.8 Application of European Standards. Some ECAC member States, those members of the EU, are bound by EC Council Regulation 2407/92 which contains provisions on leasing. Other ECAC member States apply the conditions of ECAC, which are broadly in line with the EC regulations, stating that where leasing is concerned, leases must be consistent with their national and international legal obligations. The aim of ECAC (ECAC Recommendation on Leasing of Aircraft ECAC/21-1) is to harmonise policy on leasing "to the highest possible degree", so that:

a. In the case of a wet lease, passengers and other users are entitled to expect an equivalent standard of safety and service from the lessor to that which the lessee would provide;
b. The identity of the actual air carrier operating the flight should be identifiable;
c. In the case of dry leasing: Safety functions and duties of the State of Registry, that can more adequately be discharged by the State of the Operator, should be transferred to the authorities in the State of the lessee;
d. Leases should not be used as a means to circumvent applicable laws, regulations and international agreements;
e. A framework can be set up for the exchange of information and setting up a data base for the ECAC Action Programme for the Safety Assessment of Foreign Aircraft (SAFA);
f. Common rules can be applied in Member States leading to a uniform and more liberal leasing regime for airlines of these countries.

2.18.9 World Trade Organisation and the General Arrangement of Trade and Services for Aviation (WTO/GATS). In recognition of the need to establish a world order to promote international trade on a fair basis by the removal of unfair barriers to international trade, the World Trade Organisation was set up and through the negotiated General Agreement on Tariff's and Trade (GATT) leading to General Arrangements on Trade and Services (GATS), international arrangements have been established to abolish unfair practices and to encourage growth, and thus prosperity, in the global economy.

2.18.10 Rights in Aircraft on Air Traffic. The ownership, financial title and possession of aircraft subject to a leasing, finance agreement or mortgage, is the subject of international legislation which recognises the law of the State of Registration as the law applicable to such contracts. Before the Chicago Convention addressed this subject, the Conference for the Unification of Certain Rules Relating to the Precautionary Arrest of Aircraft (1933) permitted the arrest of an aircraft for contravention of national law by the operator, or arrest to facilitate possession in the case of default by the operator in respect of the loans with which the aircraft was purchased. In 1948, the Council of ICAO adopted the Convention on the International Recognition of Rights in Aircraft. This is the international law concerning ownership of aircraft and the rights of the lender/mortgagee.

© Oxford Aviation Services Limited

a. Under the agreement, the member states undertake to recognise:

1. the ownership of aircraft

2. the right to acquire aircraft by purchase and the subsequent right of possession

3. the right of possession of aircraft leased for six months or more

4. mortgages and other charges over aircraft which are contractually created as security for loans

b. Providing that such rights:

1. have been constituted in accordance with the laws of the State in which the aircraft was registered; and

2. are recorded in a national register of aircraft, the aircraft is properly registered and changes in ownership are recorded

c. It was also agreed that nothing in the Convention would prevent the recognition of rights in aircraft under the law of any contracting State providing the rights of possession had priority. In effect, this means that the operation of an aircraft is subject to the laws of the State over which it is being flown or on the ground, but the aircraft (including any equipment) cannot be seized and sold as a penalty.

d. The Convention also covers:

1. the recording of aircraft details in registers

2. the content of a certificate of registration

3. public right of access to registration documents

4. the right of the mortgagee to levy interest on any recovered debt after the sale of a repossessed aircraft

5. which national law applies to sale of repossessed aircraft

6. appeals where the provisions of the Convention have not been complied with

7. the rights of other creditors

© Oxford Aviation Services Limited

8. the rights of persons entitled to indemnity arising from injury or damage to property

9. responsibility for costs

10. the inclusive sale of equipment (parts) with the sale of the aircraft and the recognition of the right of the owner of equipment supplied for use on the aircraft on rental or lease terms

11. the right to enforce national law relating to immigration, customs or air navigation

12. the exclusion of military, customs or police aircraft.

© Oxford Aviation Services Limited

Appendix 1 to Chapter 2

SUMMARY OF RELEVANT INTERNATIONAL CONVENTIONS AND AGREEMENTS

DATE	PLACE	TITLE	CONTENT
October 1919	Paris	Convention Relating to the Regulation of Air Navigation	Sovereignty over airspace. Standards for airworthiness. Certificates of competency for crews. Definition of 'aircraft'.
October 1929	Warsaw	Convention for the Unification of Certain Rules Relating to International Carriage by Air	Carrier's liability for damage caused to passengers, baggage and goods. Damage caused by delay.
May 1933	Rome	Convention for the Unification of Certain Rules Relating to Damage Caused by Aircraft to Third Parties on the Surface	Recognised the liability of carrier for damage caused on the ground. Led to the Brussels Insurance Protocol of 1938 Replaced by the Rome Convention of 1952 (drafted by ICAO)
May 1933	Rome	Convention for the Unification of Certain Rules Relating to Precautionary Arrest of Aircraft	Specified which aircraft can be arrested or 'attached'. Excludes government aircraft (incl postal transport), aircraft in service on public transport (and back-up aircraft), aircraft apportioned for the carriage of persons or goods for reward.
September 1938	Brussels	Protocol Supplementing the Convention for the Unification of Certain Rules Relating to Damage Caused by Aircraft to Third Parties on the Surface	Obligation of carrier to arrange third party insurance. This is what eventually killed off Pan Am!
December 1944	Chicago	Convention on International Civil Aviation	Regulation of Civil Aviation. Led to the creation of ICAO. 18 Annexes to the Chicago Convention
December 1944	Chicago	International Air Services Transit Agreement	The two technical freedoms of the air
December 1944	Chicago	International Air Transport Agreement	The three commercial freedoms of the Air (Known as the 5 freedoms agreement ; 2 +3 = 5) Note: The other freedoms 6, 7 and 8 are really no more than minor variations of these 5.
June 1948	Geneva	Convention on the International Recognition of Rights in Aircraft	To protect the rights of the seller where aircraft are bought on HP, mortgage or lease.

October 1952	Rome	Convention on Damage by Foreign Aircraft to Third Parties on the Surface	Replaced the 1933 Convention. Poor ratification. (USA, UK, Canada, Germany and many other major players) refused to ratify because compensation too low; National Law more powerful. El Al crash in Holland, neither states contracting.
September 1955	The Hague	Protocol to Amend the Convention for the Unification of Certain Rules Relating to International Carriage by Air	a. Removed exemptions for all except military aircraft b. Raised compensation limit to 250 000 gold francs c. Simplified the requirements for tickets and baggage checks d. Made carrier liable for 'pilot error'
April 1956	Paris	Multilateral Agreement on Commercial Rights of Non-Scheduled Air Services in Europe	An ECAC convention. Covers international flights within Europe of a non scheduled nature: Humanitarian and emergency; taxi class services (seating limited to 6 and not to be re-sold); hiring by a single person (or company); single flights.
April 1960	Paris	Multilateral Agreement relating to Certificates of Airworthiness for Imported Aircraft	ECAC agreement. Allows states to render valid an existing C of A or issue a new one.
September 1961	Guadalajara	Convention Supplementary to the Convention for the Unification of Certain Rules Relating to International Carriage by Air Performed by a Person Other than the Contracting Carrier	Covers charter services and 'wet-leasing'. Defines who the contracting carrier and the actual carrier is in a charter or wet-lease situation. Defines the liability of the carrier(s).
September 1963	Tokyo	Convention on Offences and Certain Other Acts Committed on Board Aircraft	a. Determines who's penal law is applicable b. Defines the rights and obligations of the aircraft Commander c. Defines the rights and obligations of the authorities of the state in which the aircraft lands after d. Defines unlawful seizure of aircraft
December 1970	The Hague	Convention for the Suppression of Unlawful Seizure of Aircraft	Applicable to domestic and international flights. Defines 'in flight'. Allocates jurisdiction after offence committed: a. State of Registration b. State of landing if offender still on board c. State of Operator d. State in which offender is apprehended if that state does not wish to extradite

March 1971	Guatemala City	Protocol to Amend the Convention for the Unification of Certain Rules Relating to International Carriage by Air	Makes the carrier absolutely liable. Replaces 'fault' liability with 'risk' liability i.e. in the case of death or injury caused by sabotage or hi-jacking. Limits liability to $100 000 for passengers and baggage including negligence. Exceptions: i) self inflicted or wilful damage by the claimant ii) death or injury resulting from ill health of passenger
September 1971	Montreal	Convention for the Suppression of Unlawful Acts Against the Safety of Civil Aviation	Deals with a person who: i) acts violently on board an aircraft ii) destroys or damages an aircraft in service iii) places an EOD or similar on board an aircraft iv) destroys or damages a nav aid or interferes with operation v) passes false information thus endangering an aircraft
September 1971	Montreal	Supplementary to the Convention for the Suppression of Unlawful Acts Against the Safety of Civil Aviation	Deals with offences committed at an airport serving international aviation
September 1975	Montreal	Additional Protocols (1 - 4) to Amend the Convention for the Unification of Certain Rules Relating to International Carriage by Air	a. Allows payment to be made in IMF Special Drawing Rights (SDR) b. Replaces limits in Hague Protocol with SDRs c. Replaces limits in Guatemala Protocol with SDRs d. Changes liability regarding goods - applies SDRs
September 1978	Montreal	Protocol to Amend the Convention on Damage by Foreign Aircraft to Third Parties on the Surface	Extended Rome 1952 to include damage caused by an aircraft registered, the state of Operator is, or the operator lives or his place of residence is - in another contracting state.

December 1982	Montego Bay	UN Convention of the High Seas	a. Air Piracy an offence b. Hot pursuit permitted c. Territorial waters extended to 12 nm d. 200 nm economic zone respected - freedom to overfly e. Right to transit straits without permission no longer allowed - freedom to transit straits under 1st freedom reinforced f. Established the authority of the Hamburg Court regarding disputes of overflying rights in territorial waters, contiguous zones, etc..
September 1990	Cyprus	The Convention of Cyprus	Established the JAA
October 1995	Kuala Lumpur	IATA Intercarrier Agreement on Passenger Liability	Agreement by IATA members to waive limitations of liability and recoverable damages established by the Warsaw Convention. Damages to be awarded by reference to the law of domicile of the passenger.

CHAPTER THREE - AIRWORTHINESS OF AIRCRAFT

Contents

		Page
3.1	INTRODUCTION	3 - 1
3.2	AIRWORTHINESS	3 -1

© Oxford Aviation Services Limited

3.1 INTRODUCTION

3.1.1 Standards. The Airworthiness standards of Annex 8 of the Chicago Convention are related to the Standards of Annex 6, part 1 dealing with aeroplane performance operating limitations. An element of the safety of an operation is the intrinsic safety of the aircraft. That is, the level of its airworthiness. The level of airworthiness of an aircraft is not fully defined by the application of the airworthiness Standards of Annex 8, but also requires the application of the Standards of Annex 6 that are complimentary. In other words, Annex 8 deals with airworthiness from the engineering point of view, whereas Annex 6 deals with the safety standards necessary for any operation. The standards apply to performance and flying qualities.

3.1.2 Applicability. The Standards of Airworthiness, detailed in Annex 8 Part 3 are applicable to aeroplanes of over 5 700kg maximum certificated take-off mass, intended for the carriage of passengers, cargo or mail in international air navigation. Unless specifically exempted, the standards apply to the complete aeroplane including power-units, systems and equipment and for the standards to be applicable, the aircraft is to have at least two engines.

3.2 AIRWORTHINESS

3.2.1 Certificate of Airworthiness. A Certificate of Airworthiness (CofA) is issued by the State of Registration when satisfactory evidence is provided that the aeroplane complies with the appropriate airworthiness requirements. ICAO has specified a standard form of C of A which is to include the nationality and registration marks, manufacturer and designation of the aircraft (ie Boeing 747-400), aircraft serial number (ie the airframe number like a car chasis number).

3.2.2. Continuing Airworthiness. The state of registry is responsible for determining if an aircraft continues to be airworthy. The state is required to maintain a system for recording faults, malfunctions, defects or other occurrences which might affect the airworthiness of aircraft of more than 5 700 Kg maximum take off mass. For these aircraft, the state of design is required to ensure that a structural integrity programme exists to ensure the airworthiness of such aircraft. The programme is to include information concerning corrosion control.

3.2.3. Validity of C of A. The C of A will be renewed or will remain valid provided that the continued airworthiness of the aircraft has been determined by a periodic inspection. The period between the inspections is to be such with regard to the type of service and elapsed period, or in accordance with a system of inspection (schedule of inspections) established by the state. Where an aircraft is damaged, it is the responsibility of the State of Registry to judge whether the damage is of such a nature that the aircraft is no longer airworthy.

3.2.4. Aircraft limitations and information. Each aircraft is required to have a flight manual (or other means) in which the approved limitations are defined and additional information is contained necessary for the safe operation of the aeroplane.

© Oxford Aviation Services Limited

CHAPTER FOUR - AIRCRAFT NATIONALITY AND REGISTRATION MARKS

Contents

Page

4.1 INTRODUCTION ..... 4 - 1

4.2 NATIONALITY, COMMON AND REGISTRATION MARKS ..... .4 - 1

4.3 CERTIFICATION OF REGISTRATION ..... 4 - 2

4.4 DIFFERENCES BETWEEN NATIONAL REGULATIONS ..... 4 - 2

4.5 CLASSIFICATION OF AIRCRAFT ..... 4 - 2

4.6 AIRCRAFT MARKINGS ..... 4 - 4

© Oxford Aviation Services Limited

4.1 INTRODUCTION

4.1.1 Annex 7. The Paris Convention of 1919 requires all aircraft to be registered and to carry a nationality mark and a registration mark. Annex 7 of the Chicago Convention covers Aircraft Nationality and Registration Marks. The Annex contains only Standards without any recommendations. An authority may temporarily exempt an aircraft from registration (test flying of a prototype) or the carriage of markings (an historic aircraft or ex-military aeroplane).

4.2 NATIONALITY AND REGISTRATION MARKS.

4.2.1 Markings. The nationality and registration mark is to consist of a group of characters.

In this case the **G** is the nationality and is always to precede the registration mark, which in this case is **AWFY**. When the first character of the registration mark is a letter, it is be preceded by a **hyphen**. The nationality mark is to be selected from the series of nationality symbols included in the radio call signs allocated to the State of Registry by the International Telecommunications Union. The nationality mark is to be notified to ICAO. The registration mark may consist of letters, numbers or a combination of both and is to be that assigned by the State of Registry.

4.2.2 Common Mark. A common mark is a prefix to a registration where the aircraft is operated by an international operating agency. In this case, one of the establishing states, is to perform the function of the State of Registry. A common mark is assigned by ICAO to the common mark registering authority which is responsible for registering the aircraft of an international operating agency. Such registration will not be on a national basis. The common mark 4YB has been issued by ICAO to Jordan and Iraq for registering aircraft operated by Arab Air Cargo. The state of Jordan performs the function of the State of Registry.

4.2.3 Exclusions. Certain combinations of letters are not permitted to be used as registration letters. These are those combinations of letters used for specific distress traffic prosigns:

SOS (Distress)
PAN (Urgency)
XXX (Urgency – morse)
TTT (Safety /Securité – morse)

Combinations starting with Q implying a 'Q' code and 5 letter combinations used in the international Code of Signals, are also proscribed.

© Oxford Aviation Services Limited

4.3 CERTIFICATION OF REGISTRATION

4.3.1 Status and Content. The certificate of registration is an official document certifying that the State of Registry has registered an aircraft. It details:

a. the Nationality or Common mark,

b. the registration mark,

c. the manufacturer's designation of the aircraft,

d. the serial number of the aircraft,

e. the name and address of the owner,

f. a certificate that it has been entered on the register of the State,

g. the dated signature of the registering officer.

h. The certificate is to be carried in the aircraft at all times.

4.4 DIFFERENCES BETWEEN NATIONAL REGULATIONS

4.4.1 National Supplement. The supplement to Annex 7 contains information regarding aircraft nationality marks, which have been notified to ICAO at part B (alphabetically by state and alphabetically by nationality marks). Part A details the differences which contracting states have notified to ICAO. In this respect, each contracting state is recorded to have either notified that:

a. Differences exit;

b. No differences exit;

c. No information has been received.

4.4.2 Notified Differences. The final part of the Supplement contains a summary of the differences notified by State (alphabetically). Each State is required to list the differences notified to ICAO at section GEN 1.7 of that State's AIP.

4.5 CLASSIFICATION OF AIRCRAFT

4.5.1 Table of Classification. The following table classifies aircraft and is used to determine where nationality (or common) marks and registration marks are displayed on aircraft. You do not need to know where marks are required to be displayed. The table is included for information only.

© Oxford Aviation Services Limited

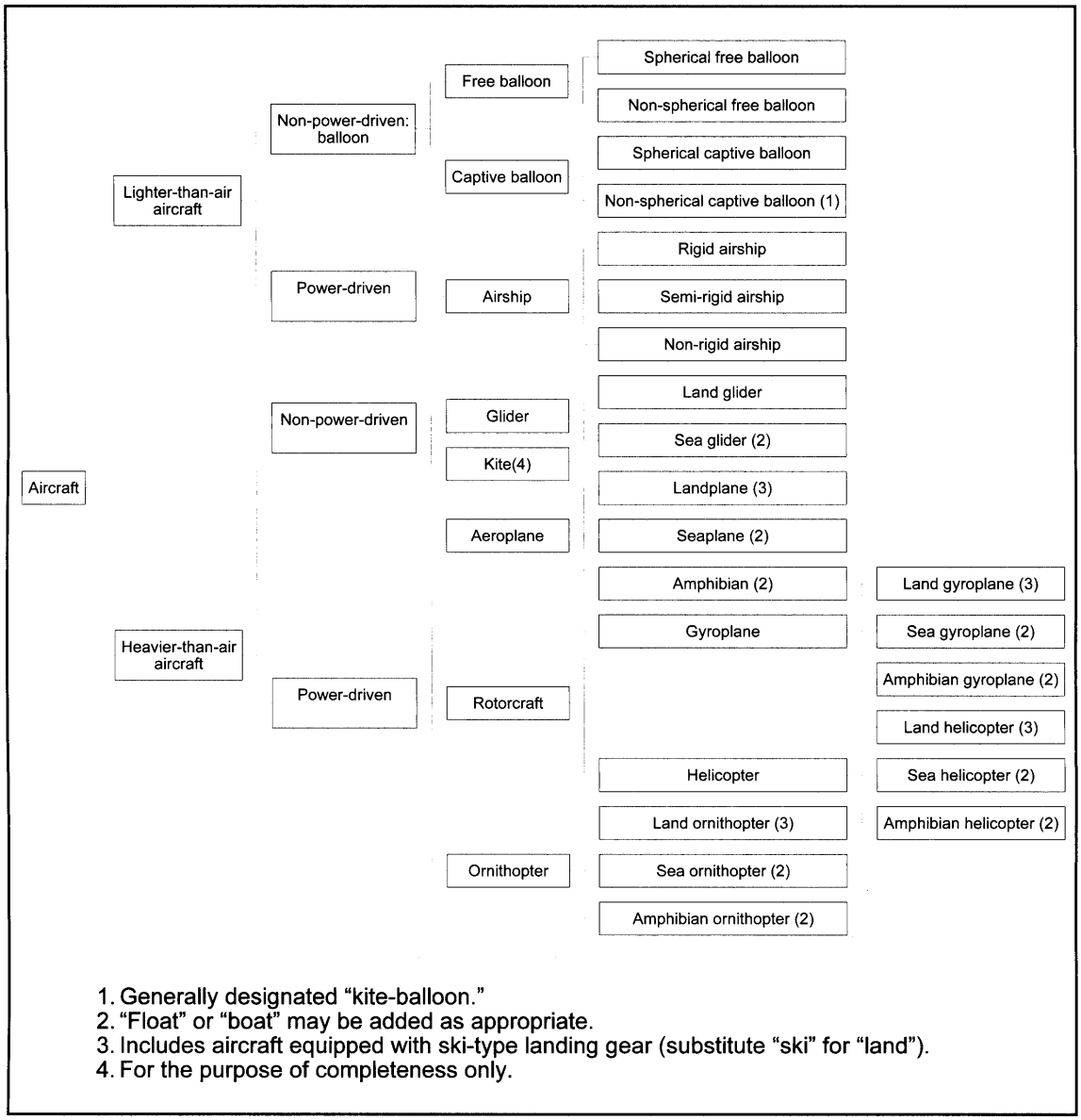


Table 4.5 Classification of Aircraft

© Oxford Aviation Services Limited

4.6 AIRCRAFT MARKINGS

4.6.1 Location of Nationality and Registration Marks. The nationality or common mark and registration mark are to be painted on the aircraft or shall be affixed by any other means ensuring a similar degree of permanence. The marks shall be kept clean and visible at all times.

4.6.1.1 Heavier than Air Aircraft. The required markings are to appear on the lower surface (underside) of the wing, the fuselage between the wings and the tail, or on the upper half of the vertical tail surface.

4.6.1.2 Size of Markings. The markings on the wings are to be at least 50cm high, and on the fuselage and vertical surfaces, 30cm high.

© Oxford Aviation Services Limited

CHAPTER FIVE - PERSONNEL LICENSING

Contents

Page

5.1 INTRODUCTION ..... 5 - 1

5.2 JAR-FCL FLIGHT CREW LICENSING ..... 5 - 1

5.3 GENERAL REQUIREMENTS ..... 5 - 1

5.4 JAR-FCL 1 - COMMERCIAL PILOT'S LICENCE (AEROPLANES) - CPL(A) 5 - 3

5.5 JAR-FCL 1 - AIRLINE TRANSPORT PILOT'S LICENCE (AEROPLANE) - ATPL(A) ..... 5 - 4

5.6 JAR-FCL 1 - RATINGS ..... 5 - 5

5.7 JAR-FCL 3 - MEDICAL REQUIREMENTS ..... 5 - 9

APPENDIX 1 ANNEX 1 (PERSONNEL LICENSING) .....5 - 12

APPENDIX 2 ANNEX 6 (OPERATION OF AIRCRAFT) .....5 - 21

APPENDIX 3 ICAO (ANNEX 1) & JAA (JAA FCL 1) LICENCE REQUIREMENTS (SUMMARY) ..... 5 - 22

REVISION QUESTIONS CHAPTERS 1 - 5 ..... 5 - 27

© Oxford Aviation Services Limited

5.1 INTRODUCTION

ICAO Personnel Licensing rules and regulations are contained in Annex 1 to the Chicago Convention. Under the heading of general information, the status of Annex Components is discussed and is a standing reference to all the Annexes.

The rules and regulations for the issue of a JAA licence are applicable to the licence you hope to obtain. However, the syllabus is based on ICAO SARPS and PANS which you are required to know to pass the exam. The Learning Objectives require knowledge of both JAR-FCL and Annex 1.

5.2 JAR-FCL FLIGHT CREW LICENCING

The JAA document, which contains the regulations concerning flight crew licensing (FCL), is JAR-FCL. In deciding a basic structure for JAR-FCL, Annex 1 to the Chicago Convention (as amended by the various protocols) was chosen as the definitive document. Additional sub-divisions have been added where considered necessary. The content of Annex 1 has been used and added to where necessary by making use of existing European regulations. The document, JAR-FCL is divided into three parts:

a. JAR-FCL Part 1 contains requirements for Aeroplane pilots (JAR-FCL 1)
b. JAR-FCL Part 2 contains requirements for Helicopter pilots (JAR-FCL 2)
c. JAR-FCL Part 3 contains Medical requirements (JAR-FCL 3)
d. JAR-FCL Part 4 contains requirements for Air Engineers (JAR-FCL 4)

5.3 GENERAL REQUIREMENTS

5.3.1 Requirement for Licence. It is a requirement of JARs, that no person shall act as a flight crew member of a civil aeroplane registered in a JAA Member State, unless that person holds a valid licence and rating complying with the requirements of JAR-FCL appropriate to the duties being performed, or in accordance with an authorisation under JAR-FCL 1.085 (student pilots) and/or 1.230 (special authorisation). The licence must be issued by:

e. a JAA Member State; or
b. another ICAO Contracting State and rendered valid in accordance with JAR-FCL 1.015 (acceptance of licences)

5.3.2 Validation and revocation. A JAA Member State may, at any time in accordance with national procedures, act on appeals, limit privileges, or suspend or revoke any licence, rating, authorisation, approval or certificate it has issued in accordance with the requirements of JAR-FCL, if it is established that an applicant or licence holder has not met, or no longer meets, the requirements of JAR-FCL or relevant national law of the State of licence issue. If this situation exists where a licence has been issued by a non JAA Member State and validated by a JAA Member State, then the Member State is to report the situation to the State of licence issue and the JAA, after which the licence

© Oxford Aviation Services Limited

holder may not pilot an aircraft registered in that State or pilot any aircraft in that States airspace. A licence issued will be valid for a period of 5 years (1.025). Within this period, the licence will be re-issued by the Authority:

a. After initial issue or renewal of a rating;
b. When paragraph xii in the licence is completed and no further spaces remain;
c. For any administrative reason; or
d. At the discretion of the Authority when a rating is re-validated

5.3.3 Validity of ratings. The validity of a licence is determined by the validity of the ratings contained therein and the medical certificate.(1.025b).

a. **Instrument Ratings.** An instrument rating is valid for a period of 12 months. It may be renewed before the expiry of the period, but if the candidate fails the test he/she may not fly in any capacity for which the rating is required until successfully passing a subsequent test.

b. **Type Rating.** A type rating is valid for one year, and remains valid subject to successful Pilot Proficiency Checks.

1. **Annex 6 Requirement.** To remain valid, two checks are required in any 12-month period separated by a period of not less than 4 months.

2. **JAR-FCL 1 Requirement.** Rating is valid for one year from date of issue or the date of expiry if revalidated within the validity period. To validate, one check is required to be completed within three months of the expiry date.

5.3.4 Medical Certificate. In order to apply for or to exercise the privileges of a licence, the applicant is to hold a medical certificate issued in accordance with the provisions of JAR-FCL 3 and appropriate to the privileges of the licence. (1.035)

5.3.5 Medical Fitness. Licence holders or student pilots are not to exercise the privileges of their licences when they are aware of any decrease in their medical fitness. In such situations they are to seek the advice of the Authority or an Aeromedical Establishment (AME).

5.3.6 Age 60 and Over. The holder of a pilot licence who has attained the age of 60 years is not permitted to act as the pilot of an aeroplane engaged in commercial air transport except:

a. As a member of a multi-pilot crew; provided that;
b. He is the only pilot in that crew 60 years of age or over.

© Oxford Aviation Services Limited

5.3.7 **Age 65.** The holder of a pilot licence who has attained the age of 65 years is not permitted to act as the pilot of an aeroplane engaged in commercial air transport. In France the proscription is effective from the age of 60, and in the Czech Republic from the age of 62.

5.3.8 **State of Licence Issue.** If an applicant has demonstrated satisfactory completion of all the requirements for the issue of a licence to the Authority of a State, and that State issues a licence to the applicant, that State is subsequently referred to as the State of Licence Issue.

5.3.9 **Normal Residency.** JAR-FCL frequently refers to the place of normal residency. This is defined as the place where an individual usually lives for at least 185 days per calendar year because of personal and occupational ties or, in the case of a person with no occupational ties, because of personal ties which show close links between that person and the place where she or he is living.

5.3.10 **Flight Crew Licence specification.** A valid licence and a valid medical certificate has always to be carried by the pilot when exercising the privileges of his/her licence. A document containing a photograph shall be carried for the purpose of identification of the holder of the licence. Where a State issues such a document, a **crew member certificate** shall suffice to identify a person as qualified aircrew when engaged on aircrew duty in accordance with the terms of employment issued by the operator of an air transport undertaking. Any medical endorsements (e.g. use of spectacles, etc..) will be entered on the medical certificate and the licence. The authority in this respect, is the Authority of the State of Licence Issue. The following are the specific requirements:

a. Each page shall not be less than 1/8th A4 and not more than the size of a European Community passport.
b. The licence number will always commence with the UN number of the country code of the State of Issue.
c. Standard date format is to be used e.g. day/month/year in full (e.g 20/11/1999)
d. Only abbreviations specified in FAR-FCL are to be used
e. The re-issue date is to be not later than 5 years from the date of initial issue.
f. A passport will suffice to provide photographic evidence of the identity of the holder
g. All additional licencing information/requirements of ICAO is to be included at item xiii

5.4 JAR-FCL 1 - COMMERCIAL PILOT'S LICENCE (AEROPLANES) - CPL(A).

5.4.1 **Medical Requirement.** An applicant for this licence or a licence holder for the purpose of exercising the privileges of the licence, is required to hold a valid class 1 medical certificate.

5.4.2 **Minimum age.** The minimum age for the issue of a CPL(A) licence is 18.

© Oxford Aviation Services Limited

5.4.3 Privileges. The holder of a CPL(A) may act as pilot-in-command (PIC) of any aeroplane engaged in operations other than commercial air transport (1.150), or any single pilot operation aeroplanes in commercial air transport. This licence also allows the holder to act as co-pilot in commercial air transport.

5.5 JAR-FCL 1 - AIRLINE TRANSPORT PILOT'S LICENCE (AEROPLANE) - ATPL(A)

5.5.1 Medical Requirement. An applicant must hold a valid class 1 medical certificate for the issue of a licence and for a holder to exercise the privileges of the licence.

5.5.2 Minimum age. The minimum age for the issue of an ATPL(A) is 21.

5.5.3 Privileges. The holder of an ATPL(A) is permitted to exercise all the privileges of a holder of a PPL(A); CPL(A); IR(A) and to act as PIC or co-pilot of aeroplanes engaged in air transportation.

5.5.4 Hours requirement. An applicant for an ATPL(A) shall have completed at least **1500 hours** of flight time as a pilot of aeroplanes of which not more than 100 hours may have been completed in a **flight simulator**. The total is to include:

a. 500 hours in multi-pilot operations in transport category aeroplanes or commuter category or equivalent code.
b. 250 hours as either PIC or at least 100 hours as PIC and 150 hours as co-pilot performing under the supervision of the PIC duties and functions of the PIC assuming that the method of supervision is acceptable to the Authority.
c. 200 hours of cross country flight of which 100 shall be as PIC or as co-pilot performing under the supervision of the PIC duties and functions of the PIC assuming that the method of supervision is acceptable to the Authority.
d. 75 hours off instrument time of which not more than 30 hours may be instrument ground time, and
e. 100 hours of night flight as PIC or as co-pilot.

5.5.4.1 Credits. Holders of a pilot licence or equivalent document for other categories of aircraft will be credited with flight time in other categories as set out in JAR-FCL 1.155, except that flight time in helicopters is credited up to 50% of the 1500 hours required. Holders of a flight engineers licence will be credited with 50% of flight engineer flight time up to a maximum of 250 hours. This may be credited against the 1500 hours total required and the 500 hours requirement of (1) above provided that the total credit given does not exceed 250 hours.

© Oxford Aviation Services Limited

5.6 JAR-FCL 1 - RATINGS

5.6.1 Class or Type Rating. The holder of a pilot licence is not to act in any capacity as a pilot of an aeroplane, except as a pilot undergoing skill testing or receiving flight instruction, unless he/she has a valid and appropriate class or type rating. If any such rating is limited to acting as co-pilot only or in accordance with any other limitation of the JAA, such limitations are to be recorded on the rating. JAR FCL 1 requires successful completion of a flying performance check and a written (or oral) examination. The ongoing validity of a type or class rating is dependant upon regular skill testing.

5.6.1.1 Class Ratings (A) Divisions. Class ratings are established for single pilot aeroplanes not requiring a type rating. These are:

a. all single engine piston land aeroplanes
b. all single engine piston sea planes
c. all touring motor gliders
d. each manufacturer of single engine turbo-prop land aeroplanes
e. each manufacturer of single engine turbo-prop sea planes
f. all multi-engine piston land aeroplanes
g. all multi-engine piston sea planes

5.6.1.2 Type Ratings (A) Divisions. Type ratings for aeroplanes are established for:

a. Each type of multi-pilot aeroplane; or
b. each type of single pilot multi-engine aeroplane fitted with turbo-prop or turbojet engines; or
c. each type of single pilot single engine aeroplane fitted with a turbojet engine; or
d. any other type of aeroplane if considered necessary.

5.6.1.3 Listings. Class and type ratings for aeroplanes will be issued according to the list of class of aeroplanes (listed in JAR FCL-1 {AMC FCL 1.215}). In order to change to another type or variant of the aeroplane within one class or type rating, differences or familiarisation training is required.

5.6.1.4 Privileges. The privileges of a type or class rating are to act as a pilot on the type or class of aeroplane specified in the rating. There is no limit to the number of ratings that may be held at any one time. JAR OPS may restrict the number of ratings that can be exercised at any one time.

© Oxford Aviation Services Limited

5.6.1.5 Variants. If the variant has not been flown within a period of 2 years following difference training , further difference training or a proficiency check in that variant will be required. Difference training requires additional knowledge or training on an appropriate training device or the aeroplane. Difference training is to be recorded in the pilot's log book and signed by a CRI/TRI.SFI(A) or FI(A) as appropriate. Familiarisation training requires the acquisition of additional knowledge.

5.6.1.6 Validity and Revalidation. Type ratings and multi-engine class ratings (aeroplane) are valid for one year from the date of issue, or the date of expiry if revalidated within the validity period. The following is required to revalidate a type or class rating:

a. a proficiency check in the relevant type or class of aeroplane within three months immediately preceding the expiry date of the rating; and

b. at least 10 route sectors as pilot of the relevant type or class of aeroplane, or one route sector as the pilot of the aeroplane with an examiner during the period of validity of the rating.

c. The revalidation of an IR(A) should be combined with the type/class rating proficiency check.

d. Single pilot single-engine class ratings are valid for a period of two years from the date of issue, or date of expiry if revalidated within the validity period.

e. An applicant who fails to achieve a pass in all sections of a proficiency check before the expiry date of a class/type rating shall not exercise the privileges of that rating until the proficiency check has been successfully completed.

5.6.1.7 Type Rating Multi-pilot Conditions. An applicant for a multi-pilot type rating shall:

a. have at least 100 hours as PIC of aeroplanes;

b. have a valid multi-engine IR(A)

c. hold a certificate of MCC

d. have completed a theoretical knowledge course and passed the appropriate examination.

5.6.1.8 Type Rating Single Pilot Conditions. An applicant for a first type rating on a single pilot multi-engine aeroplane shall have completed at least 70 hours as PIC of aeroplanes.

© Oxford Aviation Services Limited

5.6.1.9 Class Rating Conditions. An applicant for a class rating for a single pilot multi engine aeroplane shall have completed at least 70 hours as PIC of aeroplanes.

5.6.2 Instrument Rating (IR). The holder of a pilot licence shall not act in any capacity as a pilot under IFR except as a pilot undergoing skill testing or dual training, unless the holder has an instrument rating appropriate to the category of aircraft. In states where flight in VMC at night is not permitted holders of a PPL or CPL shall in order to operate in VMC at night under IFR in that state, hold at least a night qualification as set out in JAR-FCL 1.125. States may impose restrictions to flight visibility for SVFR for holders of PPL and CPL more restrictive than for ATPL. An IR is valid for 12 months.

5.6.3 Instructor Rating. Five categories of instructor are recognised. These are:

a. Flight instructor rating - aeroplane (FI(A))
b. Type rating instructor rating - aeroplane (TRI(A))
c. Class rating instructor rating - aeroplane (CRI(A))
d. Instrument rating instructor rating - aeroplane (IRI(A)
e. Synthetic flight instructor authorisation - aeroplane (SFI(A))

5.6.3.1 Prerequisites. All instructors shall hold at least the licence, rating and qualification for which instruction is being given (unless specified otherwise) and shall be entitled to act as a PIC of the aircraft during such training. Instructor ratings are valid for 3 years.

5.6.3.2 Flight Instructor Rating - Aeroplane (FI(A)). An applicant for an FI(A) shall be at least 18 years of age. Until the holder has completed 100 hours of flight instruction and has supervised at least 25 student solo flights, the privileges of the rating are restricted to a supervised state. To conduct flight instruction for the issue of a PPL(A), class and type ratings for single-engine aeroplanes, the FI(A) is to have completed not less than 15 hours on t he relevant type in the preceding 12 months. For the issue of a CPL(A) the FI(A) must have completed 500 hours of flight time as a pilot of aeroplanes including at least 200 hours of flight instruction. For night flying instruction, the FI(A) must hold a night qualification.

5.6.3.3 IRI(A). For the issue of an IR(A) the applicant must have at least 200 hours flight time in accordance with the instrument flight rules, of which up to 50 hours may be instrument ground time, and have completed, as a student, at least 5 hours of flight instruction in an aeroplane or flight simulator, and passed the appropriate skill test.

© Oxford Aviation Services Limited

5.6.3.4 Revalidation of FI(A) Rating. For revalidation, a FI(A) shall fulfil two of the three following requirements:

a. completed at least 100 hours of flight instruction on aeroplanes as an FI, CRI, IRI or as an examiner during the period of validity of the rating, including at least 30 hours of flight instruction within the 12 months preceding the expiry of the FI rating, 10 hours of this 30 hours shall be instruction for an IR if the privileges to instruct for IR are to be revalidated;

b. attended a FI refresher seminar as approved by the authority within the 12 months preceding expiry of the FI rating;

c. passed a proficiency check within the 12 months preceding expiry of the FI rating.

5.6.4 Examiners. Five roles of an examiner are recognised:

a. Flight examiner (FE(A)).
b. Type rating examiner (TRE(A)/Synthetic flight examiner (SFE(A)).
c. Class rating examiner (CRE(A)).
d. Instrument rating examiner (IRE(A)).
e. Flight instructor examiner (FIE(A)).

5.6.4.1 Requirement. Examiners shall hold a licence and rating at least equal to the licence or rating for which they are authorised to conduct skill tests or proficiency checks and, unless specified otherwise, the privilege to instruct for this licence or rating.

5.6.4.2 Period of Validity. An examiners authorisation is valid for not more than three years. Examiners are re-authorised at the discretion of the Authority.

© Oxford Aviation Services Limited

5.7 JAR-FCL 3 - MEDICAL REQUIREMENTS

5.7.1 Requirement. In order to apply for, or to exercise the privileges, of a licence, the applicant or the holder shall hold a medical certificate issued in accordance with the provisions of JAR-FCL 3 (Medical) and appropriate to the privileges of the licence. The holder of a medical certificate shall be mentally and physically fit to safely exercise the privileges of the applicable licence.

5.7.2 Aeromedical Disposition. After completion of the examination the applicant shall be advised whether fit, unfit or referred to the Authority. The authorised medical examiner (AME) shall inform the applicant of any condition(s) (medical, operational or otherwise) that may restrict flying training and/or the privileges of any licence issued. In the event that a restricted medical certificate is issued which limits the holder to exercise pilot-in-command privileges only when a safety pilot is carried, the authority will give advisory information for use by the safety pilot in determining the function and responsibilities.

5.7.3 Periodic Medical Examination. A medical certificate remains valid for a period of one year, assuming as successful medical examination every year, until the holder reaches the age of 40, after which the period of examination decreases to 6 months. The annual medical examination is effectively a health check and takes into account the aging process since the issue of the original certificate. Providing the pilot has a medical examinations at the required intervals, the aging process will be taken into account. Under the JAA regulations, extensions (departments) of medical certificate validity are not permitted.

5.7.4 Decrease in Medical Fitness. Licence holders are not to exercise the privileges of their licences if they are aware that they are unwell. In such circumstances they are to seek the advice of the Authority or AME. Such circumstances are:

a. Hospital or clinic admission for more than 12 hours
b. Surgical operation or invasive procedure
c. The regular use of medication
d. The need for regular use of correcting lenses

© Oxford Aviation Services Limited

5.7.5 Medical Conditions. Every licence holder who is aware of:

a. Any significant personal injury involving incapacity to function as flight crew
b. Any illness involving incapacity to act as flight crew throughout a period of 21 days or more
c. Being pregnant

shall inform the authority in writing of such injury or pregnancy, and as soon as the period of 21 days has elapsed in the case of illness. The medical certificate shall be deemed to be suspended upon the occurrence of a - c above. In the case of injury or illness, the suspension shall be lifted on being pronounced fit after a medical examination. The authority may exempt the holder from such an examination. In the case of pregnancy, the suspension may be lifted for such period by the Authority and subject to such conditions as it thinks fit and shall cease upon the holder being medically examined after the pregnancy has ended and being pronounced fit. If this procedure is complied with, the medical certificate shall be suspended (cannot expire) during the period of illness or injury and will be reinstated once the crew member becomes fit. (1.040).

5.7.6 Suspension of Medical Certificate. Provided the authority is notified immediately in the event of injury or when pregnancy is diagnosed, or on the 21st day of prolonged illness, the medical certificate of the holder will be suspended until the holder is passed as fit to resume aircrew duty. At this point the certificate will be reinstated with a remaining validity period equal to that extant at the time that it was suspended. After a female pilot has been diagnosed as pregnant, she may be permitted to continue flying duty until such a date as the medical authority deems that it is no longer prudent for the health of the embryonic baby or the mother to continue to be engaged in flying duty. After delivery and after a medical examination, she will then be declared fit to resume duty at which point the certificate will be reinstated.

5.7.7 Validity of Medical Certificates. A class 1 medical shall remain valid as long as the preceding aeromedical examination has been performed within the last 12 months (6 months for age 40 - 64), and, the preceding extended aeromedical examination (or initial examination) has been performed within the last 60 months (24 months for age 40 - 64). If a licence holder allows the certificate to expire by more than 5 years renewal will require initial or extended aeromedical examination (at AMEs discretion). Such an examination shall be carried out at an AMC which has obtained the certificate holder's medical records. If the certificate has expired by more than 2 but less than 5 years a standard or extended examination will be required at an AMC or by an AME (if approved by the AMS) subject to the records of medical examinations being made available. If the certificate expires by more than 90 days but less than 2 years, a standard or extended examination performed at an AMC or by an AME (if approved by the AMS). If a certificate has expired by less than 90 days, renewal shall be possible by standard or extended examination as prescribed.

© Oxford Aviation Services Limited

5.7.7.1 45 Day rule. If the medical revalidation is taken up to 45 days prior to the expiry date, the validity of the new certificate extends from the previous certificate expiry date. In other words, if your certificate expires on 31 December and you have your annual medical no earlier than 15 November, the new certificate will be valid from 1 January until the next 31 December. However, if you have a medical on 1 November, the certificate will be valid from 2 November until the following 1 November.

© Oxford Aviation Services Limited

APPENDIX 1 – ANNEX 1 (PERSONNEL LICENSING)

A1.1 INTRODUCTION

A1.1.1 Requirement. The learning objectives for the JAA ATPL(A) examinations are not based solely on the requirements of JAR FCL. The question bank contains many questions relating to ICAO Annex 1 (Personnel Licensing). However, the limit of the extent of the inclusion of questions from Annex 1 is not defined and all the author has to rely on is the extent of the questions fed back from students. At the time of writing this appendix, new questions from Annex 1 are still appearing, and the authority (or its agent- the CAA) can give no indication of what is in the question bank in this respect. The following is the basic information contained in Annex 1, which is hopefully sufficiently comprehensive and adequate.

A1.1.2 International Standard. Each Annex to the Chicago Convention includes a supplement, which is a summary of the changes notified by each state (in alphabetical order) under article 38 of the convention. The supplement for Annex 1 is the biggest of all the annex supplements and signifies the disparity in flight crew licensing around the world. It must be stated that the FAA, the JAA and certainly the CAA have not, and never have, adopted the requirements of Annex 1 (crew licensing and medical) as a standard. Each authority has specific rules, to which, JAR FCL is the JAA standard applied in Europe. The inclusion of information from Annex 1 in this manual is for information only (to enable you to pass the exam) and must not be relied upon for any matters relating to the issue of a licence.

A1.2 DEFINITIONS

A1.2.1 Definitions. When the following terms are used in the standards and recommended practices of Annex 1, they have the following meanings:

a. **Co-pilot**. A licensed pilot serving in any capacity other than PIC but excluding a pilot who is on board for the sole purpose of receiving instruction.

b. **Flight Time**. The total time from the moment an aircraft first moves under its own power for the purpose of taking off until it comes to rest at the end of the flight. (Synonymous with 'block to block' or 'chock to chock'.)

c. **Instrument Ground Time**. Time during which a pilot is practising, on the ground, simulated instrument flight in a synthetic flight trainer (see def) approved by the authority.

d. **Rating**. An authorisation entered on or associated with a licence and forming part thereof, stating special conditions, privileges or limitations pertaining to such a licence.

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

© Oxford Aviation Services Limited

i. **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;

ii. **A Flight Procedures Trainer**, which provides 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;

iii. **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.

A1.3 GENERAL RULES CONCERNING LICENSING

A1.3.1 Authority to Act as Flight Crew. A person shall not act as a flight crewmember of an aircraft unless a valid licence is held showing compliance with the specifications of Annex 1 and appropriate to the duties to be performed by that person. The licence shall have been issued by the State of Registry of that aircraft or by any other Contracting State and rendered valid by the state of Registry of that aircraft.

A1.3.2 Rendering a Licence Valid. A Contracting State may validate a licence issued by another authority, with the proviso that the period of validity is not to extend beyond the original period of validity of the licence.

A1.3.3 Privileges of a Licence. A State is not to permit the holder of a licence to exercise privileges other than those granted by the licence.

A1.3.4 Medical Fitness. The holder of a licence is to hold a medical assessment issued in accordance with the requirements of Annex 1 Chapter 6 (Medical Provisions for Licensing). Holders of licences are not to exercise the privileges of their licences if they are aware of any decrease in medical fitness. Licence holders are not to act in any capacity under their licence whilst under the influence of any psychoactive substance. Licence holders are not to engage in any problematic use (or abuse) of substances.

A1.3.5 Validity of Licences. A licence or rating holder is to maintain competence and meet the requirements for recent experience required by the licence or rating, including the maintenance of a current medical assessment.

© Oxford Aviation Services Limited

A1.3.6 Medical Report Periods. Reports of medical fitness are to be submitted at intervals not greater than:

a. 24 months for the holder of a PPL(A)
b. 12 months for the holder of a CPL(A)
c. 12 months for the holder of a ATPL(A) (6 months after the 40th birthday)

A1.3.7 Medical Examination Deferment. If a licence holder is operating in a remote area where medical examination facilities do not exist, at the discretion of the authority the requirement for a medical examination may be deferred as follow:

a. For a period of 6 months for aircrew not engaged in commercial aviation.

b. Two consecutive periods of three months for aircrew engaged in commercial air transport providing a favourable report is obtained after examination or where no approved medical examiner is available a favourable report from a medical practising physician. Such report to be sent to the authority of the State of Licence Issue.

c. A single period of 24 months for a PPL holder.

A1.3.8 Approved Training. Approved training is to provide at least the minimum experience requirements for personnel not receiving such approved training.

A1.4 LICENCES AND RATINGS FOR PILOTS

A1.4.1 General Requirements. A person is not permitted to act as PIC or co-pilot in the following categories of aircraft unless he/she holds the appropriate licence:

a. Aeroplane
b. Helicopter
c. Glider
d. Free balloon

A1.4.2 Class Ratings. Class ratings are to be established for aeroplanes certificated for single pilot operation and are to comprise:

a. Single-engine, land
b. Single-engine, sea
c. Multi-engine , land
d. Multi-engine, sea

© Oxford Aviation Services Limited

A1.4.3 Type Ratings. Type ratings are required for:

a. Each type of aircraft certificated for operation with a minimum crew of at least two pilots.
b. Each type of helicopter certificated for single-pilot operation except where a class rating has been issued under A1.4.1
c. Any type of aircraft whenever considered necessary by the licensing authority.

Note: When the applicant for a licence demonstrates skill and knowledge for the initial issue of a licence, the category and the ratings appropriate to the class or type are to be entered in the licence.

A1.4.4 When Class/Type Ratings are Required. A contracting state having issued a pilot licence is not to permit the holder to act as PIC or co-pilot of an aeroplane unless authorisation in accordance with the following has been received:

a. The appropriate class rating
b. A type rating (when required)

Note 1: When a type rating is issued limiting the holder to act as co-pilot only, the rating is to be so endorsed.

Note 2: For the purpose of testing, training , or specific special purpose non-revenue, non-passenger carrying flights, special authorisation may be provided (in writing) to the licence holder, in place of the issue of a class or type rating. The authorisation will be limited in validity to the time needed to complete the specific flight.

A1.4.5 Issue of Ratings. An applicant for a rating is required to demonstrate a degree of skill appropriate to the licence, including demonstration of the skill and knowledge required for the safe operation of the applicable type of aircraft relevant to the duties of PIC or co-pilot as specified by the licensing authority.

A1.4.6 Use of Synthetic Trainers. The licensing authority shall approve the use of a synthetic flight trainer for performing any manoeuvre required for the demonstration of skill for the issue of a licence or rating, after it has ensured that the trainer is appropriate for the task.

A1.4.7 When an Instrument Rating (IR) is Required. The State of Licence Issue is not to permit a licence holder to act as pilot or co-pilot under Instrument Flight Rules (IFR) unless the holder also holds an Instrument Rating (IR) appropriate to the aircraft category.

A1.4.8 Instructor Rating. A Contracting State, having issued a pilot licence, is not to permit the holder to carry out flight instruction for the issue of any licence or rating, unless the holder has received the proper authorisation.

© Oxford Aviation Services Limited

A1.4.9 Credit of Flight Time. A student pilot (or the holder of a licence) is entitled to be credited in full with all solo, dual instruction and PIC flight time towards the total flight time required for the initial issue of a pilot licence or a higher-grade pilot licence. When acting as co-pilot of an aeroplane in which a co-pilot is required the pilot is entitled to count not more than 50% of the co-pilot time towards the total flight time required for a higher-grade licence. A pilot acting as co-pilot performing as PIC under supervision, can count the full hours towards the total flight time required for a higher-grade licence.

A1.4.10 Age 60. Pilots are not permitted to act as PIC of an aircraft engaged in scheduled or non-scheduled commercial air transport operations for remuneration or hire, if the licence holder has attained his/her 60th birthday.

A1.4.11 Student Pilot. Licence Issuing States are to ensure that student pilots do not pose a hazard to navigation. Student pilots are only permitted to fly solo under the supervision of, or with the authorisation of, an authorised flight instructor. Student pilots are not permitted to fly solo on international flights unless in accordance with an agreement between the contracting states concerned. A student pilot is not permitted to fly solo unless he/she holds at least a class 2 medical assessment.

A1.5 PRIVATE PILOT LICENCE (AEROPLANE) – PPL(A)

A1.5.1 Requirements for Licence Issue.

A1.5.1.1 Age. An applicant for a PPL is to be not less than 17 years of age.

A1.5.1.2 Knowledge. An applicant for a PPL is required to have a required level of knowledge of the following subjects:

a. Air Law
b. Aircraft general knowledge
c. Flight performance and planning
d. Human performance and limitations
e. Meteorology
f. Navigation
g. Operational Procedures
h. Principles of flight
i. Radiotelephony

A1.5.2 Experience. An applicant for a PPL is to complete not less than 40 hours flight time. Where time in a synthetic trainer is permitted, it is limited to a maximum of 5 hours as part of the required 40 hours. Flight time as pilot in other categories of aircraft may (with authority authorisation) by credited. The applicant is required to have completed not less than 10 hours solo which is to include 5 hours of solo cross country flight time with at least one flight of not less than 270 km (150 Nm) which must include full stop landing at two different aerodromes.

© Oxford Aviation Services Limited

A1.5.3 Medical Fitness. A PPL holder must hold a current class 2 medical assessment.

A1.5.4 Privileges. The holder of a PPL(A) is to act (not for remuneration) as PIC or co-pilot of any aeroplane engaged in non-revenue flights. If the privilege is to be exercised at night, the holder is to have received dual instruction in aeroplanes flying at night, including take-offs, landings and navigation.

A1.6 COMMERCIAL PILOT LICENCE (AEROPLANE) – CPL(A)

A1.6.1 Requirements for Licence Issue.

A1.6.1.1 Age. An applicant for a CPL(a) is to be not less than 18 years of age. See A1.4.10 for curtailment of privileges.

A1.6.1.2 Knowledge. An applicant for a CPL(A) is required to have a required level of knowledge of the following subjects:

a. Air Law
b. Aircraft general knowledge
c. Flight performance and planning
d. Human performance and limitations
e. Meteorology
f. Navigation
g. Operational Procedures
h. Principles of flight
i. Radiotelephony

A1.6.2 Experience. An applicant for a CPL(A) is to complete not less than 200 hours flight time, or 150 hours if completed during an approved course. Where time in a synthetic trainer is permitted, it is limited to a maximum of 10 hours as part of the required hours. Flight time as pilot in other categories of aircraft may (with authority authorisation) by credited. The applicant is required to have completed not less than:

a. 100 hours as PIC (70 in the case of approved course)
b. 20 hours cross country flight time with at least one flight of not less than 540 km (300 Nm) which must include full stop landing at two different aerodromes.
c. 10 hours of instrument instruction time of which not more than 5 hours may be instrument ground time.
d. If the privilege is to be exercised at night, 5 hours night flight time including 5 take-offs and landings as PIC.

A1.6.3 Medical Fitness. A CPL(A) holder must hold a current class 1 medical assessment.

© Oxford Aviation Services Limited

A1.6.4 Privileges. The holder of a CPL(A) is permitted to exercise all the privileges of a PPL(A); to act as PIC of any aeroplane engaged in other than commercial air transport; to act as PIC in commercial air transport in aeroplanes certificated for single pilot operation; to act as co-pilot in commercial air transport in aeroplanes that require a co-pilot. If the privilege is to be exercised at night, the holder is to have received dual instruction in aeroplanes flying at night, including take-offs, landings and navigation.

A1.7 AIRLINE TRANSPORT PILOT LICENCE (AEROPLANE) – ATPL(A)

A1.7.1 Requirements for Licence Issue.

A1.7.1.1 Age. An applicant for a ATPL(A) is to be not less than 21 years of age. See A1.4.10 for curtailment of privileges.

A1.7.1.2 Knowledge. An applicant for a ATPL(A) is required to have a required level of knowledge of the following subjects:

a. Air Law
b. Aircraft general knowledge
c. Flight performance and planning
d Human performance and limitations
e. Meteorology
f. Navigation
g. Operational Procedures
h. Principles of flight
i. Radiotelephony

A1.7.2 Experience. An applicant for a ATPL(A) is to complete not less than 1500 hours flight time. Where time in a synthetic trainer is permitted, it is limited to a maximum of 100 hours as part of the required hours provided that not more than 25 hours have been acquired in a flight procedure trainer or a basic instrument trainer. Flight time as pilot in other categories of aircraft may (with authority authorisation) by credited. The applicant is required to have completed not less than:

a. 250 hours as PIC which can be made up of not less than 100 hours PIC and the additional hours as co-pilot acting as PIC under supervision provided that the method is approved by he authority.
b. 200 hours cross country flight time with not less than 100 hours PIC or co-pilot acting as PIC under supervision provided that the method is approved by he authority.
c. 75 hours of instrument instruction time of which not more than 30 hours may be instrument ground time.
d. 100 hours night flight time as PIC or co-pilot.

© Oxford Aviation Services Limited

A1.7.3 Medical Fitness. A ATPL(A) holder must hold a current class 1 medical assessment.

A1.7.4 Privileges. The holder of a ATPL(A) is permitted to exercise all the privileges of a PPL(A) and CPL(A) and of an Instrument Rating (A); to act as PIC and co-pilot of any aeroplane engaged in commercial air transport.

A1.8 INSTRUMENT RATING – AEROPLANE (IR(A))

A1.8.1 Requirements for Issue. The knowledge requirements for an IR(A) are related to the privilege of the rating, specifically, to operations under IFR. The skill requirement also specifically requires the applicant to demonstrate the ability to operate multi-engine aeroplanes solely with reference to instruments with one engine inoperative, if a pilot is to fly IFR in such aeroplanes. The regulations permit the use of synthetic trainers to demonstrate skills.

A1.8.2 Experience. The applicant is to hold a PPL(A) or CPL(A) and have completed 50 hours of cross country flight time as PIC in categories acceptable to the licensing authority, of which not less than 10 hours shall be in aeroplanes, and 40 hours of instrument time in aeroplanes or helicopters of which not more than 20 hours (or 30 hours where a simulator is used) may be instrument ground time under the supervision of an authorised instructor.

A1.8.3 Medical. Holders of PPL(A) are required to comply with the hearing requirements for class 1 certification and contracting states should consider requiring the PPL holder to pass the physical, mental and visual requirements of class 1.

A1.8.4 Privileges of an IR(A). Providing the holder of an IR(A) is also the holder of the appropriate licence and is medically fit (certificated), the holder is permitted to fly aeroplanes under IFR. If a pilot holds both an aeroplane and a helicopter licence, the privilege to fly both types under IFR may be conferred by a single instrument rating.

© Oxford Aviation Services Limited

A1.9 FLIGHT INSTRUCTOR RATING

A1.9.1 Knowledge Requirement. An applicant for an Instructor Rating is required to have the knowledge requirements for CPL as specified as well as demonstrable skills in the following:

a. Applied instructional technique
b. Student assessment
c. The learning process
d. Effective teaching
e. Student evaluation and testing, training philosophies
f. Training programme development
g. Lesson planning
h. Classroom instructional technique
i. Use of training aids
j. Analysis and correction of students
k. HP and limitations relevant to flight instruction
l. Hazards involved in simulating system failures and malfunctions in the aircraft

A1.9.2 Experience. The applicant is to have met the requirements for the issue of a CPL.

A1.9.3 Privileges. Providing an instructor's licence remains valid, the instructor rating will remain valid and confer the privilege to:

a. Supervise solo flight by student pilots
b. Carry out flight instruction for the issue of a PPL, CPL, IR and instructor rating, provided:

    1. The instructor holds the licence or rating to which instruction relates;
    2. The instructor holds the licence and rating necessary to act as PIC of the aircraft in which instruction is given;
    3. the instructor has the instructor privileges granted noted in the licence.

© Oxford Aviation Services Limited

APPENDIX 2 – ANNEX 6 (OPERATION OF AIRCRAFT)

A2.1 INTRODUCTION

A2.1.1 Relevance. Whilst Annex 1 contains the requirements for the issue of licences and ratings, Annex 6 contains the requirements for continued qualification to exercise the privileges of the licences and ratings.

A2.1.2 Qualifications. Apart from the requirement for an operator to ensure that the PIC is familiar with the route to be flown (must have flown the route at least once in any 12 month period), operators are also to ensure that PICs have within the preceding 90 days made at lease 3 take-offs and landings in the appropriate type of aeroplane. Co-pilots are required to have demonstrated competence at the controls of the appropriate type of aeroplane as PIC or co-pilot during 3 take-offs and landings or otherwise demonstrated competence in an approved flight simulator, within the preceding 90 days.

A2.1.3 Pilot Proficiency Checks. Pilots are required to demonstrate piloting technique and the ability to execute emergency procedures and that such skill is checked. Where flight under IFR is required, the checks required are to be carried out twice a year with any two similar checks not conducted within four months.

© Oxford Aviation Services Limited

APPENDIX 3 ICAO (ANNEX 1) & JAA (JAA FCL1) LICENCE REQUIREMENTS

QUALIFICATION	ANNEX 1/JAA FCL1	VALIDITY	RESTRICTIONS
ATPL(A)	Annex 1		age: 21 years or over Class 1 medical - renewed every year if under age of 40 and every 6 months over 40 completed minimum of 1,500* hrs flight time comprising of: not more than 100 hrs in flight simulator (provided not more than 25 hrs on basic instrument trainer) 250 hrs as PIC (not less than 100 PIC and remained as co-pilot acting as PIC under supervision) 200 hrs cross-country of which 100 as PIC or co-pilot acting as PIC under supervision 100 hrs night as PIC or co-pilot acting as PIC under supervision 75 hrs instrument time (not more than 30 hrs instrument ground time) 100 hrs night as PIC or co-pilot * time credits for other categories with approval of the Authority
	JAR FCL1	5 years	age: 21 years or over Class 1 medical - renewed every year if under age of 40 and every 6 months over 40 completed minimum of 1,500* hrs flight time comprising of: not more than 100 hrs in flight simulator 500 hrs in multi-pilot ops 250 hrs as PIC or at least 100 PIC and 159 hours as co-pilot acting as PIC under supervision 200 hrs cross-country of which 100 as PIC or co-pilot acting as PIC under supervision 100 hrs night as PIC or co-pilot 75 hrs instrument time (not more than 30 hrs instrument ground time) * helicopter flight time credited up to 50% of the 1,500 hrs flight engineers time credited up to a max of 250 hrs against the 1,500 and 500 hrs

CPL(A)	Annex 1		age: 18 years or over Class 1 medical - renewable every year until the age of 40 then every 6 months. Minimum of 200 hours flight time or 150 hours completed during an approved course (the above to include not more than 10 hours in a synthetic trainer) 100 hours PIC or 70 hours for approved courses 20 hours X - country at least one X - country flight of minimum 300 nms with full stop at 2 different a/d's. 10 hours of instrument instruction time (not more than 5 hours instrument ground time) if to fly at night - 5 hours night flight time including 5 take-offs & landings as PIC can only fly PIC for commercial transport in single pilot ops
	JAR FCL1	5 years	age: 18 years or over Class 1 medical - renewed every year if under age of 40 and every 6 months over 40 can only fly PIC for commercial transport in single pilot ops minimum of 200 hours flight time or 150 hours completed during an approved course (the above to include not more than 10 hours instrument ground time) 100 hours PIC or 70 hours for approved courses 20 hours X - country at lest one X - country flight of minimum 300 nms with full stop at 2 different a/d's 10 hours of instrument instruction time (not more than 5 hours instrument ground time) if to fly at night - 5 hours night flight time (including 3 hours dual) and 1 hour's night X-country navigation + 5 solo take-offs & full-stop landings at night.
PPL(A)	Annex 1		age: 17 years Class 2 - renewable every 2 years under 40 years of age then every 12 months. PIC or co-pilot of any aeroplane engaged in non-revenue flights Not less than 40 hours experience (max 5 hours in synthetic trainer can be credited) Not less than 10 hours solo flight time 5 solo hours cross-country at least one X - country flight of minimum 150 nms with full stop at 2 different a/d's

PPL(A)	JAA FCL1	5 years	age: 17 years Class 1 or 2 if Class 2 - up to 30 years of age renewed every 5 years, 30 - 49 inclusive every 2 years, 50 - 64 inclusive every 12 months, 65 and over every 6 months PIC or co-pilot of any aeroplane engaged in non-revenue flights 45 hours total flight time (to include not more than 5 hours instrument time) minimum 25 hours dual instruction minimum 10 hours supervised solo time 5 hours X - country at least one X - country flight of minimum 150 nms with full stop at 2 different a/d's if to be used at night - minimum of 3 hours dual night time which includes 1 hour X - country navigation + 5 solo take offs and full-stop landings skill test to be taken within 6 months of completing flight instruction
Student Pilot	Annex 1		Class 2 medical
Student Pilot	JAR FCL1		age: at least 16 years before first solo Class 1 or 2 medical certificate (if Class 2 renewed as above)
IR Rating	Annex 1		If holder has a PPL, must have hearing acuity equal to Class 1 medical requirements if to be exercised are on multi-engined ac, required to demonstrate the ability to operate multi-engined ac with sole reference to instruments with one engine inoperative. To hold PPL(A) or CPL(A) 50 hrs X - country at PIC. Not less than 10 hrs aeroplane instrument time. The remaining 40 hrs to be aeroplane or helicopter instrument time (but of which not more than 20 hours may be instrument ground time or 30 hours if a simulator is used)
IR Rating	JAR FCL1	1 year	50 hrs X - country at PIC aeroplanes or helicopters but not less than 10 hrs aeroplane instrument time.
Instructor Rating	Annex 1		must have a minimum of a CPL(A)

	JAR FCL1	3 years	
Examiner Rating	JAR FCL1	not more than 3 years	re-authorised at the discretion of the Authority
Type rating	Annex 1		required for each type of ac certified for operation with minimum crew of at least 2 pilots or as deemed necessary by the Authority 2 proficiency checks a year not within 4 months of each other. Checks to consist of normal & abnormal (emergency) flight procedures + instrument (if necessary) and crew incapacitation procedures.
	JAR FCL1	1 year	proficiency check completed within 3 months of expiry of rating
Class Rating	Annex 1	1 year 2 years	multi-engined aircraft single-engined aircraft
	JAR FCL1	1 year 2 years	multi-engined aircraft single-engined aircraft

Notes: 1. **Medical Examinations (ICAO Annex 1)**

Deferments

Where medical examination facilities do not exist, medicals can be deferred as follows:

6 months	-	Aircrew not engaged in commercial aviation
2 consecutive periods of 3 months	-	Aircrew engaged in commercial aviation
A single period of 2 years	-	PPL holder

2. **Age**

JAA FCL1 - 60-65 - no pilot permitted to engage in commercial air transport except:
As a member of a multi crew provided he/she is the only pilot in that crew of 60 years of age or over.
65 years - not permitted to act as the pilot of an aeroplane engaged in commercial air transport.
For JAA ATPL(A) inclusive age range is 21-59 (unrestricted)

ICAO Annex 1 - No pilot is to act as PIC of an aircraft engaged in schedules or non-scheduled commercial air transport for remuneration or hire having attained 60 years of age.

3. **Credit time**

ICAO Annex 1 - Not more than 50% of co-pilot flight time (in an aircraft requiring a co-pilot) can be credited towards the total flight time required for a higher grade of licence.
However total co-pilot flight time can be credited towards the total flight time required for a higher grade of licence when the co-pilot is performing the functions of PIC and under supervision.

JAA FCL1 Total co-pilot flight time can be credited towards the total flight time required for a higher grade of licence when the co-pilot is performing the functions of PIC and under supervision.

REVISION QUESTIONS CHAPTERS 1 - 5

1. What major advance in Air Transport during WWII led to the calling of the Chicago Convention in 1944?

   a. Bigger and faster aeroplanes
   b. The ability to move men and material quickly by air
   c. The establishment of an integrated Air Traffic Control system in Europe
   d. More use of air power because of the massive loss of shipping during the war

2. What is International Law based on?

   a. Historic rights of passage
   b. The ability of the strongest nation to impose its will
   c. Mutual agreement
   d. The law of the closest state to the place where the law needs to be imposed

3. What are the High Seas defined as?

   a. Sea areas outside of territorial waters of any state
   b. Sea state 6 or above
   c. Sea areas where there is more than one state bordering the sea
   d. Sea areas more than 12 nm from the closest shore

4. Which of the following concerning aviation, applies in areas where international law is applicable?

   a. ICAO Law applies
   b. ICAN rules apply
   c. The law of the state of registry of the aeroplane applies
   d. Law as agreed by the Geneva Convention on Territorial Waters and Contiguous Zones applies

5. In civil aviation, what does Suzerainty mean?

   a. Where one state has control over the movement of traffic in the airspace of another
   b. Where one state applies its law to high seas areas
   c. Where one state is granted rights to fly through the airspace of another
   d. Where one state accepts internationally agreed regulation

© Oxford Aviation Services Limited

6. What was the outcome of the Chicago Convention?

   a. ICAO
   b. PICAO
   c. The Convention on International Civil Aviation
   d. The 18 Annexes to the Chicago Convention

7. What does the International Air Transport Agreement provide for?

   a. Free and unhindered transit of aeroplanes over the high seas
   b. The freedom for aeroplanes to over fly the territory of any other state without landing
   c. The freedom for aeroplanes of one state to land in the territory of another for the purpose of refuelling
   d. The freedom for aeroplanes registered in one state to land in another state and drop off passengers

8. What are the 'freedoms' granted under the International Air Services Transit Agreement considered to be?

   a. Technical
   b. Commercial
   c. Temporary
   d. Enforceable at Law

9. Which of the following correctly relates to scheduled flights?

   a. The schedule must be agreed between individual states
   b. There must no duplication of services
   c. Once agreed, as many flights as are required may be scheduled
   d. The leg room between seats is greater than charter flights

10. What is Cabotage?

   a. The deliberate destruction of an aeroplane by terrorists
   b. The practice of an aeroplane registered in one state picking up passengers in another state and then landing them at an aerodrome in third state
   c. The right of a state to restrict domestic scheduled air services to airline operators registered in that state
   d. A freedom not enshrined by ICAO

© Oxford Aviation Services Limited

11. What are the measures by which free movement of aeroplanes, crew, passengers and goods not destined for the state in which the aeroplane has landed in, known as?

a. Open skies policy
b. Duty free zoning
c. Green Channel operations
d. Facilitation

12. Which of the following statements is true regarding the Rules of the Air over the high seas?

a. There are no rules over the high seas
b. The rules applicable are the rules as defined by the state of registration
c. The rules as defined by ICAO (Annex 2 to the Chicago Convention) apply
d. Rules are only applied where Oceanic Control is applied (ie Shanwick OCA etc..)

13. What is each contracting state of ICAO required to provide?

a. Facilities for SAR operations to be undertaken in its airspace
b. Oceanic control facilities in oceanic areas adjacent to territorial airspace
c. Modern radio navigation facilities for aeroplanes transiting its airspace
d. Details of Aerodrome Operating Minima to each operator using its airspace

14. What is ICAO?

a. A specialised agency related to the United Nations
b. An organisation of civil aviation operators, limited to 33 members
c. An organisation only permitted to make recommendations which are not binding on member states
d. An organisation constitutionally permitted to formulate and impose international law over each contracting state

15. What does the structure of ICAO consists of?

a. A Council; a Secretariat and committees and commissions
b. An Assembly, Council, Secretariat, 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
d. An Assembly of all contracted states meeting once a year from which the Council of 33 states is elected; a secretariat and committees and commissions.

© Oxford Aviation Services Limited

16. Where is the headquarters of ICAO?

a. Paris
b. London
c. New York
d. Montreal

17. ICAO has a regional structure. What is the reason for this?

a. Due to the different requirements for air navigation in different parts of the world
b. To reduce the work load on the HQ
c. To make the organisation more acceptable to local authorities
d. To provide local expertise to assist with the formulation of procedures for air navigation

18. What is the purpose of ICAO regional offices?

a. To formulate local Standards and Recommended practices
b. To provide financial assistance to states which cannot afford to provide the necessary navigation aids
c. To supply and pay for technical assistance with the implementation of programmes to improve air navigation
d. To keep regional plans up to date

19. What/who is responsible for the adoption of international standards?

a. The Assembly
b. The Council
c. The Secretariat
d. The Regional Planning Groups

20. What does the acronym PANSOPS mean?

a. Distress traffic operations
b. Procedures for RNAV operations
c. Procedures for Air Navigation, Operations of aircraft
d. Procedural Air Navigation and Sector Operations

21. The International Air Services Transit Agreement embodies the 'technical freedoms'. Which of the following is a technical freedom?

a. The freedom to over-fly a contracting state
b. The freedom to land at any aerodrome in a contracting state to drop off passengers
c. The freedom to land in a contracting state and re-fuel and unload cargo
d. The freedom to land in a contracting state for traffic purposes

© Oxford Aviation Services Limited

22. What does the 'Second Freedom' permit?

a. The freedom to overfly any state
b. The freedom to land at any aerodrome in a contracting state to drop off passengers
c. The freedom to land in a contracting state and re-fuel and unload cargo
d. The freedom to land in a contracting state for non-traffic purposes

23. The International Air Transport Agreement embodied certain 'commercial freedoms'. What are these freedoms concerned with?

a. The commercial implications (competition; profitability; market share etc..) of air transport with respect to the carriage of passengers
b. Scheduled and non-scheduled operations for public transport
c. Regular air transport between contracting states
d. All international flying where fare paying passengers are carried

24. What is the basis of the International Air Services Transit and Transport Agreements?

a. International Law
b. Multilateral International Agreements
c. ICAO Standards and Recommended Practices
d. Bilateral agreements between states

25. Why is the 8th freedom of the air particularly applicable to the European Union?

a. To prevent non-JAA states operating domestic scheduled services in Europe
b. Because the EU is effectively one state as far as the internal movement of people is concerned
c. Because the Chicago Convention allows a state to give exclusivity of internal air services to another state
d. Because the EU is primarily a commercial arrangement and it is commercially sensible to prevent non-EU carriers from profiting in Europe

26. If a state applied 'cabotage', what would be prevented ?

a. Internal scheduled operations in state B by aircraft registered in and owned by an operator in state A
b. International operations from state B by aircraft registered in and owned by an operator in state A
c. Non-scheduled operations in state B by aircraft registered in and owned by an operator in state A
d. Privately operated air taxi services

© Oxford Aviation Services Limited

27. According to the Tokyo Convention of 1963, who is considered to be competent to exercise jurisdiction over acts committed on board an aeroplane?

a. The Commander
b. The State of Registration
c. The State of the Operator
d. The State over which the aeroplane was flying when the act took place

28. The Montreal Convention of 1971 covered acts against civil aviation other than hi-jacking. Which of the following is **not** covered by this convention?

a. Taking hostages in an airport
b. Blowing up a VOR beacon
c. Placing a bomb on board an aeroplane that does not go off
d. A drunk demanding more booze whilst the aeroplane is in flight

29. In order to combat terrorism and make access to aeroplanes more difficult, Annex 17 requires each contracting state to adopt common measures and procedures. Among these procedures, states are required to do which of the following?

a. Set up an international civil aviation safety programme
b. Join the Civil Air Transport Security Protection Awareness Warning System
c. Co-ordinate activities with other national agencies (Police etc..) and the corresponding agencies in other states.
d. Lock all aeroplanes when on the ground to prevent access

30. One of the flight attendants tells you that a passenger is making a nuisance of himself and is upsetting other passengers and molesting the cabin staff. He is a big lad and has had a bit too much to drink. You ask the First Officer to sort him out but he says he will need help. Can you, as the Commander, order other passengers to help?

a. Yes, but only to apply the minimum force necessary to restrain the offender
b. No, you have no authority to co-opt passengers to help
c. Yes, all persons on board are subject to your authority
d. No you can't order but you may request and authorise passengers to assist

31. In 1955 an intergovernmental organisation was founded in Europe to promote the continuing development of a safe, efficient and sustainable European air transport system. What is the name of this organisation?

a. Eurocontrol
b. ECAC
c. European Aviation Authority
d. Joint Aviation Authority

© Oxford Aviation Services Limited

32. The commercial freedoms for scheduled operations are covered by the 'nine freedoms of the air'. Non scheduled air services in Europe are covered by a separate agreement. Which of the following falls into the category of non scheduled air services?

a. Multi company charter flights
b. Regional airlines operating 'feeder' services
c. Air taxi services
d. Military flights

33. Another matter that was agreed multilaterally within Europe concerned the airworthiness of imported aeroplanes. What is a European state required to do with regard to certificates of airworthiness?

a. Render valid the existing certificate or issue a new certificate
b. In all cases issue a new certificate in accordance with the EU regulations
c. Accept the validity of the original certificate if it has been issued by an ICAO contracting state
d. Ban all imports of aeroplanes from non EU states

34. What did the Conference of Cyprus in 1990 set up?

a. Eurocontrol
b. The JAA
c. The European Civil Aviation Organisation
d. ECAC

35. Which of the following is one of the objectives of the Joint Aviation Authorities (JAA)?

a. To establish the European Aviation Authority
b. To take over the responsibility for aviation regulation in Europe from ICAO
c. To ensure common high levels of aviation safety in JAA states
d. To ensure through regional legislation that European based aviation industry operations have preference within Europe

36. Is the JAA membership restricted to the members of the European Union?

a. Yes, but non EU member states may apply for associate status
b. No, but only non EU states that have applied for membership of the EU may join
c. No, Switzerland is a member
d. Yes without exception

© Oxford Aviation Services Limited

37. What is the relationship between the JAA and ECAC?

a. The JAA is another name for ECAC
b. The JAA is part of ECAC
c. ECAC is a part of the JAA administration division
d. The JAA is an associate body of ECAC

38. What is the long term intention of the EU and the Council of Europe with regard to civil aviation regulation?

a. To expand the JAA to cover the whole of the European region
b. To replace the JAA with the European Aviation Authority (EAA)
c. To unite the JAA with the FAA to create one regulatory body for world aviation regulation
d. To replace ICAO in Europe

39. What is the status of the JAA at this time?

a. An international aviation legislator in Europe
b. The regulatory body for the member states
c. A Europe wide forum for the aviation authorities of the member states
d. The 'policing' authority for European aviation regulations

40. In which area of Air Traffic Control in Europe does Eurocontrol have a logical and operationally essential role to play?

a. National airspace management within Europe
b. Regulation of civil aviation in Europe
c. Air Traffic Flow Management in Europe
d. Regional air navigation planning in Europe

41. The Warsaw Convention of 1929 dealt with the liabilities of carriers and their agents. Specifically what was agreed with regard to passengers?

a. That a passenger was carried at his/her own risk
b. That compensation would be payable only in the event of death in a crash
c. That a limit of liability be applied in all cases where a claim was made against the carrier
d. That claims for compensation, except claims involving gross negligence, be limited to an agreed sum

© Oxford Aviation Services Limited

42. Does the liability of a carrier extend to the carriage of mail and cargo as well as passengers?

a. No
b. Yes, but only to scheduled flights (3rd, 4th and 5th freedom flights)
c. Yes but only to internal, not international flights
d. Yes, but only mail and international cargo

43. If a passenger loses his/her ticket, is the carrier still liable for the safe carriage of him/her?

a. Yes, the absence of a ticket does not affect the contract
b. Yes, there is no legal reason why a ticket should be issued
c. No, the ticket is the documentary evidence that the contract exists
d. No, without a ticket a passenger is not permitted to board an aeroplane

44. What is the status of IATA?

a. It is a trade association of aviation operators and others involved with international aviation
b. It is an associate body of ICAO
c. It represents the air transport operators at ICAO
d. It is the international legislative arm of ICAO

45. Which of the following has been achieved to the benefit of international passengers by IATA?

a. Provision of feeder services from remote aerodromes connecting with scheduled international flights
b. Acceptance of multi-carrier 'through' ticketing
c. Regulated standards of cabin service in aeroplanes on international flights
d. Making aeroplane cabins 'no smoking' areas

46. The Paris Convention of 1919 defined the status of international airspace and gave the authority to the Commander of the aeroplane to act in accordance with what law?

a. International Law
b. The law of the state of registration
c. The law of the state of the operator
d. The law of the state of the aerodrome of departure

47. The Paris conference also addressed the status of aeroplanes. What was agreed with regard to the registration of aeroplanes?

a. That all aircraft are to be registered
b. All aircraft carrying passengers and freight are to be registered
c. All aircraft over 5700Kg carrying passengers are to be registered
d. All aircraft with 2 or more engines and carrying passengers are to be registered

© Oxford Aviation Services Limited

48. By whom is the commander of an aeroplane appointed?

a. The authority of the state of registration
b. The authority of the state of the operator
c. The rest of the crew
d. The operator

49. What is the basic requirement for appointment as Commander?

a. A minimum of 1500 hours on type
b. Performance of duty to the satisfaction of the operator
c. A minimum of two years flying for the operator and 1500 hours on type
d. A pilot's licence

50. When does 'flight time' end?

a. At touchdown
b. When the aeroplane first stops after landing to disembark passengers
c. At engine shut down when the aeroplane has stopped in the parking bay
d. When all the passengers have disembarked

51. Who is responsible for ensuring that all the passengers are aware of the authority of the commander?

a. The Commander him/herself
b. The senior cabin attendant
c. The operator
d. The authority of the state of registration

52. Where would you, as the commander of an aeroplane of MTM >5700Kg with 2 turbine engines, flying for the carriage of passengers, find your terms of reference and authority to act as commander?

a. In the Aeronautical Information Publication for the state of regisrty
b. In Annex 1 of the Chicago Convention
c. In the addition to your licence given to you on appointment as Commander
d. In the Operations Manual

53. What is a JAA operator required to do before he is permitted to 'wet lease in' an aeroplane from a non JAA operator?

a. Subject the aeroplane to a major overhaul in accordance with JAR 145
b. Check that the crew licences are valid
c. Obtain the permission of the JAA
d. Demonstrate that there is no JAA operator who has an aeroplane available for lease

© Oxford Aviation Services Limited

54. What must you, as a passenger flying in a wet leased aeroplane, be made aware of?

a. Who the Commander of the aeroplane is
b. Who is the operator of the aeroplane
c. What the normal fare would be for that flight
d. How much the leasing operator was paying for the aeroplane

55. If the JAA imposes strict rules regarding the type of gas that can be used in fire extinguishers, is it permitted to ignore those rules if the aeroplane is leased in?

a. Yes, the rules of the state of registration have priority
b. Yes, providing the certificate of airworthiness states that the aeroplane is airworthy under the authority of the state of registration
c. No, leasing is not meant to allow circumventing of rules and regulations
d. No, but only if the lease is for less than 21 days

56. If a JAA operator (Panair) provides an aeroplane and complete crew for lease to another JAA operator (Maypoleair) (a wet lease-out situation), who is the operator of the aeroplane?

a. Panair - providing the functions and responsibilities of JAR OPS 2 are retained
b. Maypoleair - providing they absolve Panair of any responsibility in the manner in which the aeroplane is operated
c. Panair - because it is their crew flying the aeroplane
d. Maypoleair - because they are charging the passengers for carriage

57. Who is responsible for the issue of a certificate of airworthiness?

a. The authority of State of Registration
b. The JAA
c. ICAO
d. The Operator

58. To what types of aeroplanes are the standards of airworthiness detailed in Annex 8 part 3 applicable?

a. All aeroplane that can carry passengers
b. Only aeroplanes with 2 engines or more
c. Aeroplanes with a maximum certificated take-off mass of 5700kg or more flying for the carriage of passengers, cargo or mail
d. Aeroplane of MTM >5700Kg with 2 or more engines flying passengers, mail or cargo

© Oxford Aviation Services Limited

59. An aeroplane has a registration mark G-BMYK. Must there always be an hyphen between the nationality mark and the registration mark?

a. Yes, annex 7 requires that format
b. Yes, because annex 7 contains standards only an no recommendations
c. It depends what the first character of the registration mark is. If it is a letter, the hyphen is required; a number it is not
d. No the hyphen is an optional item ie N768Y; 6Y-HBT

60. Where must the certificate of registration for an aeroplane be kept whilst the aeroplane is flying?

a. In the registered office of the Operator/owner
b. By the authority of the state of registration
c. On the ground at the point of departure
d. In the aeroplane

61. Where would you look to find out about the requirement for a medical certificate for your licence?

a. JAR OPS 3
b. JAR FCL 3
c. JAR FCL 1
d. JAR 145

62. Assuming that you are successful in your studies and eventually scrape through the exams and get an ATPL, can you get a job flying in another country with that licence without any more tests?

a. No, you will need to pass the local exams first
b. Yes, but only in another fully integrated JAA state
c. Yes, but only in a state that recognises a JAA licence and it has been validated for that country in accordance with the JAR FCL requirements
d. Yes, all countries recognise JAA licences automatically

63. You are detailed to fly on your 60th birthday. What must your operator ensure?

a. That you are the only pilot who is 60 or over
b. That you are the only crew member over 60
c. That you have passed the extended age medical examination and your licence is correctly endorsed
d. A birthday cake is part of the crew rations of for the flight

© Oxford Aviation Services Limited

64. How long is a JAA ATPL(A) valid for?

a. Life
b. 10 years
c. 5 years
d. Only as long as the type of aeroplane to which the licence relates remains in service

65. You are required to have a total of not less than 1500 hours to 'unfreeze' your ATPL(A). Of this total, how much must be in multi-pilot operations?

a. 100 hours
b. 200 hours
c. 250 hours
d. 500 hours

66. If a JAA member state validates a licence issued by a non-JAA state, how long is the period of validation?

a. The licence is only valid during the remaining period of validity in accordance with the rules of the non-JAA issuing state
b. Only one year and must then be replaced by a full JAA licence
c. A JAA member state is not permitted to validate a non-JAA licence
d. A full period of five years just the same as any licence issue by a JAA state

67. How long is an instrument rating valid for?

a. 6 months
b. 12 months
c. 18 months
d. The IR is valid providing regular skill tests are completed at interval dictated by the authority

68. If you have a type rating on a 737-200, are you permitted to hold a type rating on any other type of aeroplane?

a. Yes, you can be rated on as many types as your operator requires
b. Yes, but it must not have more than 2 engines
c. No, the authority only permits one type rating to be held at any time
d. No, but you may fly other variants of the 737

© Oxford Aviation Services Limited

69. What defines 'normal residency'?

a. Where you live for six months of the year or more
b. Where you live for more than six months of the year
c. Where you live more than 185 days but not necessarily in one continuous spell
d. Where you usually live for not less than 185 days per calendar year

70. If your licence does not contain a photograph of you, what is required?

a. Any other document with a photograph of you that confirms your identity
b. A driving licence
c. A crew member certificate issued by the state of licence issue
d. A certificate from your operator authenticating the licence

71. When you leave here you will hold a CPL(A)/IR. Which of the following is one of the privileges of that licence?

a. Fly as PIC in commercial air transport
b. Only to fly as co-pilot in commercial air transport
c. Fly as PIC of single engined aircraft for commercial air transport
d. Pilot a balloon

72. Once you have achieved 1500 hours as pilot of an aeroplane, your licence is upgraded to ATPL(A). Which of the following is a privilege of that licence?

a. To fly as Commander in all type rated aircraft in commercial air transport
b. To fly as co-pilot in any aircraft for commercial air transport
c. To pilot any type rated aircraft in commercial air transport
d. To pilot a balloon

73. What is the minimum requirement to pilot an aircraft with max take off mass greater than 5700 kg and seating for 20 passengers, in IMC?

a. An ATPL(A)
b. Another pilot must be on board who also has an instrument rating
c. A licence with an IMC rating
d. A CPL(A)

74. How long is an instructor rating valid for?

a. 3 years
b. 4 years
c. 5 years
d. Life

© Oxford Aviation Services Limited

75. Which of the following is not one of the recognised examiners?

a. Synthetic flight examiner
b. Command appointment examiner
c. Flight instructor examiner
d. Class rating examiner

76. The period between aircrew medical examinations for an ATPL(A) decreases to 6 months at what age?

a. 50
b. 60
c. 45
d. 40

77. Does JAR-FCL 3 permit deferments of medical examination due dates?

a. No.
b. Yes, but only for a maximum of 3 months
c. Yes, but only if the pilot was fully fit at the last medical examination
d. Yes, but only if the pilot has told the authority that he/she is unwell

78. If you break your leg on the 1st April, and your medical examination is booked for 15th April, providing you have informed the authority immediately, how much longer will your medical certificate have to run when you are pronounced fit by the doctor?

a. 3 months
b. The same period as was remaining on 1st April
c. None as the injury occurred within 21 days of the due medical date
d. 15 days

79. Under what circumstances can flight crew wear spectacles?

a. When permitted by company uniform regulations
b. For reading on the flight deck, but not the polychromatic (self darkening) type
c. Only when prescribed by a medical examiner
d. When the use of spectacles is advised the authority

80. What self medication is permitted by aircrew?

a. None
b. Only proprietary brands such as Disprin; Calpol; Advil etc.. for colds and flu.
c. Only drugs which do not have side effects incompatible with aircrew duty
d. Only drugs which enhance, not degrade, performance

© Oxford Aviation Services Limited

81. Which of the following is a combination of letters not permitted as a registration mark?

a. Charlie Romeo Alfa Papa
b. Sierra Oscar Sierra
c. Juliet Alfa Alfa
d. Sierra Alfa Romeo

82. Can Jersey European (a UK operator) dry lease an aeroplane from Delta Airlines (a US operator) on a short notice basis without prior permission of the UK authority?

a. No, the short notice exemption only applies to wet leasing
b. Yes, but only for 5 days
c. Yes, but JE must have given notice to the authority
d. Yes, providing JE has given notice to the authority and the lease period does not exceed 5 days

83. Which international convention made air piracy an offence?

a. Cyprus 1990
b. Montego Bay 1982
c. Montreal 1978
d. Tokyo 1963

84. Which international convention required states to implement certificates of competence for Aircrew?

a. Paris 1919
b. Warsaw 1929
c. Brussels 1938
d. Chicago 1944

85. Which Annex to the Chicago Convention deals with Licensing of Aircrew?

a. Annex 1
b. Annex 2
c. Annex 9
c. Annex 6

86. Which of the following documents is required to be carried in an aircraft engaged in commercial air transport?

a. General Declarations
b. Load sheets
c. Interception tables
d. The technical instructions

© Oxford Aviation Services Limited

87. Where are the duties and responsibilities of the Commander defined?

a. In Annex 1 with additional responsibilities detailed in Annex 6
b. In the Air Navigation Order (or similar document in non UK countries)
c. In Annex 6 with additional JAR-OPS 1 requirements taking precedence
d. In the Ops Manual

88. Who is responsible when damage is caused by an aeroplane to persons or property on the ground?

a. The Commander is responsible providing that no other person can be held responsible
b. The pilot actually flying or at the controls when the incident happened
c. The Operator
d. The aerodrome manager/authority, if the incident happened inside the boundary of the aerodrome

89. Which Convention defined the contract implicit in the issuance of a passenger ticket/cargo consignment note/luggage ticket?

a. Paris
b. Guatemala City
c. Kuala Lumpur
d. Warsaw

90. Which organisation considers aviation issues relevant to all European states?

a. ECAC
b. The JAA
c. The EEC
d. ICAO

91. Which of the following is a function of the ICAO regional structure?

a. Adoption of local SARPS
b. Arranging financial assistance for the provision of en-route navigation aids
c. Application of internationally agreed procedures
d. Formulation of the Comprehensive Regional Airway Plan

92. For how long are members of the ICAO Council appointed to sit on the Council?

a. 1 year
b. 2 years
c. 3 years
d. Members are elected to sit for the duration of the period between meetings of the Assembly

© Oxford Aviation Services Limited

93. What is the ICAO publication that details the methods of carriage and safety implications of the carriage of dangerous air cargo?

a. Annex 18 - Safe Carriage of Dangerous Goods by air
b. Annex 6 - Operation of Aircraft
c. ICAO Manual of Dangerous Operations
d. The Technical Instructions

94. If you fly from Washington DC to New Orleans on a scheduled service, the Operator will be an FAA licenced (US) operator. Why is this?

a. The FAA has determined that only US operators can navigate safely over the USA
b. US Employment Law prohibits foreign nationals from working in the USA
c. The USA applies cabotage
d. The FAA does not recognise and will not validate foreign licences, or the certification of foreign operators

95. What does ICAO call the process of the handling of passengers and their baggage in international commercial air transport?

a. Cabotage
b. Facilitation
c. Application
d. Expedition

96. Britannia Airways fly four times a week during summer, carrying holiday makers for the holiday company SuperSun from Luton to Fuerteventura. Is this a scheduled service?

a. No, because a person who is not a client of SuperSun could not buy a seat on the Britannia flight
b. No, Britannia does not fly to this destination throughout the year, it is only a summer service.
c. Yes, because it is international commercial air transport
d. Yes, because the flight would require agreement between the states concerned

97. Are all aircraft required to be registered and carry registration markings?

a. Yes, without exception
b. Yes, but the authority may temporarily exempt aircraft such as prototypes from registration, and historic aircraft from the requirement to carry markings
c. No, aircraft with maximum take-off mass greater than 5 700kg may be exempt from registration providing they are not flown outside the airspace of the state of the operator
d. No. Gliders and micro-lights (and model aircraft) do not need to be registered

© Oxford Aviation Services Limited

98. What is a 'common mark'?

a. A registration mark shared by more than one aircraft
b. A marking on an aircraft indicating where it is safe cut into the airframe in an emergency
c. Where the registration mark of a state includes its flag (ie Switzerland) the marking of the flag is known as a common mark
d. A 'nationality' mark for a multi-national operator, issued to ICAO by the International Telecommunications Agency

99. What is wrong with this nationality and registration mark?

6TTTF8

a. I need more information. What is the nationality marking of the state of registration?
b. TTT is a prohibited combination in marking
c. A hyphen (-) is needed between 6T and TTF
d. The mixing of letters and numbers is not permitted

100. The continuation of validity of a Certificate of Airworthiness is dependant upon what?

a. The continued registration of the aeroplane
b. The continued use of the aeroplane for the purpose stated on the certificate of registration
c. The continued airworthiness of the aeroplane as determined by periodic inspections
d. The establishment of a schedule for servicing and repair of the aeroplane in accordance with JAR 145

© Oxford Aviation Services Limited

ANSWERS TO REVISION QUESTIONS FOR CHAPTERS 1 - 5

1	B
2	C
3	A
4	C
5	D
6	C
7	D
8	A
9	A
10	C
11	D
12	C
13	A
14	A
15	B
16	D
17	A
18	D
19	B
20	C
21	A
22	D
23	B
24	D
25	B

26	A
27	B
28	D
29	C
30	D
31	B
32	C
33	A
34	B
35	C
36	C
37	D
38	B
39	B
40	C
41	D
42	D
43	A
44	A
45	B
46	B
47	B
48	D
49	D
50	B

51	C
52	D
53	C
54	B
55	C
56	A
57	A
58	D
59	C
60	D
61	B
62	B
63	A
64	C
65	D
66	A
67	B
68	A
69	D
70	A
71	C
72	C
73	B
74	A
75	B

76	D
77	A
78	B
79	D
80	C
81	B
82	A
83	B
84	A
85	A
86	B
87	D
88	C
89	D
90	A
91	B
92	C
93	D
94	C
95	B
96	D
97	B
98	D
99	A
100	C

© Oxford Aviation Services Limited

CHAPTER SIX - RULES OF THE AIR

Contents

		Page
6.0	HISTORY	6 - 1
6.1	APPLICABILITY OF THE RULES OF THE AIR	6 - 1
6.2	GENERAL RULES	6 - 3
6.3	VISUAL FLIGHT RULES	6 - 13
6.4	INSTRUMENT FLIGHT RULES	6 - 17
6.5	SPECIAL VFR	6 - 19
6.6	DISTRESS AND URGENCY SIGNALS.	6 - 20
6.7	INTERCEPTION OF CIVIL AIRCRAFT	6 - 22
6.8	RESTRICTED, PROHIBITED OR DANGER AREAS.	6 - 25
6.9	SIGNALS FOR AERODROME TRAFFIC.	6 - 26
6.10	MARSHALLING SIGNALS.	6 - 33
6.11	TABLES OF CRUISING LEVELS	6 - 35
	REVISION QUESTIONS	6 - 39

© Oxford Aviation Services Limited

6.0 HISTORY

6.0.1 Education. The rules of the air, like the rules of the road, have evolved as aviation has advanced. Initially, aircraft flew without radios (radio hadn't been invented or when it had, there wasn't an aeroplane big enough to carry the equipment!). Simple rules evolved to attempt to reduce the risk of collisions. Remember, in 1920 an aeroplane flying at 80 or 90 kts was travelling at a previously unimagined speed. Visual signals were required at aerodromes to convey information to pilots and procedures evolved to allow orderly flight in the vicinity of aerodromes and to permit visual navigation en-route. Between the 1920's and WWII, individual states passed legislation to enforce the rules that had become established in those states. With the expansion of commercial aviation during and after the war, the need for standardisation in the rules was evident and this was one topic that was seriously addressed at Chicago in 1944. It is no coincidence that the annex of the Chicago Convention that cover the rules of the air is Annex 2.

6.1 APPLICABILITY OF THE RULES OF THE AIR

6.1.1 Annex 2. Annex 2 of the Chicago Convention details the ICAO Rules of the Air. As mentioned above, the rules were primarily written in the early days for non-radio traffic and some of the requirements may now seem out of date. However, there is still a considerable amount of non-radio traffic in general aviation and those airmen are equally entitled to the protection afforded to commercial air transport. The ICAO Rules of the Air apply to aircraft bearing the nationality and registration marks of an ICAO Contracting State, wherever they may be, providing they do not conflict with the rules published by the State having jurisdiction of the territory overflown. The ICAO Council resolved in adopting Annex 2 in April 1948 and Amendment 1 in November 1951, that the **ICAO Rules apply without exception over the high seas**. [High Seas are defined as the areas of sea outside the territorial limits of any State]. When an aircraft is flying within the airspace of the state of registration, the rules of the air of that state (in the UK as published in CAP393 - The ANO) are applicable. Indeed, for a UK registered aeroplane, the UK rules apply wherever the aeroplane is flown providing there is no confliction with local rules. Where a UK registered aircraft is flying over a foreign state, the rules of the air of that state apply. The application of the rules can be summarised thus:

a. UK registered aircraft over the UK - UK rules apply

b. UK registered aircraft over France - French and UK rules apply (French have priority)

c. UK registered aircraft over the high seas - ICAO rules apply without exception

6.1.2 Types of Rules. The operation of an aeroplane either in flight or on the movement area of an aerodrome is to be in accordance with the **general rules** and, when in flight, either:

a. **The visual flight rules (VFR)**, or
b. **The instrument flight rules (IFR)**

© Oxford Aviation Services Limited

6.1.3 IFR or VFR? A pilot may elect to fly in accordance with the Instrument Flight Rules in VMC (he/she may be required to do so by the ATS Authority in certain circumstances). A pilot must fly in accordance with the IFR in IMC. If a pilot elects to fly VFR he/she must do so only in VMC.

6.1.4 Pilot-In-Command Responsibilities. Definitions:

a. **Commander**: A designated pilot amongst the flight crew who is qualified as Pilot-In-Command who may delegate the conduct of the flight to another qualified pilot.

b. **Pilot-In-Command (PIC)**: A pilot who is responsible for the operation and safety of the aeroplane during flight time.

c. **Pilot Flying (PF)**: The pilot, who for the time being, is in charge of the controls of the aeroplane.

d. **Pilot not Flying (PNF)**: The pilot who is assisting the pilot flying in accordance with the multi-crew co-operation concept, when the required flight crew is more than one.

6.1.4.1 Responsibilities. The commander is responsible for compliance with the Rules of the Air. This applies whether or not he/she is at the controls. The commander has, however, the overriding right to depart from the rules if it is absolutely necessary to do so in the interests of safety. The commander is responsible also for planning the flight. In doing so he/she will study all available weather reports and forecasts, and considering fuel available, will plan an alternative course of action. The commander of an aeroplane has the final authority as to the disposition of the aircraft whilst in command.

6.1.5 Intoxicating Liquor, Narcotics or Drugs. No person is to pilot an aircraft, or act as a flight crew member of an aircraft, whilst under the influence of intoxicating liquor, any narcotic or drug, by reason of which that persons capacity to act is impaired. ICAO does not lay down any restrictions or maximum blood/alcohol levels for aircrew. However, JAR OPS-1 does. Aircrew are not permitted to exercise the privileges of their licences with a blood/alcohol level exceeding 0.2 promille (20mg/100ml) about one quarter of the UK driving limit. ICAO clearly states that no person may act as aircrew if he/she is under the effect of any psycotrophic substance. As professional pilots, you are expected to behave in an adult manner commensurate with the responsibility placed on your shoulders concerning the safety of the passengers in your care. This is an onerous duty which, if it is abused, will result in the full force of the law being applied if you are found negligent in that duty.

© Oxford Aviation Services Limited

6.2 GENERAL RULES

6.2.1 Minimum Heights. Except when necessary for take off or landing, or except by permission of the appropriate authority, aircraft shall not be flown over the congested areas of cities, towns or settlements or over an open-air gathering 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. No specific heights are mentioned and this rule should not be confused with the minimum height rules for IFR or VFR .

6.2.2 Cruising Levels. For flights at or above the lowest usable flight level or where applicable, above the transition level, flights shall be conducted in terms of **flight levels**. For flights below the lowest usable flight level or where applicable, at or below the transition altitude, flights shall be conducted in terms of **altitude.**

6.2.3 Proximity and Right of Way. An aircraft shall not be operated in such proximity to other aircraft as to create a collision hazard. The aircraft that has the right of way shall maintain its heading and speed, but the PIC is still responsible for avoiding collisions (including ACAS alerts). Aircraft which are obliged to give way are to do so and avoid passing over, under or in front of the other unless it is well clear, and to take into account the effect of wake turbulence.

6.2.4 Approaching Head On. When two aircraft are approaching head on, and there is a danger of collision, each shall alter course to the right. It is generally accepted that where another aircraft is within a sector 20° either side of dead ahead and approaching, that aircraft is approaching head on.

6.2.5 Converging. When two aircraft of the same type (see definition of aircraft) are converging at approximately the same level, the aircraft that has the other on its right shall give way. In order not to fly over, under or pass in front of the other aircraft, the aircraft that is obliged to give way should pass behind the other aircraft. In order to achieve this the aircraft giving way should turn right. Where the two aircraft are not of the same type, the following order of priority will apply, and again, the method of giving way is to turn to the right:

a. Power driven heavier than air aircraft (aeroplanes) shall give way to airships, gliders and balloons.
b. Power driven lighter than air aircraft (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. (Note: A towing combination is considered to be a single flying machine (not ICAO definition) under the control of the pilot in command of the towing aircraft).

© Oxford Aviation Services Limited

6.2.6 **Overtaking**. An overtaking aircraft is an aircraft that approaches another from the rear on a line forming an angle of less than 70° with the plane of symmetry of the latter (at night, the approaching aircraft would see the white tail light of the aircraft in front). An aeroplane that is being overtaken has the right of way, and the overtaking aircraft whether climbing or descending or in horizontal flight, shall keep out of the way of the other aircraft by altering its heading to the right and to maintain this position with regard to the other aircraft until well clear.

6.2.7 **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** (see definition). When two or more heavier than air aircraft are approaching an aerodrome to land, the aircraft at the higher level shall give way to the aircraft at the lower level, but the latter shall not take advantage of this rule to 'cut in' in front of another aircraft. In any event, power-driven heavier- than-air aircraft shall give way to gliders.

6.2.8 **Emergency Landing**. An aircraft that is aware that another aircraft is in an emergency and is compelled to land, shall give way to that aircraft.

6.2.9 **Taking Off**. An aircraft taxiing on the manoeuvring area shall give way to aircraft taking off or about to take off.

6.2.10 **Taxiing**. An aircraft taxiing on the manoeuvring area shall stop and hold at all lighted stop bars (used in poor visibility) and may proceed further only when the lights are switched off.

6.2.11 **Surface Movement of Aircraft**. In the case of danger of collision between two aircraft taxiing on the movement area (see definition) of an aerodrome, the following shall apply:

a. **Approaching head on.** Both stop or where practicable alter course to the right to keep well clear.

b. **Converging**. The one that has the other on its right shall give way. (Stop or turn to pass behind).

c. **Overtaking**. The aircraft being overtaken has the right of way. The overtaking aircraft is to keep well clear of the other aircraft.

Note: ICAO (Annex 2) states that any vehicle operating regularly on the manoeuvring area of an aerodrome must be in two-way radio contact with ATC. The UK ANO (Rules of the Air - Rule 37) requires all vehicles and aircraft moving on the manoeuvring area to give way to vehicles towing aircraft.

© Oxford Aviation Services Limited

6.2.12 Aircraft Lights. The systems of displaying navigation lights, anti collision lights and other lights designed to draw attention to the presence of an aircraft, are covered in Operational Procedures. However, you may be asked questions in the Air Law exam on this subject. The law in this matter is restricted to when you must have the lights fitted and when they must be on.

a. **Lights Displayed by Aircraft**. The following lights, required to be shown by aircraft, are to be illuminated from sunset to sunrise (see definition) or during any other period specified by the appropriate authority:

1. Anti-collision lights intended to attract attention to the aircraft

2. Navigation lights intended to indicate the relative path of the aircraft to an observer. No other lights shall be displayed if they are likely to be mistaken for these lights.

b. **From sunset to sunrise** (or during any other period required by the appropriate authority):

1. 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. No other lights shall be displayed if they are likely to be mistaken for these lights.

2. All aircraft on the movement area of an aerodrome are to display lights that indicate the extremities of their structure, unless stationary and otherwise adequately illuminated. (Aircraft parked on the Apron (see definition) will be adequately illuminated because an Apron is required to be lit if it is to be used at night. It is usual to use 'glim' lamps to mark the extremities of aeroplanes parked off the Apron).

c. **Engines Running**. All aircraft on the movement area of an aerodrome are to display lights intended to attract attention to the aircraft. Aeroplanes with engines running are to display lights to indicate that fact. Red anti collision lights will suffice for this purpose. ***Note***: It is usual to indicate that an aeroplane is manned by operating the anti collision light. This serves to warn pedestrians that the engines may be started.

d. **Anti Collision Lights**. All aircraft in flight which are fitted with anti-collision lights shall display the lights by day as well as by night. (This is in addition to a. 1. above and is intended to ensure that **if** anti-collision lights are fitted **but are not specifically required** by law, then these lights are also to be illuminated by day as well as night. Practically, this means that if an anti-collision light fails it should be repaired when the aircraft lands, rather than landing for the purpose of fixing it.

© Oxford Aviation Services Limited

e. **Safety**. A pilot is permitted to switch off or reduce the intensity of any flashing lights if they are likely to adversely affect the satisfactory performance of duties, or subject an outside observer to harmful dazzle.

6.2.13 Simulated IMC. (Definition: Reducing the forward visibility of the Pilot Flying (PF) so that he/she has to rely on instruments for attitude and other flight data. This can be achieved by the use of full or partial flight deck window screens to prevent forward visibility or the use of a visor to 'blinker' the pilot. The most important factor is that simulated IMC is only necessary in VMC. The requirements therefore represent the steps necessary to comply with VFR whilst the visibility of the PF is impaired and he cannot maintain the lookout required by the law).

a. An aircraft shall not be flown under simulated IMC unless:

1. fully functioning dual controls are fitted, and

2. a qualified pilot (need not be type rated) occupies a control seat to act as safety pilot (PNF).

b. The safety pilot must have adequate forward vision and to each side of the aircraft. If not, a competent observer (**requirement**: must know what an aeroplane in flight looks like, be able to report any airborne contact clearly and concisely and be able to use the internal communications system of the aeroplane) in communication with the safety pilot, is to occupy a position in the aircraft from which he/she has a field of vision which adequately supplements that of the safety pilot.

6.2.14 Flight in the Vicinity of an Aerodrome. (***Note:*** The pilot of an aeroplane is to plan the route to be flown. At all times he/she is to be aware when flying in the vicinity of an aerodrome). An aeroplane operated on or in the vicinity of an aerodrome, whether or not within an Aerodrome Traffic Zone (see definition) shall:

a. Observe other aerodrome traffic for the purpose of avoiding collisions;

b. Conform with, or avoid, the pattern of traffic formed by other aircraft in operation;

c. Make all turns to the left when approaching for landing and after taking off, unless otherwise instructed (a right hand circuit!); and

d. Land and take off into wind unless safety, the runway configuration, or air traffic considerations determine that a different direction is preferable.

© Oxford Aviation Services Limited

6.2.15 Flight Plans. (Note: Do not confuse a flight plan with the form CA48 or equivalent. A flight plan is the means by which an ATCU is notified of your intention to fly and where necessary to request a clearance to fly as a controlled flight. The form CA48 is a convenient (and approved) method of communicating the necessary information in an orderly form).

a. A flight plan is to be submitted prior to operating:

1. Any flight or portion thereof to be provided with an air traffic service (a controlled flight - see definition); or

2. Any IFR flight within advisory airspace; or

3. 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 in information, alerting and search and rescue services; or

4. 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 (ADIZ) or with air traffic service units in adjacent States in order to avoid the possible need for interception for the purpose of identification; or

5. Any flight across international borders (not just FIR boundaries).

b. A flight plan shall be submitted before departure to an ATS reporting office (flight planning section, ops room, ATC or FIS office) or, during flight, transmitted to the appropriate ATS unit or air-ground control radio station, unless arrangements have been made for the submission of repetitive flight plans.

c. Unless otherwise required by the ATS authority, a flight plan for a controlled flight is to be submitted at least 60 minutes before departure (additional rules apply to flights entering an Oceanic Control Area - OCA), or if submitted in flight, at a time that will ensure its receipt by the appropriate ATSU at least 10 minutes before the aircraft is estimated to reach:

1. The intended point of entry into a control area or advisory area; or

2. The point of crossing an airway or advisory route.

d. A flight plan is to contain such of the following as are considered relevant by the appropriate ATS:

© Oxford Aviation Services Limited

1. Aircraft identification;
2. Flight rules and type of flight;
3. Number and type of aircraft and wake category;
4. Equipment;
5. Departure aerodrome;
6. Estimated off blocks time (EOBT);
7. Cruising speed(s);
8. Cruising level(s);
9. Route to be followed;
10. Destination aerodrome and total elapsed time;
11. Alternate aerodrome;
12. Fuel endurance;
13. Total number of persons on board (POB) including dead bodies;
14. Emergency and survival equipment;
15. Other information;

e. With the exception of inadvertent deviation, all changes to a flight plan submitted for IFR flight or a VFR flight operated as a controlled flight, are to 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 ATSU. ***Note:*** Information regarding fuel endurance or total number of people on board, if incorrect at time of departure constitutes a significant change and must be reported.

f. **Closing a flight plan/Arrival Report**. Unless otherwise prescribed, a report of arrival is to be made in person, by radio or via data link, as soon as possible after landing to the appropriate ATSU at the arrival aerodrome for any flight, or portion of flight, for which a flight plan has been submitted. On receipt of the arrival report at the ATSU, the flight plan shall be closed. When communications facilities are know to be inadequate and alternative message handling facilities do not exist, a message comparable to an arrival report is to be transmitted by the aircraft. Whenever an arrival report is required, failure to comply with these provisions may cause serious disruption in the air traffic services and incur great expense in carrying out unnecessary SAR operations. An arrival report made by an aircraft is to contain the following:

1. Aircraft identification;
2. Departure aerodrome;
3. Destination aerodrome;
4. Arrival aerodrome;
5. Time of arrival.

© Oxford Aviation Services Limited

6.2.16 Time. Co-ordinated Universal Time (UTC) is to be used and is to be expressed in hours and minutes of the 24 hour day beginning at midnight. It is used throughout the world in aviation but you may still find references to either Zulu time or GMT. Where a time check is passed by ATC it is to be to the nearest minute (ie 0941 and 20 secs would be 0941; 0941 and 40 secs would be 0942).

6.2.17 ATC Clearance. An ATC clearance is to 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 ATCU. A pilot-in-command may request an amended clearance if the issued clearance is unsatisfactory, and such an amended clearance will be issued if practicable. It is normal practice for an ATC clearance to be passed to the aircraft prior to departure. Usually at busy aerodromes a discrete clearance delivery frequency is established specifically for ATC clearances. The radio operator reading the clearance will in all probability not be the ATCO issuing the clearance. Before commencing the reading the of the clearance you will be asked "Ready to copy?" Your response should be "Go ahead" **when** you are ready! The clearance will be read to you and the operator will terminate with "read back". You are required to read back the clearance **exactly** as you received it. If your read back is incorrect, the operator will read the entire clearance to you again. This will continue until you get it right. There is nothing unprofessional in asking for a repeat or asking for a place name to be spelled. If you do not read it back correctly, at the subsequent board of enquiry into an accident, it will be stated that you didn't understand the clearance as read to you, and you will be held responsible. Don't assume that the air traffic controllers are infallible. If you think something is wrong - query it!

6.2.18 Adherence to Flight Plan. Flight plans are to be adhered to unless an emergency situation arises which necessitates immediate action by the aircraft . In such a case the ATSU is to be informed as soon as possible. If the average TAS at cruising level between reporting points varies or is expected to vary **by** +/- 5% of the TAS given in the flight plan, the ATCU is to be informed. If the estimate for the next applicable reporting point, FIR boundary or destination aerodrome changes by **more than** 3 minutes from that already notified. The revised time is to be communicated to the appropriate ATCU.

6.2.18.1 Inadvertent Changes. Controlled flights are required to operate along the centre line of an airway or route directly between beacons if that is how the route is specified. If requested by ATC, re-routing will result in a current flight plan and will require a re-clearance. If specified, changeover from one VOR beacon to another is to be at the specified changeover point unless otherwise directed. Any deviation from these requirements is to be reported to ATC. If a controlled flight inadvertently deviates from its current flight plan, the following action is to be taken:

© Oxford Aviation Services Limited

a. **Deviation from Track:** If the aircraft is off track, action is to be taken immediately to regain the track as soon as practicable.

b. **Variation in TAS:** If the average TAS at cruising level varies by **plus/minus** 5% of the TAS specified in the flight plan, ATC is to be informed.

c. **Changes in ETA:** If the time estimated for a reporting point, FIR boundary or destination aerodrome changes by **more than** 3 minutes from that already communicated to ATC (or any other period agreed by RAN agreement), a revised ETA is to be passed as soon as possible.

6.2.19 Weather Deterioration Below VMC. If a VFR flight is unable to maintain VMC in accordance with the current flight plan clearance, an amended clearance may be requested enabling the aircraft to continue in VMC (on another route) to destination or to an alternate aerodrome, or to leave the airspace in which ATC clearance is required. If such an amended clearance cannot be obtained to continue to operate in VMC, you must notify the ATCU of the action being taken to either leave the airspace concerned or to land at the nearest suitable aerodrome. If the flight is being operated in a control zone, request special VFR clearance. If all these measures are inappropriate, request IFR clearance.

6.2.20 Position Reports. Unless advised to cease position reporting (what usually happens when under radar control), a controlled flight is to make positions reports at required/designated positions as soon as possible after reaching the reporting point. The report is to contain the time and level of passing the point, together with any other information required. If SSR mode "C" has been verified as accurate, altitude/FL may be omitted from the position report. This is an example of a position report:

"London Airways this is GABCD, Pole Hill at 35, FL 170, Dean Cross at 46, Glasgow next"

6.2.20.1 Termination of Control. A controlled flight is to advise the appropriate ATCU as soon as it ceases to be subject to air traffic control services. This will be done automatically if the aircraft lands at a controlled aerodrome (one with a control tower).

6.2.21 Communications Failure. Aircraft operating in accordance with an ATC clearance where two way radio communication is required, are to comply with the requirements of ICAO annex 10 (Telecommunications) vol II. This specifies the requirement for air-to-ground communications equipment and the radio frequencies allocated to the aeronautical mobile telecommunications network (SELCAL satisfies the requirement to maintain air-ground voice communications). Where Controller-Pilot Data Link Communications (CPDLC) exists, the requirement for voice communications is maintained.

© Oxford Aviation Services Limited

a. If the communications system of the aeroplane (receiver or transmitter) fails when the aeroplane is flying in the traffic pattern at a controlled aerodrome, a watch shall be kept for instructions issued by visual signals.

b. If a failure occurs during a flight in VMC (regardless of flight rules - VFR/IFR) the aircraft is to continue to fly in VMC, land at the nearest suitable aerodrome and report its arrival by the most expeditious means to the appropriate ATCU.

c. If a failure occurs in IMC, the following are to be complied with:

1. Unless prohibited by a regional air navigation agreement (revise ICAO regions), the aircraft is to 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 over a compulsory reporting point, and thereafter adjust level and speed in accordance with the filed flight plan.

2. Proceed according to the current flight plan route to the appropriate designated navigation aid serving the destination aerodrome and, when required to ensure compliance with 3. below, hold over this aid until commencement of descent.

3. Commence descent from the nav aid in 2. above at, or as close as possible to, the expected approach time (EAT) last received and acknowledged. If no EAT has been received and acknowledged, descend at, or as close as possible to, the ETA resulting from the current flight plan.

4. Complete a normal instrument approach procedure as specified for the designated aid; and,

5. Land, if possible, within 30 minutes after the ETA in 3. above or the last acknowledged EAT, whichever is the later.

6.2.21.1 IFR Comms in European Airspace. The European Regional Supps (Doc 7030) defines a procedure to cope with communications failure affecting an aeroplane after departure, but not established en-route. The case refers to an IFR flight in IMC. The procedure requires the aircraft to maintain the last assigned flight level for 3 minutes and then proceed as per the filed flight plan.

© Oxford Aviation Services Limited

6.2.22 Unlawful Interference. Where an aircraft is being subjected to unlawful interference (hi-jacking etc.), communication with the appropriate ATC authority is to be attempted to notify the authority of this fact and any significant circumstances, and of any deviation from the current flight plan, to enable the ATS unit to give priority to the aircraft and to minimise conflict with other aircraft. Attachment B of Annex 2 contains guidance notes for use in this situation. Specifically:

a. Unless conditions on the aircraft dictate otherwise, the PIC is to attempt to continue flying on the assigned track and at the assigned level at least until able to notify an ATSU or until within coverage of a radar unit.

b. If forced to depart from assigned track/level, without being able to notify ATC, the PIC should, if possible:

1. Attempt to broadcast warnings on the VHF emergency frequency (121.500MHz), and use other on-board systems (ie SSR - squawk A/7500, data links etc..) when it is advantageous and circumstances permit, and

2. Proceed in accordance with applicable special procedures for in flight contingencies established and published in Doc 7030 - Regional SUPPS;

3. If no regional procedures have been established, proceed at a level different from IFR levels by 1 000ft above FL 290, or 500ft below FL290.

6.2.23 Interception of Civil Aircraft. Each Contracting State has the right to establish procedures for the interception and identification of aircraft flying over the territory of that State. In formulating the policy for interception, recognising that it is essential for the safety of flight, any visual signals employed during interception by aircraft of the Contracting State, are to be in accordance with Appendix 1 to Annex 2 of the Chicago Convention. The Council has also formulated special recommendations to ensure that the procedures for interception are applied in a uniform manner. (See Paragraph 6.7). The PIC of a civil aircraft, when intercepted is to comply with the standards set out in appendix 2 (sections 2 and 3) to Annex 2, interpreting and responding to visual signals and procedures detailed in paragraph 6.7.

6.2.23.1 Carriage of Interception Tables. It is a requirement of national law (UK - ANO; JAA - JAR OPS-1) that aircraft engaged on international flights must carry the interception tables. Clearly, the intent is that in the event of an interception you refer to the tables. You are not expected to learn the content of the tables but you should know what the tables contain. It is suggested that you read the tables to familiarise yourself. (See 6.7.4 and 6.7.5)

© Oxford Aviation Services Limited

6.3 VISUAL FLIGHT RULES

6.3.1 Visual Meteorological Conditions (VMC). With the exception of special VFR (SVFR - see paragraph 6.5) , VFR flight is to be conducted so that the aircraft is flown in conditions of visibility and distance from cloud equal to or greater than those specified in table (6.3.1). These conditions are known as the VMC minima. You must be able to recall the VMC minima.

6.3.2 Take off Conditions. Except when specially authorised by an ATC unit, VFR flights are not to take-off or land at an aerodrome within a control zone, or enter the ATZ or traffic pattern:

a) When the ceiling is less than 450m (1 500ft) or

b) When ground visibility (see definition) is less than 5 km

6.3.3 Prohibition of VFR flight. VFR flight between sunset and sunrise, or such other period between sunset and sunrise as may be detailed by the ATS authority, shall be operated in accordance with the conditions required by such authority.

a. Unless specially authorised, VFR flights shall not operate:

1. Above FL 200 (in CAS highest VFR level is FL195)

2. At transonic or supersonic speeds.

b. Authorisation for VFR flight will not be granted to flights above FL290 where RVSM is applied.

c. Except where necessary for take off and landing (or approved by the authority), VFR flight is not permitted:

1. Over the congested areas of cities, towns or settlements, or over an open air assembly of persons at a height less than 300m (1 000 ft) above the highest obstacle within a radius of 600m from the aircraft.

2. In all other areas outside 1. above, at a height not less than 150m (500 ft) above the ground or water.

6.3.4 VFR Flight Levels. Except where otherwise indicated in ATC clearances or specified by the appropriate ATS authority, VFR flights in level cruising flight when above 900m (3 000ft) above ground or water, or a higher datum as specified by the ATS authority (the transition altitude - see definition), shall be conducted at a flight level appropriate to the magnetic track of the aircraft as specified in paragraph 6.11. VFR flights are to comply with the requirements of paragraphs 6.2.17 to 6.2.21 inclusive, above:

© Oxford Aviation Services Limited

a. When operating in class B, C or D airspace (in class A, VFR flight is not permitted)

b. When forming part of aerodrome traffic at controlled aerodromes, or

c. When operating as special VFR flights

6.3.5 VFR Flight Plan. A VFR flight plan is to be submitted for a VFR flight operating in or into areas, or along routes, designated by the appropriate ATS authority as areas where a flight plan is required. Such a flight shall maintain a continuous listening watch on the appropriate radio frequency of, and make position reports to, the ATS unit providing flight information service. A VFR flight plan is to include the letter "V" in item 8 of the flight plan form. If the PIC of a flight wishes to commence the flight under VFR and at some point en-route change to IFR, the letter "Z" is to be inserted in field 8. Where the PIC of a VFR flight wishes to change to IFR:

a. If a flight plan was submitted, the PIC is to communicate the necessary changes to be effected to the current flight plan, or

b. He/she is to submit an IFR flight plan and obtain a clearance prior to proceeding under IFR when in controlled airspace.

<table>
<tr><th>Class of Airspace</th><th>Vertical Limits</th><th>Visibility</th><th>Distance from Cloud</th></tr>
<tr><td rowspan="2">A, B, C D and E
and
F and G
(Above 3 000ft AMSL or above 1 000ft above terrain, whichever is higher)</td><td>At and above FL 100(1)</td><td>8 km</td><td rowspan="2">1000ft vertical, and 1500m horizontal from cloud</td></tr>
<tr><td>Below FL 100</td><td>5 km</td></tr>
<tr><td colspan="2">F and G
At and below 3 000ft AMSL or 1 000ft above terrain whichever is the higher</td><td>5 km(2)</td><td>Clear of cloud and in sight of the surface</td></tr>
</table>

Table 6.3.1 - Visual Meteorological Conditions for VFR

Notes: 1. Where the transition level is above FL100, 10 000ft is used
2. When approved by the authority, visibilities to 1500m may be permitted for flights operating at speeds which would permit adequate opportunity to observe other traffic and obstacles in sufficient time to prevent collisions.

© Oxford Aviation Services Limited

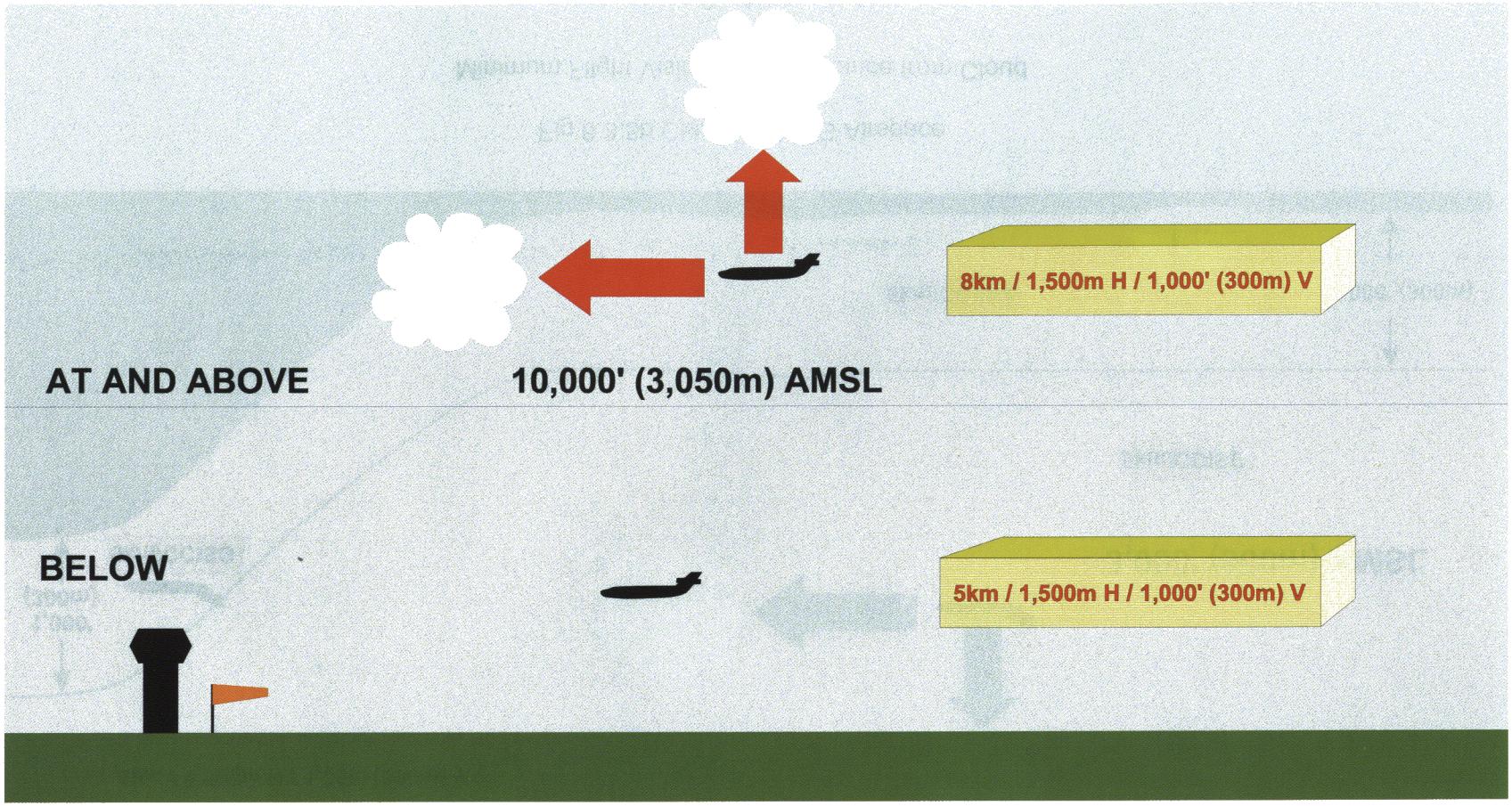


Fig 6.3.5a Classes: A, B, C, D and E Airspace
VMC
Minimum Flight Visibility and Distance from Cloud

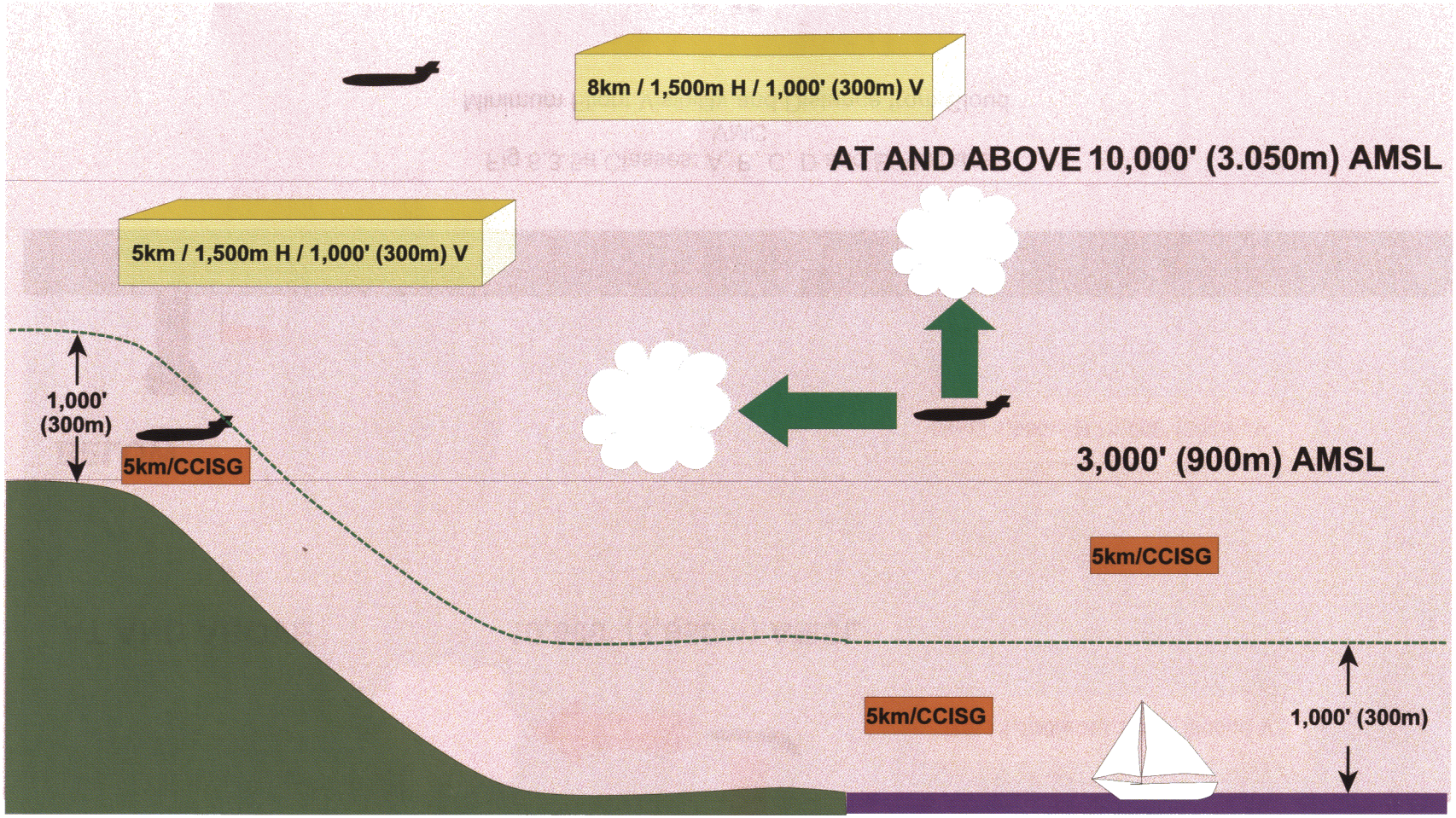


Fig 6.3.5b Classes: F & G Airspace
VMC
Minimum Flight Visibility and Distance from Cloud

6.3.6 Classes of Airspace. The classification of airspace and the services and restrictions applied is detailed in Chapter 8 of the notes.

6.4 INSTRUMENT FLIGHT RULES.

6.4.1 IFR. For aircraft to be operated in meteorological conditions less than VMC (IMC exists when VMC does not!), the following rules are applicable. The rules are collectively known as the Instrument Flight rules (IFR). Annex 1 (Personnel Licensing - 2.1.7) states that where a licence is issued by a contracting state, it shall not permit the holder to act as PIC or co-pilot of an aeroplane under IFR unless the holder also holds a valid instrument rating appropriate to the aircraft category. It is also stated that where an IR is included as an integral part of the ATPL(A), this is permitted under the rules of ICAO.

6.4.2 Aircraft Equipment. Aircraft are to be equipped with suitable instruments and with navigation equipment appropriate to the route to be flown. The necessary equipment is detailed in JAR OPS-1 and is covered in Operational Procedures lectures.

6.4.3 Minimum Levels. Except when necessary for take-off and landing, or where specially authorised by the appropriate ATS authority, an IFR flight shall be flown at a level which is not below the minimum flight altitude established by the State whose territory is being overflown, or where no such minimum altitude is specified:

a. Over high terrain or mountainous areas (not defined further), the minimum level must be at least 600m (2 000 ft) above the highest obstacle located within 8 km (5 nm) of the estimated position of the aircraft;

b. In areas other than in a) above, minimum level is to be 300 m (1 000 ft) above the highest obstacle within 8 km (5 nm) of the estimated position of the aircraft.

6.4.4 IFR Flight Plans. An IFR flight plan is to include the letter **I** in item 8 of the flight plan form. If the intention is to change from IFR to VFR at some point during the flight the letter **Y** is to be inserted in item 8.

6.4.4.1 Changing from IFR to VFR. Where it is elected to change from IFR to VFR and a flight plan was submitted **not** annotated **Y** in filed 8, the ATS authority is to be notified that IFR flight is cancelled and the necessary changes to the current flight plan are to be passed. The phrase **"Cancel my IFR flight"** is to be used. When an IFR flight encounters VMC it shall not cancel IFR unless it is anticipated and intended that the flight will be continued for 'a reasonable period' of time in uninterrupted VMC.

6.4.5 IFR within Controlled Airspace (CAS). IFR flights are to comply with paragraphs 6.2.17 to 6.2.21 and instructions issued by the appropriate ATC unit. IFR flights in cruising flight shall be flown at a cruising level, or when authorised to employ cruise climb techniques, between two levels or above a level, selected from:

© Oxford Aviation Services Limited

a. The table of cruising levels at paragraph 6.11

b. A modified table of cruising levels, if applicable, for flight above FL410.

Note: States may apply different criteria for the correlation of levels relating to tracks, (semi-circular 270 - 090 as opposed to 000 - 180) providing such criteria is notified in the AIP of the state. (Usually applicable where traffic is predominantly N/S as opposed to E/W).

6.4.6 IFR outside Controlled Airspace (CAS). The following rules apply to IFR flights outside CAS:

a. **Cruising Levels.** IFR flights outside CAS are to be flown at a cruising level appropriate to the magnetic track of the aircraft as specified in:

1. The table of cruising levels specified in paragraph 6.11 except when otherwise specified by the appropriate ATS authority for flight below 900m (3000 ft) AMSL, or

2. A modified table of cruising levels, if applicable, for flight above FL410.

3. In the UK quadrantal levels are applied to IFR flights outside of controlled airspace above the transition altitude. Quadrantal levels are based on magnetic tracks and the compass is divided into four quadrants in which flight level is allocated in 500 ft increments.

i. For magnetic tracks between 000 - 089, odd flight levels are allocated. ie FL50, FL70 etc..

ii. For magnetic tracks between 090 - 179, odd flight levels plus 500ft are allocated. ie FL55, FL75 etc..

iii. For magnetic tracks between 180 - 269, even flight levels are allocated. ie FL60, FL80 etc..

iv. For magnetic tracks between 270 - 359, even flight levels plus 500ft are allocated. ie FL65, FL85 etc..

Note: The quadrantal system is UK national law and is not applicable outside the UK. There are questions in the UK JAA question bank concerning quadrantals.

© Oxford Aviation Services Limited

b. **Communications**. An IFR flight operating outside CAS but within or into areas or along routes designated by the authority as those where the submission of a flight plan is required, shall establish communication and maintain a continuous listening watch with the ATS unit providing a flight information service (FIS). Communications failure procedures are detailed at paragraph 6.2.21.

c. **Position Reports**. An IFR flight outside CAS and required to either submit a flight plan or maintain a listening watch with the unit providing FIS, is to report position as per paragraph 6.2.20 (position reports). For flights operating off ATS routes (airways) or in a defined operating area, position reports are to be made at intervals of 1 hour after an initial report has been made 30 minutes after leaving CAS or after commencing the controlled flight. Where a position report is meaningless (prolonged controlled flight operations in a confined area) an 'operations normal' call is to be made at hourly intervals to prevent unnecessary activation of the alerting service. An example of an 'operations normal' call is:

"London Control this is GADRF operations normal at 1020, 2000ft and below. Will call again at 1120"

6.5 SPECIAL VFR

6.5.1 History. With the introduction of airspace restrictions in the late 1960s military aerodromes close to large international aerodromes, specifically Northolt in proximity to the rapidly expanding Heathrow, found that IFR procedures were mandatory in the new control zones when previously VFR procedures were generally accepted. In order to allow aeroplanes to fly into and out of Northolt (in the then Heathrow Special Rules Zone) a procedure based on a corridor in which visual navigation was required was set up. Providing the pilot could see the ground, he could navigate and provided he remained clear of cloud he could avoid collisions. A system of 'not quite' IMC or special VFR was invented. Until the late 1970s this was applied in what was known as the Northolt special VFR corridor. It was expanded to include the general aviation aerodrome at Denham, and its obvious advantages for aeroplanes and pilots unable to comply with IFR were obvious. When the classes of airspace (A - G) were introduced, ICAO also adopted the special VFR as a procedure with appropriate international amendments.

6.5.2 SVFR. SVFR is only applicable to flights into, out of or within a control zone (CTR). It is not normally permitted for flights that are transiting through a CTR. It is not permitted for aeroplanes with a max take off mass certificated over 5 700 kg flying for commercial air transport. It is defined as flight in a CTR in accordance with a clearance in conditions below VMC, in which the aeroplane remains clear of cloud and in sight of the ground. Annex 2 requires that ground visibility of 1 500m and a cloud ceiling of 1 000ft exists before a SVFR flight is permitted to take off from an aerodrome in a CTR. More restrictively, JAR OPS-1 requires 3 000m visibility.

© Oxford Aviation Services Limited

d. **Sound Signals:**

Morse Code: XXX (▬●● ▬▬ ●●▬▬ ●●▬)

6.6.3 **Safety.** An aircraft in any form of difficulty that wishes to indicate, by means other than RTF that it is compelled to land, but does not require any other assistance, may use either of the following visual signals:

a. Repeated switching on/off of landing lights or

b. Repeated switching on/off of navigation lights so as to distinguish from normal flashing operation.

Note: In maritime operations (at sea) a third level of distress (securité -say cure ee tay) is used to warn traffic of navigation problems, bad weather or unserviceable aids. The morse code is TTT (▬▬▬). This is not assessable in the syllabus but there is a question which asks about proscribed combinations of letters in registration marks. TTT is one.

6.6.4 **Emergency Frequencies.** The following are dedicated radio frequencies used to communicate Distress, Urgency and Safety messages. You are required to know these.

a.	VHF	121.500Mhz	Aeronautical mobile emergency VHF
b.	UHF	243.000Mhz	Aeronautical mobile emergency UHF (mainly military)
c.	HF	2 182khz	International maritime distress and calling HF
d.	SARSAT	406 Mhz	SAR beacon frequency (also radiates on 121.5)

6.6.5 **Search and Rescue.** SAR procedures and the requirements of the SAR service are covered in chapter 18 of the notes. There are discrete frequencies allocated to SAR operations (VHF, UHF and HF). You are not required to remember these, but if called on to assist in SAR operations you will be required to use the frequencies under direction.

© Oxford Aviation Services Limited

6.7 INTERCEPTION OF CIVIL AIRCRAFT.

6.7.1 Law. Under Article 9 of the Convention on International Civil Aviation, each contracting State reserves the right for reasons of military necessity or public safety, to restrict or prohibit the aircraft of other States from flying over certain areas of its territory. The regulations of a State may prescribe the need to investigate the identity of aircraft. Accordingly, it may be necessary to lead an aircraft of another State, which has been intercepted, away from a particular area (such as a prohibited area) or, an intercepted aircraft may be required to land for security reasons at a designated aerodrome. Adherence to flight plans and ATC procedures and the maintenance of a listening watch on the appropriate ATC frequency, make the possibility of interception highly improbable.

6.7.2 Procedures. If the identity of an aircraft is in doubt, all possible efforts will be made to secure identification through the appropriate Air Traffic Service Units. As interception of civil aircraft is, in all cases, potentially hazardous, the interception procedures will only be used as a last resort. The word 'interception' does not include the intercept and escort service provided on request to an aircraft in distress in accordance with Search and Rescue procedures. An aircraft which is intercepted by another aircraft shall immediately:

a. follow the instructions given by the intercepting aircraft, interpreting and responding to visual signals in accordance with the tables 6.7.4 and 6.7.5.

b. notify, if possible, the appropriate Air Traffic Services Unit;

c. attempt to establish radio communication with the intercepting aircraft or with the appropriate intercept control unit, by making a general call on the emergency frequency 121.500 MHz, giving the identity of the intercepted aircraft and the nature of the flight; and if no contact has been established and if practicable, repeating this call on the emergency frequency 243.000 MHz;

d. if equipped with SSR transponder, select Mode A, Code 7700 and Mode C, unless otherwise instructed by the appropriate Air Traffic Services Unit.

6.7.3 Contact with Interceptor. If radio contact with the intercepting aircraft is established but communication in a common language is not possible, attempts shall be made to convey essential information and acknowledgement of instructions by using the phrases and pronunciations as described in table 6.7.3.1. If any instructions received from any sources conflict with those given by the intercepting aircraft, the intercepted aircraft shall request immediate clarification while continuing to comply with the instructions given by the intercepting aircraft.

© Oxford Aviation Services Limited

6.7.3.1 Interception Phraseology

Phrases for use by **INTERCEPTING** aircraft			Phrases for use by **INTERCEPTED** aircraft		
Phrase	**Pronunciation**[1]	**Meaning**	**Phrase**	**Pronunciation**[1]	**Meaning**
Call Sign	KOL SA-IN	What is your call sign?	CALL SIGN (call sign)[2]	KOL SA-IN	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	Landing at this aerodrome	REPEAT	REE-PEET	Repeat your instruction
Proceed	PRO-SEED	You may proceed	AM LOST	AM LOSST	Position unknown
			MAYDAY	MAYDAY	I am in distress
			HIJACK[3]	HI-JACK	I have been hijacked
			LAND	LAAND	I request to land at (place name)
			DESCEND	DEE-SEND	I require descent

Table 6.7.3.1 -Interception Phraseology

Notes:
1. In the second column, syllables to be emphasised 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".

© Oxford Aviation Services Limited

6.7.4 Signals Initiated by Intercepting Aircraft and Responses by Intercepted Aircraft

Ser	INTERCEPTING Aircraft Signals	Meaning	INTERCEPTED Aircraft Responds	Meaning
1	**DAY**-Rocking wings from a position slightly above and ahead of, and normally to the left of the intercepted aircraft and, after acknowledgement, a slow level turn, normally to the left, on the desired heading. **NIGHT** - Same and, in addition, flashing navigational lights at irregular intervals. **Note 1:** Meteorological conditions or terrain may require the intercepting aircraft to take up a position slightly above and ahead of, and to the right of the intercepted aircraft and to make the subsequent turn to the right. **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 racetrack patterns and to rock its wings each time it passes the intercepted aircraft.	You have been intercepted follow me	**AEROPLANES:** **DAY**-Rocking wings and following. **NIGHT**-Same and, in addition, flashing navigational lights at irregular intervals. **HELICOPTERS:** DAY or NIGHT-Rocking aircraft, flashing navigational lights at irregular intervals and following. **Note:** Additional action required to be taken by intercepted aircraft is prescribed in RAC section.	Understood will comply
2	**DAY** or **NIGHT**-An abrupt breakaway 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	**AEROPLANES:** **DAY** or **NIGHT**-Rocking wings. **HELICOPTERS** **DAY** or **NIGHT**- Rocking aircraft	Understood will comply
3	**DAY**-Circling aerodrome, lowering landing gear and overflying runway in the direction of landing or, if the intercepted aircraft is a helicopter, overflying the helicopter landing area. **NIGHT**-Same and, in addition, showing steady landing lights.	Land at this aerodrome	**AEROPLANES:** **DAY**-Lowering landing gear, following the intercepting aircraft and, if after over-flying the runway landing is considered safe, proceeding to land. **NIGHT**-Same and, in addition, showing steady landing lights (if carried). **HELICOPTERS:** DAY or NIGHT-Following the intercepting aircraft and proceeding to land, showing a steady landing light (if carried)	Understood will comply

Table 6.7.4

© Oxford Aviation Services Limited

6.7.5 Signals Initiated by Intercepted Aircraft and Responses by Intercepting Aircraft.

Ser	INTERCEPTED Aircraft Signals	Meaning	INTERCEPTING Aircraft Responds	Meaning
4	**AEROPLANES:** DAY-Raising landing gear while passing over landing runway at a height exceeding 300 m (1000 ft) but not exceeding 600 m (2000 ft) above the aerodrome level, and continuing to circle the aerodrome. NIGHT-Flashing landing lights while passing over landing runway at a height exceeding 300 m (1000 ft) but not exceeding 600 m (2000 ft) above the aerodrome level, and continuing to circle the aerodrome. If unable to flash landing lights, flash any other lights available.	Aerodrome you have designated is inadequate	DAY or NIGHT-if it is desired that the intercepted aircraft follow the intercepting aircraft to an alternate aerodrome, the intercepting aircraft raises its landing gear and uses the Series 1 signals prescribed for intercepting aircraft. If it is decided to release the intercepted aircraft, the intercepting aircraft uses the Series 2 signals prescribed for intercepting aircraft.	Understood follow me Understood, you may proceed.
5	**AEROPLANES:** DAY or NIGHT-Regular switching on and off 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	**AEROPLANES:** DAY or NIGHT-Irregular flashing of all available lights. **HELICOPTERS:** DAY or NIGHT - Irregular flashing of all available lights.	In distress	DAY or NIGHT-Use Series 2 signals prescribed for intercepting aircraft.	Understood

Table 6.7.5

6.8 RESTRICTED, PROHIBITED OR DANGER AREAS.

6.8.1 Specification. Each state has the right to restrict or prohibit flight in territorial airspace for reasons of security or safety. Such areas are known as danger areas, restricted areas or prohibited areas and are detailed in the AIP. Areas that are not permanently closed are notified by NOTAM when closed.

6.8.2 Visual Warning of Incursion. By day and night; a series of projectiles discharged from the ground at intervals of 10 secs, each showing on bursting red and green lights or stars, are used to warn aircraft that they are flying in or about to enter restricted, prohibited or danger areas.

© Oxford Aviation Services Limited

6.9 SIGNALS FOR AERODROME TRAFFIC.

6.9.1 Non-Radio Traffic. Non radio traffic on or in the vicinity of an aerodrome is to keep a good look out for visual signal from ATC. Aeroplanes with radios are also to comply with instructions given visually. The lamp used by ATC to communicate (aldis lamp) is directional with a narrow beam. If you see a signal light from the tower the signal is meant for you.

6.9.2 Visual Signals. The following table gives the light and pyrotechnic signals used from ground to air:

Light	From Aerodrome Control to:	
	Aircraft in Flight	**Aircraft on the Ground**
Steady Green	Cleared to land	Cleared or take-off
Steady Red	Give way to other aircraft and continue circling	Stop
Series of Green flashes	Return for landing and await clearance to land	Cleared to taxi
Series of Red flashes	Aerodrome unsafe, do not land	Taxi clear of the landing area
Series of White flashes	Land at this aerodrome after receiving clearance to land, and proceed to the apron	Return to the starting point on the aerodrome
Red pyrotechnic	Notwithstanding any previous instructions, do not land for the time being	

Table 6.9.2 - Visual Signals

6.9.3 Acknowledgement by Aircraft. To acknowledge receipt of a signal as per table 6.9.2 an aircraft may make the following:

a. When in flight:

i. During the hours of daylight, by rocking the aircraft's wings

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 the navigation lights twice.

© Oxford Aviation Services Limited

b. When on the ground:

i. During the hours of daylight by moving the aircraft's rudder or ailerons

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 the navigation lights twice.

6.9.4 Visual Ground Signals. The following signals may be shown on an aerodrome, either in the signals square or at other locations on the apron or movement area. A signals square is usually located in front (aerodrome side) of a control tower (visual room) and is to be visible from the air anywhere in the vicinity of the aerodrome. The purpose is to convey essential information to pilots unable to communicate by radio. Other signals, applicable to non-radio traffic on the ground are displayed from a signals mast (also in front of the control tower) or by means of indicator boards (information signs) located on or adjacent to the control tower. The absence of a signal square indicates that the aerodrome is not to be used by non-radio traffic. This is the case at Oxford, where due high traffic density and trainee pilots in the circuit, non-radio traffic is considered hazardous.

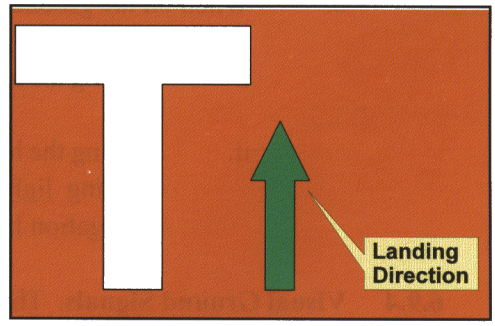
Note 1. The use of any signal by any person, shall only have the meaning assigned to it under the rule.

2. The dimensions of ground markings are subject to a 10% tolerance. (You do not need to know the dimensions of signs)

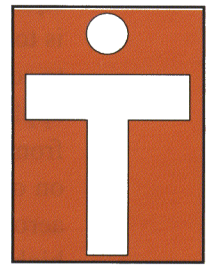
© Oxford Aviation Services Limited

6.9.4.1 Signals in the Signals Area

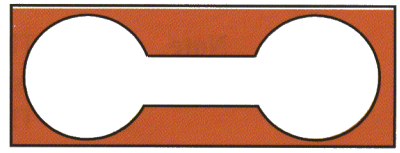
a. A white "T" as illustrated in 25.1. signifies that takeoffs and landings shall be in the direction of the shaft of the "T" (as indicated by the arrow).



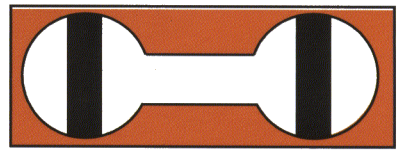
b. A white disc added to the "T",as shown in 25.2. means that take-off and landing direction do not necessarily coincide.



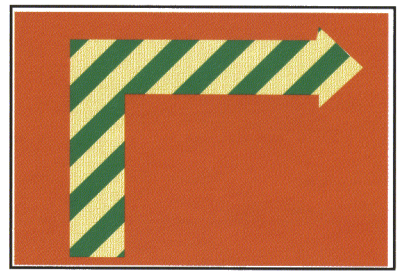
c. A white dumb-bell indicates that aircraft movement on the ground is confined to paved, metaled or similar hardened surfaces.



d. A white dumb-bell with black stripes signifies that take offs and landings are to be on a runway, but movement on the ground is not confined to pavements.

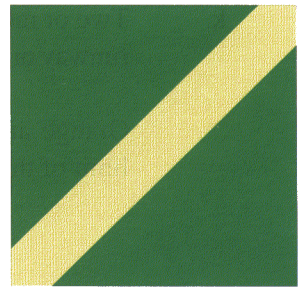


e. A red and yellow striped arrow signifies that a right hand circuit is in force.



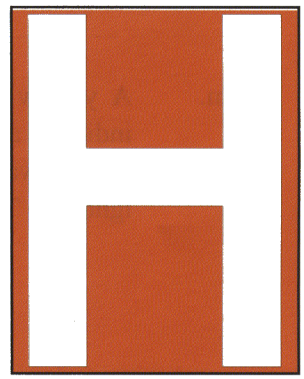
© Oxford Aviation Services Limited

f. A red panel with a yellow diagonal stripe signifies that the maneuvering area is poor and pilots must exercise special care.

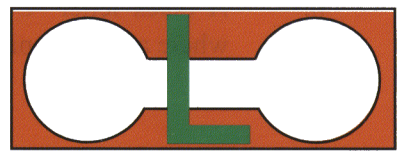


g. A red panel with a yellow cross signifies that the aerodrome is unfit for aircraft movements, and landings are prohibited.

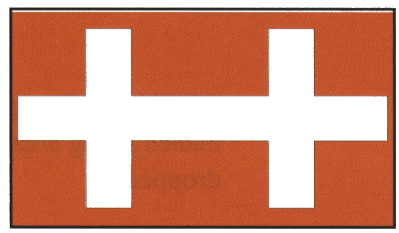
h. A white "H" signifies that helicopters shall take-off and land only within the area designated by the marking.



i. A red 'L' over a dumb-bell means that light aircraft are permitted to take off and land either on a runway or on the area designated.



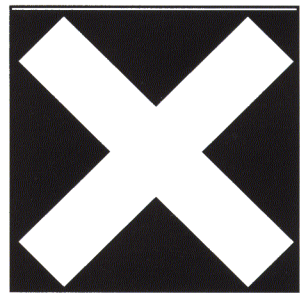
j. A white double cross means that glider flying is in progress.



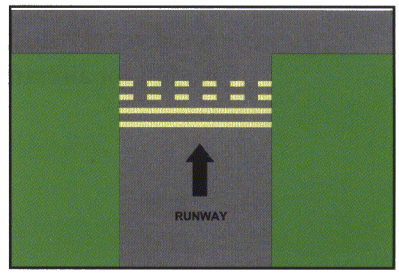
© Oxford Aviation Services Limited

k. Two or more white crosses indicate that the section of the runway or taxiway (yellow) is unfit for aircraft movement.

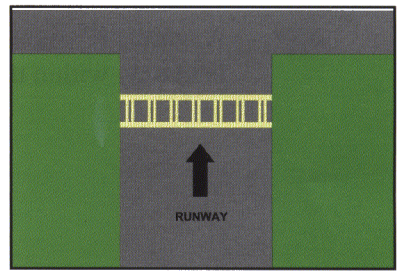
Orange and white boundary markers will delineate the limit of the unuseable ground or runway



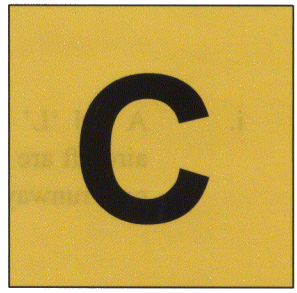
l. Two yellow broken lines and two continuous lines signify the holding point closest to the runway. Outside of the notified hours for ATC, this is the closet point an aircraft or vehicle can approach to the runway for the purpose of giving way to aircraft landing or taking off. This is a '**pattern A**' marking



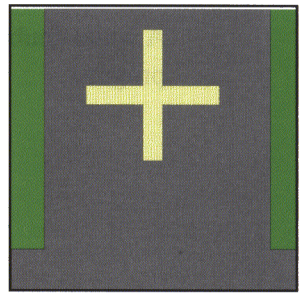
m. A yellow 'ladder' marking across the taxiway indicates a holding point other than the closest to the runway. Outside ATC hours it can be ignored. This is a **'pattern B'** marking



n. A black letter "C" on a yellow background indicates where a visiting pilot should report on arrival.

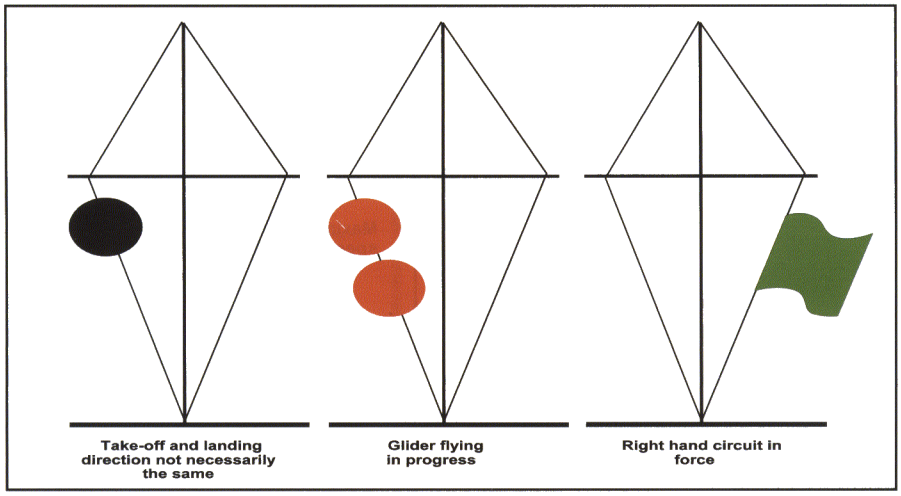


o. A yellow St George's cross indicates the position on the maneuvering area where tow ropes and banner can be dropped.



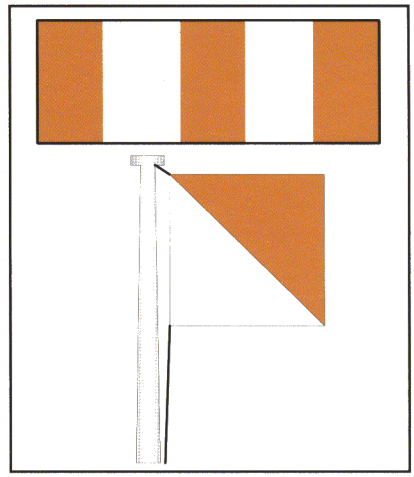
© Oxford Aviation Services Limited

6.9.4.2 Signals Mast. The following signals are flown from the signals mast:



6.9.4.3 QDM Boards. A yellow board with two black numbers on, situated on the tower, indicates the runway direction in use (QDM).

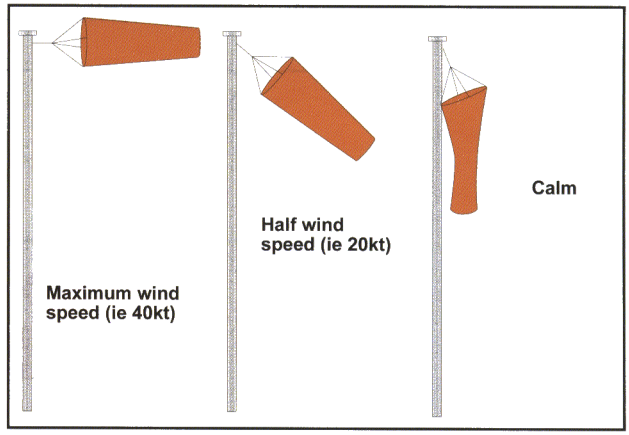
6.9.4.4 Boundary markers. Orange and white striped markers indicate the boundary of the maneuvering area where it is not clearly defined.



© Oxford Aviation Services Limited

6.9.4.5 Wind Sleeve. A wind sleeve(windsock) indicates the wind direction and speed. (Large = 40kt; medium = 30kt; small = 20kt)

Max wind speed (i.e. 40kt)
Half wind speed (i.e. 20kt)
Calm



25.19

© Oxford Aviation Services Limited

6.10 MARSHALLING SIGNALS. As a reference, CAP 637 is issued to each student. Section 6 Table E covers marshalling signals and signals from the pilot to the marshaller. The following table contains the signals you are required to know:

6.10.1 Marshaller to Pilot:

Intention	Signal	CAP637 Ref:
Proceed Under further guidance	R or L arm down, other arm moved across the body and extended to indicate position of other marshaller	Sect 6 Table E (a)
This bay	Arms placed above the head in a vertical position	Sect 6 Table E (m)
Move ahead	Arms repeated moved upward and backward, beckoning onward	Sect 6 Table E (b)
Turn LEFT	R arm down, L arm repeatedly moved upward and backward. The speed of the arm movement indicates the rate of turn.	Sect 6 Table E (c)
Turn RIGHT	L arm down, R arm repeatedly moved upward and backward. The speed of the arm movement indicates the rate of turn.	Sect 6 Table E (c)
Stop	Arms repeatedly crossed above the head. The speed of the movement indicates the urgency to stop.	Sect 6 Table E (e)
Engage brakes	Raise arm and hand with fingers extended, horizontally in front of body, then clench fist. (Not used at night)	Sect 6 Table E (v)
Release brakes	Raise arm and hand with fist clenched, horizontally in front of body, then extend fingers. (Not used at night)	Sect 6 Table E (v)
Chocks Inserted	Arms extended, palms inwards, then swung from the extended position inwards	Sect 6 Table E (g)
Chocks removed	Arms down, palms outwards, then swung outwards	Sect 6 Table E (h)
Start Engine(s)	A circular motion of the R hand at head level, with L arm pointing to the appropriate engine	Sect 6 Table E (f)
Cut Engine(s)	Either arm and hand placed level with the chest, then moved laterally with the palm downwards	Sect 6 Table E (j)
Slow down	Arms placed down with palms towards the ground, then moved up and down several times	Sect 6 Table E (k)
Slow down engine on indicated side	Arms placed down, with palms towards the ground, then either arm moved up and down several times	Sect 6 Table E (l)
Move back	Arms placed down, palms facing forwards, then repeatedly swept up and down to shoulder level	Sect 6 Table E (t)
Turn tail to right when backing	Point L arm down, move R arm down from overhead vertical position to horizontal forward position, repeating R arm movement	Sect 6 Table E (x)
Turn tail to left when backing	Point R arm down, move L arm down from overhead vertical position to horizontal forward position, repeating L arm movement	Sect 6 Table E (x)
All clear	R arm raised at the elbow, with the palm facing forward	Sect 6 Table E (n)

Table 6.10.1 Marshaller to Pilot.

© Oxford Aviation Services Limited

6.10.2 Pilot to Marshaller:

Intention	Signal	CAP637 Ref:
Brakes engaged	Raise R arm and hand with fingers extended horizontally in front of face, then clench fist	Sect 6 Table F (a)
Brakes released	Raise arm with fist clenched horizontally in front of face, then extend fingers	Sect 6 Table F (b)
Insert chocks	Arms extended palm facing outwards, move hands inwards to cross infront of face	Sect 6 Table F (c)
Remove chocks	hands crossed in front to of face, palms outwards, move arms outwards	Sect 6 Table F (d)
Ready to start engines	Raise the number of fingers on one hand to indicate engine number of engine to be started.*	Sect 6 Table F (e)

Table 6.10.2 Pilot to Marshaller

Note* Engines are numbered 1 Port (left) outer
2 Port (left) inner
3 Starboard (right) inner
4 Starboard (right) outer

© Oxford Aviation Services Limited

6.11 TABLES OF CRUISING LEVELS

6.11.1 RVSM Areas. In areas where on the basis of regional air navigation agreement and in accordance with conditions specified therein, a vertical separation minimum (RVSM) of 300m (1000 ft) is applied between FL 290 and FLK 410 inclusive[1]

TRACK[2]												
From 000 to 179 degrees(3)						From 180 to 359 degrees(3)					
IFR Flights			VFR Flights			IFR Flights			VFR Flights		
FL	Metre	Feet	FL	Metre	Feet	FL	Metre	Feet	FL	Metre	Feet
10	300	1 000	-			20	600	2000	-		
30	900	3000	35	1050	3500	40	1200	4000	45	1350	4500
50	1500	5000	55	1700	5500	60	1850	6000	65	2000	6500
70	2150	7000	75	2300	7500	80	2450	8000	85	2600	8500
90	2750	9000	95	2900	9500	100	3050	10000	105	3200	10500
110	3350	11000	115	3500	11500	120	3650	12000	125	3800	12500
130	3950	13000	135	4100	13500	140	4250	14000	145	4400	14500
150	4550	15000	155	4700	15500	160	4900	16000	165	5050	16500
170	5200	17000	175	5350	17500	180	5500	18000	185	5650	18500
190	5800	19000	195	5950	19500	200	6100	20000	205	6250	20500
210	6400	21000	215	6550	21500	220	6700	22000	225	6850	22500
230	7000	23000	235	7150	23500	240	7300	24000	245	7450	24500
250	7600	25000	255	7750	25500	260	7900	26000	265	8100	26500
270	8250	27000	275	8400	27500	280	8550	28000	285	8700	28500
290	8850	29000				300	9150	30000			
310	9450	31000				320	9750	32000			
330	10050	33000				340	10350	34000			
350	10650	35000				360	10950	36000			
370	11300	37000				380	11600	38000			
390	11900	39000				400	12200	40000			
410	12500	41000				430	13100	43000			
450	13700	45000				470	14350	47000			
490	14950	49000				510	15550	51000			
etc	etc	etc				etc	etc	etc			

1) Except when on the basis of regional air navigation agreements a modified table of cruising levels based on a nominal vertical separation minimum of 300m (1000ft) is prescribed for use under specific conditions by aircraft operating above FL 410 within designated airspace

2) Magnetic track or in polar latitudes 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 pole is employed as the Grid North.

3) 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: Reduced vertical separation minima may be applied in notified airspace where IFR flights are operated above FL 300.

© Oxford Aviation Services Limited

6.11.2 In other areas

TRACK[1]											
From 000 to 179 degrees(2)						From 180 to 359 degrees(2)					
IFR Flights			VFR Flights			IFR Flights			VFR Flights		
FL	Metre	Feet	FL	Metre	Feet	FL	Metre	Feet	FL	Metre	Feet
10	300	1 000	-			20	600	2000	-		
30	900	3000	35	1050	3500	40	1200	4000	45	1350	4500
50	1500	5000	55	1700	5500	60	1850	6000	65	2000	6500
70	2150	7000	75	2300	7500	80	2450	8000	85	2600	8500
90	2750	9000	95	2900	9500	100	3050	10000	105	3200	10500
110	3350	11000	115	3500	11500	120	3650	12000	125	3800	12500
130	3950	13000	135	4100	13500	140	4250	14000	145	4400	14500
150	4550	15000	155	4700	15500	160	4900	16000	165	5050	16500
170	5200	17000	175	5350	17500	180	5500	18000	185	5650	18500
190	5800	19000	195	5950	19500	200	6100	20000	205	6250	20500
210	6400	21000	215	6550	21500	220	6700	22000	225	6850	22500
230	7000	23000	235	7150	23500	240	7300	24000	245	7450	24500
250	7600	25000	255	7750	25500	260	7900	26000	265	8100	26500
270	8250	27000	275	8400	27500	280	8550	28000	285	8700	28500
290	8850	29000	300	9150	30000	310	9450	31000	320	9750	32000
330	10050	33000	340	10350	34000	350	10650	35000	360	10950	36000
370	11300	37000	380	11600	38000	390	11900	39000	400	12200	40000
410	12500	41000	420	12800	42000	430	13100	43000	440	13400	44000
450	13700	45000	460	14000	46000	470	14350	47000	480	14650	48000
490	14950	49000	500	15250	50000	510	15550	51000	520	15850	52000
etc	etc	etc	etc	etc	etc	etc	etc	etc	etc	etc	etc

1. Magnetic track, or in polar areas at latitudes higher than 70 degrees and within such extensions to those areas as 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 whch the direction to the North Pole is employed as the Grid North.

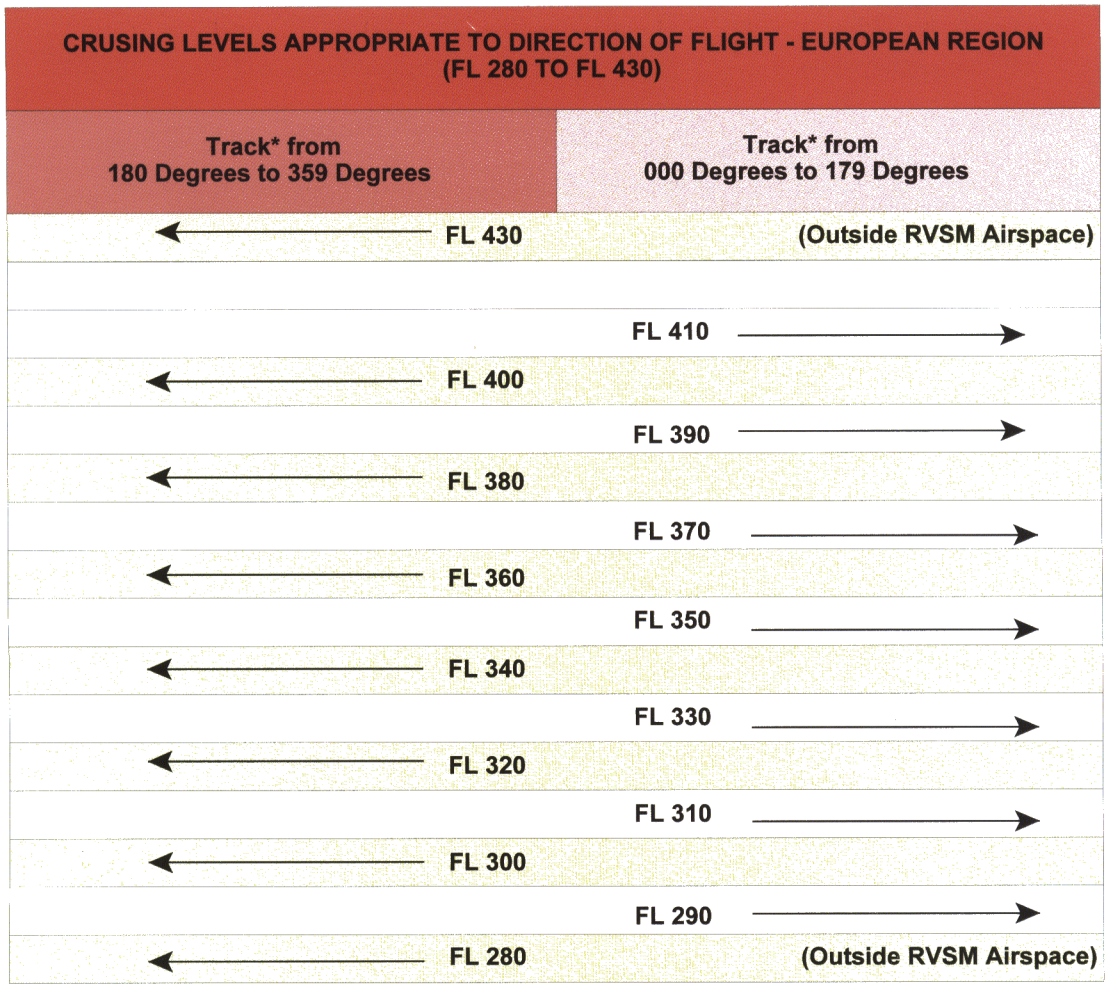
2. Except where, on the basis of regional air navigation agreements, from 090 to 269 degrees is prescribed to accommodate predominant traffic directions and appropriate transition procedures to be associated therewith are specified.

Note- Guidance material relating to vertical separation is contained in the *Manual on Implementation of a 300 m (1000ft) Vertical Separation Minimum Between FL290 and FL410 Inclusive* (Doc 9574)

© Oxford Aviation Services Limited

6.11.3 Cruising Levels Applicable in European RVSM Airspace

The Cruising Levels that will apply within European RVSM airspace, in accordance with ICAO Annex 2, Appendix 3 a), are illustrated below:



* 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.

© Oxford Aviation Services Limited

REVISION QUESTIONS CHAPTER 6

1. Which document contains the ICAO rules of the Air?

   a. JAR OPS 1
   b. ICAO Annex 2
   c. ICAO Annex 6
   d. ICAO Annex 11

2. If you are flying over the Atlantic at 30W (right in the middle), what rules of the air apply?

   a. None, it is international waters
   b. The ICAO rules without exception
   c. The rules of the air applied by the state of registration
   d. Instrument Flight Rules

3. If you are flying in an aeroplane registered in the UK, and you are flying over Egypt, which rules of the air apply?

   a. The rules that are applied by the Egyptian Aviation Authority
   b. The UK rules of the air in accordance with the ANO
   c. ICAO rules
   d. If Egypt is an ICAO contracting state, then IFR applies at all times

4. Are you permitted to fly IFR in VMC

   a. Yes
   b. No

5. Who is the PIC?

   a. The Commander
   b. The Pilot who for the time being is in charge of the controls of the aeroplane
   c. The Pilot appointed as captain of the crew
   d. A pilot who is responsible for the operation and safety of the aeroplane during flight time

6. To which aircraft do the ICAO rules of the air apply?

   a. All aircraft
   b. Aircraft bearing an ICAO contracting state registration mark
   c. Aircraft with MTM >5700Kg flying for commercial air transport
   d. All aircraft flying over the high seas

© Oxford Aviation Services Limited

7. When an aircraft is flying, under what flight rules must the flight be conducted?

   a. IFR in IMC and VFR in VMC
   b. At the commander's discretion
   c. In accordance with ATC instructions
   d. Either IFR or VFR

8. A scheduled flight is planned to be flown from London to Cairo. The aircraft has a MTM of 265 000kg. It has 4 engines and 265 passengers on board. Who is responsible for compliance with the rules of the air for the various states to be overflown where the local rules are at variance with ICAO rules?

   a. The Commander
   b. The Operator
   c. The 'local' ATC
   d. ICAO

9. When may you fly over a town at a height from which it would not be possible to land safely in the event of an emergency arising?

   a. Never
   b. Only to keep clear of cloud and remain in visual contact with the ground
   c. Only where the operator has given permission
   d. During take off and landing

10. How would you describe your vertical displacement if you were flying below the lowest useable flight level?

    a. Dangerous
    b. As a height with respect to the surface
    c. As a sub flight level
    d. As an altitude with respect to mean sea level

11. If you have the right of way, you are still responsible for avoiding collisions. Is this true or false? With the right of way what else must you do?

    a. True. Maintain track, speed and altitude
    b. False. You must not do anything to confuse the other aeroplane
    c. True. Maintain speed and heading and not fly over or under the other aeroplane unless you are well clear and only then with a good look out.
    d. False. Observe the other aircraft and if he doesn't alter course then you must take avoiding action.

© Oxford Aviation Services Limited

12. If a balloon is approaching head on to Concorde, who has the right of way?

a. Concorde of course!
b. The balloon because it is not powered
c. The balloon because aeroplanes give way to balloons
d. Neither (they are both 'aircraft')

13. When two aircraft are converging at approx. the same level, the one that has the other on its right is required to give way. Is this correct?

a. Yes
b. No, the one that has the other on its left has the right of way
c. Yes, unless the other is an aeroplane towing something
d. It depends who has the priority. This case is only applicable if they are the same type of aircraft

14. You are approaching a turning point on a cross country navex where you are required to turn to port. There is another aeroplane ahead of you and you are quite quickly overtaking him. There isn't time to pass him on the right and then make the required left turn. What should you do?

a. Ignore the requirements of the navex and delay the left turn until well clear of the other aeroplane
b. Quickly climb to 1000 ft above the other aircraft and then overtake him and make the turn at the right point then descent to the original level
c. Overtake on the left and file a report when you land
d. Turn left early and avoid the other aeroplane

15. It is high summer and the Europa airship is approaching Oxford to moor up before the race day at Silverstone. The airship is on a straight in approach at 2miles but at 1000ft. You are in a Warrior at 600 ft turning base leg. Who has the right of way?

a. You do because you are at a lower altitude
b. The airship does because he is on a straight in approach
c. The airship does because you are in an aeroplane
d. You do because the airship can adjust his speed or hover if required

16. Is the higher aeroplane always compelled to give way to the lower aeroplane if both are approaching to land?

a. Yes, the rules are quite clear - the one at the lower altitude has the right of way
b. It depends what you mean by approaching to land. If the lower one was at a range of greater than 4 nm he would be long final with no priority.
c. No, if the higher aeroplane is in an emergency, he has priority over every thing esle
d. No. The lower aircraft is obliged to give way only if he is aware that the higher aeroplane is in an emergency

© Oxford Aviation Services Limited

17. When are navigation lights required to be shown?

a. From sunset to sunrise or when specified by the authority
b. When moving on the movement area of an aerodrome or flying at night
c. When the pilot in command thinks it sensible to switch them on by day or by night
d. At night or when specified by the authority

18. You see an aircraft stationary (without engines running) on the movement area of an aerodrome with its navigation lights on. What does this mean?

a. The crew is in attendance and they are about to start engines
b. The aeroplane has temporarily stopped in that position and will shortly restart engines and move to the apron
c. The idiot has left the lights on and the batteries will probably run down
d. The lights have been left on to mark the extremities of the aeroplane as a warning to others

19. It is broad day light and you are about to start engines. Do you need to switch any lights on?

a. Yes, switch the nav lights on to indicate that the aeroplane is manned
b. No, a clear call of 'clear prop' should be enough
c. If the aeroplane has an anti-collision light that should be switched on
d. On apron yes, elsewhere on the movement area no

20. If you are flying under simulated IMC (your visibility from the flight deck is artificially reduced) you must have a safety pilot on board. What is he/she required to be able to see?

a. Ahead and to either side of the aeroplane
b. The instruments
c. All around the aeroplane
d. All around the aeroplane, but if not possible then a competent observer must be carried who has adequate vision in the impaired sector and a means of communication to the safety pilot

21. You have just taken off from an aerodrome for which there is not an ATZ operating. Which direction are you required to turn prior to departure?

a. Left
b. Right
c. There is no set direction of turn
d. The direction that will put you on track to your destination

© Oxford Aviation Services Limited

22. You are flying along W12D, an advisory route between Inverness and Wick. Are you required to file a flight plan?

a. Yes, it is controlled airspace
b. Yes, but only if you wish to take advantage of the advisory radar service
c. Yes if you are flying under IFR
d. No

23. You intend flying from Oxford to Dublin VFR at 3000ft. Are you required to file a flight plan?

a. Yes because you will be crossing an FIR boundary
b. Yes because you will cross an international boundary
c. Yes because the flight will involve an over-sea flight of more than 40km
d. No

24. Are all changes to a flight plan are to be reported to the ATSU as soon as practicable?

a. Yes, the flight is a controlled flight and subject to an ATC clearance so all changes are to be reported
b. No, you can wait for a convenient time to report
d. No but you must report within 10 minutes
e. No, inadvertent deviation is excusable!

25. Are changes to a VFR flight plan subject to the same requirements to report changes as for IFR flight plans?

a. No, you are only required to report significant changes to VFR flight plans
b. Yes, if the flight is to be operated as a controlled flight
c. Yes but only after a clearance has been received
d. No, the requirement is to report only if practicable

26. Once an arrival report has been received for any flight that a flight plan was submitted, what happens then?

a. The aerodrome of departure is informed of the safe arrival
b. The destination alternates are informed
c. The operator is informed by ATC
d. The flight plan is closed

© Oxford Aviation Services Limited

27. It is five minutes past seven o'clock in the evening at Oxford on the 5th January 2000. What is the correct time for airmen/airwomen?

a. 7.05 pm
b. 1905Z
c. 1905 hrs
d. 1905UTC

28. You receive an ATC clearance that is not as you expected. Can you request another clearance?

a. No, but you may be able to get an amended clearance
b. Yes, providing the original clearance is unsatisfactory
c. Yes, you have the right to demand the clearance in accordance the flight plan you submitted
d. No, that's it take it or leave it

29. In the flight plan, for the portion of the flight between Dinard and Nice, you had given a speed of 280 kts TAS. Once en route you find that your TAS is actually 295 kts. Should you tell ATC?

a. No it doesn't really matter
b. No, only speed changes exceeding +/-5% are to be reported
c. Yes all speed changes are to be reported
d. Yes speed changes of +/- 5% are to be reported

30. If a controlled VFR flight is unable to maintain VMC which of the following courses of action is available to the pilot?

a. Leave controlled airspace and continue to the destination keeping clear of all controlled airspace
b. File an IFR flight plan
c. File a Special VFR flight plan
d. Advise ATC what the flight visibility is and let them make the decision

31. When is a controlled flight required to make position reports?

a. When the aeroplane is over a mandatory reporting point
b. When crossing an international boundary
c. When crossing the coast line of a state
d. When not advised by ATC to cease position reports

© Oxford Aviation Services Limited

32. 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
d. Fly a triangular pattern making all turns to the left for ten minutes and then proceed to the destination

33. If you are flying in IMC and you suffer a communications failure, which of the following is a correct course of action?

a. Fly a triangular pattern for ten minutes making all turns to the right then continue to the destination
b. Proceed in accordance with the flight plan as filed
c. Proceed in accordance with the current flight plan (the flight plan as cleared by ATC and any re-clearances subsequently obtained)
d. Turn around and go home

34. If an aircraft is being unlawfully interfered with, what should the pilot attempt to do?

a. Pretend that nothing has happened and just do as the hi-jacker wants
b. Squawk 7700 and let ATC sort it out
c. Impress upon the hi-jacker that for the safety of all on board you must continue to communicate with ATC and comply with the rules of the air
d. Make false position reports so that ATC get the message that something is wrong

35. Is the interception of civilian aircraft permitted?

a. Yes, each state has the sovereign right to intercept and identify aircraft flying over its territory
b. No, its too dangerous
c. Yes providing its only for practice and the commander of the civilian aeroplane agrees before hand
d. Yes providing there is an agreement between the states to allow interception of each others aeroplanes

36. What is the basic presumption about VFR flight?

a. That the pilot holds the correct rating to allow the aeroplane to be flown under VFR
b. That the flight will be flown in Visual Meteorological Conditions
c. That the flight will only take place in class G airspace (outside CAS)
d. That the flight will not take place above FL180

© Oxford Aviation Services Limited

37. You are about to take off from an aerodrome within a control zone. What cloud ceiling and flight visibility limitations apply to VFR flight in this situation?

a. Ceiling more than 1500ft and visibility more than 5km
b. Ceiling 1500ft or higher and visibility more than 5km
c. Ceiling at least 1500ft and visibility not less than 5km
d. Ceiling not less than 1500 ft or visibility 5km or better

38. In the UK, VFR is not permitted at night. Is this a national rule that would require notification of a 'difference' in accordance with article 38 of the Chicago Convention?

a. No, but the rules under which flight at night is permitted must be specified
b. Yes. The UK AIP would contain details of the notified difference
c. No, as a member of the JAA, the UK does not have to comply with ICAO SARPS
d. Yes because annex 2 to the Chicago Convention says VFR may be prescribed by the ATS authority

39. Without special permission, what is the highest flight level that VFR flight may be authorised outside of controlled airspace?

a. FL200
b. FL290
c. FL195
d. FL245

40. Are VFR flights allowed to fly at supersonic speeds?

a. No way
b. Yes, no problem. The pilot is still required to keep a good look out!
c. Yes, but only when specially authorised
d. Yes, but only in controlled airspace

41. In controlled airspace where Reduced Vertical Separation Minima (RVSM) is applied, what is the highest FL that VFR flight is permitted at?

a. FL200
b. Even with special authorisation, not above FL 290
c. FL245
d. FL285

© Oxford Aviation Services Limited

42. Except for take off and landing, what is the lowest that an aeroplane flying VFR may fly over a town or city?

a. 500 ft
b. 1000m
c. 1000ft above the highest obstacle within 600m radius of the aeroplane
d. 1500ft above the highest obstacle within 5 nm of the estimated position of the aeroplane

43. You are flying VFR in class G airspace (the open FIR), what is the lowest you are permitted to fly when well away from towns etc..?

a. The minimum safe altitude (obstacle height on QNH plus 500ft)
b. 500 ft
c. no limit
d. 1000ft above the highest obstacle within 600m radius of the aeroplane

44. If you are flying VFR from Marseilles to Nice above the transition altitude (3000ft) and heading 085° true, and the minimum flight altitude is 4500ft, what is the lowest correct flight level you should be flying at?

a. FL55
b. You do not have enough information to make a decision (what is the variation, and what is the drift)
c. FL45
d. If you are VFR you can fly at whatever altitude you wish

45. You are flying from Oxford to Northolt (in the northern part of the London CTR - class A airspace) at 3000ft. Are you permitted to fly in the London CTR under VFR?

a. No - VFR is proscribed in class A airspace
b. Yes, in accordance with a Special VFR clearance
c. Yes providing Oxford ATC has given you clearance to enter the CTR
d. Yes providing you are being monitored by the military radar at Northolt

46. You filed a VFR flight plan for the flight from Marseilles to Nice but are unable to maintain good VMC. What do you do?

a. Tell ATC what changes you want to the current flight plan and continue as re-cleared
b. Cancel the VFR flight plan and file IFR
c. Wait until you are no longer VMC and squawk 7700
d. Turn around and return to Marseilles

© Oxford Aviation Services Limited

47. What is the VMC criteria in class B airspace above FL100?

a. Flight visibility 8km or more, clear of cloud
b. Flight visibility 8km or more, 1000ft vertically and 1500m horizontally clear of cloud
c. Flight visibility 5km or more, 1000ft vertically and 1500m horizontally clear of cloud
d. Flight visibility 8km or more, 1000m vertically and 1500ft horizontally clear of cloud

48. What is required to fly IFR?

a. The aeroplane suitably equipped and the pilot to have a night rating
b. The aeroplane suitably equipped and the pilot to have an IMC rating
c. The pilot to have an instrument rating or IMC rating and the aeroplane to have a full airways communications and navigation equipment fit
d. An ATPL(A) licence

49. Who is responsible for deciding what the minimum flight altitude for IFR operations is?

a. The Operator
b. The Commander
c. The ATC centre for the route
d. The authority of the state being over flown

50. You are approaching to land at Catania (Sicily)..Mt.Etna(c 11 000ft) is 28km to the west of the aerodrome, does this dictate what the minimum altitude is for the approach?

a. Yes, the minimum altitude is 2000ft above the highest obstacle
b. No, because it is more than 8km (5nm) from the aerodrome
c. It depends where the aeroplane is because the minimum altitude is based on the highest obstacle within 8km of the aeroplane position
d. Yes, but because the aeroplane is approaching to land, minimum altitude is not important

51. You are still flying from Marseilles to Nice but now under IFR. Suddenly you pop out of the cloud and there is the Cote d'Azure bathed in sunshine below you. Can you cancel IFR and continue VFR again?

a. Yes, but don't expect any sympathy if you run into cloud again
b. No, you must complete the flight under IFR
c. Yes, but only if you are sure that you can maintain VMC for a reasonable period
d. No, because you will shortly be entering CAS. IFR is mandatory in CAS.

© Oxford Aviation Services Limited

52. You are tracking 165° mag with no drift. What is the next available IFR flight level above FL370?

a. FL390
b. FL410
c. FL400
d. It depends whether or not RVSM is being applied in the area

53. You are flying IFR outside of controlled airspace. Are you required to maintain a radio watch?

a. No
b. Yes
c. Yes, but only in areas designated by the authority as areas where a flight plan is to be submitted
d. Yes, but only in the Upper Information Region (UIR)

54. You are flying in formation (Ugh!) with your mate Fred. Fred suddenly calls "Pan Pan, Pan Pan, Pan Pan, engine on fire attempting an emergency landing in a field just north of Woodstock". You realise that he should, of course, have made a Mayday call because he is grave an imminent danger and needs immediate assistance. Can you upgrade his Pan Pan message to a Mayday?

a. No, but you can relay the message if ATC doesn't acknowledge
b. Yes, but only after you get his permission to do so
c. Yes, you have the right to declare distress for him
d. No, you can only declare a state of urgency for someone else

55. You see an aeroplane join the visual circuit and then repeatedly switch on and off his landing lights. What does it mean?

a. He has an intermittent fault in his lights
b. He has a problem and needs to land but is otherwise OK
c. He has a communications problem as well as a more serious problem and requires help
d. He has never been to this aerodrome before and is unsure of the correct procedures

56. 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. 243 Mhz (the military distress and calling frequency)
c. 121.500MHz (the VHF distress and calling frequency)
d. No specific frequency. Try the lot until you get contact

© Oxford Aviation Services Limited

57. If the interceptor directs you to land at a military aerodrome, but the ATC centre tells you to land at the nearby international aerodrome, with whom do you comply?

a. Common-sense dictates that you comply with the instruction from the man with his finger on the trigger!
b. You must comply with ATC instructions, but make them fully aware that their instructions conflict with the signals from the interceptor
c. Land at which ever is the nearest aerodrome and sort it out on the ground
d. If you are not in communications with the interceptor, tell ATC to sort out the confliction and in the mean time go into a holding pattern

58. You are flying along VFR in super VMC and suddenly you see a series of red and green 'star burst' pyrotechnics being fired in your from the ground. What does this mean?

a. Somebody on the ground is trying to attract you attention. Descend and try and see what the problem is
b. It is probably a fireworks display. It may be prudent to turn away
c. It is probably a military live firing area and they are obviously not aware that you are there
d. It is a military live firing area and they are warning you to go away

59. You are flying VFR non radio in good VMC and you see an aerodrome below you. Its time for a cup of tea so you carry out a visual join to land. On the down wind leg you see a flashing red light pointed at you from the ATC tower. What do they want you to do?

a. Land immediately this is a military aerodrome and you have violated the MATZ
b. Give way to the other aeroplane that has just joined the circuit behind you
c. Go away. The aerodrome is unsafe for use
d. Climb to 1500 ft and hold in the overhead until given a green to land

60. You decide to abandon the cup of tea, but how do indicate to the tower that you understand the light signal and will comply?

a. Fly by the tower and rock your wings
b. Fly directly towards the tower flashing your landing lights
c. Rock your wings and depart
d. Switch on the navigation lights for ten seconds

61. If you were on the ground (in day light and non radio) and the tower shined a flashing a white light at you, what would it mean and how would you acknowledge?

a. Return to the starting point; waggle the rudder
b. Taxi clear of the landing area; flash your landing lights
c. Beware other aeroplanes are taxiing; move the ailerons
d. Give-away to the tractor towing the aeroplane ahead; stop

© Oxford Aviation Services Limited

62. What does a white cross with a line under it on a runway, mean?

a. The runway is closed but it is regularly inspected
b. It is the place where banners are dropped
c. It means that the runway is not to be used for instrument approaches
d. It means that there are no designated holding points for this runway

63. What do two red balls hanging from the signal mast indicate?

a. The locals are not very friendly
b. Take offs and landing are not necessarily in the same direction
c. A right hand circuit is in force
d. Glider flying is in progress

64. You are taxiing towards a marshaller and he put out his arms horizontally with palms face down, and then he moves his arms up and down several times. What is he indicating?

a. This is where I want you to stop
b. Slow down
c. You are clear to start shutting down engines
d. Keep coming forward

65. As you taxi out of the parking bay, you see the marshaller raise his right arm bent at the elbow with the palm towards you. (Like a red indian saying "How") What does this mean?

a. You have left a passenger behind, come back
b. All clear, have a nice day!
c. Move on to the next marshaller
d. Stop at you convenience whilst I reconnect the nosewheel steering

© Oxford Aviation Services Limited

ANSWERS TO REVISION QUESTIONS FOR CHAPTER 6

1	B
2	B
3	A
4	A
5	D
6	B
7	D
8	A
9	D
10	D
11	C
12	D
13	D
14	A
15	C
16	D
17	A
18	D
19	C
20	A
21	A
22	C
23	B
24	D
25	A

26	D
27	D
28	B
29	D
30	B
31	D
32	B
33	C
34	C
35	A
36	B
37	C
38	A
39	C
40	C
41	B
42	C
43	B
44	A
45	B
46	A
47	B
48	B
49	D
50	C

51	C
52	D
53	C
54	A
55	B
56	C
57	A
58	D
59	C
60	C
61	A
62	A
63	D
64	B
65	B
66	
67	
68	
69	
70	
71	
72.	
73	
74	
75	

76	
77	
78	
79	
80	
81	
82	
83	
84	
85	
86	
87	
88	
89	
90	
91	
92	
93	
94	
95	
96	
97	
98	
99	
100	

© Oxford Aviation Services Limited

CHAPTER SEVEN - PROCEDURES FOR AIR NAVIGATION SERVICES / AIRCRAFT OPERATIONS

Contents

		Page
7.1	INSTRUMENT PROCEDURES	7 - 1
7.2	PANS OPS	7 - 2
7.3	DEPARTURE PROCEDURES	7 - 3
7.4	APPROACH PROCEDURES	7 - 11
7.5	APPROACH PROCEDURE DESIGN	7 - 14
7.6	TRACK REVERSAL AND RACETRACKS	7 - 25
7.7	ARRIVAL AND APPROACH SEGMENTS	7 - 32
7.8	MISSED APPROACH	7 - 39
7.9	VISUAL MANOEUVRING (CIRCLING) IN THE VICINITY OF THE AERODROME	7 - 41
7.10	AREA NAVIGATION (RNAV) APPROACH PROCEDURES BASED ON VOR/DME	7 - 43
7.11	HOLDING PROCEDURES	7 - 45
7.12	ALTIMETER SETTING PROCEDURES	7 - 51
7.13	SIMULTANEOUS OPERATION ON PARALLEL OR NEAR-PARALLEL RUNWAYS	7 - 54
7.14	SECONDARY SURVEILLANCE RADAR (SSR) TRANSPONDER OPERATING PROCEDURES	7 - 64

© Oxford Aviation Services Limited

7.15 PRECISION AND SURVEILLANCE RADAR AND OTHER NON PRECISION APPROACHES ..... 7 - 66

REVISION QUESTIONS ..... 7 - 69

PRACTICE EXAMINATION PAPER 1 ..... 7 - 89

© Oxford Aviation Services Limited

7.1 INSTRUMENT PROCEDURES

7.1.1 General Introduction. In order to permit all weather operation (low visibility take-off and landing) procedures are established to provide track guidance and terrain avoidance for aircraft departing, and track guidance, terrain clearance and where special equipment is used, vertical displacement guidance for aircraft arriving at aerodromes. Low visibility operations (ICAO) are defined as take-off and landing operations with RVR less than 800m. Remember, the minima for take off from an aerodrome in a CTR is ground visibility not less than 1 500m and cloud ceiling not less than 1 000ft. The criteria for the type of procedure to be employed are defined in terms of RVR and the limit to which a pilot is permitted to descend. Clearly, obstacle avoidance during the procedure is of paramount importance. Prior to commencing any instrument procedure, a clearance must be obtained from ATC. Procedures for departure and arrival are published and you are required to have the necessary plates (printed representations of the procedures) available on the flight deck. If you are required by ATC to divert to an aerodrome with which you are not familiar and do not have the plates, ATC will read the procedure, including the loss of communications and missed approach procedures, to you. We will start by looking at instrument departure procedures. There are, however, many abbreviations used in instrument procedures with which you must be familiar. The following are the abbreviations that you are required to know by the learning objectives.

7.1.2 Abbreviations

ACAS	Airborne Collision avoidance systems	IAS	Indicated airspeed	OM	Outer marker
ATC	Air Traffic control	IF	Intermediate app fix	PAPI	Precision app path indicator
ATIS	Automatic terminal information service	IFR	Instrument flight rules	PAR	Precision app radar
ATS	Air traffic service	ILS	Instrument landing system	PDG	Procedure design gradient
C/L	Centre line	IMC	Instrument Met Conditions	RNAV	Area navigation
DA/H	Decision height/altitude	ISA	International standard atmosphere	RSR	En-route surveillance radar
DER	Departure end of runway	MAPt	Missed app point	RSS	Root sum square
DME	Distance measuring equip	MDA/H	Minimum descent height/altitude	SID	Standard instrument departure
DR	Dead reckoning	MOC	Minimum obstacle clearance	SOC	Start of climb
EFIS	Electronic flight information system	MSL	Mean sea level	SPI	Special position indicator
FAF	Final approach fix	NDB	Non-directional beacon	SSR	Secondary surveillance radar
FAP	Final approach point	NOZ	Normal operating zone	STAR	Standard instrument arrival
FMS	Flight management system	NTZ	No transgression zone	TAR	Terminal area surveillance radar
HSI	Horizontal situation indicator	OCA/H	Obstacle clearance height/altitude	TAS	True air speed
IAF	Initial approach fix	OIS	Obstacle identification surface	TP	Turning point

© Oxford Aviation Services Limited

7.1.3 Obstacle Clearance. It is implied that any procedure developed will not require the aeroplane to fly dangerously close to obstacles at any point during the procedure. Clearance from obstacles can be obtained by lateral clearance and vertical clearance. By requiring a pilot to fly the track accurately (within tolerances accepted) the aircraft can be guided over a surveyed flight path within the bounds of which, all obstacles can be determined and assessed. Obviously, the area surveyed must have finite limits. It is, however, not acceptable for, say, an area 5 nm wide to be surveyed and then permit aircraft to fly within guidance tolerance, 2.5 nm either side of the desired track. The extremities of the surveyed area must gradually permit higher obstacles until at the limit of reasonable expectations of accuracy (guidance tolerance - both equipment and flight technical), the guaranteed clearance is reduced to zero. This assessment is known as creation of MOC (minimum obstacle clearance areas). MOC is discussed later in this chapter. Obstacle clearance could be provided by assessing the highest obstacle to be flown over and by applying a safety margin to the obstacle height. An obstacle clearance height or altitude (OCH/A) can thus be obtained. This is the method of obtaining MSA and with refinements, minimum descent height/altitude (MDH/A) for non precision procedures. As precision procedures provide height guidance, an obstacle 1 000 ft high at 10 nm from the threshold is not as significant as an obstacle 150 ft high 1 nm from the threshold (assuming a 300 ft per mile glide slope). For precision systems, OCH/A is 'range from threshold' dependant. It should therefore be obvious that OCH/A for precision procedures are less than OCH/A for non precision. It must be stressed that, from an operational point of view, the obstacle clearance applied in the development of each instrument approach procedure is considered to be the minimum required for an acceptable level of safety in operations. If you have your own aeroplane and it is not used for commercial air transport, you may operate to OCH limits. Operators apply higher criteria resulting in aerodrome operating minima for commercial air transport.

7.2 PANS OPS

7.2.1 Document 8168. The ICAO document that specifies the recommendations for instrument procedures is PANS OPS. The term '**PANS-OPS**' is commonly used to refer to the content of ICAO Doc 8168. The correct title of the document is 'Procedures for Air Navigation services - Aircraft Operations'. The document is printed in two volumes; Vol, 1 - Flight Procedures; Vol 2 - Construction of Visual and Instrument Flight Procedures. Volume 1 describes operational procedures recommended for the guidance of flight operations personnel and we shall limit our considerations of instrument procedures to the content of Vol 1. Vol 1 outlines the various parameters on which the criteria of Vol 2 are based. Volume 2 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. Both volumes present coverage of operational practices that are beyond the scope of Standards and Recommenced Practices (SARPS) but with respect to which, a measure of international uniformity is desirable. PANS OPS considers both departure and arrival procedures and to a lesser extent, en-route procedures where obstacle clearance criteria should be taken into consideration.

© Oxford Aviation Services Limited

7.3 DEPARTURE PROCEDURES

7.3.1 General Criteria. These procedures assume that all engines are operating. The design of an instrument departure procedure is, in general, dictated by the terrain surrounding the aerodrome, but may also be required to cater for ATC requirements (adjacent ATS routes, restricted, prohibited or danger areas and the proximity of other aerodromes). These factors in turn influence the type and siting of navigation aids required to provide track guidance for the departure route. Airspace restrictions may also affect the routing and siting of navigation aids. From the pilot and operator point of view, the use of automatic take-off thrust control systems (ATTCS) and noise abatement procedures will need to be taken into account as well. Where no suitable navigation aid is available to provide specific track guidance, the criteria for omnidirectional (any direction) departures is applied. Wherever possible, a straight departure will be specified which is aligned with the runway. Where a departure route requires a turn of more than 15° to avoid an obstacle, a turning departure is constructed.

7.3.1.1 Requirements. Where instrument departures are expected to be used, a departure procedure will be established for each runway to be used, and will define the procedure for the various categories of aircraft based on an all engines running PDG of 3.3% or an increased PDG if required to achieve minimum obstacle clearance. The procedures assume that pilots will not compensate for wind effects when being radar vectored, and will compensate for known or estimated wind effects when flying departure routes which are expressed as tracks to be made good.

7.3.1.2 Obstacle Clearance. Obstacle clearance is a primary safety consideration in instrument departure procedures. See fig 7.3.1.2. Unless otherwise stated a PDG of 3.3% is assumed. The PDG is made up of 2.5% gradient of obstacle identification surfaces or the gradient based on the most critical obstacle penetrating these surfaces (whichever is higher), and 0.8% increasing obstacle clearance. Gradients published will be specified to an altitude/height after which the minimum gradient of 3.3% is considered to exist. The final PDG continues until obstacle clearance is ensured for the next phase of flight (en-route; holding or approach). At this point the departure procedure ends and is marked by a significant point. The minimum obstacle clearance equals zero at the departure end of the runway (DER) and thereafter increases by 0.8% of the horizontal distance in the direction of flight, assuming maximum divergence of 15°. In the turn initiation area a minimum obstacle clearance of 90m (295 ft) is provided. Increased obstacle clearance will be provided in mountainous terrain. If DME is available, additional height/distance information is made available.

© Oxford Aviation Services Limited

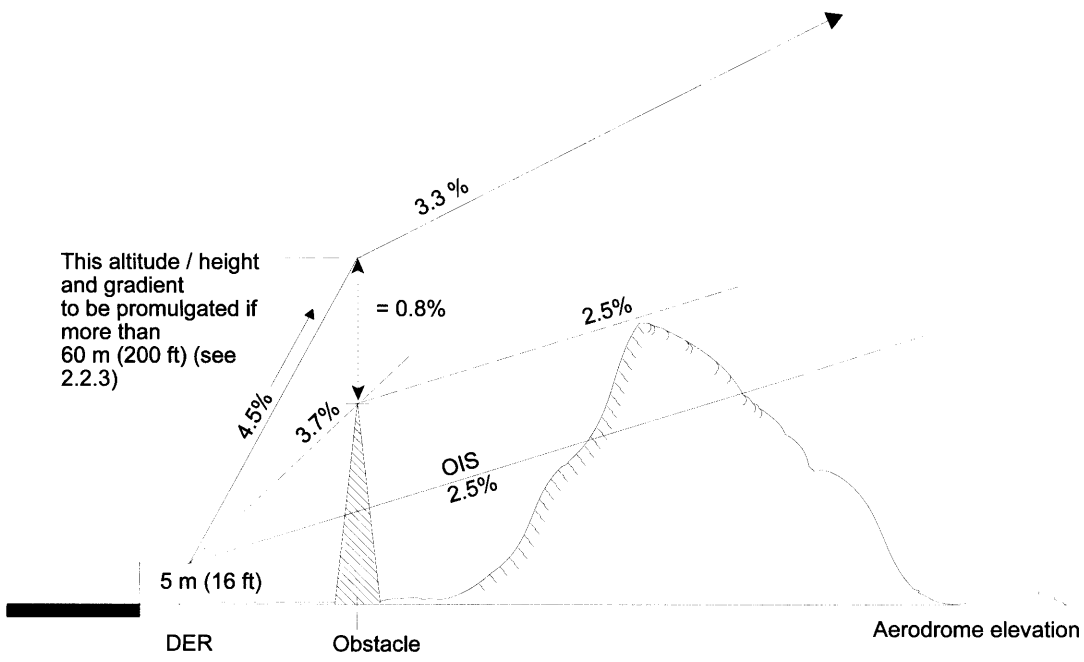


Figure 7.3.1.2 - Procedure design gradient

7.3.1.3 Mountainous Terrain. What defines mountainous terrain is not specified. In deciding if the mountainous terrain criteria is applicable, the designer takes notice of the prevailing wind conditions. If the average wind speed is 37 Kmph or more and the nature of the terrain produces down draughts, the increased obstacle clearance criteria is applied.

7.3.1.4 Aircraft category. We have already mentioned that the major consideration in planning a departure route to ensure adequate obstacle clearance and this is dependant upon the maximum speed that an aircraft can fly a departure procedure. Speeds for such departure procedures are defined in table 7.3.1.4. Wherever limiting speeds other than those specified in the table are published, they must be complied with to remain within the appropriate areas. If an aeroplane operation requires a higher speed, then an alternative departure procedure must be requested.

Aeroplane category	Max Speed km/h (kt)
A	225 (120)
B	305 (165)
C	490 (265)
D	540 (290)
E	560 (300)

Table 7.3.1.4: Maximum speeds for turning departures

© Oxford Aviation Services Limited

7.3.2 Standard Instrument Departures. There are two basic types of departure route, straight, or turning. Departure routes are based on track guidance acquired within 20km (10.8nm) from the end of the runway (DER) on straight departures, and within 10km (5.4nm) after completion of turns on turning departures. The design of the instrument departure routes are based on the definition of tracks to be followed along which the pilot is expected to correct for known wind and to remain within the protected airspace.

7.3.2.1 Straight Departure. A straight departure is one in which the initial departure track is within 15° of the alignment of the runway. Track guidance may be provided by VOR, NDB or RNAV. See fig. 7.3.2.1.

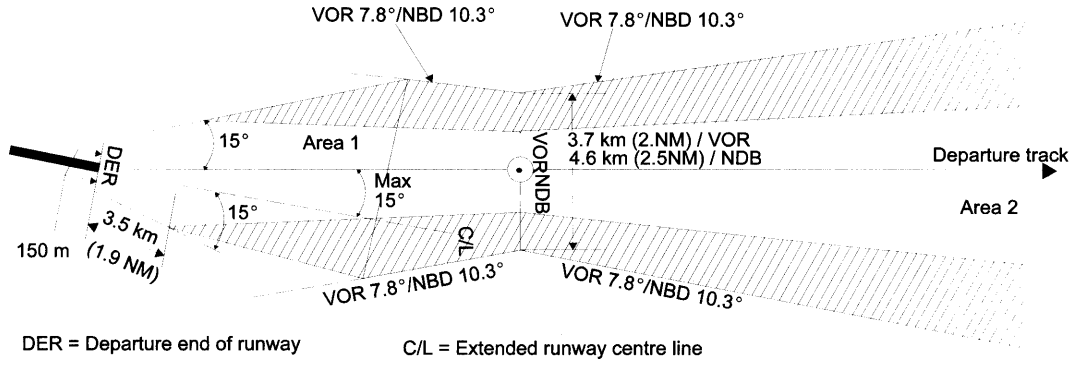


Figure 7.3.2.1 - Area for straight departure with track guidance

© Oxford Aviation Services Limited

7.3.2.2 Turning Departure. If the departure track requires a turn of more than 15°, a turning area is constructed and the turn required is commenced upon reaching a specified altitude/height, at a fix and at a facility (VOR, NDB etc..). Straight flight is assumed until reaching an altitude of at least 120m (394 ft) above the elevation of the DER. See fig 7.3.2.2.

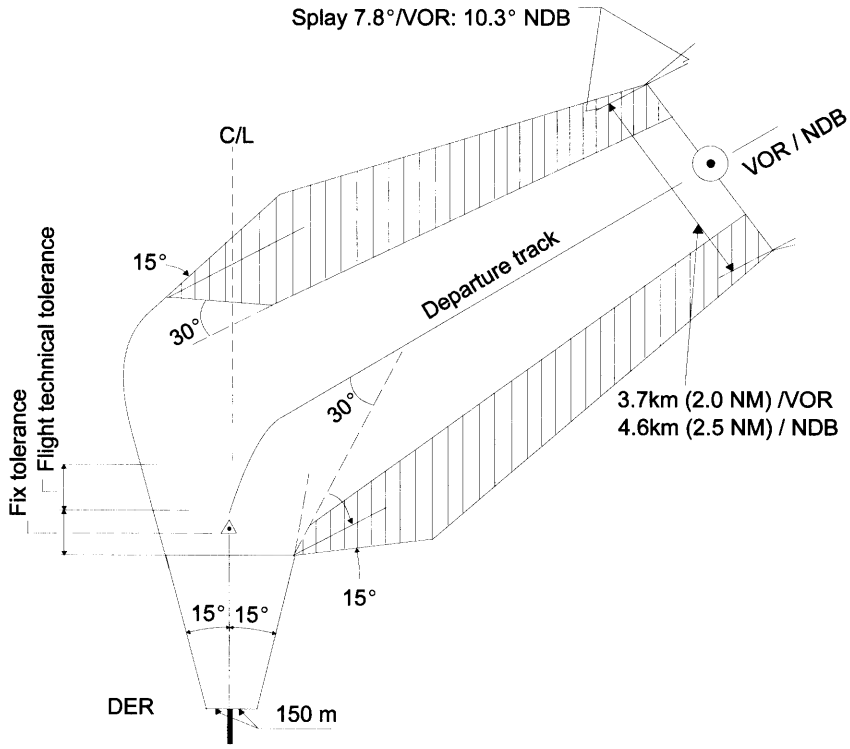


Figure 7.3.2.2 Turning departure - turn at a fix

7.3.2.3 Emergencies. Contingency procedures are required to cover the case of engine failure or an emergency in flight which occurs after V_1. It is the responsibility of the operator to establish the procedures for the operation.

7.3.3 Omnidirectional Departures. Where no track guidance is provided in the design of a departure procedure, the departure criteria are developed by using the omnidirectional method which basically provides for initial departure tracks to be undefined. In other words, once off the end of the runway and at a safe height, the aircraft can be navigated in any direction required to achieve the initial en-route point. It may be that some sectors of the departure area may contain obstacles which preclude departures in that direction, in which case the published procedures will be annotated to show the restricted sectors. The basic procedure is that the aircraft will climb on the extended runway centre line to 120 m (394 ft) before turns can be specified, and at least 90 m (295 ft) of obstacle clearance will be provided before turns greater than 15° can be specified. Where obstacles do not permit the development of omnidirectional procedures, it is necessary to fly a departure route (straight or turning), or ensure that ceiling and visibility will permit obstacles to be avoided by visual means.

© Oxford Aviation Services Limited

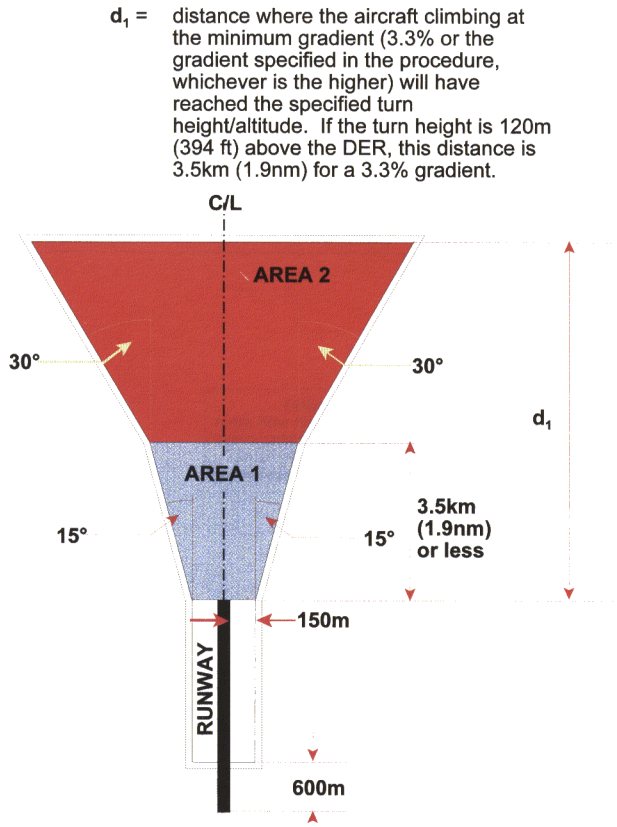


Figure 7.3.3 Turn Initiation Area for Omnidirectional Departure.

7.3.4 Published Information. Departure routes and standard instrument departure charts are published in accordance with standards contained in Annex 11 and Annex 4 to the Chicago Convention. Departure routes are labelled as RNAV only when that is the primary means of navigation utilised. For omnidirectional departures, the restrictions will be expressed as sectors to be avoided or sectors in which minimum gradients and/or minimum altitudes are specified to enable an aeroplane to safely overfly obstacles. Figure 7.3.4 shows a typical SID plate. This one details the departures from all the useable runways at Heathrow and specifies that the point of joining the ATS route structure is Compton (CPT). All SIDS start at the departure end of the runway and end at the point of joining the ATS route system. Note that each route has a specific name i.e. CPT3G. In the ATC clearance for IFR flights, departure instructions will include a SID to the first airways point. The ATCO will refer to the SID by its name. Note the means by which track guidance is applied. In a normal aeroplane fully 'airways fitted' for IFR, the SID can be complied with. You will have two VOR/NAV boxes and at least one ADF. The Compton SIDs required you to navigate by the LON and CPT VORs also the WOD NDB. You also require a DME receiver. The SID specifies DME distances to or from the facility, and radials from VORs or QDMs for NDBs. The SID will also specify altitude restrictions in the form of "Above .....", or "At .....". as well as a diagram of the procedure. A narrative is always given in English.

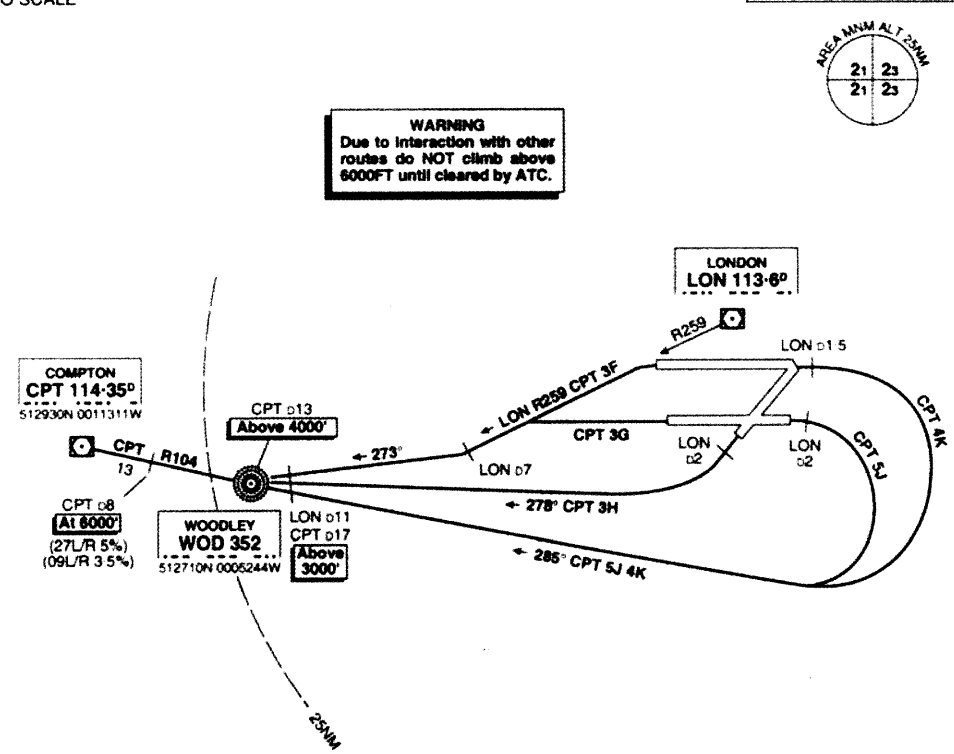
© Oxford Aviation Services Limited

COMPTON SIDs — LONDON HEATHROW

GENERAL INFORMATION
1 SIDs reflect Noise Preferential Routeings. See EGLL AD 2.21 for Noise Abatement Procedures.
2 Initial climb straight ahead to 580' QNH (500' QFE).
3 Cross Noise Monitoring Points not below 1080' QNH (1000' QFE) thereafter maintain minimum 4% climb gradient to 4000' (Note climb gradients greater than 4% may be required for ATC and airspace purposes) to comply with Noise Abatement requirements.
4 Callsign for RTF frequency used **when instructed after take-off** 'London Control'. Report callsign, SID designator, current altitude and cleared altitude on first contact with 'London Control'.
5 Callsign for frequency marked * will be 'Heathrow Director'.
6 En-route cruising level will be issued after take-off by 'London Control'. **Do not climb above SID levels until instructed by ATC**
7 Maximum IAS 250KT below FL100 unless otherwise authorised.

NOT TO SCALE

TRANSITION ALT 6000'



AVERAGE TRACK MILEAGE TO WOD NDB	
CPT 3F	15
CPT 3G	15
CPT 3H	16
CPT 5J	21
CPT 4K	22

SID	RWY	ROUTEING (Incl. Noise Preferential Routeing)	ALTITUDES	AIRWAY ROUTE
CPT 3F 134·125	27R	Straight ahead to intercept **LON VOR** R259 until **LON** D7, then turn right onto QDM 273° to **WOD NDB** (**CPT** D13), then to **CPT VOR**.	Cross **LON** D11 (**CPT** D17) above 3000' **WOD NDB** (**CPT** D13) above 4000' **CPT** D8 at 6000' 27L/R 5%, 09L/R 3·5%.	Via CPT G1- Westbound
CPT 3G 134·125	27L	Straight ahead to intercept **LON VOR** R259 until **LON** D7, then turn right onto QDM 273° to **WOD NDB** (**CPT** D13), then to **CPT VOR**.		
CPT 3H 134·125	23	Straight ahead to **LON** D2, then turn right onto QDM 278° to **WOD NDB** (**CPT** D13), then to **CPT VOR**.		
CPT 5J *134·975	09R	Straight ahead to **LON** D2, then turn right onto QDM 285° to **WOD NDB** (**CPT** D13), then to **CPT VOR**.		
CPT 4K *134·975	09L	Straight ahead to **LON** D15, then turn right onto QDM 285° to **WOD NDB** (**CPT** D13), then to **CPT VOR**.		

CHANGE RADIALS UPDATED

Figure 7.3.4

© Oxford Aviation Services Limited

At the end of the SID you should be well placed to continue en-route climbing in the airway or under radar control. At any time during the procedure, you may be ordered to comply with radar vectoring requiring you to abandon the SID or abbreviate it. In any event you will be told that you are under radar control at that stage and you are required to comply with the instructions issued.

7.3.5 **Area Navigation (RNAV) Departure Procedures Based on a VOR/DME.** The general principles relating to RNAV approach procedures based on a VOR/DME also apply to RNAV departures based on a VOR/DME. These are covered in a later section.

7.3.6 **Use of FMS/RNAV Equipment to Follow Conventional Departure Procedures.** Where FMS/RNAV equipment is available, it may be used when flying the conventional departure procedures defined, provided the procedure is monitored using the basic display normally associated with that procedure, and the tolerances for flight using raw data on the basic display are complied with.

7.3.7 **GNSS Procedures.** Recently, trials have begun for SIDs utilising GNSS(GPS) data for departures. The SID can be downloaded into the FMS and a fully automatic departure completed. As in the case of FMS/RNAV procedures, the pilot is required to monitor the procedure with reference to direct input data from other nav aids (VOR, NDB and DME).

7.3.7.1 **PRNAV.** It is the aim to eventually replace VOR/DME with GNSS procedures. These procedures will use precision RNAV (PRNAV) which may be augmented by altimetry cross reference (BAROVRNAV) to give a 'precision' element to both arrivals and departures. The aim is to achieve RNPO.3. RNP is covered in chapter 8.

© Oxford Aviation Services Limited

TRIAL FMS COMPTON SID — LONDON LUTON

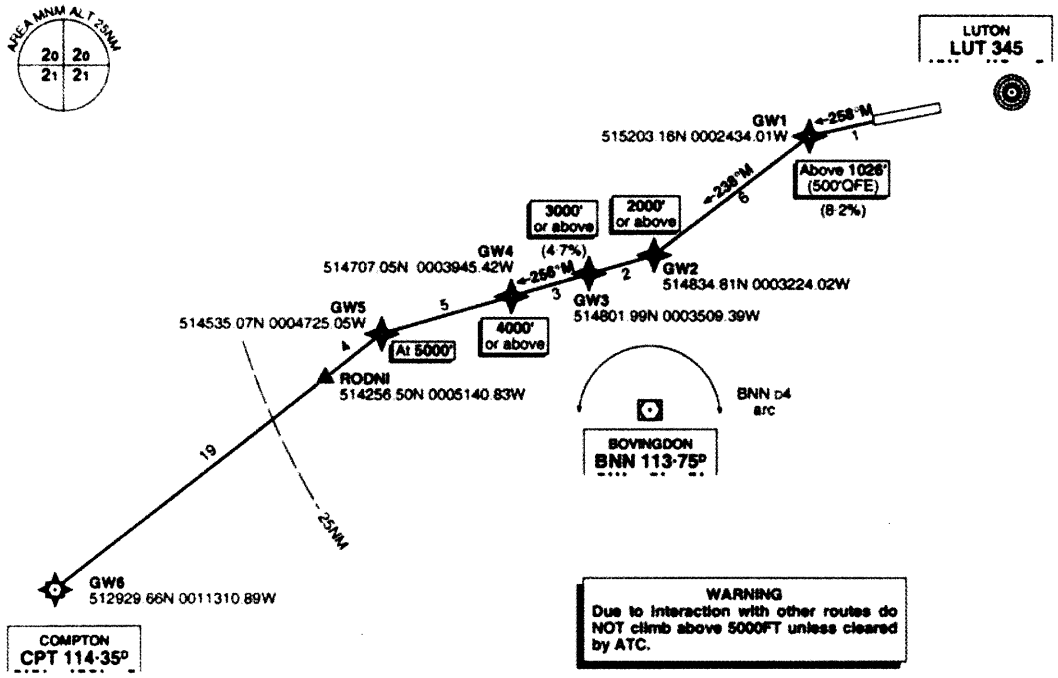
GENERAL INFORMATION
1 Trial SID incorporates Trial NPR
2 Initial climb straight ahead to 1026' QNH (500' QFE).
3 Minimum Climb Gradient (i) 4.5% to 200' AAL (Obstacle Clearance); (ii) 8.2% to 500' AAL (Noise Abatement)
4 RTF frequency **when instructed** after departure 118.825. Callsign 'London Control'
5 Max IAS 250KT below FL100 unless otherwise authorised.
6 En-route cruising level will be issued by 'London Control' **Do not climb above SID altitude until cleared**

WAYPOINTS
GW1 : 515203.16N 0002434.01W : I-LJ ▷1 0/258°M
GW2 : 514834.81N 0003224.02W : I-LJ ▷6 9/CPT R057 ▷31.8
GW3 : 514801.99N 0003509.39W : HEN 076°M 8NM
GW4 : 514707.05N 0003945.42W : HEN 076°M 5NM
GW5 : 514535.07N 0004725.05W : HEN NDB
GW6 : 512929.66N 0011310.89W : CPT VOR

ADDITIONAL RNAV/FMS DATA
a All waypoints are 'fly-over' waypoints
b All lat/long positions referenced to WGS 84 datum
c Runway Update Reference Point (on Rwy Centre-line, at Rwy 26 displaced threshold) **515237.33N 0002116.27W**
d Departure End of Rwy **515219.27N 0002300.78W**

Transition ALT 6000'

NOT TO SCALE



WARNING
Due to interaction with other routes do NOT climb above 5000FT unless cleared by ATC.

NB:
Procedure available only to operators approved by the CAA.

AVERAGE TRACK MILEAGE TO CPT
CPT 3Z 40

SID	RWY	ROUTEING (Incl. Noise Preferential Routeing)	ALTITUDES	AIRWAY ROUTE
CPT 3Z 119.775	26	Straight ahead to **GW1**. Turn left to **GW2** (track 238°M **CPT R057**) Turn right to **GW5** (track 256°M) ensuring that **BNN DME** does not reduce below 4NM. At **GW5** turn left to **CPT VOR (GW6)**	Cross **GW1** above 1026' QNH (500' QFE) (8.2%) Cross **GW2** at 2000' or above Cross **GW3** at 3000' or above (4.7%) Cross **GW4** at 4000' or above Cross **GW5** at 5000'	Via **CPT** G1 B39 R25 R41

CHANGE REPORTING POINT RODNI ADDED SID DESIGNATORS CO-ORDINATES UPDATED

Figure 7.3.7

© Oxford Aviation Services Limited

7.4 APPROACH PROCEDURES

7.4.1 Introduction. The design of an instrument approach procedure is, as we have already discussed, in general dictated by the terrain surrounding the aerodrome. It is also affected by the type of operations to be considered and by the types of aeroplane flying the procedures. These factors influence the siting of, and type of, navigation aids in relation to the runway or aerodrome. As we have already seen for departure procedures, airspace restriction may also affect the design of the procedure.

7.4.1.1 Speed. As with departure procedures, aircraft speed is an important consideration. The critical speed is the speed at which the aircraft crosses the threshold of the runway (V_{at}) but other speeds have important implications. The table below relates speeds to category of aircraft.

Aircraft category	V_{at}	Range of speeds for initial approach	Range of final approach speeds	Max speed for visual circling	Max speed 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

V_{at} Speed at threshold based on 1.3 x stall speed in landing configuration at max certificated landing mass.

* Maximum speed for track reversal or racetrack procedures.

Table 7.4.1.1 Speeds for instrument approach procedures (Knots)

7.4.2 Types of Procedure. Broadly, instrument procedures are defined in terms what guidance is provided. There are two types:

a. Precision Procedures (runway approach)

b. Non-precision Procedures (aerodrome approach)

© Oxford Aviation Services Limited

7.4.2.1 Precision. A precision procedure gives accurate track guidance during the final approach phase and information concerning height above the threshold of the runway. In all cases external equipment is required to provide the necessary data. By flying the required track and glide path (within the required accuracy) the aircraft is kept within a protected area which ensures terrain clearance throughout the procedure. ILS, MLS and Precision Approach Radar (PAR) are examples of equipment that can be used as part of a precision approach system. In the design of the procedure (track and altitude requirements), obstacle clearance is implicit if the descent path (glide path) is adhered to. Because a precision approach terminates at the touchdown point (or at the commencement of a missed approach) it is often referred to as a runway approach. For a precision approach the pilot is required to calculate the height on the final approach at which he/she must make a decision either to land or go around (fly the missed approach procedure). This is **Decision Height (Altitude) DH(A)**. Guidance on the calculation of DH/A is contained in the Operations Manual. DH/A is defined as the specific height (or altitude) in a precision approach at which a missed approach must be initiated if the required visual reference to continue the approach has not been established.

7.4.2.2 Precision Categories. It must be emphasised that at decision height, if the approach has been flown correctly, the aircraft will be at the place it should be and must be safe, and further descent along track must also be safe (if the visibility was perfect, the aeroplane would be at the same place and height, and the approach would be continued anyway!). Except where the 'system' (ground equipment and aeroplane equipment) permits 'blind' landing, the latter stage of the final approach will be flown visually (you will need visual reference to complete the landing). In order to accomplish this, a minimum RVR is required and a visual means of maintaining the centreline of the runway once on the ground. As technology has advanced, systems, specifically ILS, have become more accurate in track and height guidance. The use of 'on board' computer systems (FMS) to interpret received data and to control the aeroplane, means that the visual element can be reduced to the minimum. ILS systems are categorised by accuracy of operation and this results in the specified decision height (or altitude) (DH/A) and minimum RVR requirements. The categories are as follows, but beware, there are anomalies between ICAO requirements and JAR OPS. For Air Law, we are interested only in **ICAO requirements**. These are:

Cat I

System Minima 60m (200ft)
DH => 60m (than 200ft), and
RVR not less than 550m **or** ground visibility not less than 800m

Cat II

System Minima 30m (100ft)
DH < 60m (200ft) but => 30m (100ft), and
RVR not less than 350m

© Oxford Aviation Services Limited

Cat IIIA	DH < 30m (100ft) or no DH, and RVR not less than 200m
Cat IIIB	DH < 15m (50ft) or no DH, and RVR less than 200m but more than 50m
Cat IIIC	No DH and no RVR requirements

7.4.2.3 Visual Approach. In all cases, once established on final approach, the pilot has the option to continue the approach visually providing, of course, that he/she has the necessary visual criteria. This is not VFR! It is completing the IFR procedure visually. Unless Cat IIIC applies, you will need some form of visual criteria anyway, so if you have the criteria at 7 miles, what is the difference!

7.4.2.4 Completing the Procedure. Once an instrument procedure has been commenced the pilot must complete the procedure as published unless given contrary instructions by ATC. Even if the final approach is flown visually, the requirements of the procedure must be complied with.

7.4.2.5 Non Precision. Where there is no ground equipment that can provide height data to the aircraft, the procedure is defined as non-precision although the track guidance accuracy may be as good as that required for precision. Non precision procedures can be established where track guidance is provided by VOR or NDB, or by track guidance elements of precision systems ie. ILS localiser only or PAR in azimuth only. Another type of non precision system is surveillance radar on a reduced range scale (SRA). Because there is no reference to touchdown and the procedures always terminate above touchdown, the procedures are sometimes referred to as aerodrome approach procedures. Indeed, some procedures are specified for approach to the aerodrome, followed by a circling manoeuvre complying with defined visual criteria to land in a direction other than that of the straight in approach. This is known as Visual Manoeuvre (Circling) and is discussed in detail later in this chapter.

© Oxford Aviation Services Limited

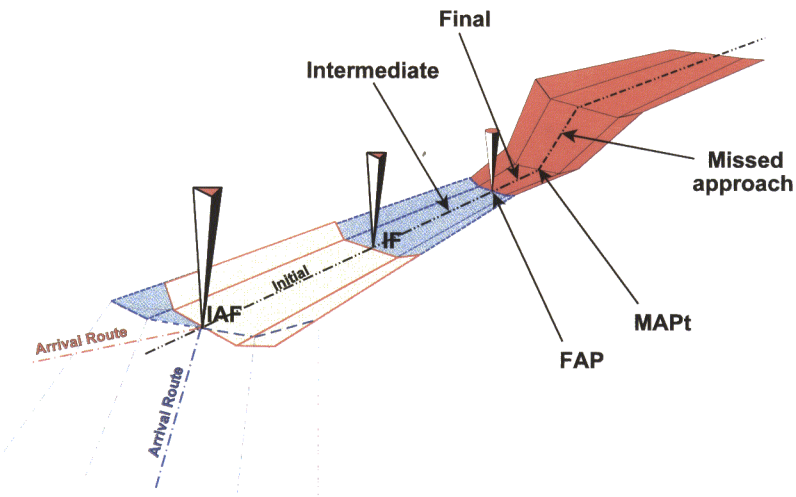
7.5 APPROACH PROCEDURE DESIGN

7.5.1 Procedure Segments. An instrument approach procedure requires the aeroplane to be flown in safe airspace. In order to remain in safe airspace the required track of the aeroplane must be achievable and the altitude limitations which need to be applied must be commensurate with what is trying to be achieved. As the procedure takes the aeroplane closer to the runway/aerodrome and closer to the ground, the safety limitations must be increased not relaxed. Until 3-D satellite navigation technology is widely available and proved reliable, the system of guidance in track and glide path will rely on ground based equipment which has inherent errors. Providing the error tolerances are known and the design of the procedure detailing the flight path to be flown take the error tolerances into account, the procedure will be useable. It does of course require the pilot (or the auto-pilot) to be able to fly the aeroplane to the required basic accuracy to keep the aeroplane in the airspace specified. An instrument approach procedure may have five separate segments, each of which has a specific purpose. Each of the five segments begins and ends at a designated fix. It is, however, possible for segments to begin at specified points if no fix is available. For instance, the final approach segment of a precision approach may originate at the point of intersection of the intermediate flight altitude and the nominal glide path.

7.5.1.1 The Five Segments of an Instrument approach. The five segments are:

a. Arrival
b. Initial
c. Intermediate
d. Final
e. Missed approach

7.5.1.2 Physical Characteristics of Segments. 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.



© Oxford Aviation Services Limited

7.5.1.3 Straight In Approaches. Wherever possible a straight in approach will be specified which is aligned with the runway centre line (C/L). 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 C/L is 30° or less. If terrain or other restrictions preclude a straight in approach, a circling approach will be specified.

7.5.1.4 Minimum Sector Altitudes. Minimum sector altitudes (MSA) are established for each aerodrome and provide at least 300 m (984 ft) obstacle clearance within 46 km (25 nm) of the homing facility (VOR, NDB) associated with the approach procedure at the aerodrome. MSA is specified for each of the cardinal magnetic compass quadrants. On all approach plates (including Radar Vectoring plates) the MSA is diagrammatically represented. The lowest level permitted for an arrival route will be the MSA for the appropriate quadrant that contains the arrival track.

7.5.1.5 Track Maintenance. All procedures depict tracks and pilots should attempt to maintain the track by applying corrections to heading for known wind. For ILS approaches, pilots are expected to be able to fly the aeroplane during the final approach with a track accuracy equal to no worse than half full scale deflection of the ILS indicator.

7.5.2 Categories of Aircraft. Aircraft performance has a direct effect on the airspace and visibility needed to perform the various manoeuvres associated with the conduct of instrument approach procedures. The most significant performance factor is aircraft speed. Five categories of aircraft have been established based on speed at threshold (V_{AT} = 1.3 times the stall speed in the landing configuration at maximum certificated landing mass). This provides a standardised basis for relating aircraft manoeuvrability to specified instrument approach procedures. See table 7.4.1.1.

7.5.3 Obstacle Clearance Altitude/Height (OCA/H). For each individual approach procedure an obstacle clearance altitude/height (OCA/H) is calculated in the development of the procedure and published on the instrument approach plate. The vital factor concerning OCA/H is that the minima can only be **deliberately** exceeded (descent below) when the visual criteria to continue is achieved. In the case of precision, non-precision and circling approach procedures, an OCA/H is specified for each category of aircraft. OCA/H is defined as follows

a. **OCA/H for Precision Approach Procedure**: The lowest altitude (OCA) or height above the elevation of the relevant runway threshold (OCH), at which a missed approach must be initiated to ensure compliance with the appropriate obstacle clearance criteria. (See figure 7.5.3b).

© Oxford Aviation Services Limited

b. **OCA/H for Non-precision Approach**: The lowest altitude (OCA) or height (OCH) above the aerodrome elevation, or above the elevation of the relevant runway threshold (if the threshold is more than 2 m (7 ft) below the aerodrome elevation), below which the aircraft cannot descend without infringing the appropriate obstacle clearance criteria. (See fig 7.5.3a)

c. **OCA/H for Visual Manoeuvre (Circling) Procedure**: The lowest altitude (OCA) or height above the aerodrome elevation (OCH), below which the aircraft cannot descend without infringing the appropriate obstacle clearance criteria.

© Oxford Aviation Services Limited

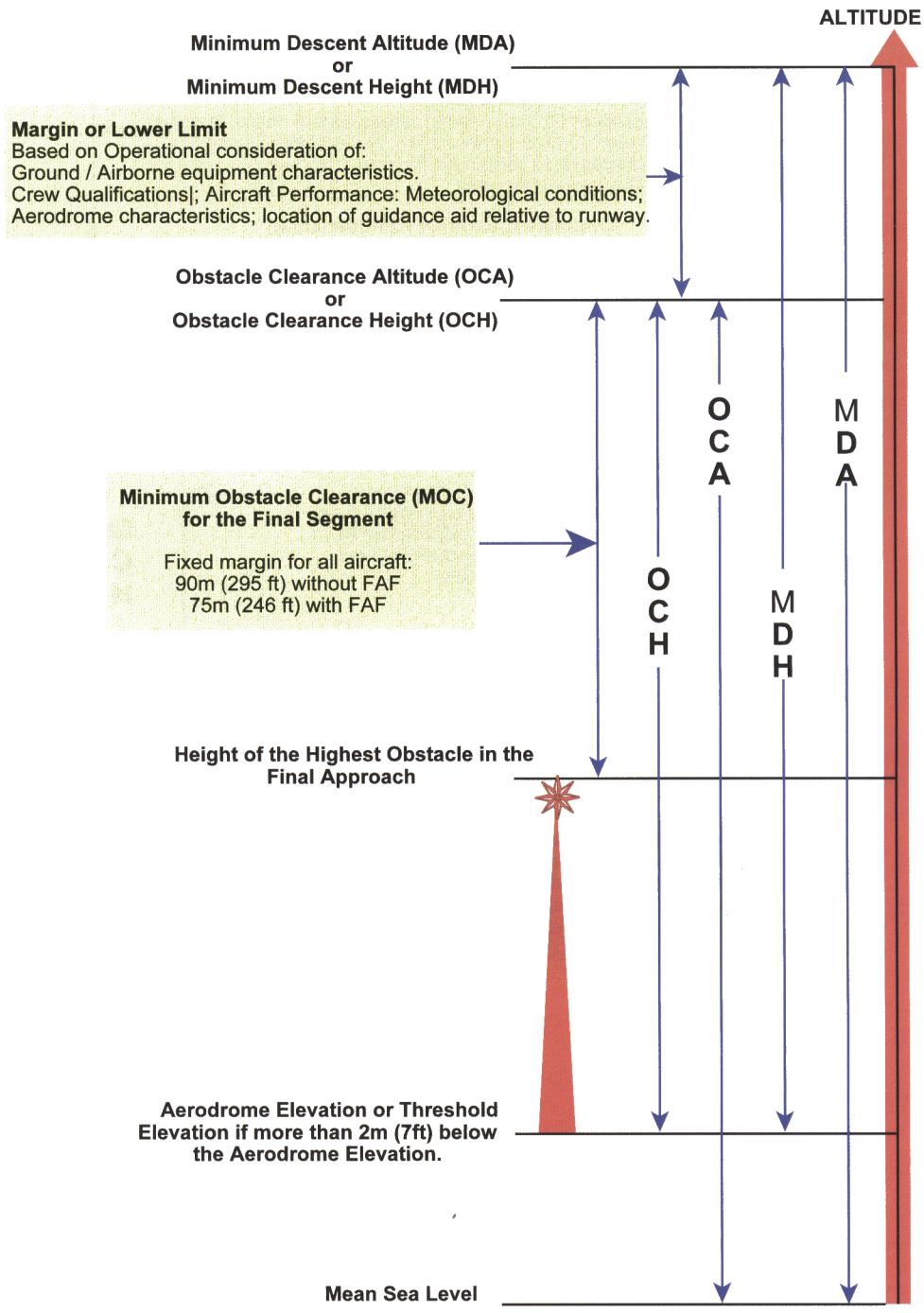


Fig 7.5.3a Method of Determining MDH/A for a Non-Precision Approach Procedure

© Oxford Aviation Services Limited

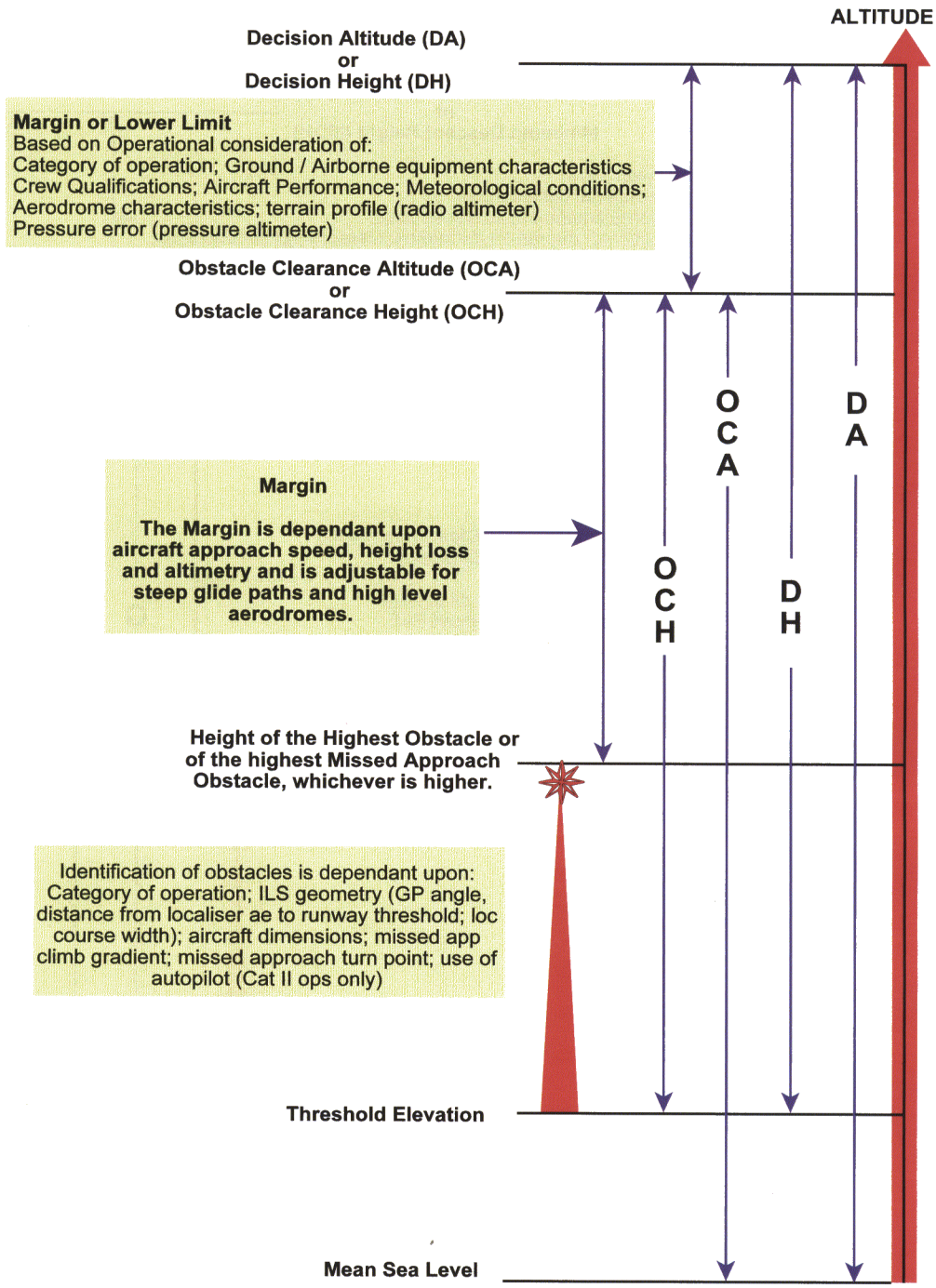


Fig 7.5.3b Method of Determining DH/A for a Precision Approach Procedure

© Oxford Aviation Services Limited

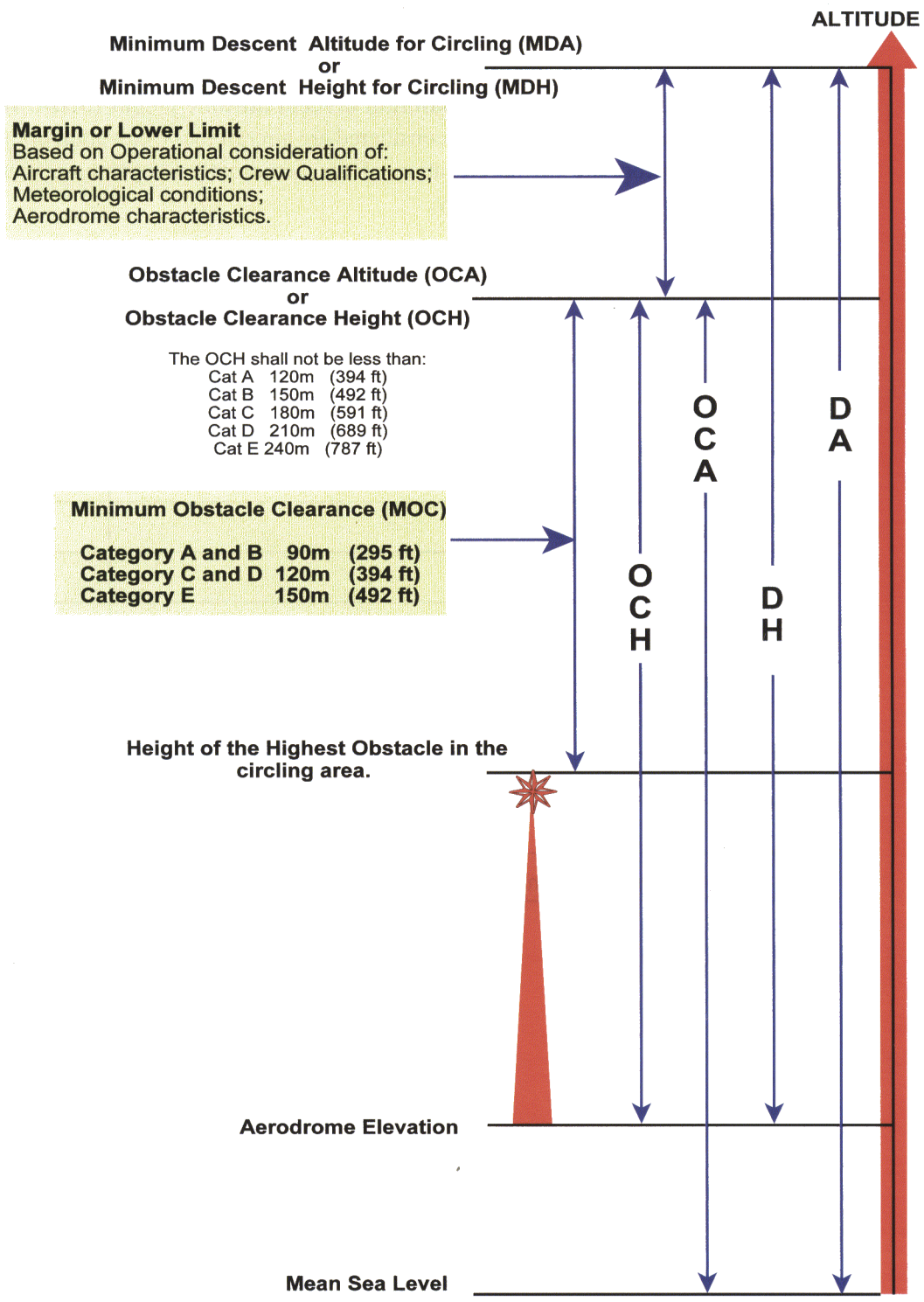


Fig 7.5.3c Method for Determining MDH/A for Circling Approach Procedures

© Oxford Aviation Services Limited

7.5.4 **Factors Affecting Operational Minima.** In general, minima are developed by adding the effect of a number of operational factors to the OCA/H to produce, in the case of precision approaches, **decision altitude (DA) or decision height (DH)** and, in the case of non-precision approaches, **minimum descent altitude/height (MDA/MDH).** The general operational factors to be considered are aircraft mass; elevation or the pressure-altitude appropriate to the elevation of the aerodrome, temperature, wind, runway gradient and condition of runway.

SYSTEM MINIMA

SYSTEM	MINIMA (ft)
ILS without glide path	250
ILS back beam (not approved)	250
PAR without glide path	250
VOR/DME	250
SRA terminating ½ nm	250
SRA terminating 1 nm	300
VOR	300
NDB or localiser	300
VDF	300
SRA terminating at 2 nms	350

© Oxford Aviation Services Limited

7.5.5 **Dominant Obstacle**. The criteria for deciding DA/H or MDA/H depends upon the type of approach. In the case of a precision approach, the dominant obstacle height is either the height of the highest approach obstacle or the height of the highest missed approach obstacle whichever is the highest. (To calculate altitudes, the elevation of the base of the obstacle above MSL must be added). For a non-precision approach, dominant obstacle is the highest obstacle in the final approach, and for a circling (visual) approach it is highest obstacle in the circling area.

7.5.6 **Minimum Obstacle Clearance (MOC)**. The MOC is defined for all aircraft as a fixed margin which is to be added to the height of the dominant obstacle in the final approach of a **non-precision approach** procedure. Because glide path information is provided for precision approach, it is implicit that the glide path must have sufficient obstacle clearance. Where a final approach fix (FAF) is specified, the MOC is 75 m (247 ft), and without a FAF the MOC is 90 m (295 ft). In mountainous terrain, the MOC may include an additional margin. It is increased for excessive length of final approach segment and for remote and forecast altimeter settings. 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.

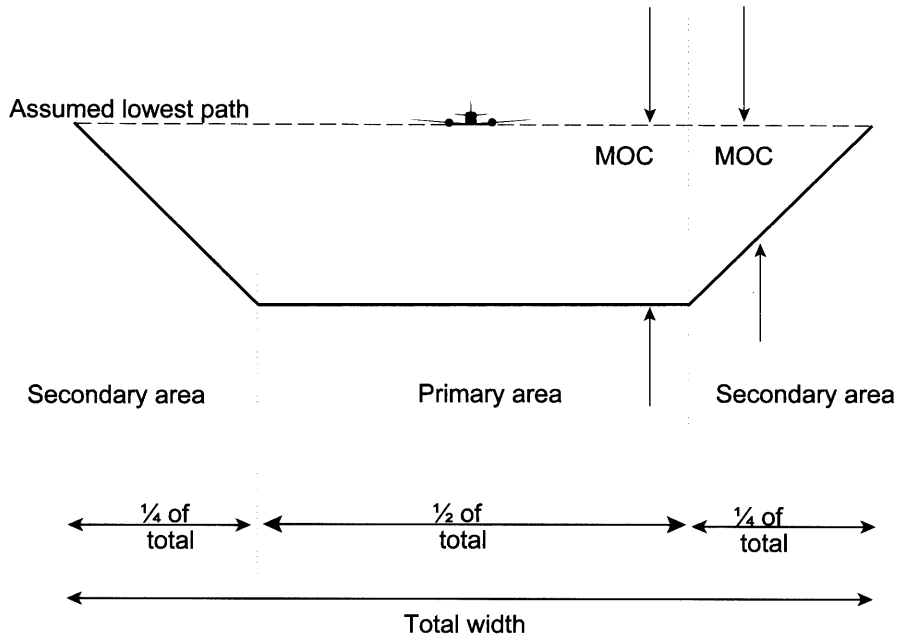


Figure 7.5.6 Non-Precision MOC

© Oxford Aviation Services Limited

7.5.7 **Accuracy of Fixes**. Fixes and points used in designing approach procedures include, but are not limited to, the initial approach fix (IAF), the intermediate fix (IF), the final approach fix (FAF), the holding fix and where necessary, a fix to mark the missed approach point (MAPt), or the turning point (TP). Fixes are normally based on standard navigation systems.

7.5.7.1 Intersection fixes. Because all navigational facilities 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.

7.5.7.2 Intersection Fix Tolerance Factors. The dimensions of the intersection fix are determined by the system use accuracy of the navigational system which supplies information to define the fix. The factors from which the accuracy of the system is determined are:

a. ground station tolerance,

b. airborne receiving system tolerance,

c. flight technical tolerance (the accuracy to which you can fly the aeroplane).

d. distance from the facility.

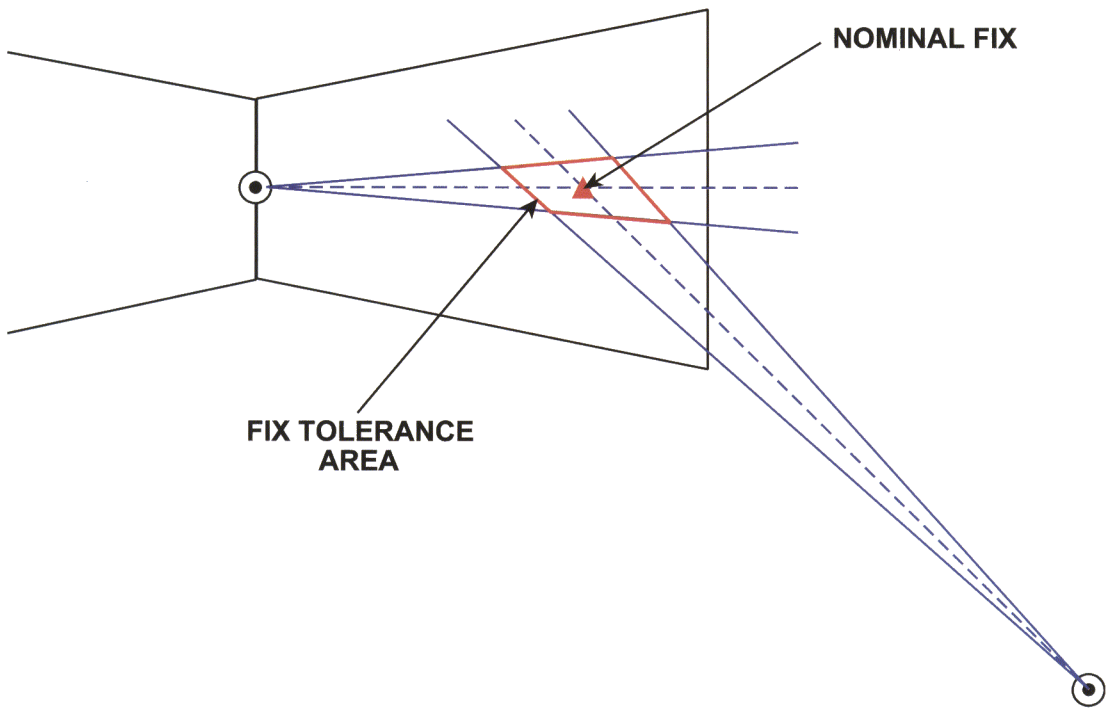


Figure 7.5.7 Fix Tolerance Area

© Oxford Aviation Services Limited

7.5.7 Track Accuracy. There is a difference between the overall tolerance of the intersecting facility and along track facility and this is accounted for by the fact that flight technical tolerance is not applied to the former. The following values are used in the development of instrument procedures:

a. Accuracy of facility providing track:

1.	VOR	+/- 5.2° (incl flight tech tolerance of +/- 2.5°)
2.	ILS Localiser	+/- 2.4° (incl flight tech tolerance of +/- 2°)
3.	NDB	+/- 6.9° (incl flight tech tolerance of +/- 3°)

Note: The tolerance values expressed result from the root sum square (RSS) of the system errors.

b. Over-all tolerance of the intersecting facility

1.	VOR	+/- 4.5°	When used in an approach procedure to establish a step down fix where less than 300 m (984 ft) of obstacle clearance prevails, accuracy is considered to be +/- 7.8°
2.	ILS Localiser	+/- 1.4°	
3.	NDB	+/- 6.2°	When used in an approach procedure to establish a step down fix where less than 300 m (984 ft) of obstacle clearance prevails, accuracy is considered to be +/- 10.3°

Note: The tolerance values expressed result from the root sum square (RSS) of the system errors except that in applying system tolerances in the determination of splay angles in segments of the approach/missed approach procedures, the sigma values (7.8°VOR, 10.3° NDB) are used.

7.5.7.1 RSS. RSS is a statistical method of 'averaging' errors in which the 'average' is the square root of the sum of the squares of the individual items, similar to the Root Mean Squared (RMS) method of calculating average power in AC electrical generation systems.

7.5.7.2 Other Fix Tolerances. In instrument procedures, positions and turning points may be referenced to other navigational facilities. For instance, when leaving airways you may be given radar vectoring to a point that serves as the start of the arrival route. Also ILS systems still use 75 Mhz 'fan' markers for marking the Outer and Middle Markers. Indeed, the NDB procedures at Oxford use the fan marker (Mkr K) at Woodstock. The accuracy of these facilities is as follows:

© Oxford Aviation Services Limited

a. **Surveillance Radar** Radar fix accuracies are based on radar mapping accuracies, azimuth resolution, flight technical tolerances, controller technique tolerances, and the speed of the aircraft in the terminal area.

1. Terminal Area Radar (TAR) within 37 Km (20 nm). Fix tolerances +/- 1.5 km (0.8 nm).

2. En-route Surveillance Radar (RSR) within 74 km (40 nm). Fix tolerance is +/- 3.1 km (1.7 nm).

b. **DME**. Fix tolerance is +/- 0.46 km (0.25 nm) + 1.25% of the distance to the antenna.

c. **75 Mhz Marker Beacon**. The accuracy of fixes from ILS and "Z" (fan) markers depends upon the sensitivity of the aircraft receiving system and the aircraft aerial. Typically, for a system with a sensitivity setting of 1000μV, fix tolerance is +/- 0.8 km (0.45 nm) at 6000 ft and 0.35 km (0.2 nm) at 1000 ft.

7.5.8 **Fix Tolerance Overhead a Station**. In nearly all procedures you are required to position the aeroplane overhead a ground facility. This may be at the commencement of the procedure or to define a position during the procedure. Unfortunately, most of these facilities are not designed to give accurate 'on tops' rather to give accurate bearing information (track guidance). For instance, a VOR beacon is excellent at providing accurate radial information, but 'on top' is difficult to determine and is usually only evident after you have passed over the beacon. The following are important:

a. **VOR**. Fix tolerance overhead a VOR is based on a circular cone of ambiguity of 50° from the vertical and assumes that you can actually maintain track to the overhead. At 3 000 ft the accuracy of the 'on top' may be as poor as:

2 x Tan 50° x 3000 = 2 x 1.19 x 3000 = 7140 ft; or 1.17 nm

b. **NDB.** Fix tolerance overhead an NDB is based upon an inverted cone of ambiguity extending to an angle of 40°either side of the facility. The same calculation for an NDB reveals that it is a more accurate 'on top' facility.

2 x Tan 40° x 3000 = 2 x 0.84 x 3000 = 5040 ft; or 0.83 nm

7.5.9 **Approach Area Splays**. The tolerances in 7.5.7 a. determine the overall fix tolerance for the type of facility. This is used to narrow and widen instrument approach areas as the aircraft flies to and from a facility respectively. The area is of a standard width of 3.7 km (2.0 nm) for VOR and 4.6 km (2.5 nm) for NDB, at the facility. The optimum and maximum distances for locating the FAF relative to the threshold are 9 km (5 nm) and 19 km (10 nm) respectively.

© Oxford Aviation Services Limited

7.5.10 Descent Gradient. The design of procedures allows adequate space for descent from the published height crossing the facility, to the runway threshold. This is achieved by establishing a maximum allowable descent gradient for each segment of the procedure. The optimum descent gradient in the final approach should not exceed 5% (50 m/km; approx 300 ft/nm which is equivalent to a 3° glide path). Where a steeper gradient is necessary the maximum permissible is 6.5% (65 m/km (400 ft/nm) which is equivalent to a 3.8° glide path). In the case of a precision approach the operationally preferred glide path angle is 3.0°. An ILS GP in excess of 3° is used only where an alternative means of satisfying Obstacle Clearance requirements are impractical. Gradients of 6.5% may result in descent rates exceeding the recommended maximum rate of descent for some aircraft. Pilots of those aircraft types should be aware of this before starting the approach. Where GP greater than 6.5% are established, the authority of the state in which the aerodrome is situated must give specific approval.

7.6 TRACK REVERSAL AND RACETRACKS

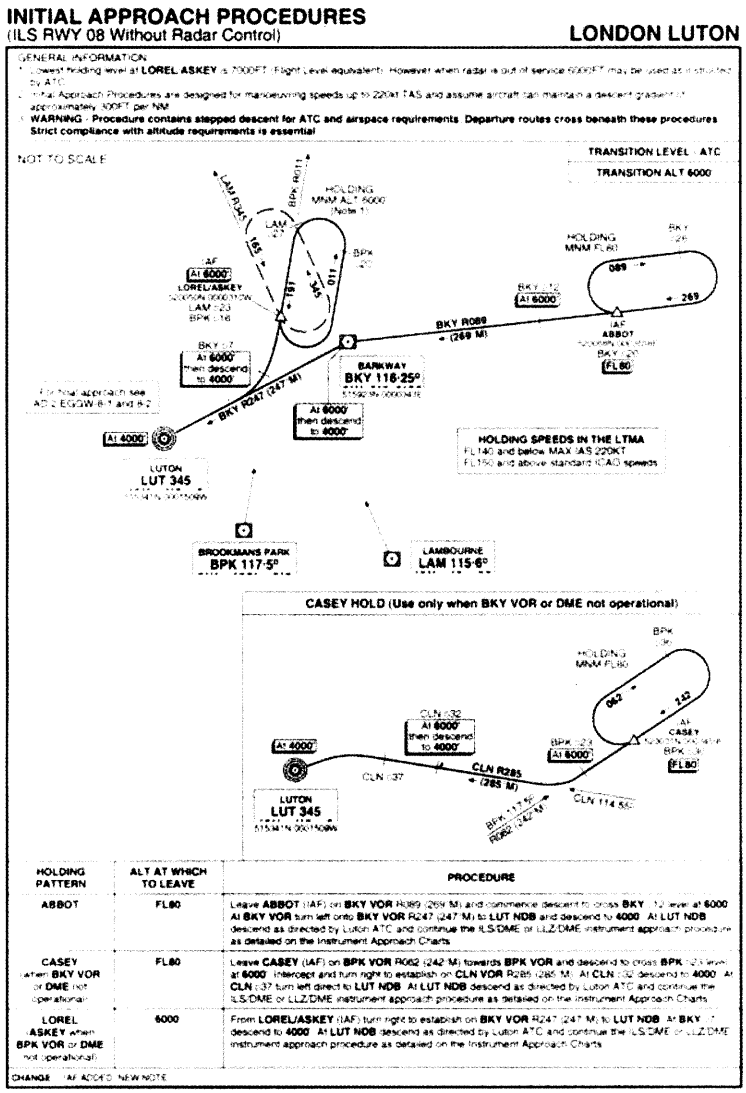


Fig 7.6.1

© Oxford Aviation Services Limited

7.6.1 **Requirement**. Without radar vectoring, an instrument procedure relies on the pilot self-positioning at the initial approach fix (IAF) and then flying the procedure as published. A simple procedure will require an outbound track from the fix facility followed by a track reversal to track inbound towards the runway (assuming that the IAF facility is co-located on the aerodrome). The standard procedure for track reversal is a **procedure turn**. This has two variants discussed below. An alternative procedure is a **base turn**, usually associated with a VOR beacon. Aircraft can approach the IAF from all directions (converging angle recommended to be no greater than 120 deg). In order to establish the outbound track accurately, a procedure is defined to allow the aircraft to manoeuvre at the IAF prior to commencing the instrument procedure. Usually, a racetrack is set up (similar to a holding pattern) based on the facility providing the IAF. Utilising the established methods of joining a hold this allows correct track orientation at the IAF outbound. Holding patterns and associated procedures are covered later in this chapter. (This racetrack pattern can also serve as the holding patten at the completion of the missed approach).

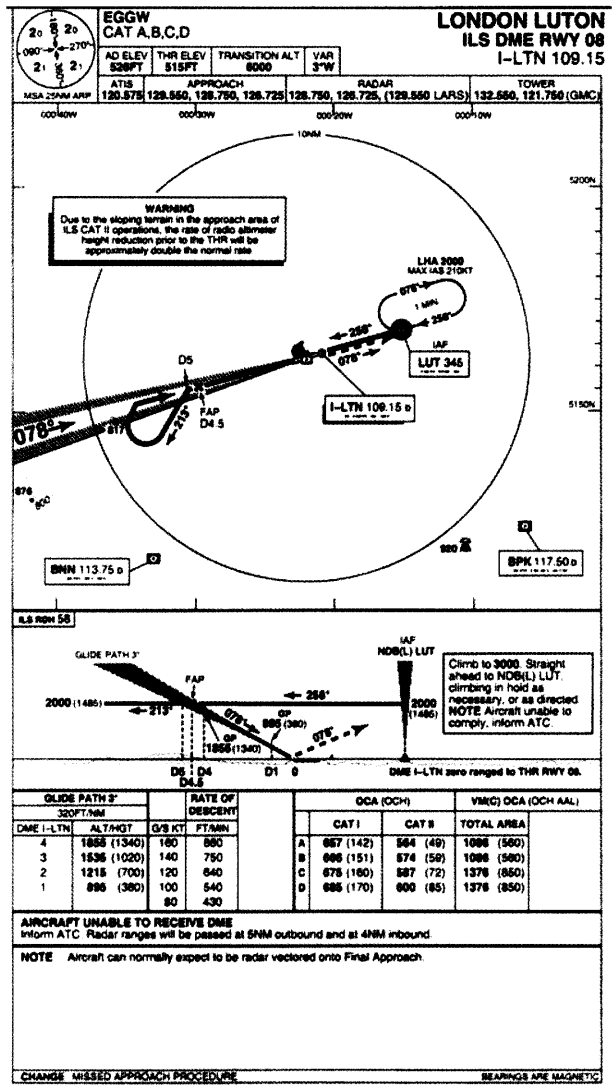


Fig 7.6.2

© Oxford Aviation Services Limited

7.6.2 **Track Reversal Manoeuvres**. The track reversal procedure (the turn from 'outbound' to 'inbound') may be in the form of a procedure or base turn. Entry is restricted to a specific direction or sector. In these cases, a particular pattern, normally a base turn or procedure turn is prescribed, and to remain within the airspace provided requires strict adherence to the directions and timing specified. 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°/180° procedure turn**. (See Fig 7.6a) Starts at a facility or fix and consists of:

- a straight leg with tack guidance; this straight leg may be timed or limited by a radial or DME distance;
- a 45° turn;
- a straight leg without track guidance. This straight leg is timed; it is 1 minute from the start of the turn for categories A and B aircraft and 1 minute 15 seconds from the start of he turn for categories C, D and E aircraft.;
- a 180° turn in the opposite direction to intercept the inbound track at a converging angle.

The 45°/180° procedure turn is an alternative to the 80°/260° procedure turn b. below unless specifically excluded.

b. **80°/260° procedure turn**. (See Fig 7.6b) Starts at a facility or fix and consists of:

- a straight leg with track guidance; this straight leg may be timed or limited by a radial or DME distance;
- an 80° turn;
- a 260° turn in the opposite direction to align on the inbound track.

The 80°/260° procedure turn is an alternative to the 45°/180° procedure turn a. above unless specifically excluded.

Note. - The duration of the initial outbound leg of a procedure may be varied in accordance with aircraft speed categories in order to reduce the over-all length of the protected area. In this case, separate procedures are published.

c. **Base turn**, (See Fig 7.6c) consisting of a specified outbound track (usually with track guidance provided by a VOR beacon) and timing or DME distance from a facility, followed by a turn to intercept the inbound track. The outbound track and/or the timing may be different for the various categories of aircraft. Where this is done, separate procedures will be published.

© Oxford Aviation Services Limited

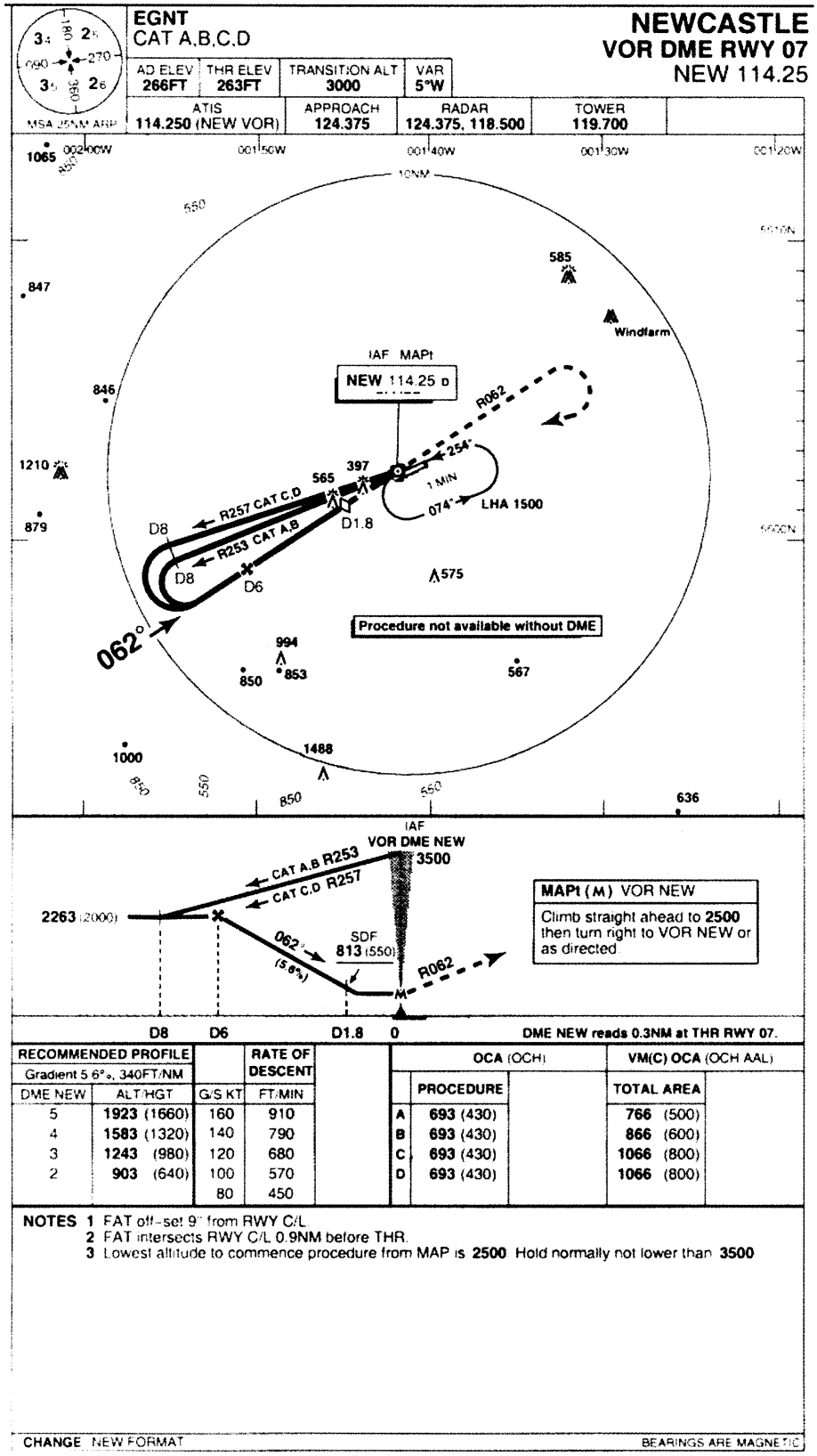


Fig 7.6.3

© Oxford Aviation Services Limited

7.6.3 **Racetrack Procedure.** (See Fig 7.5.4d) A racetrack procedure consists of 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 a 180° turn in the same direction to return to the inbound track. As an alternative to timing, the outbound leg may be limited by a DME distance or intersecting radial/bearing. Normally a racetrack procedure is used when aircraft arrive overhead the fix from various directions. In these cases, aircraft are expected to enter the procedure in a manner comparable to that prescribed for holding procedure entry with the following considerations:

a. Offset entry from sector 2 (see 7.11.5b) shall limit the time on the 30° offset track to 1 min 30 secs, after which the pilot is expected to turn to a heading parallel to the outbound track for the remainder of the outbound time. If the outbound time is only 1 min, the time on the 30° offset track shall be 1 min also.

b. Parallel entry (7.5.11a) shall not return directly to the facility without first intercepting the inbound track when proceeding to the final segment of the approach procedure.

c. All manoeuvring shall be done in so far as possible on the manoeuvring side of the inbound track.

Note: Racetrack procedures are used where sufficient distance is not available in a straight segment to accommodate the required loss of altitude and when entry into a reversal procedure is not practical. They may also be specified as alternatives to reversal procedures to increase operational flexibility (in this case they are not necessarily published separately).

© Oxford Aviation Services Limited

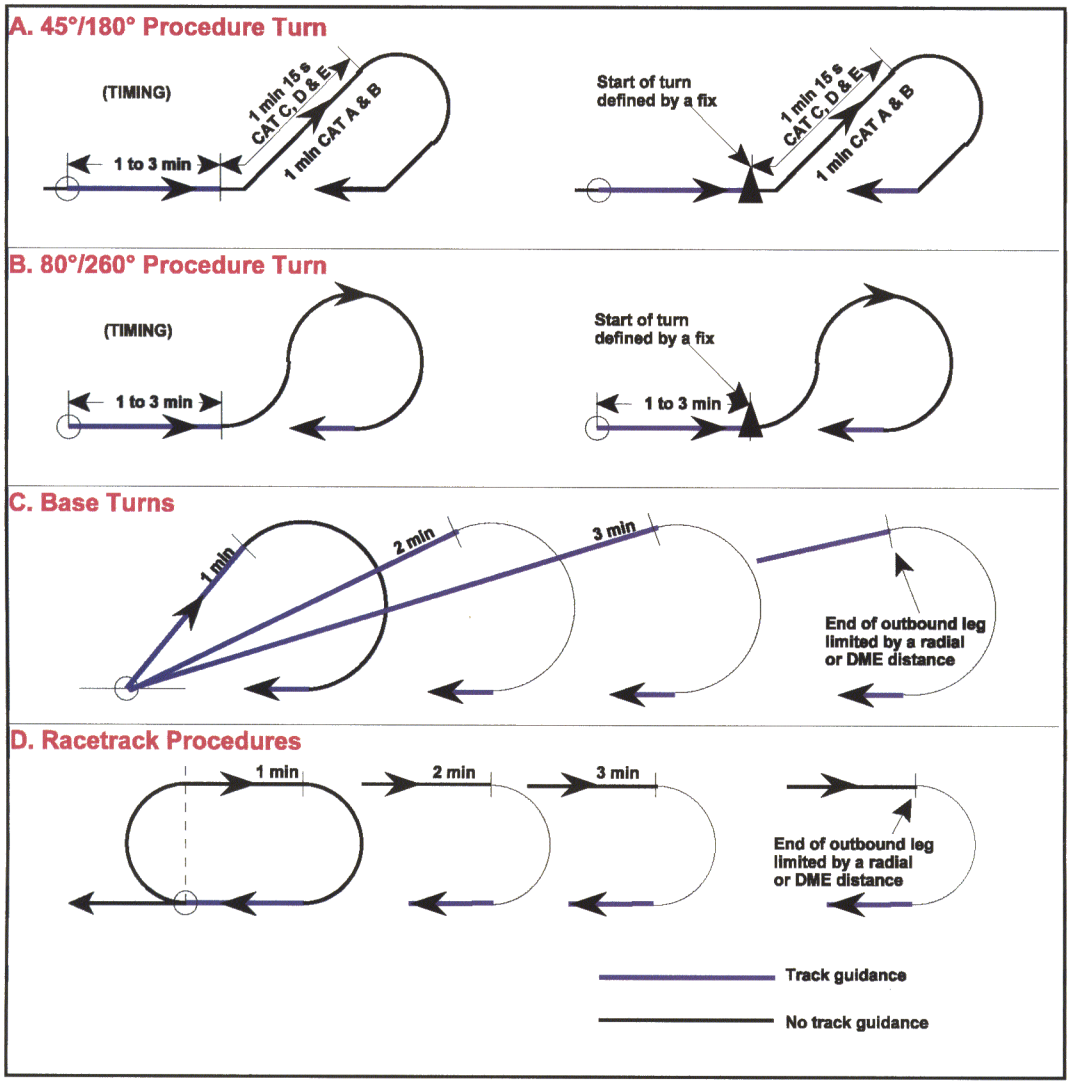


Fig 7.6: Track Reversals and Racetrack Procedures

7.6.4 **Flight Procedures for Racetrack and Reversal Procedures**. The following specifies the procedures to be adopted when flying racetracks and track reversals:

a. **Entry**. Unless the procedure specifies particular entry restrictions, reversal procedures shall be entered from a track within ± 30° of the outbound track of the reversal procedure. However, for base turns, where the ±30° direct entry sector does not include the reciprocal of the inbound track, the entry sector is expanded to include it.

b. **Speed Restrictions**. These may be specified in addition to, or instead of, aircraft category restrictions. The speeds must not be exceeded to ensure that the aircraft remains within the limits of the protected areas.

c. **Bank angle**. Procedures are based on average achieved bank angle of 25°, or the bank angle giving a rate of turn of 3°/second (rate 1), whichever is less.

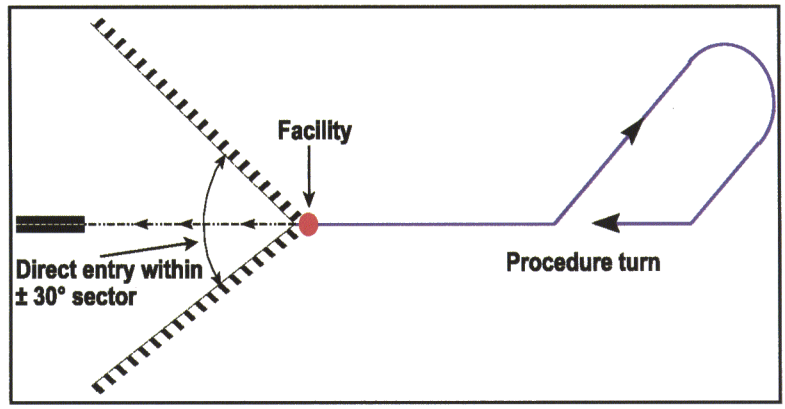
© Oxford Aviation Services Limited

d. **Descent**. The aircraft is to cross the fix, or facility, and fly outbound on the specified track descending as necessary to the specified altitude. If a further descent is specified after the inbound turn, this descent is not to be started until established on the inbound track ("established" is considered as being within half full scale deflection for the ILS localiser or within ±5° of the required bearing for the NDB or VOR).

e. **Outbound timing - racetrack procedure**. When the procedure is based on a facility, outbound timing starts from abeam the facility or on attaining the outbound heading, whichever comes later. When the procedure is based on a fix the outbound timing starts from attaining the outbound heading. The turn on to the inbound track should be started within the specified time (adjusted for wind) or when encountering any DME distance or the radial/bearing specifying a limiting distance, whichever occurs first.

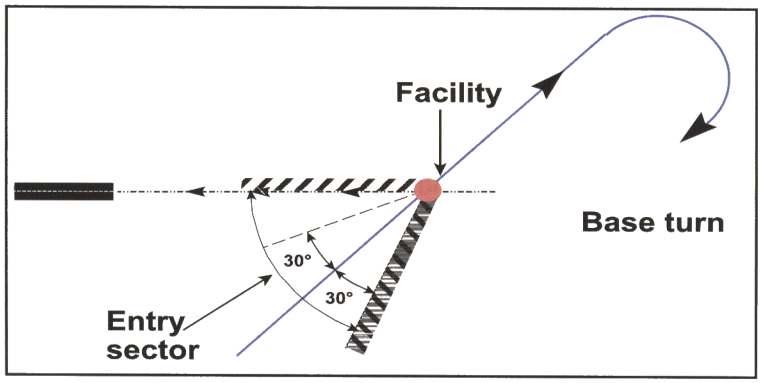
f. **Wind effect.** Due allowance should be made in both heading and timing to compensate for the effects of wind to regain the inbound track as accurately and expeditiously as possible to achieve a stabilized approach. In making these corrections, full use should be made of the indications available from the aid and estimated or known winds. When a DME distance or radial/bearing is specified it is not to be exceeded when flying on the outbound track.

g. Direct entry to procedure turn:



© Oxford Aviation Services Limited

h. Direct entry to base turn:



7.7 ARRIVAL AND APPROACH SEGMENTS

7.7.1 Approach Segments. There are five standard segments of an instrument approach procedure. These are:

Segment	Start Point	End Point
Arrival Segment	25 nm from the IAF or at the start of the arrival route if this is less than 25nm long.	Initial Approach Fix (IAF). This is the point at which the Arrival Route (ARR) normally ends.
Initial Approach	Initial Approach Fix (IAF)	Intermediate Approach Fix (IF)
Intermediate Approach	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 to the racetrack procedure	Final Approach Fix (FAF). If no FAF exists, the intermediate approach segment ends when the aircraft is established on the inbound track.
Final Approach	Final Approach Fix (FAF) or if no FAF specified, when established on the inbound track. For ILS approaches, the point at which the centre line of the localiser intercepts the glide path.	Landing, or to the aerodrome for a visual manoeuvre.
Missed Approach	The missed approach point (MAPt)	A specified point where the missed approach procedure ends and where a new approach, holding or return to en-route flight is initiated.

Table 7.7.1: Approach Segments

© Oxford Aviation Services Limited

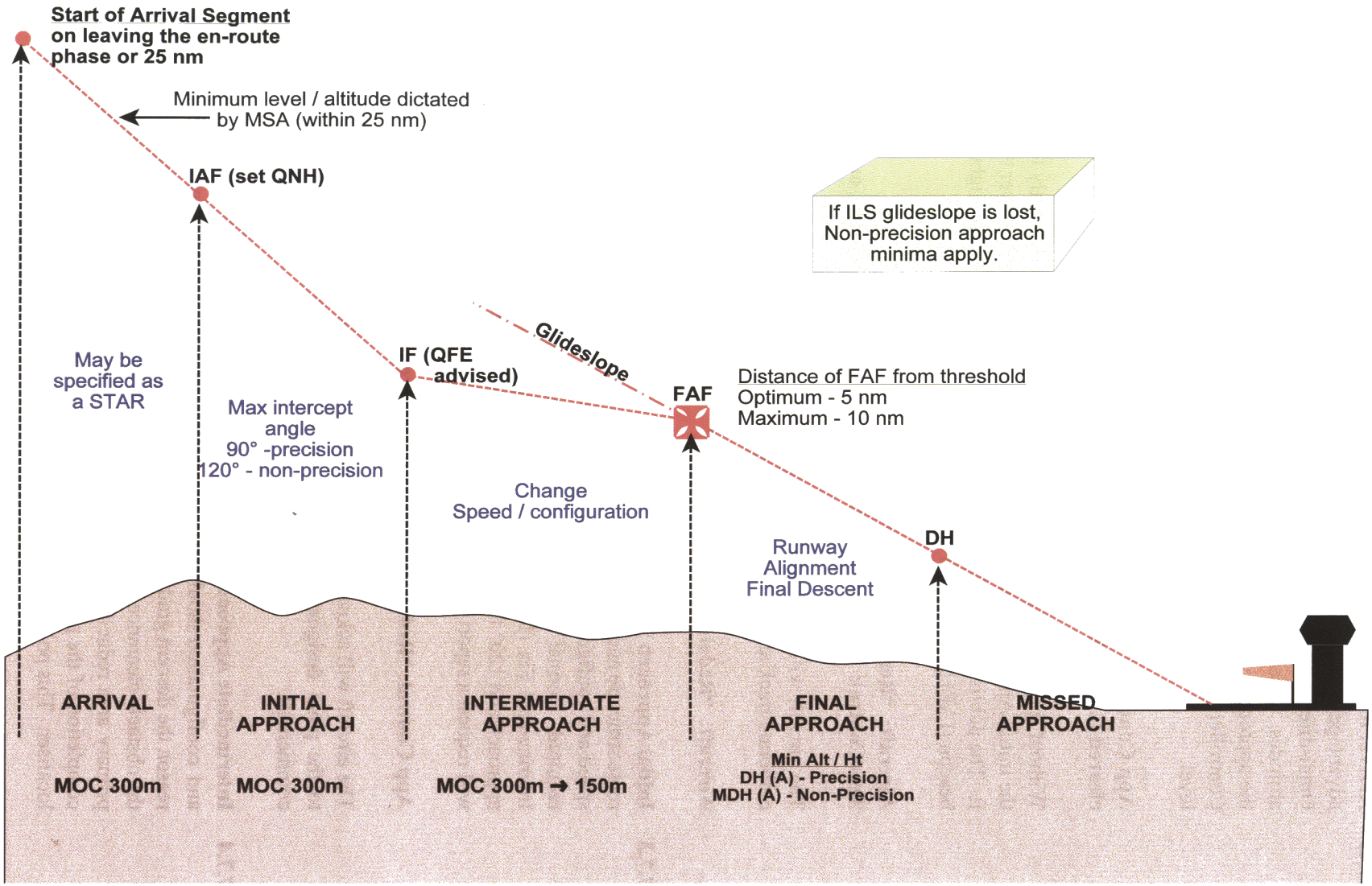


Fig 7.7.1 5 Segments of an Instrument Approach

7.7.2 **Arrival Routes.** Arrival routes are published where necessary or where an operational advantage is obtained. The route normally ends at the Initial Approach Fix (IAF). Omni-directional or sector arrivals can be provided taking into account minimum sector altitudes. When cleared to leave the ATS route (airway), control will be transferred to the approach controller at the destination aerodrome (or CTA/R controller; approach Controller; Radar Director) and the aircraft will be cleared to the facility at a specified level.

App Control: "Redair 123 set the Oxford QNH 1007 .....expect ILS runway 02 cleared to the OX beacon at 2000ft"

Without specific route instructions the aircraft is navigated directly to the OX beacon, the Initial Approach Fix (IAF), descending as required to arrive over the beacon at 2000 ft. The published plate for the approach will be available on the flight deck. At the OX beacon (IAF) the pilot will advise :

Aircraft: "Redair 123 is the OX at 2000ft"
App Control: "Redair 123 cleared ILS runway 02 advise OX outbound"

The aircraft will acknowledge the message and be manoeuvred to attain the required outbound track and at the beacon the pilot will advise:

Aircraft: "Redair 123 OX outbound"

7.7.3 **Initial Approach Segment**. In the initial approach segment, 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 descent required. Normal track guidance is provided along the initial approach segment to the Intermediate Fix (IF) with a maximum angle of interception of 90° for a precision approach and 120° for a non-precision approach. At this point the approach controller will request a report from the aircraft relating to the Intermediate Fix (IF).

App Control: "Redair 123 report procedure turn complete QFE1008"

The aircraft will acknowledge the message and QFE and fly the published initial track to the point designated at which the track reversal procedure (procedure turn) is commenced.

7.7.4 **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 low as possible 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. On completion of the procedure turn , the aeroplane track should be aligned with the ILS localiser. This point is in effect the Intermediate Fix (IF). The aircraft reports:

© Oxford Aviation Services Limited

"Redair 123 procedure turn complete localiser established"

Approach will acknowledge the report and request:

"Redair 123 report at the outer marker"

This assumes that the Final Approach Fix (FAF or FAP) for this procedure is defined by the outer marker. It could be a Localiser/DME fix or the interception of the Localiser with the Glide Path. The aircraft is then flown with increasing track accuracy to the FAF along the intermediate approach track. At the FAF (FAP) the aircraft makes the report:

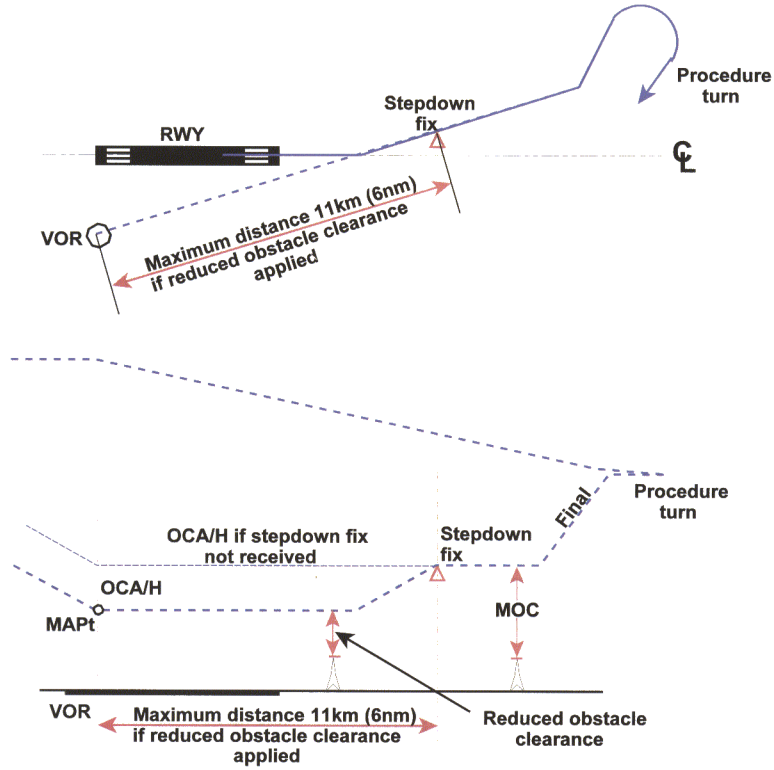
"Redair 123 outer marker"

At this point, the approach controller is satisfied that the aircraft is properly positioned and will hand over to Tower for clearance to land.

7.7.5 **Final Approach Segment**. This is the segment in which alignment and descent for landing are made. Final approach may be made to any runway for a straight-in landing or to an aerodrome for a visual manoeuvre.

7.7.5.1 Non Precision with Final Approach Fix. This segment begins at a facility or fix called the FAF and ends at the missed approach point (MAPt). The FAF is sited on the final approach track at a distance that permits configuration and descent from the intermediate height to MDH/A for straight in or circling. The optimum distance of the FAF from the threshold is 9.3 km (5 nm). The maximum distance is 19 km (10 nm). The FAF is crossed at or above the specified altitude and then descent is initiated. A step-down fix may be incorporated in which case two OCA/H values will be published. For a VOR/DME approach several fixes may be depicted, each with its own specified crossing altitude.

© Oxford Aviation Services Limited



7.7.5.2 Non Precision with no Final Approach Fix. When the aerodrome is served by a single facility located on or near the aerodrome, and no other facility is suitably situated to form a FAF, a procedure may be designed where the facility is both the IAF and the MAPt. The procedures will include a minimum altitude/height for a reversal procedure or racetrack, and 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. In procedures of this type, the final approach track cannot normally be aligned on the runway centre line (the actual case at Oxford using the OX NDB). Whether OCA/H for straight-in approach limits are published or not depends on the angular difference between the track and the runway QDM (also the displacement of the track with respect to the runway threshold).

© Oxford Aviation Services Limited

7.7.6 **Shuttle**. A shuttle is the procedure of climbing or descending in a holding pattern. As part of an instrument procedure, a shuttle may be prescribed at the IAF where to achieve the specified altitude at the FAF/FAP would require excessive rate of descent from the minimum specified altitude at the end of the initial approach.

7.7.7 **Dead Reckoning Segment**. Where an operational advantage can be obtained, an ILS procedure may include a dead reckoning segment from a fix to the localiser. The DR track will intersect the localiser at 45° and will not be more than 19 km (10 nm) in length. The point of intersection is the beginning of the intermediate segment and will allow for proper glide path interception.

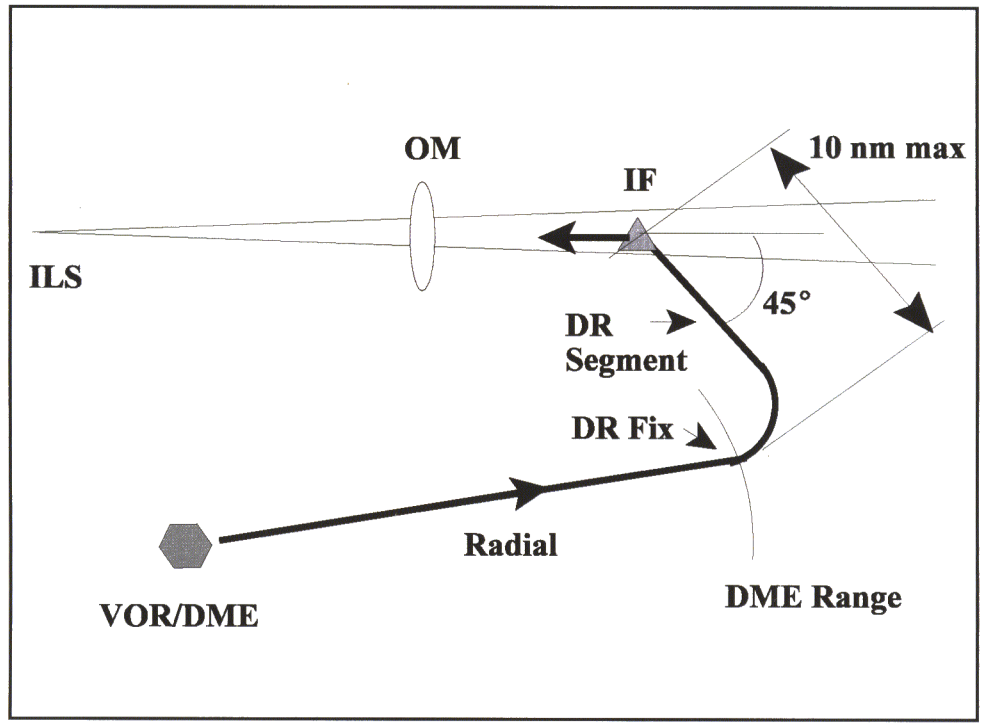


Fig 7.7.7 Dead Reckoning Segment

© Oxford Aviation Services Limited

7.7.5.3 Precision Approach ILS/MLS. Where an ILS/MLS (we only consider the ILS case) precision approach is flown, the final approach segment begins at the **Final Approach Point (FAP).** This is the point in space, on the centre line of the localiser specified for the final approach track, where the intermediate approach altitude/height intersects the nominal glide path(GP). Generally, GP interception occurs at heights from 300 m (984 ft) to 900 m (2 955 ft) above runway elevation. In that case, on a 3° GP interception occurs between 6 km (3 nm) and 19 km (10 nm). The width of the ILS final approach area is much narrower than those of non-precision approaches. Descent on the GP must never be initiated until the aircraft is within the tracking tolerance of the ILS localiser. The ILS obstacle clearance surfaces assume that the pilot does not normally deviate from the centreline more than half scale deflection after being established on track. Thereafter the aircraft should adhere to the on-course, on GP position since a more than half scale deflection in azimuth and a half scale fly-up deflection (when combined with other allowable system tolerances) could place the aircraft in the vicinity of the lower extremity of the protected airspace. In the event of loss of glide path during the final approach on an ILS precision approach, the procedure becomes a non-precision approach and the OCA/H published for the glide path inoperative case will then apply. In any event, the Final Approach Segment ends either at touchdown or at the Missed Approach Point if a missed approach is flown.

7.7.5.4 Determination of DA/H for ILS. In addition to the physical characteristics of the ILS installation, calculation of OCA/H considers obstacles in both the approach and missed approach areas. The calculated OCA/H is the height of the highest approach obstacle or equivalent missed approach obstacle, plus an aircraft category related allowance (based on altimeter inaccuracies). The OCA/H values are published on the plate (see fig 7.6.2) for the categories of aircraft for which the procedure is designed. The values assume the following as standard:

a. Cat I flown with pressure altimeter
b. Cat II flown with radio altimeter and flight director
c. Wing span not more than 60 m and the vertical distance between wheels and GP Ae no more than 6 m.
d. Missed approach climb gradient is 2.5%; and
e. GP angle - minimum 2.5°
optimum 3.0°
maximum 3.5° (3° for Cat II/III operations)

7.7.5.5 GP greater than 3.5°. Procedures involving GP greater than 3.5° or any angle when the nominal rate of descent (V_{AT} for the aircraft type x Sin GP angle) exceeds 5 m/sec (1 000 ft/min), are non-standard. They require increase of height loss margin (which may be aircraft type specific), adjustment of the origin of the missed approach surface, re-survey of obstacles and the application of related operational constraints. They are normally restricted to specially approved operators and aircraft, and with crew restrictions. They are not to be used as a means to introduce noise abatement procedures.

© Oxford Aviation Services Limited

7.8 MISSED APPROACH

7.8.1 The Procedure. If the necessary visual criteria is not obtained at decision height (DH/A) or minimum descent height (MDH/A), or at any time during the instrument approach procedure that the pilot is unable to continue the approach, the approach procedure requires the pilot to fly a missed approach. The procedure is always detailed on the instrument approach plate together with the loss of RT procedure. A missed approach procedure consists of three phases (See Fig 7.8):

a. Initial missed approach

b. Intermediate missed approach

c. Final Missed approach

7.8.2 Initiating the Procedure (The Initial Phase). The initial missed approach begins at the missed approach point (MAPt) and ends where the climb is established. The manoeuvre in this phase necessitates the attention of the pilot on establishing the climb and the changes in aeroplane configuration to get the aircraft away from the ground with increasing altitude. For this reason, guidance equipment cannot normally be fully utilised during these manoeuvres and therefore no turns are specified in this phase. The missed approach is assumed to be initiated not lower than the DA/H in a precision approach, or at a specified point in non-precision approach procedure not lower than the MDA/H. When the MAPt is defined by a navigational facility or a fix (for instance the middle marker), the distance from the FAF to the MAPt is normally published as well, and may be used for timing to the MAPt. In all cases where timing may not be used, the procedure is to be annotated "timing not authorised for defining the MAPt". The MAPt may be defined in a procedure as:

a. The point of intersection of the glide path with the applicable DA/H

b. A navigational facility

c. A fix

d. A specified distance from the FAF.

7.8.2.1 Navigation. 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 for protection from obstacles to be maintained. It is expected that the pilot will fly the missed approach as published. In the event that a missed approach is initiated prior to arriving at the MAPt, it is expected that the pilot will proceed to the MAPt and then follow the missed approach procedure in order to remain within the protected airspace. This does not preclude flying over the MAPt at an altitude/height higher than that required by the procedure.

© Oxford Aviation Services Limited

7.8.3 Intermediate Phase. This is the phase in which 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 track and it is assumed that the aircraft will begin track corrections (pilots begin concentrating on track as well as configuration and climb).

7.8.4 Final Phase. The final phase begins at the point where 50 m (164 ft) obstacle clearance is first obtained 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.

a. Turning Missed Approach. Turns in a missed approach are only prescribed where terrain or other factors make a turn necessary. When turns greater then 15° are required, they shall not be prescribed until at least 50 m (164 ft) of vertical clearance above obstacles has been ensured. If a turn from the final approach track is made, a specifically constructed missed approach area is specified. The turning point (TP) is specified in one of two ways:

1. At a designated facility or fix: The turn is made on arrival overhead the fix or facility; or
2. At a designated altitude: The turn is made upon reaching the designated altitude unless an additional fix or distance is specified to limit early turns.

Note: Where limitations to speed are specified for turns, or requirements for turns to be made at specified points, the published plates will contain implicit instructions. Aircrew are expected to comply with such instructions without undue delay.

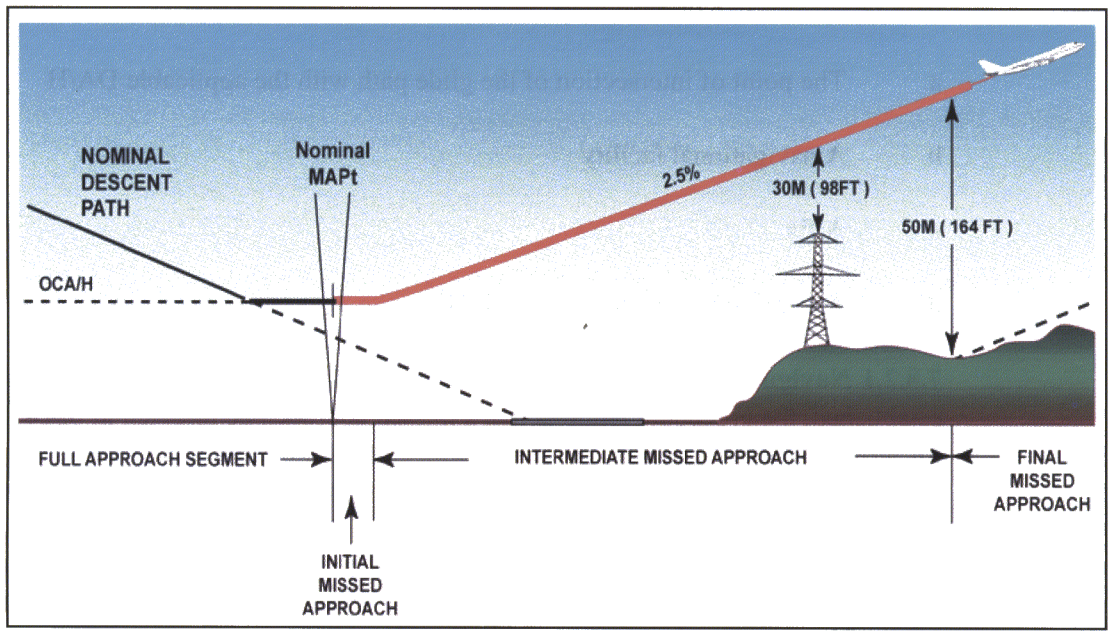


Figure 7.8. Missed Approach Phases

© Oxford Aviation Services Limited

7.9 VISUAL MANOEUVRING (CIRCLING) IN THE VICINITY OF THE AERODROME

7.9.1 Definition. Visual manoeuvring (circling) is the term used to describe the visual phase of a flight after completing an instrument approach, to bring an aircraft into position for a landing on a runway which is not suitably located for a straight in approach.

7.9.2 Visual Manoeuvring (Circling) Area VM(C)A. The visual manoeuvring area for a circling approach is determined by drawing arcs centred on each runway threshold and joining those arcs with tangential lines (see fig. 7.9). The radius of the arcs is related to:

a. Aircraft category;

b. Speed;

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)

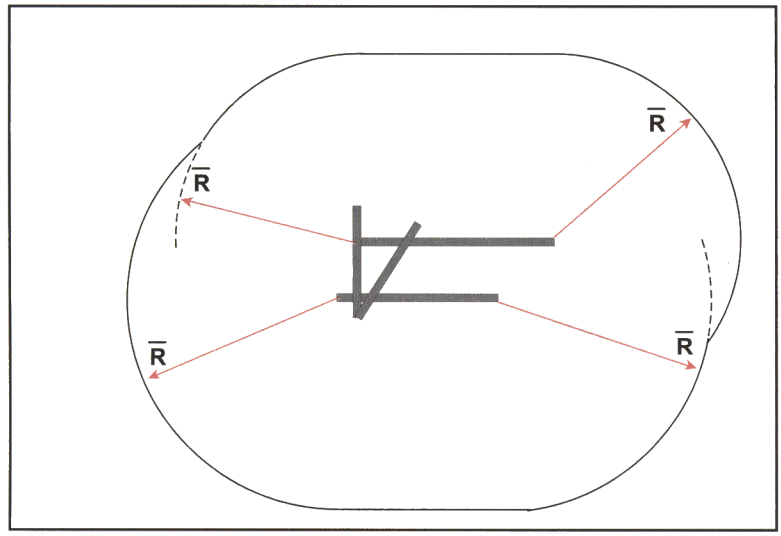


Figure 7.9. Construction of Visual Manoeuvring (Circling) Area .

7.9.2 Obstacles Within the VM(C)A. It is permissible to eliminate from consideration a particular sector where a prominent obstacle exists in the VM(C)A outside the final approach or missed approach areas. This sector, within the circling area, is bounded by the dimensions (limits) of the instrument approach surfaces. When this option is exercised, the published procedure prohibits circling within the sector within which the obstacle exists Fig.7.8.2).

© Oxford Aviation Services Limited

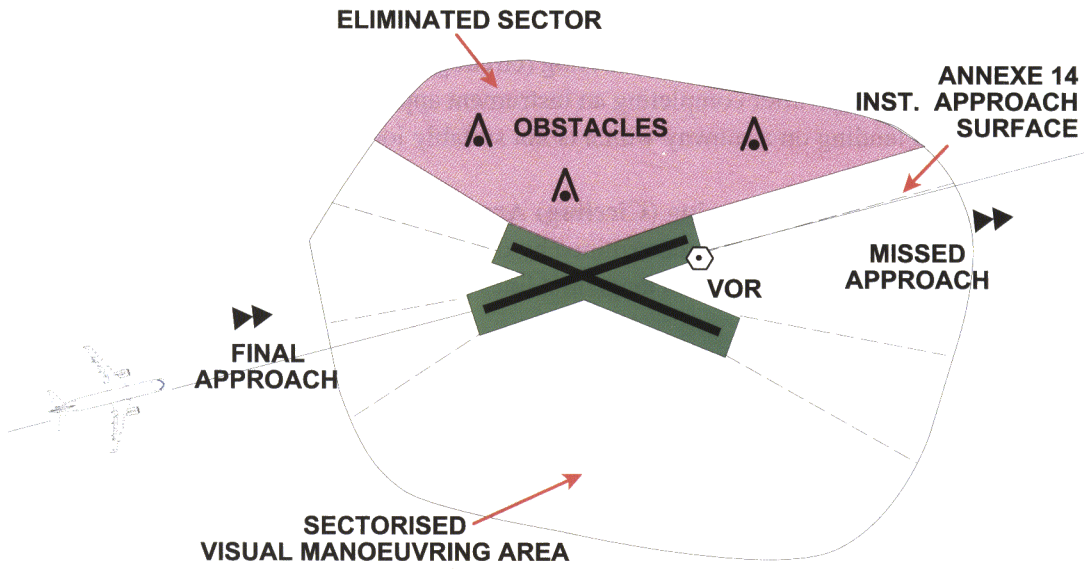


Figure 7.8.2: Sectored VM(C)A

7.9.3 Obstacle Clearance. When the VM(C)A has been established, the obstacle clearance altitude/height (OCA/H) is determined for each category of aircraft.

Aircraft Category	Obstacle Clearance m (ft)	Lowest OCH above aerodrome elevation m (ft)	Minimum Visibility km (nm)
A	90 (295)	120 (394)	1.9 (1.0)
B	90 (295)	150 (492)	2.8 (1.5)
C	120 (394)	180 (591)	3.7 (2.0)
D	120 (394)	210 (689)	4.6 (2.5)
E	150 (492)	240 (787)	6.5 (3.5)

Table7.9.3: OCA/H for Visual manoeuvring (circling) approach

7.9.4 MDA/H. When additional margin is added to the OCA/H for operational considerations, an MDA/H is specified. Descent below the 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.

Warning: The procedure does not provide protection from obstacles when the aircraft is below the OCA/H.

© Oxford Aviation Services Limited

7.9.5. Visual Flight Manoeuvre. A circling approach is a visual flight manoeuvre. Each circling situation is different because of variables such as runway layout, final approach track, wind velocity and meteorological conditions. Therefore there can be no single procedure that can cater for conducting a circling approach in every situation. After initial visual contact, the basic assumption is that the runway environment (the runway threshold or approach lighting aids or other markings identifiable with the runway) should be kept in sight while at MDA/H for circling.

7.9.6 Missed Approach While Circling. If visual reference is lost while circling to land from an instrument approach, the missed approach specified for that particular instrument approach procedure must be followed. It is expected that the pilot will make an initial climbing turn towards the landing runway and overhead the aerodrome where the pilot will establish the aircraft climbing on the missed approach track. Because the circling manoeuvre may be accomplished in more than one direction, different patterns will be required to establish the aircraft on the missed approach course depending on its position at the time visual reference is lost.

7.10 AREA NAVIGATION (RNAV) APPROACH PROCEDURES BASED ON VOR/DME

7.10.1 Procedure. RNAV approach procedures based on VOR/DME are non-precision procedures (See fig 7.6.3). Such procedures are assumed to be based on one reference facility composed of a VOR and co-located DME. The reference facility will be indicated. Aircraft with RNAV systems approved by the State of the Operator for the appropriate level of RNAV operations may use these systems to carry out VOR/DME RNAV approaches, providing that before conducting any flight it is ensured that:

a. The RNAV equipment is serviceable

b. The pilot has a current knowledge how to operate the equipment so as to achieve the optimum level of navigation accuracy

c. The published VOR/DME facility upon which the published procedue is based is serviceable

7.10.2 Disadvantages. The main disadvantage of using the VOR/DME RNAV system is that it relies on a navigational database to support the computer interpretation of the received navigational information. If this database contains errors, computed position will be in error and the system will be unable to recognise such errors. The factors on which the navigational accuracy of the VOR/DME RNAV system depends are:

a. Ground station tolerance

b. Airborne receiving system tolerance

c. Flight technical tolerance

© Oxford Aviation Services Limited

d. System computation tolerance

e. Distance from reference facility

7.10.3 Use of FMS/RNAV equipment to follow conventional non precision approach procedures. Where FMS/RNAV equipment is available, it may be used when flying the conventional non-precision approach procedures defined provided:

a. The procedure is monitored using the basic display normally associated with that procedure, and

b. The tolerances for using flight data on the basic display are complied with.

© Oxford Aviation Services Limited

7.11 HOLDING PROCEDURES

7.11.1 Introduction. Holding procedures are the equivalent to temporary parking areas for aeroplanes. Clearly (unless you are flying a rotorcraft) you cannot stop, but you can remain (hold) in the vicinity of a radio navigation facility for as long as is required. Providing you can fly the aeroplane accurately (maintain height to the required standard +/- 300 ft) and navigate with reference to a radio nav aid (VOR, NDB) or a fix position, holding is a feasible option for losing time. Indeed, in bad weather or at times of peak traffic flow, you will be lucky to get a 'straight in' approach. The majority of arrivals will start from a holding pattern. In a hold, aircraft are stacked up, one on top of another with the necessary vertical separation applied (1 000 ft). As the bottom aircraft departs the hold to fly the approach procedure, the others above are 'shuttled' (descended in the stack) to a lower level one at a time. Holding is a procedure you will become very familiar with and it will form an important part of your ability to demonstrate that you can fly the aeroplane, especially during your IRT.

7.11.2 Deviation warning. It must be noted that deviations from the in-flight procedures for holding incur the risk of excursions beyond the perimeters of holding areas established in accordance with the provisions of PANS OPS. The procedures described in PANS OPS relate to right turn holding patterns. For left turn holding patterns, the corresponding entry and holding procedures are symmetrical with respect to the inbound holding track.

7.11.3 Shape and Terminology. The shape of holding patterns and the associated terminology is shown in fig 7.11.3.

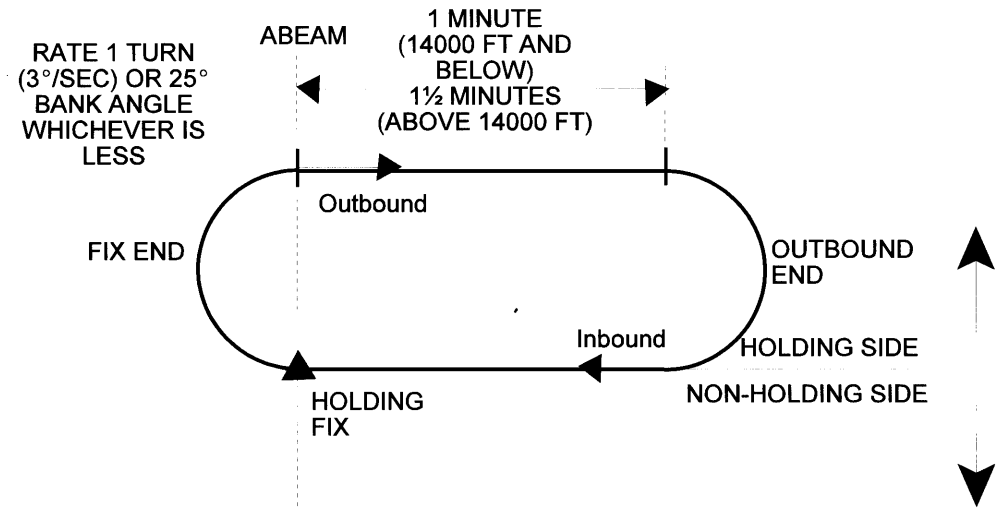


Fig 7.11.3 Holding Pattern Terminology

© Oxford Aviation Services Limited

7.11.4 Flying the Pattern. In flying the holding pattern described, all turns are to be made at an angle of bank of 25° or at a rate of 3° per second (rate 1), whichever requires the lesser bank. All the procedures depict tracks and pilots should attempt to maintain the track by making allowance for known wind by applying corrections both to heading and timing during entry and while flying the holding pattern. Outbound timings begin over or abeam the fix whichever occurs later. If the abeam position cannot be determined, start timing when turn to outbound is completed. If the outbound leg is based on a DME distance, the outbound leg terminates as soon as the limiting DME distance is attained. If for any reason, a pilot is unable to conform with procedures for normal conditions, ATC should be informed as soon as possible. Holding patterns are to be flown at speeds given in table 7.11.4. Note: The speeds quoted are converted and rounded to the nearest five for operational reasons and from the standpoint of operational safety are considered to be equivalent.

Levels [1]	**Normal Conditions**	**Turbulence Conditions**
up to 4250m (**14 000 ft**) inclusive	425 km/h **(230 kt)**[2] 315 km/h (170kt)[4]	520 km/h (280 kt)[3] 315 km/h (170 kt)[4]
above 4250 m (**14 000 ft**) **to** 6100 m (**20 000 ft**) inclusive	445 km/h **(240 kt)**[5]	520 km/h (280 kt) or
above 6100 m (20 000 ft) to 10350 m (34 000 ft) inclusive	490 km/h (265 kt)[5]	0.8 Mach, whichever is less [3]
above 10350 m (34 000ft)	0.83 Mach	0.83 Mach

1. The levels tabulated 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 at these fhigh 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.

Table 7.11.4 - Holding Speeds

© Oxford Aviation Services Limited

7.11.5 Entry Sectors. The entry into the holding pattern shall be according to heading in relation to the three entry sectors shown in the following diagram. There is a zone of flexibility 5° either side of the sector boundaries.

a. Sector 1 Procedure (Parallel Entry). Having reached the fix, the aircraft is turned left onto an outbound heading for the appropriate period of time (see 7.11.5a), then turned left onto the holding side to intercept the inbound track or to return to the fix, and then on the second arrival over the holding fix turn right to follow the holding pattern.

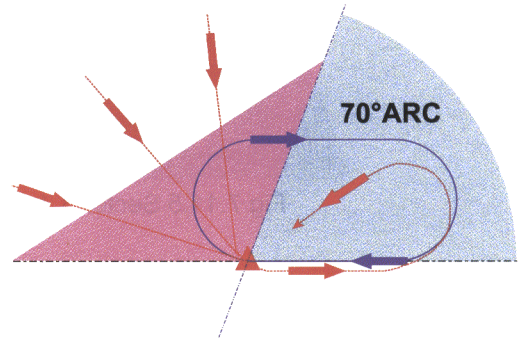


Fig 7.11.5a 1 Join

b. Sector 2 Procedure (Offset Entry). Having reached 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 the aircraft will be flown outbound:

a. For the appropriate period of time (see 7.11.5b) where timing is specified, or
b. Until the appropriate limiting DME distance is attained, where distance is specified, or
c. Where a limiting radial is also specified, either until the limiting DME distance is attained or until the limiting radial is encountered, whichever occurs first, then the aircraft is turned right to intercept the inbound holding track , then on the second arrival over the holding fix, the aircraft is turned right to follow the holding pattern.

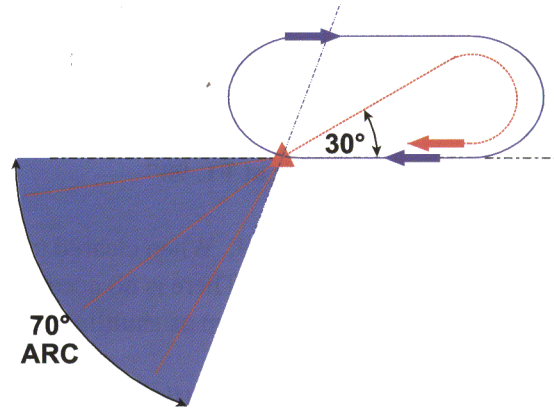


Fig 7.11.5b

© Oxford Aviation Services Limited

c. **Sector 3 Procedure (Direct Entry).** Having reached the fix, the aircraft is turned right to follow the holding pattern.

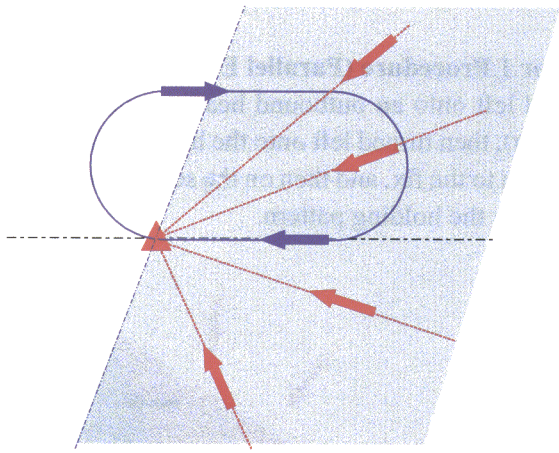


Fig 7.11.5 Sector 3 Join

7.11.6 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 a half minutes if above 4 250m (14 000 ft)

Where DME is available, the length of the outbound leg may be specified in terms of distance instead of time.

7.11.7 Holding. Having entered the holding pattern, on the second and subsequent arrivals over the fix the aircraft is turned to fly an outbound track which will most appropriately position the aircraft for the turn on to the inbound track. Due allowance should be made to compensate for the effects of wind to ensure that the inbound track is regained before passing the holding fix inbound. The aircraft will then:

a. Continue outbound in accordance with 7.11.6
b. Turn so as to realign the aircraft on the inbound track

Having been instructed by ATC to hold at the OX beacon at flight level 90, on arriving over the holding fix for the second time, the pilot should report:

"Redair 123 OX holding at FL 90"

7.11.7.1 Descent in the hold. When cleared to descend in the hold, the aircraft should descend as soon as possible. There is no need to wait until over the fix. The process of descending in the hold is known as shuttling and the pilot will be advised:

App Control: "Redair 123 shuttle in the hold FL80"

© Oxford Aviation Services Limited

The pilot will acknowledge the order and when established at FL80 over the fix, report:

"Redair 123 OX holding FL80"

7.11.7 Departing the Pattern. When clearance is received specifying the time of departure from the holding point, the pilot should adjust the pattern within the limits of the established holding procedure in order to leave the holding point at the specified time.

7.11.8 Obstacle Clearance. The holding area includes the basic holding area and the entry area (see fig 7.11.8a). The basic holding area at any particular level is the airspace required at that level to encompass a holding pattern based on the allowances for aircraft speed, wind effect, timing errors, holding fix characteristics etc.. The entry area includes the airspace required to accommodate the specified entry procedures. The buffer area is the area extending 9.3 km (5.0 nm) beyond the boundary of the holding area within which the height and nature of obstacles are taken into consideration when determining the minimum holding level useable in the holding pattern associated with the holding area. The minimum permissible holding level provides a clearance of at least:

a. 300 m (984 ft) in the holding area

b. The following in the buffer area:

Distance Beyond the Boundary of the Holding Area	Minimum Obstacle Clearance Over Low Flat Terrain	
	Metres	Feet
0 to 1.9 km (0 to 1.0 nm)	300	984
1.9 to 3.7 km (1.0 to 2.0 nm)	150	492
3.7 to 5.6 km (2.0 to 3.0 nm)	120	394
5.6 to 7.4 km (3.0 to 4.0 nm)	90	295
7.4 to 9.3 km (4.0 to 5.0 nm)	60	197

Table 7.11.8: Obstacle Clearance Increment (see fig 7.11.8b)

c. 600 m (1 969 ft) over high terrain or in mountainous areas.

© Oxford Aviation Services Limited

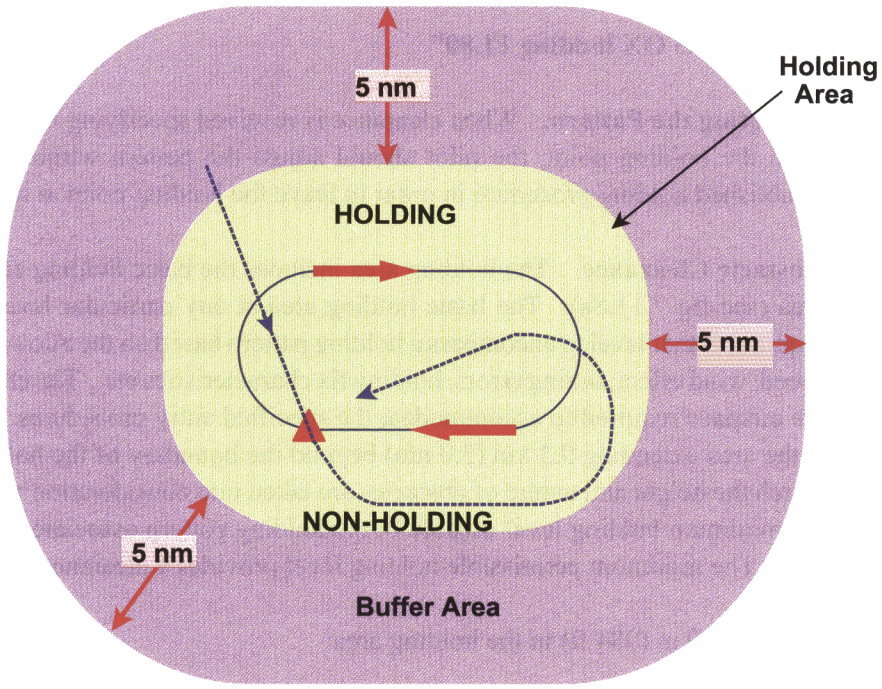


Fig 7.11.8a Holding and Buffer Areas

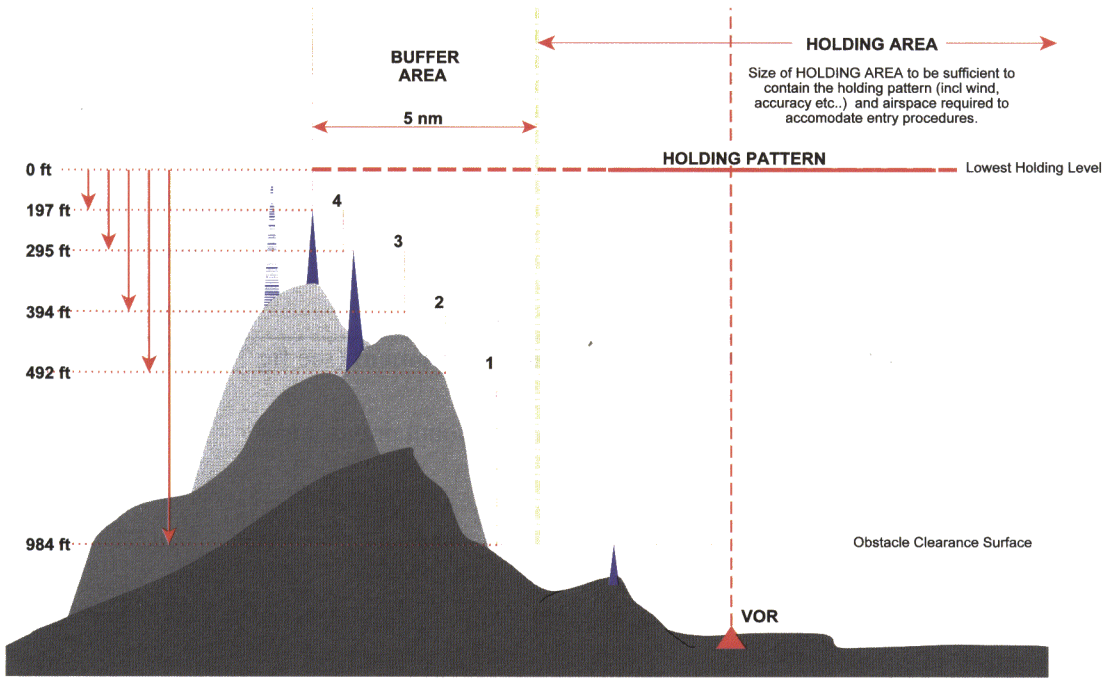


Fig 7.11.8b Holding Obstacle Clearance

© Oxford Aviation Services Limited

7.12 ALTIMETER SETTING PROCEDURES

7.12.1 Objectives. The two main objectives of altimeter setting procedures are to:

a. Provide adequate vertical separation between aircraft

b. Provide adequate terrain clearance during all phases of flight.

7.12.1.1 Sub-Scale settings. There are two altimeter sub scale settings that can be applied at any aerodrome. These are :

a. **QNH**. This is the observed barometric pressure at an aerodrome adjusted in accordance with the ISA pressure lapse rate to indicate the pressure that would be observed if the observation was carried out at sea level. If QNH is set on the altimeter sub-scale, the altimeter would read aerodrome elevation at touchdown.

b. **QFE.** Is the observed barometric pressure at an aerodrome which if set on the altimeter sub-scale, the altimeter would read zero at touchdown.

7.12.2 Transition. When flying below the **transition altitude**, the aircraft is flown at altitudes determined with reference to sea level pressure (QNH) and the vertical position is expressed in terms of altitude. Above the transition altitude, the aircraft is flown along surfaces of constant atmospheric pressure based on an altimeter sub-scale setting of 1013 hPa (mb) and the vertical position is expressed in terms of **flight levels**. During a climb upon reaching the **transition altitude**, 1013 hPa is set and the climb continued to the desired flight level. In the descent, upon reaching the **transition level**, the QNH is then set and descent continued to the desired altitude.

7.12.3 Flight Levels. Flight Level Zero (FL0) is located at the atmospheric pressure level of 1013 hPa. Subsequent flight levels are separated by a pressure interval corresponding to 500 ft in standard atmosphere. Flight levels are numbered as follows:

FL30 FL35 FL40 FL45 etc. FL100 FL105 FL110 etc..

7.12.4 Transition Altitude. This is the altitude (QNH set) above the aerodrome at which the altimeter sub scale is reset to 1013hPa (mb) and vertical position above that is then reported as a flight level. The transition altitude is to be specified for every aerodrome by the State in which the aerodrome is located. The altitude above the aerodrome of the transition altitude shall be as low as possible but normally not less than 3 000 ft. The calculated height of the transition altitude is to be rounded up to the nearest 1 000 ft. Transition altitudes are published in AIPs and shown on charts and instrument plates. A state may specify a general transition altitude (as in the USA).

© Oxford Aviation Services Limited

7.12.5 Transition Level. The transition level is the flight level at which the altimeter is reset to the aerodrome QNH and subsequent flight is reported with reference to altitude. The transition level is normally passed to aircraft in the approach and landing clearances. The transition level changes with the QNH. It is calculated by the Approach Controller at regular intervals and when QNH changes. It is defined as the first flight level above the transition altitude. It is calculated as follows:

Example 1.

Transition altitude = 3 000 ft

QNH = 1 018 mB (hPa)

QNH – 1 013 = 5 mB

5mB x 30' per mB = 150ft.

At T/alt with 1 013 set altimeter reads 3 000 - 150 = 2 850'

First flight level above 2 850 ft = FL30 = **Transition Level**

NOTE: Wind off pressure, wind off height.

Example 2.

QNH = 1 005 mB

QNH - 1 013 = - 8mB x 30 = -240 ft therefore alt reads 3 240 ft thus T/level = FL35

NOTE: Wind on pressure, wind on height.

7.12.6 Transition Layer. This is the airspace between the transition altitude and the transition level. It is usually insignificant. When ascending through the transition layer vertical position is reported as a flight level and when descending, as an altitude.
In example 1, at T/Alt with 1013 set, altimeter reads 2850 ft, so T/L is at 3000ft. So T/Layer - 3000 - 2850 = 150ft deep.

In example 2, at T/Alt, altimeter reads 3240 and T/L = 3500. So T/Layer = 3500 - 3240 = 260ft deep.

Max depth of T/L = 500[1] (QNH = 1013; therefore T/L = FL35)
Min depth is less than 30ft (assuming 1mb= 30ft).

© Oxford Aviation Services Limited

7.12.7 Phases of Flight. The QNH shall be communicated to aircraft in taxi clearances prior to take-off. En-route when flying below the transition altitude the vertical position is reported in terms of altitude (QNH set) and when above the transition altitude, in terms of flight level. If flying below the transition altitude, QNH should be obtained from sufficient locations to permit determination of terrain clearance with an acceptable degree of accuracy. When approaching an aerodrome to land, the QNH will be passed to aircraft in clearances to enter the traffic circuit. Normally, vertical position is reported as a flight level until reaching the transition level in the descent, however, after an approach clearance has been issued, reference should then be made in terms of altitude with the QNH set. This is intended to apply primarily to turbine aircraft for which an uninterrupted descent from high altitude is desirable.

7.12.8 Pilot/Operator Procedures. Pilots and operators are required to plan the route and, complying with the rules of a state and the general flight rules, are to select an appropriate IFR or VFR flight level for the flight. The following are to be taken into consideration:

a. In selecting flight levels for a flight, those selected:

1. should ensure adequate terrain clearance at all points along the route;
2. should satisfy ATC requirements; and
3. should be compatible with the table of cruising levels in Chap. 6

b. The serviceability and accuracy of the altimeter should be confirmed prior to the commencement of a flight. With knowledge of the aerodrome elevation in the case of QNH, the altimeter should be set to either QNH or QFE. The instrument should then be vibrated (avoiding tapping the glass) to ensure that the instrument has reacted to the mechanical adjustment of setting the sub-scale. A serviceable altimeter will indicate:

1. the height of the altimeter above the reference point (QFE); or

2. the elevation of the position of the aeroplane plus the height of the altimeter above the ground (QNH);

c. Altimeters are to be checked for correct operation within the following tolerances:

1. plus or minus 60 ft (20 m) for a test range between 0 - 30 000 ft; or
2. plus or minus 80 ft (28 m) for a test range between 0 - 50 000 ft

d. Prior to take-off, one altimeter (if two are fitted) shall be set to the QNH of the aerodrome. (The other altimeter may be set to QFE.)

© Oxford Aviation Services Limited

7.12.9 Approach and Landing. Before commencing an approach to an aerodrome, the pilot is to obtain the transition level. Before descending below the transition level, the latest QNH for the aerodrome is to be obtained. (This does not preclude a pilot using **QFE** for terrain clearance purposes **during the final approach** to a runway.) ATC may clear an aircraft to be operated using QNH when above the transition level if so required for the purpose of descent in accordance with a prescribed procedure (i.e not for level flight). When an aircraft which has been given clearance as number one to land is using QFE to complete the approach, OCH is to be established with reference to height above the aerodrome datum for that portion of the flight. On approach plates all vertical displacement is shown as both AMSL and AGL in the following form: **2000** (1485) with the AMSL figure in bold type and the AGL figure in parenthesis. This is a standard format and is used in all publications.

7.13 SIMULTANEOUS OPERATION ON PARALLEL OR NEAR-PARALLEL RUNWAYS

7.13.1 Introduction. The need to increase capacity at aerodromes handling IFR traffic in IMC can be met by the use of parallel or near-parallel runways. An aerodrome already having dual parallel precision approach (ILS or MLS) runways could increase its capacity if these runways could be safely operated simultaneously and independently in IMC. There are a variety of modes of operation associated with parallel or near-parallel runways.

a. **Simultaneous Parallel Instrument Approaches**. There are two basic modes of operation possible:

1. Mode 1, independent parallel approaches: Approaches are made to parallel runways where radar separation minima between aircraft using adjacent ILS and/or MLS are **not** applied; (see fig 7.13.1ai)

2. Mode 2, dependant parallel approaches: Approaches are made to parallel runways where radar separation minima between aircraft using adjacent ILS and/or MLS **are** applied; (see fig 7.13.1aii)

b. **Simultaneous Instrument Departures.** Mode 3, independent parallel departures: Simultaneous departures for aircraft departing in the same direction from parallel runways. (see fig,7.13.1b)

Note: When the minimum distance between two parallel runways is less than the specified value for wake turbulence separation considerations for departing aircraft, the runways are considered to be a single runway and therefore a simultaneous dependant parallel departure mode is not used.

c. **Segregated Parallel Approaches/departures**: Mode 4, segregated parallel operations: One runway is used for approaches, one runway is used for departures. (see fig 7.13.1c)

© Oxford Aviation Services Limited

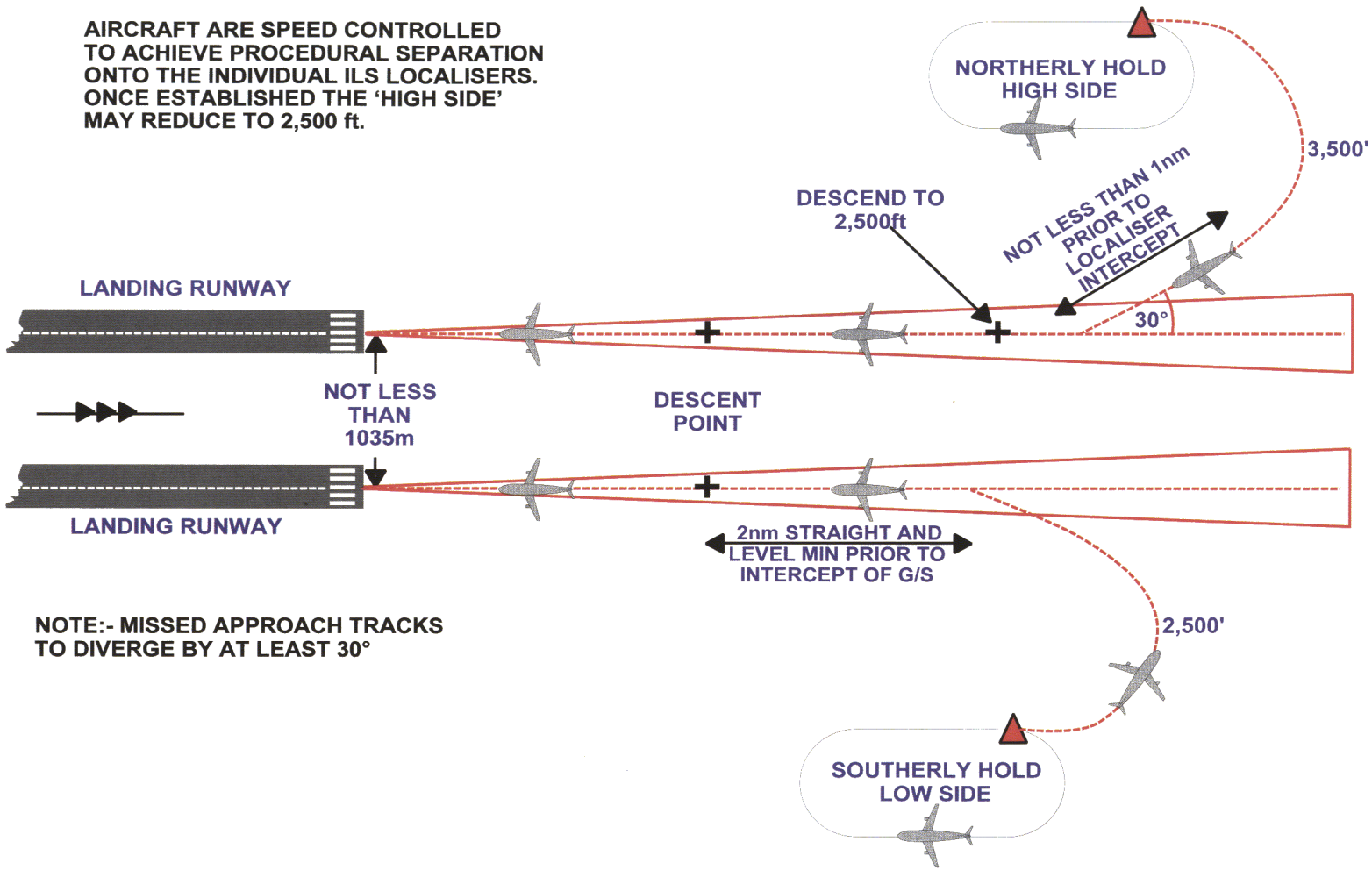


Fig 7.13.1ai Simultaneous Parallel Approach Operations Mode 1 - Independent

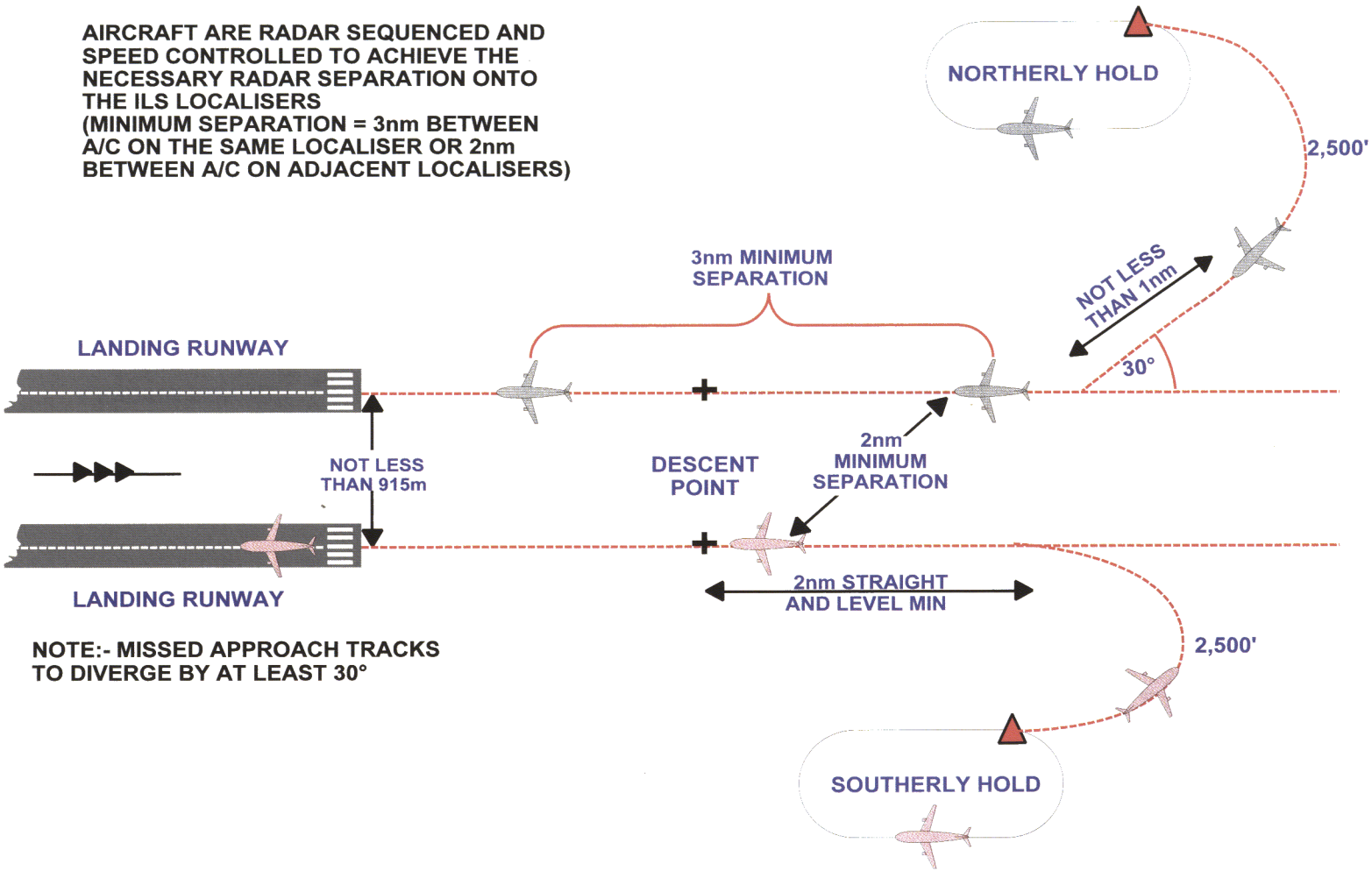


Fig 7.13.1aii Simultaneous Parallel Approach Operations Mode 2 - Dependant

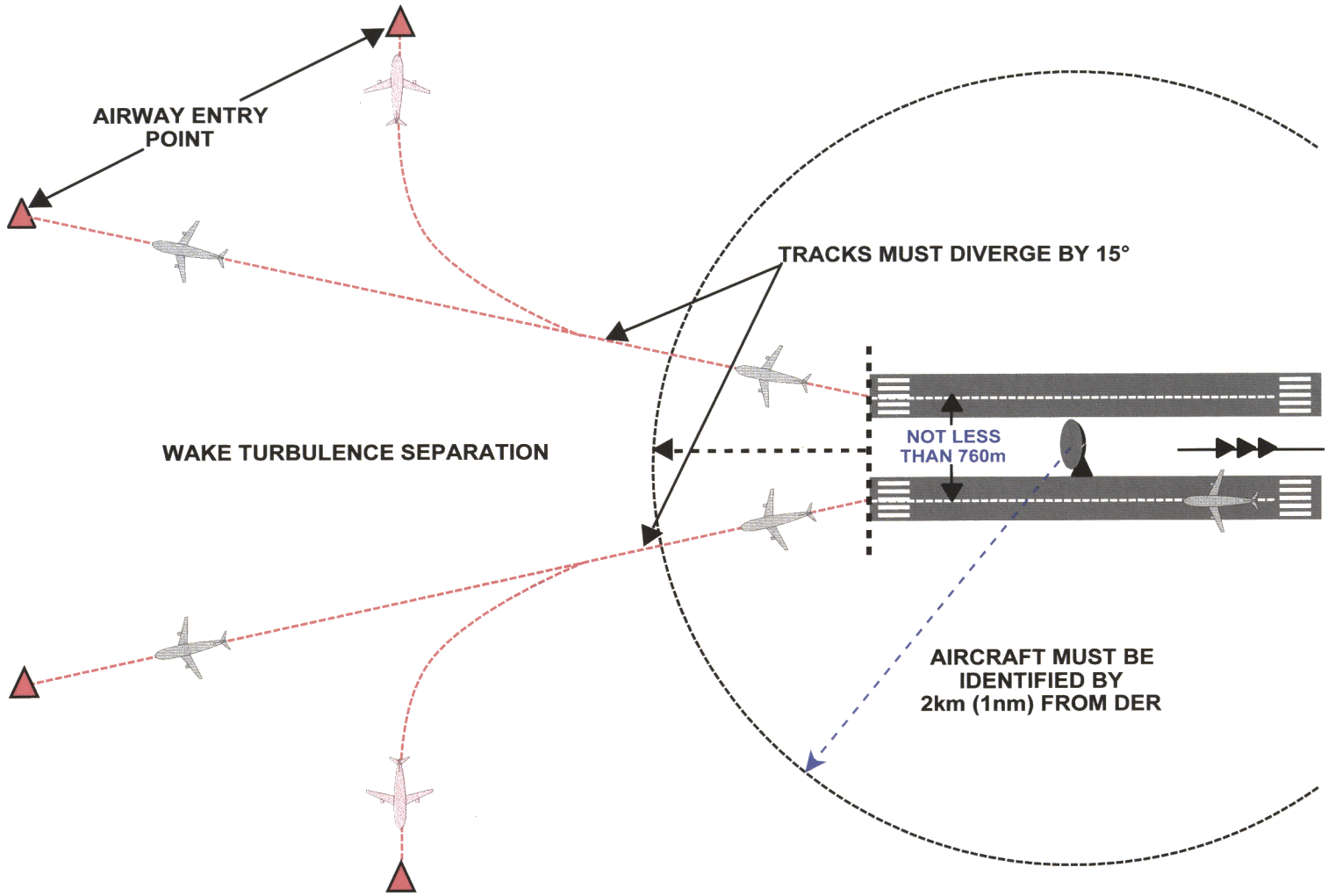


Fig 7.13.1b Simultaneous Departure Operations Mode 3

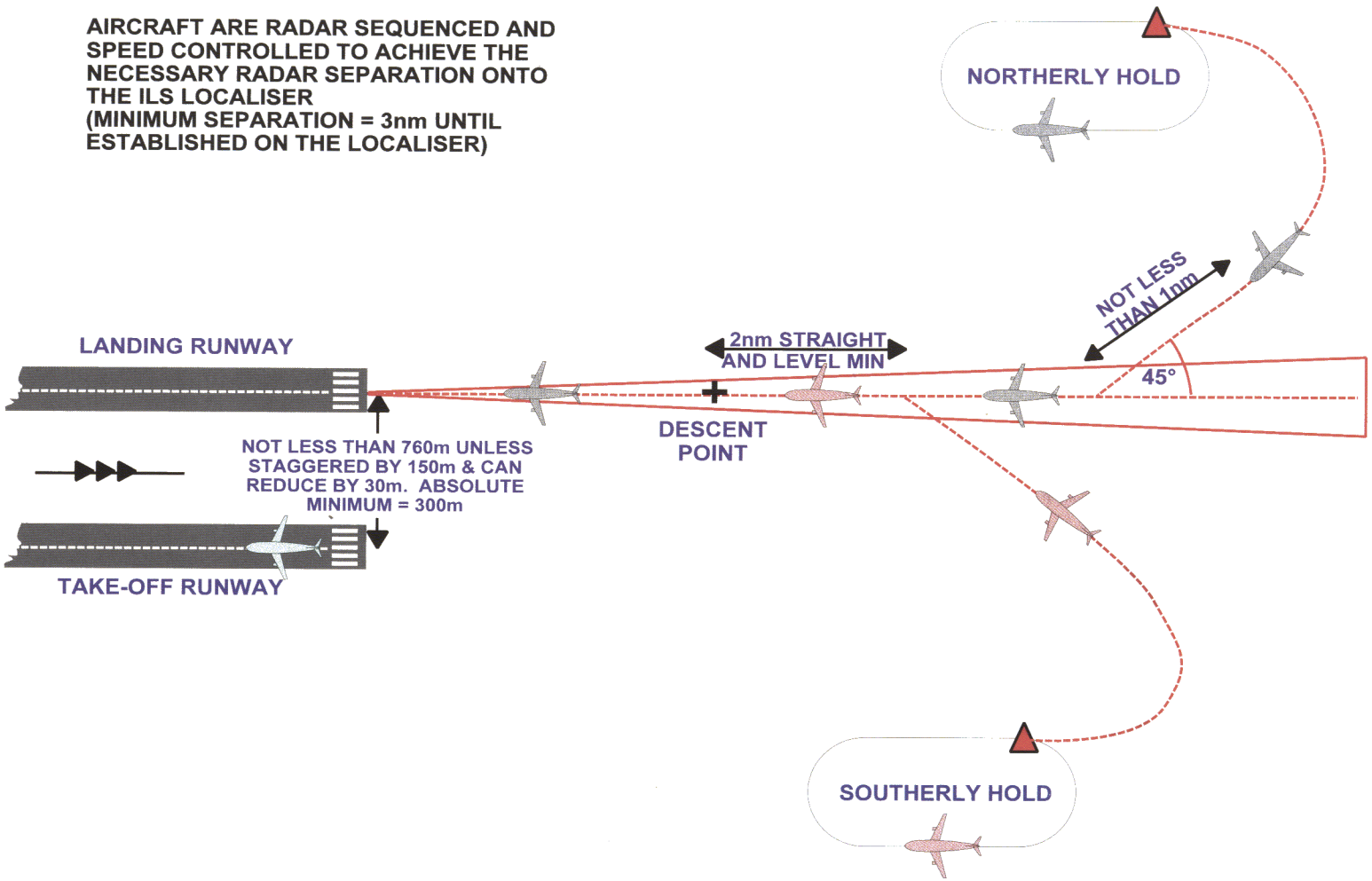


Fig 7.13.1c Segregated Parallel Runway Operations Mode 4

d. **Semi-mixed Operations**. In the case of parallel approaches and departures there may be semi mixed operations i.e one runway is used exclusively for departures, while the other runway accepts a mixture of departures and approaches or vice versa. There may also be simultaneous parallel approaches with departures interspersed on both runways. Semi-mixed operations may be related to the four basic modes (above).

i.	Semi-mixed operations:	Mode
1.	One runway is used exclusively for approaches while:	
	- approaches are being made to the other runway, or	1 or 2
	- departures are in progress on the other runway	4
2.	One runway is used exclusively for departures while:	
	- approaches are being made to the other runway, or	4
	- departures are in progress on the other runway	3
ii.	Mixed operations: All modes of operation possible.	1, 2, 3, 4

7.13.2 Normal Operating Zone (NOZ). This is airspace of defined dimensions extending either side of an ILS localiser course and/or an MLS final approach track centre line. Only the inner half of the NOZ is taken into account in independent parallel approaches.

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

© Oxford Aviation Services Limited

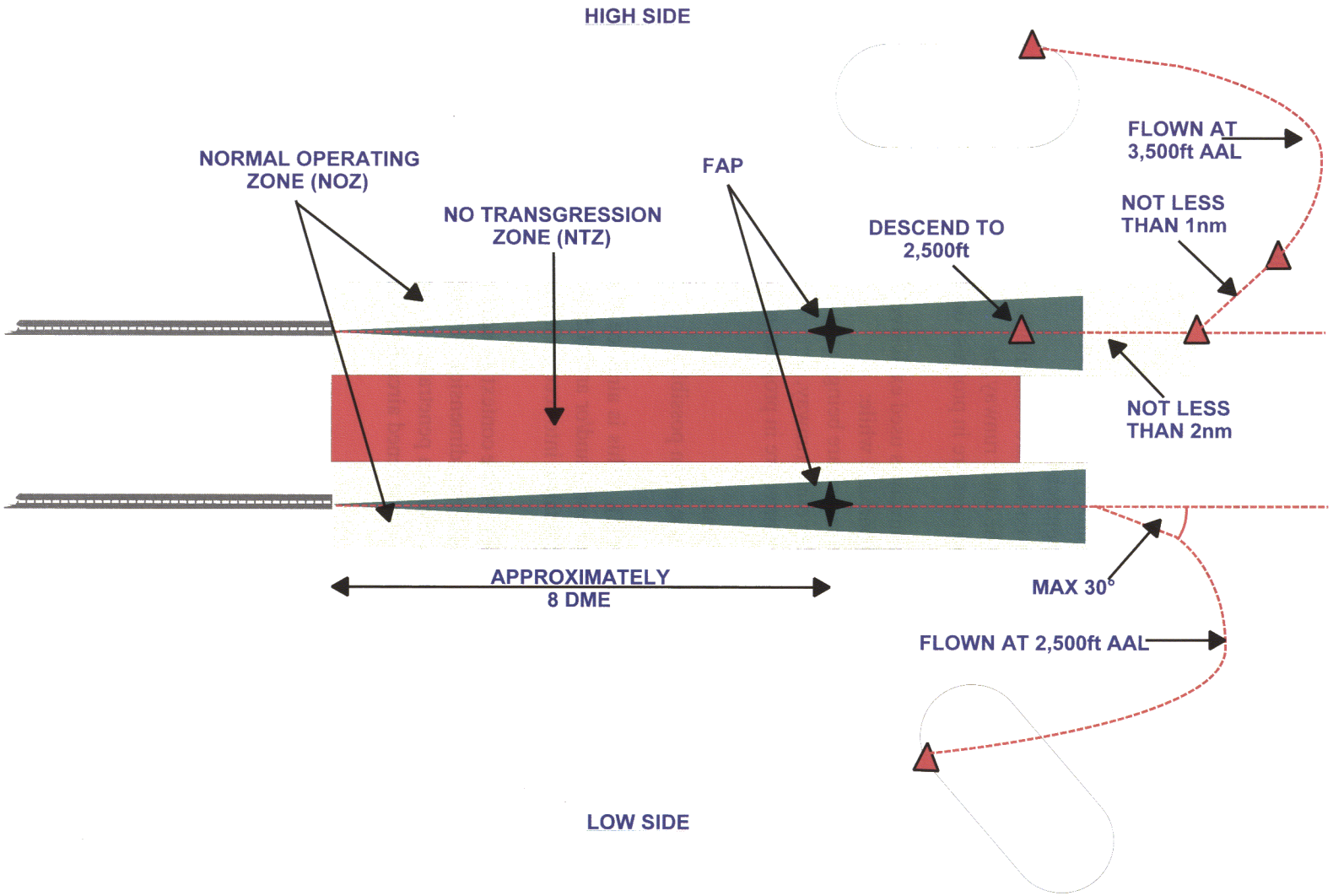

HIGH SIDE
NORMAL OPERATING ZONE (NOZ)
NO TRANSGRESSION ZONE (NTZ)
FAP
DESCEND TO 2,500ft
FLOWN AT 3,500ft AAL
NOT LESS THAN 1nm
NOT LESS THAN 2nm
APPROXIMATELY 8 DME
MAX 30°
FLOWN AT 2,500ft AAL
LOW SIDE

Fig 7.13.3a

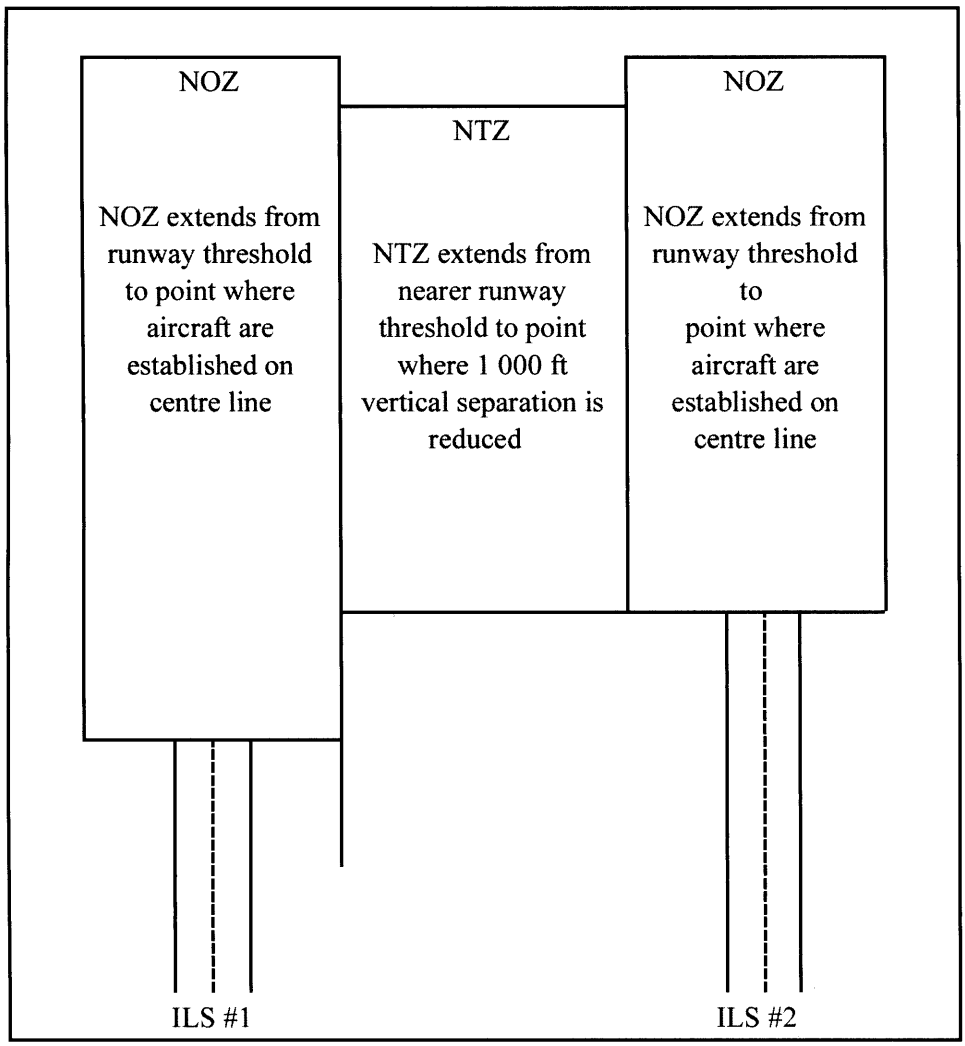


Fig 7.13.3b NOZ and NTZ

7.13.4 Airborne Equipment Requirements. To conduct parallel approaches, aircraft must be fitted with the normal IFR avionics including full ILS or MLS capability.

7.13.5 Procedures. Where independent operations are in force, aircraft are to be advised accordingly on initial contact with approach control.

a. Radar Monitoring. Regardless of the weather conditions, all approaches are to be radar monitored with radar controllers specifically detailed for that duty only. Dedicated discrete RTF frequencies are to allocated to the radar controllers. Only straight-in approaches are permitted with parallel runway operation. Track reversal procedures are not permitted). During vectoring to intercept the localiser the maximum interception angle permitted is 30° and a minimum of 1 nm straight and level flight is required before localiser intercept. Vectoring is also to ensure that the localiser track is intercepted and flown for at least 2 nm before glide path intercept.

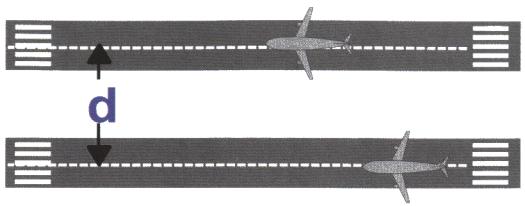
© Oxford Aviation Services Limited

b. **Separation**. Each pair of parallel approaches will have a 'high' side and a 'low' side to provide vertical separation until aircraft are established inbound on the respective ILS localiser course. The high side will be 1 000 ft above the low side. Before vertical separation can be reduced below 1 000 ft, both aircraft on a simultaneous parallel approach must be established on the ILS localiser centre line or MLS final approach track. Once the 1 000 ft separation is reduced, the radar controller will issue instructions if the aircraft deviates significantly from the localiser course.

c. **Corrective action**. If the aircraft fails to take corrective action and penetrates the NTZ, the aircraft on the adjacent ILS will be issued with appropriate control instructions. If considered necessary, aircraft will be ordered to carry out a missed approach.

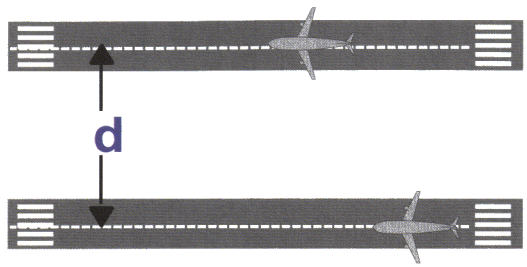
d. **Missed approach**. Simultaneous parallel operations require diverging tracks for missed approaches and departures. When turns are prescribed to establish divergence, pilots are to commence turns as soon as practicable.

© Oxford Aviation Services Limited



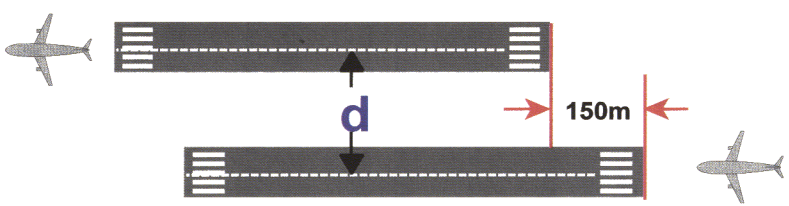
PARALLEL NON-INSTRUMENT (VISUAL) RUNWAYS SIMULTANEOUS USE

CODE 3 OR 4; d = 210m
CODE 2, d = 150m
CODE 1, d = 120m



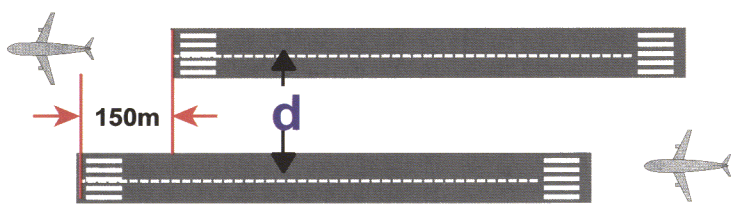
PARALLEL INSTRUMENT RUNWAYS SIMULTANEOUS USE

d = 1035m FOR INDEPENDENT PARALLEL APPROACHES (MODE 1)
d = 915m FOR DEPENDENT PARALLEL APPROACHES (MODE 2)
d = 760m FOR INDEPENDENT PARALLEL DEPARTURES (MODE 3)
d = 760m FOR SEGREGATED PARALLEL OPERATIONS (MODE 4 -see below)



SEGREGATED PARALLEL OPERATIONS

'd' MAY BE REDUCED BY 30m FOR EVERY 150m THAT THE THRESHOLD OF THE ARRIVAL RUNWAY IS STAGGERED TOWARDS THE ARRIVING AIRCRAFT.



SEGREGATED PARALLEL OPERATIONS

'd' SHOULD BE INCREASED BY 30m FOR EACH 150m THAT THE DEPARETURE RUNWAY THRESHOLD IS STAGGERED TOWARDS THE ARRIVING AIRCRAFT.

Fig 7.13.5d Parallel Runways - Minimum Spacing

7.14 SECONDARY SURVEILLANCE RADAR (SSR) TRANSPONDER OPERATING PROCEDURES

7.14.1 Operation of Transponders. In commercial aviation, an aircraft is not permitted to commence a flight without a transponder. If a transponder fails and cannot be repaired before flight, ATC approval is to be sought to fly the aircraft without a transponder. The flight plan is to be annotated accordingly (put "N" in item 10 of the form). A serviceable transponder is to be operated at all times in flight regardless of whether the aircraft is in an area where SSR is used for ATC purposes. In the absence of any contra instructions or emergency requirements, the transponder is to be set to respond with code A2000. The equipment is only to be operated in 'IDENT' mode when requested by ATC. In all cases where mode C is serviceable it is to be set 'ON' and during voice communications with ATC pilots are to report the vertical position of the aeroplane to the nearest full 100 ft indicated on the altimeter. The following mode A codes have special meanings and should be used when appropriate (unless otherwise directed by ATC);

a. 7700 Emergency
b. 7600 Communications failure
c. 7500 Unlawful interference with flight (unless 7700 is more appropriate)

7.14.2 Mode S. Pilots of aircraft engaged in international civil aviation equipped with Mode S are required to have an aircraft identification feature. This setting shall correspond to the identification specified in item 7 of the flight plan or, if no flight plan submitted, the aircraft registration.

7.14.3 Transponder failure. If a flight is continued with an unserviceable transponder, ATC will endeavour to facilitate the flight as flight planned, however, the pilot must comply with any restrictions in view of the failure. If the transponder fails and cannot be restored before departure, the pilot shall:

a. inform ATS as soon as possible, preferably before submission of a flight plan;

b. insert in item 10 of the flight plan under SSR, the letter 'N' for complete failure or the appropriate letter for the remaining capability;

c. comply with any published procedures for seeking exemption from the requirements to carry functioning SSR;

d. if required by ATC, proceed directly to the nearest aerodrome where the equipment can be repaired.

e. in the case of inaccurate mode C information, if directed by ATC squawk A/0000 to indicate that the SSR transponder information is unreliable.

© Oxford Aviation Services Limited

7.14.4 Phraseology. The SSR phraseology is derived from the military use of IFF equipment. The military code word for a transponder was originally 'PARROT', hence instructions are given to 'SQUAWK' indicating that the SSR transponder is to be operated in accordance with the following instruction. i.e 'SQUAWK IDENT' meaning operate the IDENT feature of the equipment; or ATC may request the pilot to 'SQUAWK ALFA 5453 and CHARLIE' meaning select Mode A code 5453 and set the response facility to Mode A + C. In this latter case the pilot will, before adjusting the transponder controls, acknowledge the instruction by reading back the modes and code to be selected.

7.14.5 Operation of ACAS. Information provided by the Airborne Collision Avoidance System (ACAS) is intended to assist pilots in the safe operation of the aeroplane.

a. ACAS Indications. ACAS indications are intended to assist pilots in the active search for, and visual acquisition of, the conflicting traffic and the avoidance of possible collisions. The indications generated by ACAS shall be used by pilots as follows:

1. Pilots shall not manoeuvre their aircraft in response to traffic advisories only.
   Note: Traffic advisories are intended to assist in visual acquisition and to alert pilots to the possibility of a resolution advisory. The restriction to the use of traffic advisories is due to the limited bearing accuracy and to the difficulty in interpreting altitude rate from displayed traffic information.

2. In the event of a **resolution advisory** to alter the flight path, the search for the conflicting traffic shall include a visual scan of the airspace. Alterations of the flight path are to be limited to the minimum necessary to comply with the resolution advisories.

3. If a pilot deviates from an ATC instruction or clearance in response to an ACAS generated **resolution advisory**, he is to promptly return to the terms of that instruction or clearance when the conflict is resolved and he is to notify ATC as soon as is practicable of the deviation including its direction and when the deviation has ended.

© Oxford Aviation Services Limited

7.15 PRECISION AND SURVEILLANCE RADAR AND OTHER NON PRECISION APPROACHES

7.15.1 PAR. Apart from ILS and MLS precision systems, another precision system is PAR. Precision Approach Radar (PAR) is a landing aid that requires both ground equipment and a ground radar controller. The system consists of a radar set that operates in two dimensions: Azimuth (plan view) and elevation. The equipment is set up to 'look' at the approach path to a runway out to a range of about 15 nm in azimuth and to the same range and about 5 500 ft in elevation. Information is displayed on computer interpreted screens that give the operator a primary 'paint' in both azimuth and elevation. By passing headings to fly and instructions to adjust rate of descent, the aircraft is 'talked down' the approach track and glide slope. PAR was once widely used for military fast jet traffic where the pilot had limited nav aids and a very high work load just keeping the aircraft in the air. It fell into disuse in the 80s and 90s but with modern computer enhancement is now being re-introduced. Because it is a precision aid, DH/A is applicable.

7.15.2 Surveillance Radar Approach (SRA). Terminal radar usually has a higher data rate than en-route surveillance radar (higher aerial rotation rate) and this gives the opportunity to use this radar system to provide reasonably accurate track information and guidance within a relatively short distance from the end of the runway. With the use of radar markers (radar reflectors situated at the touchdown point) the aiming point can be identified by the radar operator. Using an electronic bearing marker, the extended centre line of the runway can be plotted and range markers positioned along it at 0.5 nm intervals. By passing heading information (track correction requirements) and advisory height information, an aircraft can be 'talked' along the track with the pilot flying the glide slope against the advisory heights. SRA approaches may be carried out only where the equipment and the procedures have been approved by the authority at a particular aerodrome. During the procedure, aircraft will be reminded to check that the gear is down. As a non precision aid, MDH is applicable (QFE used). The service will terminate at 2 nm or less (radar termination range - RTR) depending on the following:

7.15.2.1 SRA terminating at 2 nm. The following conditions apply to SRA terminating at 2 nm from touchdown:

a. Advisory heights together with ranges from touchdown are to be passed every mile (i.e. "4 miles from touchdown you should be passing 1 250 feet").

b. The pilot is to be instructed to check his/her minimum descent height one mile before advisory heights are discontinued.

c. Advisory heights are to be discontinued at the one above the highest OCH.

© Oxford Aviation Services Limited

7.15.2.2 SRA terminating at less than 2nm. Where a SRA procedure terminates at less than 2nm from touchdown:

a. Advisory heights together with ranges from touchdown are to be passed every half mile (i.e. "4 and a half miles from touchdown you should be passing 1 400 feet").

b. Talk-down transmission are not to be interrupted for intervals of more than 5 secs from a range of 4 miles until the approach is terminated.

c. The pilot shall be instructed to check his/her MDH at a range of 2 nm.

d. Advisory heights shall be discontinued at the one above the highest OCH or at 1 nm whichever is the sooner.

e. The controller shall not be responsible for any other duty other than that strictly connected with SRA.

7.15.2.3 Phraseology. At the commencement of radar vectoring to the procedure, the pilot will be advised:

Radar: "Redair 123 this will be a surveillance radar approach to runway 29 terminating at 2 miles from touchdown. Check your minima, step down fixes and missed approach point. Check wheels".

As the aircraft is approaching the point at which the glide slope commences, the pilot will be advised:

Radar:"Redair 123 approaching 6 nm from touchdown - commence descent now to maintain a 3 degree glide path. Do not reply to further instructions"

As the procedure continues:

Radar: "Slightly left of track, turn right three degrees heading 292. Approaching three miles from touchdown you should be passing 950 ft. Closing to final approach track turn left two degrees, heading 290 to maintain. On track heading 290".

At termination range:
Radar: "Redair 123 approach completed - out"

© Oxford Aviation Services Limited

7.15.2.3 Published Information. The procedures for SRA are published as approach plates headed "SRA RTR 2NM RWY 09L. The information on the plate relates only to the final approach and will include radar advisory heights, rate of descent against ground speed, and the OCH for the procedure. The missed approach procedure will also be printed on the plate.

7.15.3 Other Approaches. Approaches may be made in accordance with any published procedure. These include:

a. VOR/DME

b. NDB/DME

c. ILS (no GP)/DME

d. VDF

In all cases where a procedure has been approved for use, the underlying air traffic control is procedural, even though the procedure may be radar monitored. If you are unsure about any part of the procedure or the loss of RTF or missed approach procedure, request information from the controller.

© Oxford Aviation Services Limited

REVISION QUESTIONS CHAPTER 7

1. What is the ICAO document that defines the Procedures for Air Navigation?

   a. The Chicago Convention
   b. Doc 8168
   c. JAR Ops 1
   d. ICAO Annex 6

2. Why do PANS OPS require 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 only relevant to air crew
   d. The Annexes are too big to contain all the extra information

3. What does the abbreviation DME stand for?

   a. Directional Monitoring Equipment
   b. Distance Monitoring Equipment
   c. Digital Measurement Equipment
   d. Distance Measuring Equipment

4. What does the abbreviation OCH stand for?

   a. Obstacle Clearance Height
   b. Observed Clearance Height
   c. Overall Clearance Height
   d. Operational Ceiling Height

5. What basic assumption is made with regard to the capability of the aeroplane when discussing departure procedures?

   a. That it can comply with the noise abatement requirements
   b. That the procedure is capable of being flown by the average pilot
   c. That all engines are working
   d. That the initial part of the procedure will be flown with the flaps and lift enhancers operating

© Oxford Aviation Services Limited

6. A category A aeroplane is defined as having a maximum climb out turning speed of 120 kt. What would you expect the maximum turning speed of a category E aeroplane to be?

a. Greater than 120 kts
b. Less than 120 kts
c. Unlimited
d. At the pilot's discretion

7. In designing a departure procedure reference is made to the DER. What is the DER?

a. Directional extension required
b. Drag engagement rate
c. Departure end of the runway
d. Distance/Energy ratio

8. If a departure procedure was based on tracking directly outbound on a radial from a VOR beacon situated on the aerodrome to a point 12 nm from the end of the runway before turning to join airways, what type of departure procedure would this be?

a. Direct
b. Straight
c. Turning
d. Omni-directional

9. A departure procedure from runway 26L requires the aeroplane to climb straight ahead to 500 ft and then intercept the 350 inbound radial to an en-route VOR beacon, what type of procedure would this be?

a. Direct
b. Straight
c. Turning
d. Omni-directional

10. If the initial departure track required by a departure procedure requires a turn of more than a specified angle, a turning area is to be constructed to ensure the aeroplane is safe during the turn. What is the specified angle above which the turning area is required?

a. 5 deg
b. 15 deg
c. 45 deg
d. 90 deg

© Oxford Aviation Services Limited

11. If an engine fails at V_1, what is the pilot required to do?

a. Ignore it
b. Abort the take off
c. Continue the departure in accordance with the contingency procedure
d. Carry out a circling approach and land at the aerodrome from which you have just taken off

12. Who is responsible for deciding the contingency procedure in the event of an engine failure?

a. The Commander
b. The Authority of the state of registration
c. The Authority of the State of the Operator
d. The Operator

13. What determines when an omni-directional departure procedure should be established?

a. Where no specific track guidance is required
b. In mountainous terrain
c. At aerodromes with no ATC facilities
d. Take offs from aerodromes on the coast where the take off path is all over the sea

14. An omni-directional departure procedure requires the aircraft to be flown straight ahead and climb before turning. To what height is the climb required before turning?

a. 295ft (90m)
b. 495 ft (150m)
c. 394 ft (120m)
d. 969ft (300m)

15. Where details of an omni-directional departure procedure are published, how are the restrictions specified ?

a. As sectors to be avoided or minimum climb gradient/minimum altitude sectors
b. As geographic radar vectoring sectors with the minimum safety altitude specified
c. As VOR radials and DME ranges delineating the restricted zones
d. As notified danger areas

16. If you have a sophisticated EFIS coupled flight management system linked to an auto pilot, can you pre-set the system to fly a laid down departure procedure?

a. No, the specified procedure must be flown manually
b. Yes, providing you monitor the system
c. Yes, but only in VMC
d. Yes, but only in CAT IIIc operations

© Oxford Aviation Services Limited

17. Which of the following is not one of the five approach procedure segments?

a. Initial
b. Missed Approach
c. Terminal
d. Intermediate

18. Each of the approach segments starts and ends at fixes. Is this always true?

a. Yes
b. Yes, but only where a fix is available and within the required tolerance
c. No, the final approach can begin at the interception of the glide path
d. No, the procedure may be flown on timings

19. What is the difference between a precision approach and a non-precision approach?

a. The degree of accuracy of the track alignment in the final approach
b. The degree of accuracy with which the touchdown point can be identified
c. The method of determination of azimuthal information in the final approach
d. The method by which the vertical displacement of the aeroplane is determined in the final approach

20. A straight in approach is one in which the final approach is aligned with the runway heading. For a non-precision approach it is permissable for the approach to be offset by up to what angle?

a. 30 deg
b. 45 deg
c. 90 deg
d. 180 deg

21. It is a requirement of any approach procedure that minimum sector altitudes (MSA) are to be established for each aerodrome. What is the minimum obstacle clearance provided by the MSA?

a. 300m within 25nm
b. 500ft within 10nm
c. 1000ft within 50nm
d. 120m within 40km

22. On the STAR plate you will be given information to guide you from one fix to the next. What type of information is supplied?

a. True heading
b. Mag heading
c. True track
d. Mag track

© Oxford Aviation Services Limited

23. In designing an approach procedure, the designer will base the procedure on certain minimum criteria one of which is aircraft speed. Specifically, what speed is the designer interested in?

a. Normal cruising speed
b. Average speed with flaps, gear down and lift enhancers extended
c. Minimum drag speed
d. Threshold speed

24. How is the speed referred to in Q23 calculated?

a. 1.3 x the stalling speed in the landing configuration
b. 2 x (V_{ne} - V_{md})
c. V_2 +10 kts
d. $V_{max\ drag}$ or the maximum undercarriage down speed, (whichever is less) minus 10 kts

25. What is the datum against which the obstacle clearance height (OCH) for a precision approach is referenced?

a. Mean Sea Level
b. Aerodrome Datum height
c. Aerodrome elevation
d. Threshold elevation of the landing runway.

26. What is the relevance of the OCH for a precision approach?

a. It is the lowest height at which a missed approach must be initiated
b. It is the height at which an aircraft correctly positioned on the glide path must obtain the visual minima to land
c. It is the MDH if the glide path information is lost
d. It is the minimum allowance added to the dominant obstacle allowance by the operator to obtain decision height

27. What is the datum against which the obstacle clearance height (OCH) for a non-precision approach is normally referenced?

a. Mean Sea Level
b. Aerodrome datum height
c. Aerodrome elevation
d. Threshold elevation

© Oxford Aviation Services Limited

28. In Q27 the word 'normally' is used. Under what circumstances would another datum be used for the reference?

a. If the aerodrome is below sea level
b. Runway threshold if that was more than 2m below aerodrome elevation
c. Runway threshold if that was more than 2m above aerodrome elevation
d. In Northern Ireland, the Belfast Bay Datum

29. What is the relevance of the OCH for a non-precision approach visual (circling) manoeuvre?

a. It is the height at which visual reference must be obtained
b. It is the height at which a missed approach must be initiated
c. It is the lowest height to which the aircraft can descend and not infringe the obstacle clearance criteria
d. It is 250ft above the height of the highest obstacle in the in the approach path

30. What constitutes the dominant obstacle for a precision approach?

a. The highest approach, or missed approach, obstacle whichever is higher
b. The highest obstacle in the final approach segment
c. The highest obstacle within 10nm
d. The obstacle upon which the minimum sector altitude is based

31. Is the dominant obstacle for a non-precision approach different from that for a precision approach, and if so why?

a. No, both approaches have the same dominant obstacle criteria
b. Yes, for a non-precision approach the dominant obstacle is the highest obstacle in the final approach segment
c. Yes, in a non-precision approach the dominant obstacle is called the highest sector obstacle
d. No, in both procedure cases the dominant obstacle height defines the lowest safe approach height

32. Which of the following correctly defines the Minimum Obstacle Clearance (MOC)?

a. The dominant obstacle allowance
b. The difference between the dominant obstacle height and the minimum decision height
c. The fixed allowance added to the dominant obstacle height to give MDH
d. 250 feet (75m) except in mountainous areas where it may contain an additional allowance for the local terrain

© Oxford Aviation Services Limited

33. Is MOC provided over the entire base width of the cross sectional area of the approach segments?

a. Yes
b. No
c. Yes, but only the intermediate and final approach segments
d. No, only the width of the primary area

34. Which of the following is not a fix or point used in an instrument approach?

a. Initial approach Fix (IAF)
b. Missed Approach Fix (MAF)
c. Final Approach Fix (FAF)
d. Turning Point (TP)

35. In Nav General you have come across 'cocked hats'. In plotting fixes for use in instrument approaches, the designer also takes into account the accuracy of the fixing aid(s). What is the name given to the area in which an intersection fix may lie?

a. The fix tolerance area
b. The intersection area
c. The maximum accuracy area
d. The RNP fix accuracy area

36. Which of the following do you think is most likely to lead to the greatest inaccuracy in obtaining a fix during an instrument approach?

a. Aircraft speed
b. Aircraft altitude
c. Aircraft distance from the facility
d. Proximity of high ground

37. Which of these facilities is the most accurate at providing track information?

a. Secondary Surveillance Radar
b. ILS localiser
c. VOR beacon
d. NDB beacon

© Oxford Aviation Services Limited

38. Why does the accuracy of a radar fix depend upon the speed of the aeroplane?

a. Because of the Doppler effect
b. Because the aspect of the target to the radar head is speed related
c. Because a slow target will be lost in ground clutter
d. Because the target position is only updated once every rotation of the radar, a fast contact will move further than a slow one during the rotation, and the last fix will therefore be more inaccurate for a fast target.

39. In some cases radar vectoring is used to guide the aeroplane onto the approach procedure. In such cases surveillance radar or terminal area is used. Fix tolerances are also applied radar fixes and these are related distance from the radar transmitter. Which is the most accurate?

a. Surveillance radar at 60nm
b. Terminal area radar at 20 nm
c. Surveillance radar at 40nm
d. Terminal area radar at 40 nm

40. As part of an ILS system, position fixes are introduced by the use of 75Mhz or 'Z' beacons. You may hear the term 'fan' marker used. These define the outer and middle marker positions at approx. 5.5 and 0.5nm from touchdown. What is the typical accuracy of a fix from such a beacon??

a. 1 nm at 1000ft
b. 350m at 1000ft
c. Not very good because of the frequency
d. Very good laterally but poor longitudinally

41. Why are there errors in fixing when on top of a beacon?

a. Because of the speed the aeroplane is moving
b. Because the aircraft system cannot cope with instantaneous change of bearing
c. Because of the cone of ambiguity over the aerial system of a beacon
d. Because the aircraft aerials are usually on top of the aeroplane and shielded from the transmissions from the beacon

42. Comparing VOR with NDB, which gives the best fix when 'on top' the beacon?

a. The VOR because it uses VHF
b. The NDB because the aerial is a simple dipole
c. It depends upon the type of aircraft
d. Not a lot in it really, although the cone of ambiguity is tighter for the NDB

© Oxford Aviation Services Limited

43. What is the maximum distance that the Final Approach Fix (FAF) can be located from the runway threshold?

a. 5nm
b. 10nm
c. 15nm
d. 20nm

44. What is the optimum descent gradient in the final approach segment of an instrument approach?

a. 6.50% or 3.8° (400ft/ml)
b. 6.00% or 3.5° (350ft/ml)
c. 5.00% or 3.0° (300ft/ml)
d. 4.50% or 2.5° (250ft/ml)

45. The en-route phase of a flight usually involves flight along airways. An instrument procedure normally starts at the initial approach fix (IAF). What is the name of the segment between the recommended point of leaving the airway and IAF?

a. Initial segment
b. Arrival segment
c. Arrival route
d. En-route segment

46. Where does the initial approach segment of an instrument approach start?

a. At the initial fix
b. At the arrival fix
c. The start of the arrival route
d. The end of the arrival route

47. For a precision procedure, what is the maximum interception angle from the initial approach segment to the IF?

a. 45°
b. 60°
c. 90°
d. 120°

48. What is the purpose of the intermediate approach segment?

a. To provide a buffer between the Arrival segment and the Final approach segment
b. To provide airspace for the aircraft to reduce height and speed
c. To provide airspace for the aircraft to reduce speed and change configuration
d. To allow plenty of space for lining up on the final approach path

© Oxford Aviation Services Limited

49. Is the final approach always made to a runway?

a. Yes
b. No
c. Yes, providing the approach is a non-precision approach
d. No, a non precision approach can be made to an aerodrome

50. Which of the following correctly identifies the phases of a missed approach?

a. Initial missed approach, intermediate missed approach, final missed approach
b. Initial missed approach, Secondary missed approach, final missed approach
c. Overshoot, climb, return to the IF
d. Decision, manoeuvre, procedure

51. Which of the following is correct?

a. A Missed Approach Procedure begins at the Missed Approach Point
b. On an ILS the missed approach procedure begins at DH/A
c. The missed approach point may be defined as a fix or time and distance from a fix
d. On an ILS no glide path approach the missed approach point is the middle marker

52. The missed approach point can be defined by which of the following?

a. The point of interception of the localiser with the applicable DH/A
b. Not more than 1.5nm from the threshold of the runway
c. The position related to a time interval after passing the IAF
d. A specified distance from the FAF

53. For a non-precision procedure, at what point must the missed approach procedure be **immediately** initiated?

a. At MDH/A if the visual reference has not been obtained
b. At the missed approach point if visual reference has not been obtained
c. If aircraft is below 1000ft and the RVR is reported to be below minima
d. At any point visual contact with the runway is lost

54. In the event of a missed approach prior to the missed approach point which of the following is the correct course of action?

a. Fly to the MAPt at the DH/A or MDH/A before initiating the procedure
b. If above DH/A or MDH/A continue to descend until reaching the MAPt
c. Climb immediately to the height/altitude specified in the procedure flying via the MAPt
d. Maintain height and fly to the MAPt and begin the procedure from there

© Oxford Aviation Services Limited

55. Why are there no turns prescribed in the initial missed approach segment?

a. Climbing turns are not recommended
b. The aircraft may be so low that a wing may hit the ground in a turn
c. The pilot will be too busy changing configuration to be able to cope with a turn as well
d. The initial track will be roughly along the runway so that is a safe direction and no turns are needed

56. What is a Visual Manoeuvre (Circling)?

a. In the event of a missed approach it will allow the pilot to circle the aerodrome and regain the instrument runway threshold
b. It is another name for a visual circuit at an aerodrome of which the ATZ is class A
c. It allows an back-beam ILS to be flown to the downwind end of the runway and then land on the upwind end
d. It is a visual phase after an instrument approach to allow a landing on a runway not suitable for a straight in approach

57. The VM(C) Area is sectored. What does this allow?

a. The visual phase to be flown in specified sectors at a lower altitude than the overall area obstacle clearance height
b. Different types of approach to be flown leading to the visual phase
c. Use of the instrument DH/A in the visual phase
d. A right hand circuit to be flown

58. Apart from obstacle clearance, what is the OCH for the visual manoeuvre is based on?

a. Aircraft category; minimum visibility
b. Aircraft speed and weight
c. MOC in the final approach phase
d. Cloud ceiling and visibility

59. A basic assumption is made concerning visual manoeuvring. What is it?

a. That the aeroplane can remain in VMC throughout the visual phase
b. The missed approach procedure for the instrument phase of the approach is good at all times during the visual phase
c. That the pilot will remain in visual contact with the threshold of the landing runway throughout
d. That the OCH for the visual phase must be higher than the DH for the instrument phase

© Oxford Aviation Services Limited

60. If the aeroplane has a Flight Management System fitted and it is decided to use it during a precision approach, what must also be done?

a. The procedure must be monitored on the basic display normally associated with the procedure
b. The DH must be increased by a factor specified by the operator
c. The RVR is reported at all times
d. The missed approach procedure must be initiated if the FMS fails

61. Is there any difference in a holding pattern where the holding turn is left instead of right?

a. No the patterns are symmetrical
b. Yes, the holding side is now the buffer side
c. Yes the entry procedures are reversed (procedure 1 is now Offset etc..)
d. Yes, a right hand holding pattern is called a procedure turn

62. There are three types of entry procedure into the holding pattern. What do these procedures cater for?

a. Different handling characteristics of aeroplanes
b. Skill levels of pilots
c. The orientation of the holding direction
d. To allow 3 aeroplanes to join the hold at the same time

63. In still air, what is the outbound leg time for holding at 10 000ft?

a. 1 minute
b. 1½ minutes
c. 2 minutes
d. 2½ minutes

64. Where would you normally leave a holding pattern?

a. On the outbound leg
b. On the inbound leg
c. At the holding point
d. Overhead the fixing facility

65. How far does the buffer area extend beyond the boundary of the holding area?

a. 10 km
b. 9.3 nm
c. 3 nm
d. 5 nm

© Oxford Aviation Services Limited

66. Why is a lowest holding altitude (LHA) specified?

a. So that obstacle clearance can be achieved
b. So that as many aeroplanes as possible can use the holding facility
c. So that an airway can exist under the holding pattern
d. So that the lowest level in the holding pattern is above the initial level for any arrival or departure procedure

67. A holding pattern is set up on the WOT beacon. The holding direction is 180 and the holding turn is right at the facility. The minimum holding level is FL160. You are tracking towards the beacon heading 355 T. The variation is 7° East and the drift 5° starboard. What type of entry procedure will you employ?

a. Parallel
b. Offset
c. Direct
d. Don't know (this option does not exist!)

68. At what point would you normally start the timing for the holding pattern in Q67?

a. At the fix
b. Abeam the fix
c. When the outbound turn is complete
d. Over or abeam the fix, which ever occurs later

69. What are the two main objectives 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
d. To provide altimeter reference to MSL above the transition altitude and to aerodrome level below.

70. 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
d. Vertical position with reference to the standard pressure level

© Oxford Aviation Services Limited

71. 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
d. Vertical position with reference to the standard pressure level

72. 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 touchdown
d. Vertical position with reference to the standard pressure level

73. If the QNH is 991 Mb where is FL0? (Assume 1 Mb = 30 ft)

a. Below sea level!
b. 660 ft above mean sea level
c. 660 ft above the transition level
d. 660 ft below the transition altitude

74. Which of the following is the location of FL0?

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
d. Where QNH = QNE

75. What is the relationship between IFR and VFR flight levels?

a. VFR levels are odd levels and IFR are even levels
b. IFR levels are flown on mag tracks from 000 to 179 and 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
d. For a given mag track, the VFR level is the IFR level plus 500' if below FL290

76. At what point in a flight is the QNH communicated to the pilot by ATC?

a. On engine start
b. In the taxi clearance
c. In the ATC clearance
d. With the take-off clearance

© Oxford Aviation Services Limited

77. 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
d. The QFE for the highest aerodrome in the vicinity

78. 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 QNHs 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
d. Set 1013 mb and add the root mean squared difference between the departure and destination aerodrome QNHs and 1013, convert the difference to altitude at the rate of 1mb = 27ft and then add this to the safety altitude to give you the lowest safe en route altitude

79. 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
d. On handover from approach to tower

80. You are carrying out an instrument approach to land at Birmingham International. You are IMC at FL 70. The radar controller tells you set the Birmingham QNH 1007 and descend to and maintain 4500 ft. On the approach plate it tells you that the transition level is FL50. What do you do?

a. Set 1007 immediately and advise leaving 7000 ft for 4500 ft
b. Leave 1013 set until at FL50 then set 1007 and descend to 4500 ft
c. Tell the radar controller that you cannot accept his clearance as you are above the transition level.
d. Assume that the radar controller knows what he is doing but make sure that you report the matter when you land

© Oxford Aviation Services Limited

81. 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
d. The height of the aeroplane above mean sea level corrected for temperature error and with reference to a set point on the surface of the aerodrome

82. 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
d. 1, 3, 4 and 5

83. Why are parallel runway operations used?

a. To make the most use of the runways available
b. To increase an aerodromes IFR traffic capacity in IMC
c. To cut down queues at the holding points and make slot times more attainable
d. To increases separation between aeroplanes making instrument approaches

84. Where is it feasible to use parallel runway approach operations?

a. Where both the parallel runways have ILS or MLS systems installed
b. Where the runways are separated by not less than 760 metres
c. Where one runway is used for take-offs and the other for landings
d. Where the angle of divergence from the parallel is not more than 15 deg

85. There are 2 basic modes of parallel runway approach operations: Mode 1 and Mode 2. What is the difference between these modes of operation?

a. Mode 1 is visual approaches only and mode 2 is a mixture of visual and instrument approaches
b. Mode 1 requires ILS Cat III criteria whereas mode 2 is either Cat I or Cat II
c. Mode 2 requires radar separation to be applied between aircraft using adjacent ILS systems
d. Mode 1 permits straight in approaches whereas mode 2 doesn't.

© Oxford Aviation Services Limited

86. Is it feasible to use one runway for take-offs and the other for landings?

a. Yes, providing the departure procedures do not interfere with the missed approach procedure for the instrument approach runway
b. No, because there must be a dedicated direction of turn for the missed approach procedure and this would preclude departures in that direction
c. Yes, it is known as Mode 4 segregated parallel operations
d. Yes, providing all the departures are 'straight departures' (ie initial departure track within15 deg of runway heading)

87. What does NOZ stand for?

a. The No Obstruction Zone
b. The Normal Operating Zone
c. The Normal Operations Zone
d. The Not Over Zero weight area

88. Where independent parallel approach operations are in operation, how much of the NOZ is used?

a. All of it
b. ¾ of it
c. Half of it (¼ either side of the extended centreline)
d. Only the inner half

89. When would a radar approach controller intervene to manoeuvre an aircraft in a parallel approach situation?

a. During Mode 2 (dependant parallel approach) operations only
b. During independent parallel approaches (Mode 1) when the NTZ is penetrated by another aircraft
c. When radar separation is lost during penetration of the NTZ
d. When 1000 ft separation cannot be maintained between approaching aircraft

90. Where independent parallel approach operations are established, where does the NTZ start?

a. Where adjacent aeroplanes are established on the ILS centreline
b. The Final Approach Fix (FAF)
c. Where normal radar separation can no longer be applied
d. The point where 1000 ft separation is lost

© Oxford Aviation Services Limited

91. Which of the following are correct for parallel approach operations?

1. Straight in approaches only
2. All approaches to be radar monitored
3. Maximum centreline (localiser) interception angle to be 30 deg
4. No reduction of 1000 ft separation unless both aircraft are established on the ILS localiser
5. Diverging tracks to be established for missed approach procedures

a. All the above
b. 1, 3, 4 and 5
c. 2, 3, 4 and 5
d. 3, 4 and 5

92. When are SSR transponders to be operated?

a. Only on controlled flights
b. When in receipt of a radar service ie Radar advisory or Radar control
c. On all commercial flights
d. When required by ATC

93. 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/7000 + C
d. A/2000 + C

94. Your aircraft is subjected to unlawful interference (hi jacking). Without upsetting the man with the gun, what would you squawk?

a. A/7700 + C
b. A/7600 + C
c. A/7500 + C
d. Either A/7700 or A/7500 depending upon the situation

95. 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
d. Just forget it, the controller will soon notice

© Oxford Aviation Services Limited

96. Which of the following is an **invalid** squawk?

a. A/7777 + C
b. A/5678 + C
c. A/2000 +C
d. A/0000 + C

97. 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
d. It doesn't matter because there is a delay built into the ground station

98. What does the abbreviation ACAS mean?

a. Advisory, Counselling and Arbitration Service
b. Anti-Collision Action System
c. Automatic Collision Avoidance System
d. Airborne Collision Avoidance System

99. How often are ranges to be passed during an SRA terminating at 2 nm from touchdown?

a. Every mile
b. Every half mile
c. As required
d. Every mile until 4 nm from touchdown then every half mile after that

100. Precision Approach Radar (PAR) may be used to provide distance and centre line information (PAR in azimuth only). What type of an approach is this?

a. Precision Instrument approach
b. SRA
c. Non-precision instrument approach
d. Radar vectored approach

© Oxford Aviation Services Limited

ANSWERS TO REVISION QUESTIONS FOR CHAPTER 7

1	B	26	A	51	C	76	B
2	A	27	C	52	D	77	C
3	D	28	B	53	B	78	C
4	A	29	C	54	C	79	B
5	C	30	A	55	C	80	A
6	A	31	B	56	D	81	B
7	C	32	C	57	A	82	A
8	B	33	D	58	A	83	B
9	C	34	B	59	B	84	A
10	B	35	A	60	A	85	C
11	B	36	C	61	A	86	C
12	D	37	B	62	C	87	B
13	A	38	D	63	A	88	D
14	C	39	B	64	C	89	B
15	A	40	B	65	D	90	D
16	B	41	C	66	A	91	A
17	C	42	D	67	B	92	C
18	C	43	B	68	B	93	D
19	D	44	C	69	C	94	D
20	A	45	C	70	A	95	C
21	A	46	D	71	B	96	B
22	D	47	B	72	D	97	A
23	D	48	C	73	A	98	D
24	A	49	D	74	C	99	A
25	D	50	A	75	D	100	C

© Oxford Aviation Services Limited

PRACTICE EXAMINATION PAPER 1

This is the first of two practice examinations to get you prepared for the school and JAA examinations. It is intended to simulate a JAA exam not replicate one. Before the actual examination you will be given real examination feedback and specimen answers.

The School and JAA examinations in Air Law will consist of 80 questions (ish) and may be score weighted (unequal marks allocated). When you attempt this practice paper, allow yourself no more than 1 minute per question. The questions cover the contents of Chapters 1 - 7 of the Air Law notes. Use the answer sheet provided. There is a set of correct answers (referenced) on the back of the answer sheet.

1. Against what political background was the Chicago Convention of 1944 held?

    a. World War I
    b. The Korean War
    c. World War II
    d. The American War of Independence

2. What in civil aviation terms does 'territorial airspace' mean?

    a. The airspace over a state's land-mass of a state within international agreed frontiers
    b. All the airspace over a state extending to the limits of space
    c. The airspace over a state and the adjacent international waters to a defined median line forming a boundary with another state
    d. The airspace over a state and its territorial waters

3. What law is applicable over the 'high seas'?

    a. International law
    b. The law of the state of registry of the aeroplane over flying the high seas area
    c. The ICAO law
    d. The law of the state closest to the point in the high seas area

4. If an aeroplane, which is registered in the United Kingdom, is over-flying France, does the commander have to obey the law of France ?

    a. Yes at all times
    b. No, the law of the UK applies because the aeroplane is not landing in France
    c. Yes, but only if it does not conflict with the law of UK
    d. Yes, but if there is a confliction with UK Law he must ask the French authority what he should do

© Oxford Aviation Services Limited

5. A scheduled air service, in international context, is defined as:

   a. A regular series of flights from one place to another
   b. Flights from one place to another in accordance with an agreed schedule and a bilateral agreement between the two states
   c. Any flight for which the flight plan is published in advance
   d. Any flight in accordance with the first and second freedoms of the air

6. Do any rules of the air exists over international waters (high seas areas)?

   a. Yes - ICAO Annex 2 - Rules of the Air
   b. No. No state has the right to impose its law over the high seas
   c. Yes - the rules of the air that are applicable to the state with the closest land-mass
   d. Yes - the rules of the air of the state of registry of the aeroplane

7. If an aeroplane is arriving in an EEC state from a non EEC (but ICAO contracting) state, where must it first land?

   a. At an International Airport
   b. At the closest airport to the point of entry into the state
   c. At an authorised UK customs airport
   d. At any aerodrome that has a long enough runway and is licensed for public transport of passengers

8. With regard to search and rescue of aircraft (SAR), each state is required to:

   a. Maintain an efficient SAR service capable of responding within 1 hour
   b. Comply fully with the standards and recommended practices of annex 12 to the Chicago Convention
   c. Maintain and fully staff a rescue co-ordination centre (RCC)
   d. Co-operate with adjacent states for the purpose of SAR

9. 'Each contracting ICAO state is required to comply totally with the standards and recommended practices detailed in the Annexes to the Convention on International Civil Aviation'. This statement is:

   a. True, but only when flying over international waters
   b. False. Differences may be notified by individual states

10. The governing body of ICAO is:

    a. The Assembly
    b. The Council
    c. The Secretariat
    d. The Montreal HQ

© Oxford Aviation Services Limited

11. Why does ICAO have regional offices?

    a. Because the organisation is too large to be administered from one office
    b. Because of the use of different languages in the world
    c. Because of geographical and regional air navigation considerations
    d. To allow the preservation of traditional methods of air navigation regionally throughout the world

12. ICAO has 7 regional offices, but how many regions?

    a. 7
    b. 8
    c. 9
    d. 10

13. The main role of the ICAO regional offices is:

    a. To disseminate ICAO SARPS and PANS in the differing languages of the regions
    b. To co-ordinate policy with regard to the special regional requirements for SARPS and PANS
    c. The production and implementation of Regional Air Navigation Plans
    d. To co-ordinating the implementation of limits to the growth of air traffic and restricting the unlimited use of airspace

14. There are 18 annexes to the Convention on International Civil Aviation. These consist of:

    a. SARPS and PANS
    b. Procedures for Air navigation
    c. Regional Supplementary Procedures
    d. Standards and Recommended Practices

15. You are flying an aeroplane registered in Germany en route from Dublin to Berlin via London and Brussels. In Dublin you pick up passengers for Berlin, London and Brussels. Are you permitted to pick up passengers in London who want to travel to Brussels or Berlin?

    a. Yes, but the total number of passengers on board at any one time must not exceed the number on board at departure from Dublin
    b. No, this situation is not covered by the freedoms of the air
    c. Yes, but you will have to pick up extra flight attendants en route to comply with the law
    d. Yes, this is a fifth freedom flight

© Oxford Aviation Services Limited

16. Why does the Chicago Standard Form of Bilateral Agreements exist?

    a. Because the International Air Transit and Air Transport agreements are bilateral and a standard form of words is used to make sure that the same agreement applies to all participating states
    b. To make life easy for the various states party to the agreements
    c. Because English is the common language of ICAO
    d. So that ICAO can regulate the terms and conditions of any agreements

17. It is an offence to commit an unlawful act in an aeroplane in the air. Who is empowered to prosecute such an offence?

    a. Interpol
    b. The Authority of the State of registration of the aeroplane
    c. The Authority of the State of the Operator
    d. ICAO through the International Court at The Hague

18. It is an offence to commit unlawful acts against civil aviation on the ground as well as in the air. The Protocol to the Montreal Convention of 1971, signed in 1988 makes it an international offence if such acts are committed where?

    a. At any aerodrome used for passenger traffic handling
    b. At an aerodrome serving international civil aviation
    c. At an aerodrome only in ICAO contracted states
    d. At all aerodromes where the state, in which the aerodrome is located, is ICAO contracted and the state has ratified the Convention on International Civil Aviation

19. What is the SSR unlawful interference (hi-jack) code?

    a. 2000
    b. 7777
    c. 7600
    d. 7500

20. You are the commander of an aeroplane in flight. From whom do you get the authority to act as commander?

    a. The passengers
    b. The Operator
    c. The authority of the state of registry of the aeroplane
    d. The national legislature of the state of registry of the aeroplane

© Oxford Aviation Services Limited

21. Within Europe, there are two organisations which have affected the development of European Civil Aviation leading to the establishment of the JAA. One is the EU, the other one is:

    a. Eurocontrol
    b. ECAC
    c. NATO
    d. ICAO

22. The Convention of Cyprus in 1990 set up the JAA. One of the main objectives of the JAA is to:

    a. Eventually be replaced by the EAA under the Central Regional Aviation Plan
    b. Apply ICAO SARPS throughout the European area
    c. Allow the EU commission to act as the ICAO contracted body for Europe
    d. Contribute to fair and equal competition within member states

23. The JAR document dealing with matter relating to the issue of aircrew licences for flying aeroplanes is:

    a. JAR OPS-3
    b. JAR FCL-1
    c. JAR FCL-3
    d. JAR AWO

24. If you hold a JAA ATPL(A) and are over 60, can you fly as the pilot of an aeroplane engaged in commercial air transport?

    a. No
    b. Yes, providing you are the only pilot on board
    c. Yes, if there are two pilots and you are the only one 60 or over
    d. Yes but only until the age of 65

25. Can you continue to fly if you are over 65?

    a. No
    b. Yes, but only for single engine operation
    c. Yes, but not in commercial aviation
    d. Yes, if there are two pilots on board, and you are the only pilot on board 65 or over

26. Normal residency, for the purpose of flight crew licensing under the JAA, is defined as the usual place where you live for:

    a. Not more than 185 days per year
    b. At least 185 days per year
    c. Not less than 185 consecutively days per year
    d. The purpose of carrying on your normal business

© Oxford Aviation Services Limited

27. Your valid flight crew licence is always to be carried with you when exercising the privileges of the licence. What else must you carry?

    a. Your passport or a means of photographically identifying yourself
    b. Your valid medical certificate
    c. Your valid medical certificate or your passport
    d. Your valid medical certificate and a document containing a photograph of you that confirms you identity as stated on your licence

28. How long is a JAA ATPL(A) valid for:

    a. A minimum of 5 years but not more than 10 years
    b. Not less than 5 years
    c. 5 years from the date of issue or re-issue date
    d. Your lifetime (until age 65)

29. An applicant for a JAA ATPL(A) must have completed a total of 1500 hours. Can you include simulator hours in this requirement?

    a. Yes, but not more than 100 hours simulator time
    b. No
    c. Yes, but only for a simulator on which you are type rated and then only 500 hours
    d. Yes, but to a maximum of 100 hours as PIC or 150 hours as co-pilot

30. Within the 1500 hours referred to in Q29, are you required to include PIC cross country hours?

    a. No
    b. Yes, 200 hours
    c. Yes, 200 hours out of a total of 250 hours cross country flying
    d. Yes, but you can include co-pilot hours performing the duties of PIC under supervision

31. If you have a full ATPL(A) - unfrozen - and you are type rated for say Boeing 737 aircraft, are you permitted to act as the PIC of such an aeroplane automatically?

    a. Yes, that is the purpose of type rating
    b. Yes, provided that you have successfully passed a skill test in the last three months
    c. No, the rating could be limited to co-pilot only
    d. Yes, providing you have completed 5 take-offs and landings as PIC in the previous three months

© Oxford Aviation Services Limited

32. You are not permitted to exercise the privileges of your licence if you are aware that you are unwell. Which of the following would be classified as being unwell?

    a. Suffering a minor condition that requires the occasional use of medication
    b. Admission to hospital or a clinic for 12 hours or less
    c. Undergoing any surgical or invasive procedure
    d. The need to wear dark glasses

33. You are required to inform the authority that you are unable to fly because of certain medical concerns. One such situation is:

    a. A visit to hospital or a clinic as a patient
    b. Persistent sickness that has lasted 21 days
    c. Persistent sickness that has lasted more than 21 days
    d. Diagnosis of the need for spectacles to be used for reading

34. The QNH is 965mb (hPa). The transition altitude is 4000ft. What is the transition level? {Assume 1 mb (hPa) = 30 ft}

    a. FL40
    b. FL45
    c. FL50
    d. FL55

35. An airship is approaching head on to a glider and there is a danger of collision. Which must give way?

    a. Both - they are both aircraft
    b. The glider - the glider has priority (FAGB)
    c. The airship - The airship has priority because it is less manoeuvrable
    d. Neither - an interesting situation!

36. An airship has an aeroplane towing a glider in its ten o'clock which is tracking from left to right at the same altitude. Which has the right of way?

    a. The aeroplane towing the glider - because the towing combination is moving faster
    b. The aeroplane towing the glider - because towing combinations have priority
    c. The towing combination - because it contains a glider which has priority (FAGB)
    d. If there is a collision risk, the airship has the right of way because the towing combination which includes an aeroplane (FAGB) would have the airship on its right.

© Oxford Aviation Services Limited

37. You are approaching another Warrior from behind but are climbing to a higher altitude. Are you required to give way to the other aircraft?

    a. Yes
    b. No
    c. Only if the other is climbing too
    d. Yes, and you must stop climbing and turn to the right and maintain altitude and track until well clear

38. It is night time and your aeroplane is parked on the movement area of an aerodrome. Is the aeroplane required to be lit?

    a. Yes, to indicate its extremities unless otherwise adequately illuminated
    b. Only if the engines are running
    c. No
    d. Yes, aircraft are to be lit at all times on an aerodrome

39. It is daytime and your aeroplane is fitted with anti-collision high intensity strobe (capacitive discharge) lights. You are flying IFR just in the base of the clouds and the lights are creating a stroboscopic effect that is worrying some of the passengers. Can you switch the strobe lights off?

    a. No. Aircraft with anti-collision lights are to show them at all times
    b. Yes but only because it is daylight
    c. No because you are flying IFR
    d. Yes

40. If you intend to fly the aeroplane to simulate IMC, you must have dual controls and a safety pilot at the other set of controls. Must the safety pilot be a qualified pilot?

    a. No, he only needs to be a qualified observer
    b. No, but he must be capable of detecting any errors you make
    c. Yes
    d. No, he is there only to cover the case of you suffering a debilitating condition that renders you incapable of flying the aeroplane, but he must have rudimentary knowledge of flying

41. 'If you are flying in the vicinity of an aerodrome you are required to conform with or avoid the formed traffic pattern'. For which of the following is this statement true?

    a. Only if you intend landing at the aerodrome
    b. If you are aware that the aerodrome is there
    c. If you are flying inside the aerodrome traffic zone (ATZ)
    d. Regardless of whether you are inside or outside the ATZ

© Oxford Aviation Services Limited

42. When is a flight plan is required?

    a. For all flights
    b. For all IFR flights
    c. For all VFR flights in controlled airspace
    d. For all flights which require an air traffic service

43. When is a flight plan not required?

    a. For VFR flights crossing international boundaries
    b. For flights along boundaries between FIRs providing the flight does not actually cross the boundary
    c. For VFR flights in advisory airspace
    d. For flights over distances less than 50Km at night

44. A flight plan is required to include the number and type of aircraft for which the flight plan is submitted.(NB one FP may be submitted for a formation of aeroplanes!). What other information is required regarding the type of aeroplane?

    a. Wake turbulence category
    b. Optimum cruising mach number
    c. Maximum un-pressurised cabin altitude
    d. Minimum equipment list

45. When is a flight plan 'closed'?

    a. When it is complete and ready for filing
    b. When all the passengers are on board and the flight is announced as 'closing'
    c. When the aeroplane arrives at the destination
    d. On the receipt of the arrival report at the ATSU at the arrival aerodrome

46. When is an ATC clearance to be obtained?

    a. Prior to operating any controlled flight
    b. Prior to entry into controlled airspace
    c. Prior to take off from the initial departure aerodrome where the route involves landing at several aerodromes en route
    d. At least 30 minutes prior to take off

© Oxford Aviation Services Limited

47. You are cruising at FL350 at M0.94. You have just reported over Caraffa (southern Italy) at time 1035Z and have informed Rome Control that your next position is Ponza (abeam Naples) at 1056Z. Rome clears you to climb to FL390. This gives you a new speed of M0.96 and your estimate for Ponza is revised to 1053Z. Do you need to tell Rome what the new ETA at Ponza is?

    a. Yes, you must inform ATC if ETAs change by more than 5%
    b. No, you only tell ATC if ETAs change by more than 3 minutes
    c. No, nobody is interested in such a small change but you might want to tell ATC about the speed change
    d. Yes and you must also tell ATC what your new cruising speed is because changes of 3 minutes or more in ETA and all changes in cruising speed are to be reported immediately

48. You are flying in class G airspace. What meteorological conditions are required for VMC?

    a. Flight Vis = 5 Km; clear of cloud and in sight of the surface
    b. Flight Vis = 8 Km; 1500m horizontally and 1000ft vertically from cloud
    c. Flight Vis = 5 KM; 1500m horizontally and 1000ft vertically from cloud
    d. It depends upon your height above the ground

49. You are en-route from London to Athens and Rome tells you to climb to FL370 (you had flight planned for FL330). You report level at FL370 and then Rome tells you to call Athenai on 119.750Mhz. You say goodbye and change freq. You call Athenai but get no reply. (This is not unusual in that neck of the woods!) You recall Rome on the previous freq and again get no reply. You change VHF boxes and try both stations again but still get no reply. You can hear other aircraft working so you try to call one of them but still get no reply. What do you do?

    a. Proceed in accordance the flight plan as originally cleared
    b. Proceed in accordance with the flight plan and the revised clearance given to you by Rome to maintain FL 370
    c. Squawk 7600 and descend to FL330 as originally cleared by London and then continue as flight planned
    d. Squawk 7600 and fly around in a circle until somebody answers you

50. If you suffer a comms failure during the later stages of a flight after you have been given an Estimated Approach Time (EAT) that is significantly different from your flight planned ETA, what do you do?

    a. Try and land within 30 minutes of the EAT, if possible
    b. Revert to the original flight planned ETA and land as close to that time as possible
    c. Stay in the holding pattern and squawk 7600 until you run short of fuel and then squawk 7700 and make an approach to land
    d. Abandon the instrument approach and squawk 7700 and make a straight in approach in VMC

© Oxford Aviation Services Limited

51. If you see a military aeroplane (a small one with missiles on it) positioning itself ahead, slightly to the left, and slightly above you and it is rocking its wings, what does this mean?

    a. Congratulations, you have just joined the Red Arrows (Gulp! Where are the rest of them!)
    b. You have just been intercepted and he/she wants you to follow
    c. You are flying in military restricted airspace and are in danger
    d. The Air Traffic Controllers have fouled up the clearances. This is an incident and must be reported by AIRPROX procedures

52. When is a VFR flight not permitted to take off from an aerodrome in a CTR?

    a. If the cloud ceiling is 1500ft or less **and** ground visibility is 5km or less
    b. If the cloud ceiling is greater than 1500ft, **but** ground visibility is only 5km
    c. If the cloud ceiling is less than 1500ft, **or** ground visibility is less than 5km
    d. If the cloud ceiling is more than 1500ft, **with** ground visibility 5km or less

53. Unless authorised, VFR flight is not permitted above what flight level?

    a. FL290
    b. FL245
    c. FL200
    d. FL180

54. When or where are you permitted to fly VFR below 1000ft above the highest obstacle within 600m radius of the aircraft over towns, cities etc.. or below 500 ft above ground or water?

    a. En route outside of an ATZ
    b. Over the sea within gliding distance of the shore
    c. In class G airspace in daylight
    d. Only where necessary for take off and landing

55. You are flying VFR in class F airspace (outside of the UK) at 4000 ft (which is above the transition altitude) clear of any ATZ. You are tracking 250° Mag. Which of the following is the correct height/altitude/flight level that you should fly at?

    a. FL 40
    b. FL 45
    c. 4000ft on the QNH of the nearest aerodrome
    d. You are VFR so you do not need to fly at any particular height, level or altitude

© Oxford Aviation Services Limited

56. You are flying VFR in class C airspace outside of a CTR and you doubt if you can maintain VMC much longer. What should you do?

    a. File an IFR flight plan and continue whilst awaiting clearance
    b. If unable to get a clearance to continue under IFR leave CAS and land at the nearest suitable aerodrome
    c. Get a Special VFR clearance and continue
    d. Push on in VMC until the last minute then squawk 7700 and let the Air Traffic Controllers sort it out.

57. You are flying IFR at FL100 in class A airspace. The Air Traffic Controller warns you that there is traffic in your 12 O'clock at range 10 miles and asks you if you are VMC with a view to taking avoiding action. What should you do?

    a. Assess the meteorological conditions and if the minima for class A airspace is exceeded report your flight conditions as VMC
    b. Regardless of the meteorological conditions, report your flight conditions as IMC
    c. Advise ATC that VFR is not applicable in class A airspace
    d. Ask for Radar Advisory service to avoid the contact unless ATC advises that it has disappeared

58. You are flying IFR in class B airspace but are flying in good VMC. What must you consider before making a request to cancel the IFR flight plan and to proceed VFR?

    a. What is the correct VFR flight level for the class of airspace
    b. How long are you going to be able to maintain VMC
    c. How much day light is left
    d. Do you have the necessary equipment fitted in the aeroplane to make a VFR approach at the destination

59. When may you routinely ignore the table of IFR cruising levels (flight levels) if flying IFR in class A airspace?

    a. In good VMC
    b. Above 24 500 ft
    c. Where Reduced Vertical Separation Minima standards are in force
    d. When cleared above a level to employ a cruise climb technique

60. If you are operating an IFR flight outside of controlled airspace, are you required to maintain a listening watch with an ATS unit?

    a. No
    b. Yes, always
    c. Yes, but only in areas or along routes where a flight plan is required
    d. Yes if you are flying in IMC

© Oxford Aviation Services Limited

61. If you have an urgent message to transmit regarding the safety of an aeroplane, what proword do you prefix the message with?

    a. Help
    b. Mayday
    c. Pan Pan
    d. Securité (pron - see cure ee tay)

62. If you have been intercepted by a military aircraft, on what frequency should you attempt to communicate with the military pilot?

    a. The frequency in use
    b. 121.500 Mhz (VHF Distress and Calling Frequency)
    c. 119.100 Mhz (Common ATC Tower frequency)
    d. 123.450 Mhz (general chat frequency)

63. You are flying VFR in class G airspace when you see a series of red and green flares/star shells fired at 10 sec intervals exploding in your vicinity. What do these most probably mean?

    a. You are about to stray into or are flying in an active danger area
    b. Somebody is in distress and needs your help
    c. It is New Years Eve
    d. If you are near an aerodrome these are signals to aeroplanes in the visual circuit

64. You are taxiing on the manoeuvring area and see a flashing white light pointed at you from the tower, what does it mean?

    a. Give way to an approaching aeroplane
    b. Return to the starting point
    c. Stop
    d. Continue taxiing to the holding point of the active runway

65. You are short final after having received a clearance to land and you see a red pyrotechnic flare fired from the tower. There are no other aeroplanes in the circuit, what does the flare mean?

    a. The Tower controller is scaring the birds away
    b. An aeroplane is taxiing out of sight of the tower controller and he is ordered to stop immediately
    c. You have not acknowledged the clearance to land
    d. Notwithstanding any previous clearance, you are not to land for the time being

© Oxford Aviation Services Limited

66. You are taxiing towards the runway at an aerodrome and it is outside the published hours of the ATC watch. You see this yellow marking on the taxiway, what does it mean and what must you do?

a. It is a holding point but not the closest one to the runway. You can ignore it.
b. It is a holding point other than the closest to the runway. You must stop and check that you are clear to continue taxiing
c. It is a holding point for another runway so can ignore it.
d. It means that the taxiway is weak and you must not stop on it.

67. A green flag is flying from the signals mast at an aerodrome. What does it mean?

a. Glider flying is in progress
b. Take-off and landing are not restricted to the same direction
c. Right hand circuit in force
d. Non radio traffic is permitted to use this aerodrome

68. You are taxiing towards the terminal building but have not been allocated a bay for parking. You see a man standing in an open space facing you with his arms raised vertically above his head. What does this mean?

a. I am not your marshaller, I am waiting for the next aeroplane.
b. I am your marshaller, keep moving ahead and I will indicate when it is safe to turn into this parking bay
c. This is your parking bay
d. Stop immediately

69. You are ready to start engines but there is no ground intercom system working. How do you indicate to the marshaller that you intend to start no. 2 engine first?

a. Raise your right hand with the index finger extended making a circular motion, whilst pointing to no 2 engine
b. Raise a hand with two fingers extended
c. Raise a hand with two fingers extended and then raise and lower the other hand with a clenched fist
d. Raise a hand and make a circular motion and leave it to him to work out which engine is starting

© Oxford Aviation Services Limited

70. If not otherwise stated, what is the assumed Procedure Design Gradient for a departure procedure?

a. 5%
b. 3.3%
c. 300 ft per nm
d. 3°

71. With respect to a standard instrument departure (SID), a straight departure is one in which the departure track is within a certain angle of alignment to the runway. What is this angle?

a. 5 deg
b. 10 deg
c. 15 deg
d. 20 deg

72. Where no track guidance is provided in the design of a SID, aircraft are to climb on the extended centre line to what height before turns are to be made?

a. 90 m (295 ft)
b. 100m (328 ft)
c. 120m (394 ft)
d. 150m (492ft)

73. In general, what navigation aids are used to define RNAV departure routes?

a. NDB and ILS
b. VOR and NDB
c. VOR and DME
d. NDB and DME

74. Which of the following correctly defines the five segments of an instrument approach procedure?

a. En-route, Initial, Immediate, Final, Missed Approach
b. Arrival, Initial, Intermediate, Final, Missed Approach
c. Arrival, Initial, Intermediate, Final, Terminal
d. En-route, Initial, Secondary, Final, Terminating

© Oxford Aviation Services Limited

75. Generally, the stages of an instrument approach start and end at defined (designated) fixes. However, a stage may start where no fix is available. Which of the following is a common example of the start of a segment without a fix?

    a. Start of the initial segment where the arrival/en-route segment is greater than 20nm wide
    b. Where the Initial segment leads directly into the final segment with no change of heading required
    c. The start of the final approach segment being defined as the point at which the intermediate flight altitude intercepts the nominal glide path
    d. A missed approach procedure segment which begins at any altitude and at any point during the intermediate or final phases

76. To allow the construction of both departure and approach procedures, aircraft performance is taken into consideration. Which factor of performance decides the aircraft category for an approach procedures?

    a. Final approach speed clean
    b. Rate of descent in the final approach in landing configuration
    c. Minimum drag speed with gear, flaps and spoilers down (landing configuration)
    d. Threshold speed (1.3 x stalling speed in landing configuration)

77. During the latter stages of an instrument approach, track accuracy is of paramount importance as it is the major factor in defining the limits of the obstacle clearance zone which leads to calculation of DH. Which of the following facilities is the most accurate for providing track guidance?

    a. VOR
    b. ILS localiser
    c. ILS glide path
    d. NDB

78. One method of achieving direction to the final approach fix (FAF) is to use radar vectoring. The type of radar used for this purpose is Terminal Area Radar (TAR). When TAR is used within 20nm of the radar head (where the radar transmitter is located), what is the accuracy of a TAR fix?

    a. +/- 1.0 Km
    b. +/- 1.5 Km
    c. +/- 2.0 Km
    d. +/- 5.0 Km

79. What is the optimum gradient of the final approach segment (the glide path)?

    a. Not less than 3.5%
    b. 3.5°
    c. About 300ft/km
    d. Should not exceed 5%

© Oxford Aviation Services Limited

80. Where does the initial approach segment end?

a. At the start of the final approach segment
b. At the FAF
c. Overhead the facility upon which the procedure is based
d. At the intermediate fix

81. In a missed approach procedure, turns are not specified until the climb is established. Why is this?

a. The aeroplane is too close to the ground and obstacle clearance my not be achieved
b. The final approach track is along the extended centre line of the runway and deviation from this track may result in a collision with other approaching aircraft
c. The safest direction to go is in the direction of the runway and the climb-out lane
d. The initialisation of the climb (attitude change, drag reduction, application of power) requires the attention of the pilot, therefore turns are not specified.

82. Where does the missed approach procedure start?

a. At the beginning of the initial missed approach phase
b. At the missed approach point (MAPt)
c. At the point at which the instrument approach procedure cannot be continued
d. At DH for a precision approach or at MDH for a non precision approach

83. The ILS for runway 28 is unserviceable and the cloud ceiling is 800 ft but the RVR is above minima. No other useable approach procedure is available for 28 but ILS is available for runway 19. Can you use the ILS procedure for 19 to position to land on runway 28?

a. Yes providing the RVR for 19 is good and the DH for ILS on 19 is below the cloud
b. Yes, but you must be aware of the Visual Manoeuvre (Circling) Obstacle Clearance Altitude requirement for your category of aeroplane for the aerodrome. MDH for circling will be based on this..
c. Yes but you must use MDH for the approach to 19 not DH and then visually acquire and maintain contact with the threshold of 28 whilst flying the circling approach visually at MDH to land.
d. No, you cannot use a precision approach aid to one runway and land on another.

84. A holding procedure has been established on the OX beacon turning right at the facility with inbound (holding) track of 270. You are approaching the facility from the northwest to hold prior to commencing an instrument procedure. What type of joining procedure to the holding pattern will you be require to make?

a. Sector one (parallel entry)
b. Sector two (offset entry)
c. Sector three (direct entry)
d. Sector four (reciprocal parallel indirect offset entry)

© Oxford Aviation Services Limited

85. In still air, holding on a facility at 5000 ft, what is the length of the outbound leg?

a. 1½ minutes starting over or abeam the fix
b. 1 minute starting abeam the fix
c. It is determined by either distance or time, whichever is specified
d. Not less than 5nm

86. The minimum permissible holding level for a holding pattern is based on the obstacle clearance height of obstacles within the buffer area. The buffer area extends:

a. All the way around the holding area and encompasses the entry area
b. To 5nm beyond the boundary of the holding area
c. To 5nm beyond the boundary of the holding area but not including the entry area
d. 2nm to the non holding side of the boundary of the holding area and 5 nm from the boundary of the holding area on the holding side of the pattern

87. In mountainous areas, what is the minimum clearance provided by the lowest permissible holding level of a holding pattern?

a. 761 m (2 500) ft
b. 1 000m (3 281 ft)
c. 600m (1 969 ft)
d. 609m (2 000 ft)

88. What is the maximum depth of the transition layer?

a. 500 ft
b. 1000 ft
c. 999 ft
d. 470 ft

89. When flying through the transition layer, how is vertical position is reported?

a. As a flight level
b. It depends upon what you have set on the altimeter
c. As an altitude when ascending and as a flight level when descending
d. It doesn't matter because the layer is not very deep

90. A what point does the law require the QNH to be passed to an aeroplane before take-off?

a. Whilst taxiing
b. At the holding point for the active runway
c. In the taxi clearance
d. In the ATC clearance for IFR flights

© Oxford Aviation Services Limited

91. When/where is the use of aerodrome QFE permitted?

    a. When transiting the Aerodrome Traffic Zone
    b. Within a zone if the aerodrome is within a CTR
    c. When flying en-route in the vicinity of an aerodrome if regional QNH is below the subscale of the altimeter
    d. For terrain clearance during the final approach to a runway

92. In simultaneous parallel runway instrument approach operations, two basic modes (modes1 and 2) are employed. What determines which mode is to be used?

    a. The physical spacing (distance) between the runways
    b. Whether radar separation between aircraft on adjacent procedures is required or not
    c. Use of either of the runways for departures as well as approaches
    d. The RVR

93. What is the extent of the Normal Operating Zone (NOZ) for parallel runways operation?

    a. From the runway threshold to the point where aircraft are established on the extended centre line of the ILS approach
    b. From the missed approach point to the point where aircraft are established on the glide path
    c. From the touchdown point to the point where aircraft are established on the centre line
    d. From the final approach fix to the intermediate approach fix

94. Where does a No Transgression Zone (NTZ) for parallel runways operation start?

    a. At the final approach fix for both runways
    b. At the interception of the intermediate approach level and the glide path for both ILS systems
    c. From the point at which lateral separation is reduced
    d. From the point at which 1 000 ft vertical separation is reduced

95. You are carrying out fuel jettison trials at 500 ft over the sea, what should you squawk on your transponder?

    a. A/1234 + C
    b. A/2000 + C
    c. A/7000 + C
    d. Nothing, you are below radar coverage

© Oxford Aviation Services Limited

96. If your transponder fails before departure, can you continue if the flight is a controlled flight?

a. No, you must get if fixed even if the flight does not enter controlled airspace
b. Yes, but only if the flight does not enter class A, B or C controlled airspace
c. Yes if you have entered 'X' in field 10 (SSR capability) of the flight plan form
d. Yes after seeking exemption from the requirements to carry SSR equipment on controlled flights

97. What do the initials SRA mean?

a. Separated Radar Approach
b. Simplex Radar Application
c. Secondary Radar Approach
d. Surveillance Radar Approach

98. A procedure on an approach plate is stated to be SRA RTR 2 NM RWY 09L. How often would advisory ranges be passed to the aircraft?

a. Every 1 nm
b. Every 1 km
c. Every ½ nm
d. Every ½ km

99. What is defined by a minimum obstacle clearance of 300 m (984 ft) within 46 km (25 nm) of a homing facility providing the basis for an instrument approach?

a. Minimum Safe Altitude
b. Minimum Sector Altitude
c. Mandatory Safety Area
d. Maximum Speed Area

100. According to JAR OPS-1, what is the maximum blood/alcohol level above which a pilot is not permitted to exercise the privileges of his/her licence?

a. 80mg/100ml
b. Nil
c. 0.2 pro mille
d. None specified, but you are not permitted to drink during the 8 hour period prior to flying

© Oxford Aviation Services Limited

Answer Sheet for Practice Paper 1

	A	B	C	D
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				
16				
17				
18				
19				
20				
21				
22				
23				
24				
25				

	A	B	C	D
26				
27				
28				
29				
30				
31				
32				
33				
34				
35				
36				
37				
38				
39				
40				
41				
42				
43				
44				
45				
46				
47				
48				
49				
50				

	A	B	C	D
51				
52				
53				
54				
55				
56				
57				
58				
59				
60				
61				
62				
63				
64				
65				
66				
67				
68				
69				
70				
71				
72				
73				
74				
75				

	A	B	C	D
76				
77				
78				
79				
80				
81				
82				
83				
84				
85				
86				
87				
88				
89				
90				
91				
92				
93				
94				
95				
96				
97				
98				
99				
100				

© Oxford Aviation Services Limited

PRACTICE EXAMINATION PAPER 1 - ANSWERS

	✔	Reference		✔	Reference		✔	Reference		✔	Reference
1	C	2.1.2	26	B	5.3.9	51	B	6.7.4 (1)	76	D	7.5.2
2	D	2.1.2.2	27	D	5.3.10	52	C	6.3.2	77	B	7.5.7.ai
3	B	2.16.1/2	28	C	5.3.2	53	C	6.3.3.a(1)	78	B	7.5.7.2.ai
4	A	2.16.1	29	A	5.5.4	54	D	6.3.3.c(1)	79	D	7.5.10
5	B	2.1.3.3a	30	D	5.5.4.c	55	B	6.3.4	80	D	7.7.1
6	A	6.1.1	31	C	5.6.1	56	B	6.2.19	81	D	7.8.2
7	A	2.1.4.1	32	C	5.7.4.b	57	A	6.3.1	82	B	7.7.1
8	D	2.2.3	33	B	5.7.5.b	58	B	6.4.4.1	83	B	7.5.3.C
9	B	2.3.1	34	D	7.12.5	59	D	6.4.5	84	A	7.11.5
10	B	2.6.2	35	A	6.2.4	60	C	6.4.6.b	85	B	7.11.6
11	C	2.7	36	B	6.2.5d	61	C	6.6.2	86	B	7.11.8
12	C	2.7.1	37	A	6.2.6	62	B	6.7.2.c	87	C	7.11.8.c
13	C	2.8.1	38	A	6.2.12.b2	63	A	6.8.2	88	A	7.12.6
14	D	2.3.1/9.1	39	D	6.2.12.e	64	B	6.9.2	89	B	7.12.5
15	D	2.10.4c	40	C	6.2.13.a2	65	D	6.9.2	90	C	7.12.7
16	A	2.10.2	41	D	6.2.14	66	A	6.9.4.m	91	D	7.12.9
17	B	2.11.1	42	D	6.2.15.a1	67	C	6.9.3.2	92	B	7.13.1.a
18	B	2.11.4	43	C	6.2.15.a2	68	C	6.10.1	93	A	Fig 7.13.3
19	D	7.14.1.c	44	A	6.2.15.d3	69	B	6.10.2	94	D	Fig 7.13.3
20	C	2.16.2	45	D	6.2.15.f	70	B	7.3.1.2	95	B	7.14.1
21	B	2.13.1	46	A	6.2.17	71	C	7.3.2.1	96	D	7.14.3.c
22	D	2.13.2a ii	47	B	6.2.18	72	C	7.3.3	97	D	7.15.2
23	B	5.2.1.a	48	D	6.3.1	73	C	7.3.5	98	A	7.15.2.1.a
24	C	5.3.6	49	B	6.2.21.c2	74	B	7.5.1.1	99	B	7.5.1.4
25	C	5.3.7	50	A	6.2.21.c5	75	C	7.5.1	100	C	6.1.5

© Oxford Aviation Services Limited

CHAPTER EIGHT - AIR TRAFFIC SERVICES

Contents

		Page
8.0	AIR TRAFFIC SERVICES	8 - 1
8.1	INTRODUCTION.	8 - 1
8.2	ANNEX 11 - THE ATC SERVICE	8 - 2
8.3	CLASSES OF AIRSPACES.	8 - 3
8.4	UNITS PROVIDING AIR TRAFFIC CONTROL SERVICES	8 - 6
8.5	FLIGHT INFORMATION REGIONS	8 - 6
8.6	AIR TRAFFIC ROUTE STRUCTURE	8 - 8
8.7	MINIMUM FLIGHT ALTITUDES.	8 - 11
8.8	CONTINGENCIES	8 - 11
8.9	TIME	8 - 12
8.10	AIR TRAFFIC CONTROL SERVICE	8 - 13
8.11	AIR TRAFFIC CONTROL CLEARANCES	8 - 15
8.12	CONTROL OF PERSONS AND VEHICLES AT AERODROMES	8 - 17
8.13	FLIGHT INFORMATION SERVICE (FIS)	8 - 18
8.14	ALERTING SERVICE	8 - 21
8.15	ATS COMMUNICATIONS	8 - 24
	REVISION QUESTIONS	8 - 25

© Oxford Aviation Services Limited

8.0 AIR TRAFFIC SERVICES

8.1 INTRODUCTION. Today's air traffic control services have evolved from the requirement for somebody to provide a basic service to airmen at an aerodrome (usually the local fireman - see Those Magnificent Men In Their Flying Machines) to computerised central control organisations with responsibility for vast areas of airspace utilising global communications and international co-operation at the highest level. Modern ATC systems use 'state of the art' electronics to provide a service in ever shrinking airspace caused by faster aircraft and increasing traffic density. The use of radar in ATC is now fundamental yet the procedural system of ATC (most evident in the use of 'flight strips') still underpins the entire system. Air Traffic Controllers (ATCOs) are highly qualified personnel who may or may not have any aircrew experience. The idea of an old or medically downgraded pilot no longer able to fly taking a position as an ATCO, is now well and truly dead. ATCO training takes 3 years and all ATCOs must be licenced practitioners. ATCOs are either recruited as cadet ATCOs or are drawn from the ranks of experienced assistant ATCOs. At aerodromes and ATC centres, Flight Information Officers (FISOs) are employed where a fully licenced ATCO would be under utilised. The powers of a FISO are strictly limited and basically allow him/her to provide 'information' with very strictly controlled powers to issue instructions to aircraft **only** on the ground. ATCOs are responsible for amongst other things:

a. Providing the ATC service to pilots in the air

b. Providing flight information to pilots (including an alerting service)

c. Controlling the crash/rescue service on an aerodrome

d. Control of vehicular traffic on the ground at an aerodrome

e. Ensuring that the aerodrome is fit for use.

8.1.1 Communications. At the heart of the ATC system is a communications system of global proportions. It includes telex systems, satellite communications, microwave systems, data link systems digital data transmission systems and of course voice systems using radio. Radio systems (the Aeronautical Mobile Telecommunications System) use VHF and HF radio networks. In some areas (typically the USA) UHF is also used in civilian ATC, but in Europe this tends to be restricted to military ATC. The transmission of flight plans between ATC Centres (ATCCs) is by telex through central switching centres. If you file an international flight plan at Oxford (at the flight planning desk) this is type into a teleprinter console and then transmitted to all addressees automatically. The increasing dependance on computer systems in our lives has led to major advances in ATC communications and control systems. In 1998 a KLM 747 flew from Amsterdam to New York and whilst that aeroplane was flying in European airspace all communications with ATC, from take off to entering the Shanwick OCA, was in the form of digital data transmission utilising the EFIS system and the data link facilities of the airborne and grounds comms systems. Not a word was spoken between the pilots and the ground.

© Oxford Aviation Services Limited

8.1.2 Documents. Annex 11- ATS; and Doc 4444 - PANS RAC (Rules of the Air and Air Traffic Services), are the main references for this course regarding ATC.

8.2 ANNEX 11 - THE ATC SERVICE

8.2.1 Safety. The overriding need for an ATC service is to enhance safety. All aspects of the provision of an ATC service are underwritten by the need to maintain and where necessary improve the quality of the service provided. Close liaison is imperative between the ATC service and the operators of airlines, other airspace users, aerodrome management and essentially the military. Each state has the right to defend itself and to maintain effective air forces. The aim of national defence is not well served if the aeronautical environment is unsafe, and in Europe as a whole, there is interdependency between civilian ATC and the military.

8.2.2 Objectives. The objectives of Air Traffic Services (ATS) are:

a. to prevent collisions between aircraft;

b. to prevent collisions between aircraft on the manoeuvring area and obstructions on that area;

c. to expedite and maintain an orderly flow of air traffic;

d. to provide advice and information useful for the safe and efficient conduct of flights;

e. to notify appropriate organisations regarding aircraft in need of search and rescue aid, and assist such organisations as required.

8.2.3 Basic Services. The three basic Air Traffic Services are:

a. **The Air Traffic Control Service**. To accomplish the objectives a - c above, this service is divided into three parts as follows:

1. **Area control service**. The provision of Air Traffic Control Service for controlled flights, except for those parts of such flights described in ii) and iii) below, in order to accomplish objectives a) and c) above.

2. **Approach control service**. The provision of Air Traffic Control Service for controlled flights, associated with arrival or departure, in order to accomplish objectives a) and c) above.

3. **Aerodrome control service**. The provision of Air Traffic Control Service for aerodrome traffic, except for those parts of flights described in subparagraph ii) above, in order to accomplish objectives a) b) and c) above.

b. **The Flight Information Service**. To accomplish objective d. above.

© Oxford Aviation Services Limited

c. **The Alerting Service**. To accomplish objective e. above.

8.2.4 Flight Information Regions(FIRs). FIRs are defined as those portions of the airspace where it is determined that flight information service (FIS) and alerting service will be provided.

8.2.5 Control Areas (CTA) and Control Zones (CTR). CTAs and CTRs are defined as those portions of the airspace where it has been determined that an air traffic control service will be provided to IFR flights. Those portions of airspace where air traffic control service is also provided to VFR flights are designated as Classes B, C or D airspace. Where designated within an FIR, CTAs and CTRs form part of that FIR. Note that class E airspace is not used for CTRs.

8.2.6 Controlled Aerodromes. Those aerodromes where air traffic control is provided to aerodrome traffic are designated controlled aerodromes. In other words, the aerodrome has a control tower.

8.3 CLASSES OF AIRSPACES.

8.3.1 Description. In order to provide the correct service and to specify appropriate rules, airspace is classified according to the following criteria:

a. Flight rules under which flight is permitted

b. The separation provided

c. Requirements for an ATC clearance to be issued to aircraft using the airspace

d. Requirements for two way communications to be maintained between ATC and pilots

e. Where VFR is permitted, the VMC criteria is applied.

8.3.2 Classification. ATS airspaces are classified and designated as follows:

a. **Class A**. IFR flights only permitted, all flights are subject to ATC and are separated from each other.

b. **Class B**. IFR and VFR flights are permitted, all flights are subject to ATC and are separated from each other.

c. **Class C**. IFR and VFR flights are permitted, all flights are subject to ATC, and IFR flights are separated from other IFR flights and from VFR flights. VFR flights are separated from IFR flights and receive information about other VFR flights.

© Oxford Aviation Services Limited

d. **Class D.** IFR and VFR flights are permitted, all flights are subject to ATC, IFR flights are separated from other IFR flights and receive traffic information concerning VFR flights. VFR flights receive traffic information in respect of all other flights.

e. **Class E.** IFR and VFR are permitted, IFR flights are subject to ATC and are separated from other IFR flights. All flights receive traffic information as far as is practicable. Class E is not used for CTRs.

f. **Class F.** IFR and VFR flights are permitted. All participating IFR flights receive an ATC advisory service and all flights receive flight information service if requested.

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

Note: Where airspaces adjoin vertically, the more restrictive rules apply to the common level.

Class	Type of flight	Separation provided	Service provided	Speed limitation*	Radio Communication requirement	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 000ft) AMSL	Continuous two-way	Yes
D	IFR	IFR from IFR	Air traffic control service, traffic information about VFR flights (and traffic avoidance advice on request)	250 kt IAS below 3050m (10 000ft) AMSL	Continuous two-way	Yes

© Oxford Aviation Services Limited

	VFR	Nil	IFR/VFR and VFR/VFR traffic information (and traffic avoidance advice on request)	250 kt IAS below 3050m (10 000ft) AMSL	Continuous two-way	Yes
E	IFR	IFR from IFR	Air traffic control service and, as far as practical, traffic information about VFR flights	250 kt IAS below 3050m (10 000ft) AMSL	Continuous two-way	Yes
	VFR	Nil	Traffic information as far as is practical	250 kt IAS below 3050m (10 000ft) AMSL	No	No
F	IFR	IFR from IFR as far as practical	Air traffic advisory service; flight information service	250 kt IAS below 3050m (10 000ft) AMSL	Continuous two-way	No
	VFR	Nil	Flight information service	250 kt IAS below 3050m (10 000ft) AMSL	No	No
G	IFR	Nil	Flight information service	250 kt IAS below 3050m (10 000ft) AMSL	Continuous two-way	No
	VFR	Nil	Flight information service	250 kt IAS below 3050m (10 000ft) AMSL	No	No

* When the height of the transition altitude is lower than 3050m (10000 ft) AMSL, FL 100 should be used in lieu of 10000 ft.

Table 8.3.2: ATS Airspace Classes - Services Provided and Flight Requirements

© Oxford Aviation Services Limited

8.3.3 Required Navigation Performance (RNP). States are required to specify RNP requirements for controlled airspace including airways and routes. RNP type is a containment value expressed as a distance in NM from the intended position within which flights would be for at least 95% of the total flying time. RNP is applied to the specification of ATS routes (see 8.5.6) and the term 'containment value' relates to the total number of individual aeroplanes flying the route, not the average nav accuracy with which one aeroplane flies the route. For example, RNP4 means that 95% of all the aeroplanes that fly along a route will be within 4 nm of the centreline of that route all the time.

8.4 UNITS PROVIDING AIR TRAFFIC CONTROL SERVICES

8.4.1 Flight Information Centres (FICS). FICs are established to provide a FIS and alerting service within an FIR unless the responsibility for providing the services have been assigned to an ATC Unit having adequate facilities to discharge the responsibility.

8.4.2 Air Traffic Control Units. ATCUs are established to provide ATC service, FIS and alerting service within CTAs and CTRs and at controlled aerodromes.

8.5 FLIGHT INFORMATION REGIONS.

8.5.1 Coverage. Flight information regions are delineated to cover the whole of the air route structure to be served by such regions. The boundaries of a FIR can be either agreed by common consent between states (a straight line roughly aligned along national borders as is the case between the Irish Republic and the UK in Northern Ireland) or strict adherence to national borders. In the case of a boundary over territorial waters where the internationally agreed 12 nm limit is not possible to achieve (the English Channel) the boundary is agreed at a median line between the adjacent states. Where a FIR boundary is established between states over the high seas (see definition) such boundaries are agreed internationally, usually to meet the requirements of communications. A flight information region is to include all airspace within its lateral limits, except as limited by an upper flight information region (UIR). Vertically the internationally agreed limit of controlled airspace is FL 660. In the UK the UIR exists from above FL245 to FL660. Elsewhere, where a flight information region is limited by an upper flight information region, the lower limit specified for the upper flight information region shall constitute the upper vertical limit of the flight information region and shall coincide with a VFR cruising level of the tables in Chapter 6.

8.5.1.1 Multiple FIRs. A state with extensive land mass or special air traffic requirements, can organise its airspace to include more than one FIR, the boundaries between which are not international FIR boundaries. ie Between London FIR and Scottish FIR.

Note: In cases where an UIR is established the procedures applicable need not be identical with those in the underlying FIR.

© Oxford Aviation Services Limited

8.5.2 **Control Areas.** Control areas (CTAs), including all airways and terminal control areas (TCAs), are set up to contain all the airspace required for the flight paths of IFR flights for which an ATC service is required, taking into account the capabilities of the navigation aids normally used in that area. The controlling authority for a CTA is an area control centre (ACC). Normally, CTAs are set up at the confluence of airways in the vicinity of major international aerodromes. For instance, over London a terminal manoeuvring area (TMA) exists to cater for traffic departing from and arriving at Heathrow, Gatwick, Stansted and Luton, whilst also catering for the needs of traffic transiting the area en-route to and from Europe and the North Atlantic routes. The lower limit of a control area is to be established at a height above the ground or water of not less than 200m (700ft). This does not imply that the lower limit has to be established uniformly in a given control area. The top of a CTA (normally FL245 in the UK) is defined when there is a vertical limit for the air traffic control service provided, or the CTA is below an upper CTA, in which case the limit coincides with the lower limit of the upper CTA. When established the upper limit will be a VFR cruising level from the tables in Chapter 6.

8.5.3 **Upper Information Regions or Upper Control Areas.** Aircraft at high altitude fly faster than aircraft at lower levels. Indeed, speed limits are applied below FL100. In order to expedite the flow of upper air traffic, the upper airspace over a state may be delineated as one UIR or Upper CTA even though there are several FIRs below. For example, in Europe, the upper airspace of the Brussels, Amsterdam and Hamburg FIRs are combined to form the Maastrict UIR under the control of Eurocontrol. The purpose of providing separate control of aircraft in the upper airspace is to allow that traffic to flow without having to provide separation from traffic manoeuvring to join airways and climbing and descending to and from aerodromes.

8.5.4 **Control Zones (CTRs).** The lateral limits of CTRs encompass those parts of the airspace of a FIR, which are not within control areas, and which contain the flight paths of IFR flights arriving and departing from aerodromes which can be used in IMC. The ATC authority for a CTR can be the approach control at an aerodrome or a dedicated office within an ACC with responsibility solely for the CTR. Being a zone, it extends from the ground (**Z**ero - **Z**one) to a defined altitude or FL. A CTR may include several aerodromes situated close together. The lateral limits of a CTR must extend at least 9.3km (5NM) from the centre of the aerodrome, or aerodromes concerned, in the direction from which approaches may be made. If a CTR is located wholly underneath a CTA, the upper limit of the CTR must be at least the lower limit of the CTA. If a CTR exists outside the limits of a CTA or there is no CTA above the CTR, the CTR must have a defined upper limit.

8.5.5 **Names.** An area control centre (ACC) is identified by the name of a nearby town or city, or a geographic feature. An aerodrome control tower or approach office is known by the name of the aerodrome. A CTR, CTA or FIR is identified by the name of the unit having jurisdiction over the airspace.

© Oxford Aviation Services Limited

8.6 AIR TRAFFIC ROUTE STRUCTURE

8.6.1 ATS Routes. An ATS route is any predetermined flight path that allows aeroplanes to fly from point to point. ATS routes include:

a. Airways

b. Upper air routes

c. Standard departure and arrival routes

d. Low level helicopter routes

When ATS routes are established, a protected area along each route is set up and safe spacing between adjacent routes is specified. Normally airways are 10 nm wide (5 nm either side of the route) alternatively in areas where the centre line is difficult to maintain (worse than RNP 4) the width may be increased to 20 nm. In the UIR, the whole area is protected airspace so airways do not exist and navigation is by means of upper routes. The methods by which aircraft depart from and arrive at aerodromes are known as SIDs and STARs and these are also ATS routes. ATS routes are identified by designators.

8.6.2 Designators for ATS Routes and RNP Types. The purpose of a system of route designators and required navigation performance (RNP) type(s), is to allow both pilots and ATS:

a. to make unambiguous reference to any ATS route without the need to resort to the use of geographical coordinates or other means in order to describe it;

b. to relate an ATS route to a specified vertical structure of the airspace;

c. to indicate a required level of navigation performance accuracy, when operating along an ATS route or within a specified area; and

d. to indicate that a route is used primarily or exclusively by certain types of aircraft.

Note : For flight planning purposes, a prescribed RNP type is not considered an integral part of the ATS route designator.

8.6.3 Designator Criteria. In order to meet the requirement for designators, the designation system is to be capable of:

a. permitting the identification of any ATS route in a simple and unique manner;

© Oxford Aviation Services Limited

b. avoiding redundancy;

c. being used by both ground and airborne automation systems;

d. permitting the utmost brevity in operational use; and

e. providing sufficient possibility of extension to cater for any further requirements without the need for fundamental changes.

8.6.4 Application. Controlled, advisory and uncontrolled ATS routes, except standard arrival and departure routes, are given designators in accordance with the following:

a. The ATS route designator shall consist of a basic designator supplemented, if necessary, by:

1. one prefix as prescribed below; and

2. one additional letter as described below

b. The maximum number of characters composing the designator is six, but should be kept to five.

c. The basic designator shall consist of one letter of the alphabet followed by a number from 1 to 999. i.e A1

8.6.5 Designator Letters. The route designator letter is to be from those listed below:

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.

8.6.6 ATS Routes. An ATS route is defined as " a specified route designed for channelling the flow of traffic as necessary for the provision of air traffic services". ATS routes include airways, advisory routes, controlled or uncontrolled routes, arrival or departure routes, etc.

© Oxford Aviation Services Limited

8.6.7 Area Navigation Routes. An area navigation route is defined as an ATS route established for the use of aircraft capable of employing area navigation. (RNAV is defined as a method of navigation using station referenced navigation aids or self contained navigation systems or any combination of both).

8.6.8 Supplementary Prefix. Where applicable one supplementary letter may be added as a prefix to the basic designator in accordance with the following:

a. K to indicate a low level route established for use primarily by helicopters

b. U to indicate that the route or portion thereof is established in the upper airspace;

c. S to indicate a route established exclusively for use by supersonic aircraft during acceleration, deceleration, and while in supersonic flight;

8.6.9 Supplementary Suffix. When required by the appropriate ATS authority or on the basis of regional air navigation agreement, a supplementary letter may be added as a suffix to the basic designator 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. for RNP 1 routes **at or above FL200**, the letter **Y** to indicate that all turns on the route between 30 and 90 degrees shall be made within the allowable RNP tolerance of a tangential arc between the straight leg segment defined with a radius of 22.5 nm

b. for RNP 1 routes **at or below FL190**, the letter **Z** to indicate that all turns on the route between 30 and 90 degrees shall be made within the allowable RNP tolerance of a tangential arc between the straight leg segments defined with a radius of 15nm.

c. 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.

8.6.10 Airways (Classification of Airspace). Within an airway (see definition) it is essential that all traffic is separated. To achieve this for both IFR and controlled VFR flights the classification of the airspace must be either Class A (where VFR is proscribed) or Class B separating both VFR and IFR totally. However, where an airway passes through a Control Area (CTA/TMA), the class of airspace of the airway will reflect the class of airspace of the CTA/TMA. For instance, in the UK, airway B3 (Liverpool to Belfast) enters the Strangford CTA (Class D) at the IOM. At this point the Class A airway becomes Class D.

© Oxford Aviation Services Limited

8.7 MINIMUM FLIGHT ALTITUDES.

8.7.1 Requirement. States are required to specify and publish minimum flight altitudes (MFA) for aircraft flying ATS routes over that state. The minimum flight altitudes determined shall provide a minimum clearance above the controlling obstacle located within the area concerned. Where the lowest level of an airway is specified, it is to be no lower than the MFA.

8.8 CONTINGENCIES

8.8.1 Assistance to Aircraft in 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 the circumstances require. To indicate that it is in a state of emergency, an aircraft equipped with an SSR transponder might operate the equipment as follows:

a. on Mode A, Code 7700; or

b. on Mode A, Code 7500, to indicate specifically that it is being subjected to unlawful interference.

c. activate the appropriate emergency capability of ADS (data link surveillance system).

d. transmit the appropriate message via CPDLC (data link fir ATC comms)

8.8.2 Unlawful Interference. When an occurrence of unlawful interference with an aircraft takes place or is suspected, ATS units shall attend promptly to requests by the aircraft. Information pertinent to the safe conduct of the flight shall continue to be transmitted and necessary action shall be taken to expedite the conduct of all phases of the flight, specially safe landing of the aircraft. In dealing with instances of unlawful interference, ATC will observe strict confidentiality in communications and minimise any reference to the event.

8.8.3 Strayed or Unidentified Aircraft. A strayed aircraft is one which has deviated significantly from its intended track or which reports that it is lost. An Unidentified aircraft is an aircraft that has been observed or reported operating in a given area but whose identity has not been established. As soon as ATC becomes aware of a strayed aircraft it is to take all necessary steps to assist the aircraft and safeguard its flight. Navigational assistance by an ATCU is particularly important if the unit becomes aware of an aircraft straying, or about to stray, into an area where there is a risk of interception or other hazard to its safety. As soon as an ATCU becomes aware of an unidentified aircraft in its area, it shall attempt to establish the identity of the aircraft for Air Traffic purposes or as required by the military. If successful, the military is to be informed if previously notified about the unidentified aircraft. Attempts should be made:

© Oxford Aviation Services Limited

a. to establish two-way communications

b. establish if the aircraft is under the control of other ATCUs in the FIR

c. establish if the aircraft is under the control of ATCUs in adjacent FIRs

d. obtain information from other aircraft in the area.

8.8.4 Interception of Civil Aircraft. 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 on any available frequency, including the emergency frequency 121.5MHz, unless such communication already exists;

b. Inform the pilot of the intercepted aircraft of the interception;

c. establish contact with the intercept control unit maintaining two-way communication with the intercepting aircraft and provide it with available information concerning the aircraft;

d. relay messages between the intercepting aircraft or the intercept control unit and the intercepted aircraft; as necessary;

e. in close co-ordination with the intercept control unit take all necessary steps to ensure the safety of the intercepted aircraft;

f. Inform ATS units serving adjacent flight information regions if it appears that the aircraft has strayed from such adjacent flight information regions.

8.9 TIME

8.9.1 Time in Air Traffic Services. ATSUs use co-ordinated Universal Time (UTC) (you may still find references to Zulu time or GMT - the same thing) and express the time in hours and minutes of the 24-hour day beginning at midnight. ATSUs are equipped with clocks indicating the time in hours, minutes and seconds, which should be clearly visible from each controller position. ATSU clocks and other time-recording devices are checked to ensure correct time to within plus or minus 30 seconds of UTC at all times.

8.9.2 Time Checks. Aerodrome control towers, prior to an aircraft taxying for take-off, provide the pilot with the correct time, unless arrangements have been made for the pilot to obtain it from other sources. Air traffic service units will, in addition, provide aircraft with the correct time on request. Time checks shall be given to the nearest half minute (If the time is 1030 and 25 secs, this would be stated as 1030 not 1030 and 30 secs!

© Oxford Aviation Services Limited

We don't work to accuracy less than 0.5 mins) . Other sources of useable time checks include BBC radio 4 long wave (200 kHz - 1 500m) selectable on the ADF, the 'Washington Clock' (call signs WWV - Colorado; and WWVH - Hawaii) on HF voice 2.5MHz; 5MHz; 10MHz; 15MHz and 20MHz. This is a voice announcement in English in the format:

"At the tone - fourteen hours thirty five minutes Co-ordinated Universal Time"

8.10 AIR TRAFFIC CONTROL SERVICE

8.10.1 Scope. An air traffic control service is provided:

a. to all IFR flights in Class A, B, C, D and E airspaces;

b. to all VFR flights in Classes B, C and D airspace;

c. to all special VFR flights;

d. to all aerodrome traffic at controlled aerodromes;

8.10.2 Provision of Air Traffic Control Service. The parts of the air traffic control service provided and the various units providing the service are as follows:

a. **Area Control Service:**

1. by an area control centre (ACC); or
2. by the unit providing approach control service in a CTR or CTA of limited extent, which is designated primarily for the provision of approach control service and where no ACC is established.

b. **Approach Control Service:**

1. by an aerodrome control tower or ACC when it is necessary or desirable to combine, under the responsibility of one unit, the functions of the approach control service or the area control service.
2. by an approach control office when it is necessary or desirable to establish a separate unit.

c. **Aerodrome Control Service:** By an aerodrome control tower.

Note: The task of providing specified services on the apron. eg apron management service, may be assigned to an aerodrome control tower or to a separate unit. Where established, Ground Control is under the authority and supervision of the aerodrome controller.

© Oxford Aviation Services Limited

8.10.3 Operation of the Air Traffic Control Service. In order to provide the required air traffic control service, an ATCU is to:

a. be provided with information on the intended movement of each aircraft and current information on the actual progress of each aircraft;

b. determine from the information received, the positions of known aircraft to each other;

c. issue clearances and information for the purpose of preventing collision between aircraft under its control and of expediting and maintaining an orderly flow of traffic;

d. co-ordinate clearances as necessary with other units;

1. whenever an aircraft might conflict with traffic operated under the control of other units;

2. before transferring control of an aircraft to other units.

8.10.4 Issuing of Clearances. The purpose of issuing clearances by ATCUs is to provide the required (specified) separation between aircraft depending upon the flight rules applicable and the class of airspace in which the aircraft are flying. Clearances are issue to separate the following:

a. all flights in Class A and B airspaces;

b. IFR flights in Class C and D airspaces;

c. IFR flights and VFR flights in Class C airspace;

d. IFR flights and special VFR flights;

e. special VFR flights when required by the appropriate ATS authority.

8.10.4.1 Clearance to Maintain Own Separation in VMC. When so requested by an aircraft and provided it is agreed by the pilot of the other aircraft and authorised by the ATS authority, an ACC may clear a controlled flight operating in Class D and E airspace in VMC during the hours of daylight to fly subject to maintaining own separation to one other aircraft and remaining VMC. When cleared:

a. the clearance shall be for a specific portion of the flight below 10 000 ft during climb and descent

b. alternative instructions are to be issued to cover the event of loss of VMC

© Oxford Aviation Services Limited

c. if VMC is deteriorating to limits, the pilot is to inform ATC that further flight will be in accordance with the alternate instructions given.

8.10.5 Separation. Separation provided by an ATCU is obtained by one or more of the following methods:

a. **Vertical Separation**. This is obtained by assigning different levels to adjacent or opposing aircraft selected from the tables of cruising levels in Chapter 6, or a modified table of cruising levels, when so prescribed for flight above FL410. The normal vertical separation standard is 1000 ft. Above 30 000 ft in areas where RVSM is **not** applied this standard is increased to 2 000 ft.

b. **Horizontal Separation**. By requiring aircraft at the same level or altitude, to be kept clear of each other separation can be imposed. This is horizontal separation and can be obtained by providing:

1. **Longitudinal separation**. By maintaining an interval between aircraft operating along the same, converging or reciprocal tracks, expressed in time or distance; or

2. **Lateral separation**. By maintaining aircraft on different routes or in different geographical areas;

c. **Composite Separation**. This method consists of a combination of vertical separation and one of the other forms of separation contained in b) above, using minima for each which may be lower than, but not less than half of, those used for each of the combined elements when applied individually. Composite separation is only applied where its use has been agreed in regional air navigation agreements.

8.10.6 Document Reference. The ICAO separation standards are published in ICAO Doc 4444 - PANS RAC (Rules of the Air and Air Traffic Services).

8.11 AIR TRAFFIC CONTROL CLEARANCES

8.11.1 Basis. Air traffic control clearances shall be based solely on the requirements for providing air traffic control services.

8.11.2 Contents of clearances. An air traffic control clearance is to include:

a. aircraft identification as shown in the flight plan

b. clearance limit (the point to which an aircraft is granted a clearance)

c. route of flight

© Oxford Aviation Services Limited

d. level(s) of flight for the entire route or part of the route and changes of level if required;

e. any necessary instructions or information on other matters such as approach or departure manoeuvres, communications and the time of expiry of the clearance.

Note: The time of expiry of the clearance indicates the time after which the clearance will be automatically cancelled if the flight has not been commenced.

8.11.3 Co-ordination of Clearances. Air traffic control clearance are co-ordinated between air traffic control units to cover the entire route of an aircraft , or a specified portion, as follows:

a. **Entire Route**. An aircraft shall be cleared for the entire route to the aerodrome of first intended landing:

1. when it has been possible, prior to departure, to co-ordinate the clearance between all the units under whose control the aircraft will come; or

2. when there is a reasonable assurance that prior co-ordination will be effected between those units under whose control the aircraft will subsequently come.

b. **Partial Co-ordination**. When co-ordination has not been achieved or is not anticipated, the aircraft shall be cleared only to that point where co-ordination is reasonably assured; prior to reaching such point, or at such point, the aircraft shall receive further clearance, holding instructions being issued as appropriate.

c. **Aircraft Contact**. When permitted by the appropriate authority, aircraft may be required to contact a down route ATCU directly for he purpose of obtaining onward clearance prior to reaching the limit of clearance. During radio contact with the down route ATCU, contact is also to be maintained with the ATCU currently providing the service. A down route clearance will not affect the current clearance.

d. **Flight in CTRs**. If an aircraft is departing from an aerodrome in a CTR and is planned to enter another CTR with 30 minutes of the planned take off time, the clearance issued will be co-ordinated between the ATCUs for the CTRs.

8.11.4 Air Traffic Flow Management (ATFM). When it becomes apparent to an air traffic control unit that traffic additional to that already accepted cannot be accommodated within a given period of time at a particular location in a particular area, or can only be accommodated at a given rate, that unit shall advise other air traffic control units and operators known or believed to be concerned and pilots-in-command of aircraft destined to that location or area that additional flights are likely to be subjected to excessive

© Oxford Aviation Services Limited

delay, or, if applicable, that specified restrictions are to be applied to any additional traffic for a specified period of time for the purpose of avoiding excessive delay to aircraft in flight. In the ECAC region ATFM is managed by Eurocontrol through the Central Flow Management Unit (CFMU).

8.12 CONTROL OF PERSONS AND VEHICLES AT AERODROMES

8.12.1 Requirement. The movement of persons or vehicles including towed aircraft on the manoeuvring area of an aerodrome shall be controlled by the aerodrome control tower to avoid hazard to them or to aircraft landing, taxiing or taking off. The level of control is dependant upon many factors including the ground visibility (RVR for movements on or near the runways), traffic density, surface movement guidance systems available and the size of the aerodrome.

8.12.2 Low Visibility Ops. In conditions where low visibility procedures are in operation (the period of application of low visibility procedures is to be determined in accordance with local instructions):

a. persons and vehicles operating on the manoeuvring area of an aerodrome are to be restricted to the essential minimum and particular regard is to be given to the requirements to protect the ILS/MLS sensitive area(s) when Category II/III precision instrument operations are in progress;

b. except where emergency vehicles are concerned, the minimum separation between vehicles and taxiing aircraft is to be specified by the appropriate ATS authority taking into account the surface movement guidance aids available;

c. when mixed ILS and MLS Category II/III precision instrument operations are taking place to the same runway continuously, the more restrictive ILS or MLS critical and sensitive areas shall be protected.

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

8.12.4 Rules for Movement on the Manoeuvring Area. Except where contrary to the provisions of 8.12.2 above, vehicles on the manoeuvring area are required to comply with the following rules:

a. vehicles and vehicles towing aircraft shall give way to aircraft which are landing, taking off or taxiing:

b. vehicles shall give way to other vehicles towing aircraft:

c. vehicles shall give way to other vehicles in accordance with local instructions:

© Oxford Aviation Services Limited

d. unless complying with a), b), and c), vehicles and vehicles towing aircraft shall comply with instructions issued by the aerodrome control tower.

8.13 FLIGHT INFORMATION SERVICE (FIS)

8.13.1 Provision. A Flight information service (FIS) is to 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 service units;

Note: FIS does not relieve the PIC of an aircraft of any responsibilities and he/she has to make the final decision regarding any suggested alteration of flight plan.

8.13.2 Precedence. When ATSUs provide both FIS and ATC service, the provision of ATC service shall have precedence over the provision of FIS whenever the provision of ATC service so requires. In certain circumstances aircraft on final approach, landing, take-off or climb may require essential information without delay, before ATC service information.

8.13.3 Scope of Flight Information Service. FIS includes the provision of pertinent information likely to affect safety and specifically concerning:

a. SIGMET and AIRMET

b. pre-eruption volcanic activity, volcanic eruptions and volcanic ash clouds;

c. the release into the atmosphere of radioactive materials or toxic chemicals;

d. changes in the serviceability of navigation aids;

e. 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. un-manned free balloons:

8.13.4 Routine Information. In addition to the safety related information specified in 8.13.3, FIS provided to flights is to routinely include information concerning:

a. weather conditions reported or forecast at departure, destination and alternate aerodromes:

© Oxford Aviation Services Limited

b. collision hazards to aircraft operating in airspace classes C, D, E, F and G. Information provided, which may include known aircraft the presence of which might constitute a collision hazard to the aircraft informed, will sometimes be incomplete and therefore ATC cannot assume responsibility for the accuracy of the information issued.

c. for flights over water areas, where practicable and when requested by a pilot, any available information such as radio callsign, position, true track, speed etc. of any such vessels in the area;

8.13.4.1 VFR Traffic. FIS provided to VFR flights includes, in addition to that outlined above, available information concerning traffic and weather conditions along the route of flight that are likely to make operation under the visual flight rules impracticable.

8.13.4.2 Traffic Information Broadcasts by Aircraft (TIBAs). When there is a need to supplement collision hazard information provided in compliance with 8.13.4b), or in case of temporary disruption of flight information service, traffic information broadcasts by aircraft (TIBAs) may be applied in designated airspaces. TIBAs are broadcast on a designated VHF frequency during periods and under circumstances specified by ATC. When required TIBAs are made :

a. 10 minutes before entering the designated airspace, or for a pilot taking off from an aerodrome within the airspace, as soon as possible after take off

b. 10 minutes prior to crossing a reporting point

c. 10 minutes prior to crossing or joining an ATS route

d. at 20 minute intervals between distant reporting points

e. 2 to 5 minutes before a level change

f. at the time of a change in level

g. at any time considered necessary by the pilot

8.13.5 Operational FIS (OFIS) Broadcasts. The met and operational information concerning nav aids and aerodromes included in the FIS is to be provided in an operationally integrated form. OFIS broadcasts, when provided, consist of messages containing integrated information regarding selected operational and meteorological elements appropriate to the various phases of flight. These broadcasts should be of three major types, ie HF, VHF, and ATIS.

© Oxford Aviation Services Limited

a. HF operational flight information service (HF OFIS) broadcasts.

b. VHF operational flight information service (VHF OFIS) broadcasts.

c. Voice - automatic terminal information service (Voice-ATIS)

8.13.5.1 Voice - ATIS. Voice - automatic terminal information service (Voice-ATIS) broadcasts are provided at aerodromes where there is a requirement to reduce the communication load on the ATS VHF air-ground communication channels. When provided, Voice-ATIS broadcasts are to comprise:

a. one broadcast serving arriving aircraft; or

b. one broadcast serving departing aircraft; or

c. one broadcast serving both arriving and departing aircraft; or

d. two broadcasts serving arriving and departing aircraft respectively at those aerodromes where the length of a broadcast serving both arriving and departing aircraft would be excessively long.

8.13.5.2 Voice - ATIS Frequency. A discrete VHF frequency shall, whenever practicable, be used for ATIS broadcasts. If a discrete frequency is not available, the transmissions may be made on the voice channel(s) of the most appropriate terminal navigational 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. ATIS broadcast are not transmitted on the voice channel of an ILS. Whenever Voice-ATIS is provided:

a. the broadcast information shall relate to a single aerodrome;

b. the broadcast shall be continuous and repetitive and generally not more than 30 seconds in duration.

c. the broadcast information shall be updated immediately a significant change occurs;

d. the preparation and dissemination of the Voice-ATIS message shall be the responsibility of the air traffic services;

e. the information contained in the current broadcast shall immediately be made known to the ATS unit(s) concerned with the provision of aircraft of information relating to approach, landing and take-off, whenever the message has not been prepared by that (those) unit(s);

© Oxford Aviation Services Limited

f. individual Voice-ATIS messages shall be identified by a designator in the form of a letter of the ICAO spelling alphabet. Broadcast designators are assigned to consecutive Voice-ATIS messages in alphabetical order. (ie ATIS Bravo).

g. aircraft shall acknowledge receipt of the broadcast information upon establishing communication with the ATS unit providing approach control service or aerodrome control service, as appropriate; and

h. the appropriate ATS unit shall, when replying to the message in g) 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.

8.13.6 Data Link ATIS (D-ATIS). With the introduction of data link systems displaying information through the EFIS, D-ATIS systems now exist which supplement the existing Voice-ATIS. The D-ATIS information is identical to Voice-ATIS. The major advantage of D-ATIS is that the information displayed is 'real-time' and can reflect changes at a faster rate than Voice-ATIS. With special regard to meteorological data, providing changes to met information are with in the parameters of 'significant' change, the ATIS broadcast designator remains the same. The contents of paragraph 8.13.5.2 a) - f) are applicable to D-ATIS.

8.14 ALERTING SERVICE

8.14.1 Provision of Service. It is a requirement for all contracting states of ICAO to provide SAR facilities for all aircraft flying in the airspace of that state. In order to alert the SAR (and other services; fire; ambulance; police; mountain rescue, civil defence), states are required to have a formal system by which the controlling agencies (ie the RCC) are notified that an aircraft is in an emergency. This system is known as the Alerting Service and it is part of Air Traffic Services. FICs or ACCs are required to provide the alerting service. The service ensures that aircraft in any emergency situation are given the assistance they need. This may range from information concerning the nearest aerodrome to ensuring that a rescue co-ordination centre (RCC) has all the information needed to mount a full scale rescue operation. 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.

© Oxford Aviation Services Limited

8.14.1.1 Emergency at an Aerodrome. In the event of a state of emergency arising to an aircraft while under the control of an aerodrome control tower or approach control office, the unit is to immediately notify the FIC or ACC responsible, which shall in turn notify the RCC where necessary. Whenever the urgency of the situation so requires, the aerodrome control tower or approach control office responsible shall first alert and take other necessary steps to set in motion all appropriate local rescue and emergency organisations which can give the immediate assistance required. The three phases of the alerting service are:

a. **Uncertainty phase (INCERFA).** Except when no doubt exists as to the safety of the aircraft and its occupants, the uncertainty phase is declared 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 thirty minutes from the time an unsuccessful attempt to establish communication with the 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 ATCUs, whichever is the later,

b. **Alert phase (ALERFA).** Except when evidence exists that would allay apprehension as to the safety of the aircraft and its occupants, or when the distress phase is more appropriate, the alert phase is declared when:

1. following the uncertainty phase, subsequent attempts to establish communication with the aircraft or inquiries of other relevant sources have failed to reveal any news of the aircraft; or when

2. an aircraft has been cleared to land and fails to land within **five minutes** of the estimated time of landing and communication has not been re-established with the aircraft, or when

3. information has been received which indicates that the operating efficiency of the aircraft has been impaired, but not to the extent that a forced landing is likely, or

4. an aircraft is known or believed to be the subject of unlawful interference.

a. **Distress phase (DETRESFA)**. 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, the distress phase is declared when:

© Oxford Aviation Services Limited

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.

8.14.1.2 Notification Information. The information passed to the RCC by the alerting unit contains as much of the following information as is available at the time in the order listed. If some information is not available at the time of notification, the alerting ATCU is to attempt to obtain the information if there is reasonable certainty the distress phase will follow.

a. INCERFA, ALERFA, or DETRESFA, as appropriate to the phase of emergency;

b. agency and person calling

c. nature of emergency

d. significant information from the flight plan

e. unit which made last contact, time and frequency used:

f. last position report and how determined

g. colour and distinctive marks of aircraft;

h. any action taken by reporting office;

i. other pertinent remarks;

8.14.1.3 Additional Information. In addition to the information at 8.13 information on the development of the state of emergency through subsequent phases or information that the emergency situation no longer exists, is to be passed to the RCC.

© Oxford Aviation Services Limited

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.

8.14.1.2 Notification Information. The information passed to the RCC by the alerting unit contains as much of the following information as is available at the time in the order listed. If some information is not available at the time of notification, the alerting ATCU is to attempt to obtain the information if there is reasonable certainty the distress phase will follow.

a. INCERFA, ALERFA, or DETRESFA, as appropriate to the phase of emergency;

b. agency and person calling

c. nature of emergency

d. significant information from the flight plan

e. unit which made last contact, time and frequency used:

f. last position report and how determined

g. colour and distinctive marks of aircraft;

h. any action taken by reporting office;

i. other pertinent remarks;

8.14.1.3 Additional Information. In addition to the information at 8.13 information on the development of the state of emergency through subsequent phases or information that the emergency situation no longer exists, is to be passed to the RCC.

© Oxford Aviation Services Limited

8.14.1.4 Information to Aircraft Operating in the Vicinity of An Aircraft in Emergency. When it has been established by an ATSU that an aircraft is in a state of emergency, other aircraft known to be in the vicinity of the aircraft, except as provided below 8.17.1.5, are to be informed of the nature of the emergency as soon as practicable.

8.14.1.5 Unlawful Interference. When an air traffic services unit knows or believes that an aircraft is being subjected to unlawful interference, no reference is to be made in ATS air-ground communications to the nature of the emergency unless it has first been referred to in communications from the aircraft involved and it is certain that reference will not aggravate the situation.

8.15 ATS COMMUNICATIONS

8.15.1 Aeronautical Mobile Service. RTF or data link is the method of communications used for ATS purposes. All ATSUs are required to maintain a guard (listening watch) on the VHF emergency frequency, 121.5 MHz. All communications between pilots and controllers are recorded (records kept for not less than 14 days). For area control and approach control, two-way communications are provided between the controller and the aircraft which permit direct, rapid, continuous and static free communication. Similar requirements exist for aerodrome control with a proviso that communications are not required beyond 25 nm from the aerodrome.

8.15.2 Aeronautical Fixed Service. This service is used for communications between ATSUs. This is normally a land-line system for telephones and telex system but may also include microwave links and satellite communications systems. Modern digital communication system between ATC computer systems (on line) (Automatic Dependant Surveillance - ADS) allow computerised radar system to interact. This service also allows communication between FIR on an international basis and is the system which flight plans are transmitted down the route to be flown.

© Oxford Aviation Services Limited

REVISION QUESTIONS CHAPTER 8

1. Which of the following are the three basic Air Traffic Services?

   a. ATC; Approach Control, Aerodrome Control
   b. Flight Information Service; Alerting Service; Aerodrome Services
   c. ATC; Flight Information Service; Alerting Service
   d. Aerodrome Control; Approach Control; Area Control

2. Which of the following is not a service provided by the Air Traffic Control Service?

   a. Ground Control
   b. Aerodrome Control
   c. Approach Control
   d. Area Control

3. What is the basic Air Traffic Service provided in an FIR?

   a. Flight Information Service
   b. Area Control
   c. Procedural Air Traffic Control
   d. Flight Watch

4. What defines a Control Area?

   a. 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
   b. The confluence of airways adjacent to one or more aerodromes where ATC is provided to all air traffic
   c. A defined area of airspace in which all controlled flights are provided with an Air Traffic Service
   d. Airspace of defined limits in which IFR traffic is separated from other IFR traffic; IFR from VFR and controlled VFR from other VFR traffic

5. What defines a Control Zone?

   a. The same as a Control Area but extending to the ground
   b. An area around one or more aerodromes where a common approach control is applied
   c. A zone of defined radius centred upon the longest runway of an aerodrome extending up to 2000 ft
   d. A danger area, prohibited zone or restricted area

© Oxford Aviation Services Limited

6. What defines a controlled aerodrome?

a. An aerodrome with a control tower
b. An aerodrome where arriving and departing traffic is controlled by approach control and local area traffic is controlled by the aerodrome controller
c. An aerodrome within a control zone
d. An aerodrome where Air Traffic Control is provided for aerodrome traffic

7. What class of airspace permits VFR controlled flights which are separated from all IFR traffic, and the controlled VFR traffic receives flight information about other (non controlled) VFR traffic?

a. A
b. B
c. C
d. D

8. Can you fly in VMC in class A airspace?

a. Yes
b. No, only IMC is permitted
c. No, you must have an instrument rating and the aircraft must be instrument equipped
d. No, IFR is mandatory in class A airspace

9. Which class of airspace permits IFR and VFR flights but only offers a Flight Information Service and Alerting Service?

a. D
b. E
c. F
d. G

10. What is the main difference between class D and class E airspace?

a. You do not need to file a flight plan to fly in class E airspace
b. Class E airspace is not controlled airspace
c. Non radio VFR traffic is permitted in class E airspace and not in class D
d. In class E airspace, a Flight Information Service is not available

© Oxford Aviation Services Limited

11. Why is Class F airspace called 'advisory airspace'?

a. Because advisory control is provided for both IFR and VFR traffic
b. Advisory control is provided to participating IFR traffic
c. Because there is no legal requirement to observe the existence of class F airspace, you are just 'advised' to call the controller
d. Class F airspace only exists where normal procedural ATC cannot be applied due to remoteness or sparse traffic density

12. What is the difference between Class A airspace and Class B airspace?

a. Class B airspace is confined to the Upper Information Region (above FL245)
b. Air Traffic Routes in class B are not airways (ie no defined limits)
c. In VMC you do not need to file a flight plan in class B
d. FL245 exists in class B but not in class A

13. What does RNP10 mean?

a. Air Traffic Route number Papa 10
b. Required Notice Period is 10 minutes before the aerodrome boundary
c. Routine/Normal Position accuracy suffix is 10 nm
d. Required Navigation Performance standard is 10 nm

14. Are all Flight Information Regions (FIR) required to have a Flight Information Centre (FIC)?

a. Yes
b. Not if the services (FIS and Alerting Service) have been assigned to an ATC unit having adequate facilities
c. Not necessarily. An FIC is only required if the FIR has airways and control areas/zones
d. An FIC is not required if there are no aerodromes in an FIR

15. What are Air Traffic Control Units (ATCUs) required to provide?

a. ATC within CTAs, CTRs and at controlled aerodromes
b. Area Control to IFR traffic flying on airways
c. FIS and Area Control in a controlled FIR
d. Area, Approach and Aerodrome control

© Oxford Aviation Services Limited

16. What airspace is included in a Flight Information Region?

a. Airways and Upper routes; CTAs and CTRs and all non controlled airspace within geographically defined limits
b. Airways, CTAs (including Upper CTAs) and CTRs, and all non controlled airspace within geographically defined limits
c. All airspace within geographically defined limits
d. All airspace below FL245

17. Who determines minimum flight altitude?

a. The authority of the state being overflown
b. The regional ATCU
c. The FIC for the FIR
d. The operator

18. What SSR squawk should be set in an emergency?

a. A7777
b. A7700
c. A7000
d. A7600

19. What is the International Aeronautical VHF Distress and Calling frequency?

a. 123.450MHz
b. 121.500MHz
c. 243.000MHz
d. 406.000MHz

20. If you are flying over state A but close to the border of state B and are intercepted by air defence aircraft of state A, what should you do?

a. Communicate with ATC and ask the controller to liase with the Air Defence Unit
b. Ignore the signals from the fighters and squawk 7600
c. Squawk 7700 and try to evade the fighters
d. Try calling the fighters on the distress frequency stating that you are a controlled flight under instructions of the ATCU and cannot comply with the interceptor requirements

© Oxford Aviation Services Limited

21. It is 1000 hrs British Summer Time (BST) in London. What is the Co-ordinated Universal Time (UTC)?

a. 0900 UTC
b. 1000 UTC
c. 1100 A
d. 1100 Z

22. It is 1000 UTC in London (0° E/W). What is the time in New York (74° W)? Clue: The Earth rotates through 360° in 24 Hours!

a. 1500 UTC
b. 0500 UTC
c. 1000 UTC
d. 0400 Eastern Standard Time

23. If you request a time check from ATC to what accuracy will it be given?

a. The nearest minute
b. The nearest half minute
c. Accurately on the minute (counting down from 5)
d. Plus or minus 10 seconds

24. In what classes of airspace is ATC is provided to IFR flights?

a. All classes of airspace
b. Classes A to E only
c. All classes except class G
d. Classes A – D and in CTRs in class E

25. In what classes of airspace is ATC provided to VFR flights?

a. All classes of airspace
b. Classes A to D only
c. B; C and D only
d. Classes B to E

26. Can you fly under a Special VFR clearance in Class F airspace?

a. No, because Class F is advisory control only
b. Yes, providing adequate terrain clearance can be maintained
c. No, SVFR is only applicable to Classes A, B and C airspace
d. No, because there are no class F CTRs

© Oxford Aviation Services Limited

27. You are flying for Commercial Air Transport in a B737. Without a specific need, would you be permitted to depart airways at BOVVA and land at Stansted under a SVFR clearance?

a. Yes, providing the SVFR requirements are met
b. No, SVFR is not permitted under an Air Operators Certificate
c. Not normally. SVFR is not usually granted to a/c with a MTM greater than 5700 Kg flying for Commercial Air Transport
d. No, Stansted is in controlled airspace and SVFR is not applicable to CAS

28. Do you require an ATC clearance to fly under SVFR?

a. Yes. SVFR is defined as "flight .....in accordance with an ATC clearance...etc"
b. No, the idea of SVFR is to avoid the need to get ATC clearance
c. It depends on where you are flying under SVFR. In CAS – yes, outside CAS – No
d. Yes, but only where ATC can be provided

29. Apart from the requirements of certain classes of airspace and SVFR, where else is ATC required to be provided?

a. Outside CAS in Class B and C airspace
b. Over the Oceans
c. In areas where military activity and civilian training activity is higher than normal (ie AIAAs)
d. At controlled aerodromes

30. By what/whom is Area Control provided?

a. An area control centre (ACC) or by Approach Control in certain CTRs
b. The local Flight Information Centre (FIC)
c. An Oceanic Control Centre
d. The airways radar controller

31. Is a dedicated approach controller necessary at an aerodrome?

a. Yes if approach control is required
b. No, approach control can be provided by an Area Control Centre (ACC)
c. Yes, but only in meteorological conditions that preclude visual approaches
d. Yes if the aerodrome is within a CTR

32. How does ATC provide separation between controlled flights under IFR?

a. By radar control
b. By issuing a clearance
c. By requesting position reports
d. By requiring all flights to fly along ATS routes (airways)

© Oxford Aviation Services Limited

33. How is separation achieved?

a. Vertically, longitudinally and compositely
b. Vertically, laterally and compositely
c. Vertically, horizontally and compositely
d. Vertically, laterally and longitudinally

34. What type of separation is being applied when two aircraft are at the same flight level and are required to report over specific reporting points along the route?

a. Longitudinal
b. Time related
c. Distance related
d. Lateral

35. If an ATCU cannot issue a complete route clearance (ie from departure aerodrome to destination) what must be included in the pre-takeoff ATC clearance?

a. Advice to request onward clearance form other ATCUs
b. Specific information concerning the limit of the clearance
c. The flight level allocated if different from that requested
d. The details of any routing diversions

36. If a clearance expiry time has been included in a clearance, what does it mean?

a. The time by which the flight (or the portion of the flight) has to have been completed
b. The latest off blocks time (OBT)
c. The time at which the flight plan will be cancelled
d. That clearance will be cancelled if the flight does not commence by that time

37. Why is it essential that the movement of vehicles and persons on an aerodrome is controlled?

a. To prevent injury and damage to property
b. On the aerodrome responsibility for avoiding collisions between aircraft and vehicles rests with the air traffic controller
c. To ensure that the rules of the air are complied with
d. To avoid hazards to aeroplanes

38. To which aircraft is a flight information service (FIS) to be provided?

a. All aircraft flying in a flight information region (FIR)
b. Only aircraft in receipt of ATC
c. All controlled flights from engine start to final shut down
d. All aircraft in receipt of an ATC service or known to ATC which are likely to be affected by the information

© Oxford Aviation Services Limited

39. Other than SIGMET and AIRMET, which of the following are included in FIS info?

1. Volcanic activity
2. Release of radioactive and toxic material
3. Unserviceability of radio nav aids
4. Changes in aerodrome conditions
5. Unmanned free balloons

a. All the above
b. All except 1 which is subject of an ASHTAM
c. All except 5
d. 2,3 and 4 only

40. When will a flight information service officer (FISO) provide information regarding the operation of other aircraft in your vicinity?

a. When requested to provide separation
b. To IFR traffic in IMC
c. When a collision risk exists
d. Where no ATC facility exists

41. What are the three types of Operational Flight Information Service (OFIS) Broadcasts?

a. OFIS, AFIS, ATIS
b. HF OFIS; VHF OFIS; ATIS
c. AFIS; Volmet; AFIS
d. OFIS; AFIS; AFTN

42. What does the abbreviation ATIS stand for?

a. Automated Traffic Information System
b. Aerodrome Traffic Information Service
c. Active Terminal Information System
d. Automatic Terminal Information Service

43. Why is an ATIS system used at an aerodrome?

a. To cut down VHF chatter
b. To ensure that essential information is available at all times to pilots
c. To allow FISOs to give repetitive information on a broadcast basis
d. To reduce the workload on Air Traffic Controllers

© Oxford Aviation Services Limited

44. On the frequencies of what radio navigation facilities can ATIS be transmitted?

a. VOR; NDB, ILS (localiser not glide path)
b. VOR/DVORTAC; NDB
c. VOR; ILS localiser
d. VOR only

45. What type of ATIS information is given on the Oxford ATIS?

a. Arriving traffic
b. Departing traffic
c. Composite (arriving and departing)
d. Local area

46. You are flying VFR in the London FIR outside controlled airspace. Is the ATCC required to provide you with an alerting service?

a. Yes, all aircraft flying in the FIR are to be provided with the service
b. Yes, but you must have an ATC clearance
c. Yes if you have filed a flight plan, otherwise no
d. Yes if you have made your intention to fly known to the ATCC

47. You are overdue arrival at Oxford on a VFR flight from Carlisle. It is now 1525 and your ETA (passed via Birmingham ATC at 1430) was 1500. What phase of emergency should have been declared by Oxford ATC?

a. None
b. INCERFA (uncertainty phase)
c. ALERFA (alert phase)
d. DETRESFA (distress phase)

48. When a state of emergency has been declared by an aeroplane, ATC is required to ensure that all aircraft known to be in the vicinity are aware of the emergency situation and either assist or remain clear. What is the one exception to this rule?

a. When the nature of the emergency is unlawful interference
b. When the aeroplane in distress is carrying dangerous air cargo
c. When the aeroplane in distress is outside of controlled airspace
d. When the aircraft in distress is not flying for commercial air transport

© Oxford Aviation Services Limited

49. ATS routes (airways etc..) are given designation codes to allow them to be uniquely identified. For instance A1 (Alfa One). To what type of ATS route would the designator UA1 refer?

a. An ATS route (desig A1) in an Upper Information Region
b. Airway A1 'one way only' ie Unidirectional
c. The U indicates that the route is Unclassified. ie it does not form part of the regional rote structure
d. The portion of a designated route at which the minimum level is Unsafe

50. If an airway was given the designator W25F what would the F indicate?

a. The route is an advisory route
b. The airspace is class D
c. It is a subdivision of airway W25. ie W25A; W25B; W25C etc...
d. It is a temporary route ie weekend only

51. How would a route that is used exclusively by supersonic transports be designated?

a. By use of the suffix S
b. By use of the prefix S
c. By use of the prefix X
d. By use of the suffix X

52. What is the RNP number applicable to routes designated by suffixes Y and Z?

a. 1; b. 2; c. 5; d. 10

53. In allocating a basic route designation letter (ie **A**1), what does the choice of the letter A mean?

a. A regional ATS route (airway)
b. A regional area navigation route
c. A non regional ATS route (airway)
d. A non regional area navigation route

© Oxford Aviation Services Limited

ANSWERS TO REVISION QUESTIONS FOR CHAPTER 8

1	C	26	D	51	B	76	
2	A	27	C	52	A	77	
3	A	28	A	53	A	78	
4	A	29	D	54		79	
5	A	30	A	55		80	
6	D	31	B	56		81	
7	D	32	B	57		82	
8	A	33	C	58		83	
9	D	34	A	59		84	
10	C	35	B	60		85	
11	B	36	D	61		86	
12	D	37	D	62		87	
13	D	38	D	63		88	
14	B	39	A	64		89	
15	A	40	C	65		90	
16	B	41	B	66		91	
17	A	42	D	67		92	
18	B	43	A	68		93	
19	B	44	D	69		94	
20	A	45	C	70		95	
21	A	46	D	71		96	
22	C	47	A	72		97	
23	A	48	A	73		98	
24	B	49	A	74		99	
25	C	50	A	75		100	

© Oxford Aviation Services Limited

CHAPTER NINE - PROCEDURES FOR AIR TRAFFIC MANAGEMENT (PANS RAC - DOC 4444)

Contents

		Page
9.1	INTRODUCTION.	9-1
9.2	FLIGHT PLAN	9-1
9.3	CHANGE FROM IFR TO VFR FLIGHT	9-2
9.4	CLEARANCES AND INFORMATION	9-3
9.5	POSITION REPORTING	9-5
9.6	AIR TRAFFIC INCIDENT REPORT (ATIR)	9-9
9.7	AIRBORNE COLLISION AVOIDANCE SYSTEMS (ACAS).	9-9
	REVISION QUESTIONS	9 - 11

© Oxford Aviation Services Limited

9.1 INTRODUCTION

9.1.1 Doc4444. The Procedures for Air Navigation Services - Air Traffic Management (PANS-ATM) (DOC 4444) are the result of the progressive evolution of the Procedures for Air Navigation Services - Air Traffic Control (PANS-ATC) prepared by the Air Traffic Control Committee of the International Conference on North Atlantic Route Service Organisation (Dublin, March 1946). Procedures contained in the present documents are complimentary to the Standards and Recommended Practices contained in Annexes 2 and 11. They are supplemented when necessary by regional procedures contained in Part 1 of the Regional Supplementary Procedures (Doc 7030).

9.1.2 Terrain Clearance. Although the procedures in PANS-ATM are mainly directed to air traffic services personnel, the attention of pilots-in-command is drawn to the following. The objectives of the air traffic control service do not include prevention of collision with terrain. The procedures described in this document, with the exception of radar vectoring of IFR traffic, do not relieve the pilot of his responsibilities of ensuring that any clearance issued by air traffic control units are safe in this respect.

9.2 FLIGHT PLAN

9.2.1 Submission of a Flight Plan. A flight plan is defined as 'specified information provided to ATSUs, relative to an intended flight or portion of a flight'. It may be 'filed' (submitted to the ATSU), depending upon the circumstance, either before or after departure. Where a FP is submitted to obtain air traffic control the PIC must wait for a clearance before proceeding. If the FP is submitted for advisory ATC the PIC is wait for acknowledgement of the of receipt before proceeding.

9.2.1.1 Prior to Departure. Except when other arrangements have been made for submission of repetitive flight plans (RPLs), a flight plan submitted prior to departure should be submitted in person or by telephone to the air traffic services reporting office at the departure aerodrome. If no such unit exists at the departure aerodrome, the flight plan should be submitted by telephone or teletypewriter, or if these means are not available, by radio to the unit serving or designated to serve the departure aerodrome.

a. In normal circumstances, a flight plan should be submitted not less than 1 hr before departure.

b. Where clearance to enter an Oceanic CTA or flow management is applicable, the FP should be submitted not less then 3 hours before departure.

c. In exceptional circumstances, ATC will accept a FP 30 minutes before departure but the PIC must be prepared to accept whatever ATC can offer in the way of a clearance.

d. For a non-commercial, non-scheduled international flight, the plan is to be filed at least 2 hours before arrival.

© Oxford Aviation Services Limited

e. Where air traffic flow management (ATFM) is applied, usually to scheduled flights with repetitive flight plans (RPLs) the critical time is the estimated off blocks time (EOBT) and this will reflect the taxi, departure and transit time from the point of passenger loading to the time of entry into the managed airspace (the slot time). The ATFMU will calculate the EOBT from the slot time and advise the operator accordingly.

9.2.1.2 Delays to Departure. In the event of a delay of thirty (30) minutes in excess of the estimated off-block time for a controlled flight, or a delay of one hour for an uncontrolled flight for which a flight plan has been submitted, the flight plan should be amended or a new flight plan should be submitted and the old flight plan cancelled, whichever is applicable.

9.2.1.3 Repetitive Flight Plans (RPLs). RPLs are used for IFR flights operated regularly on the same day(s) of consecutive weeks, and on at least 10 occasions or every day over a period of at least 10 days. The elements of the RPL shall have a high degree of stability (only minor changes accepted). RPLs are the main method of submission of FPs for scheduled air services. The air traffic system will activate the FP for every flight of the schedule automatically.

9.3 CHANGE FROM IFR TO VFR FLIGHT

9.3.1 Procedure. Change from IFR flight to VFR flight is only acceptable when a message initiated by the pilot-in-command containing the specific expression "**CANCELLING MY IFR FLIGHT**", together with the changes, if any, to be made to the current flight plan, is received by an air traffic services unit. No invitation to change from IFR flight to VFR flight is to made either directly or indirectly or by inference. No reply, other than the acknowledgement **"IFR FLIGHT CANCELLED AT....(time)"** should normally be made by an air traffic services unit.

When an air traffic services unit is in possession of information that instrument meteorological conditions are likely to be encountered along the route of flight, a pilot changing from IFR flight to VFR flight should, if practicable, be so advised.

9.3.2 Advice to Other ATCUs. An air traffic services unit receiving notification of an aircraft's intention to change from IFR to VFR flight shall, as soon as practicable thereafter, so inform all other traffic services units to whom the IFR plan was addressed, except those units through whose regions or areas the flight has already passed.

© Oxford Aviation Services Limited

9.4 CLEARANCES AND INFORMATION

9.4.1 **Scope** The issuance of air traffic control clearances by air traffic control units constitutes authority for an aircraft to proceed only in so far as known air traffic is concerned. Clearances are based on known traffic conditions which affect safety in aircraft operation. Such traffic conditions include not only aircraft in the air and on the manoeuvring area over which control is being exercised, but also any vehicular traffic or other obstructions not permanently installed on the manoeuvring area in use. If an air traffic control clearance is not suitable to the pilot-in-command of an aircraft, he may request and, if practicable, obtain an amended clearance. Clearances issued by controllers relate to traffic and aerodrome conditions only and do not relieve a pilot of any responsibility whatsoever in connection with a possible violation of applicable rules and regulations.

9.4.2 **Issuance.** Air traffic control units shall issue such air traffic control clearances as are necessary to meet the objectives of collision prevention and the expedition and maintenance of an orderly flow of air traffic. Aircraft flying through a terminal control area shall, where possible, be cleared by the most direct route from the entry to the exit point of the terminal control area. Similarly, aircraft arriving and/or departing within a terminal control area shall, where possible, be cleared by the most direct route from the point of entry to the aerodrome of landing or from the aerodrome of departure to the point of exit. Aircraft intending supersonic flight shall, whenever possible, be cleared by the most direct route from the point of entry to the aerodrome of landing or from the aerodrome of departure to the point of exit. Aircraft intending supersonic flight shall, whenever practicable, be cleared for the transonic acceleration prior ro departure.

9.4.3 **Control of air traffic flow**. When it becomes apparent to an air traffic control unit that traffic additional to that already accepted cannot be accommodated within a given period of time (overload) at a particular location or in a particular area , or can only be accommodated at a given rate, that unit is to advise other air traffic control units known or believed to be concerned. Pilots-in-command of aircraft destined to the location or area in question and operators known or believed to be concerned are also to be advised of the delays expected or the restrictions that will be applied.

9.4.4 **Altimeter setting procedures.** For flights in the vicinity of aerodromes the vertical position of aircraft shall be expressed in terms of altitude at or below the transition level. While passing through the transition layer, vertical position shall be expressed in terms of flight levels when ascending and in terms of altitudes when descending.

© Oxford Aviation Services Limited

a. **Continuous descent**. After approach clearance has been issued and the descent to land is commenced, the vertical position of an aircraft above the transition level may be expressed by reference to altitudes (QNH) provided that level flight above the transition altitude is not indicated or anticipated. **Note**:- this is intended to apply primarily to turbine-engined aircraft for which an uninterrupted descent from a high level is desirable and to aerodromes equipped to control such aircraft by reference to altitudes throughout the descent.

b. **Use of QFE**. When an aircraft, which has been given a clearance as number one to land, is completing its approach using QFE, the vertical position of the aircraft shall be expressed in terms of height above aerodrome elevation during that portion of its flight for which QFE may be used. However, vertical position shall be expressed in terms of height above runway threshold elevation:

1. for instrument runways, if the threshold is 2 metres (7 feet) or more below the aerodrome elevation, and

2. for precision approach runways.

c. **En route**. Except where, on the basis of regional air navigation agreements, a transition altitude has been established for a specified area, for flights en route the vertical position of aircraft shall be expressed in terms of:

1. flight levels at or above the lowest usable flight level;

2. altitudes below the lowest usable flight level;

9.4.5 Determination of the transition level. Approach control offices or aerodrome control towers shall establish the **transition level** to be used in the vicinity of the relevant aerodrome(s) concerned. Where a common transition altitude has been established for two or more aerodromes which are so closely located as to require co-ordinated procedures, the appropriate air traffic services units shall establish a common transition level to be used at any given time in the vicinity of the aerodrome concerned.

9.4.6 Provision of information. Appropriate air traffic service units shall at all times have available for transmission to aircraft in flight, on request, the information required to determine the lowest flight level which will ensure adequate terrain clearance on routes or segments of routes for which this information is required.

a. **Area QNH or forecast QNH**. Flight information centres and area control centres shall have available for transmission to aircraft on request an appropriate number of QNH reports or forecast pressures for the flight information regions and control areas for which they are responsible.

© Oxford Aviation Services Limited

b. **Transition level**. The transition level shall be included in approach clearances when so prescribed by the appropriate authority or requested by the pilot.

c. **Aerodrome QNH**. A QNH altimeter setting shall be included in approach clearances or clearances to enter the traffic circuit and in taxi clearances for departing aircraft, except when it is known that the aircraft already have received the information. QNH altimeter setting shall be provided to aircraft on request or on a regular basis in accordance with local arrangements. Where reference is made to aerodrome elevation the aerodrome QFE shall be provided (see 9.4.4 b. 1) and 2)).

d. **Round down**. Altimeter settings provided to aircraft shall be rounded down to the nearest lower whole hectopascal (millibar).

9.4.7 **Indication of heavy wake turbulence and MLS capability.** For aircraft in the heavy wake turbulence category the word "Heavy" shall be included immediately after the aircraft call sign in the **initial** radio contact between the aircraft and ATC prior to departure or arrival. Wake turbulence categories are specified in the instructions for completing Item 9 of the flight plan.

The appropriate MLS capability designator (FP item 10 - kilo) shall be included, whenever appropriate, in the initial radiotelephony contact between such aircraft and the control office, prior to departure or arrival.

9.5 POSITION REPORTING

9.5.1 **Transmission of position reports.** On routes defined by designated significant points (reporting points x- compulsory , - non-compulsory) position reports shall be made when over, or as soon as possible after passing, each designated compulsory reporting point. Additional reports over other (non-compulsory) points may be requested by the appropriate air traffic services unit by the appropriate air traffic services unit when so required for air traffic services purposes.

a. **Routes not defined by reporting points**. On routes not defined by designated significant points, position reports shall be made as soon as possible after the first half hour of flight and at hourly intervals thereafter. Additional reports over other points may be requested by the appropriate air traffic services unit when so required for air traffic services purposes.

© Oxford Aviation Services Limited

b. **'Omit position reports'**. Under conditions specified by the appropriate ATS authority, flights may be exempted form the requirement to make position reports at each designated compulsory reporting point or interval. In applying this paragraph, account should be taken if the meteorological requirement for the making and reporting of routine aircraft observations. **Note**:- This is intended to apply in cases where adequate flight progress data are available from other sources, e.g. ground radar, and in other circumstances where the omission of routine reports from selected flights is found to be acceptable. ATC will advise pilots to "Omit position reports".

c. **Reporting Unit**. The position reports shall be made to the air traffic services unit serving the airspace in which the aircraft is operated. In addition, when so prescribed by the appropriate ATS authority in aeronautical information publications or requested by the appropriate air traffic services unit, the last position report before passing from one flight information region or control area shall be made to the air traffic services unit serving the airspace about to be entered

d. **Late reporting**. If a position report is not received at the expected time, subsequent control shall not be based on the assumption that the estimated time is accurate. Immediate action shall be taken to obtain the report if it likely to have any bearing on the control of other aircraft.

9.5.2 **Contents of position report.** A position report shall contain the following elements of information, except that the elements d) e) and f) may be omitted from position reports transmitted by radiotelephony, when so prescribed on the basis of regional air navigation agreement. **Note**:- Omission of element d) may be possible when flight level or altitude, as appropriate, derived from SSR Mode C information can be made continuously available to controllers in a labelled form, and when adequate procedures have been developed to guarantee the safe and efficient use of SSR mode C information.

a. Aircraft identification

b. Position.

c. Time.

d. Flight level or altitude.

e. Next position and time over.

f. Ensuing significant point.

© Oxford Aviation Services Limited

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

a. **Transmission of ADS reports.** The position reports shall be made automatically to the air traffic services unit serving the airspace in which the aircraft is operating. The requirements for the transmission and contents of ADS reports shall be established by the controlling ATC unit on the basis of current operational conditions, and committed to the aircraft and acknowledged through an ADS agreement.

9.5.4 **Air-Reports and Special Air-Reports (Routine Airep and Special Aireps).** When operational and/or routine meteorological information is to be reported by an aircraft en route at points or times where position reports are required, the position report is to be given in the form of a routine air-report (airep). Special aircraft observations are reported as special aireps. All aireps are to be reported as soon as possible. When ADS is applied, para 9.5.3 applies.

a. **Contents of routine air-reports**. Routine aireps transmitted by voice or data link when ADS is not being applied, are to give information relating to such of the following elements as are necessary for compliance with sub para b) below.

1. **Position information**.

i. Aircraft identification
ii. Position
iii. Time
iv. Flight level or altitude
v. Next position and time over
vi. Ensuing significant point

2. **Operational information.**

i. Estimated time of arrival
ii. Endurance

3. **Meteorological information**.

i. air temperature
ii. Wind direction
iii. Wind speed
iv. Turbulence
v. Aircraft icing
vi. Humidity (if available)

© Oxford Aviation Services Limited

Note: Section 1 of the airep is mandatory except that v. and vi. may be omitted if in accordance with a regional air navigation agreement. Section 2 is only transmitted when requested by the operator (or agent) and when deemed necessary by the pilot. Section 3 is transmitted when requested "report met". One aircraft per hour flying routes in the NAT area is required to report met.

b. **Contents of special air-reports.** Special air-reports are to be made by all aircraft when any of the following conditions are encountered or observed:

1. Severe turbulence
2. severe icing
3. severe mountain wave
4. thunderstorms (with or without hail that are embedded, widespread or in line squalls)
5. heavy duststorms or heavy sandstorms
6. volcanic ash cloud
7. pre-eruption volcanic activity or volcanic eruption

Additionally, in the case of transonic/supersonic flight:

8. moderate turbulence
9. hail
10. cumulonimbus clouds

c. **AIREP/AIREP SPECIAL forms.** Airep/Airep special forms (Doc 4444 app 1) are provided for the use of flight crew in compiling the required reports. Instructions for compilation and phraseology are also provided.

d. **Special Air-reports for Volcanic Activity.** Reports containing observations of volcanic activity are to be recorded on the special 'air-report of volcanic activity' form.

© Oxford Aviation Services Limited

9.6 AIR TRAFFIC INCIDENT REPORT (ATIR)

9.6.1 AIRPROX. The code word used in an air traffic incident report to designate air proximity. An air traffic incident report should be submitted, normally to the air traffic services unit concerned, for incidents specifically related to the provision of air traffic services involving such occurrences as aircraft proximity (AIRPROX) or other serious difficulty resulting in hazard to aircraft, caused by e.g.: faulty procedures, non-compliance with procedures, or failure of ground facilities.

9.6.2 Determination of Risk. Procedures are established for the reporting of aircraft proximity incidents and their investigation to promote the safety of an aircraft. The degree of risk involved in an aircraft proximity should be established in the incident investigation and classified as "risk of collision", "safety not assured", "no risk of collision" or "risk not determined". When an accident/incident investigative authority conducts an investigation of an aircraft proximity incident, the air traffic services aspects should be included.

9.7 AIRBORNE COLLISION AVOIDANCE SYSTEMS (ACAS).

9.7.1 Definition. ACAS - An aircraft system based on secondary surveillance radar(SSR) transponder signals which operate independently of ground-based equipment to provide advice to the pilot on potential conflicting aircraft that are equipped with SSR transponders.

9.7.2 ATC Procedures. The procedures to be applied for the provision of air traffic services to aircraft equipped with ACAS shall be identical to those applicable to non-ACAS equipped aircraft. In particular, the prevention of collisions, the establishment of appropriate separation and the information which might be provided in relation to conflicting traffic and to possible avoiding action shall conform with the normal ATS procedures and shall exclude consideration of aircraft capabilities dependent on ACAS equipment.

9.7.3 ACAS Advisory. When a pilot reports an manouevre induced by an ACAS resolution advisory, the controller shall not attempt to modify the aircraft flight path until the pilot reports returning to the terms of the current air traffic control instruction or clearance but shall provided traffic information as appropriate. **Note**:- The ACAS capability of an aircraft will not normally be known to air traffic controllers.

© Oxford Aviation Services Limited

REVISION QUESTIONS CHAPTER 9

1. 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 1234
   c. Doc 4444
   d. Doc 7333

2. The ICAO Rules of the Air are detailed in Annex 2. Why do we need PANS-ATM?

   a. Annex 2 doesn't cover national procedures. PANS-ATM does
   b. PANS documents contain far more detail of procedures than can be incorporated in the relevant Annex to the Convention
   c. ATC procedures are covered in Annex 11 and the Rules of the Air in Annex 2. As the two are complimentary, they have both been combined in PANS-ATM
   d. PANS –ATM is applicable to pilots and ATCOs, whereas Annex 2 is only applicable to pilots

3. When do PANS-ATM procedures absolve pilots from the responsibility for terrain avoidance?

   a. Never
   b. During take off and landing
   c. When under radar vectoring
   d. When flying a pre-defined instrument approach procedure

4. A flight plan may be filed to the ATCC by:

   1. In person
   2. By phone
   3. By fax
   4. By teleprinter
   5. Letter
   6. E-mail

   Which combination is correct?

   a. All the above
   b. 1 – 4 only
   c. 2 – 4 only
   d. All except 6

© Oxford Aviation Services Limited

5. What does the abbreviation EOBT mean?

   a. **E**stimated **O**ut-**B**ound **T**ime
   b. **E**ngine start/**O**n **B**oard **T**ime
   c. **E**stimated **O**ff **B**locks **T**ime
   d. **E**stimate **O**f **B**rakes off **T**ime

6. What must you do if a delay in EOBT of 40 minutes is expected?

   a. Re-negotiate a new slot time
   b. Taxy as soon a possible
   c. Ask ATC re issue a revised clearance
   d. File a revised flight plan

7. When may a pilot elect to change flight rules from IFR to VFR?

   a. If he/she is unable to maintain IMC
   b. If he/she is able to complete a significant part of the remainder of the flight in uninterrupted VMC
   c. If advised to do so by ATC
   d. If by remaining IFR delays will be incurred in holding patterns

8. You are given an ATC clearance which includes flight through prohibited airspace. What should you do?

   a. Continue – the ATCOs must know what they are doing!
   b. File a revised flight plan for another route
   c. Tell the ATCO that you cannot comply and will fly the route as flight planned
   d. Request a revised clearance

9. What are the objectives of an ATC clearance?

   a. Collision avoidance and air traffic flow management
   b. To see how accurately the pilot can read the clearance back and test if he can spot errors
   c. To allow a flight to commence and to inform subsequent ATCC that the flight is about to commence
   d. To give route and altitude specific information when different from that flight planned

10. The met man records QNH (ie MSL pressure to the nearest 1 decimal place). How is QNH reported if the QNH is 1007.8mb?

    a. 1008mb
    b. 1007mb
    c. If Temp is greater than 15° C, 1008
    d. It doesn't really matter. Either 1007 or 1008 will do!

© Oxford Aviation Services Limited

11. Who determines the transition level?

a. The pilot
b. The ATCO
c. The operator
d. The authority of the state in which the aerodrome is situtated

12. Who determines the transition height?

a. The pilot
b. The ATCO
c. The operator
d. The authority of the state in which the aerodrome is situated

13. When an aircraft carrying out a non precision instrument approach is cleared to land using QFE, height is express with reference to what?

a. The aerodrome elevation
b. The threshold of the landing runway
c. The altitude of the highest point on the manoeuvring area
d. The threshold elevation if 2 metres or more below aerodrome elevation

14. An aeroplane has a take off mass of 136,000 kg. What is the wake turbulence category of this aeroplane?

a. Heavy. Any aeroplane with a max take off mass equal to or greater than 136,000 kg is heavy
b. Medium. Only aeroplanes with max take off mass greater than 136,000 kg are heavy.
c. It depends upon the actual take off mass not max take off mass. If actual take off mass is equal to or less than 136,000Kg – medium; more than 136,000 – Heavy
d. A wide bodied aeroplane at that mass would be heavy, narrow body would be medium

15. If your aeroplane is wake turbulence category heavy, how do you indicate this to ATC?

a. Suffix your callsign with the word 'heavy' at all times
b. Suffix your callsign with the word 'heavy' on initial contact with a ATCU
c. You do not need to, it is on your flight plan
d. Make a point of telling ATC at some time after initial contact that you are a heavy category aeroplane

© Oxford Aviation Services Limited

16. If position reports are required, is it essential to make the report exactly over the position?

a. Yes
b. Yes, but as soon as possible after is acceptable
c. No, but within 2 minutes is required
d. No, it depends upon the RNP number for the route

17. You intend to fly in the open FIR (non airways) under IFR. Without defined reporting points, where/when should you make position reports?

a. At significant geographic points (ie 50N 010W; 50N 020W etc..)
b. At any turning points
c. 30 minutes after starting the flight then hourly thereafter
d. If the route is not a defined ATS route, you do not need to make position reports

18. When are you **not** required to make position reports on a controlled flight?

a. When advised by ATC to cease position reports
b. If navigating by visual reporting points (VRPs)
c. Outside of controlled airspace
d. If flying under VFR

19. A standard position report consists of:

1. Ident
2. Position
3. Time
4. FL (or altitude)
5. Next position and ETA
6. Next significant position

When are you permitted to omit the FL (or altitude) information?

a. If the ATC clearance specifies a FL or altitude to be flown
b. If under radar control
c. If outside of controlled airspace
d. If SSR mode C serviceable and advised to omit by ATC

© Oxford Aviation Services Limited

20. When two aircraft under ATC approach to within a distance between them less than the specified separation minima, something has gone wrong. Both pilots and ATCOs are required to report such instances. What is the name of the form used to report the occurrence?

a. AIRPROX report
b. Air traffic incident report (ATIR)
c. AIRMISS report
d. Air traffic violation report

© Oxford Aviation Services Limited

ANSWERS TO REVISION QUESTIONS FOR CHAPTER 9

1	C	26		51		76	
2	B	27		52		77	
3	C	28		53		78	
4	C	29		54		79	
5	C	30		55		80	
6	D	31		56		81	
7	B	32		57		82	
8	D	33		58		83	
9	A	34		59		84	
10	B	35		60		85	
11	B	36		61		86	
12	D	37		62		87	
13	D	38		63		88	
14	A	39		64		89	
15	B	40		65		90	
16	B	41		66		91	
17	C	42		67		92	
18	A	43		68		93	
19	D	44		69		94	
20	B	45		70		95	
21		46		71		96	
22		47		72		97	
23		48		73		98	
24		49		74		99	
25		50		75		100	

© Oxford Aviation Services Limited

CHAPTER TEN - AREA CONTROL SERVICE

Contents

		Page
10.1	AREA CONTROL SERVICE	10 - 1
10.2	HORIZONTAL SEPARATION	10 - 3
10.3	AIR TRAFFIC CONTROL CLEARANCES	10 - 19
10.4	EMERGENCY AND COMMUNICATIONS FAILURE	10 - 22
	REVISION QUESTIONS	10 - 25

© Oxford Aviation Services Limited

10.1 AREA CONTROL SERVICE

10.1.1 General provisions for the separation of controlled traffic. Vertical and horizontal separation is to be provided by ATC as detailed in a - e below. However, IFR flights in VMC during daylight hours in classes D and E airspace may be cleared to climb and descend whilst maintaining own separation.

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

e. Between special VFR flights, when so prescribed by the appropriate ATS authority

10.1.2 Minimum separation. Clearance will not be given to execute any manoeuvre that would reduce the spacing between two aircraft to less than the separation minimum applicable. Larger separations than the specified minima will be applied whenever wake turbulence or exceptional circumstances such as unlawful interference call for extra precautions. Whenever the type of separation or minimum used to separate two aircraft cannot be maintained, action shall be taken to ensure that another type of separation exists, or is established, the previously applied separation becomes insufficient.

10.1.3 Vertical separation application. Vertical separation is obtained by requiring aircraft using the same altimeter setting to fly at different levels expressed in terms of flight levels or altitudes.

10.1.4 Vertical separation minimum. The vertical separation minimum (VSM) is:

a. within designated airspace (subject to regional air navigation agreement (RVSM)), a nominal 300m (1000 ft) below FL 410 or a higher level where so prescribed for use under specified conditions, and a nominal 600m (2000f t) at or above this level; and

b. within all other airspace : a nominal 300m (1000ft) below FL 290 and a nominal 600m (2000ft) at or above this level.

© Oxford Aviation Services Limited

10.1.5 Minimum cruising level Except when specifically authorised by the appropriate authority, cruising levels below the minimum flight altitudes (established by the State) shall not be assigned. Area control centres shall, when circumstances warrant it, determine the lowest useable flight level or levels for the whole or parts of the control area for which they are responsible, and use it when assigning flight levels and pass it to pilots on request. Unless otherwise prescribed by the State concerned, the lowest usable flight level is that which corresponds to, or is immediately above, the established minimum flight altitude. The portion of a control area for which a particular lowest usable flight level applies is determined in accordance with air traffic services requirements.

10.1.6 Assignment of Cruising Level. An ACC will normally allocate only one cruising level to an aeroplane (except where cruise climb is authorised), for flight in the control area or for flight entering another control area.

a. **Level Change.** If a change in cruising level is required, the aircraft is to request a level change en route (after initial clearance received). Aircraft, cruise climb authorised, will be cleared to operate between two levels. On ATS routes (airways) extending beyond the control area, level changes are to be effected over a radio navigation aid (in a hold). If an aircraft has been cleared into a CTA below the minimum cruising level for that airspace, the ACC will issue a clearance to climb even though the pilot has not requested it. When necessary, an aircraft may be cleared to change cruising level at a specified time, place or rate.

b. **Same destination.** If practicable, cruising levels of aircraft bound for the same destination will be assigned to facilitate the correct approach sequence at the destination.

c. **Priority.** An aircraft at a cruising level will have priority over aircraft requesting that level. When two or more aircraft are at the same level, the preceding aircraft will have priority

d. **Allocation separation.** An aircraft may be assigned a level previously occupied by another aircraft after the latter has reported vacating it. In the case of severe turbulence or cruise climb, the assignment will be withheld until the other aircraft has reported at another level separated by the required minimum.

e. **Table of cruising levels.** The levels allocated are to be in accordance with the table of cruising levels in chapter 6 except where a specific level is allocated by ATC.

10.1.7 Vertical separation during ascent or descent. Pilots 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.

© Oxford Aviation Services Limited

10.2 HORIZONTAL SEPARATION

10.2.1 Definition. Horizontal separation relates to the distance between aircraft in the horizontal plane. This may be longitudinal (aircraft following the same route) where the separation standard is based on time or distance along track between aircraft, or lateral.

10.2.2 Lateral separation. Lateral separation shall be applied so that the distance between those portions of the intended routes for which the aircraft are to be laterally separated is never less than an established distance to account for navigational inaccuracies plus a specified buffer. This buffer shall be determined by the appropriate authority and included in the lateral separation minima. Lateral separation of aircraft at the same level is obtained by requiring operation on different routes or in different geographical locations as determined by visual observation, by use of navigation aids or by use of area navigation (RNAV) equipment.

10.2.2.1 Lateral separation criteria and minima. Means by which lateral separation may be achieved include the following:

a. **Geographical separation**. Separation positively indicated by position reports over different geographical locations as determined visually or by reference to a navigation aid.

b. **Track separation**. Used between aircraft using the same navigation aid or method. It is achieved by requiring aircraft to fly on specified tracks which are separated by a minimum amount appropriate to the navigation aid or method employed as follows:

1. VOR: track divergence of at least 15 degrees and at a distance of 28km (15 NM) or more from the facility (see fig 10.2.2.1a) ;

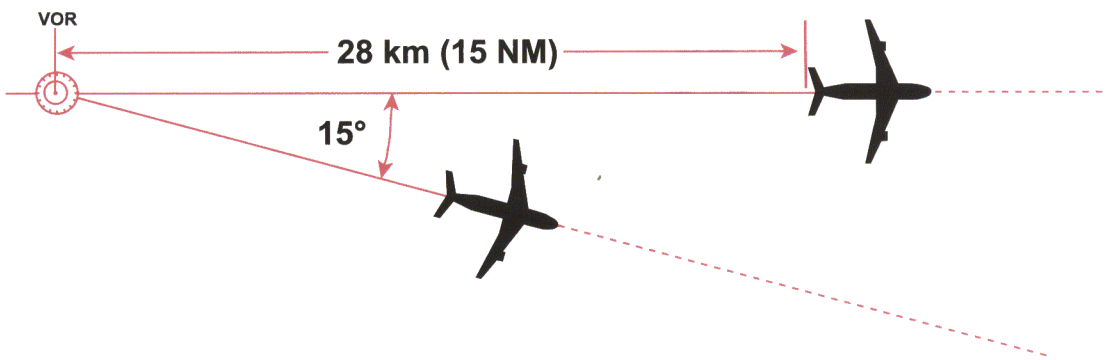


Figure 10.2.2.1a

© Oxford Aviation Services Limited

2. NDB. track divergence of at least 30 degrees and at a distance of 28 km (15 NM) or more from the facility (see fig 9.9.2.1b)

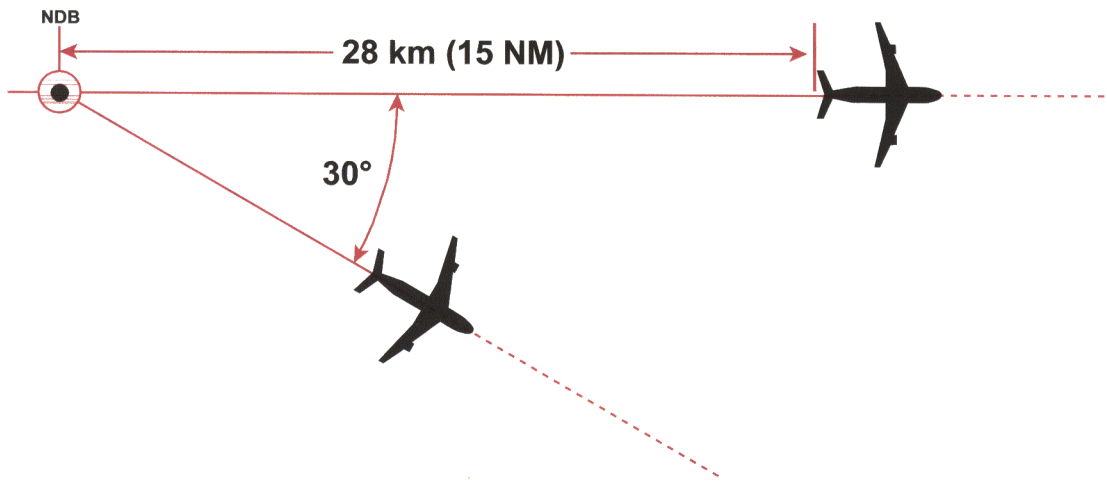


Figure 10.2.2.1b

3. Dead reckoning (DR). tracks diverging by at least 45 degrees and at a distance of 28 km (15NM) or more from the point of intersection of the tracks, this point being determined either visually or by reference to a navigation aid.

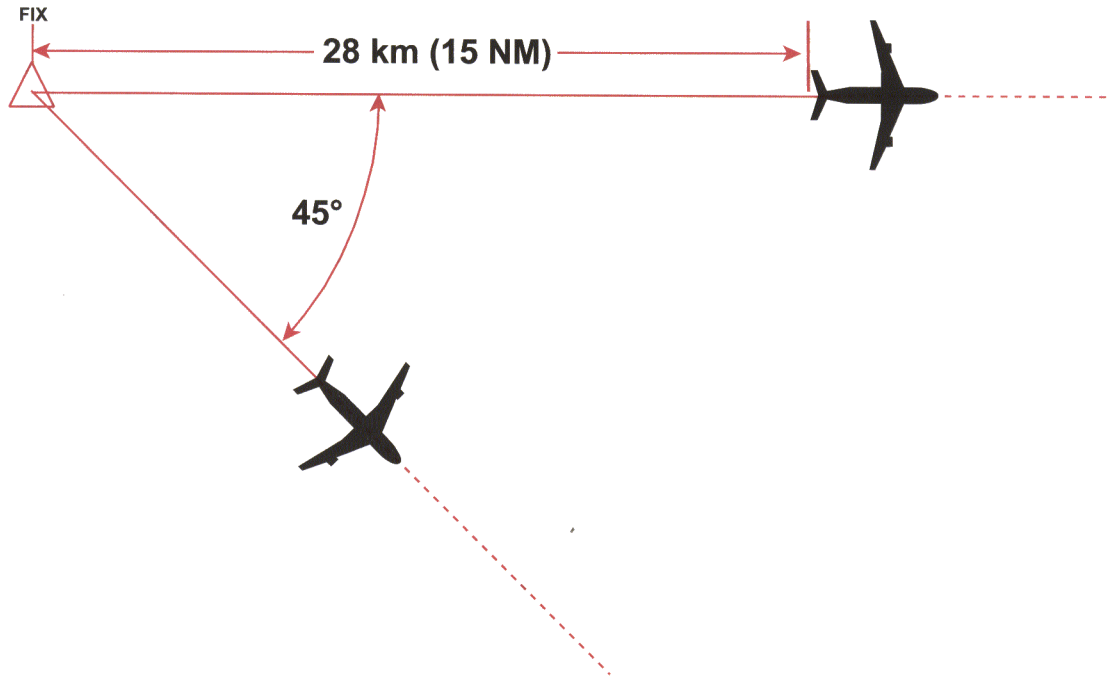


Figure 10.2.2.1c

Note: When aircraft are operating on tracks which are separated by considerably more than the foregoing minimum figures, States may reduce the distance at which lateral separation is achieved.

© Oxford Aviation Services Limited

10.2.2.2 Different navigation aids. Lateral separation between aircraft using different navigation aids, or where one aircraft is using RNAV equipment, is to be established by ensuring that the derived protected airspaces do not overlap.

10.2.2.3 RNAV operations. Within designated airspace or on parallel routes where RNP is specified, lateral separation between RNAV aircraft may be obtained by requiring aircraft to be established on the centre lines of parallel tracks or ATS routes spaced at a distance which ensures that the protected airspaces do not overlap.

10.2.2.4 Oceanic Operations. Track separation between aircraft entering airspace over the high seas, is achieved by requiring aircraft to fly on specified tracks:

a. which are separated by an appropriate minimum (for the NAT region see NAT Ops manual), then
b. diverge by at least 15 degrees until the applicable lateral separation is established, and
c. it is possible to ensure, by means approved by the appropriate ATS authority, that aircraft have the navigation capability necessary to ensure accurate track guidance.

10.2.3 Longitudinal Separation. Longitudinal separation is the most complex application of separation standards. In procedural ATC (not radar control) the position of the aircraft is that which is reported by the pilot. The positions reported are usually specified reporting points, radio navigation facilities or geographic points for routes not specified by navigation aids. In any event, the position known to the ATCO is only as good as that reported by the pilot. In applying procedural separation, all possible errors must be allowed for and then safety margins applied. The only situation in which the safety margins may be relaxed is where the pilots of aircraft to which separation should be applied have (and confirmed) that they have visual contact with each other and that they can maintain visual contact during the necessary manoeuvre to which separation would otherwise be applied. Clearly, the separation standards assume operations in IMC. The accuracy of pilot position reporting relies on the accuracy of the navigation system in use. In remote areas (over the oceans and desert regions) where RNAV procedures may be used, greater protection needs to be applied. Longitudinal separation applied is either time or distance.

10.2.3.1 Application. Longitudinal séparation is applied so that the spacing between the **estimated** positions of the aircraft being separated is never less than a prescribed minimum. Longitudinal separation between aircraft following the same or diverging tracks may be maintained by application of the Mach number technique, when so prescribed on the basis of regional air navigation agreement. Longitudinal separation is established by requiring aircraft to depart at a specific time, to lose time to arrive over a geographical location at a specified time, or to hold over a geographical location until a specified time. For the purpose of the application of longitudinal separation, the following terms are defined:

© Oxford Aviation Services Limited

a. **Same Track.** The same track case applies when the tracks of two aircraft that require separation, converge or diverge by an angular difference less than 45 or more than 315 and whose protection areas overlap(see fig 10.2.3.1a).

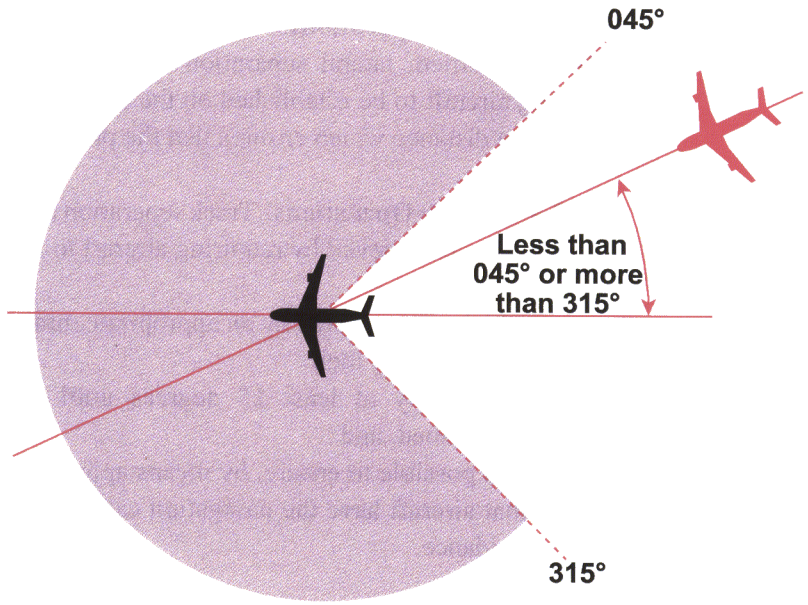


Figure 10.2.3.1a

b. **Reciprocal Track.** The reciprocal track case applies when the tracks of two aircraft that require separation, converge or diverge by an angular difference more than 135 but less than 225 and whose protection areas overlap (see fig 10.2.3.1b).

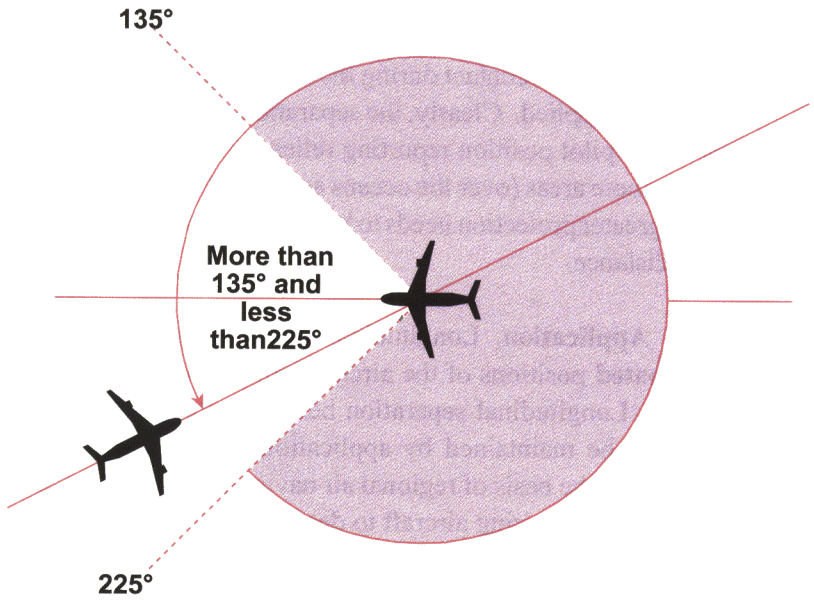


Figure 10.2.3.1b

© Oxford Aviation Services Limited

c. **Crossing Track**. Crossing tracks are defined as tracks which intersect at angles other than those defined in a or b above (see fig 10.2.3.1c).

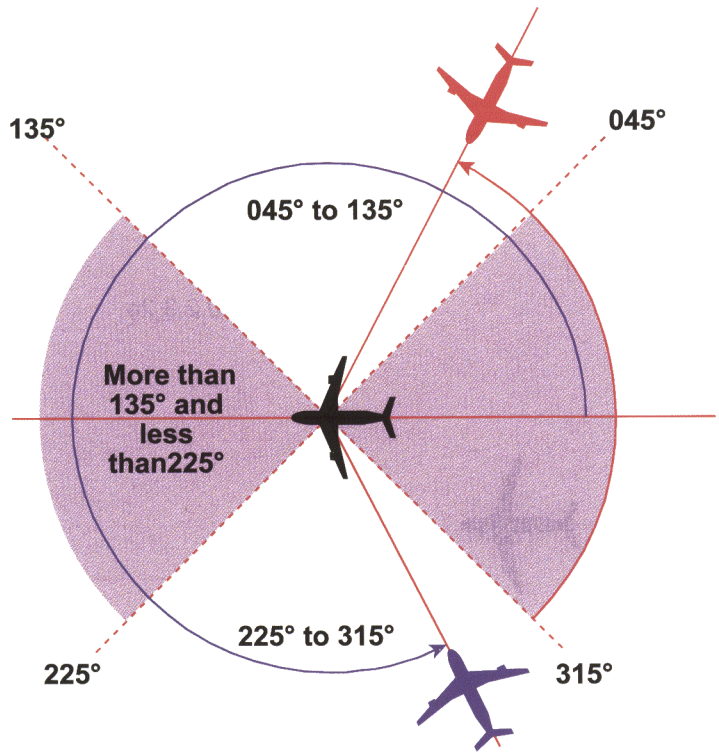


Figure 10.2.3.1c

10.2.3.2 Time Based Longitudinal Separation. The separation standards applied depends whether the aircraft concerned are maintaining the same level, or are climbing/descending.

a. **Aircraft at the same cruising level**. In this case the separation is dependant upon the track case.

1. **Same track case**. The basic standard is that aircraft should be at least 15 minutes apart (see fig 10.2.3.2a). If, however, navigation aids for the route being flown permit frequent determination of position and speed the basic standard may be reduced to 10 minutes (see fig 10.2.3.2b). The standard my be further reduced to 5 minutes (see fig 10.2.3.2c) providing the aircraft have departed from the same aerodrome, or passed over the same en-route reporting point, or reported over a fix that is located relative to the departure point to ensure that 5 minutes separation can be established at the point the departing will join the air route, with the overriding proviso that the preceding aircraft has TAS 20 kts or more faster than the succeeding aircraft. If the speed difference is increased to 40 kts, the standard may be further reduced to 3 minutes (see fig 10.2.3.2d).

© Oxford Aviation Services Limited

2. **Crossing track case.** The basic standard is 15 minutes (see fig 10.2.3.2e). If however, the frequent determination of position and speed caveat applies, the standard may be reduced to 10 minutes (see fig 10.2.3.2f).

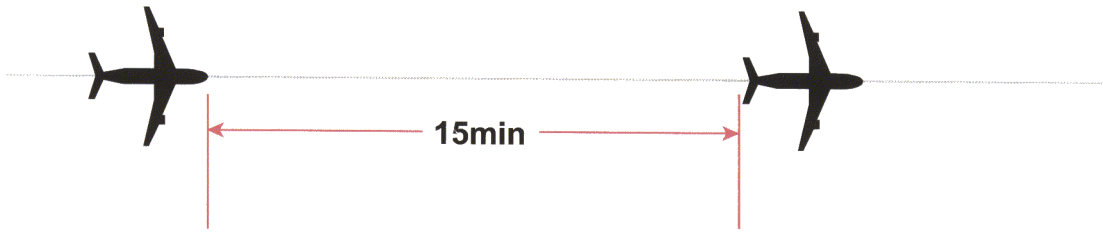


Figure 10.2.3.2a

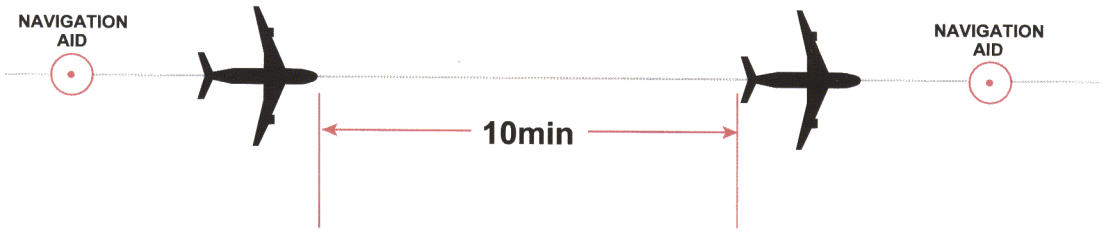


Figure 10.2.3.2b

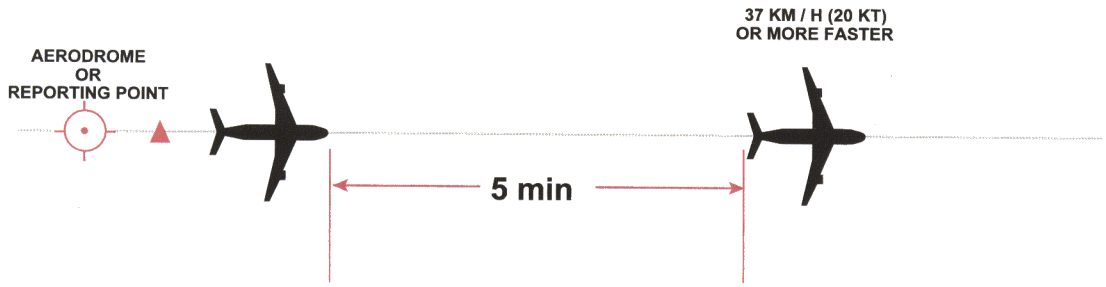


Figure 10.2.3.2c

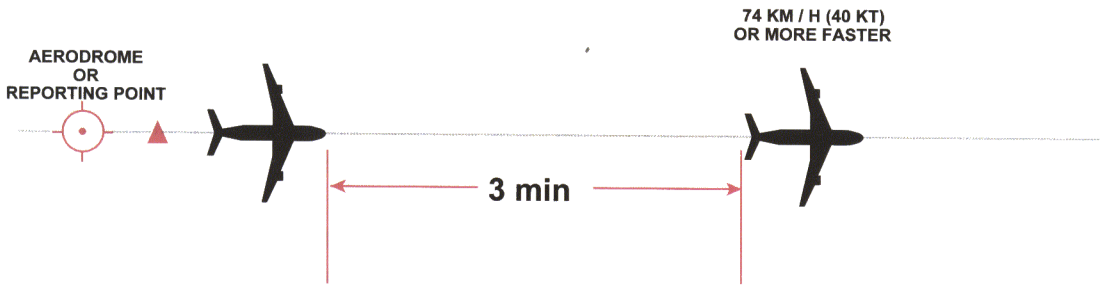


Figure 10.2.3.2d

© Oxford Aviation Services Limited

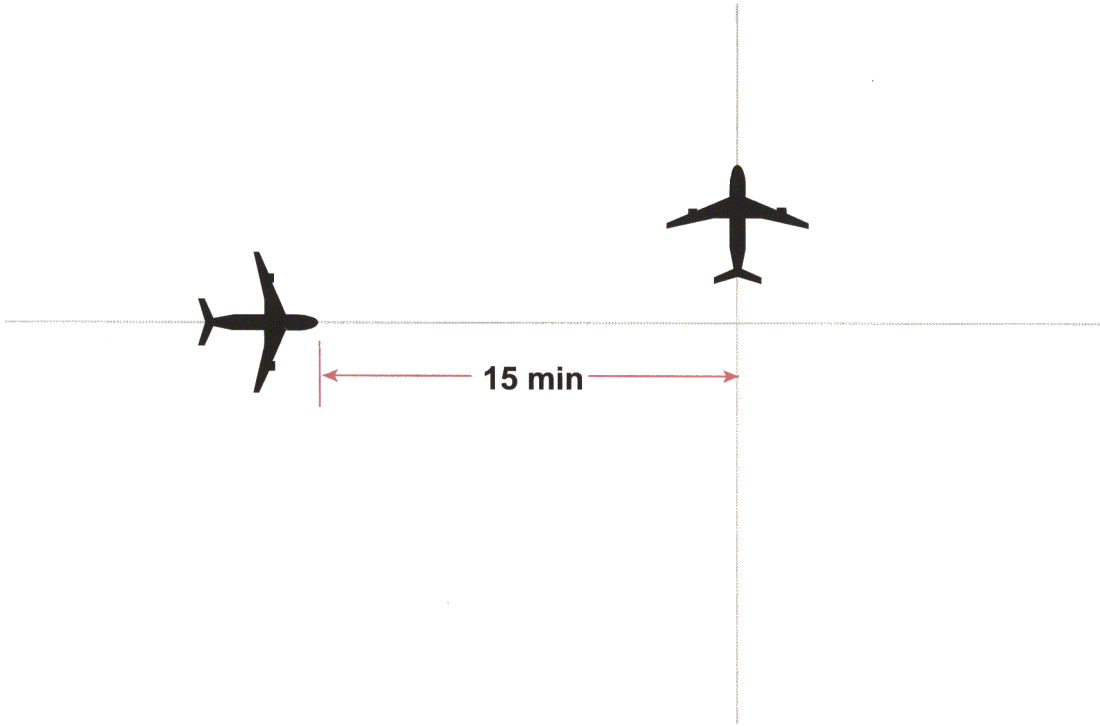


Figure 10.2.3.2e

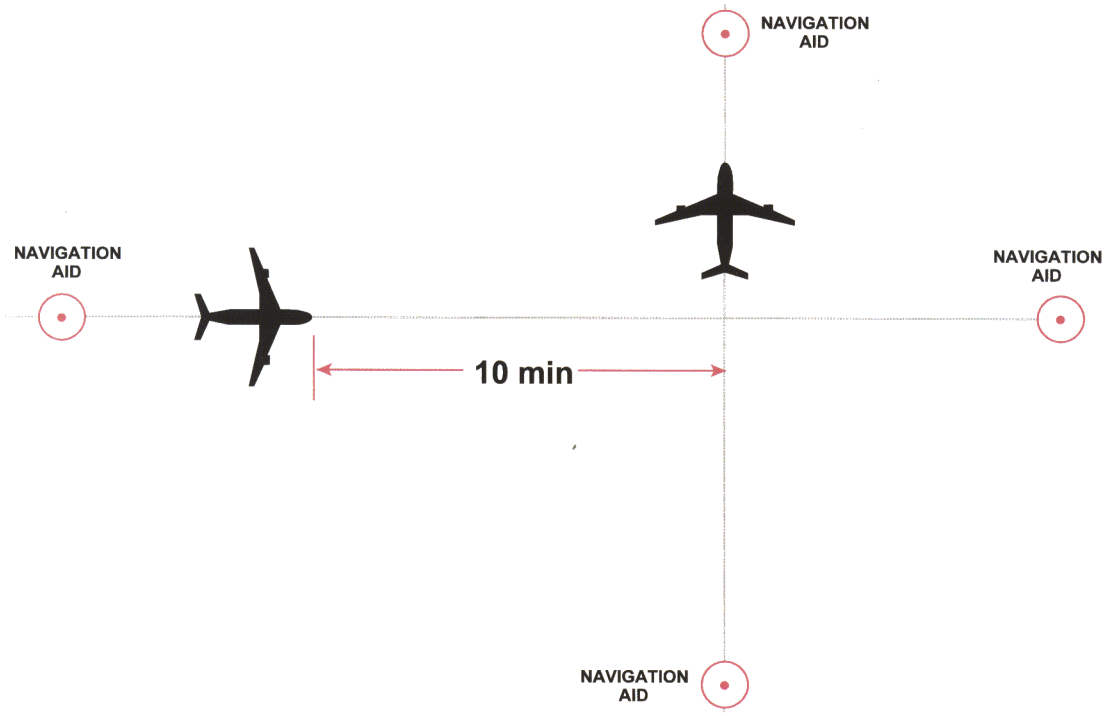


Figure 10.2.3.2f

© Oxford Aviation Services Limited

b. **Climbing or descending**. This a more complex case. Again it depends upon the relative tracks of the aeroplanes but now also involves reciprocal tracks.

1) **Same track**. When an aircraft will pass through the level of another aircraft on the same track, the following minimum longitudinal separation is applied:

i. 15 minutes while vertical separation does not exist (fig 10.2.3.2g and h); or

ii. 10 minutes while vertical separation does not exist provided that navigation aids permit frequent update of position and speed (and approved by the authority) (see fig 10.2.3.2j and k); or

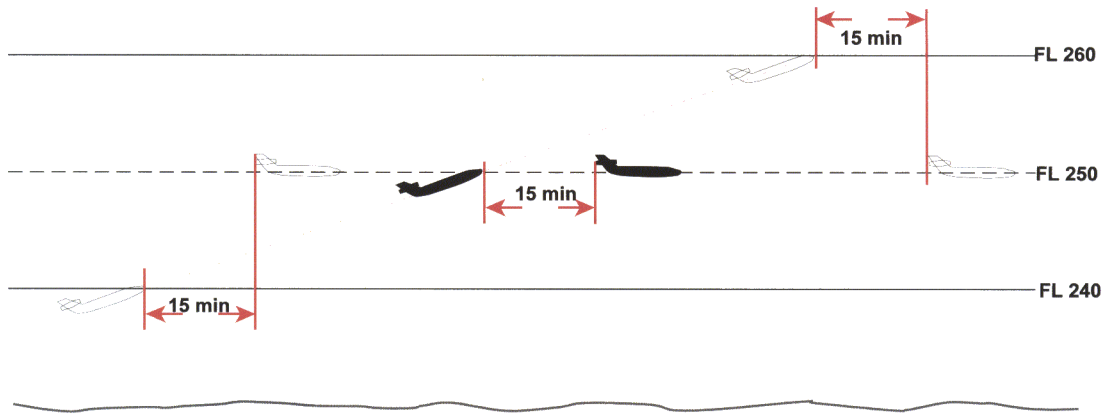


Figure 10.2.3.2g

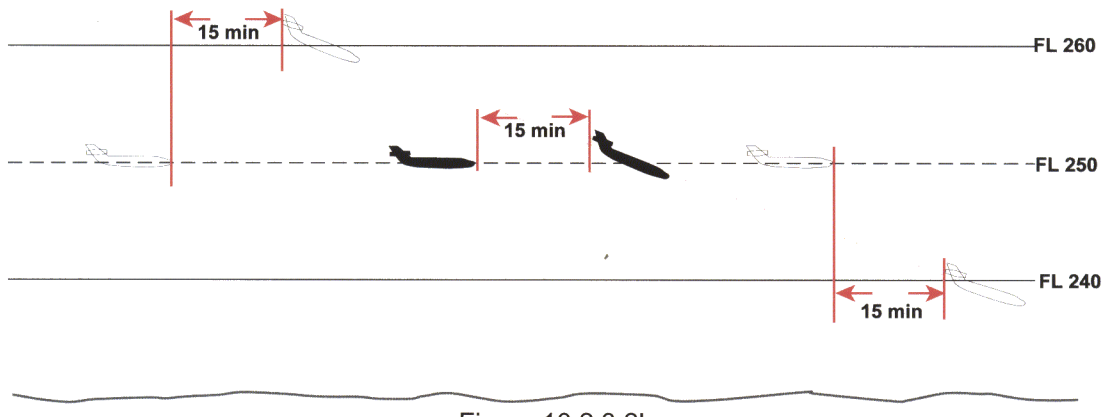


Figure 10.2.3.2h

© Oxford Aviation Services Limited

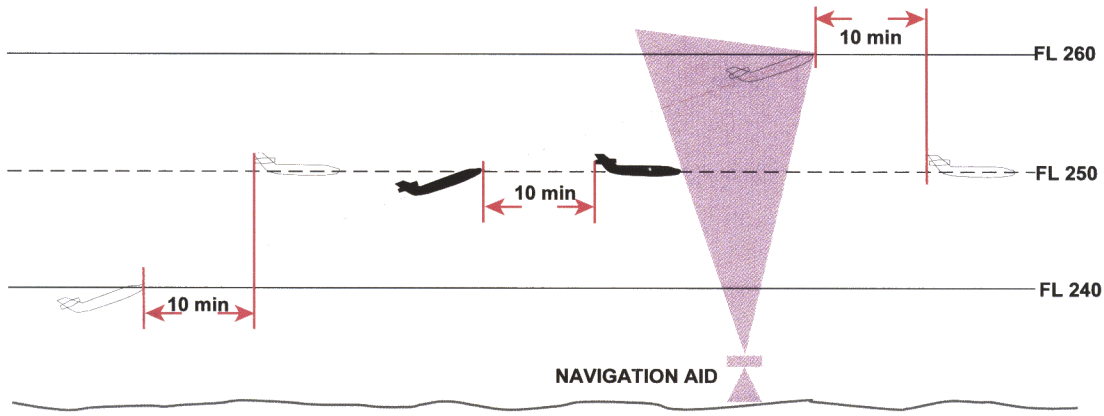


Figure 10.2.3.2j

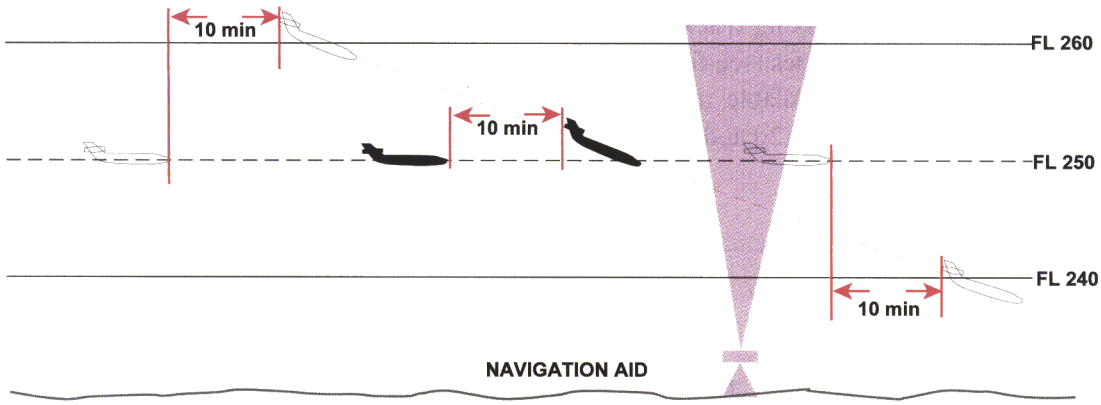


Figure 10.2.3.2k

iii. 5 minutes while vertical separation does not exist, provided that the level change is commenced within 10 minutes of the time that the second aircraft has reported over an exact reporting point (see fig 10.2.3.2 l and m).

Note: If the level change involved is considerable, an intermediate level just above or just below (depending on the case - climb or descend) may be allocated to the manoeuvring traffic. Once at that level, separation will be assessed and if applied, the level crossing manoeuvre approved and executed.

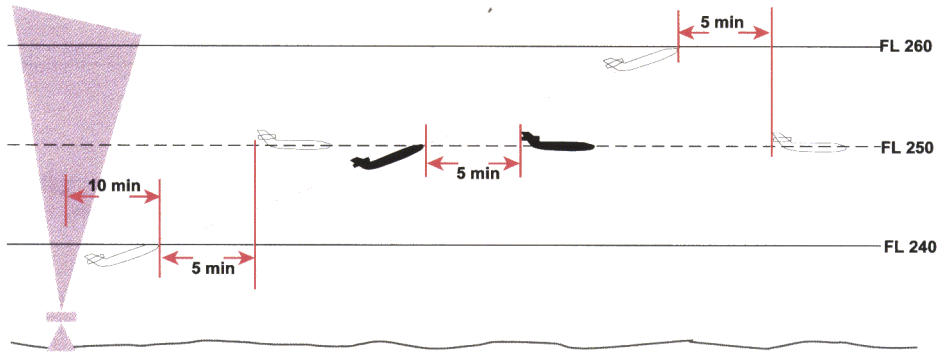


Figure 10.2.3.2l

© Oxford Aviation Services Limited

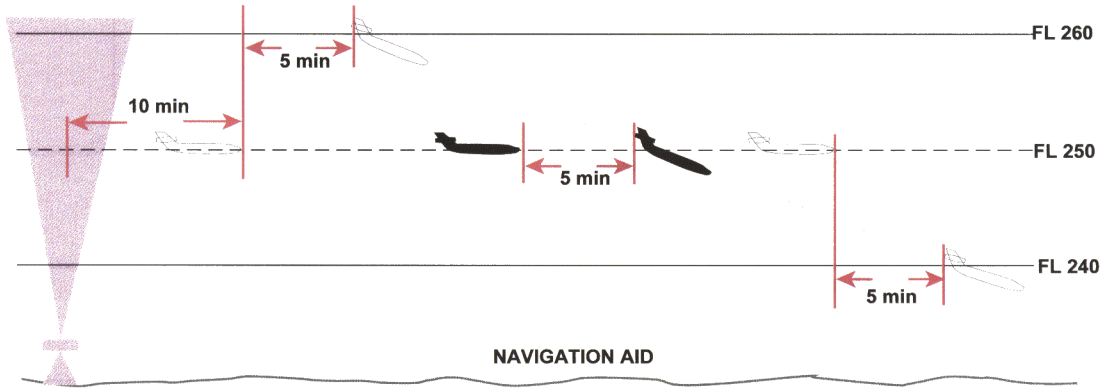


Figure 10.2.3.2m

2. **Crossing tracks**. While vertical separation does not exist, the standard is 15 minutes (see fig 10.2.3.2n and p) unless frequent update of position and speed is available in which case the minimum is reduced to 10 minutes (see fig 10.2.3.2q and r).

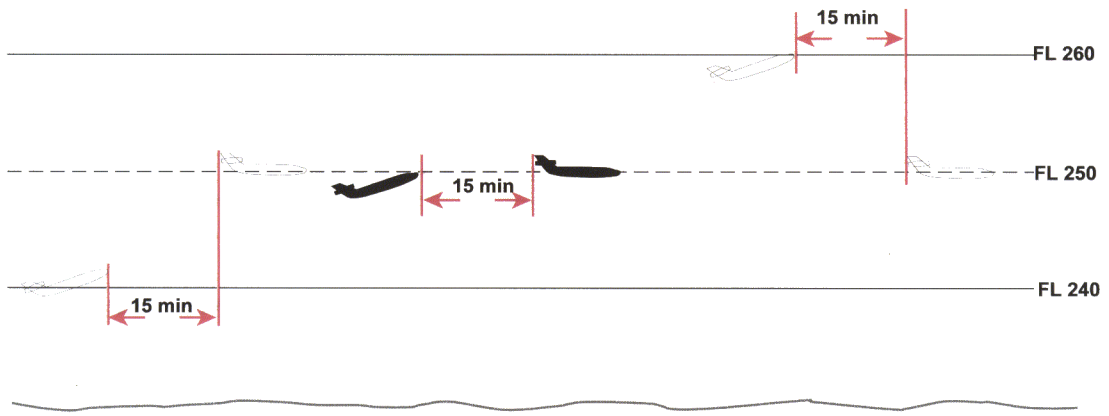


Figure 10.2.3.2n

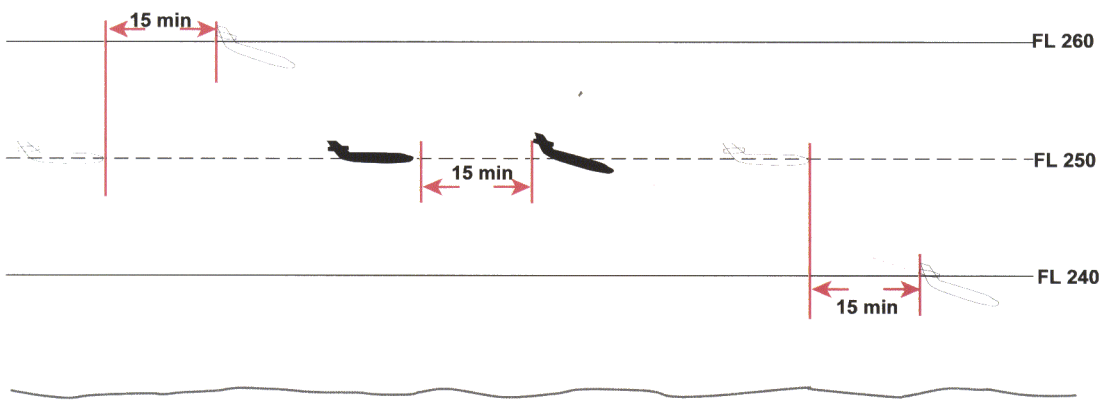


Figure 10.2.3.2.p

© Oxford Aviation Services Limited

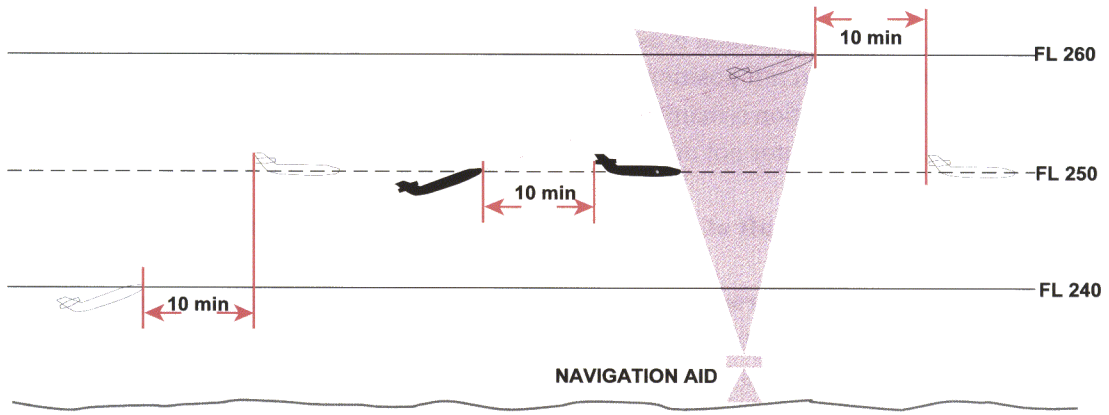


Figure 10.2.3.2q

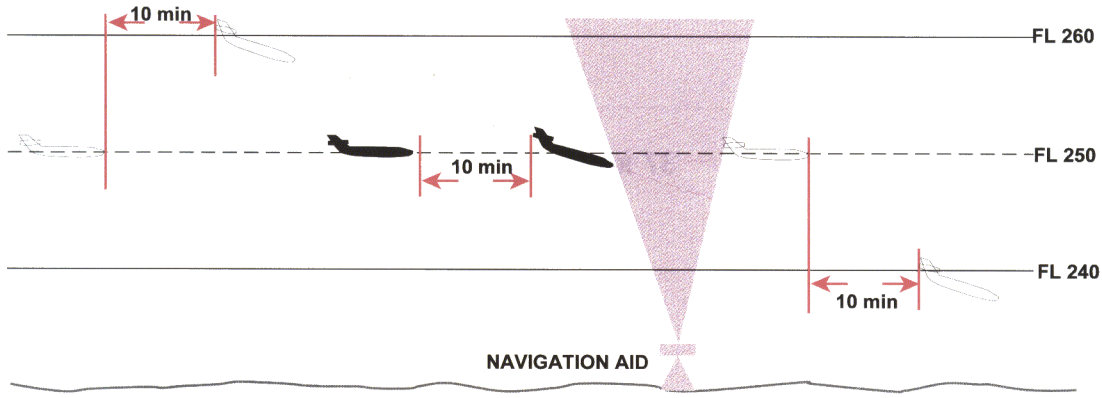


Figure 10.2.3.2r

3. **Reciprocal tracks**. Where lateral separation is not provided, vertical separation shall be provided for at least 10 minutes prior to and after the time the aircraft are estimated to have passed. If it has been established that the aircraft have indeed passed, this minimum need not then apply. (see fig 10.2.3.2s).

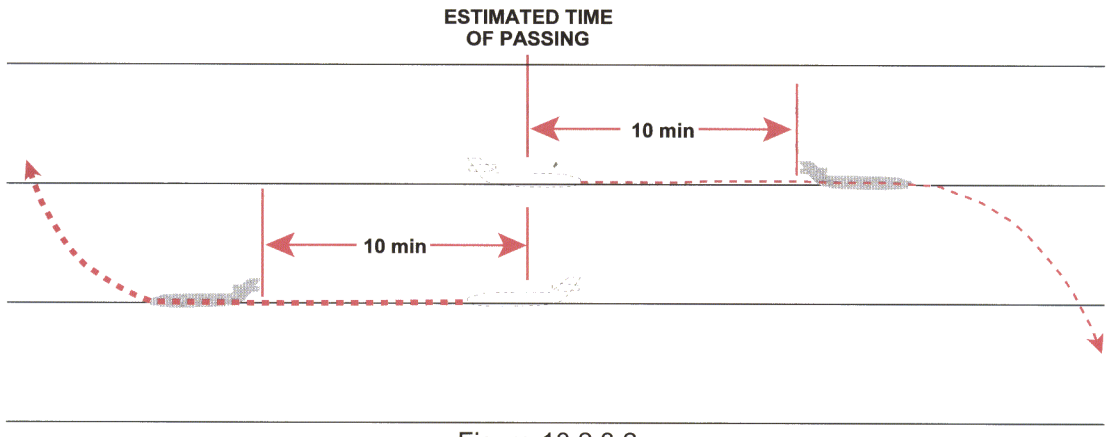


Figure 10.2.3.2s

© Oxford Aviation Services Limited

10.2.3.3 Longitudinal separation based on DME. Where DME information is available, separation is established by maintaining not less than the specified distances between aircraft positions. In this case it is a requirement that direct pilot - controller communication is maintained. **Note:** in the NAT region using HF, communication is via a radio operator not direct to the controller.

a. **Aircraft at the same level.** The same and crossing track situations apply:

1. **Same track.** The normal standard is 20 nm provided each aircraft uses on-track DME stations and separation is checked by obtaining simultaneous DME readings from the aircraft at frequent intervals (see fig 10.2.3.3a). The standard may be reduced to 10 nm provided the leading aircraft maintains a TAS 20 kts or more faster than the succeeding aircraft (see fig 10.2.3.3b).

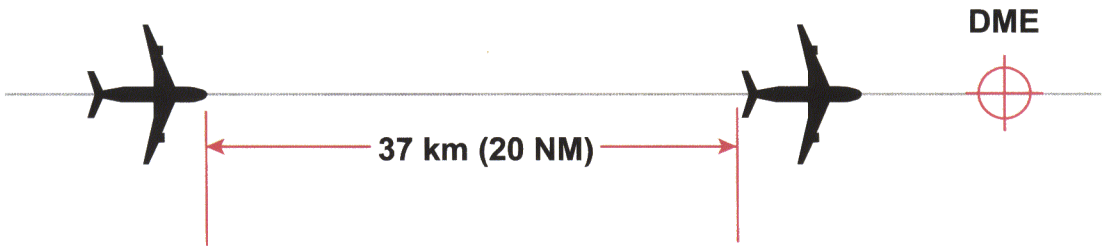


Figure 10.2.3.3a

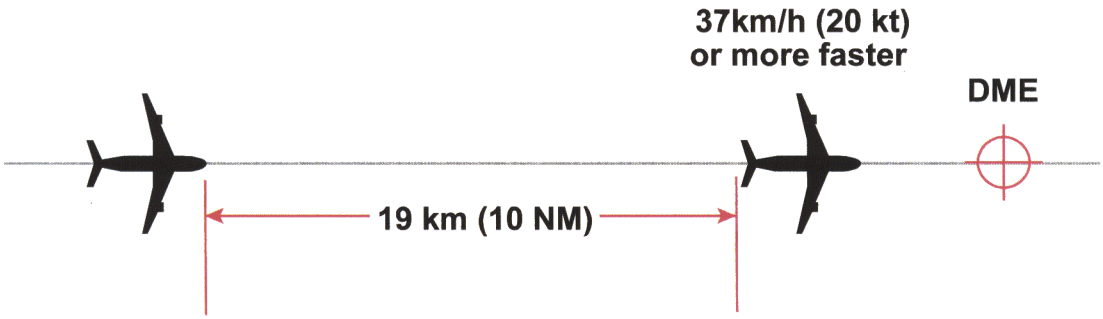


Figure 10.2.3.3b

2. **Crossing tracks.** The standards specified in 1. above apply to crossing traffic providing that each aircraft reports distance from the station located at the crossing point and that the relative angle of the tracks is less than 90 (see figs 10.2.3.3 c and d).

© Oxford Aviation Services Limited

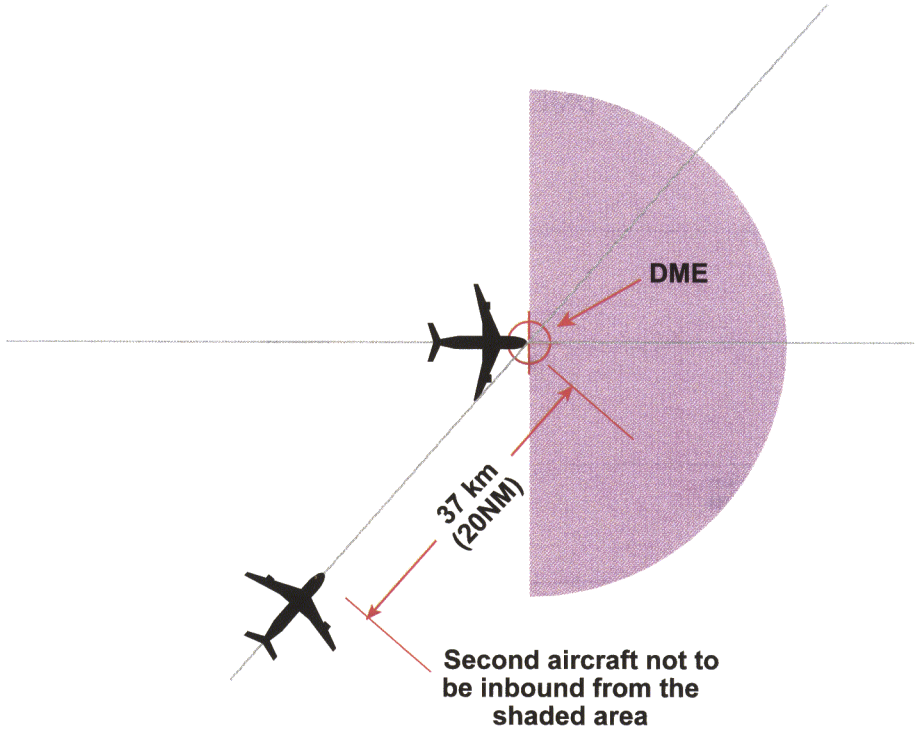


Figure 10.2.3.3c

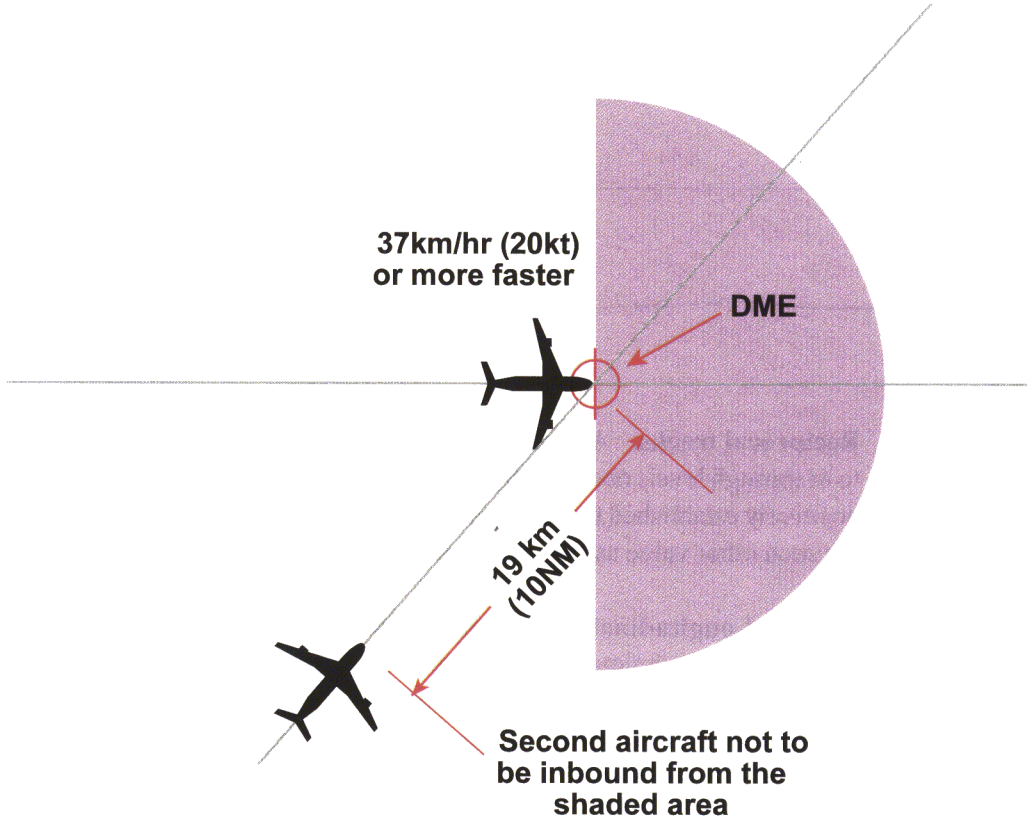


Figure 10.2.3.3d

© Oxford Aviation Services Limited

b. **Climbing or descending**. The standard separation is 10 nm whilst vertical separation does not exist, providing each aircraft uses 'on-track' DME stations; one aircraft maintains a level whilst vertical separation does not exist, and separation is established by simultaneous DME readings from the aircraft (see figs 10.2.3.3e and f).

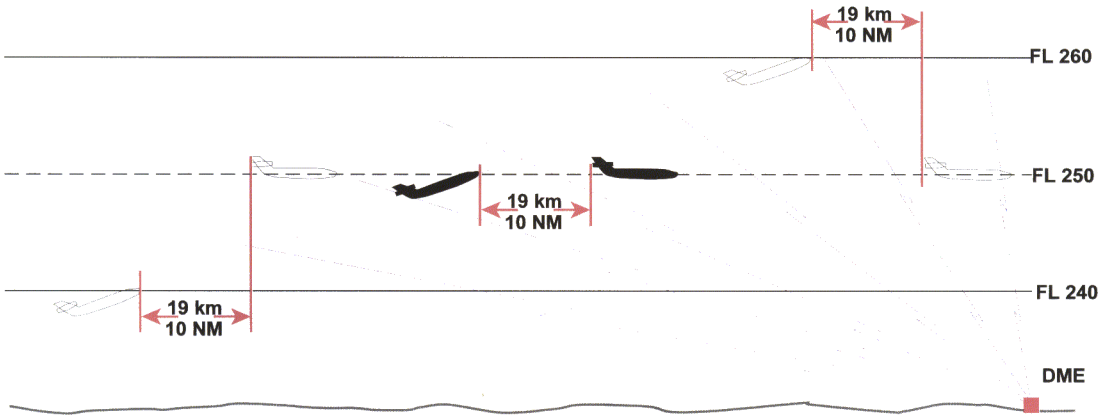


Figure 10.2.3.3.e

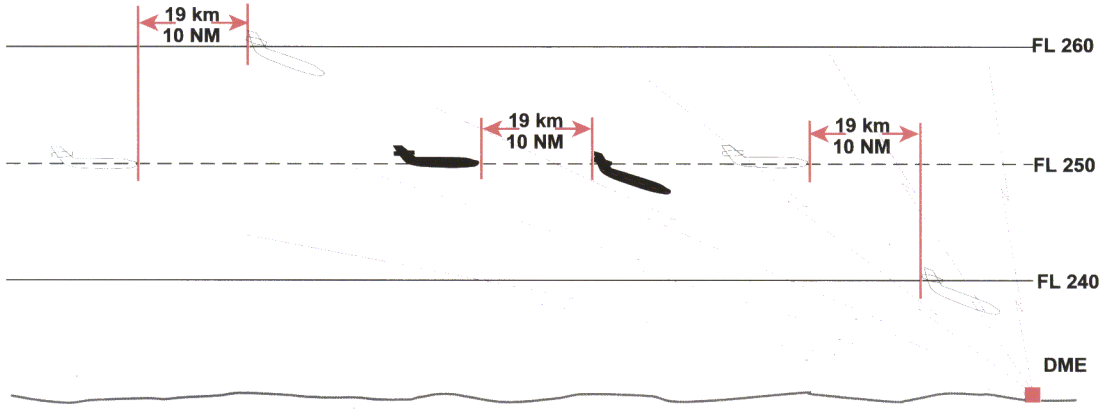


Figure 10.2.3.3f

c. **Reciprocal tracks**. Aircraft using on-track DME may be cleared to climb or descend to or through levels occupied by other aircraft using on-track DME, provided it has been positively established that the aircraft have passed each other and are at least 10 nm apart (or such other value as the authority specifies).

10.2.3.4 Longitudinal separation with Mach number technique based on time. The mach number technique requires turbojet aircraft to fly at the mach number approved by ATC and are to request approval before making any speed changes. If it is essential to make immediate temporary changes to speed (eg due to turbulence), ATC is to be informed as soon as possible. If it is not feasible due to aircraft performance to maintain the last assigned mach no during en route climbs and descents, pilots are to advise ATC at the time clearance to climb or descent is requested.

© Oxford Aviation Services Limited

a. **Separation**. Separation is deemed to exist when the required time interval exists providing:

1. the aircraft concerned have reported over the same reporting point and follow the same track or continuously diverging tracks until some other form of separation is provided, or

2. it is possible to ensure, by radar or other means, that the appropriate time interval will exist at the common point from which they will either follow the same track or continuously diverge, if the aircraft have not already reported over the same point.

b. **Time intervals**. When the mach number technique is applied, minimum longitudinal separation between turbojet aircraft on the same track, whether in level, climbing or descending flight is:

1. 10 minutes providing the preceding aircraft maintains a Mach speed equal to or greater than that maintained by the following aircraft, or

2. between 9 and 5 minutes inclusive, providing the preceding aircraft is maintaining a mach no greater than the following aircraft in accordance with the following:

Case	Mach No difference between preceding and following aircraft	Longitudinal Separation standard
a.	Mach 0.02 faster	9 minutes
b.	Mach 0.03 faster	8 minutes
c.	Mach 0.04 faster	7 minutes
d.	Mach 0.05 faster	6 minutes
e.	Mach 0.06 faster	5 minutes

Table: 10.2.3.4b(2)

10.2.3.5 Longitudinal Separation based on RNAV. This is applicable to RNAV aircraft operating along RNAV routes or ATS routes defined by VOR. In this case, separation is established by maintaining the specified distance between aircraft positions reported by reference to the RNAV equipment. It is a requirement that direct controller/pilot communications are maintained. RNAV positions are defined as standard way points common to both aircraft subject to separation. The minima is 150 km (80 nm) distance based separation instead of the normally required 10 minutes. It is also essential that the Mach no technique is applied. In the event of equipment failure reducing the navigation capability to less than the RNAV requirement, the normal longitudinal separation will be applied (10.2.3.2.a 1). The specific separation requirements are:

© Oxford Aviation Services Limited

a. **Same cruising level**. 150 km (80 nm) providing each aircraft reports position from same point and separation is checked by obtaining simultaneous RNAV distance readings from the aircraft at frequent intervals.

b. **Climbing or descending on same track**. 150 km (80 nm) whilst vertical separation does not exist, provided each aircraft reports distance from same way point, one aircraft maintains level flight whilst vertical separation does not exist, and separation is established by obtaining simultaneous RNAV distance readings from the aircraft.

c. **Reciprocal tracks**. Aircraft may be permitted climb or descend through levels occupied by other aircraft providing it has been positively established by simultaneous RNAV distance readings to or from the same on-track way point that the aircraft have passed each other by at least 150 km (80 nm) (see fig 10.2.3.5c).

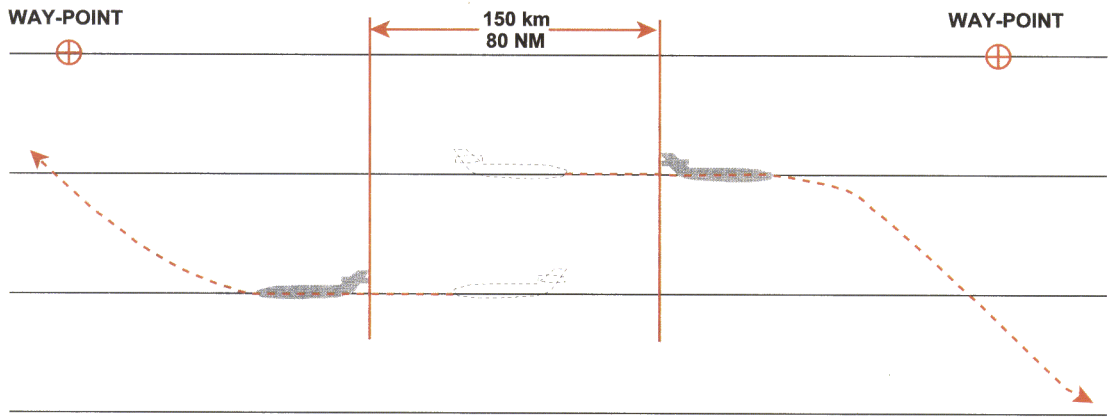


Figure 10.2.3.5c

10.2.3.6 Longitudinal Separation based on RNAV where RNP is specified. For aircraft cruising, climbing or descending on the same track in an RNP RNAV environment, the separation standards detailed in table 10.2.3.6 may be used. During the application of the 50 nm minimum, if an aircraft fails to report its position, the controller is to take action within 3 minutes to establish communications. If communication has not been established within 8 minutes alternative separation is to be applied. An aircraft may climb or descend through an occupied level once it has been established that the aircraft concerned have passed.

Separation standard	RNP type	Communications requirement	Surveillance requirement	Distance verification requirements
80 nm	20	Direct pilot controller communications	Procedural position reports	At least every 60 minutes
50 nm	10	Direct pilot controller communications	Procedural position reports	At least every 30 minutes

Table 10.2.3.6 RNP RNAV Separation Standards

© Oxford Aviation Services Limited

10.2.3.7 Reduction in separation minima. The separation minima may be reduced as determined by the appropriate ATS authority, after prior consultation with the aircraft operators, as appropriate, in the following circumstances:

1. when special electronic or other aids enable the pilot-in-command of an aircraft to determine accurately the aircraft's position and when adequate communication facilities exist for that position to be transmitted without delay to the appropriate air traffic control unit; or
2. when, in association with rapid and reliable communication facilities, radar-derived information of an aircraft's position is available to the appropriate air traffic control unit; or
3. when special electronic or other aids enable the air traffic controller to predict rapidly and accurately the flight paths of an aircraft and adequate facilities exist to verify frequently the actual aircraft positions with the predicted positions; or
4. when RNAV-equipped aircraft operate within the coverage of electronic aids that provide the necessary updates to maintain navigational accuracy.
5. In accordance with regional air navigation agreements, after prior consultation with the aircraft operators, when:

    i. special electronic, area navigation on other aids enable the aircraft to closely adhere to their current flight plans; and
    ii. the air traffic situation is such that the conditions regarding communications between pilots and the appropriate ATS unit or units need not necessarily be met to the degree specified therein, in order to maintain an adequate level of safety.

10.3 AIR TRAFFIC CONTROL CLEARANCES.

10.3.1 Issuance of air traffic control clearances. ATC clearances are to be issued in accordance with the following:

a. **Departing aircraft.** Area control centres shall forward a clearance to approach control offices or aerodrome control towers with the least possible delay after a receipt of request made by these units, or prior to such a request if practicable. It is usual practice for ATC at the departure aerodrome to contact the ATCC when the aircraft requests engine start (or push back) and place the clearance 'on request'. If the clearance has not been received from the ATCC before the aeroplane requests taxi clearance, the aircraft is to be permitted to move and the clearance relayed as soon as received. If the clearance has still not been received and the aircraft is approaching the holding point, it should be directed into a holding area (sin-bin) to await clearance. Once received, the clearance is read to the aircraft and must be read back **exactly** as received to confirm that the pilot has received the clearance as intended and understands what is required.

© Oxford Aviation Services Limited

b. **En-route aircraft**. Air traffic control clearances must be issued early enough to ensure that they are transmitted to the aircraft in sufficient time for it to comply with them. If a pilot so requests, a cruise climb clearance will be issued is possible (if traffic conditions permit) for cruise climb between specified levels or above a specified level. A pilot may ask for reduced cruising speed to delay arrival at destination. For a flight with intermediate stops, the clearance issued initially will only be to the first destination aerodrome. Clearance for subsequent 'legs' will be issued by the ATCC of the FIR in which the aeroplane has landed.

10.3.2 Contents of air traffic control clearances. Clearances are to contain positive and concise data and shall, as far as practicable, be phrased in a standard manner. Clearances shall contain the following in the order listed:

a. aircraft identification;

b. clearance limit;

c. route of flight;

d. level(s) of flight for the entire route or part thereof and changes of levels if required;

Note:- If the clearance for the levels covers only part of the route, it is important for the air traffic control unit to specify a point to which the part of the clearance regarding levels applies.

e. any necessary instructions or information on other matters such as SSR transponder operation, approach or departure manoeuvres, communications and the time of expiry of the clearance.

Note:- The time of expiry of the clearance indicates the time after which the clearance will be automatically cancelled if the flight has not been started.

10.3.3 Route of flight. The route of flight shall be detailed in each clearance when deemed necessary. The phrases 'cleared via planned route' may be used to describe any route or portion thereof that is identical to that filed in the flight plan and sufficient routing details are given to definitely establish the aircraft on its route. The phrases 'cleared via (designation) departure' or 'cleared via (designation) arrival' may be used when standard departure or arrival routes have been established by the appropriate ATS authority and published in Aeronautical Information Publications. The phrase "cleared via flight planned route" shall not be used when granting a re-clearance.

© Oxford Aviation Services Limited

10.3.4 Clearances to fly maintaining own separation while in VMC. The provision of vertical or horizontal separation by an ATCU is not applicable in respect of any portion of a flight cleared subject to maintaining own separation and remaining in VMC. It is for the flight so cleared to ensure that for the duration of the clearance, it is not operated in such proximity to other flights as to create a collision hazard. It is implied that a VFR flight must remain in visual meteorological conditions at all times. Accordingly the issuance of a clearance to a VFR flight to fly subject to maintaining own separation and remaining in visual meteorological conditions has no other object than to signify that, for the duration of the clearance, the provision of separation by air traffic control is not entailed. When so requested by an aircraft and provided it is agreed by the pilot of the other aircraft (and authorised by the authority) an ACC may clear a controlled flight operating in class D and E in VMC during daylight hours to fly maintaining own separation to one other aircraft and remain in VMC. The following provisos apply:

a. The clearance shall be for a specified portion of the flight below 10 000 ft during climb and descent;

b. If flight under VMC becomes impracticable, an IFR flight is to be provided with alternate instructions to be complied with (in the event that flight in VMC cannot be maintained) for the term of the clearance. In the event, the pilot of an IFR flight is to comply with the alternate instructions.

10.3.5 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 separated by the previously defined minima. Essential traffic information shall be given to controlled flights concerned whenever they constitute essential traffic to each other. This information will inevitably relate to controlled flights cleared subject to maintaining own separation and remaining in visual meteorological conditions. Essential traffic information shall include:

a. direction of flight of aircraft concerned;

b. type of aircraft concerned;

c. cruising level of aircraft concerned and estimated time over the reporting point nearest to where the level will be crossed.

10.3.6 Clearance of a requested change to a flight plan. A clearance issued covering a requested change in a flight plan will include the exact nature of the change. If a level change is involved and more than one level is is contained in the flight plan, all such levels are to be included in the re-clearance. If traffic conditions do not permit a requested re-clearance, the pilot is to be advised 'unable to clear ...' If warranted, an alternative will be offered.

© Oxford Aviation Services Limited

10.4 EMERGENCY AND COMMUNICATIONS FAILURE

10.4.1 Emergency procedures - General. The various circumstances surrounding each emergency situation preclude the establishment of exact detailed procedures to be followed. The procedures outlined below are intended as a general guide. Air traffic control units shall maintain full and complete co-ordination, and personnel shall use their best judgement in handling emergency situations.

10.4.2 Unlawful Interference. It is important that ATC personnel are prepared to recognise the indications that an aircraft has been subjected to unlawful interference. If a radar controller does not have an automatic SSR distinct display system (one that automatically displays 7700; 7600 and 7500) then if unlawful interference is suspected, specific interrogation of Mode A/7500 should be attempted followed by A/7700.

Note:- To indicate that it is in a state of emergency, an aircraft with an SSR transponder might operate the equipments as follows:

a. on Mode A, Code 7700; or
b. on Mode A, Code 7500, to indicate specifically that is being subjected to unlawful interference.

10.4.3 Priority. An aircraft known or believed to be in a state of emergency, including being subjected to unlawful interference, shall be given priority over other aircraft.

10.4.4 Emergency Descent. Upon receipt of advice that an aircraft is making an emergency descent through other traffic, all possible action shall be taken immediately to safeguard all aircraft concerned. When deemed necessary, air traffic control units shall immediately broadcast by means of the appropriate radio aids, or if not possible, request the appropriate communications stations immediately to broadcast an emergency message. It is expected that aircraft receiving such a broadcast will clear the specified areas and standby on the appropriate radio frequency for further clearances from the ATCU.

10.4.5 Air-ground communication failure. As soon as it is known that two-way communication has failed, action shall be taken to ascertain whether the aircraft is able to receive transmissions from the air traffic control unit by requesting it to execute a specified manoeuvre which can be observed by radar or to transmit, if possible a specified signal in order to indicate acknowledgement. If the aircraft fails to indicate that it is able to receive and acknowledge transmissions, separation shall be maintained between the aircraft having the communication failure and other aircraft, based on the assumption that the aircraft will,

a. if in VMC:

1. continue to fly in visual meteorological conditions;

© Oxford Aviation Services Limited

2. land at the nearest suitable aerodrome; and
3. report its arrival by the most expeditious means to the appropriate air traffic control unit; or

b. if in IMC or when conditions are such that it does not appear feasible to complete the flight in VMC:

1. unless otherwise prescribed on the basis of regional air navigation agreement, 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;

2. proceed according to the current flight plan route to the appropriate designated navigation aid serving the destination aerodrome and, when required to ensure compliance with 3. below, hold over this aid until the commencement of descent;

3. commence descent from the navigation aid specified in 2. at, or as close as possible to, the expected approach time last received and acknowledged, at, or as close as possible to, the estimated time of arrival resulting from the current flight plan;

4. complete a normal instrument approach procedure as specified for the designated navigation aid, and;

5. land, if possible, within thirty minutes after the estimated time of arrival specified in 3. or the last acknowledged expected approach time, whichever is later.

10.4.5.1 Action by ATC. As soon as it is known that two-way communication has failed, appropriate information describing the action taken by the air traffic control unit, or instructions justified by any emergency situation, shall be transmitted blind for the attention of the aircraft concerned, on the frequencies available on which the aircraft is believed to be listening, including the voice frequencies of available radio navigation or approach aids (ie the localiser frequency or the VOR frequency). Information will be given concerning weather conditions favourable to a cloud breaking procedure in areas where traffic may be avoided and weather conditions at suitable aerodromes. Pertinent information is to be given to other aircraft in the vicinity. The ATCU will send information concerning the aircraft in communications failure to all other ATCU in adjacent FIRs and all alternate aerodromes in the filed flight plan. If an aircraft has not reported within 30 minutes after the ETA given by the pilot, the ETA calculated by the ACC or the last acknowledged EAT (whichever is the latest), information is to be forwarded concerning the aeroplane to the operator (or designated representatives) and PICs of aircraft concerned.

© Oxford Aviation Services Limited

10.4.6 Other In-flight Contingencies. ATC will take the necessary action to assist aircraft which are thought to be 'strayed' or are known to be lost. ATC is also to take action to attempt to identify an aircraft which is unidentified. The following definitions are required by the learning objectives:

a. **Strayed**. An aircraft which has deviated significantly from its intended track or which reports that it is lost.

b. **Unidentified Aircraft**. An aircraft which has been observed or reported to be operating in a given area but whose identity has not been established.

10.4.7 Interception of civil aircraft. 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 on any available frequency, including the emergency frequency 121.500 MHz, unless such communication already exists;

b. inform the pilot of the intercepted aircraft of the interception;

c. establish contact with the intercept control unit maintaining two-way communication with the intercepting aircraft and provide it with available information concerning the aircraft;

d. relay messages between the intercepting aircraft or the intercept control unit and the intercepted aircraft, as necessary.

e. in close co-ordination with the intercept control unit take all necessary steps to ensure the safety of the intercepted aircraft; and

f. inform ATS units serving adjacent flight information regions if it appears that the aircraft has strayed from such flight information regions.

10.4.7.1 Interception outside of ATC area of responsibility. As soon as an air traffic services unit learns that an aircraft is being intercepted outside its area of responsibility, it shall take the following steps as are appropriate in the circumstances;

a. inform the ATS unit serving the airspace in which the interception is taking place, providing this unit with available information that will assist in identifying the aircraft and requesting it to take action;

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

© Oxford Aviation Services Limited

REVISION QUESTIONS CHAPTER 10

1. What is the method by which vertical separation is achieved?

   a. Applying a minimum separation of 1000 ft at all times
   b. Altimeter setting procedures
   c. VFR traffic at one set of flight levels and IFR at another
   d. Relating magnetic track to an allocated flight level

2. Between what flight levels is RVSM applied in notified airspace?

   a. Above FL290 and below FL 410
   b. Above FL290 to FL410
   c. Between FL290 and FL410
   d. From FL290 to below FL410

3. In areas where RVSM is not applicable, what is the min altitude separation?

   a. 500 ft
   b. 1000 ft
   c. 1500 ft
   d. 2000 ft

4. What is implied when specifying a Minimum Useable Flight Level?

   a. It shall not be less than the minimum flight altitude
   b. It must give 1000 ft vertical clearance above the highest obstacle within 600 m of track
   c. It must be 500 ft above the base of an airway
   d. It must be greater than the minimum cruising altitude

5. What are the two types of horizontal separation?

   a. Latitudinal and longitudinal
   b. Lateral and longitudinal
   c. Lateral and chronological
   d. Lateral and geographic

6. How is geographic separation achieved?

   a. By requiring position reports over various geographic locations
   b. By specifying different routes for aircraft at the same level
   c. Insisting that navigation is achieved with position reference to lat and long
   d. By using GPS and the preferred navigation aid

© Oxford Aviation Services Limited

7. Two aircraft are approaching a VOR beacon separated by 1000ft. The higher aircraft requests descent through the level of the lower aircraft. When will ATC give clearance for the descent?

   a. When the tracks of the two aircraft from on top the VOR diverge by 10° and one aircraft is more than 15nm outbound from the beacon
   b. When the tracks of the two aircraft from on top the VOR diverge by 15° and both aircraft are more than 10nm outbound from the beacon
   c. When the tracks of the two aircraft from on top the VOR diverge by 15° and one aircraft is 15nm or more outbound from the beacon
   d. When the tracks of the two aircraft from on top the VOR diverge by more than 15° and both aircraft are more than 15nm outbound from the beacon

8. If the same situation as in Q7 existed where the facility was an NDB beacon and not a VOR, what would the divergence angle be?

   a. 10°
   b. 45°
   c. 20°
   d. 30°

9. If the entry point into an Oceanic Control Area (OCA) is via a VOR beacon, for how long must track divergence be maintained?

   a. Until one climbs or the other descends
   b. Until the first one makes a position report at a latitude difference of 5°
   c. Until the oceanic separation standard is achieved
   d. Throughout the period of flight in the OCA

10. Longitudinal separation can be achieved by time. Clearly this must also require speed consideration. Where longitudinal separation is achieved by time how is speed to be reported?

    a. Mach No
    b. TAS
    c. IAS
    d. GS

11. If you are flying outside of ATC ground radar coverage, can RVSM be applied?

    a. Yes, providing equipment is used to accurately determine aircraft position
    b. No, the ATCO must be aware of your position at all times
    c. Yes, if you have an IN system fitted to the aeroplane
    d. Yes, but the upper limit is FL350

© Oxford Aviation Services Limited

12. What must an ATC clearance allow for?

a. Acceptable navigation errors
b. In ability of pilots to fly an accurate track
c. Enough time for the clearance to be complied with
d. All foreseeable contingencies

13. What is the position known as after which an ATC clearance is not valid?

a. Point of no return
b. Limiting position
c. Clearance limitation
d. Limit of clearance

14. Your flight plan submission will specify the point of departure and the point at which you join the ATS route structure (airways). How will ATC pass information allowing you to navigate from the aerodrome to the point of joining airways?

a. The method of joining airways is entirely up to you. ATC will only allocate a limiting FL before joining and issue instructions to comply with noise abatement procedures
b. All departures will be radar monitored and you will be advised to contact radar after take off
c. You will always be cleared to climb straight ahead to a defined altitude then take up a track to the joining point
d. IFR departures are either radar controlled or flown in accordance with a Standard Instrument Departure procedure

15. What is a 'STAR'?

a. A first class pilot!
b. A procedure in which **S**eparation is provided by **T**erminal **A**rea **R**adar
c. A pre-determined arrival route flown by IFR flights to the point at which an instrument approach can commence
d. Published track information for arriving IFR traffic encompassing the arrival, initial and intermediate approach segments of a instrument approach

16. When may the PIC of an IFR flight assume reśponsibility for own separation?

a. Never
b. At any time providing the flight is not under radar control
c. At any time in VMC
d. During climb and descent in VMC under specified conditions if approved by ATC

© Oxford Aviation Services Limited

17. What is 'essential traffic'?

a. Special flights that do not require a clearance to fly in CAS or under IFR (ie military, air ambulance, SAR etc..)
b. Controlled traffic to which separation by ATC is applicable but not yet applied
c. Traffic that has priority by virtue of state of emergency, position or altitude
d. Commercial air transport as opposed to private category flights

18. If you have flight planned to fly an IFR flight using a stepped climb procedure and ATC has cleared you accordingly, what is the effect of you requesting a higher level earlier than the stepped climb procedure planned?

a. A revised clearance will need to be issued covering all aspects of the flight
b. A re-clearance will effect all subsequent levels requested in the original plan
c. If cleared to climb earlier than planned, permission to climb above the new level will not be subsequently granted
d. The stepped procedure will automatically be brought forward and subsequent climbs will be time based on the planned time lapse from the earlier position of the first climb step

19. What can an aircraft in emergency expect?

a. Priority
b. Immediate response by SAR units
c. All other traffic to be cleared from the flight path
d. Dedicated ATC on a discrete frequency

20. What is the underpinning procedure in any communications failure situation?

a. Fly to and land at the destination as per the last instruction received
b. Find VMC and land
c. Fly as per the flight plan filed
d. Squawk A7600+C and return to the aerodrome of departure

21. If your departure clearance includes "...climb initially to FL 140 and after BOGNA request higher..." and after take off you experience communications failure, What do you do after you have passed BOGNA?

a. Maintain FL140 for 20 mins after BOGNA then follow the flight plan
b. Climb to your flight plan requested level
c. Turn round and return to the aerodrome of departure
d. Move sideways out of CAS, climb to the FP requested cruise level and then re-enter CAS and complete the flight as per the flight plan squawking A7600+C

© Oxford Aviation Services Limited

22. If you suspect that your VHF receivers are unserviceable as you begin an ILS instrument approach, what other facility may ATC use to pass instructions to you?

a. The ILS glide path Tx voice channel
b. The ILS localiser Tx voice channel
c. The VOR ident channel
d. Visual morse on the aerodrome ident beacon

23. What defines a 'strayed' aircraft?

a. An aircraft that is 'off track' by more than 10 nm
b. An aircraft that has not reported its position for more than 30 minutes
c. An aircraft that has reported that it is lost
d. An aircraft that cannot navigate within the required RNP

24. What defines an 'unidentified aircraft'?

a. An aircraft that is observed to be operating in an adjacent FIR but has not been identified to the observer
b. An aircraft which is seen to operate in airspace which is not subject to ATC
c. An aircraft with no SSR squawk
d. An aircraft that is observed to be operating in a given area but whose identity has not been established

25. Which of the following will be informed by ATC if an aircraft has not reported its position within 30 minutes of an ETA?

1. The Operator
2. The Operator's Agent
3. ATCU's in adjacent FIRs
4. Pilots of other aircraft in the vicinity
5. The ACC with responsibility for the FIR
6. The RCC

a. All the above
b. All except 6
c. 3, 4,5 and 6
d. 5 and 6 only

© Oxford Aviation Services Limited

26. Two aircraft are flying the same route at the same altitude but the navigation aids do not permit frequent updating of position. What is the minimum longitudinal separation permitted?

a. 15 nm
b. 15 min
c. 10 min
d. 10 nm

27. Two aircraft are flying along the same route at the same altitude. They have both passed over the same navigation aid and the first aircraft is travelling 25kts faster than the subsequent aircraft. What is the minimum longitudinal separation permitted?

a. 10 mins
b. 15 mins
c. 5 mins
d. 3 mins

28. When one aircraft is climbing (or descending) through the level of another aircraft that is following the same route, what is the minimum horizontal separation permitted?

a. 15 minutes whilst vertical separation does not exist
b. 15 minutes at all times
c. 15 minutes providing the climbing/descending aircraft has updated its position within 5 minutes of commencing the manoeuvre
d. 10 minutes with vertical separation and 5 minutes without

29. Where two aircraft are approaching each other on reciprocal tracks (vertically separated) but one requires to manoeuvre through the level of the other, what separation is required?

a. Divergent tracks and 10 nm horizontal separation
b. 10 minutes longitudinal based on the estimated time of passing
c. 15 minutes whilst vertical separation exists and not less than 5 mins whilst vertical doesn't exist
d. This manoeuvre would only be permitted with reference to a radio navigation aid

30. Two aircraft are flying a route at the same altitude where DME information is available. The first aircraft if flying at 285 kts IAS and the second at 260 kts IAS. What is the minimum permitted separation?

a. 20 nm based on range from the same DME station
b. 15 nm based on the same DME station
c. 10 nm based on the same DME station
d. 5 nm based on the same DME station

© Oxford Aviation Services Limited

31. When one aircraft is climbing (or descending) through the level of another aircraft that is following the same route, where the route is determined by VOR/DME, what is the separation required?

a. 15 nm from a common DME station whilst vertical separation does not exist
b. 15 nm DME at all times
c. 15 nm providing the climbing/descending aircraft has updated its position within 5 minutes of commencing the manoeuvre with reference to a common VOR/DME facility
d. 10 nm based on a common DME facility whilst vertical separation doesn't exist

32. Two aircraft are about to enter the Shanwick OCA via a common reporting point at the same FL. The first aircraft to enter the OCA is flying at Mach 0.93 and the second aircraft at Mach 0.95. What separation is required?

a. 10 minutes longitudinal
b. 8 minutes longitudinal
c. 9 minutes longitudinal
d. Longitudinal separation is not possible, lateral or vertical separation must be established

33. Two aircraft flying eastbound in the New York OCA are navigation the same NAT route defining the way points by GNSS. The first aircraft is weight and performance limited to Mach 0.86 and FL290. The subsequent aircraft (presently at FL 280) is able to maintain Mach 0.95 and wishes to climb to FL 370. During the climb manoeuvre, what is the required separation minima?

a. 80 nm longitudinal whilst vertical separation does not exist
b. 150 nm lateral whilst vertical separation does not exist
c. 50 nm longitudinal whilst vertical separation does not exist
d. 10 min longitudinal whilst vertical separation does not exist

34. Under what circumstance may the separation minima defined in Doc 4444 be reduced?

a. When radar is used
b. When SSR is used providing Mode C is checked as useable
c. When rapid and reliable ground/air communications systems are used
d. When radar and rapid and reliable ground/air communications systems are used

© Oxford Aviation Services Limited

35. In an area where longitudinal separation is based on RNAV information, what conditions are necessary for the reduced separation standard of 50 nm to be applied?

a. RNP 20; direct controller/pilot comms; procedural position reps; distance update every 60 minutes
b. RNP 10; direct controller/pilot comms; procedural position reps; distance update every 60 minutes
c. RNP 20; direct controller/pilot comms; procedural position reps; distance update every 30 minutes
d. RNP 10; direct controller/pilot comms; procedural position reps; distance update every 30 minutes

© Oxford Aviation Services Limited

ANSWERS TO REVISION QUESTIONS FOR CHAPTER 10

1	B	26	B	51		76	
2	C	27	C	52		77	
3	B	28	A	53		78	
4	A	29	B	54		79	
5	B	30	C	55		80	
6	B	31	D	56		81	
7	C	32	D	57		82	
8	D	33	A	58		83	
9	C	34	D	59		84	
10	A	35	D	60		85	
11	A	36		61		86	
12	C	37		62		87	
13	D	38		63		88	
14	D	39		64		89	
15	C	40		65		90	
16	D	41		66		91	
17	B	42		67		92	
18	B	43		68		93	
19	A	44		69		94	
20	C	45		70		95	
21	A	46		71		96	
22	B	47		72		97	
23	C	48		73		98	
24	D	49		74		99	
25	B	50		75		100	

© Oxford Aviation Services Limited

CHAPTER ELEVEN - APPROACH CONTROL SERVICE

Contents

		Page
11.0	APPROACH CONTROL SERVICE.	11-1
11.1	ESTABLISHMENT.	11-1
11.2	DEPARTING AIRCRAFT	11-1
11.3	ARRIVING AIRCRAFT	11-4
11.4	STACKING	11-6
11.5	PARALLEL RUNWAY OPERATIONS	11-7
11.6	SEPARATION OF DEPARTING AIRCRAFT FROM ARRIVING AIRCRAFT	11-13
	REVISION QUESTIONS	11-15

© Oxford Aviation Services Limited

11.0 APPROACH CONTROL SERVICE.

11.1 Establishment. Approach control provides ATC to traffic departing from, and arriving at, aerodromes. Where IFR traffic is departing to join airways, the approach controller is the link between the aerodrome departure procedures and the airways joining procedures and vice versa for arriving traffic. It usual nowadays for radar to be used in approach control although procedural approach control exists (as here at Oxford for the VDF and NDB approach procedures). Where an aerodrome is in a CTR, approach control is mandatory and the controller may be known as the zone controller. The approach office (approach control room) may be at another aerodrome if there are more than one aerodromes in the CTR. Where an aerodrome is outside of a CTR, approach control (where established, as here at Oxford) is advisory. Where procedures are established for instrument approaches, the approach controller may delegate radar vectoring (and monitoring of self positioning) to a radar director. At aerodromes in CTRs where the met conditions are IMC or the criteria for VMC take-off cannot be met, the approach controller will be responsible giving clearance for take-offs. It will also be the approach controllers responsibility for obtaining clearance to land from the aerodrome controller for IFR flights carrying out low visibility instrument approaches.

11.2 DEPARTING AIRCRAFT

11.2.1 General Procedures. When the control of traffic is based on an air traffic control clearances, that clearance is to specify:

a. direction of take-off and turn after take-off,

b. track to be made good before proceeding on desired heading,

c. level to maintain before continuing climb to assigned cruising level,

d. time, point and/or rate at which level change shall be made,

e. and any other necessary manoeuvre consistent with the safe operation of the aircraft.

11.2.2.1 Take off direction. Departing aircraft may be expedited by suggesting a take-off direction which is not into the wind. It is the responsibility of the pilot-in-command of an aircraft to decide between making such a take-off or waiting for normal take-off in a preferred direction.

11.2.2.2 Delays. In order to avoid excessive holding at the destination, aircraft may be held at the departure aerodrome prior to take off. ATC is required to advise operators (or their nominated representative) of substantial delays and in any case where the delay is expected to exceed 30 minutes.

© Oxford Aviation Services Limited

11.2.2.3 Minimum separation between departing aircraft. Separation is applied between departing aircraft by time between take-offs.

a. One-minute separation is applied between departing aircraft, if aircraft are to fly on tracks diverging by at least 45° immediately after take-off, so that lateral separation is also provided (see fig 11.2.2a). This minimum may be reduced when aircraft are using parallel runways or when the procedure is adopted for operations on diverging runways which do not cross, providing instructions covering the procedure have been approved by the appropriate ATS authority and lateral separation is effected immediately after take-off.

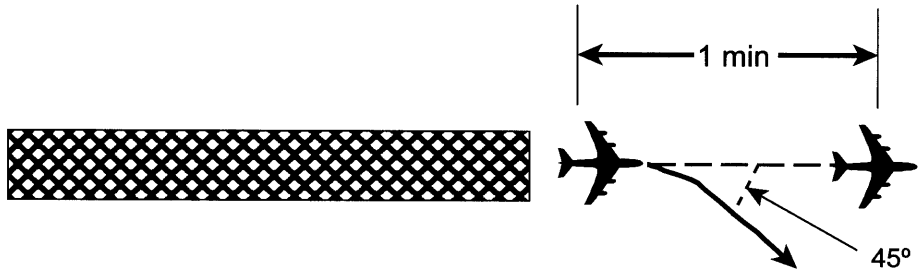


Fig 11.2.2a

b. When the preceding aircraft is 74km/h (40 kts) or more faster than the following aircraft and both aircraft propose to follow the same track, the separation applied is 2 minutes (see fig 11.2.2b).

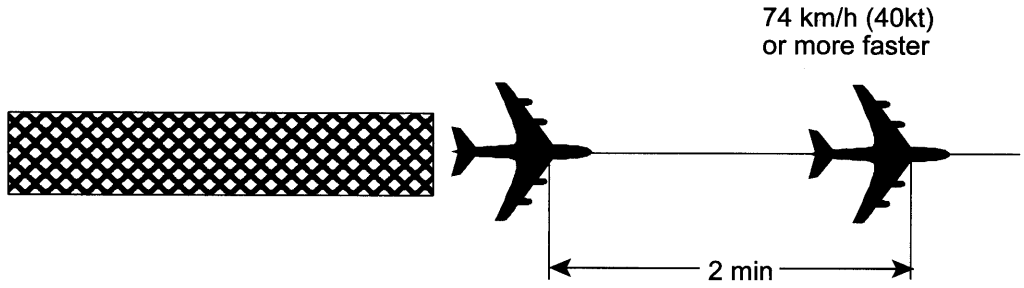


Fig 11.2.2b.

c. Where a departing aircraft will be flown through the level of a preceding departing aircraft and both aircraft propose to follow the same track, five minute separation is applied (see paragraph 9.9.3.2a.1; fig 9.9.3.2c). Action must be taken to ensure that the five minute separation will be maintained or increased while vertical separation does not exist.

© Oxford Aviation Services Limited

11.2.2.4 Clearances for departing aircraft to climb maintaining own separation in VMC. When requested by the aircraft and if so prescribed by the appropriate ATS authority, a departing aircraft may be cleared to climb, subject to maintaining own separation and remaining in visual meteorological conditions until a specified time or to a specified location if reports indicate that this is possible.

11.2.2.5 Departures from parallel (or near parallel) Runways. Parallel runways may be used for independent instrument departures as follows:

a. both runways are used exclusively for take-offs;

b. one runway is used exclusively for departures while the other runway is used for a mixture of arrivals and departures (semi-mixed operations); and

c. both runways are used for mixed operations.

11.2.2.6 Parallel runway requirements. Independent parallel departures may be conducted from parallel runways provided:

a. the runway centre lines are spaced not less than 760 m;

b. the departure tracks diverge by at least 15 degrees immediately after take off;

c. suitable surveillance radar capable of identification of the aircraft within 2 km (1.0 nm) from the end of the runway is available; and

d. procedures ensure the required track divergence is achieved.

11.2.2.7 Information for departing aircraft. The following information is to be passed to departing aircraft by the approach controller:

a. Meteorological information. Information regarding significant changes in the meteorological conditions in the take-off or climb-out area, obtained by the unit providing approach control service is to be transmitted to departing aircraft without delay, except when it is known that the aircraft already has received the information. Significant changes in this context include those relating to surface wind direction or speed, visibility, runway visual range, or air temperature (for turbine engined 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.

© Oxford Aviation Services Limited

b. **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.

c. **Essential traffic information.** Information regarding essential local traffic known to the controller shall be transmitted to departing aircraft without delay.

11.3 ARRIVING AIRCRAFT

11.3.3 General procedures. Arriving aircraft (aircraft being handed over to approach from area (airways)) may be required to report when leaving or passing a reporting point, or when starting procedure turn or base turn, or to provide other information required by the controller to expedite departing aircraft.

11.3.3.1 Initial approach clearance. An IFR flight will not be cleared for an initial approach below the appropriate minimum altitude unless:

a. the pilot has reported passing an appropriate point defined by a radio navigation aid; or

b. the pilot reports that the aerodrome is (and can be maintained) in sight; or

c. the aircraft is conducting a visual approach; or

d. The aircraft's position has been positively determined by radar.

11.3.3.2 Clearance to descend maintaining own separation while in VMC. When requested by the aircraft and if so prescribed by the appropriate ATS authority an arriving aircraft may be cleared to descend subject to maintaining own separation and remaining in visual meteorological conditions if reports indicate that this is possible.

11.3.3.3 Visual Approach. Visual approach is defined as an approach by an IFR flight when either part or all of an instrument approach procedure is not completed and the approach is executed with visual reference to terrain. An IFR flight may be cleared to execute a visual approach provided that the pilot can maintain visual reference to the terrain and:

a. the reported ceiling is at or above the approved initial approach level for the aircraft so cleared; or

b. the pilot reports at the initial approach level 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.

© Oxford Aviation Services Limited

11.3.3.4 Separation. Separation shall be provided between an aircraft cleared to execute a visual approach and other arriving and departing aircraft. For successive visual approaches, radar or non-radar separation shall be maintained until the pilot of a succeeding aircraft reports having the preceding aircraft in sight. The aircraft shall be instructed to follow and maintain separation from the preceding aircraft. Transfer of communications should be effected at such a point or time that clearance to land or alternative instructions can be issued to the aircraft in a timely manner.

11.3.3.5 Instrument Approach. Instrument approaches are carried out under the supervision of the approach controller. Where radar vectoring and monitoring of approaches ais carried out, control may be delegated to a radar director or radar final controller.

a. **Unfamiliar procedures**. If a pilot-in-command reports (or if it is clearly apparent to the ATC unit) that he or she is not familiar with an instrument approach procedure, the initial approach level, the point (in minutes from the appropriate reporting point) at which procedure turn will be started, the level at which the procedure turn shall be carried out and the final approach track shall be specified, except that only the last-mentioned need be specified if the aircraft is to be cleared for a straight in approach. The missed approach procedure shall be specified when deemed necessary.

b. **Visual reference to terrain**. If visual reference to terrain is established before completion of the approach procedure, the entire procedure must nevertheless be executed unless the aircraft requests and is cleared for a visual approach.

c. **Choice of procedure**. A particular approach procedure may be specified to expedite traffic. The omission of a specified approach procedure will indicate that any authorised approach may be used at the discretion of the pilot.

11.3.3.6 Holding. Where holding is required as part of an arrival procedure leading to an instrument approach, the approach controller will control the holding procedure (stack). Control may be delegated to a radar controller (director). Holding and holding pattern entry shall be accomplished in accordance with procedures established by the appropriate ATS authority and published in Aeronautical Information Publications. If entry and holding procedures have not been published or if the procedure are not known to the pilot in command of an aircraft, the appropriate air traffic control unit shall describe the procedures to be followed.

a. **Holding point**. Aircraft shall be held at a designated holding point. The required minimum vertical, lateral or longitudinal separation from other aircraft, according to the system in use at that holding point, shall be provided.

© Oxford Aviation Services Limited

b. **Separation**. When aircraft are being held in flight, the appropriate vertical separation minima shall continue to be provided between holding aircraft and en-route aircraft while such en-route aircraft are within five minutes flying time of the holding area, unless lateral separation exists.

c. **Holding levels**. Levels at holding points shall be assigned in a manner that will facilitate clearing each aircraft to approach in its proper priority. Normally the first aircraft to arrive over a holding point should be at the lowest level, with following aircraft at successively higher levels. However, aircraft particularly sensitive to high fuel consumption at low levels, such as supersonic aircraft, should be permitted to hold at higher levels than their order in the approach sequence, whenever the availability of discrete descent paths and/or radar makes it possible, subsequently, to clear the aircraft for descent through the levels occupied by other aircraft.

d. **Alternate procedures**. If a pilot-in-command of an aircraft advises of an inability to comply with the approach control holding or communication procedures, the alternative procedure(s) requested by the pilot in command should be approved if known traffic conditions permit.

11.4 STACKING

11.4.4 Approach Sequence. Whenever approaches are in progress, the following procedures (stacking) are applied:

a. **Priority**. The approach sequence (the stack) is established to permit the arrival of the maximum number of aircraft with the least average delay. Special priority **may** be given to:

1. an aircraft which anticipates being compelled to land because of factors affecting the safe operation of the aircraft (engine failure, fuel shortage, etc.).
2. hospital aircraft or aircraft carrying any sick or seriously injured person requiring urgent medical attention.

b. **Procedural sequence**. Except where timed approaches are in progress (see paragraph 11.4.5), succeeding aircraft will be cleared for approach (to start the procedure - leave the stack) when the preceding aircraft:

1. has reported that it is able to complete its approach without encountering IMC; or
2. is in communication with and has been sighted by the aerodrome controller, and reasonable assurance exists that a normal landing can be made.

© Oxford Aviation Services Limited

c. **Holding**. ATC will approve a request to hold for weather improvement (or for other reasons). If other aircraft holding decide to make an approach and radar is available, a pilot deciding to remain holding will be vectored to an adjacent fix to continue holding. Alternatively, he/she may be vectored (or given a procedural clearance) to place the aircraft at the top of the stack so that other aircraft may be permitted to carry out the procedure and land.

d. **Credit time**. Where an aircraft has been authorised to absorb delay time whilst en-route (by reduced cruising speed or en-route holding), the time delayed should be credited in any stacking.

11.4.5 Timed Approaches. Timed approaches allow subsequent aircraft to commence approaches more frequently than as specified in paragraph 11.4.4b. In this case an aircraft would be cleared to depart the fix of the stack a period of time after the preceding aircraft. This is the case for ILS approaches at Heathrow. The procedure must be authorised by the authority and the following complied with:

a. a suitable point on the approach path (capable of being determined by the pilot - VOR radial, DME range) is to be specified as a check point for timing of successive approaches;

b. aircraft are to be give a time at which to pass the specified point inbound (the purpose of which is to achieve the desired interval between successive landings on the runway while respecting the applicable separation minima at all times including runway occupancy period). The time determined is to be passed to the pilot to allow sufficient time for him/her to arrange the flight to comply.

11.5 PARALLEL RUNWAY OPERATIONS

11.5.1 Parallel or near parallel runways. Parallel runways may be used for:

a. independent parallel approaches (no radar separation applied to aircraft on same ILS)

b. dependant parallel approaches (radar separation applied)

c. segregated parallel operations (one runway for take-offs the other for landings)

11.5.2 Independent parallel approaches. All approaches are to be radar monitored regardless of the weather conditions. Instructions and information are issued to ensure separation between aircraft and to ensure aircraft do not enter the NTZ. Independent parallel approaches may be conducted providing that:

© Oxford Aviation Services Limited

a. SSR equipment is available to identify aircraft on final approach to the approach controller. The sensitivity of the SSR equipment is to be commensurate with the distance between the runways;
b. ILS or MLS approaches are being conducted on both runways;
c. the aircraft are making straight in approaches;
d. the missed approach tracks diverges by at least 30 (
e. an obstacle survey has been carried out for the areas adjacent to the final approach segments (to allow vectoring of threatened aircraft away from the NTZ)
f. aircraft are aware of the runway identification and ILS localiser (or MLS) frequency
g. radar vectoring is used to intercept the localiser
h. the NTZ is at least 610m wide and is depicted on the radar display
i. separate radar controllers monitor the approaches to each runway (Heathrow Director North and South) to ensure that where 1000 ft separation is reduced:

    1. aircraft do not penetrate the depicted NTZ
    2. the applicable longitudinal separation between aircraft on the same ILS localiser course (or MLS final track) is maintained; and

j. if no dedicated radio channels are available for the radar controllers:

    1. aircraft are transferred to the aerodrome controller's frequency before the higher of the two on adjacent final approach tracks intercepts the localiser (or the specified MLS elevation angle); and
    2. the radar controllers have the ability to override the aerodrome controller's radio transmissions

11.5.2.1 Information. As early as possible after an aircraft has checked in with approach the aircraft will be advised that parallel runway operations are in progress. The runway identifiers and the ILS/MLS frequencies passed. This information may be passed on terminal voice-ATIS.

11.5.2.2 Radar Vectoring. When vectoring to intercept the ILS localiser or MLS final track, the final vector is to be such to enable the aircraft to intercept at an angle not greater than 30 and to provide at least 2 km (1.0 nm) straight and level flight prior to interception. The vector shall also allow level flight for at least 3.7 km (2.0 nm) prior to intercepting the glide path. When an aircraft is observed to overshoot the turn-on or to continue on a track which will penetrate the NTZ instructions will be issued to return to the correct track. If an aircraft is observed to penetrate the NTZ the adjacent aircraft will be given heading and altitude instructions to avoid the deviating aircraft. Radar monitoring shall not be terminated until visual separation is applied or the aircraft has landed, or in the event of a missed approach, is at least 2 km (1.0 nm) beyond the departure DER and adequate separation with any other traffic is established. Aircraft will not be told that radar monitoring has ceased.

© Oxford Aviation Services Limited

11.5.2.3 Separation. A minimum of 1 000 ft vertical or 5.6 km (3.0 nm) radar separation is to be provided until aircraft are either inbound on the ILS or within the NOZ. A minimum of 5.6 km (3.0 nm) radar separation is to be established between aircraft on the same ILS localiser (or MLS final track) unless longitudinal separation is required due to wake turbulence. **Note:** separation between aircraft on adjacent approaches is achieved provided neither aircraft penetrates the NTZ.

11.5.2.4 Final Information/Clearance. When assigning a final heading to intercept the localiser (or MLS track) the aircraft is to be advised of:

a. position relative to a fix on the localiser (MLS track)

b. the altitude to be maintained until established on the localiser (MLS track) to the ILS glide path (MLS elevation angle intercept point; and

c. if required, clearance for the ILS (or MLS) approach.

11.5.3 Dependant parallel approaches. Dependant approaches (radar separation between aircraft on adjacent tracks) is permitted when the requirements of 11.5.2 a - d are complied with. Additionally, the approach controller must have the capability to override the aerodrome radio frequency.

11.5.3.1 Radar separation. A minimum of 1 000 ft vertical or 5.6 km (3.0 nm) radar separation is to be established between air craft during turn-on to parallel localisers (MLS tracks). Once established on ILS localiser (MLS track) radar separation is to be 5.6 km (3.0 nm) between aircraft on the same ILS unless wake turbulence requires greater longitudinal separation, and 3.7 km (2.0 nm) between successive aircraft on adjacent ILS localisers (MLS tracks).

11.5.4 Segregated parallel operations. Segregated operations are permitted when the nominal departure track diverges immediately after take-off by at least 30 from the missed approach track of the adjacent approach (see fig 11.5.4a). The minimum distance between runways for segregated operations is 760 m. This may be reduced by 30 m for each 150 m that the arrival runway is staggered towards the approach (fig 11.5.4b), subject to a minimum of 300 m, and should be increased by 30 m for every 150 m that the arrival runway is staggered away from the arriving aircraft (fig 11.5.4c). ILS (or MLS) precision, radar or visual approaches may be conducted in segregated parallel operations provided suitable surveillance radar and ground facilities exist for the specific type of approach.

© Oxford Aviation Services Limited

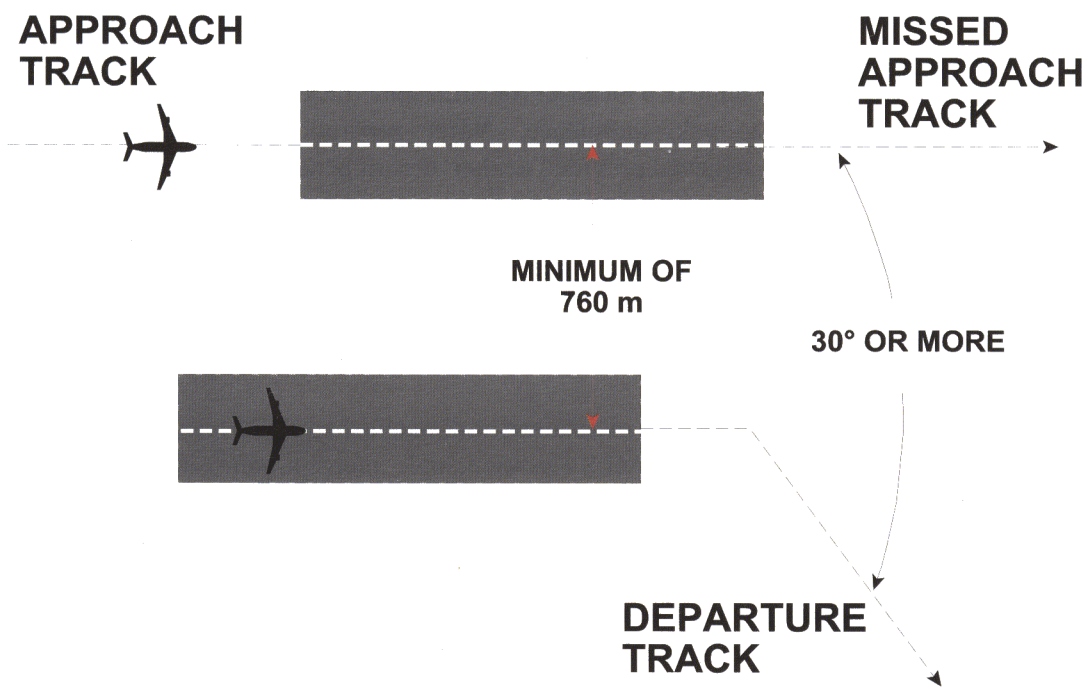
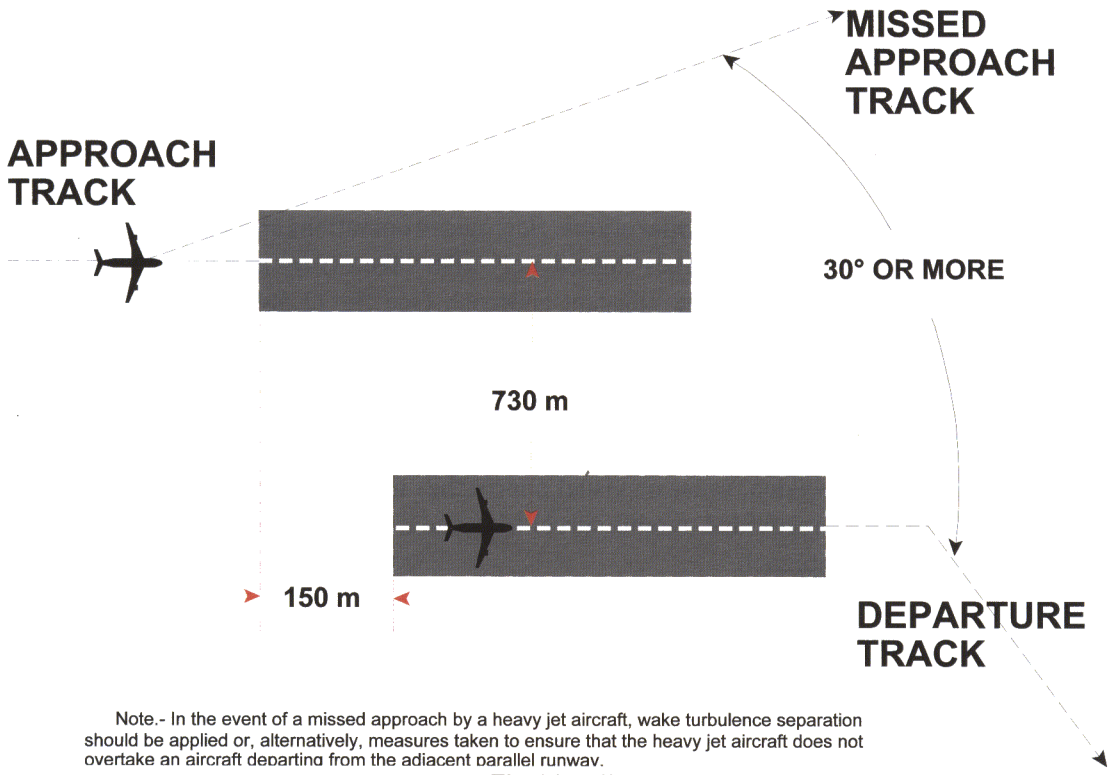


Fig 11.5.4a



Note.- In the event of a missed approach by a heavy jet aircraft, wake turbulence separation should be applied or, alternatively, measures taken to ensure that the heavy jet aircraft does not overtake an aircraft departing from the adjacent parallel runway.

Fig 11.5.4b

© Oxford Aviation Services Limited

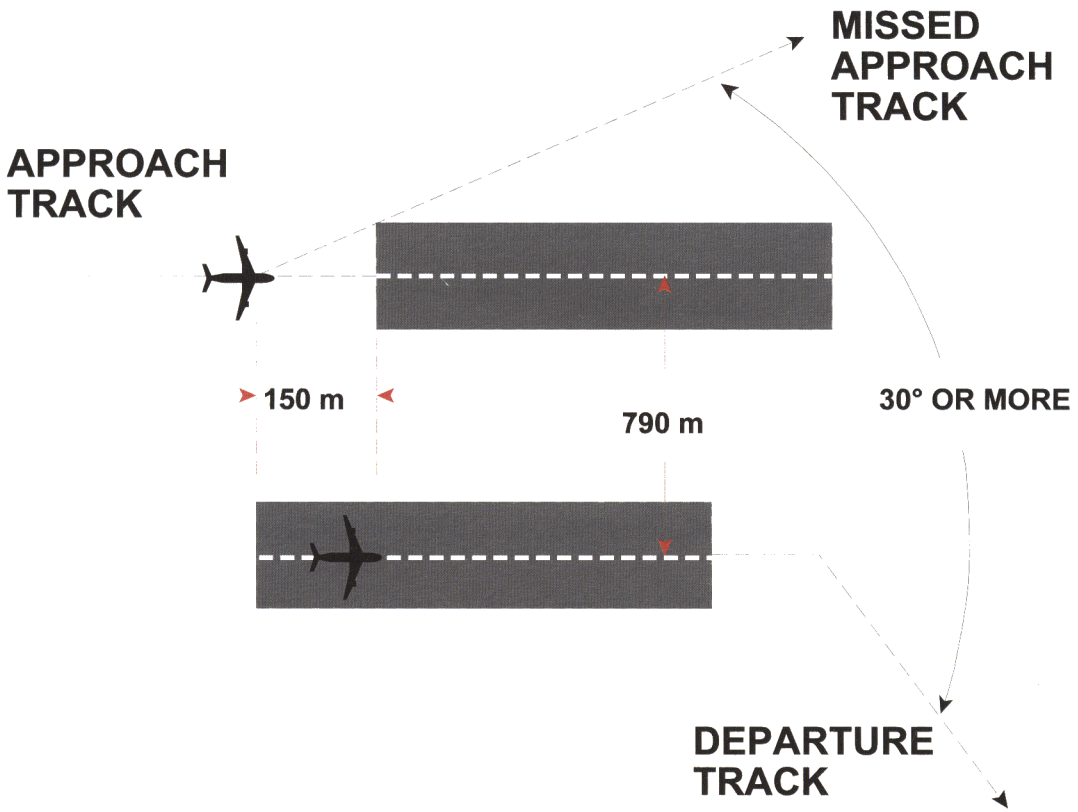


Fig 11.5.4c

11.5.5 Expected approach time (EAT). An expected approach time shall be determined for an arriving aircraft that will be subjected to stacking, and 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. In the case of aircraft particularly sensitive to high fuel consumption at low levels, an expected approach time should, whenever possible, be transmitted to the aircraft early enough before its intended descent time to enable the pilot to chose the method if absorbing the delay and to request a change in the flight plan if the choice is to reduce speed en-route. 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 lessor period of time as has been established by the appropriate ATS authority or 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 thirty minutes or more. The holding point 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.

© Oxford Aviation Services Limited

11.5.6 Information for arriving aircraft. The following information is to be passed to aircraft during the approach phase:

a. When established. As early as practicable after an aircraft has established communication with the approach controller, the following information, in the order listed, shall be transmitted to the aircraft, except where it is known the aircraft has already received it:

1. runway-in-use;

2. meteorological information;

Note: The meteorological information is identical to that required in ATIS broadcasts for aircraft arriving, and is to be extracted from meteorological reports disseminated locally at the aerodrome.

3. current runway surface conditions, in case of precipitants or other temporary hazards;

4. changes in the operational status of visual and non-visual aids essential for approach and landing.

b. Commencing final approach. At the commencement of final approach, the following information shall be transmitted to the aircraft:

1. significant changes in the mean surface wind direction and speed;

Note: Significant changes are detailed in Annex 3 (Met). If the controller has access to wind component tables, the following are considered to be significant:

i.	Mean head-wind component	10 kt
ii.	Mean tail-wind component	2 kt
iii.	Mean cross-wind component	5 kt

2. the latest information, if any, on wind shear and/or turbulence in the final approach area;

3. 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;

c. During final approach. The following information shall be transmitted without delay;

© Oxford Aviation Services Limited

1. the sudden occurrence of hazards (eg unauthorised traffic on the runway)

2. significant variations in the current surface wind, expressed in terms of minimum and maximum values;

3. significant changes in runway surface conditions

4. changes in the operational status of required visual or non-visual aids;

5. 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.

11.6 SEPARATION OF DEPARTING AIRCRAFT FROM ARRIVING AIRCRAFT

11.6.1 Take off clearance. Clearance for take-off for a departing aircraft will be granted when separation from arriving aircraft exists. The following situations are considered:

a. Complete procedure. Where an arriving aircraft is making a complete instrument approach, a departing aircraft may take-off

1. in any direction until the arriving aircraft has started its procedure turn or base turn leading to final approach, or

2. in a direction at least 45 from the reciprocal of the approach direction after the arriving aircraft has started the procedure turn inbound and there will be at least 3 minutes before the arriving aircraft is estimated to be over the threshold of the instrument runway (see fig 11.6).

b. Straight in approach. If an arriving aircraft is making a straight-in approach, a departing aircraft may take-off:

1. in any direction until 5 minutes before the arriving aircraft is estimated to be over the threshold of the instrument runway

2. in a direction which is different by 45 from the reciprocal of the direction of approach:

   i. until 3 minutes before the arriving aircraft is estimated to be over the threshold of the instrument runway (see fig 11.6), or

   ii. before the arriving aircraft crosses a designated fix on the approach track.

© Oxford Aviation Services Limited

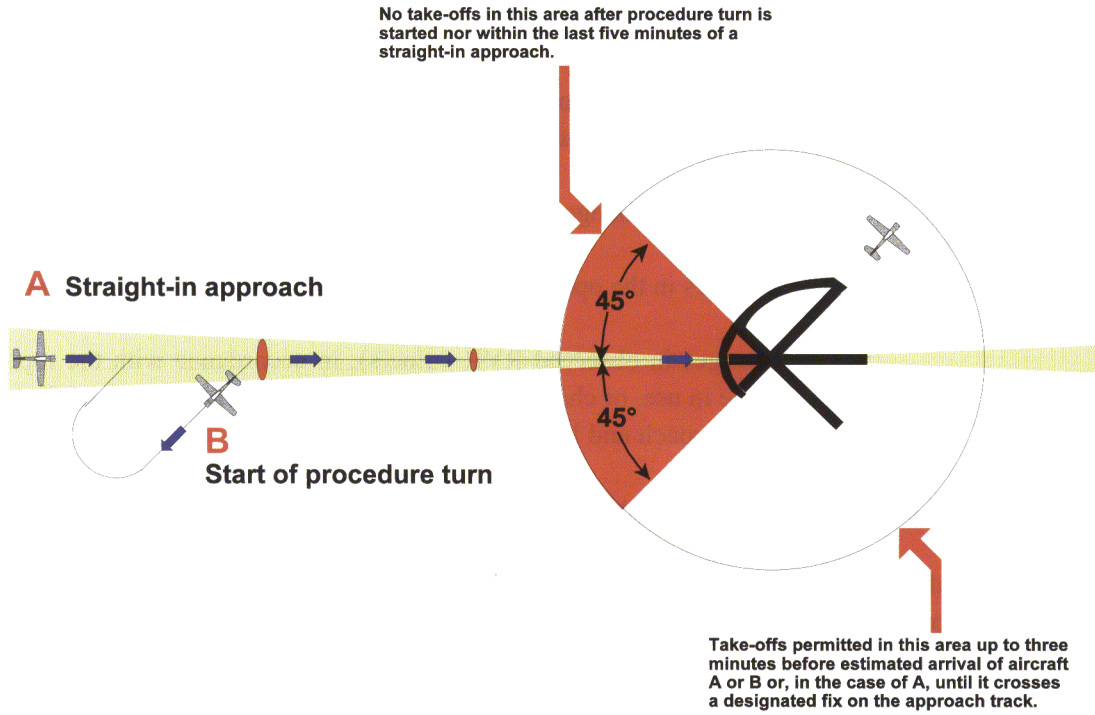


Fig 11.6

© Oxford Aviation Services Limited

REVISION QUESTIONS CHAPTER 11

1. The surface wind is 300/12 gusting 20kts but there is grass cutting in progress in the vicinity of the overrrun of runway 28. ATC gives you a clearance to depart from runway 19. As 19 is some 2000ft shorter than 28 and only just within limits for use, are you obliged to accept the clearance?

   a. No, you can request the contractors to be cleared from the overrun
   b. Yes, it is ATC that decides which runways can be used
   c. No, but it would then be up to your operator to negotiate with the aerodrome management for a special relaxation
   d. Yes, but you must get acknowledgement from ATC that they accept responsibility for the safety of the aircraft

2. ATC advises you that you are cleared for take off and cleared via SID DET3Z to climb initially to 6000ft maintaining own separation in VMC. Is this a valid clearance?

   a. Yes, the SID is valid for the route and IFR flights may climb or descend maintaining own separation in VMC
   b. No, you may request a climb or descent under IFR in VMC but you cannot be ordered to do it
   c. No, because it does not tell you what to do after you reach 6000ft
   d. No SIDs are applicable only to IFR flights and for all IFR flights ATC provides separation (normally by radar)

3. You have been cleared to taxi for runway 28R at Heathrow. Your EOBT allowed 17 minutes taxi and hold time. A warm front is approaching from the south and the temperature is expected to rise by 5°C with the passage of the front. By the time you arrive at the holding point for 28R the temperature has risen by 2°C. Would you expect ATC to inform you of the change?

   a. Yes
   b. No
   c. Yes if there was also a temperature inversion in the first 1000ft above the aerodrome
   d. Yes, if 2° is considered a significant change

© Oxford Aviation Services Limited

4. Which of the following met phenomena would you expect ATC to give information about to departing aircraft?

1. TS and CB
2. Turbulence
3. Windshear
4. Icing
5. Blowing snow
6. Heavy precipitation

a. All the above
b. All, with the exception of 6 (may be included if the precipitation is hail or freezing rain)
c. As b, but with the additional proviso that 2 and 4 are mod or severe not just light.
d. As c, but ignoring 5 (the aerodrome would be closed in this case)

5. You are at the take off holding point for 28R awaiting take off clearance from the aerodrome controller. Low vis landing operations are in progress on 28L. A landing aeroplane reports to ground control that one of the PAPI lights is inoperative. Would you expect the aerodrome controller to pass this information to you?

a. No, you are using 28R not 28L
b. No, PAPIs are not significant for take off
c. Yes, it is not the ATCOs responsibility to decide what is important information
d. Yes, it may affect your decision to try and land on 28L if an emergency occurs on take off rather than go to your nominated take off alternate

6. You elect to carry out a visual approach and land. With Approach you descend to below cloud ceiling and you are cleared to track outbound on the reciprocal of the runway QDM descending to 1000ft and at DME 5 to carry out a procedure turn and advise 'field in sight' to Tower. There is no other VFR or IFR traffic at the aerodrome. At what point would you expect to change frequency to Tower?

a. At the start of the procedure turn
b. At the completion of the procedure turn with the field in sight
c. When descending below 1000ft
d. At 4nm from touchdown (final call)

7. What is a **visual approach**?

a. Any approach carried out with only the use of visual aids
b. An instrument approach in VMC
c. Part or all of an instrument approach carried out with regard to visual reference
d. The part of an instrument approach below DH or MDH where visual contact with the ground is maintained

© Oxford Aviation Services Limited

8. London Director gives you radar vectors to the FAF for ILS on 28L. You are cleared to descend to 2500 ft (the initial approach height) and at that altitude you are well below the lowest cloud. When established on the centreline with 3 nm to run to the FAF you can see the landing runway and traffic ahead. Are you required to continue the instrument approach?

a. Yes. You are IFR traffic and you remain IFR until the FP is cancelled
b. Yes. The London CTR is class A airspace and VFR procedures are not permitted
c. No. You may request to make a visual approach providing visual reference to the terrain can be maintained and the cloud ceiling is above the initial approach level/altitude
d. Yes, but who is to know that you are flying the approach visually

9. What defines 'cloud ceiling'?

a. The cloud base over the aerodrome
b. The height of the bottom of the lowest layer of cloud below 20,000ft covering more than ½ of the sky
c. The height above the ground of the base of a layer of cloud that covers at least ½ of the sky providing that there is no other layer below that and the layer in question is not higher than 20,000ft
d. The top of the lowest layer of cloud above an aerodrome. The bottom of the layer is the 'cloud base'

10. Which of the following is essential information to be passed to a pilot who is not familiar with an instrument approach?

1. Initial approach level
2. Point at which the procedure turn is commenced
3. The level for the procedure turn
4. The final approach track
5. The missed approach procedure

a. All the above
b. All except 5
c. 1, 4 and 5 only
d. All except 3

11. When an instrument approach is commenced is a pilot required to complete the entire procedure?

a. No, reversion to visual approach is permitted at any time
b. No, the approach can be abandoned at any point before the DH/MDH and reversion to visual approach made
c. No, but the missed approach procedure only needs to be flown in IMC
d. No, a pilot may elect to carry out the missed approach procedure at any time

© Oxford Aviation Services Limited

12. Who is responsible for publishing holding procedures?

a. The authority of the state being flown over
b. The operator
c. The Area Control Centre
d. Jeppeson or Aerad

13. What determines the allocation of holding levels in a holding pattern?

a. The fastest are allocated the highest levels
b. Turbine powered aircraft are not allocated levels below FL100
c. Heavy wake turbulence group aircraft are allocated higher levels than lesser group aircraft
d. First in gets the lowest level!

14. You are in a holding pattern and you state your intention to continue holding whilst all the others decide to make an approach. There are three aircraft above you. What happens?

a. You will be told to hold on another facility or put to the top of the stack
b. You will be required to descend in turn and from the bottom of the stack you will be routed via the missed approach procedure to the top of the stack
c. Those above you, when it is their turn, will commence the procedure at that height/altitude
d. You have no choice. You must go along with the majority decision.

15. What does EAT mean?

a. The same as ETA ie Estimated Arrival Time
b. Estimated Approach Time
c. Expected Approach Time
d. Earliest Approach Time

16. What is EAT?

a. The time at which it is anticipated that an aircraft will leave the holding pattern and commence an instrument approach
b. The time at which it is expected that an aircraft will land
c. The time it is expected that an aircraft will commence an instrument approach procedure
d. The earliest time that an aircraft may expect to be permitted to make an instrument approach

© Oxford Aviation Services Limited

17. The Approach controller anticipates a delay of 20 minutes for your arrival and directs you into a holding pattern. Will he pass you an EAT?

a. Yes
b. No

18. You, and six others, are in a holding pattern awaiting clearance to commence an instrument approach and you have been given an EAT. Due to congestion on the ground, arrivals are delayed by a further 5 minutes to let 4 departures to take place. Would you expect to be given a revised EAT?

a. Yes, but only if you are the next in line for the procedure
b. No, only delays of more than 5 minutes require revised EAT
c. Yes, delays of 5 minutes or more require a revised EAT
d. It is up to the stack controller.

19. What defines 'Final Approach'?

a. The part of a visual approach equating to 'final' in a visual circuit
b. Part of an instrument approach that begins at the FAP and ends where a landing or missed approach can be made
c. The segment of an instrument approach for the point at which the aeroplane is established on the centreline of the runway with track guidance and that height data is also available
d. The part of an instrument approach to the threshold of the landing runway from the point at which the localiser intercepts the glide path

20. Which of the following would **not normally** be passed to aeroplanes at the commencement of final approach?

a. Significant changes in outside air temperature
b. Significant changes in surface wind
c. Information concerning windshear/turbulence
d. Trends in visibility or slant visibility

21. An aircraft is established on final approach. Which of the following is to be communicated by ATC to the aeroplane?

a. Changes in forecast RVR
b. Change of runway braking action from Good to Medium
c. The failure of the aerodrome ident beacon
d. Change in surface wind velocity

© Oxford Aviation Services Limited

22. Declaration of which of the following **would not qualify** for allocation of priority to land?

a. Distress
b. Urgency
c. Fuel priority
d. A technical problem

23. You are in a holding pattern and you get a message on your company frequency that the obstacle that is blocking the landing runway is about to be moved. You work out that if you try an approach now, you might be lucky and jump the queue. Can you do it and if so, what is the gamble?

a. Yes, you could ask to make an approach, but the ATC controller may deny you the opportunity and you would then have alerted the others in the stack
b. Yes you can, but if you do not land off the approach you will go to the top of the stack and loose your place
c. No you are not permitted to leave the stack except in turn or in an emergency
d. This is a totally hypothetical situation. No sensible commercial air transport operation would ever consider such an underhand slimy nasty backstabbing ploy – would they!

24. What would be considered a significant tail wind component?

a. 10 kts
b. 5 kts
c. 2 kts
d. Any tail wind is significant

25. For a take off operations, separation is required from arriving traffic. Where an inbound aircraft is carrying out a complete instrument arrival procedure, until when would take offs be permitted?

a. At any time until the inbound aircraft is established on final approach
b. At any time until the inbound commences the procedure turn
c. Until the inbound is 5 mins from touchdown
d. It depends upon the take off direction

© Oxford Aviation Services Limited

ANSWERS TO REVISION QUESTIONS FOR CHAPTER 11

1	A	26		51		76	
2	B	27		52		77	
3	D	28		53		78	
4	C	29		54		79	
5	C	30		55		80	
6	A	31		56		81	
7	C	32		57		82	
8	C	33		58		83	
9	B	34		59		84	
10	B	35		60		85	
11	D	36		61		86	
12	A	37		62		87	
13	D	38		63		88	
14	A	39		64		89	
15	C	40		65		90	
16	A	41		66		91	
17	B	42		67		92	
18	C	43		68		93	
19	B	44		69		94	
20	A	45		70		95	
21	A	46		71		96	
22	C	47		72		97	
23	B	48		73		98	
24	C	49		74		99	
25	D	50		75		100	

© Oxford Aviation Services Limited

CHAPTER TWELVE - AERODROME CONTROL, RADAR SERVICES, ADVISORY SERVICE AND ALERTING SERVICE

Contents

		Page
12.0	AERODROME CONTROL SERVICE	12-1
12.1	INTRODUCTION.	12-1
12.2	TRAFFIC AND TAXI CIRCUITS	12-2
12.3	INFORMATION TO AIRCRAFT	12-2
12.4	CONTROL OF AERODROME TRAFFIC	12-4
12.5	WAKE TURBULENCE CONSIDERATIONS	12-7
12.6	RADAR SERVICES	12-11
12.7	GENERAL RADAR PROCEDURES	12-14
12.8	RADAR VECTORING	12-17
12.9	USE OF RADAR IN THE AIR TRAFFIC CONTROL SERVICE	12-19
12.10	RADAR SEPARATION STANDARDS	12-22
12.11	EMERGENCIES.	12-25
12.12	USE OF RADAR IN APPROACH CONTROL.	12-26
12.13	RADAR APPROACHES	12-27
12.14	USE OF RADAR IN AERODROME CONTROL	12-29
12.15	AIR TRAFFIC ADVISORY SERVICE.	12-30
12.16	ALERTING SERVICE	12-32
12.17	SEPARATION REVISION	12-34
	REVISION QUESTIONS	12-43

12.0 AERODROME CONTROL SERVICE

12.1 INTRODUCTION. There is no legal requirement for an aerodrome used for VFR flight only to have an aerodrome controller. If however, the aerodrome is to be used for commercial air transport under IFR, it must be licenced and part of the licence requirement is for aerodrome control to be provided by licenced air traffic controllers. Usually referred to as either "local" or "tower" or just by the name of the aerodrome on RTF, the aerodrome controller is required to provide ATC services at **controlled** aerodromes. At non-controlled aerodromes, a flight information service may be provided by a Flight Information Officer (FISO) (callsign usually the name of the aerodrome with the addition of "information" ie Oxford information).

12.1.1 Functions of Aerodrome Control Towers. Aerodrome control towers 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 collisions between:

a. aircraft flying in the aerodrome traffic circuits around an aerodrome;
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.

12.1.2 Alerting service. Aerodrome control towers are also responsible for alerting the safety services in the event of an incident or accident occurring on or in the vicinity of the aerodrome. It is also responsible for immediately reporting (to the ACC) any failure or irregularity of operation in any apparatus, light or other device established at an aerodrome for the guidance of aerodrome traffic and pilots-in-command of an aircraft. Aircraft which fail to report after having been handed over to an aerodrome control tower, or, having once reported, cease radio contact and in either case fail to land **five minutes** after the expected landing time, shall be reported to the area control centre (ACC) or flight information centre (FIC).

12.1.3 Suspension of VFR operations by aerodrome control towers. Any or all VFR operations on and in the vicinity of an aerodrome may be suspended whenever safety requires such action. Authorities permitted to suspend VFR ops are the area control centre within whose control area the aerodrome is located, the aerodrome controller on duty and the appropriate ATS authority. All such suspensions of visual flight rules operations shall be accomplished through or notified to the aerodrome control tower. The following procedures shall be observed by the aerodrome control tower whenever visual flight rules operations are suspended:

a. hold all departures other than those which file an instrument flight rules plan and obtain approval thereof from the area control centre;
b. recall all local flights operating under visual flight rules or obtain approval for special VFR operations;

© Oxford Aviation Services Limited

c. notify the area control centre of the action taken;
d. notify all operators, or their designated representatives, of the reason for taking such action if necessary or requested.

12.2 TRAFFIC AND TAXI CIRCUITS

12.2.1 Selection of runway-in-use. The term "runway-in-use" shall be used to indicate the runway that at a particular time is considered by a unit providing aerodrome control service to be the most suitable for use by the types of aircraft expected to land or take off at the aerodrome. Normally, an aircraft will land and take off into wind unless safety, the runway configuration, or air traffic conditions determine that a different direction is preferable. In selecting the runway-in-use, however, the unit providing aerodrome control service shall take into consideration, besides surface wind speed and direction, other relevant factors such as the aerodrome traffic circuits, the length of runways, and the approach and landing aids available. If the runway-in-use is not considered suitable for the operation involved the pilot-in-command may request permission to use another runway.

12.3 INFORMATION TO AIRCRAFT

12.3.1 Information to Aircraft by Aerodrome Control Towers. Aircraft will be passed by RTF the following, in the order listed, with the exception of elements which it is known the aircraft has already received:

a. Prior to taxiing for take-off:

1. the runway to be used;

2. the current surface wind direction and speed, including significant variations;

3. 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;

4. the air temperature for the runway to be used, in the case of turbine-engined aircraft;

5. the current visibility representative of the direction of take-off and initial climb, if less than 10 km. Or, when provided, the current RVR value(s) for the runway to be used;

6. the correct time.

© Oxford Aviation Services Limited

b. **Prior to take-off**:

1. any significant changes in the surface wind direction and speed, the air temperature, and the visibility or RVR value(s);
2. 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 of expected occurrence of cumulonimbus or thunderstorm, moderate or severe turbulence, wind shear, hail, moderate or severe icing, sever squall line, freezing precipitation, severe mountain waves, sand storm, dust storm, blowing snow, tornado or waterspout in the take-off and climb-out area.

c. **Prior to entering the traffic pattern**:

1. the runway to be used;
2. the mean surface wind direction and speed and significant variations therefrom;
3. the QNH altimeter setting and, either in a regular basis in accordance with local arrangements or, if so requested by the aircraft, the QFE altimeter setting.

12.3.2 Information to avoid collisions. When operating under visual meteorological conditions, it is the responsibility of the pilot-in-command of an aircraft to avoid collision with other aircraft. However, due to the restricted space in and around manoeuvring areas, it is often essential that traffic information be issued to aid the pilot-in-command of an aircraft to avoid collision. 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.

12.3.3 Information on aerodrome conditions. Essential information on aerodrome conditions shall be given to every aircraft, except when it is known that the aircraft has already received all or part of the information from other sources. The information shall be given in sufficient time for the aircraft to make proper use of it, and the hazards shall be identified as distinctly as possible. Essential information on aerodrome conditions is to 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;

c. snow, slush or ice on a runway, a taxiway or an apron;

© Oxford Aviation Services Limited

d. water on a runway, taxiway or an apron;

e. snow banks or drift adjacent to a runway, taxiway or an apron;

f. other temporary hazards, including parked aircraft and birds on the ground or on the air;

g. failure or irregular operation of part or all of the aerodrome lighting system;

h. any other pertinent information.

12.4 CONTROL OF AERODROME TRAFFIC

12.4.1 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. 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 of departures with the least average delay.

12.4.2 Control of taxiing aircraft. When taxiing a pilots vision is limited. The aerodrome controller will issue instructions and information to assist the pilot to determine the correct taxi route and to avoid collisions with other aircraft or objects. Aircraft may be permitted to taxi on the runway in use. Aircraft are not to be held closer to the runway in use than a runway holding position. An aircraft may be permitted to enter the runway and hold during landing operations after the landing aircraft has passed the intended landing point.

12.4.2.1 Unlawful Interference. Aircraft known (or believed) to have been unlawfully interfered with, or for other reasons, which need isolation from normal aerodrome activities, are to be parked in a designated isolated parking position. The parking area designated is to be not less than 100 m from any other parking area.

12.4.3 Control of non-aircraft traffic on the manoeuvring area. The movement of pedestrians or vehicles on the manoeuvring area shall be subject to authorisation by the aerodrome control tower. Persons (including drivers of vehicles) are to obtain authorisation before entering the manoeuvring area. Entry to a runway (or runway strip) is to be subject to further authorisation. At controlled aerodromes, vehicles employed on the manoeuvring area are to be equipped with two-way radios for communication with the tower. If not radio equipped a vehicle on temporary duty will be accompanied by a radio equipped vehicle or employed in accordance with a pre-arranged plan. Visual signals to vehicles from the tower are detailed in Annex 2.

© Oxford Aviation Services Limited

12.4.4 Control of air traffic in the visual circuit. Pilots of aircraft operating under VFR in the traffic circuit are responsible for their own separation and circuit discipline. Tower will impose control on circuit traffic to provide separation between circuit traffic and departing and arriving traffic under both VFR and IFR. Control may be imposed if unauthorised traffic enters the circuit until the hazard caused by the unauthorised traffic has been resolved. Clearance to enter the traffic circuit will be issued to traffic intending to land when it is not able (due to other traffic) to carry out a straight in approach to land. Pilots are to be aware at all times that aircraft in an emergency may enter the circuit without authority or prior clearance.

12.4.4.1 Critical positions in the Traffic circuit. The tracks depicted in fig. 12.4.4.1 reflect the critical positions in the visual circuit of an aerodrome where a left-hand circuit is in force. The critical points are:

a. **Position 1.** Aircraft reports on downwind leg when abeam upwind end of the landing runway

b. **Position 2.** Base leg report

c. **Position 3.** 'Final' report. Clearance to land issued here.

d. **Position 4.** 'Long final' report (between 8 and 4 miles) when aircraft is on a straight-in approach.

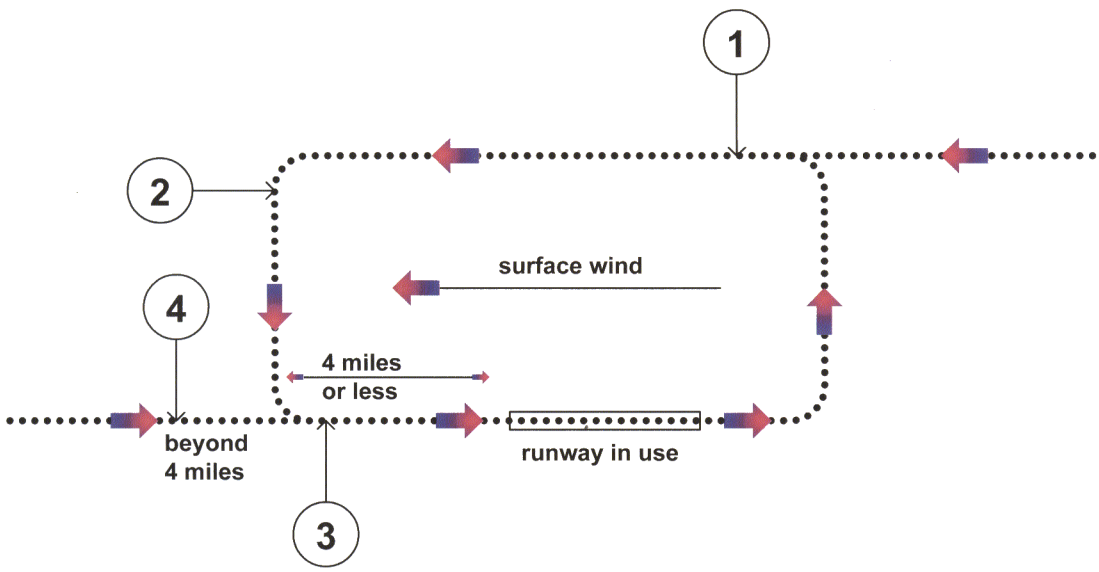


Figure 12.4.4.1

© Oxford Aviation Services Limited

12.4.5 **Control of departing aircraft.** The requirements of wake turbulence separation will determine the separation between aircraft departing. Departing aircraft will not normally be permitted to commence take-off until the preceding departing aircraft is airborne and has crossed the departure end of the runway-in-use or has started a turn, or until all preceding landing aircraft are clear of the runway-in-use. In the interest of expediting traffic a clearance for immediate take-off may be issued to an aircraft before it enters the runway, in which case the aircraft is to be taxied onto the runway and the take off run commenced in one continuous movement. A departing aircraft may be ordered to 'line up and hold' behind a landing aircraft before that aircraft has cleared the landing runway. When safe to do so, a departing aircraft (even if staying in the visual circuit) is to report "airborne" on the tower RTF frequency.

12.4.6 **Control of arriving aircraft**. A landing aircraft will not normally be permitted to cross the threshold of the landing runway on its final approach until the preceding departing aircraft is airborne and has crossed the departure end of the runway in use, or has started a turn, or until all preceding landing aircraft are clear of the runway.

12.4.6.1. 'Land After' procedure. When aircraft are using the same runway, a landing aircraft may be permitted to touch down before a preceding landing aircraft is clear of the runway. In this case ATC will provide a warning by issuing the second aircraft with the instruction **"land after .....(first aircraft type)"** instead of the usual instruction "cleared to land". Responsibility for ensuring adequate separation rests with the pilot of the second aircraft. The procedure is permitted providing:

a. the runway is long enough to allow safe separation between the two aircraft and there is no evidence that braking may be adversely affected;

b. it is during daylight hours;

c. the controller is satisfied that the landing aircraft will be able to see the preceding aircraft clearly and continuously, until it is clear of the runway; and

d. the pilot of the following aircraft is warned.

12.4.7 **Authorisation for SVFR flight.** When traffic conditions permit, special VFR flights may be authorised subject to the approval of the ATCU providing approach control. Requests for authorisation will be considered on an individual basis. Separation is applied between all IFR flights and special VFR flights, and when required by the authority, between all special VFR flights. Special VFR flights are not permitted to take off and depart from a CTR, or to enter a CTR for the purpose of landing, to cross a CTR, or to operate locally within a CTR unless the **ground visibility** (see definition) is greater than that specified..

a. In accordance with PANS ATM, ground vis to be not less than 1 500 m

© Oxford Aviation Services Limited

b. In accordance with JAR-OPS 1.465; not to commence if the ground visibility is less than 3 km, and not otherwise conducted when (flight) visibility is less than 1 500 m.

12.5 WAKE TURBULENCE CONSIDERATIONS

12.5.1 Wake turbulence categorisation of aircraft. Wake turbulence separation minima shall be based on grouping of aircraft types into three categories according to the maximum certificated take-off mass as follows:

a. **HEAVY** (H) - all aircraft types of 136 000 kg or more;

b. **MEDIUM** (M) - aircraft types less than 136 000 kg but more than 7 000 kg; and

c. **LIGHT** (L) - aircraft types of 7000 kg or less.

12.5.2 Separation minima. The following non-radar separation minima is applied:

a. **Arriving aircraft**. For timed approaches, the following minima is applied to aircraft landing behind a heavy or medium aircraft:

1. Medium behind heavy - 2 minutes

2. Light behind heavy or medium - 3 minutes

b. **Departing aircraft.** A minimum of 2 minutes separation is applied between a light or medium taking off behind a heavy, or a light behind a medium, when they are using:

1. the same runway;

2. parallel runways separated by less than 760 m;

3. crossing runways if the projected flight path of the second aircraft will cross the projected flight path of the first at the same altitude or less than 1 000 ft below;

4. parallel runways are separated by 760 m or more, if the projected flight path of the second aircraft will cross the projected flight path of the first at the same altitude or less than 1 000 ft below. See figs 12.5.2bi and ii.

© Oxford Aviation Services Limited

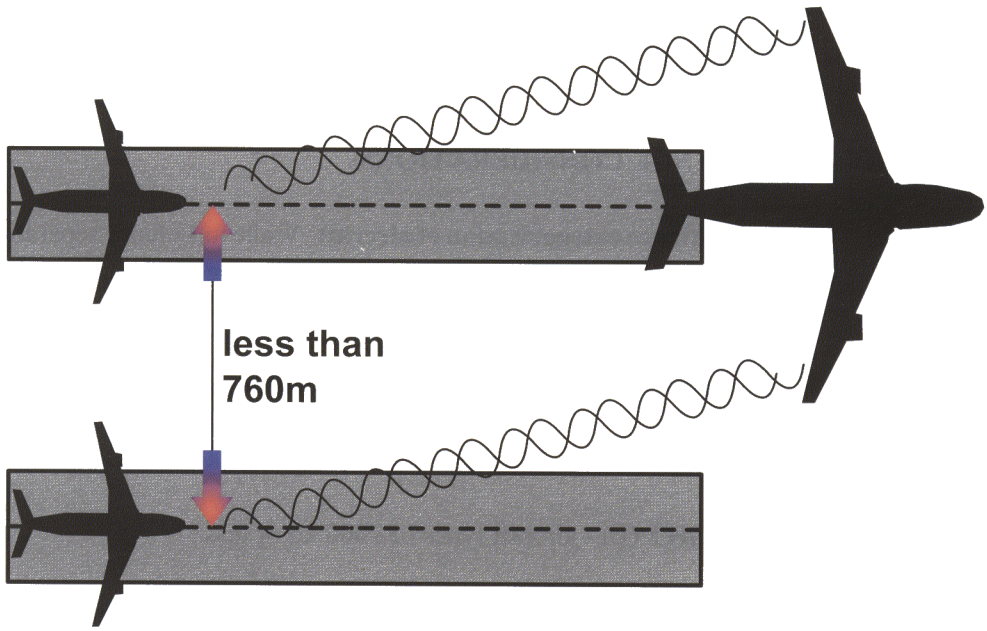


Figure 12.5.2.bi

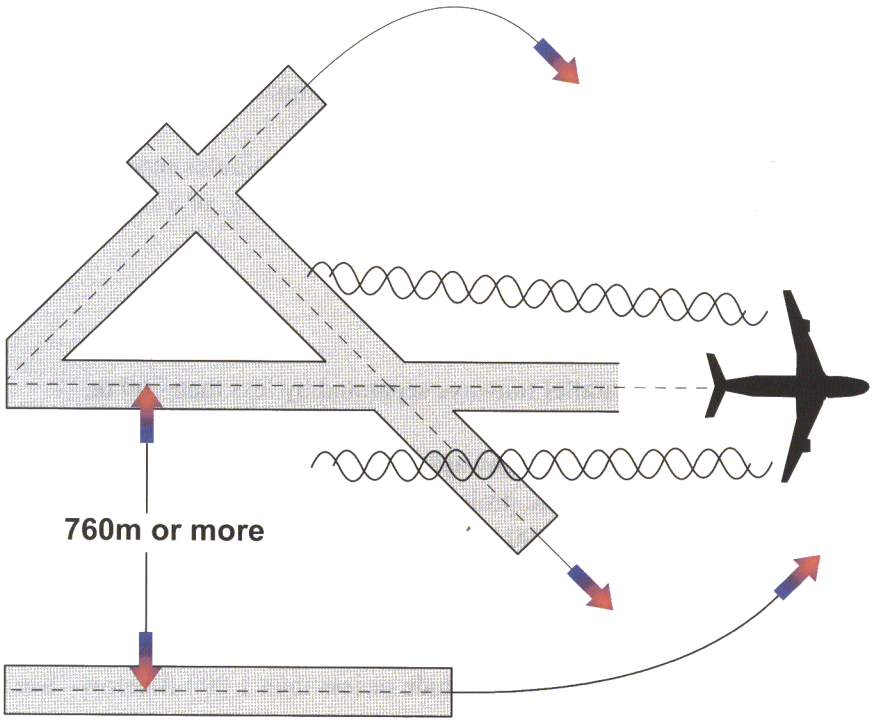


Figure 12.5.2.bii

© Oxford Aviation Services Limited

Note: Separation is increased to 3 minutes where a light or medium is taking off behind a heavy (or light behind a medium) from an intermediate part of he same runway or an intermediate point on parallel runways. See fig 12.5.2biii

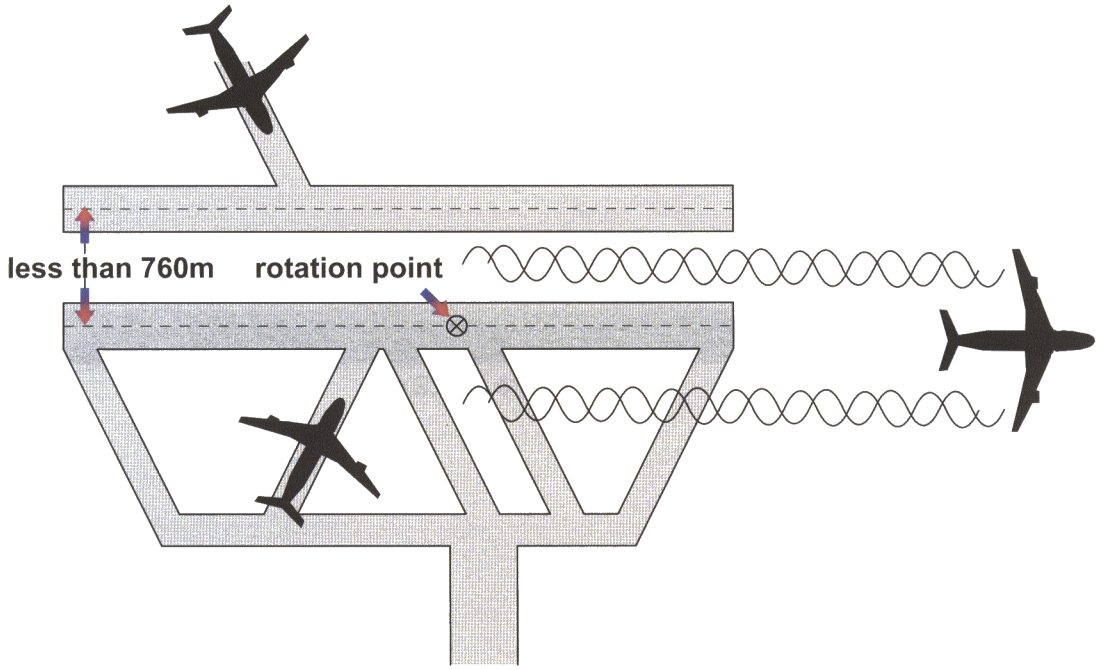


Figure12.5.2.bii

c. **Displaced landing threshold**. A separation of 2 minutes is applied between light or medium and heavy (light and medium) when operating on a runway with a displaced threshold when:

1. a departing light or medium follows a heavy arriving and a departing light follows a medium arriving, or

2. an arriving light or medium follows a heavy departing and an arriving light follows a medium departing if the projected flight paths are expected to cross.

d. **Opposite direction**. A separation of 2 minutes is applied between a light or medium and a heavy, and between a light and a medium when the heavier aircraft is making a low or missed approach and the lighter aircraft is:

1. using an opposite direction runway for take-off, see fig 12.5.2di; or

2. landing on the same runway in the opposite direction, or on a parallel opposite direction runway separated by less than 760 m. See fig 12.5.2dii.

© Oxford Aviation Services Limited

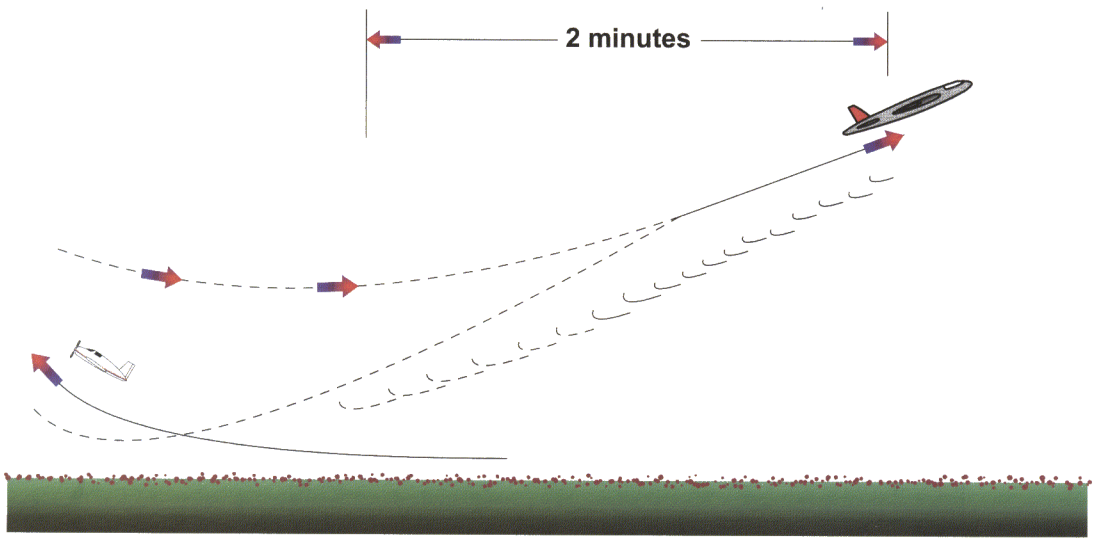


Figure 12.5.2.di

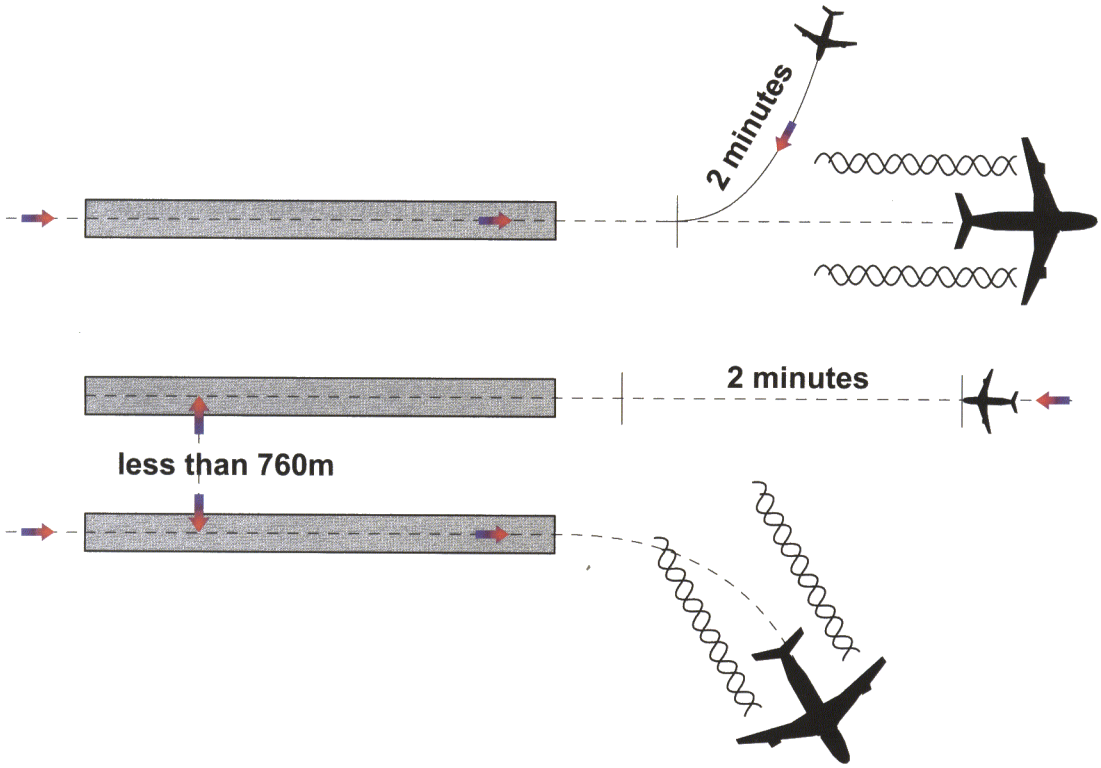


Figure 12.5.2dii

© Oxford Aviation Services Limited

12.6 RADAR SERVICES

12.6.1 Introduction. The use of radar in ATC is now widespread and the addition of digital systems and computer enhancement have yet further improved the ability of ATCOs to provide an efficient and safe service. Radar is used in all aspects of air traffic. Specifically in area control (airways and upper air routes are all radar controlled in Europe and North America); approach radar provides zone penetration and crossing services and of course, radar vectoring in the vicinity of aerodromes to achieve either a visual join or an instrument approach. Radar is used for ground movement monitoring and control and we are now seeing computerised Precision Approach Radar (PAR) systems coming on line. In chapter 7 we looked at non-precision approaches using surveillance radar (SRA). The one major advantage radar based ATC has over the traditional procedural system is that the radar operator/controller has a pictorial display of the airspace he/she is controlling and most importantly, the plan position of the aircraft is displayed therefore not relying on the pilot to tell the controller where the aircraft is. SSR Mode C provides accurate height information giving a 3-D presentation to the controller. By taking the potential pilot error out of the equation, less restrictive separation standards can be applied based on radar position. This in turn leads to the ability of the ATC system to handle more aeroplanes safely, thus helping to achieve a smooth and expeditious flow of air traffic.

12.6.2 Radar systems capabilities. Radar systems used in the provision of air traffic services are required to have a very high level of reliability, availability and integrity. The possibility of system failures or significant system degradations which cause complete or partial interruptions of service are very remote, but all systems require back-up facilities to be provided. Radar systems should provide for the display of safety related alerts and warnings, including conflict alert, minimum safe altitude warning, conflict prediction and unintentionally duplicated SSR codes.

12.6.3 Types of radar. Primary surveillance radar (PSR) and secondary surveillance radar (SSR) may be used either alone or in combination in the provision of air traffic services, including in the provision of separation between aircraft, provided reliable coverage exists in the area, and the probability of detection, the accuracy and the integrity of the radar systems are satisfactory.

a. PSR systems should be used in circumstances where SSR alone would not meet the air traffic services requirements. Where PSR and SSR are required to be used in combination, SSR alone may be used in the event of PSR failure, to provide separation between identified transponder equipped aircraft, provided the accuracy of the SSR position indications has been verified by monitor equipment or other means.

© Oxford Aviation Services Limited

b. SSR systems, especially those with monopulse technique or Mode S capability, may be used alone, including the provision of separation between aircraft provided the carriage of SSR transponders is mandatory, and aircraft identification is established and maintained by the use of assigned discrete SSR codes.

Note: Monopulse technique is a radar technique in which azimuth information of an SSR transponder aircraft is derived from each pulse detection by comparison of signals received simultaneously in two or more antenna beams. Monopulse SSR sensors provide for an improved azimuth resolution and less garbling than conventional SSR sensors.

12.6.4 Radar coverage and operation. The use of radar in air traffic services shall be limited to specified areas of radar coverage and shall be subject to such other limitations as have been specified by the appropriate ATS authority. Adequate information on the operating methods used shall be published in aeronautical information publications, as well as operating practices and/or equipment limitations having direct effects on the operation of the air traffic services.

12.6.5 Presentation of radar information. Radar-derived information available for display to the controller shall, as a minimum, include radar position indications, radar map information and, when available, information from SSR Mode A, Mode C and Mode S. The radar system shall provide for a continuously updated presentation of radar-derived information, including radar position indications. Radar indications (including position information) may be displayed as:

a. Radar position symbols (RPS), including;

1. PSR symbols
2. SSR symbols; and
3. combined PSR/SSR symbols;

b. PSR blips.

c. SSR responses.

d. Reserved SSR codes, including 7500, 7600 and 7700, operation of IDENT, safety related alerts and warnings as well as information related to automated co-ordination shall be presented in a clear and distinct manner, providing for ease of recognition.

© Oxford Aviation Services Limited

e. **Radar labels** should be used to provide, in alphanumeric form, SSR-derived as well as other information which may be available. Radar label information shall as a minimum include the SSR code transmitted by an aircraft or, when code/call sign conversion is effected, aircraft identification, and SSR Mode C-derived level information. All label information shall be presented in a clear and concise manner. Radar labels shall be associated with their radar position indications in a manner precluding erroneous identification by or confusion on the part of the controller.

Note: When applicable, distinct symbols should be used for presentation of unintentionally duplicated SSR codes, predicted positions for a non-updated track; and plot and track data.

12.6.6 Communications. Direct pilot-controller communications are to be established prior to the provision of radar services, unless special circumstances such as emergencies dictate otherwise. Radar controllers will use call signs that may or may not indicate that the use of radar is the method by which ATC is being applied. Typically, radar controllers are called 'Radar'; 'Director' 'Zone' amongst others. Radar control will usually have a discrete frequency but may share (or have the ability to override) frequencies with procedural controllers.

12.6.7 SSR. Modern ATC SSR systems allow an assigned code to be linked to the call sign of an aircraft. This is called code/callsign conversions. Where SSR is used, standard procedures and phraseology will be strictly adhered to. The reserved codes (7700; 7600; 7500) are only to be used for the purposes intended. Other codes used in a state are to be those allocated to the state in accordance with regional air navigation agreements. Use plans are to be compatible with those of adjacent states. Code changes for en-route aircraft should be kept to the minimum to reduce pilot/controller work loads. Where there is a need for individual aircraft identification codes (humanitarian relief, medical flights, VIP etc..) the code allocated should be retained throughout the flight.

12.6.7.1 Operation of transponders. If it is observed that a pilot mis-selects the assigned code, he/she is to be requested to reselect the correct code rather than continuing to use the wrong code (there may be a code confliction!). When a code is changed, the transponder is to be set to 'standby' during the code change operation and then re-selected to 'on'. Ostensibly, this is to prevent inadvertent response with the incorrect code. Modern systems have a transmit delay function or twin code selector units with a changeover switch. To prevent operation of the transponder on the ground, weight inhibit switches are fitted in the transmitter control to prevent transmission whilst the undercarriage is loaded.

© Oxford Aviation Services Limited

12.6.8 Mode C. The tolerance value of Mode C derived level information displayed to the controller is to be +/- 300 ft. Verification of the accuracy of Mode C is to be effected at least once by each suitably equipped ATCU on initial contact. There is no need for the pilot to be advised if the verification proves within tolerance. If it is outside tolerance or a discrepancy occurs after verification of correct operation, the pilot is to be advised and requested to check the pressure setting and confirm the aircraft level. If the discrepancy continues to be apparent, the pilot is to be requested to stop Mode C transmissions (provided this does not inhibit Mode A transmissions).

12.6.8.1 Determination of Level Occupancy. A particular level is deemed to be occupied by an aircraft providing the aircraft is within a height bracket of the level ±300ft (90m). Where an ATS authority deems it more appropriate, the bracket may be reduced to ±200ft (as is the case in the UK and throughout most of Europe).

12.6.8.2 Aircraft Maintaining a Level. An aircraft is considered to be maintaining its assigned level as long as the Mode C derived level information indicates that it is within ±300ft (90m) of the assigned level.

12.6.8.3 Aircraft Vacating a Level. When an aircraft is cleared to vacate a level, it is considered to have commenced the manoeuvre and vacated the previous level when Mode C derived information indicates a change of **more than** 300ft (90m) in the anticipated direction from the previously assigned level.

12.6.8.4 Passing a Level (Climbing/Descending). An aircraft climbing or descending is considered to have crossed a level when the Mode C derived information indicates that it has passed this level in the required direction by **more than** 300ft (90m).

12.6.8.5 Reaching a Level. An aircraft is considered to have reached a level to which it has been cleared when three consecutive renewals of Mode C level derived information have indicated that it is within 300ft (90m) of the assigned level.

12.7 GENERAL RADAR PROCEDURES

12.7.1 Identification of aircraft. Before a radar service is provided to an aircraft, radar identification is to be established and the pilot informed accordingly. From then on, radar identification is to be maintained until the termination of the radar service. If radar ident is subsequently lost, the pilot is to be informed and when applicable alternate instructions issued.

12.7.2 Radar identification methods. Radar identification is to be established by one of the approved methods using PSR or SSR.

© Oxford Aviation Services Limited

12.7.2.1 Identification procedures using SSR. Where SSR is used it will be the preferred method of identification, and aircraft may be identified by:

a. recognition of the aircraft identification in a radar label. This procedure requires code/callsign correlation.

b. recognition of the assigned discrete code, the setting of which has been verified in a radar label

c. direct recognition of the aircraft identification of a Mode S equipped aircraft in a radar label

d. by transfer of radar identification

e. compliance with instruction to set a specific code

f. compliance with an instruction to squawk IDENT

12.7.2.2 Identification procedures using PSR. Where SSR is not available, radar identification will be achieved by one of the following methods:

a. relating a radar contact position with the position reported by an aircraft, and relating the track of the contact on the screen with the aircraft path or reported heading. Note: The controller must be aware of slant range errors and time late display error.

b. by relating a radar contact position with an aircraft that is known to have taken off from an aerodrome providing the identification is achieved within 2 km (1 nm) of the end of the runway. Care must be taken to avoid a mis-ident occurring in this case.

c. by transfer of radar identification

d. with the heading of an aircraft known, observing the track of a possible contact and:

   1. instructing the pilot to execute one or more heading changes of 30 or more; or

   2. relating the movement of a particular contact with executed manoeuvres of the aircraft

© Oxford Aviation Services Limited

12.7.2.3 Confirmation. Other aids (ie VDF) may be used to assist identification of a radar contact. In the case where two or more contacts are observed in close proximity (or are seen making the same manoeuvre) instructions are to be given to the pilot of the aircraft to be identified to repeat the manoeuvres as many times as is necessary to confirm identification.

12.7.3 Transfer of radar identification. Transfer of radar identification from one radar controller to another should only be attempted when it is considered that the aircraft is within the accepting controller's radar coverage. This procedure is used where the controllers are at different geographic locations and are using different radar transmitters (ground station). It is the method used to transfer radar control from one ACC to another. The process requires the controllers to positively establish that a contact previously identified by the first controller is seen by the second controller. It may be as simple as observation of a contact position (range and bearing) related to a common geographic feature or radio navigation aid, the position of which is displayed on both radar screens. The use of SSR is encouraged. Transfer within an ACC or between units in the same FIR may be achieved electronically using the capability of radar systems to accept data from remote radar heads via microwave links.

12.7.4 Position information. When aircraft are provided with a radar service, pilots are to be informed of the aircraft's (radar contact) position by the controller. The circumstances in which the information will be passed are:

a. upon identification, where identification is based on:

   1. pilots report of aircraft position or within 1 nm of the runway end after take off; or

   2. relation of a discrete squawk and radar contact position (providing this is consistent with flight plan information)

   3. transfer of radar identification

b. when the pilot requests position information

c. when the pilot's estimate of position differs significantly from the radar controller's estimate based on radar observation

d. when the pilot is instructed to resume own navigation after radar vectoring

e. immediately before the termination of the radar service.

© Oxford Aviation Services Limited

12.7.4.1 Forms of position reference. Whenever practicable, position information is to relate to positions or routes pertinent to the navigation of the aircraft concerned and displayed on the radar map (an electronically generated overlay showing geographic positions of radio nav aids, aerodromes, the extremities of airways, danger areas etc..). Position information will be passed to aircraft in one of the following forms:

a. as a well-known geographical position;

b. magnetic track and distance to a significant point, an en-route navigational aid, or an approach aid;

c. direction (using points of the compass) and distance from a known position ;

d. distance to touchdown, if the aircraft is on final approach; or

e. distance and direction from the centre line of an ATS route.

12.7.4.2 'Omit position reports'. When so informed, the pilot may omit position reports at compulsory reporting points or report only over those reporting points specified by the air traffic services unit concerned, including points at which air-reports are required for meteorological purposes. Pilots shall resume position reporting when so instructed and when advised that radar service is terminated or that radar identification is lost.

12.8 RADAR VECTORING

12.8.1 Purpose. Radar vectoring is a procedure that allows a radar controller to give headings to fly to the pilot of an identified aircraft so that the aircraft may be positioned at a specific point, on the correct heading, to avoid other contacts, avoid restricted or prohibited airspace, assist navigation or achieve the criteria for the continuation of an instrument approach by other means.

12.8.2 Radar vectoring area. Radar vectoring is only carried out in the vicinity of aerodromes in specified areas. A radar vectoring area chart is included in documentation in the AD section of the AIP for each aerodrome at which radar vectoring takes place. The area is surveyed for obstacles and minimum altitudes are specified for each sector of the area, or the whole area. Obstacles within the radar vectoring area are displayed on the chart. Whenever possible, minimum vectoring altitudes should be sufficiently high to minimise activation of aircraft ground proximity warning systems. States encourage operators to report incidents involving activations of aircraft ground proximity warning systems so that their locations can be identified and altitude, routing and/or aircraft operating procedures can be altered to prevent recurrences. When an IFR flight is being vectored, the pilot is often unable to determine the aircraft's exact position and consequently the altitude which provides the required obstacle clearance.

© Oxford Aviation Services Limited

Note:- Activation of such systems will induce the aircraft to pull up immediately and climb steeply to avoid hazardous terrain, possible compromising separation between aircraft.

12.8.3 Procedure. Radar vectoring shall be achieved by issuing to the pilot specific headings which will enable the aircraft to maintain the desired track. When vectoring an IFR flight , the radar controller shall issue clearances such that the prescribed obstacle clearance will exist at all times until the aircraft reaches the point where the pilot will resume own navigation. When vectoring an aircraft, a radar controller should comply with the following:

a. whenever practicable, the aircraft should be vectored along routes or tracks on which the pilot can monitor the aircraft position with reference to pilot-interpreted navigation aids (this will minimise the amount of radar navigational assistance required and alleviate the consequences resulting from a radar failure);

b. when an aircraft is given a vector diverting it from a previously assigned route, the pilot should be informed, unless it self-evident, what the vector is to accomplish and, when possible, the limit of the vector should be specified (e.g. to....position, for.... approach).

c. except when transfer of radar control is to be effected, aircraft shall not be vectored closer than 4.6 km (2.5 NM) or, where a radar separation minimum greater than 9.3 km (5 NM) is prescribed, a distance equivalent to one half if the prescribed separation minimum, from the limit of the airspace for which the radar controller is responsible, unless local arrangements have been made to ensure that separation will exist with radar-controlled aircraft operating in adjoining areas;

e. controlled flights should not be vectored into uncontrolled airspace except in the case of emergency or in order to circumnavigate severe weather (in which case the pilot should be so informed), or at the specific request of the pilot; and

f. when an aircraft has reported unreliable directional instruments, the pilot should be requested, prior to the issuance of manoeuvring instructions, to make all turns at an agreed rate and to carry out the instructions immediately upon receipt.

© Oxford Aviation Services Limited

12.8.4 Navigation assistance. An identified aircraft which is observed to deviate significantly from its intended route or designated holding pattern is to be advised accordingly. Appropriate action is to be taken by the radar controller if in the controller's opinion the deviation is likely to affect the service being provided. A pilot requesting navigation assistance is required to inform the radar controller why the assistance is being requested (to avoid adverse weather, unreliable navigation instruments etc.), and pass as much information as possible to allow the radar controller to provide the service level required.

12.8.5 Adverse weather. If it appears likely from radar information that an aircraft will penetrate an area of intense weather returns on the radar display, the pilot should be informed in sufficient time to permit the pilot to decide the appropriate course of action. The pilot may request advice on how best to circumnavigate the adverse weather. In vectoring the aircraft around the weather the controller should determine if the aircraft will be able to return to the planned course after weather avoidance. Pilots should note that the worst of the weather may not show on radar (it may be masked by other weather returns).

12.8.6 Termination. In terminating radar vectoring of an aircraft, the radar controller shall instruct the pilot to resume own navigation, giving the pilot the aircraft's position and appropriate instructions if the current instruction had diverted the aircraft from a previously assigned one.

12.9 USE OF RADAR IN THE AIR TRAFFIC CONTROL SERVICE

12.9.1 Service provided. The radar service provided depends upon the type of airspace in which the service is provided, the type of traffic to which the service is provided and ability of the controller to provide the service. There are three types of radar service:

a. Radar control service,

b. Radar Advisory Service (RAS), and

c. Radar Information Service (RIS)

Note: The terms Radar Control, RAS and RIS, are UK national air traffic terminology. They have no ICAO equivalent although the use of radar in advisory airspace and to augment the FIS is permitted (see paragraphs 12.13.3 and 4). In Doc 4444, collision hazard information is specified, and associated avoiding action suggested for the classes of airspace that radar control, radar advisory and radar information are specified for.

© Oxford Aviation Services Limited

12.9.1.1 Radar Control Service. A radar control service may be provided to aircraft operating IFR, SVFR or VFR in controlled airspace. When providing the service controllers issue instructions to which:

a. pilots operating IFR are required to comply, and

b. pilots of aircraft operating SVFR or VFR will comply unless they advise the controller otherwise.

12.9.1.2 Radar Advisory Service. A radar advisory service (RAS) is provided outside controlled airspace or on advisory routes, and within designated Radar Advisory Service Areas. RAS is an air traffic radar service in which the controller provides advice necessary to maintain prescribed separation between aircraft participating in the advisory service, and in which bearing, distance and known level of conflicting traffic is passed to the pilot of participating traffic, together with advice on action to resolve the confliction. Where time does not permit the procedure to be applied, the controller is to pass avoiding action information, followed by details of the confliction. Even though the service is advisory, information will be passed in the form of instructions. Under RAS the following apply:

a. The service is only provided to flights under IFR irrespective of the met conditions.

b. Controller will issue advisory instructions which may involve flight in IMC. If a pilot is not qualified to fly in IMC this fact is to be communicated to the controller.

c. There is no requirement for a pilot flying outside controlled airspace to comply with advisory instructions because of the nature of the service. If a pilot chooses not to comply with advisory avoiding action, he/she will become responsible for separation and any avoiding action which may become necessary.

d. Pilots are to inform controllers providing RAS before changing heading or level.

e. Controllers will provide information on conflicting traffic until the confliction is resolved.

12.9.1.3 Radar Information Service. A Radar Information Service (RIS) is an air traffic service in which the controller informs the pilot of the bearing, distance and , if known, the level of conflicting traffic. No avoiding action will be offered. The pilot remains responsible for maintaining separation from other aircraft whether or not the controller has passed traffic information. Under RIS the following conditions apply:

© Oxford Aviation Services Limited

a. The service may be requested by a pilot under any flight rules or meteorological conditions.

b. After the initial traffic warning, subsequent information will only be passed at the pilot's request, or if the controller considers that the traffic poses a significant hazard.

c. If requested, radar vectors may be provided, but responsibility for separation will remain with the pilot throughout the vectoring period. A controller may, if it is considered necessary, vector RIS traffic but the pilot has the right to refuse to comply.

d. The pilot is to advise the controller before changing level, level band or route.

e. RIS may be offered when it is not possible to provide RAS.

f. If after an initial traffic warning, a pilot requests avoiding action, this will be treated as a request for a change of service. A change from RIS to RAS will only be accepted subject to the controller's workload. If a controller cannot provide RAS, RIS will continue to be provided.

12.9.1.4 Commencement of the service. The specified service will only be provided once the aircraft has been identified in accordance with 12.7.2. When identified the pilot will be informed of his position and when it is not self evident, the type of service provided will be stated. For example:

"Speedbird 1234 is identified 5 miles north of Strumble. Radar Control. Maintain FL230"

or

"GABCD is identifed 3 miles south of Charlbury. Radar advisory. Fly at 2000 ft on the Brize QNH 1007 advise set"

12.9.2 Function of Radar in ATC. The information presented on a radar display may be used to perform the following functions in the provision of air traffic control service:

a. provide radar services as necessary in order to improve airspace utilisation, reduce delays, provide for direct routings and more optimum flight profiles, as well as to enhance safety;

b. provide radar vectoring to departing aircraft for the purpose of facilitating an expeditious and efficient departure flow and expediting climb to cruising level;

c. provide radar vectoring to aircraft for the purpose of resolving potential conflicts;

© Oxford Aviation Services Limited

d. provide radar vectoring to arriving aircraft for the purpose of establishing an expeditious and efficient approach sequence;

e. provide radar vectoring to assist pilots in their navigation. e.g. to or from a radio navigation aid, away from or around areas of adverse weather, etc.

f. provide separation and maintain normal traffic flow when an aircraft experiences communication failure within the area of the radar coverage;

g. maintain radar monitoring of air traffic;

Note:- Where tolerances regarding such matters as adherence to track, speed or time have been prescribed by the appropriate ATS authority, deviations are not considered significant until such tolerances are exceeded.

h. when applicable, maintain a watch on the progress of air traffic, in order to provide non-radar controller with:

1. improved position information regarding aircraft under control;

2. supplementary information regarding other traffic; and

3. information regarding any significant deviations, by aircraft, from the terms of their respective control clearances, including their cleared routes as well as levels when appropriate.

12.10 RADAR SEPARATION STANDARDS

12.10.1 Co-ordination. Radar separation standards permit the safe flow of air traffic in closer proximity than procedural horizontal standards. Where traffic consists of mixed procedural and radar controlled flights, the ATCU using radar is to ensure that co-ordination of radar and non-radar traffic exists. To achieve this, close liaison (including detailed procedures) is required between radar controllers and procedural controllers.

12.10.2 Separation application. In order to apply the radar separation standards, a controller must, when determining the spacing required, take into account aircraft relative headings and speeds, radar technical limitations, controller workload and any difficulties caused by communications congestion.

© Oxford Aviation Services Limited

Separation is only to be applied between identified aircraft when there is reasonable assurance that identification will be maintained. If transfer of identification is not possible, non-radar separation is to be established before an aircraft reaches the limit of a controller's radar coverage. Radar separation may be applied between an aircraft taking off and a preceding departing aircraft (or other radar controlled traffic) provided there is reasonable assurance that the departing aircraft will be identified within 2 km (1 nm) from the end of the runway and at that time, the required separation will exist. Radar separation is not applied between aircraft holding over the same holding point.

12.10.3 Radar separation minima. Unless otherwise prescribed below or with respect to independent and dependent parallel approaches, the horizontal radar separation minimum is 9.3 km (5.0 NM).

12.10.4 Reduced radar separation. The radar separation minimum may, if approved by the appropriate ATS authority, be reduced to5.6 km (3.0 nm) when radar capabilities at a given location so permit. This is usually where contacts are identified at ranges not greater than 40 nm from the radar transmitter (the radar head). Where two aircraft are established on the same final approach track of a radar separated instrument approach, and are both within 10 nm of the end of the landing runway, a reduced separation minimum of 4.6 km (2.5 nm) may be applied with the following provisos:

a. runway occupancy time for landing aircraft is not more than 50 seconds;

b. braking action is reported as good and runway occupancy times are not adversely affected by runway conditions (slush, snow, ice);

c. the aerodrome controller is able to observe (visually or otherwise) the runway in use and associated exits and taxiways;

d. wake turbulence radar separation minima do not apply;

e. aircraft speeds are closely monitored and adjusted as necessary to maintain separation.

f. aircraft operators and pilots have been informed of the need to exit the runway expeditiously, and that procedures concerning the application of the reduced minimum have been published.

© Oxford Aviation Services Limited

12.10.5 Wake turbulence radar separation. The table below contains the wake turbulence radar separation minima which will be applied to aircraft in the approach and departure phases of flight:

Aircraft wake turbulence category		Wake turbulence radar separation minima
Preceding aircraft	**Succeeding aircraft**	
HEAVY	HEAVY	7.4 km (4.0 NM)
	MEDIUM	9.3 km (5.0 NM)
	LIGHT	11.1 km (6.0 NM)
MEDIUM	LIGHT	9.3 km (5.0 NM)

Table 12.10.5: Radar wake turbulence minima

The minima set out above shall be applied when:

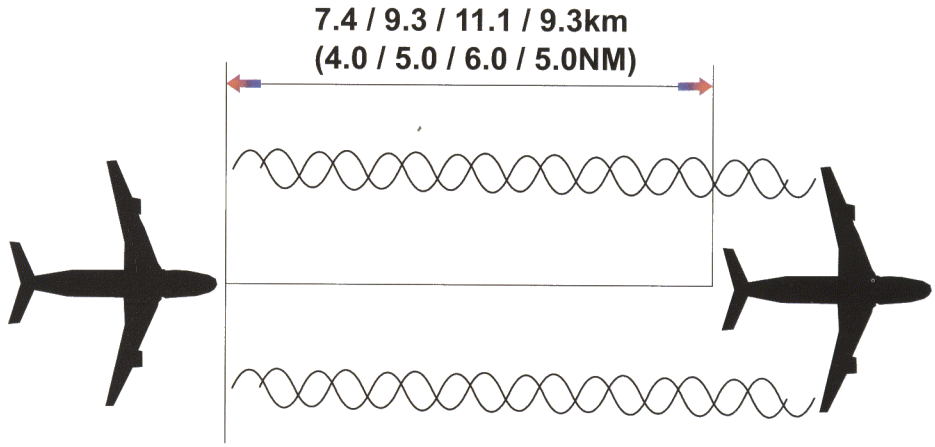
a. an aircraft is operating directly behind another aircraft at the same altitude or less than 300 m (1000ft) below; or

b. both aircraft are using the same runway, or parallel runways separated by less than 760 m; or

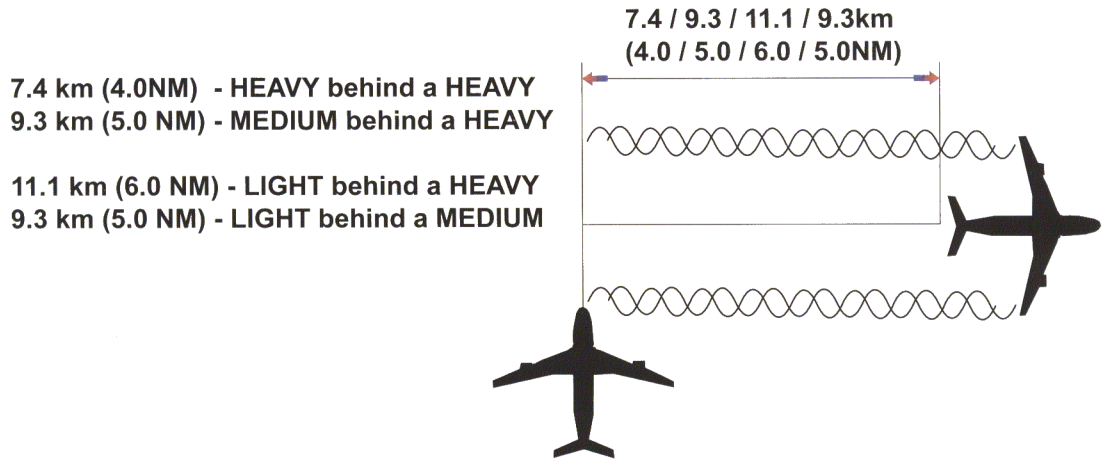
c. an aircraft is crossing behind another aircraft, at the same altitude or less that 300 m (1000ft) below.

7.4 km (4.0NM) - HEAVY behind a HEAVY
9.3 km (5.0 NM) - MEDIUM behind a HEAVY

11.1 km (6.0 NM) - LIGHT behind a HEAVY
9.3 km (5.0 NM) - LIGHT behind a MEDIUM



© Oxford Aviation Services Limited



12.10.6 Speed control. In order to facilitate radar control, or to reduce the need for radar vectoring, a controller may request aircraft under radar control to adjust their speed in a specified manner. Aircraft may be requested to maintain maximum speed, minimum speed, minimum clean speed (specifying that drag-inducing devices are not to be employed), minimum approach speed or a specific speed. Specific speeds should be specified in increments of 20 km/h (10 kt) IAS or in multiples of 0.01 Mach. Only minor speed adjustments, of not more than +/- 40 km/h (20 kt), should be requested when established on intermediate or final approach. Speed control is not to be applied after a point 8 km (4 nm) from the threshold of the landing runway. Aircraft concerned should be advised as soon as speed control is no longer necessary.

12.11 EMERGENCIES.

12.11.1 Assistance. In the event of an aircraft in, or appearing to be in, any form of emergency, every assistance shall be provided by the radar controller and the procedures described may be varied according to the situation. The progress of an identified aircraft in emergency shall be monitored and (wherever possible) plotted on the radar display until the aircraft passes out of radar coverage, and position information shall be provided to all air traffic services units which may be able to give assistance to the aircraft. Radar transfer to adjacent radar sectors shall also be effected when appropriate.

Note:- If the pilot of an aircraft encountering a state of emergency has previously been directed by ATC to operate the transponder on a specific code, that code will normally be maintained unless, in special circumstances, the pilot has decided or has been advised otherwise. Where ATC has not requested a code to be set, the pilot will set the transponder to Mode A Code 7700.

© Oxford Aviation Services Limited

12.12 USE OF RADAR IN APPROACH CONTROL.

12.12.1 Functions. Radar is used in approach control to perform the following functions:

a. radar vectoring of arriving traffic on to pilot interpreted final approach aids (ILS etc) or to a point where a visual approach can be completed.

b. radar monitoring of parallel ILS approaches

c. radar vectoring of arriving traffic to a point where a Precision Approach Radar (PAR) or an SRA can be made

d. radar monitoring of other pilot interpreted approaches

e. in accordance with the specified procedures, conduct:

1. Surveillance Radar Approaches (SRA)
2. Precision Approach Radar (PAR) approaches

f. provide radar separation between:

1. succeeding departing aircraft;
2. succeeding arriving aircraft; and
3. a departing aircraft and a succeeding arriving aircraft

12.12.2 Approach radar procedures. Procedures are to be established to ensure that the aerodrome controller is kept informed of the sequence of arriving aircraft as well as any instruction which have been issued to maintain separation after transfer of control to the aerodrome controller. Before commencing radar vectoring, the pilot is to be advised of the type of approach and the runway in use. Before commencement of the final approach, the radar controller is to advise the pilot of the aircraft position at least once during radar vectoring.

12.12.3 Instrument approaches. The initial and intermediate phases of an approach conducted under radar direction are to comprise those parts of the approach from the time radar vectoring is initiated until the aircraft is on final approach, and:

a. is established on the final approach path of a pilot interpreted aid; or

b. reports that it is able to complete a visual approach; or

c. is ready to commence a SRA; or

d. is transferred to a PAR controller.

© Oxford Aviation Services Limited

12.12.4 Vectoring to final approach. Aircraft vectored to final approach will be given a heading, or a series of headings, calculated to close the final approach track. The final vector will enable the aircraft to be established in level flight on the final approach track prior to intercepting the specified glide path, and should provide an intercept angle with the final approach track of 45 or less. If it is necessary to vector the aircraft through the final approach track, the controller is to inform pilot accordingly stating the reason. If the aircraft is being vectored to intercept the localiser (or MLS final track), or the inbound track for another pilot interpreted aid, the pilot is to report when established on the final track. Radar vectoring will normally terminate at the time the aircraft leaves the last assigned heading to intercept the final track.

12.12.5 Transfer of control to the aerodrome controller. Transfer of communications to the aerodrome controller should be carried out at such a point or time that clearance to land or alternative instructions can be issued with sufficient time to permit compliance and acknowledgement.

12.12.6 Vectoring to the visual. Vectoring for a visual approach may be initiated provided the reported ceiling is above the minimum altitude applicable to radar vectoring and meteorological conditions are such that, with reasonable assurance, a visual approach and landing can be carried out. Clearance for a visual approach is only to be issued after the pilot has reported the aerodrome or the preceding aircraft in sight, at which time radar vectoring would normally be terminated.

12.13 RADAR APPROACHES

12.13.1 Prior to commencement. Before a radar approach is started, the pilot is to be informed of:

a. the runway in use

b. the applicable obstacle clearance altitude/height

c. the angle of the glide path and (if necessary) the approximate rate of descent to be maintained

d. the procedure to be followed in the event of a loss of radio communications, unless the procedure has been published in the AIP (on the approach plates).

12.13.2 Discontinuation. When a radar approach cannot be continued for any reason, the pilot is to be informed immediately. If possible, the approach should be continued using non-radar facilities or visually if the pilot reports this possible. If continuation is not possible, an alternative clearance should be given (to carry out a missed approach).

12.13.3 Undercarriage. At a point on final approach, an aircraft making a radar approach is to be asked to confirm that the gear is down and locked.

© Oxford Aviation Services Limited

12.13.4 Landing clearance. Unless otherwise specified, a radar controller is required to notify the aerodrome controller when an aircraft making a radar approach is approximately 8 nm from touchdown. In response to the notification the aerodrome controller may issue a clearance to land or state that clearance will be issued subsequently. If landing clearance is not received by the radar controller at that time, a subsequent notification is to be made at 4 nm and the aerodrome controller asked for a clearance for the aircraft to land. In any event, clearance to land should be passed to the radar controller for onward transmission to the pilot before the aircraft reaches a point 2 nm from touchdown.

12.13.5 Missed approach. An aircraft making a radar approach should be directed to execute a missed approach when the aircraft appears to be dangerously positioned on final approach, for reasons of conflicting traffic, if no clearance has been received from the aerodrome controller before the aircraft reaches 2 nm from touchdown, or on instructions from the aerodrome controller. A pilot may be advised to consider executing a missed approach if the aircraft reaches a point where a successful approach cannot be completed, the aircraft is not visible on the radar display for any significant interval during the last 2 nm of the approach, or the position or identification of the aircraft is in doubt at any time during the final approach.

12.13.5.1 Procedure. Unless otherwise required by exceptional circumstance, radar instructions concerning a missed approach are to be in accordance with the published missed approach procedure. Such instructions are to include level to which the aircraft is to climb and heading instructions to keep the aircraft within the missed approach area during the missed approach procedure.

12.13.6 SRA. During a SRA procedure with a termination range (RTR) of 2 nm, distance from touchdown is to be reported every 1 nm. Pre-computed levels through which the aircraft should be passing to maintain the glide path are also transmitted every 1 nm at the same time as distance information is transmitted. The approach is to be terminated at a distance of 2 nm from touchdown or, if earlier, before the aircraft radar return enters an area of ground clutter, or when the pilot reports that a visual approach can be made. The SRA may be terminated at the threshold of the landing runway or at a range less than 2 nm from touchdown, if the accuracy of the radar (determined by the authority) permits. In this case, distance and level information is to be passed every ½ nm, RTF transmission from the radar controller are not to be interrupted for more than 5 seconds whilst the aircraft is within 4 nm of touchdown and the radar controller is dedicated to the approach of that aircraft.

© Oxford Aviation Services Limited

12.13.7 PAR. At the commencement of the final approach using PAR, the pilot will be advised not to acknowledge further instructions. Communications will be uninterrupted (interruptions of not more than 5 seconds permitted). If the elevation element of the system fails during the approach, the procedure for an SRA would be adopted by the PAR controller after advising the pilot of the failure. Up to a point 4 nm from touchdown, distance information is to be transmitted at intervals of 1 nm. After this point more frequent information is to be transmitted but priority is to be give to the transmission of azimuth and elevation information. The PAR approach is terminated when the aircraft reaches the point where the glide path intercepts the OCA/H. After this advisory information is to be transmitted to the point where the aircraft is over the threshold of the landing runway. The approach may be monitored to touchdown and information may be provided at the discretion of the radar controller, in which case the pilot is to be informed when the aircraft is over the threshold. If it becomes obvious that the pilot is commencing a missed approach and the aircraft is more than 2 nm from touchdown, the pilot is to be asked for an acknowledgement that he/she is commencing a missed approach, and the missed approach procedure instructions transmitted. Where a missed approach is commenced at a range less than 2 nm from touchdown, the precision approach is to be continued and terminated at the normal termination point.

12.14 USE OF RADAR IN AERODROME CONTROL

12.14.1 Surveillance Radar. Surveillance radar can be used by aerodrome control service for the following functions:

a. radar monitoring of aircraft on final approach;
b. radar monitoring of other aircraft in the vicinity of the aerodrome;
c. establishing radar separation between succeeding departing aircraft; and
d. providing navigation assistance to VFR flights.

12.14.1.1 Procedures. Special VFR flights shall not be radar vectored unless special circumstances, such as emergencies, dictate otherwise. Caution is to be exercised when controllers radar vector VFR flights to ensure that the aircraft does not inadvertently enter areas of IMC. Of overriding importance is that the availability of radar information does not detrimentally affect visual observation of aerodrome traffic.

12.14.2 Surface movement radar. The use of surface movement radar (SMR) is to be related to the operational conditions and requirements of the particular aerodrome (ie visibility conditions, traffic density and aerodrome layout). SMR systems are to enable the detection and display of the movement of all aircraft and vehicles on the manoeuvring area in a clear and unambiguous manner. SMR should be used to augment visual observation and to provide surveillance of traffic on those parts of the manoeuvring area which cannot be observed visually. SMR radar may be used to assist:

a. monitoring aircraft and vehicles on the manoeuvring area for compliance with clearances and instructions;

© Oxford Aviation Services Limited

b. in determining that a runway is clear of traffic prior to a landing or take-off;
c. providing information on essential local traffic on or near the manoeuvring area;
d. determining the location of aircraft and vehicles on the manoeuvring area;
e. providing directional taxi information to aircraft when requested by the pilot or deemed necessary by the controller. Except under special circumstances e.g. emergencies, such information should not be issued in the form of specific heading instructions; and
f. providing assistance and advice to emergency vehicles.

12.14.3 Radar in the Flight Information Service. (This is the ICAO equivalent of RIS) The use of radar in the provision of FIS does not relieve the PIC of any responsibilities, including final decision regarding any suggested alteration of the flight plan. The information displayed may be used to provide identified aircraft with :

a. information regarding any aircraft observed to be on a conflicting path with the radar-identified aircraft and suggestions or advice regarding avoiding action;
b. information on the position of significant weather and, as practicable, advice to the aircraft on how best to circumnavigate any such areas of adverse weather.
c. information to assist the aircraft in its navigation.

12.14.4 Radar in air traffic advisory service. When radar is used in the provision of air traffic advisory service, the general procedures for the use of radar in ATC are to be applied subject to the conditions and limitations governing the provision of air traffic advisory service detailed in 12.14. (The ICAO equivalent of RAS).

12.15 AIR TRAFFIC ADVISORY SERVICE.

12.15.1 Objective and basic principles. The objective of the air traffic advisory service is to make information on collision hazards more effective than it would be in the provision of flight information service. It may be provided to aircraft conducting IFR flights in advisory airspace or on advisory routes (Class F airspace). Such areas or routes will be specified by the State concerned. Air traffic advisory service should only be implemented where the air traffic services are inadequate for the provision of air traffic control and the limited advice on collision hazards otherwise provided by flight information service will not meet the requirement. Where air traffic advisory service is implemented, this would be considered normally as a temporary measure until such time as it can be replaced by air traffic control service. Air traffic advisory service does not afford the degree of safety and cannot assume the same responsibilities as air traffic control service in respect of the avoidance of collisions, since information regarding the disposition of traffic in the area concerned available to the unit providing air traffic advisory service may be incomplete. To make this quite clear, air traffic advisory service does not deliver "clearances" but only "advisory information" and it uses the word "advise" or "suggest" when a course of action is proposed to an aircraft.

© Oxford Aviation Services Limited

12.15.2 Aircraft using the air traffic advisory service. IFR flights electing to use or required by the appropriate ATS authority on the basis of regional agreements to use the 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:

a. the flight plan and changes thereto are not subjected to a clearance, since the unit furnishing air traffic advisory service will only provide advice on the presence of essential traffic or suggestions as to a possible course of action;

Note 1:- It is assumed that a pilot will not affect a change in the current flight plan until he has notified the intended change to the appropriate ATS unit, and, if practicable, has received acknowledgement or relevant advice.

Note 2:- When a flight is operating or about to operate in a control area or continue eventually into an advisory area or along an advisory route, a clearance maybe issued for the whole route, but the clearance as such, or revisions thereto, applies only to those portions of the flight conducted within control areas and control zones. Advice or suggestions would be provided as necessary for the remaining portion of the route.

b. it is for the aircraft to decide whether or not it will comply with the advice or suggestion received and to inform the unit providing air traffic advisory service, without delay, of its decision;

c. 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.

12.15.3 Aircraft not using the air traffic advisory service. Aircraft wishing to conduct IFR flights within advisory airspace, but not electing to use the air traffic advisory service, shall nevertheless submit a flight plan, and notify changes made thereto to the unit providing that service. IFR flights intending to cross an advisory route should do so at an angle of 90 degrees to the direction of the route at a level, appropriate to its track, selected from the tables of cruising levels prescribed for use by IFR flights operating outside controlled airspace.

© Oxford Aviation Services Limited

12.15.4 ATSUs providing the advisory service. Efficiency of air traffic advisory service will depend largely on the procedures and practices in use. Their establishment in line with the organisation, procedures and equipment of area control service, taking into account the basic differences of the two services , will help to ensure a high degree of efficiency and promote uniformity in the various provisions of air traffic advisory service. For example, exchange of information by the units concerned on the progress of an aircraft from one advisory area into an adjacent control area or terminal control area, and vice versa, will help relieve pilots from repeating details of their flight plans already filed; also, use of standard air traffic control phraseology, preceded by the word "suggest" or "advise", will facilitate the pilot's understanding of air traffic advisory service intelligence. The criteria used as a basis for action should be at least those laid down for aircraft operating in controlled airspace and should take into account the limitations inherent in the provision of air traffic advisory service, navigation facilities and air-ground communications prevailing in the region. An air traffic services unit providing air traffic advisory service shall:

a. **Advise** the aircraft to depart at the time specified and to cruise at the levels indicated in the flight plan if it does not foresee any conflict with other known traffic.

b. **Suggest** to aircraft a course of action by which a potential hazard may be avoided, giving priority to an aircraft already in advisory service over other aircraft desiring to enter such advisory airspace.

c. **Pass** to aircraft traffic information comprising the same information as that prescribed for area control service.

12.16 ALERTING SERVICE.

12.16.1 Application. Whenever applied, the procedures for the provision of air traffic control service or air traffic advisory service take the place of the following procedures, except when relevant procedures do not call for more than hourly position reports, in which case the Operations normal procedure applies.

12.16.2 Flight Plan. When so required by the appropriate ATS authority to facilitate the provision of alerting and search and rescue services, an aircraft, prior to and when operating, within or into designated areas or along designated routes, shall comply with the provisions concerning the submission, completion, changing and closing of a flight plan.

12.16.3 Communications. In addition to the above, aircraft equipped with suitable two-way radio communications shall report during the period twenty to forty minutes following the time of last contact, merely to indicate that the flight is progressing according to plan, such report to comprise identification of the aircraft and the words "operations normal" or the signal QRU.

© Oxford Aviation Services Limited

12.16.3.1. Operations Normal. The "operations normal" message shall be transmitted air-ground to an appropriate air traffic services unit (e.g. normally to the aeronautical telecommunication station serving the air traffic services unit area of responsibility in which the aircraft is flying, otherwise to another aeronautical telecommunication station to be re-transmitted as required to the air traffic services unit in charge of the FIR).

12.16.4 SAR Operations. It may be advisable, in case of a SAR operation of a substantial duration, to promulgate by NOTAM the lateral and vertical limits of the area of SAR action, and to warn aircraft not engaged in actual SAR operations and not controlled by air traffic control to avoid such areas unless otherwise advised by the appropriate ATS unit.

12.16.5 ATSU responsible. When no report from an aircraft has been received within a reasonable period of time (which may be a specified interval prescribed on the basis of regional air navigation agreements) after a scheduled or expected reporting time, the ATSU shall, within the stipulated period of thirty minutes, endeavour to obtain a report in order to be in a position to apply the provisions relevant to the "Uncertainty Phase" should circumstances warrant such application. When alerting service is required in respect of a flight operated through more then one flight information region or control area, and when the position of the aircraft is in doubt, responsibility shall rest with the ATS unit of the flight information region or control area:

a. within which the aircraft was flying at the time of last air-ground contact;
b. that the aircraft was about to enter when last air-ground contact was established at or close to the boundary of two flight information regions or control areas; within which the aircraft's immediate stop or final destination point is located:

    1. if the aircraft was not equipped with suitable two-way radiocommunication equipment; or
    2. was not under obligation to transmit position reports.

12.16.6 ATSU action. The unit responsible for alerting service, is to:

a. notify units providing alerting service in other affected flight information regions or control areas of the emergency phase or phases, in addition to notifying the rescue co-ordination centre associated with it;
b. request those units to assist in the search for any useful information pertaining to the aircraft presumed to be in an emergency, by all appropriate means.
c. collect the information gathered during each phase of the emergency and, after verifying it as necessary, transmit it to the rescue co-ordination centre;
d. announce the termination of the state of emergency as circumstances dictate.

Note: In obtaining the necessary information attention shall particularly be given to informing the relevant rescue co-ordination centre of the distress frequencies available to survivors, as listed in Item 19 of the flight plan but not normally transmitted.

© Oxford Aviation Services Limited

12.17 SEPARATION REVISION

This revision summarises:

1. Procedural Separation
2. Radar Separation
3. Wake Turbulence Separation (Procedural and Radar)
4. Departing and Arrival Separation
5. Parallel Runway Separation

12.17.1 Procedural Separation

Consists of:
a. Vertical Separation
b. Horizontal (made up of Longitudinal and Lateral)
c. Composite Separation

a. **Vertical Separation**

Non RVSM	=	FL0 - FL290	=	1,000 ft
		at or above FL 290	=	2,000 ft

2 ac on same track = double above separation

RVSM	=	FL0 - FL 410	=	1,000 ft
		above FL 410	=	2,000 ft

b. **Longitudinal Separation**

1. **Same level & track**

15 mins	-	normal	
10 mins	-	nav aids allow frequent determination of position	
5 mins	-	***providing*** :	ac have departed from same a/d or passed over same RP or fix ***AND*** 1st ac is 20 kts TAS faster
3 mins	-	as in 5 mins above but 1st ac is 40 kts faster	

2. **Same level crossing tracks**

15 mins

10 mins - nav aids allow frequent determination of position

3. **Climbing/descending**

i. **Same track** 15 mins - with no vertical separation

10 mins - no vertical separation exists but nav aids permit frequent update of position & speed

5 mins - no vertical separation exists but level change is commenced within ***10 mins*** of 2nd ac reporting overhead an exact reporting point

ii. **Crossing tracks** 15 mins - with no vertical separation

10 mins - no vertical separation exists but nav aids permit frequent update of position & speed

iii. **Reciprocal tracks** - Vertical separation will be provided for at least ***10 mins*** prior to and after the ac are estimated to have passed each other

c. **Longitudinal Separation based on DME**

1. **Same level** - 20 nms - using on-track DME stations and both ac making simultaneous checks at frequent intervals

10 nms - as above + leading ac maintains TAS +20 kts

2. **Crossing Tracks** - as above providing crossing track angle is *less than 90°* and both pass over the same DME

3. **Climbing/descending** - 10 nms whilst vertical separation does not exist. One ac must remain level and both ac use the same on-track DME

4. **Reciprocal Tracks** - ac must have passed each other and at least ***10 nms*** apart both using the same on-track DME

d. **Longitudinal Separation using Mach # based on time**

1. ac reported over same RP and follow same track
2. radar ensures that time intervals exist and ac on same or diverging tracks

10 mins if 1st ac same speed or greater than 2nd ac

or

Mach # difference	**Separation**
0.02 faster	9 mins
0.03	8
0.04	7
0.05	6
0.06	5

** all add up to 11

e. **Longitudinal Separation based on RNAV**
(Along RNAV or ATS routes based in a VOR)

- Mach # technique applied
- based on waypoints common to both ac
- same for at same level, climbing/descending and reciprocal tracks
- based on simultaneous RNAV distance readings from both ac

Minimum - 150 kms (80 nms)

When RNP is specified as follows:

RNP 20	Separation 80 nms with reports at least every 60 mins*
RNP 10	Separation 50 nms with reports at least every 30 mins*

* require direct pilot/controller communications

f. **Lateral Separation**

2 types : Geographical and Track Separation

1. **Geographical** = ac report over different geographic locations

2. **Track Separation** = ac fly routes that are laterally separated by a specified "buffer area" i.e. for Oceanic operations on adjacent NAT routes, using RNP 20, the buffer is 20 nms wide. Thus tracks are 60 nms apart laterally.

Min separation for ac on diverging tracks and using the same nav aid :

VOR	minimum 15° at 28 kms (15 nms) from facility
NDB	minimum 30° at 28 kms (15 nms) from facility
DR	tracks diverging by minimum 45° at 28 kms (15 nms) from point of intersection of track

g. **Composite Separation**

Combination of both vertical and one form of horizontal separation. The minima for each may be lower than, *but not less than half* of, those use for each of the combined elements when applied individually.

12.17.2 RADAR SEPARATION

a. 5 nms normal standard

b. 3 nms (reduced) allowed if: approved by Authority
radar capabilities allow
radar head within 40 nms of ac

c. 2.5 nms (reduced) allowed when: 2 ac are on the same final approach track of a radar separated instrument approach and are within ***10 nms*** of the end of the runway providing:

1. ac runway occupancy not more than 50 secs
2. braking action reported as "good"
3. controller can see runway and associated exits
4. wake turbulence not applicable
5. ac speeds are closely monitored
6. ac exits runways expeditiously

12.17.3 PROCEDURAL WAKE TURBULENCE SEPARATION (TIMES)

a. **Categories**

Heavy (H)	-	all types of 136,000 kgs or more
Medium (M)	-	less than 136,000 kgs but more than 7,000 kgs
Light (L)	-	7,000 kgs or less

b. **Non-radar separation:**

1. **Arriving Aircraft**

M behind **H**	-	2 mins
L behind **H or M**	-	3 mins

2. **Departing Aircraft**

Applied when:

i. ac using same runway
ii. parallel runways separated by less than 760m
iii. crossing runways if flight path of 2nd ac will cross the flight path of the 1st ac at the same altitude or less than 1,000 below
iv. parallel runways are separated by 760m or more, if flight path of 2nd ac will cross the flight path of the 1st ac at the same altitude or less than 1,000 below

L or M behind **H**	-	2 mins
L behind **M**	-	2 mins

These minima are increased to ***3 mins*** when the ac take-off from:

1. An intermediate part of the runway
   or
2. An intermediate part of a parallel runway separated by less than **760m**

3. **Displaced Landing Thresholds**

2 mins	separation between	**L or M** behind **H**; and **L** behind **M**, when

a. A departing **L or M** ac follows a **H** arrival
b. A departing **L** follows a **M** arrival
c. An arriving **L or M** follows a **H** departure if the projected flight paths are expected to cross

d. An arriving **L** follows a **M** departure if the projected flight paths are expected to cross

4. **Opposite Direction - *JAA exam question!***

2 mins between a **L or M** behind **H**; and
L behind **M**

When the heavier aircraft is making a low missed approach and the lighter ac is:

a. Utilising an opposite direction runway or
b. Landing on the same runway in the opposite direction or on a parallel runway separated by less than **760m**

5. **Radar Wake Turbulence Separation (Distances)**

Applied when:

a. ac is directly behind another at same altitude or less than 1,000ft below
b. both ac using same runway or parallel runways separated by less than 760m
c. ac is crossing behind another aircraft, at same altitude or less than 1,000ft below

Ac wake turbulence category		Wake turbulence radar separation minima
Preceding Aircraft	Succeeding Aircraft	
Heavy	Heavy	7.4 kms (4.0 nms)
Heavy	Medium	9.3 kms (5.0 nms)
Heavy	Light	11.1 kms (6.0 nms)
Medium	Light	9.3 kms (5.0nms)

12.17.4 DEPARTING AND ARRIVAL SEPARATION

a. **Departing**

1.	1 min	providing ac fly on diverging track of at least 45° immediately after take-off
2.	2 mins	when 1st ac is 74 km/h (40 kts) faster and both ac following same track
3.	5 mins	when 2nd ac is to fly through the level of the 1st ac and both follow the same track

b. **Arriving**

5 mins	Vertical separation kept between arriving ac and those holding until arriving ac is within 5 mins of the holding area

12.17.5 PARALLEL RUNWAY SEPARATION

a. **Independent parallel approaches**

1. missed approach tracks must diverge by at least 30°
2. NTZ at least 610m wide
3. final vector localiser intercept not greater than 30°
4. 2 kms (1 nm) straight & level prior to localiser intercept
5. 3.7 kms (2nms) straight & level prior to glideslope intercept
6. radar monitoring ends after landing (or visual separation) or at least 2 kms (1 nm) beyond DER on a missed approach
7. min 1,000 vertical or 5.6 kms (3 nms) radar separation between ac on the same localiser (unless there are wake turbulence factors)
8. min 1,000 vertical or 5.6 kms (3 nms) radar separation between ac until either inbound on the ILS or within the NOZ

b. **Independent parallel departures**

1. R/w centre lines less than 760m apart
2. departure tracks diverge by at least 15° immediately after take-off
3. ac radar identified within 1 nm from DER on take-off

c. **Dependent parallel approaches**

1. missed approach tracks must diverge by at least 30°
2. min 1,000 vertical or 5.6 kms (3 nms) radar separation between ac during turn-on to parallel localisers
3. min 5.6 kms (3 nms) radar separation between ac on the same ILS (unless there are wake turbulence factors)
4. min 3.7 kms (2 nms) between successive ac on adjacent localisers

d. **Segregated parallel operations**

1. departure track diverges immediately after takeoff by at least 30° from the missed approach track of the adjacent approach
2. min distance between runways = 760m (can be altered by 30m for each 150m runways are staggered) subject to a minimum of 300m between runways.

REVISION QUESTIONS CHAPTER 12

1. Who is responsible for the issuing of clearance to achieve the safe and expeditious flow of air traffic to aircraft on the manoeuvring area and to prevent collisions between aircraft and obstructions on the movement area?

   a. The Approach Controller
   b. The Aerodrome Controller
   c. The Ground Controller
   d. The Apron Manager

2. A light on the aerodrome is unserviceable. Is Aerodrome Control required to pass this information to pilots?

   a. Yes
   b. No
   c. Yes, but only at night
   d. Yes, but only if that light is used for the guidance of aircraft

3. If an aircraft is handed over from Approach to Tower but does not make contact or land within a certain time, a report is to be made to the ACC or FIC. How long is this time?

   a. 3 mins
   b. 5 mins
   c. 30 mins
   d. 45 mins

4. Who may **NOT** suspend VFR operations at an aerodrome on safety grounds?

   a. The Approach Controller
   b. The Aerodrome Controller
   c. The local Area Control Centre (ACC)
   d. The appropriate ATS authority

5. Which of the following defines 'runway in use'?

   a. A runway into wind
   b. A concrete area of the manoeuvring area defined and marked as such for current take-off and landing operations of aircraft
   c. The most suitable runway for the time being for use by aircraft using the aerodrome
   d. The defined landing/take off portion of an aerodrome

© Oxford Aviation Services Limited

6. Is the 'duty runway' always to be into wind?

   a. Yes, or as near as the physical position of the runway permits
   b. No, the wind direction is variable
   c. Yes, unless safety, runway configuration or air traffic considerations favour another direction
   d. No, the pilots using the aerodrome decide what runway to use

7. If ATC has nominated runway 28 as the duty runway but a pilot wishes to use runway 33, is he permitted to use that runway?

   a. No. To use another runway would jeopardise other air traffic
   b. Yes, a pilot may request to use any runway at an aerodrome
   c. Yes, but only if all the pilots flying in the local area agree to the use of runway 33
   d. Yes, but only after the signals square has been altered to show the use of runway 33

8. When is ATC required to pass the time to a pilot of an aircraft?

   a. Prior to an aeroplane taxiing for take off
   b. When engine start requested
   c. When take off clearance requested
   d. A time check is part of the ATIS broadcast

9. What time does ATC use?

   a. Zulu time
   b. Local time
   c. Co-ordinated Universal Time
   d. Greenwich Mean Time (GMT)

10. How is the time check given by ATC?

   a. To the nearest minute
   b. Plus or minus 30 seconds
   c. Always the next minute counted down from 5
   d. To within 10 seconds

11. What changes in the aerodrome met conditions are to be passes by ATC to departing aeroplanes?

   a. All changes
   b. Only significant changes
   c. Only changes to QNH and RVR
   d. On hazardous conditions i.e windshear; icing; turbulence; volcanic activity etc.

© Oxford Aviation Services Limited

12. When you join the circuit the Aerodrome Controller is required to pass wind! What wind?

a. Spot wind
b. Forecast wind
c. Actual wind
d. Mean wind

13. 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. The pilots of the aeroplanes
b. The aerodrome controller
c. The aerodrome controller in VMC or the Approach controller in IMC
d. It depends upon the class of airspace

14. What is essential traffic?

a. Emergency services on the aerodrome (fire, ambulance etc..)
b. SAR aircraft and air ambulances
c. Commercial Air Transport aircraft
d. Traffic to which separation should be applied but has not yet been applied

15. Which of the following statements is true?

1. Landing aircraft have priority over all other traffic
2. Aircraft taxiing give way to aircraft being towed
3. Departures are cleared in the order they request taxy clearance
4. Unless cleared for an immediate take-off, you are required to line up and stop on the runway prior to commencing the take off run
5. A clearance to 'line-up and hold' can be given and complied with even if an aeroplane is short final.

a. None of the above
b. Only statement 1
c. 1 and 2 only
d. 1,2 and 4 only

16. An aeroplane has a basic mass of 96 000 Kg and a certificated max take off mass of 220 000 Kg. For a particular flight the fuel and passenger load give a ramp mass of 129 000 Kg. What is the wake turbulence category of this aeroplane?

a. Heavy
b. Medium
c. Light
d. Medium/Heavy

© Oxford Aviation Services Limited

17. Which of the following statements are correct concerning Special VFR (SVFR)?

1. SVFR is only applicable to flights in, into or out of a CTR.
2. SVFR must be requested by you. The ATCO cannot instruct you to fly SVFR
3. SVFR can be flown in class A airspace
4. SVFR will not normally be granted to aircraft involved in Commercial Air Transport with a certificated take off mass greater than 5700 Kg
5. The minimum ground visibility for a SVFR take off is 1500m

a. All the above
b. None of the above
c. All except 3
d. All except 3 and 4

18. What is the objective of the ATS advisory service?

a. To provide a radar advisory service to VFR aircraft outside of CAS
b. To pass advisory traffic information to aircraft in CAS
c. To make information on collision hazards more effective
d. To provide employment for Flight Information Officers

19. In what class of airspace is the ATS advisory service provided to air traffic?

a. All classes of airspace in which IFR flights are separated from other IFR flights
b. In class F airspace to participating IFR and VFR traffic only
c. To all known traffic in class F airspace
d. None. But it may be provided to IFR flights requesting the service in class F airspace

20. You are flying IFR along an advisory route. You have filed a flight plan and are in contact with ATC. Will you be flying in accordance with an ATC clearance?

a. Yes. All traffic in CAS in receipt of ATC must receive a clearance
b. Yes all IFR flights in CAS must receive a clearance
c. No, it's only 'advisory' airspace and you can ignore it if you wish
d. No. For flights in Class F airspace a clearance will not be issued even to participating IFR traffic.

© Oxford Aviation Services Limited

21. Which one of the following statements is correct?

a. Aeroplanes operating as a controlled flight are required to file a flight plan and make position reports unless advised 'omit position reports'
b. Position reports are only required from a controlled flight when requested
c. Position reports from controlled flights are only required in class A airspace and then only when requested
d. Position reports are only required from IFR controlled flights not VFR controlled flights

22. If a non-controlled flight is operating outside of the ATS route structure (outside of CAS) but is in receipt of a flight information service, are position reports required?

a. No, but an 'operations normal' call to the FIS controller is required every 20 – 40 minutes
b. Yes, if you are talking to ATC, position reports are required unless advised not required.
c. No, this must be in class G airspace and therefore no ATC is provided
d. Position reports are not required, but may be made if requested by the ATCO to allow separation from other controlled flights

23. If ATC looses RTF contact with an aeroplane, after what time period would the uncertainty phase of the alerting service be declared?

a. 30 minutes
b. 45 minutes
c. 10 minutes (if aeroplane has been handed over from APP to TOWER)
d. It depends on what has been agreed on regional basis

24. Speedbird 1234 is told by Athens "...continue now with Roma on 131.55" Speedbird 1234 replies "Speedbird 1234 changing to Roma on 131.55, good day sir." Ten minutes later Rome ATCC calls Athens ATCC and says "I have no contact with Speedbird 1234 yet". Which controller will be responsible for declaring the uncertainty phase?

a. The Rome controller as the aeroplane has cleared with Athens
b. The Athens controller because he was the last one to speak to Speedbird 1234
c. It doesn't matter as long as one of them does it
d. Neither of them. The responsibility rest with the Rescue Co-ordination Centre for the region (RCC)

© Oxford Aviation Services Limited

25. Which of the following may cause a primary radar system designed for use in ATC, to be degraded in performance?

1. Weather
2. Ground clutter
3. Equipment failure
4. Traffic density
5. Slant range
6. Interference from SSR

a. 1,2 and 3
b. All the above
c. None of the above
d. 3 only

26. There are two types of radar used in ATC. What are they?

a. PSR and SSR
b. Pulse Doppler and CW
c. Raw and computer interpreted
d. Lower airspace radar and middle/upper airspace radar

27. What does the abbreviation SSR stand for?

a. Simple Solution Response
b. Segregated Surveillance Radar
c. Simultaneous System Response
d. Secondary Surveillance Radar

28. When is the radar controller required to pass position information to an aeroplane?

a. When the pilot is lost
b. When the aeroplane is first identified by the radar controller
c. When radar control is transferred from one radar unit to another
d. When the radar controller cannot identify the aeroplane and needs pilot assistance

© Oxford Aviation Services Limited

29. Which of the following are approved methods by which a radar controller may pass position information to a pilot?

1. Lat and Long
2. Georef grid position
3. Range and bearing from a nav aid
4. Direction and distance from a known point
5. Distance to touchdown
6. Bearing and distance from the radar head

a. 1,3,4 and 5
b. All except 6
c. All the above
d. 3 and 4 only (the others may not mean anything to a pilot)

30. What is the closest that a radar controller may vector an aircraft under his control to the boundary of the radar vectoring area?

a. 5nm
b. 2.5nm or ½ radar separation distance if greater than 5 nm
c. 2.5 nm
d. 2nm at or below 5000ft and 5nm above 5000ft

31. What is the radar separation standard?

a. 5nm (9.3km)
b. 3nm (5.6km)
c. 2.5nm (4.6km)
d. 5nm but may be reduced to 3nm within 60 nm of the radar head

32. If two 'heavy' wake turbulence category aircraft are approaching to land, what radar separation is applied?

a. 4nm
b. 5nm
c. 6nm
d. 2 mins

33. If parallel runway operations are in force where the runways are separated by a physical distance of 960m and the projected flight path of the second aircraft will not cross the path of the first aircraft within 1000 ft, is wake turbulence radar separation applied?

a. Yes
b. No

© Oxford Aviation Services Limited

34. Two heavy wake turbulence category aeroplanes are being radar vectored to the ILS for the same runway. They are vertically separated. The radar controller is trying to delay the following aeroplane. Is he required to apply wake turbulence radar separation also?

a. No, providing the vertical separation is 1000 ft or more
b. Yes, wake turbulence radar separation is always applied
c. No, it is only required for parallel runway operations
d. It depends upon what radar separation has already been achieved!

35. An aeroplane has suffered an emergency in flight and squawked 7700. The crew dealt with the emergency during which they were asked by ATC to squawk 4121 for London. Just as things settle down, the same emergency situation re-appears. What would you, the pilot, squawk now?

a. 7700 without hesitation
b. 7700 if you think it necessary, otherwise maintain 4121
c. No need to squawk 7700 as you have already previously declared an emergency
d. Ask the London ATC controller what should you squawk in this circumstance

36. Where radar is used in ATC what is the communications requirement that must be satisfied in order for the separation standards specified in Doc 4444 to be reduced?

a. Must be VHF
b. Must have multi-channel capability
c. Must be direct controller to pilot (not through a radio operator)
d. Must be SSB (single side band)

37. What is the name of the system that permits an assigned SSR code to be linked to an aircraft callsign?

a. Code/callsign conversions
b. Special identification feature (SIF)
c. Code related aircraft procedures
d. Reserved code allocation system

38. What is the tolerance factor of Mode C derived height information?

a. +/- 200 ft
b. +/- 250 ft
c. +/- 300 ft
d. +/- 500 ft

© Oxford Aviation Services Limited

39. What is required before a radar service can be provided?

a. All conflictions to be resolved
b. The pilot must request the service
c. An IFR flight plan must have been filed and a clearance issued
d. The aircraft must be radar identified and the pilot so informed

40. Which of the following is NOT an approved method of radar identification using SSR?

a. Track observation and position reports
b. Squawk handover from another radar controller
c. Use of the IDENT function
d. Recognition of the callsign/code correlation

41. Identification using PSR may be achieved by observation of manoeuvres. Through what minimum angle is a turn to be executed and observed to confirm identification?

a. 15 deg
b. 30 deg
c. 45 deg
d. 90 deg

42. Radar control augments procedural control. What phrase would a radar controller use to indicate that the requirement for aircraft generated position reports is overriden by radar control?

a. "Cease position reports"
b. "Omit position reports"
c. "Stop position reports"
d. "Cease own navigation"

43. What is the name of the procedure by which an aircraft is given headings to fly by a radar controller to achieve positioning of an aircraft to start an instrument approach or avoid other contacts etc..?

a. Radar control
b. Radar identification
c. Radar verification
d. Radar vectoring

© Oxford Aviation Services Limited

44. Where is radar vectoring permitted?

a. Classes A, B and D only
b. Radar vectoring areas (RVAs)
c. Radar Control Areas (RCTAs)
d. Special Rules Areas (SRAs)

45. Where is radar control provided?

a. In controlled airspace
b. In CTRs and CTAs only
c. Only in airways
d. In the vicinity of aerodromes for IFR traffic

46. Radar separation may be reduced when two aircraft are established on final approach (within 10 nm of the threshold). Which of the following are also taken into consideration when deciding reduced separation?

1. Aircraft speed
2. Runway braking action
3. Runway occupancy for landing
4. Length of the runway
5. Wake turbulence requirements
6. Ground visibility

a. All the above
b. All except 4
c. All except 4 and 6
d. 1, 2 and 3 only

47. Speedbird 1234 (at 3500 ft) is radar vectored to pass behind Shamrock 321 (at 2000 ft). Both are heavy wake turbulence category aircraft. What is the required **radar** wake turbulence separation?

a. None
b. 4 nm
c. 5 nm
d. 6 nm

© Oxford Aviation Services Limited

48. Speed control may be applied by a radar controller. What are the minimum increments and multiples thereof?

a. 20 kts IAS or M0.01
b. 20 kts TAS or M0.01
c. 10 kts IAS or M0.01
d. 10 kts TAS or M0.01

49. Speed control is not applied when an aircraft is within a certain distance from the threshold. What is the specified distance ?

a. 2 nm
b. 5 nm
c. 4 nm
d. 2.5 nm

50. When an aircraft is being radar vectored on to final approach, what is the required convergence angle of the final vector to the final approach track?

a. Roughly 30 deg
b. 45 deg
c. Roughly 45 deg
d. 45 deg or less

© Oxford Aviation Services Limited

ANSWERS TO REVISION QUESTIONS FOR CHAPTER 12

1	B	26	A	51		76	
2	D	27	D	52		77	
3	B	28	B	53		78	
4	A	29	A	54		79	
5	C	30	B	55		80	
6	C	31	A	56		81	
7	B	32	A	57		82	
8	A	33	B	58		83	
9	C	34	D	59		84	
10	A	35	B	60		85	
11	B	36	C	61		86	
12	D	37	A	62		87	
13	A	38	C	63		88	
14	D	39	D	64		89	
15	A	40	A	65		90	
16	A	41	B	66		91	
17	A	42	B	67		92	
18	C	43	D	68		93	
19	D	44	B	69		94	
20	D	45	A	70		95	
21	A	46	B	71		96	
22	A	47	A	72		97	
23	D	48	C	73		98	
24	A	49	C	74		99	
25	D	50	B	75		100	

© Oxford Aviation Services Limited

CHAPTER THIRTEEN - AERONAUTICAL INFORMATION SERVICES

Contents

		Page
13.1	INTRODUCTION	13-1
13.2	GENERAL	13-1
13.3	THE INTEGRATED AERONAUTICAL INFORMATION PACKAGE	13-2
13.4	THE AERONAUTICAL INFORMATION PUBLICATION (AIP)	13-4
13.5	CONTENTS OF AERONAUTICAL INFORMATION PUBLICATION (AIP)	13-6
13.6	NOTICES TO AIRMEN (NOTAM)	13-8
13.7	AERONAUTICAL INFORMATION REGULATION AND CONTROL (AIRAC)	13-12
13.8	AERONAUTICAL INFORMATION CIRCULARS (AICS)	13-13
13.9	PRE-FLIGHT AND POST-FLIGHT INFORMATION	13-16
13.10	SNOWTAM	13-17
13.11	WHEEL BRAKING ON WET RUNWAYS	13-20
13.12	ASHTAM	13-21
	REVISION QUESTIONS	13-23

© Oxford Aviation Services Limited

13.1 INTRODUCTION

13.1.1 Objectives of the AIS. The objective of the aeronautical information service is to ensure the flow of information necessary for the safety, regularity and efficiency of international air navigation. The role and importance of aeronautical information/data changed significantly with the implementation of area navigation (RNAV), required navigation performance (RNP) and airborne computer-based navigation systems. Corrupt or erroneous aeronautical information./data can potentially affect the safety of air navigation.

13.1.2 Annex 15. The ICAO document concerning the provision of the AIS and which contains the material relevant to the learning objectives is Annex 15 to the Convention on Civil Aviation.

13.2 GENERAL

13.2.1 Functions. Each Contracting State is required to:

a. provide an aeronautical information service; or

b. agree with one or more other Contracting State(s) for the provision of a joint service; or

c. delegate the authority for the service to a non-governmental agency, provided the Standards and Recommended Practices of this Annex are adequately met.

13.2.2 Responsibilities. The State concerned shall remain responsible for the information published. Aeronautical information published for and on behalf of a State shall clearly indicate that it is published under the authority of that state. Each Contracting State shall take all necessary measures to ensure that aeronautical information/data it provides relating to its own territory, as well as areas in which the State is responsible for air traffic services outside its territory, is adequate, of required quality and timely. This shall include arrangements for the timely provision of required information to the aeronautical information service bu each of the State services associated with aircraft operations.

13.2.3 Availability. Where 24- hour service is not provided, service shall be available during the whole period an aircraft is in flight in the area of responsibility of an aeronautical information service plus a period of at least two hours before and after such period. The service shall also be available at such other time as may be requested by an appropriate ground organisation.

13.2.4 Sources of information. An aeronautical information service shall, in addition, obtain information to enable it to provide pre-flight information service and to meet the need for in-flight information:

© Oxford Aviation Services Limited

a. from the aeronautical information services of other States;

b. from other sources that may be available.

13.2.5 **Requirements of the service**. Aeronautical information obtained shall, when distributed, be clearly identified as having the authority of the State of Origin, and shall, if possible, be verified before distribution and if not verified shall, when distributed, be clearly identified as such. An aeronautical information service shall promptly make available to the aeronautical information services of other services of other States any information necessary for the safety, regularity or efficiency of air navigation required by them. An aeronautical information service shall ensure that aeronautical information/data necessary for the safety, regularity or efficiency of air navigation is available in a form suitable for the operational requirements of:

a. flight operations personnel including flight crews, flight planning and flight simulator; and

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

13.2.6 **Publication**. An aeronautical information service shall receive and/or originate, collate or assemble, edit, format, publish/store and distribute aeronautical information/data concerning the entire territory of the State as well as areas in which the State is responsible for air traffic services outside its territory. Aeronautical information shall be published as an integrated Aeronautical Information Package.

13.2.7 **Quality system.** As of 1 January 1998, each contracting state is to take all necessary measures to introduce a properly organised quality system to ensure that the AIS provided is quality assured. ISO 9000 provides a useable framework for the quality system.

13.2.8 **World Geodetic System - 1984 (WGS - 84).** As of 1 January 1998, published geographical co-ordinates indicating latitude and longitude shall be expressed in terms of the World Geodetic System - 1984 (WGS - 84) geodetic reference datum. As of 5 November 1998, in addition to the elevation (referenced to mean sea level) for the specific surveyed ground positions, geoid undulation (referenced to the WGS-84 ellipsoid) for those positions specified in the AIP AD section shall also be published.

13.3 THE INTEGRATED AERONAUTICAL INFORMATION PACKAGE

13.3.1 **Definition and contents.** The Integrated Aeronautical Information Package is a system of dissemination of information essential to aviation operations and safety. It consists of the following elements which will be discussed in detail in the following notes:

© Oxford Aviation Services Limited

a. AIP (including amendment service)

b. supplements to the AIP

c. NOTAM and pre-flight information bulletins (PIBs)

d. Aeronautical Information Circulars (AICs)

e. checklists and summaries

13.3.2 Structure. The flow chart at fig 13.3.2 pictorially describes the relationship of the various elements if the package.

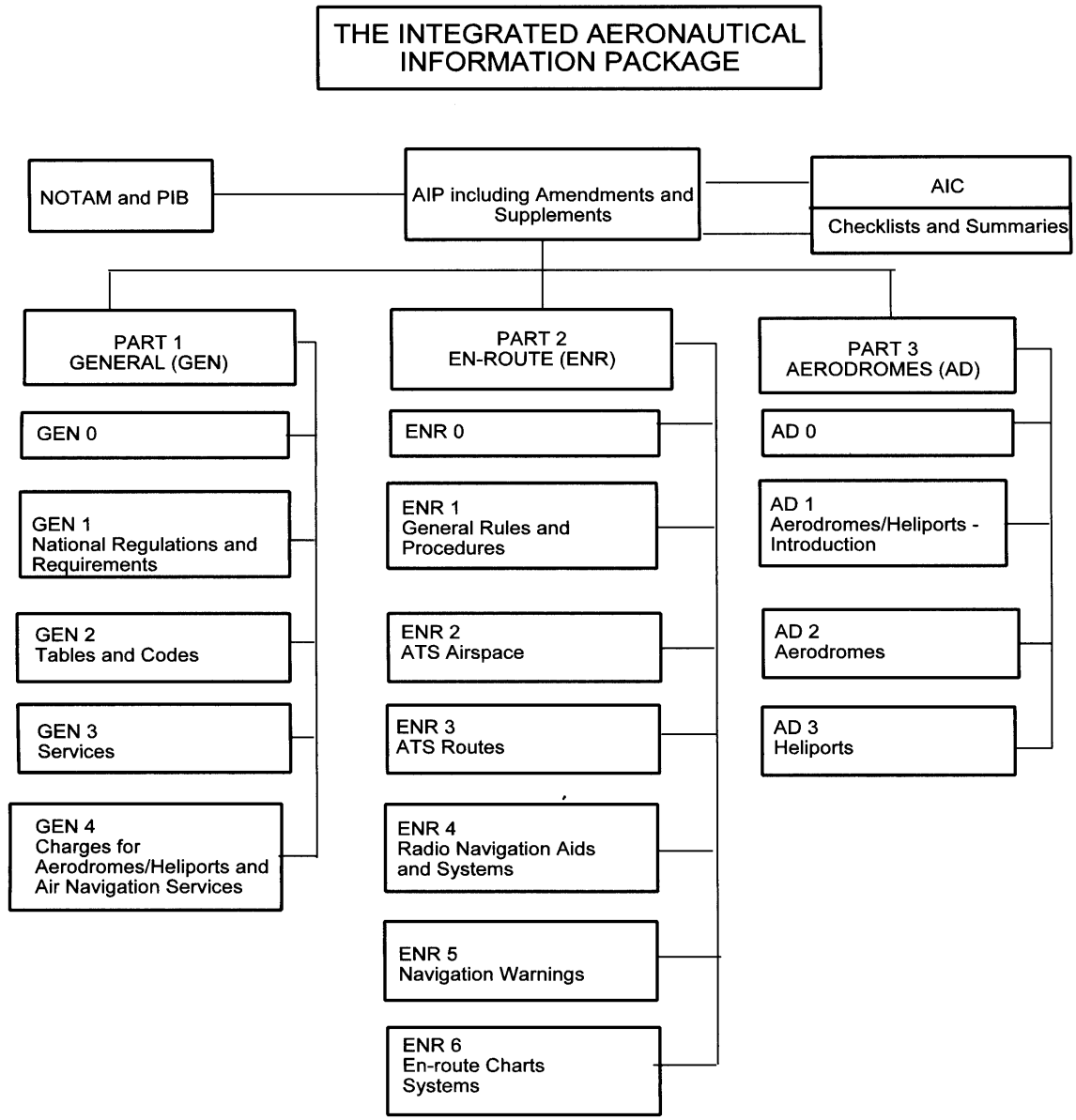


Figure 13.3.2

© Oxford Aviation Services Limited

13.4 THE AERONAUTICAL INFORMATION PUBLICATION (AIP)

13.4.1 Use. The AIP is 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 use in flight. The AIP constitutes the basic information source for permanent information and long duration temporary changes.

13.4.2 Contents. An AIP shall consist of three parts:

Part 1 - General (GEN)
Part 2 - En-route (ENR)
Part 3 - Aerodrome Directory (AD)

13.4.2.1 AIP Part 1 - GEN. An Aeronautical Information Publications is to include in Part 1 - General (GEN) the following sections and information:

a. a statement of the competent authority responsible for the air navigation facilities, services covered by the AIP;

b. the general conditions under which the services of facilities are available for international use;

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

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

13.4.2.2 Charts. Aeronautical charts relating to aerodromes, instrument approaches, standard arrival and departure procedures and visual approaches, are to be included in the AIP and to be in such a form as to permit distribution separately to recipients and users.

13.4.3 Specifications. Each AIP shall be self contained and not contain duplicate information. In the case of AIPs issued in loose-leaf form, each page shall be dated. The date, consisting of the day, month (by name) and year, shall be the publication date or the effective date of the information. A checklist giving the current date of each page in the AIP issued in loose-leaf form shall be so annotated as to indicate clearly:

© Oxford Aviation Services Limited

a. the identity of the Aeronautical Information Publication;

b. territory covered and subdivisions when necessary;

c. identification of issuing State and producing organisation (authority);

d. page numbers/chart titles;

c. degree of reliability if the information is doubtful.

13.4.4 AIP Amendments. All changes to the AIP, or new information on a reprinted page, shall be identified by a distinctive symbol or annotation. The 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. 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 AIP amendment page, including the cover sheet, shall display a publication date. When an AIP Amendment is issued, it shall include references to the serial number of those elements, if any, of the Integrated Aeronautical Information Package which have been incorporated into the amendment. A brief indication of the subjects affected by the amendment shall be given on the AIP amendment cover sheet.

13.4.5 AIRAC. Operationally significant changes to the AIP shall be published in accordance with Aeronautical Information Regulation and Control (AIRAC) procedures and shall be clearly identified by the acronym - AIRAC. Each AIRAC AIP amendment page, including the cover sheet, shall display an effective date.

13.4.6 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 reference to the serial number of the NOTAM. A checklist of AIP Supplements currently in force shall be issued at intervals of not more than one month. AIP Supplement pages should be coloured in order to be conspicuous, preferably in yellow.

© Oxford Aviation Services Limited

13.5 CONTENTS OF AERONAUTICAL INFORMATION PUBLICATION (AIP)

13.5.1 The AIP Structure. The AIP is, as has been stated, published in three parts which are printed as three separate books. In the UK there are in fact four books because the AD section is too large to be contained in one binder. Since 1 Jan 2000, the UK integrated Information package which includes the AIP has been produced on CD, with a new CD being produced for each AIRAC period (see later notes). Students are required to have a basic knowledge of the contents of each part sufficient that you should be able to recall which part of the AIP you would find specified information. The learning objectives do, however, ask for more detailed knowledge in certain areas and questions exists in the question bank relating to those objectives.

13.5.2 Part 1 - General. Part 1 contains information of a regulatory and administrative nature. It consists of five sections. It is important that to know that differences to the ICAO SARPS and PANS notified by the state publishing the AIP are detailed fully at GEN 1.7 (this is the usual method of referral to the AIP contents). The complete content of part 1 (by headings) is as follows.

GEN 0 Preface; Record AIP amendments; Record of AIP Supplements; Checklist of AIP pages; List of hand amendments to Part 1; Table of Contents to Part 1;

GEN 1 National regulations 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; Summary of national regulations and international agreements/conventions; Differences from ICAO Standards and Recommended Practices.

GEN 2 Tables and Codes - Measuring system, aircraft markings, holidays; Abbreviations used in AIS publications; Chart symbols; Location indicators; List of Radio Navigation Aids; Conversion tables; Sunrise/Sunset tables; Rate of Climb Table.

GEN 3 Services - Aeronautical Information Service; Aeronautical Charts; Air Traffic Services; Communications Services; Meteorological Services; Search and Rescue.

GEN 4 Charges for aerodrome/heliport and air navigation services - Aerodrome/heliport charges; Air navigation service charges.

13.5.3 Part 2 - En-Route (ENR). This part contains information for planning flights. It also contains information of a procedural administrative nature to allow notification of flights and compliance with ATC requirements. It consists of seven sections.

ENR 0 Preface; List of hand amendments to Part 2; Table of Contents of Part 2.

© Oxford Aviation Services Limited

ENR 1 General rules and procedures - General rules; Visual flight rules; Instrument flight rules; ATS airspace classification; Holding, Approach and Departure procedures; Radar services and procedures; Altimeter setting procedures; Regional Supplementary procedures; Air Traffic flow management; Flight Planning; Addressing of flight plan messages; Interception of civil aircraft; Unlawful interference; Air traffic incidents; Off-shore operations.

ENR 2 Air traffic services airspace - Detailed description of Flight Information Regions (FIR); Upper Flight Information Regions (UIR); Terminal Control Areas (TMA); Other regulated airspace,

ENR 3 ATS routes - Detailed description of Lower ATS routes; Upper ATS routes; Area navigation routes; Helicopter routes; Other routes; En-route holding.

ENR 4 Radio Navigation aids/systems - Radio navigation aids - enroute; Special navigation systems; Name-code designators for significant points; Aeronautical ground lights - en-route.

ENR 5 Navigation warnings - Prohibited, restricted and danger areas; Military exercise and training areas; Other activities of a dangerous nature; Air navigation obstacles - en-route; Aerial sporting and recreational activities; Bird migration and areas of sensitive fauna.

ENR 6 En-route charts - En-route Chart ICAO and index charts.

13.5.4 Part 3 - Aerodromes. This part consists of four sections containing information concerning aerodromes (and heliports). Each aerodrome entry contains specified information in accordance with a set schedule. For instance, AD2.3 for Heathrow contains details of operational hours of the aerodrome, AD2.3 for Oxford contains the same information applicable to that aerodrome.

The contents are:

AD 0 Preface; List of hand amendments to Part 3; Table of Contents to Part 3.

AD 1 Aerodrome/Heliports - Introduction - Aeronautical/helicopter availability; Rescue and fire fighting services and snow plan; Index to aerodromes and heliports; Grouping of aerodromes/heliports.

AD 2 Aerodromes - Detailed information about aerodromes (including helicopter landing areas if located at the aerodromes) listed under 24 sub-sections.

AD 3 Heliports - Detailed information about heliports (not located at aerodromes), listed under 23 sub-sections.

© Oxford Aviation Services Limited

13.6 NOTICES TO AIRMEN (NOTAM)

13.6.1 Definition: A NOTAM is a notice distributed by means of telecommunications 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.

13.6.2 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. Information of short duration containing extensive text and/or graphics is published as an AIP supplement. A NOTAM is required whenever the following information is of direct operational significance:

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

b. establishment, withdrawal and significant changes in operation of the following aeronautical services:

1. AGA (Aerodromes, air routes and ground aids)

2. AIS (Aeronautical Information Service)

3. ATS (Air Traffic Services)

4. COM (Communications)

5. MET (Meteorological Services)

6. SAR (Search and Rescue Services)

c. the establishment or withdrawal of electronic and other aids to air navigation and aerodromes. This includes: interruption or return to operation, change of frequencies, change in notified hours of service, change of identification, change of orientation (directional aids), change of location, power increase or decrease amounting to 50% or more, change in broadcast schedule or contents, or irregularity or unreliability of operation of any electronic aid or air navigation, and air-ground communication services.

d. establishment, withdrawal or significant changes made to visual aids.

e. interruption of or return to operation of major components of aerodrome lighting systems.

© Oxford Aviation Services Limited

f. establishment, withdrawal or significant changes made to procedures for air navigation services;

g. occurrence or correction of major defects or impediments in the manoeuvring area;

h. changes to and limitations on availability of fuel, oil and oxygen;

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

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

l. changes in regulations requiring immediate action, eg prohibited areas for SAR action;

m. presence of hazards which affect air navigation (including obstacles, military exercises, displays, races, major parachuting events outside promulgated sites);

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

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

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

q. allocation, cancellation or change of location indicators;

r. significant changes in the level of protection normally available at an aerodrome for rescue and fire fighting purposes. NOTAM shall be originated only when a change of category is involved and such change of category shall be clearly stated;

s. presence or removal or significant changes in hazardous conditions due to snow, slush, ice or water on the movement area; Notification of such conditions is to be made preferably by use of the SNOWTAM format.

t. outbreaks of epidemics necessitating changes in notified requirements for inoculations and quarantine measures;

u. forecasts of solar cosmic radiation, where provided;

© Oxford Aviation Services Limited

v. an operationally significant change in volcanic activity, the location, date and time of volcanic eruptions and/or horizontal and vertical extent of volcanic ash cloud, including direction of movement, flight levels and routes or portions of routes which could be affected. Notification of such conditions is to be made preferably by use of the ASHTAM format or in the NOTAM Code and plain language;

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

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

13.6.3 AIRAC notification. When an AIP amendment or an AIP Supplement is published in accordance with AIRAC procedures (see 13.7), NOTAM shall be originated giving a brief description of the contents, the effective date and the reference number to the amendment supplement. This NOTAM shall come into force on the same effective date as the amendment or supplement.

13.6.4 Notice and validity. NOTAM should remain in force as a reminder in the pre-flight information bulletin until the next checklist/summary is issued. 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 should give an estimate of the period of unserviceability or the time at which restoration of service is expected.

13.6.5 Excluded matter. 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 be safely conducted on other available runways, or the equipment used can be removed when necessary;

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

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

© Oxford Aviation Services Limited

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.

13.6.6 NOTAM specifications. NOTAMs are:

a. To be serial numbered.

b. To be as brief as possible

c. To be transmitted as a single telecommunications transmission.

d. To carry AIP or AIP Supplement references if the information is permanent or of long duration.

e. To include only ICAO location indicators. If no location indicator exists, the place name in full is to be spelled out.

13.6.6.1 Checklists. A checklist of current NOTAMs is to be issued at intervals of not more than one month. The checklist is to refer to the latest AIP Amendment, AIP Supplement and the internationally distributed AICs

13.6.6.2 Summary. A monthly printed plain language summary of NOTAMs in force, including the indications of the latest AIP Amendments, checklist of AIP Supplements and AIC issued, is to be sent by the most expeditious means to recipients of the Integrated Aeronautical Information Package.

13.6.7 Distribution. A NOTAM shall be distributed to addressees to whom the information is of direct operational significance, and who would not otherwise have at least seven days' prior notification. The aeronautical fixed telecommunication network (AFTN) shall, whenever practicable, be employed for NOTAM distribution. When a NOTAM is sent by means other than the aeronautical fixed telecommunication network (AFTN) a six digit date-time group indicating the date and time of filing the NOTAM and the identification of the originator shall be used, preceding the text.

© Oxford Aviation Services Limited

13.6.8 SNOWTAM. Information concerning snow, ice and standing water on aerodrome pavement areas is to be reported by SNOWTAM.(See paragraph 13.10).

13.6.9 ASHTAM. 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.(See paragraph 13.12).

13.6.10 NOTAM Code. Where NOTAMs are transmitted over the AFTN system the telex transmissions are to be in the form of significations/uniform abbreviated phraseology assigned to the ICAO NOTAM code, complemented by ICAO abbreviations, indicators, identifiers, designators, call signs, frequencies, figures and plain language.

13.7 AERONAUTICAL INFORMATION REGULATION AND CONTROL (AIRAC)

13.7.1 Regulated system. Information concerning the circumstances listed below shall be distributed under the regulated system (AIRAC), basing establishment, withdrawal or significant changes on a series of common effective dates at intervals of 28 days (started 10 Jan 91). The information shall be distributed by the AIS unit at least 42 days in advance of the effective date and the information notified shall not be changed 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. Whenever major changes are planned and where additional notice is desirable, a publication date 56 days in advance of the effective date should be used. It is recommended that dates between 21 December and 17 January should be avoided as effective dates for the introduction of significant changes under the AIRAC system. Implementation dates other than AIRAC effective dates are not to be used for preplanned operationally significant changes requiring cartographic work and/or for updating navigation databases. When the planned effective date will not coincide with the AIRAC effective date, the publication date of the information, whenever possible, should precede the beginning of the AIRAC cycle within which the planned effective date falls, by 28 days.

13.7.2 AIRAC Part 1 contents. Information concerning the following will be included at part 1 of an AIRAC issue:

a. The establishment, withdrawal of, and premeditated significant changes (including operational trials) to:

b. Limits (horizontal and vertical), regulations and procedures applicable to:

1. flight information regions;

2. control areas;

3. control zones;

© Oxford Aviation Services Limited

4. advisory areas;

5. ATS routes;

6. permanent danger, prohibited and restricted areas, (including type and periods of activity when known) and ADIZ;

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

c. Positions, frequencies, call signs, known irregularities and maintenance periods, of radio navigation aids and communications facilities.

d. holding and approach procedures, arrival and departure procedures, noise abatement procedures and any other pertinent ATC procedures.

e. Meteorological facilities (including broadcasts) and procedures;

f. Runways and stopways.

13.7.3 AIRAC Part 2 contents. Part 2 of an AIRAC issue will contain information regarding the establishment and withdrawal of, and premeditated significant changes to:

a. Position, height and lighting of navigational obstacles;

b. Taxiways and aprons;

c. Hours of service: aerodromes, facilities and services;

d. Customs, immigration and health services.

e. Temporary danger, prohibited and restricted areas and navigational hazards, military exercises and mass movement of aircraft.

f. Temporary areas or routes or portions thereof where the possibility of interception exists.

13.8 AERONAUTICAL INFORMATION CIRCULARS (AICs)

13.8.1 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.

© Oxford Aviation Services Limited

13.8.2 Promulgation of information. 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.

13.8.3 Information included. This shall include:

a. forecasts of important changes in the air navigation procedures, services and facilities provided;

b. forecasts of implementation of new navigational systems;

c. significant information arising from aircraft accident/incident investigation which has a bearing on flight safety;

d. information on regulations relating to the safeguarding of international civil aviation against acts of unlawful interference;

e. advice on medical matters of special interest to pilots;

f. warning to pilots concerning the avoidance of physical hazards;

g. effects of certain weather phenomenon on aircraft operations;

h. information on new hazards affecting aircraft handling techniques;

j. regulations relating to the carriage of restricted articles by air;

k. reference to the requirements of, and publication of changes in, national legislation;

l. aircrew licensing arrangements;

m. training of aviation personnel;

n. application of, or exemption from, requirements in national legislation;

o. advice on the use and maintenance of specific types of equipment;

© Oxford Aviation Services Limited

p. actual or planned availability of new or revised editions of aeronautical charts;

q. carriage of radio equipment;

r. explanatory information relating to noise abatement selected airworthiness directives;

s. changes in NOTAM series or distribution, new editions of AIP or major changes in their contents, coverage or format;

t. advance information on the snow plan;

u. other information of a similar nature;

13.8.4 Snow plan notification. Where snow plans are published in accordance with the requirements of the contents of the AIP (AD 1.2.2), the plans are to be supplemented with seasonal information issued by AIC well in advance of the beginning of each winter (not less than one month before the normal onset of winter conditions), and is to include a list of aerodromes where snow clearance is expected to be performed during the winter and the division of aerodromes into SNOWTAM distribution lists.

13.8.5 General specifications of AICs. AIC shall be issued in printed form, and both text and diagrams may be included. The originating State shall select the AICs that are to be given international distribution. AICs are to be allocated a serial number which should be consecutive and based on the calendar year. When AICs are distributed in more than one series, each series shall be separately identified by a letter. Differentiation and identification of AIC topics according to subjects using colour coding should be practised where the numbers of AIC in force are sufficient to make identification in this form necessary. A checklist of AIC currently in force shall be issued at least once a year, with distribution as for the AIC. AICs in the UK are published on Thursdays every 28 days.

13.8.5.1 Colour coding of UK AICs. In the UK the following colour coding scheme for AICs is adopted:

a. Pink Matter which need special emphasis on safety

b. Yellow Operational matters including ATS facilities and requirements

c. White Administrative matters eg examination dates fees and charges etc..

d. Mauve (Purple) UK airspace reservations imposed in accordance with applicable regulations

e. Green Maps and charts

© Oxford Aviation Services Limited

13.9 PRE-FLIGHT AND POST-FLIGHT INFORMATION

13.9.1 Pre-flight information. 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. Aeronautical information provided for pre-flight planning purposes at the aerodromes shall include relevant:

a. elements of the Integrated Aeronautical Information Package;

b. maps and charts;

Note: The documentation listed above 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.

13.9.2 Aerodrome information. Additional current information relating to the aerodrome of departure shall be provided concerning the following:

a. construction or maintenance work on or immediately adjacent to the manoeuvring area;

b. rough portions of any part of the manoeuvring area, whether marked or not eg broken parts of the surface of runways and taxiways;

c. presence and depth of snow, ice or water on runways and taxiways, including their effect on surface friction;

d. snow drifted or piled on or adjacent to runways or taxiways;

e. parked aircraft or other objects on or immediately adjacent to taxiways;

f. presence of other temporary hazards including those created by birds;

g. failure or irregular operation of part or all of the aerodrome lighting system including approach, threshold, runway, taxiway, obstruction and manoeuvring area unserviceability lights and aerodrome power supply;

h. failure, irregular operation and changes in operation status of ILS (including markers) SRE, PAR, DME, SSR, VOR, NDB, VHF aeronautical mobile channels, RVR observing system, and secondary power supply;

© Oxford Aviation Services Limited

j. presence and operations of humanitarian relief missions, such as those undertaken under the auspices of the United Nations, together with any associated procedures, and/or limitations applied thereof;

13.9.3 PIBs. 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).

13.9.4 Post-flight information. States shall ensure that arrangements are made to receive at aerodromes/heliports information concerning the state and operation of air navigation facilities noted by aircrews, and shall ensure that such information is made available to the aeronautical information service for such distribution as the circumstances necessitate.

13.10 SNOWTAM

13.10.1 Contents of a SNOWTAM. Information concerning contamination of aerodrome pavement areas by snow and solid water deposits and snow clearing operations is notified by SNOWTAM. Appendix 2 to Annex 15 details the requirements of a SNOWTAM. The information contained is as follows. If a field is not applicable then it is left blank and nothing is transmitted.

a. The ICAO aerodrome locator code eg. EGLL (Heathrow)

b. The date/time of observation (UTC)

c. Runway designators (eg 27)

d. Cleared runway length if less than published length (m)

e. Cleared runway width if less than the published width (m; if off set: L or R)

f. Deposits over total runway length

Nil	Clear and dry
1.	Damp
2.	Wet or water patches
3.	Rime or frost covered
4.	Dry snow
5.	Wet snow
6.	Slush
7.	Ice
8.	Compacted or rolled snow
9.	Frozen ruts or ridges

© Oxford Aviation Services Limited

g. Mean depth (mm) for each third of total runway length

h. Friction measurement on each third of runway and friction measuring device

Measured of Calculated or	Estimated surface friction	
0.40 and above	Good	5
0.39 - 0.36	Medium/good	4
0.35 - 0.30	Medium	3
0.29 - 0.26	Medium/poor	2
0.25 and below	Poor	1
9 - unreliable	Unreliable	9

j. Critical snow banks (m)

k. Runway lights (if obscured "yes" followed by L , R or LR)

l. Further clearance (if planned inset length/width to be cleared or if to full dimensions insert FULL)

m. Further clearance expected to be completed by (UTC)

n. Taxiway

p. Taxiway snow banks (if more than 60cm insert "Yes" followed by distance apart (m))

r. Apron

s. Next planned observation /measurement is for (month/day/hour (UTC))

t. Plain language remarks

13.10.2 Density of snow and slush. Until a satisfactory method has been found to determine accurately and quickly the density of a precipitant on a runway the nature of the surface covering will be described using the following categories and will be based on a subjective assessment by the personnel making the inspections. The SG figures in parentheses are arbitrary values of specific gravity which will, for the purpose of experimental density measuring, be assumed to correspond to the appropriate description:

a. Dry snow (if compacted by hand, will fall apart again. SG up to but not including 0.35);

b. Wet snow (if compacted by hand will form a snowball, SG 0.35 up to but not including 0.50);

© Oxford Aviation Services Limited

c. Compacted snow (has been compressed into a solid mass. SG Over 0.50);

d. Slush (water saturated snow that tends to splatter when trodden on. SG 0.50 - 0.80);

e. Standing water (1.00).

13.10.3 Snow banks. The height and distance apart of snow banks will be reported as soon as a situation arises that these no longer permit safe manoeuvring by the most critical aircraft, in this context, normally using the aerodrome.

13.10.4 Runway braking action. The braking action assessment will be made by either of the following methods:

a. Continuous Recording Friction Measuring Trailer (Mu-meter or Grip Tester)

b. Brake Testing Decelerometer (Tapley Meter)

13.10.4.1 Method of assessment. Braking action tests will be made over the usable length of the runway at approximately 3 metres each side of the centre-line and in such a manner as to produce mean values for each third of the length available. The Mu-meter will make a continuous record (which can be integrated) of each section of the runway to be measured. The Tapley Meter assessments will be approximately 300 metre intervals or on areas where the most representative results are likely to be obtained. Assessment of Stopway braking action where applicable may also be made available on request. The results of testing on compacted snow or ice, by either the Mu-Meter, Grip Tester or the Tapley Meter, should be interpreted and recorded as per:13.10.1h.

13.10.4.2 Warning. The braking action assessment is only a broad indication of the relative slipperiness of the runway and the friction number should not be used to try and make precise arithmetical adjustments to the scheduled landing or accelerate-stop distances. As a guide to interpretation, the scheduled distances contain an allowance for a degradation in runway friction which is adequate for almost all conditions likely to be encountered in service, but where 'POOR' braking assessment exists landings should only be attempted if the Landing Distance Available exceeds the Landing Distance Required on a 'very slippery' or icy runway as given in the aircraft Flight Manual.

© Oxford Aviation Services Limited

13.10.4.3 Use of grit to improve braking action. As an interim measure, grit to an internationally accepted specification, may have to be used to increase the friction value of manoeuvring areas affected by ice or snow but it will be left on surface only for so long as the ice or snow persists. The specifications of grit has been selected as providing the best compromise between improving the coefficient of friction and presenting the least hazard to aircraft. However, the risk of ingestion into jet engines or of damage to the control surfaces of propeller driven aircraft, where reverse thrust is used, cannot be entirely discounted. Caution in using reverse thrust is therefore advised, particularly when a sudden thaw has resulted in the grit lying on an otherwise bare surface.

13.10.5 SNOWCLO. A term used in a Volmet Broadcast to indicate that an aerodrome is closed due to snow or snow clearance in progress.

13.11 WHEEL BRAKING ON WET RUNWAYS

13.11.1 Description. The inherent friction characteristics of a runway surface deteriorate only slowly over a period of time, but the friction of a runway surface and thus the braking action can vary significantly over a short period in wet conditions depending on the actual depth of water on the runway. Also, long term (six monthly) seasonal variations in friction value may exist. The consequence of combination of these factors is that no meaningful operational benefit can be derived from continually measuring the friction value of a runway in wet conditions. In the context of these paragraphs a 'wet runway' covers a range of conditions from 'Damp' to 'Flooded' as described below. It does not include ice or runways contaminated with snow, slush, or water associated with slush. Paved runways of 1200 m and longer at Civil aerodromes licensed for public use have been calibrated, to ensure that the friction characteristics of a runway surface, are of a quality to provide good braking action in wet conditions. The presence of water on a runway will be reported on R/T using the following descriptions:

a.	DAMP	-	the surface shows a change of colour due to moisture.
b.	WET	-	the surface is soaked but no significant patches of standing water are visible.
c.	WATER PATCHES	-	significant patches of standing water are visible.
d.	FLOODED	-	extensive standing water is visible.
e.	DRY	-	the surface is dry.

© Oxford Aviation Services Limited

13.11.2 Interpretation. When a runway is reported as 'DAMP' or 'WET' pilots may assume that an acceptable level of runway wheel braking friction is available. When a runway is reported as having 'WATER PATCHES' or being 'FLOODED' braking may be affected by aquaplaning and appropriate operational adjustments should be considered. "Water patches" will be used if at least 25% of the runway length is covered with standing water. When a runway is notified as liable to be slippery when wet, take-offs or landings in wet conditions should only be considered when the distances available equal or exceed those required for a very slippery or icy runway as determined from information in the aeroplane's Flight Manual. At military aerodromes in the UK, runway surface conditions will be described in plain language, and, where a braking action measuring device has been used, braking action will be described as good, medium or poor.

13.12 ASHTAM

13.12.1 Description. The ASHTAM provides information on the status of activity of a volcano when a change in its activity is, or is expected to be of operational significance. This information is provided using the volcano level of alert colour code. In the event of a volcanic eruption producing ash cloud of operational significance, the ASHTAM also provides information on the location, extent and movement of the ash cloud and the air routes and flight levels affected. The maximum period of validity of an ASHTAM is 24 hours. A new ASHTAM must be issued whenever there is a change in the alert level.

13.12.2 Volcano level of alert colour code. The table below details the volcano alert code used in field E of an ASHTAM

Alert Colour	Status of activity of the volcano
Red	Volcanic eruption in progress. Ash plume/cloud reported above FL 250, or Volcano dangerous, eruption likely, with ash plume/cloud expected to rise above FL 250
Orange	Volcanic eruption in progress. Ash plume/cloud not reaching nor expected to reach FL 250, or Volcano dangerous, eruption likely, with ash plume/cloud not expected to reach FL 250
Yellow	Volcano known to be active from time to time and volcanic activity has recently increased significantly, volcano not currently considered dangerous but caution should be exercised, or After a volcanic eruption (ie change in alert to yellow from red or orange) Volcanic activity has decreased significantly, volcano not currently considered dangerous but caution should be exercised.
Green	Volcanic activity considered to have ceased and volcano reverted to its normal state.

Table 13.12.2 - Volcano alert colour code.

© Oxford Aviation Services Limited

REVISION QUESTIONS CHAPTER 13

1. Which of the following has **NOT** had a significant on the development of the Aeronautical Information Service (AIS)?

   a. Introduction of RNP
   b. Airborne computer based navigation systems
   c. Implementation of RNAV
   d. Classification of airspace

2. If the AIS for an FIR is not available on a 24 hour basis, when is it to be available?

   a. 0800 to 1700 UTC Monday to Friday
   b. During the hours of watch of the Air Traffic Unit
   c. 2hrs before until 2 hours after a flight is in progress in the FIR
   d. Not less than 12 hours per day

3. Is each contracting state required to set up an AIS?

   a. Yes, it is a contractual requirement
   b. Not if the responsibility is assumed (on a bilateral basis) by another state
   c. Yes, but only if the state has more than one FIR
   d. Yes, but only if the airspace of the state contains regional ATS routes

4. Does every contracting state have to produce an Aeronautical Information Publication (AIP)?

   a. Yes
   b. Yes, but only if it is required to set up an AIS
   c. No, it purely an optional document
   d. Yes, but only if the aisrpace of the state encompasses the regional ATS route structure

5. With effect from 1 Jan 98, with reference to what system is position to be determined for use in the AIP?

   a. WGS –84
   b. Lat and Long
   c. Georef
   d. National Grid

© Oxford Aviation Services Limited

6. What is contained in the AIP?

a. ICAO Sarps and Pans
b. Only National Procedures (notified to ICAO under article 38 of the Chicago Convention)
c. Navigational information of a lasting nature
d. Emergency drills and check lists

7. Which of the following is NOT a section of the AIP?

a. GEN
b. NAV
c. ENR
d. AD

8. In which section of the AIP are the notified differences from SAPRS detailed for the state issuing the AIP?

a. NAV
b. ENR
c. GEN
d. AD

9. How are temporary changes of a long term nature incorporated in the AIP?

a. AIRAC amendment
b. AIC issue
c. AIP supplements
d. NOTAMs

10. How are NOTAMs which contain extensive graphics published?

a. As an AIP supplement
b. As a NOTAM on high quality paper
c. By fax
d. By letter

11. What information is contained in a NOTAM?

a. Information of a temporary nature
b. Information concerning runway markings
c. Information concerning temporary obstructions
d. Information concerning parachuting in notified danger areas

© Oxford Aviation Services Limited

12. How would information of an operationally significant permanent nature be published?

a. By NOTAM
b. By AIP supplement
c. By AIRAC Amendment
d. By issuing an AIC (yellow)

13. To whom are NOTAMs issued?

a. All airmen
b. All addressees in receipt of the regular signals traffic of the Aeronautical Fixed Telecommunications Network (AFTN)
c. Addressees for whom the information is of operational significance and who would not have 7 days notice
d. Operators; Aerodrome Managers; ATCCs and other parties who have signified a desire to be informed

14. Which Annex to the Chicago Convention is concerned with the AIS?

a. Annex 15
b. Annex 13
c. Annex 16
d. Annex 14

15. What is an ASHTAM?

a. An **A**dvisory **S**ervice or **H**elicopter NOTAM
b. Notification of **A**ction **S**uspending **H**ostilities **T**o **A**ir**m**en
c. Declaration of a No Smoking Zone
d. Information concerning volcanic activity

16. How are NOTAMs sent?

a. By Fax
b. By letter
c. By e-mail
d. By teleprinter network or letter

17. By what method would information concerning amended procedures for the use of ATS routes be issued?

a. NOTAM
b. AIRAC
c. AIC (Pink)
d. AIC (White)

© Oxford Aviation Services Limited

18. What colour are AIP supplements?

a. Red
b. White
c. Yellow
d. Green

19. How frequently is information issued under the regulated system (AIRAC)?

a. Every 7 days
b. Every 14 days
c. Every 21 days
d. Every 28 days

20. How long in advance of an event is AIRAC information to be published?

a. 14 days
b. 28 days
c. 42 days
d. 60 days

21. What is the minimum notice period required for the information contained in AIRAC to reach the recipient?

a. 14 days
b. 28 days
c. 35 days
d. 42 days

22. If AIRAC action has been taken to notify an event, what is the minimum period after the event that details can be changed?

a. 7 days
b. 14 days
c. 28 days
d. 42 days

23. What information is contained in an AIC?

a. Information that does not qualify for inclusion in the AIP
b. A better printed version of a NOTAM
c. Information that meets the requirement for AIRAC but has missed the publishing deadline
d. Major changes to Search and Rescue facilities

© Oxford Aviation Services Limited

24. What information is contained in pre-flight information bulletins?

a. A transcript of the latest ATIS
b. Plain language versions of NOTAMS
c. Details of Royal Flights
d. Opening and closing times of aerodromes

25. In which section of the AIP would you expect to find details of ATS routes?

a. GEN 1.3
b. AD 2.9
c. ENR 3
d. GEN 3

26. In which section of the AIP would you expect to find details of Runway characteristics of an aerodrome?

a. GEN 1.5
b. AD 2.12
c. ENR 5
d. ENR 1

27. In which section of the AIP would you expect to find details of Aircrew entry and exit procedures to a contracting state?

a. GEN 1.3
b. ENR 4
c. AD 2.25
d. AD 1.10

28. Where would you expect to find details of the documents required to be carried in aeroplanes?

a. The AIP
b. The Annex 2
c. PANS OPS
d. JAR 25

29. How are **permanent** changes made to the AIP?

a. By NOTAM
b. By replacing whole pages
c. By issuing a new book
d. By issuing complete sections when sufficient amendments have been notified

© Oxford Aviation Services Limited

30. How often are summaries of NOTAMs in force published?

a. Weekly
b. Monthly
c. Bi-monthly (every 2 months)
d. Annually

31. What colour is a UK AIC concerned with safety matters?

a. Red
b. Green
c. Pink
d. Yellow

32. What is a PIB?

a. **P**re-briefing **I**nformation **B**ook
b. **P**ersonal **I**n-flight **B**riefing
c. **P**recipitation and **I**cing **B**riefing
d. **P**re-flight **I**nformation **B**ulletin

33. In field A of a SNOWTAM the code group EDDM is included. What is this?

a. The ICAO aerodrome locator code for Munich
b. A code group that indicates that the data is manually derived
c. A code group that indicates that the braking action was recorded by a mu-Meter
d. A code group indicating that the SNOWTAM includes taxiways and runways

34. In field H of a SNOWTAM the braking action is recorded as "9". What does this mean?

a. Very good
b. Unreliable
c. There is no contaminant on the runway
d. Extremely poor

35. Which combination of the following correctly defines the density of precipitants on a runway?

a. Dry snow; wet snow; compacted snow; slush; standing water
b. Water, snow; ice; vapour
c. Snow, slush; ice; water
d. Rime ice; glaze ice; dry ice; wet ice; snow; slush; drizzle

© Oxford Aviation Services Limited

36. On an ASHTAM the alert colour code is stated to be RED.What does this mean?

a. Volcanic eruption is in progress with cloud/plume reported above FL250
b. Volcanic eruption expected within 12 hours
c. Volcanic eruption is in progress with cloud/plume reported not above FL250
d. Global alert for volcanic activity

© Oxford Aviation Services Limited

ANSWERS TO REVISION QUESTIONS FOR CHAPTER 13

1	D	26	B	51		76	
2	C	27	A	52		77	
3	B	28	A	53		78	
4	B	29	B	54		79	
5	A	30	B	55		80	
6	C	31	C	56		81	
7	B	32	D	57		82	
8	C	33	A	58		83	
9	C	34	B	59		84	
10	A	35	A	60		85	
11	A	36	A	61		86	
12	C	37		62		87	
13	C	38		63		88	
14	A	39		64		89	
15	D	40		65		90	
16	D	41		66		91	
17	B	42		67		92	
18	C	43		68		93	
19	D	44		69		94	
20	C	45		70		95	
21	B	46		71		96	
22	C	47		72		97	
23	A	48		73		98	
24	A	49		74		99	
25	C	50		75		100	

© Oxford Aviation Services Limited

CHAPTER FOURTEEN - AERODROMES

Contents

		Page
14.1	INTRODUCTION	14-1
14.2	AERODROME REFERENCE CODE	14-2
14.2	GLOSSARY OF TERMS	14-3
14.3	AERODROME DATA	14-6
14.4	RUNWAYS	14-8
14.5	TAXIWAYS	14-12
14.6	APRONS	14-16
14.7	VISUAL AIDS FOR NAVIGATION	14-16
14.8	RUNWAY MARKINGS	14-17
14.9	TAXIWAY MARKINGS.	14-25

© Oxford Aviation Services Limited

14.1 INTRODUCTION

14.1.1 Aerodromes. The place on the surface of the Earth where aeroplanes (aircraft) take off and land is known as an aerodrome. Aerodromes may be nothing more than a field used for light private flying, a defined strip of open water (a water aerodrome) or the complex and fascinating areas of real estate we associate with places like Heathrow, Gatwick. Chicago O'Hare, JFK etc.. The one thing they all have in common is that they are all provided especially for the use of aeroplanes.

14.1.2 Annex 14. The annex to the Conference on International Civil Aviation that is concerned with aerodromes is Annex 14. In common with other annexes, it contains standards and recommended practices (SARPs) and states can notify differences to Annex 14 under article 38 of the convention. In accordance with article 15 of the convention, Annex 14 is only concerned with aerodromes that are open to the public. Each contracting state is required to ensure that such aerodromes comply with the requirements of the annex. In the United Kingdom, the authority responsible for ensuring compliance is the CAA which is acting as the agent of the JAA. In the UK there are 4 types of aerodrome:

a. Public licenced
b. Private licenced
c. Private unlicenced
d. Government owned

14.1.3 Use by Commercial Air Transport. The learning objectives of the course are directed towards the use of aerodromes by commercial air transport (CAT). The differentiation between public and private, is immaterial. If an aerodrome is to be used for CAT, the services, facilities, markings and aircraft handling capability must comply with the requirements of the state for the issue of a licence. The use of an unlicenced aerodrome is not precluded for CAT, but the absence of a licence means that any instrument procedures associated with instrument approaches have not been certified as safe for use for CAT. It is therefore implicit that the use of an unlicenced aerodrome for CAT is restricted to visual operations only.

14.1.4 Basic layout. All aerodromes complying with the SARPs of Annex 14 have a movement area, a manoeuvring area and an apron. At a controlled aerodrome there must be a control tower which has a visual room. If the aerodrome accepts non-radio traffic, there must be a signals area laid out on the ground so that it is visible from the air within a defined distance and height from the aerodrome. The signals used have already been covered in chapter six - Rules of the Air. Further description and explanation can be found in CAP 637.

© Oxford Aviation Services Limited

14.2 AERODROME REFERENCE CODE

14.2.1 Use. The reference code, which is used for aerodrome planning purposes, is a simple method of interrelating the specifications concerning the characteristics of aerodromes, so as to provide aerodrome facilities that are suitable for the aeroplanes that are intended to operate at the aerodrome. It is not intended to be used for determining the runway length or pavement length requirements for aeroplanes or to specify a minimum or maximum length for a runway.

14.2.2 Elements. The code is composed of two elements which are related to aeroplane performance characteristics and dimensions. Element 1 is a number based on the aeroplane reference field length and element 2 is a letter based on the aeroplane wing span. A particular specification is related to the more appropriate of the two elements of the code or to an appropriate combination of the two code elements. The code letter or number selected for design purposes is related to the critical aeroplane characteristics for which the facility is provided. In aerodrome design and operations, the aeroplanes which the aerodrome is intended to serve are first identified and then the two elements of the code. The following table defines the aerodrome code.

Code Element 1		Code Element 2		
Code number	**Aeroplane reference field length**	**Code letter**	**Wing span**	**Outer main gear wheel span** (1)
1	Less than 800m	A	Up to but not including 15 m	Up to but not including 4.5 m
2	800 m or more, but less than 1 200 m	B	15 m or more, but less than 24 m	4.5 m up to but not including 6 m
3	1 200 m or more, but less than 1 800 m	C	24 m or more, but less than 36 m	6 m up to but not including 9 m
4	1 800 m or more	D	36 m or more, but less than 52 m	9 m up to but not including 14 m
		E	52 m or more, but less than 65 m	9 m up to but not including 14 m
		F	65m up to but not including 80m (2)	14 m up to but not including 16 m

1. Distance between the outside edges of the main gear wheels
2. Guidance on planning for aeroplanes with wing span greater than 80m is given in the Aerodrome Design manual parts 1 and 2.
3. The question bank was written before the introduction of code F. Beware of questions referring to code F aerodromes.

Table 14.2.2. Aerodrome Reference Code

14.2.3 Aeroplane Reference Field Length. The minimum field length (take off distance) required for take off at max certificated take off mass, sea level, standard atmospheric conditions, still air and runway slope, as shown in the appropriate AFM prescribed by the certifying authority or equivalent data from the aeroplane manufacturer.

© Oxford Aviation Services Limited

14.2 GLOSSARY OF TERMS

Aerodrome	Any area of land or water designed, equipped, set apart or commonly used for affording facilities for the landing and departure of aircraft and includes any area or space, whether on the ground, on the roof of a building or elsewhere, which is designed, equipped or set apart for affording facilities for the landing and departure of aircraft capable of descending or climbing vertically, but shall not include any area the use of which for affording facilities for the landing and departure of aircraft has been abandoned and has not been resumed.
Aerodrome elevation	The elevation of the highest point of the landing area.
Aerodrome reference point	The aerodrome reference point is the geographical location of the aerodrome and the centre of its traffic zone where an ATZ is established.
Apron	A defined area on a land aerodrome provided for the stationing of aircraft for the embarkation and disembarkation of passengers, the loading and unloading of cargo, and for parking.
Clearway	An area at the end of the take-off run available and under the control of the aerodrome licensee, selected or prepared as a suitable area over which an aircraft may make a portion of its initial climb to a specified height.
Crosswind component	The velocity component of the wind measured at or corrected to a height of 33 feet above ground level at right angles to the direction of take-off or landing.
Instrument approach runway	A runway intended for the operation of aircraft using non-visual aids providing at least directional guidance in azimuth adequate for a straignt-in approach.
Instrument approach strip	An area of specified dimensions which encloses an instrument runway.
Landing area	That part of the manoeuvring area primarily intended for the landing or take-off of aircraft.
Main runway	The runway most used for take-off and landing.
Manoeuvring area	That part of an aerodrome provided for the take-off and landing of aircraft and for the movement of aircraft on the surface, excluding the apron and any part of the aerodrome provided for the maintenance of aircraft.
Movement area	That part of an aerodrome intended for the surface movement of aircraft including the manoeuvring area, aprons and any part of the aerodrome provided for the maintenance of aircraft.

© Oxford Aviation Services Limited

Non-instrument runway	A runway intended for the operation of aircraft using visual approach procedures.
Obstacle	All fixed (whether temporary or permanent) and mobile objects, or parts thereof, that are located on an area intended for the surface movement of aircraft or that extend above a defined surface intended to protect aircraft in flight.
Obstacle Free Zone	A volume of airspace extending upwards and outwards from an inner portion of the strip to specified upper limits which is kept clear of all obstructions except for minor specified items.
Precision approach runway	A runway intended for the operation of aircraft using visual and non-visual aids providing guidance in both pitch and azimuth adequate for a straight-in approach. These runways are divided into three categories as follows. Note: the following categories are ICAO defined. JAR-OPS 1.430 contains other specifications dependent upon the type of the autopilot system, which are more restrictive. **Category I (Cat I) operation** A precision instrument approach and landing with a decision height not lower than 200 feet and with either a visibility not less than 800 m, or a runway visual range not less than 550 m. **Category II (Cat II) operation** A precision instrument approach and landing with a decision height lower than 200 feet but not lower than 100 feet, and a runway visual range not less than 350 m. **Category IIIA (Cat IIIA) operation** A precision instrument approach and landing with either, a decision height lower than 100 feet, or with no decision height and a runway visual range not less than 200 m. **Category IIIB (Cat IIIB) operation** A precision instrument approach and landing with either, a decision height lower than 50 feet, or with no decision height and a runway visual range less than 200 m but not less than 50m. **Category IIIC (Cat IIIC) operation** A precision instrument approach and landing with no decision height and no runway visual range limitations.

© Oxford Aviation Services Limited

Runway	A defined rectangular area, on a land aerodrome prepared for the landing and take-off run of aircraft along its length.
Runway End Safety Area (RESA)	An area symmetrical about the extended runway centreline and adjacent to the end of the strip primarily intended to reduce the risk of damage to an aeroplane undershooting or overrunning the runway.
Shoulder	An area adjacent to the edge of a paved surface so prepared as to provide a transition between the pavement and the adjacent surface for aircraft running of the pavement.
Stopway	A defined rectangular area at the end of the take-off run available, prepared and designated as suitable area in which an aircraft can be stopped in the case of a discontinued take-off.
Strip	An area of specified dimensions enclosing a runway and taxiway to provide for the safety of aircraft operations.
Take-off Runway	A runway equipped to allow take-offs in specified weather minima.
Taxiway	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 minimising runway occupancy times.
Taxiway holding position	A designated position at which taxiing aircraft and vehicles may be required to hold in order to provide adequate clearance from a runway.
Taxiway Intersection	A junction of two or more taxiways.
Threshold	The beginning of that portion of the runway usable for landing.
Usability	The percentage of occasions on which the crosswind component is below a specified value. The usability may be determined for any combination of take-off and landing directions available at an aerodrome.

© Oxford Aviation Services Limited

14.3 AERODROME DATA

14.3.1 Aerodrome reference point. An aerodrome reference point shall be established for an aerodrome and is defined as the designated geographical location of the aerodrome. The aerodrome reference point shall be located near the initial or planned geometric centre of the aerodrome and shall normally remain where first established. It is usually the centre of the longest runway. The position of the aerodrome reference point shall be measured and reported to the aeronautical information services authority in degrees, minutes and seconds.

14.3.2 Pre-flight altimeter check location. One or more pre-flight altimeter check locations are required for an aerodrome. It should be located on an apron to enable an altimeter check to be made prior to obtaining taxi clearance and thus eliminate the need for stopping for that purpose after leaving the apron. Normally an entire apron can serve as a satisfactory altimeter check location. The elevation of a pre-flight altimeter check location shall be given as the average elevation, rounded to the nearest metre or foot, of the area in which it is located. The elevation of any portion of a pre-flight altimeter check location shall be within 3m (10ft) of the average elevation for that location.

14.3.2.1 Aerodrome and Runway Elevations. The aerodrome elevation and geoid undulation at the aerodrome elevation position (the highest point of the landing area) is measured to the nearest half metre or foot. For precision runways, to the nearest quarter metre or foot. **Note**: The geoid is the gravitational level of mean sea level extending continuously through the continents. It is irregular (due to local gravitational disturbances) hence geoid undulations.

14.3.3 Pavement strengths. Where pavements are used by aircraft with maximum take off mass greater than 5 700 kg, the strength of the pavement is reported by the aircraft classification number - pavement classification number (ACN-PCN) system.

14.3.4 Declared distances. The following distances shall be calculated to the nearest metre or foot for a runway intended for the use by international commercial air transport:

a. take-off run available;

b. take-off distance available;

c. accelerate-stop distance available; and

d. landing distance available.

© Oxford Aviation Services Limited

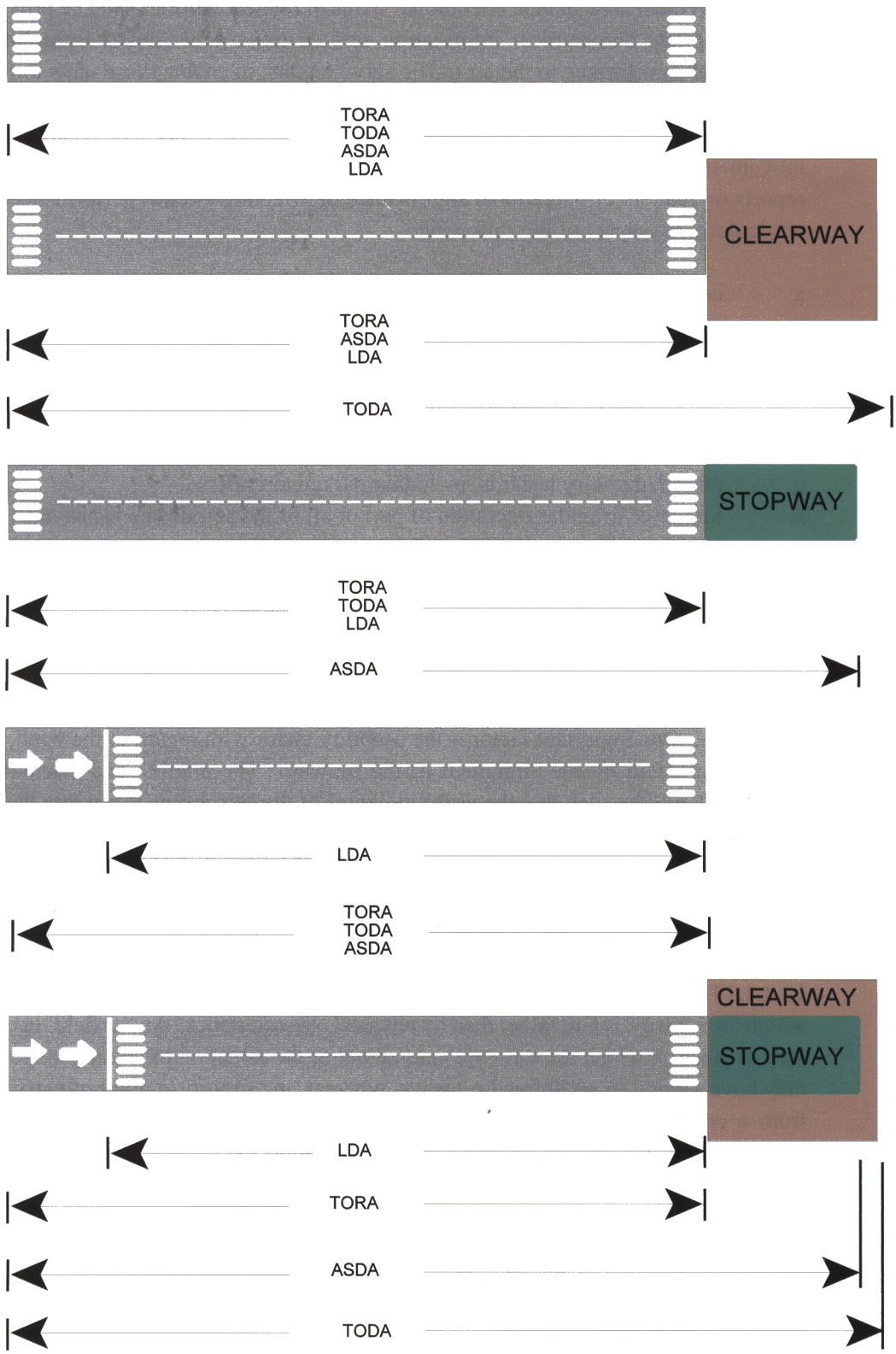


Figure 14.3.1 Declared Distances

© Oxford Aviation Services Limited

14.3.5 Condition of the movement area and related facilities. Information on the condition of the movement area and the operational status of related facilities shall be provided to the appropriate aeronautical information service units, and similar information of operational significance to the air traffic service units, to enable those units to provide the necessary information to arriving and departing aircraft. The information shall be kept up to date and changes in conditions reported without delay. The condition of the movement area and the operational status of related facilities shall be monitored and reports on matters of operational significance or affecting aircraft performance given, particularly in respect of the following:

a. construction or maintenance work;
b. rough or broken surfaces on a runway, a taxiway or an apron;
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. anti-icing or de-icing liquid chemicals on a runway or a taxiway;
g. other temporary hazards, including parked aircraft;
h. failure or irregular operation of part or all of the aerodrome visual aids; and
i. failure of the normal or secondary power supply.

14.4 RUNWAYS

14.4.1 Usability. Many factor affect the orientation, siting and number of runways at an aerodrome. One important factor is the usability factor with regard to the wind, which could be affected by the alignment of the runway. The number and orientation of runways should be such that the usability factor of the aerodrome is not less than 95% for the aeroplanes that the aerodrome is intended to serve. It is normal practice to take off and land into wind. However operations will be precluded when the crosswind component exceeds 20 kts for aeroplanes with reference field length is 1 500 m or more; 13 kts where reference filed length is 1 200 to 1 500 m; and 10 kts for less than 1 200m.

14.4.1.1Types of Runway. Runways (see definition 14.2) are defined by the use to which the runway is put, rather than by physical characteristics. An 'airfield' (a defined area of grass on which runways are marked out or the direction of landing is indicated) may have several or no defined runways, whereas an 'airport' (a point of entry or exit from a country by air) may have several defined concrete runways. The types of operations carried out on or to a runway determine the runway type. The service provided, markings, signs, and physical characteristics of a runway are type dependant.

a. A non - instrument (visual) runway is used where take-off and landing criteria are determined visually. The criteria are usually defined by reference to ground visibility or RVR, cloud ceiling and day/night considerations.

© Oxford Aviation Services Limited

b. An instrument runway is one to which instrument departure and approach procedures are applied. Instrument runways are sub-divided into:

1. Precision runways (see definition 14.2)
2. Non-precision (see definition 14.2)

c. A take-off runway is a runway intended for take off only.

14.4.2 Location of threshold. A threshold should normally be located at the extremity of a runway unless operational considerations justify the choice of another location. Considerations may include unserviceable runway conditions, glide path angle, obstacle clearance etc..

14.4.3 Length of runways. The actual length of a runway should be adequate to meet the operational requirements of the aeroplanes for which the runway is intended and should be not less than the longest length calculated to correct for local conditions (elevation, temperature, runway slope, humidity and surface characteristics). There is no requirement to cater for the worst case aeroplane at critical mass. Where a secondary runway is constructed, the length criteria is applied in order to obtain a usability factor of 95%.

14.4.4 Width of runways. The width of a runway should not be less than the dimension specified in the table below.

Code No.	Code letter					
	A	B	C	D	E	F
1[(a)]	18 m	18 m	23 m	-	-	-
2[(a)]	23 m	23 m	30 m	-	-	-
3	30 m	30 m	30 m	45 m	-	-
4	-	-	45 m	45 m	45 m	60 m
(a) For a precision runway, w = 30 m where code is 1 and 2						

Table 14.4.4 Width of Runways

14.4.6 Spacing of parallel runways. The minimum distance between parallel runway centre lines should be:

a. where parallel runways are intended for simultaneous use:

1. 210 m where the highest runway code number is 3 or 4;

2. 150 m where the highest runway code number is 2; and

© Oxford Aviation Services Limited

3. 120 m where the higher runway code number is 1.

b. where parallel instrument runways are intended for simultaneous use:

1. 1035 m for independent parallel approaches

2. 915 m for dependent parallel approaches

3. 760 m for independent parallel departures

4. 760 m for segregated parallel operations

14.4.7 Runway slopes. Ideally runways should be flat but terrain considerations make this virtually impossible to attain. Where a runway has slopes along its length, the rate of slope is not to exceed 1% (difference between max and min elevation ÷ runway length) for code 3 or 4 runways. Greater slopes may be permitted (1.25% for code 4; 1.5% for code 3) where the slope only affects a portion of the runway. To promote water drainage most runways are cambered or have a single cross fall from high to low.

14.4.8 Runway shoulders. A runway shoulder should be capable of supporting an aeroplane that runs off the runway, without structural damage, and also of supporting all vehicles likely to operate on the shoulder. Runway shoulders are required where the code letter is D or E and the width of the runway is less than 60 m, and for all code F runways. The width of the shoulder should be 60 m where the code letter is D or E; and 75 m where the code letter is F. The surface of the shoulder that abuts the runway should be flush.

14.4.9 Runway strips. A runway and any associated stopways shall be included in a strip. A strip is defined as an area including the runway and stopway, if provided, in which obstacles are kept to a minimum (any that are there must be constructed so as to present the minimum danger to aircraft). The purpose of the runway strip is:

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.

14.4.9.1Length of runway strips. A strip should extend before the threshold and beyond the end of the runway or stopway for a distance of at least:

a. 60m where the code number is 2, 3 or 4;

b. 60m for a code 1 instrument runway; and

c. 30m for a code 1 non-instrument runway.

© Oxford Aviation Services Limited

14.4.9.2Width of runway strips. A runway strip, wherever practicable, is to extend laterally on each side of the centre line of the runway and its extended centre line throughout the length of the runway strip, to a distance defined in table 14.4.9.2.

Type of Runway	Runway code number			
	1	2	3	4
Precision	75 m	75 m	150 m	150 m
Non - precision	75 m	75 m	150 m	150 m
Non - instrument	30 m	40 m	75 m	75 m

Table 14.4.9.2 - Width of runway strips

14.4.9.3Grading of runway strips. That portion of a strip of an instrument runway within a distance of at least 75m where the code number is at 3 or 4 and 40m where the code number is 1 or 2, from the centre line of the runway and its extended centre line, should provide a graded area for aeroplanes which the runway is intended to serve in the event of an aeroplane running off the runway. The surface of that portion of a strip that abuts a runway, shoulder or stopway shall be flush with the surface of the runway, shoulder or stopway.

14.4.9.4 Objects on a runway strip. No fixed objects other than visual aids are permitted on a runway strip within 77.5 m of the centre line for code 4F precision CAT I/II/III runways (60 m code 3 or 4 precision CAT I/II/III runways; or 45 m code 1 or 2 CAT I). No mobile objects are permitted on this part of a runway strip during landing or take off. An object which is situated within the stated dimensions is to be regarded as an obstacle and, as far as is practicable, removed.

14.4.10 Runway end safety areas (RESA). An area asymmetrical 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. A runway end safety area should be provided at each end of a runway strip where:

a. the code number is 3 or 4; and

b. the code number is 1 or 2 and it is an instrument runway.

14.4.10.1RESA dimensions. The RESA should be at least twice the width of the runway and extend from the end of the runway strip for a distance not less than 90m. However, for a code 3 or 4 runway it is recommended to extend for 240 m, and for 120 m for code 1 and 2.

© Oxford Aviation Services Limited

14.4.11 Clearways. 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. The origin of a clearway should be at the end of the take-off run available. The length should not exceed half the length of the take-off run available, and the width should extend laterally to a distance of at least 75m on each side of the extended centre line of the runway.

14.4.12 Stopways. A stopway is 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. It is to have the same width as the runway with which it is associated.

14.4.13 Radio altimeter operating area. A radio altimeter operating area should be established in the pre-threshold area of a precision approach runway. The area should extend before the threshold for a distance of at least 300m. The area should extend laterally, on each side of the extended centre line of the runway; to a distance of 60m, except that when special circumstances so warrant, the distance may be reduced to no less than 30m if an aeronautical study indicates that such reduction would not affect the safety of operations of aircraft.

14.5 TAXIWAYS

14.5.1 Introduction. A major limitation to the use of an aerodrome is the capability of the taxiways to accommodate different sizes of aeroplanes. Clearly, a narrow taxiway cannot cope with a large aeroplane. However, width is not the only consideration. The strength of a taxiway needs to be equal to that of the runway and the surface of taxiways is more vulnerable to damage than a runway (constant loading and unloading, turning and stopping). Taxiways may include turns especially close to runways. Taxiways may cross, join, intersect and require signs and markings to enable pilots to reach their destination on the aerodrome. Taxiways, especially parallel to runways, must not be confused with runways. At some aerodromes, Gatwick for example, the parallel taxiway is also the secondary runway! Considerations have to be given to the points on taxiways where aeroplanes are held prior to entering the runway for take-off, and also portions of taxiways close to the runway where the presence of a large aeroplane (a large lump of electromagnetically friendly metal) may interfere with ILS or MLS transmissions, or more fundamentally, be an obstacle to operations. In basic terms according to Annex 14, taxiways should be provided to permit the safe and expeditious surface movement of aircraft.

14.5.2 General layout. Sufficient entrance and exit taxiways for a runway are to be provided to expedite to movement of aeroplanes to and from the runway including the provision of rapid exit taxiways where traffic volumes are high. Where the end of a runway is not served by a taxiway, it may be necessary to provide additional pavement at the end of the runway for turning aeroplanes. Such areas may be usefully situated along the runway to reduce taxi times.

© Oxford Aviation Services Limited

14.5.2.1 Minimum Requirements. As previously mentioned, width is the most important factor in taxiway design and construction. Table 14.5.2 specifies the minimum requirements for clearance of the outermost main wheels when the nose wheel is on the centre line of the taxiway. The shoulders of taxiways which are used by turbine aeroplanes are to be prepared to prevent erosion by jet blast, and the ingestion of surface material into the jet engines. Taxiway strips, similar to runway strips, are provided primarily to delineate the area to be cleared of objects which may be obstacles.

Code Letter	Clearance
A	1.5m
B	2.25 m
C	3 m if the taxiway is intended to be used by aeroplanes with a wheel base less than 18 m; otherwise 4.5 m
D	4.5 m
E	4.5 m
F	4.5 m

Table 14.5.2 - Wheel to taxiway edge clearance

14.5.3 Width of taxiways. The straight portion of a taxiway should have a width of not less than that specified in table 14.5.3.

Code Letter	Taxiway width
A	7.5m
B	10.5 m
C	15 m if the taxiway is intended to be used by aeroplanes with a wheel base less than 18 m; otherwise 18 m
D	18 m if the taxiway is intended to be used by aeroplanes with an outer main gear span of less than 9 m; otherwise 23 m
E	23 m
F	25 m

Table 14.5.3 - Width of taxiways

© Oxford Aviation Services Limited

14.5.4 Taxiway curves. Changes in direction of taxiways should be as few and small as possible. The radii of the curves should be compatible with the manoeuvring capability and normal taxiing speeds of the aeroplanes for which the taxiway is intended. An example of widening taxiways to achieve the wheel clearance specified is illustrated if fig.14.5.4

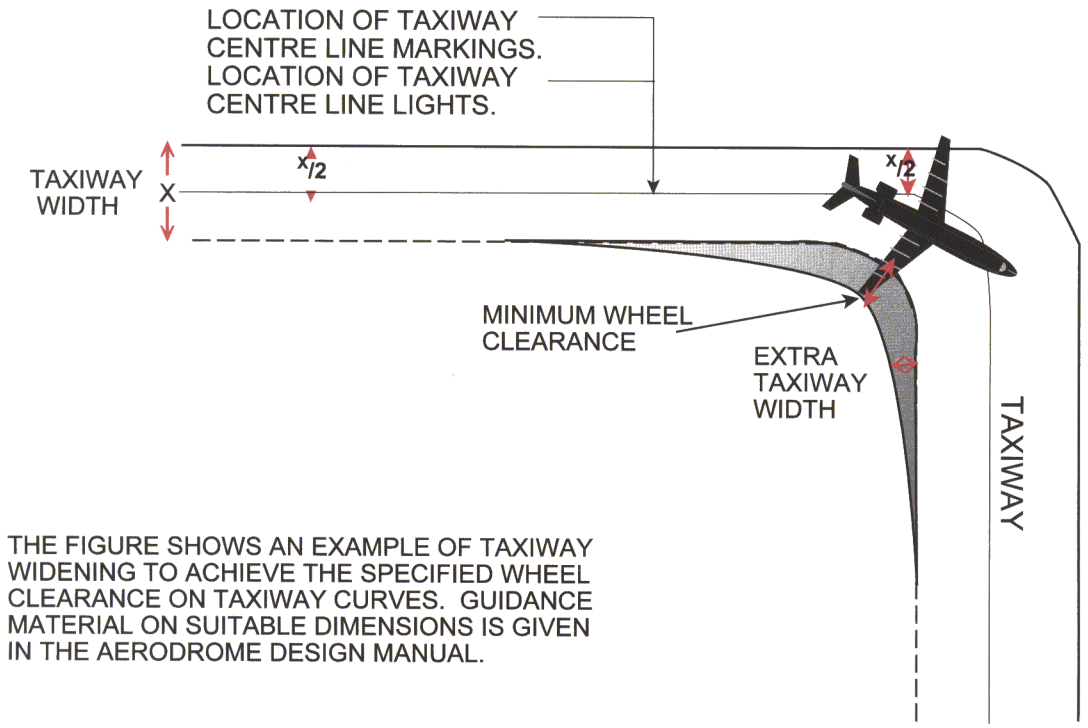


Figure 14.5.4 Taxiway curve

14.5.5 Taxiway separation distances. There is no requirement of the learning objectives for the student to know the taxiway separation distances from runways or other taxiways. However, the distance between taxiway and instrument runway centre lines for code 1A is 82.5 m, and for code 4F is 190 m.

14.5.6 Rapid exit taxiways. Rapid exit taxiways are provided where traffic density is high. They are used to allow aeroplanes to turn off of the duty runway at a speed higher than would be permitted at a right angled turn on to a normal taxiway. They are located along runways and are designed and constructed to cater for turn off speeds of 93 km/h (50 kts) for code 3 or 4 runways and 65 km/h (35 kts) on code 1 and 2 runways, in wet conditions. The taxiway is to include a straight section after the turn off curve to allow an exiting aircraft to come to a full stop clear of the intersecting taxiway. The intersecting angle with the runway should not be greater than 45 , not less than 25 and preferably 30 .

© Oxford Aviation Services Limited

14.5.7 Holding bays, and runway-holding positions. Inevitably, at a busy aerodrome, aeroplanes will be required to wait before their turn for take off. You have seen the situation with a stream of traffic waiting along the taxiway for take off , but at an international airport the queues for take off can exceed the capability of the taxiway to accommodate all the aircraft waiting. In this situation or where environmental considerations exist, holding bays are provided adjacent to runways entrances which leave the taxiway clear. At some major aerodromes with particularly high traffic levels or intense peaks in traffic density, 'sin bins' are established to take aeroplanes out of the stream if something has gone wrong. Regardless of the position of holding bays, the entrance to the runway will be protected by a defined mandatory holding point set back from the edge of the runway to accommodate all the traffic using the runway. A runway -holding position is to be established on a taxiway if the location or alignment of the taxiway is such that a taxiing aircraft or vehicle can infringe an obstacle limitation surface or interfere with the operation of radio navigation aids. The method of indicating a runway-holding position is covered later in this chapter (under Signs and Markings). A runway-holding position, or positions, shall be established at the distances in table 14.5.7 at the following locations:

a. at an intersection of a taxiway with a runway; and

b. at an intersection of a runway with another runway when the former runway is part of a standard taxi-route.

Type of Runway	Code Number			
	1	2	3	4
Non-instrument approach	30 m	40 m	75 m	75 m
Non-precision approach	40 m	40 m	75 m	75 m
Precision Cat I approach	60 m[(b)]	60 m[(b)]	90 m[(a,b)]	90 m[(a,b,c)]
Precision Cat II/III approach	-	-	90 m[(a,b)]	90 m[(a,b,c)]
Take off	30 m	40 m	75 m	75 m
Notes: a. may be increased if holding elevation lower than runway b. may be increased to avoid interference with radio nav aids c. for code F this should be 107.5 m				

Table 14.5.7 - Minimum distances from runway centre lines of holding positions

14.5.8 Road holding position. A designated position at which vehicles may be required to hold. A road holding position shall be established at an intersection of a road with a runway. The distances in table 14.5.7 apply to road holding points.

© Oxford Aviation Services Limited

14.6 APRONS

14.6.1 Requirement. Aprons are provided where necessary to permit the embarking and disembarking of passengers, and the loading and off loading of cargo and mail, as well as the servicing of aircraft, without interference with aerodrome traffic. The total apron area should be adequate to permit the expeditious handling of the aerodrome traffic at its maximum anticipated density. Aprons are to be built to accommodate slow moving traffic and in any case to withstand higher stresses than runways. Aircraft parking areas on aprons (stands) are to be marked and are required to provide a minimum distance between parked aircraft. For code A the distance is 3 m, and for code D and above 7.5m.

14.6.2 Isolated aircraft parking position. An isolated aircraft parking position is to be designated, or the control tower advised of an areas 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 traffic. This special area is not to be less than 100 m from any other parking area, building, or public area, or over underground utilities (gas, aviation fuel, electrical or communications cables).

14.7 VISUAL AIDS FOR NAVIGATION

14.7.1 Indicators and signalling devices. Aerodrome are required to be equipped with a means of indicating the wind direction to pilots of non-radio aircraft. Remember, the Rules of the Air require a pilot to land and take off into wind, so there must be a method of indication. In order for a non-radio pilot to know what the landing direction is, a landing indicator is required. Also a means of communicating visual signal to non-radio aircraft is required to be positioned in the visual control room.

14.7.1.1Wind direction indicators. An aerodrome shall be equipped with at least one wind direction indicator. The wind direction indicator should be in the form of a truncated cone made of fabric and should have a length of not less than 3.6m and a diameter, at the larger end, of not less than 0.9m. It should be constructed so that it gives a clear indication of the direction of the surface wind and a general indication of the wind speed. The colour or colours should be so selected as to make the wind direction indicator clearly visible and understandable from a height of at least 300m, having regard to background. Where practicable, a single colour, preferably white or orange, should be used. Where a combination of two colours is required to give adequate conspicuity against changing backgrounds, they should preferably be orange and white, red and white, or black and white, and should be arranged in five alternate bands, the first and last bands being in the darker colour. The location of at least one wind direction indicator should be marked by a circular band 15m in diameter and 1.2m wide. The band should be centred about the wind direction indicator support and should be in a colour chosen to give adequate conspicuity preferably white. Provisions should be made for illuminating at least one wind indicator at an aerodrome intended for use at night.

© Oxford Aviation Services Limited

14.7.1.2 Landing direction indicator. When provided, a landing direction indicator shall be located in a conspicuous place on the aerodrome. The landing direction indicator should be in the form of a "T". The colour of the landing "T" shall be either white or orange, the choice being dependent on the colour that contrasts best with the background against which the indicator will be viewed. Where required for use at night the landing "T" shall either be illuminated or outlined by white lights.

14.7.1.3 Signalling Lamp. A signalling lamp shall be provided at a controlled aerodrome in the aerodrome control tower. The lamp should be capable of producing red, green and white signals and of;

a. being aimed manually at any target as required;

b. giving a signal in any one colour followed by a signal in either of the other two colours; and

c. transmitting a message in any one of the three colours by morse code up to a speed of at least four words per minute.

14.7.2 Signal panels and signal area. The provision of a signals area at an aerodrome implies that non-radio traffic is accepted. No signals area is required if an aerodrome authority has proscribed non-radio traffic. The signal area should be located so as to be visible for all angles of azimuth above an angle of 10° above the horizontal when viewed from a height of 300m. The signal area shall be an even horizontal surface of at least 9m square. 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 0.3m wide.

14.8 RUNWAY MARKINGS

14.8.1 Requirements. Runway markings shall be white. It has been found that, on runway surfaces of light colour, the conspicuity of white markings can be improved by outlining them in black. The risk of uneven friction characteristics on markings should be reduced, as far as practicable, by the use of a suitable kind of paint. Markings may consist of solid areas or a series of longitudinal stripes providing an effect equivalent to the solid areas.

14.8.2 Runway designation marking. A runway designation marking is to be provided at the threshold of paved runways, and as far as is practicable at the threshold of unpaved runways. 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.

© Oxford Aviation Services Limited

14.8.2.1 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 azimuth 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:

a. for two parallel runways "L" "R";

b. for three parallel runways "L" "C" "R";

c. for four parallel runways "L" "R" "L" "R" (in this case the QDM for one pair will be increased to differentiate that pair form the other).

14.8.3 Runway centre line marking. A runway centre line marking shall be provided on a paved runway. The centre line marking shall be located along the centre line of the runway between the runway designation markings.

14.8.3.1 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 50m or more than 75m, The length of each stripe shall be at least equal to the length of the gap or 30m, whichever is greater.

14.8.4 Threshold marking. A threshold marking is required to be provided at the thresholds of paved instrument runways, and of paved non-instrument runways where the code number is 3 or 4 and the runway is intended for use by international commercial air transport (CAT). It is only **recommended** that thresholds be marked for code 3 and 4 non-instrument runways which are used by operations **other than** CAT. A threshold marking should be provided, so far as is practicable, at the threshold of an unpaved runway.

14.8.4.1Location. The stripes of the threshold marking start 6m from the threshold.

14.8.4.2 Characteristics. A runway threshold marking is a pattern of longitudinal stripes of uniform dimensions disposed symmetrically about the centre line of the runway for a runway width of 45m (for non-precision approach and non-instrument runways 45m or greater in width; they may be placed either side of the runway designation number). The stripes shall extend laterally to within 3m of the edge of the runway or to a distance of 27m on either side of a runway centre line, whichever results in the smaller lateral distance.

© Oxford Aviation Services Limited

Where a runway designation marking is placed within a threshold marking there will be a minimum of three stripes on each side of the centre line of the runway. Where a runway designation marking is placed above a threshold marking the stripes shall be continued across the runway. The stripes shall be at least 30m long and approximately 1.80m between them except where the stripes are continued across a runway, in which case a double spacing shall be used to separate the two stripes nearest the centre line of the runway. In the case where the designation marking is included within the threshold marking this spacing shall be 22.5m. The number of stripes shall be in accordance with the runway width as follows:

Runway width	Number of stripes
18m	4
23m	6
30m	8
45m	12
60m	16

14.8.5 Transverse stripe. Where a threshold is displaced from the extremity of a runway (the end of the concrete) or where the end is not square with the runway centre line, a transverse stripe should be added to the threshold marking. When a runway threshold is permanently displaced, arrows shall be provided on the portion of the runway before the displaced threshold.

14.8.6 Aiming point marking. An aiming point marking is to be provided at each approach end of code 2,3 or 4 paved instrument runways. It is recommended that an aiming point marking is provided on code 1 paved instrument runways and code 3 or 4 paved non-instrument runways when additional conspicuity of the aiming point is desirable. An aiming point marking consists of two conspicuous stripes (ICAO specification see fig 14.8).

14.8.6.1 Location The aiming point marking shall commence no closer to the threshold than the distance indicated in the appropriate column of table 14.8.6, 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.

© Oxford Aviation Services Limited

Location and dimensions	Landing distance available			
	Less than 800m	800m up to but not including 1,200m	1,200m up to but not including 2,400m	2400m and above
Distance from threshold to beginning of marking	150 m	250 m	300 m	400 m

Table 14.8.6 - Location of aiming point marking

14.8.7 Touchdown zone marking. Touchdown zone markings are to be provided in the touchdown zone of code 2, 3 and 4 paved precision approach runways, and recommended for code 3 or 4 paved non-precision or non-instrument runways, where additional conspicuity is required.

14.8.7.1 Location. Touchdown zone markings consist of pairs of rectangular markings symmetrically placed about the runway centre line with the number of pairs related to the landing distance available.

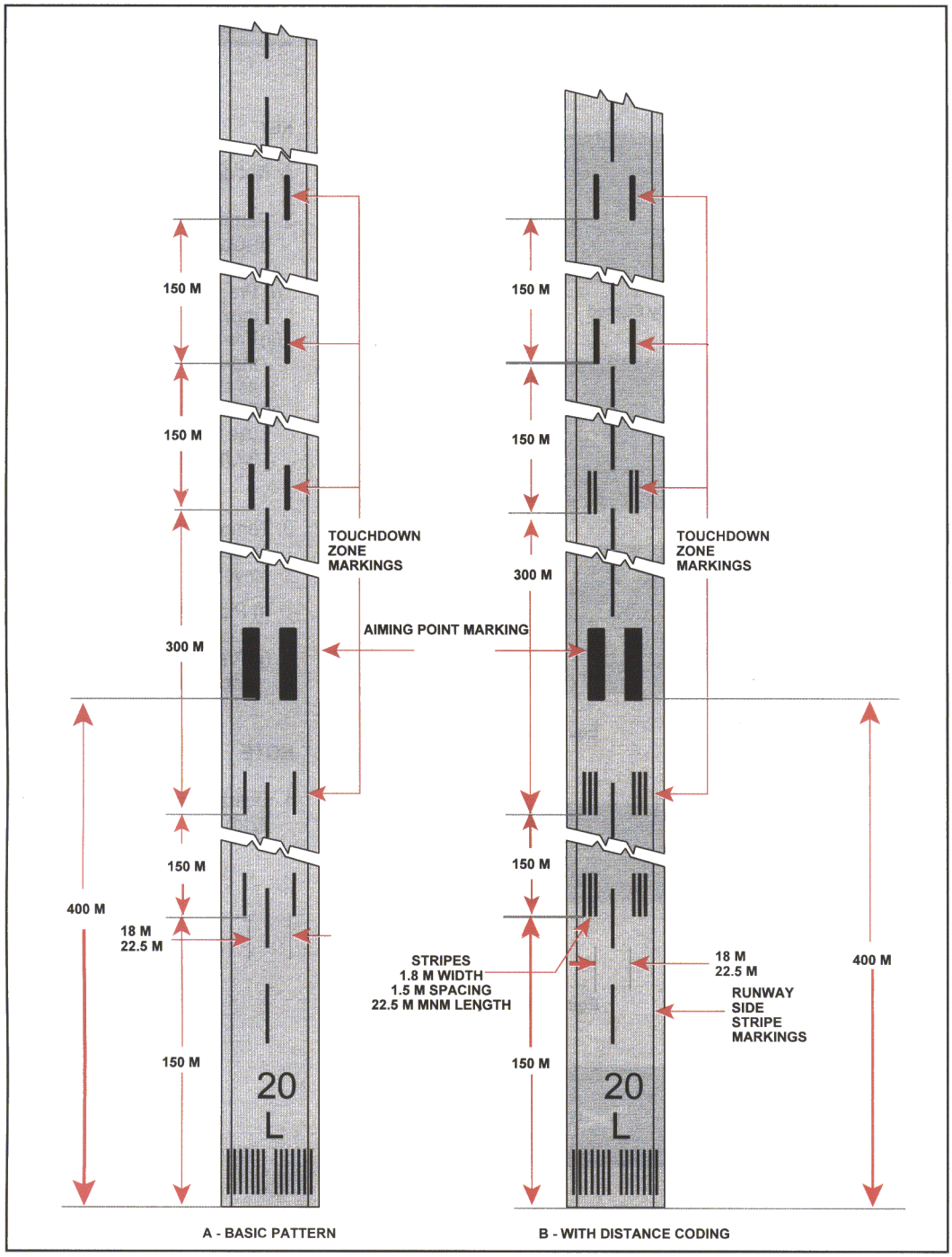
Landing distance available or the distance between thresholds	Pair (s) of markings
less than 900m	1
900m up to but not including 1200m	2
1200m up to but not including 1500m	3
1500 up to but not including 2400m	4
2400m or more	6

Table 14.8.7.1 - Touchdown Zone Markings

14.8.7.2Touchdown Zone Marking Characteristics. Touchdown zone markings shall conform to either of the two patterns shown in fig 14.8. The pairs of markings shall be provided at longitudinal spacings of 150 m beginning from the threshold except that pairs of touchdown zone markings coincident with or located within 50m of an aiming point marking shall be deleted from the pattern.

© Oxford Aviation Services Limited

14.8.8 Runway side stripe marking. Runway side stripe markings are to be provided between the thresholds of precision runways, and paved runways where there is a lack of contrast between the runway edges and the shoulders or the surrounding terrain. It is recommended that side stripes are marked on all precision runways regardless of the contrast with the surrounding ground.



AL10-F1

Fig 14.8 Aiming point and touchdown zone markings (illustrated for a runway with a length of 2 400 m or more).

© Oxford Aviation Services Limited

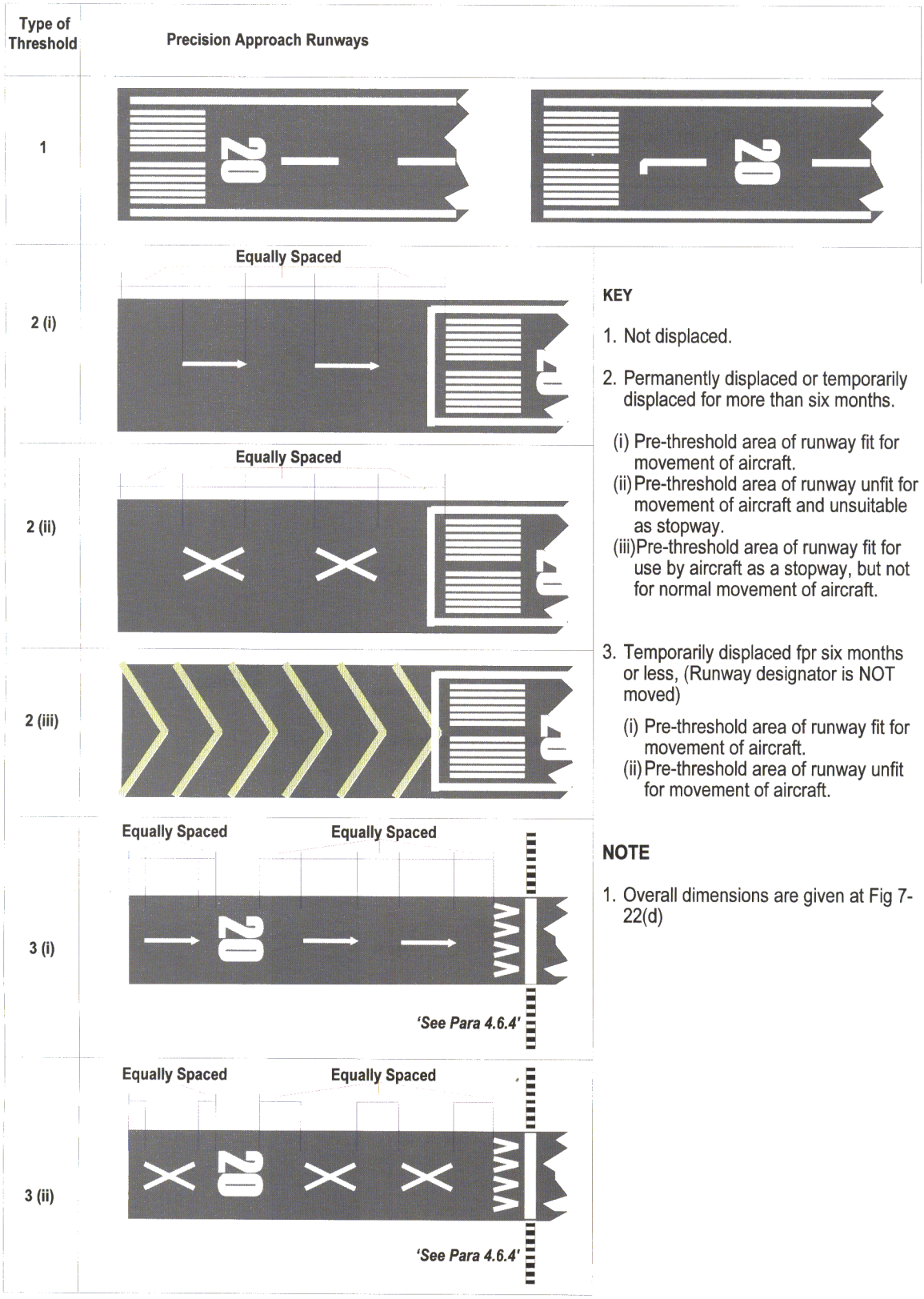


Fig 14.8a Precision Approach Runway Markings

© Oxford Aviation Services Limited

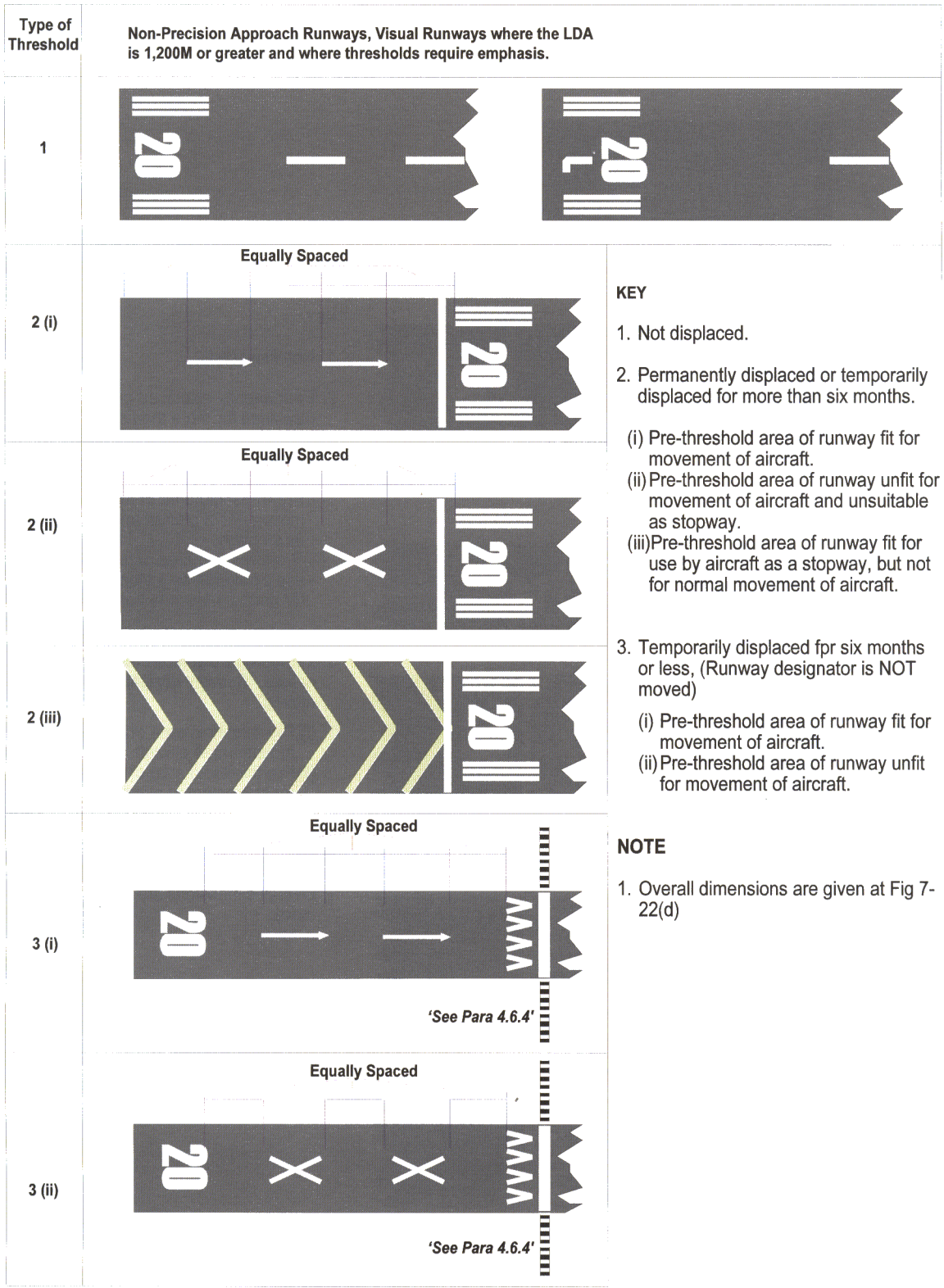
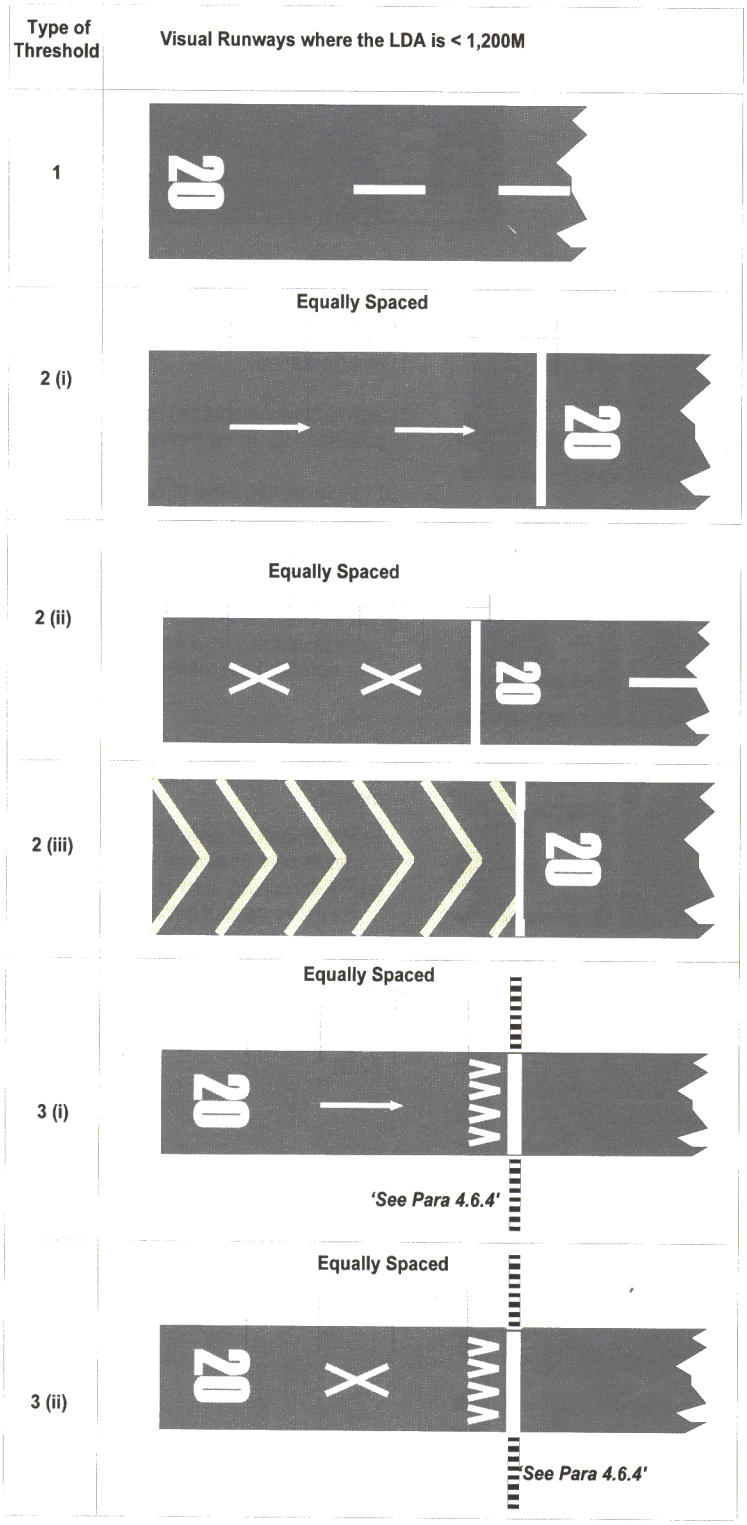


Fig 14.8b Non-Precision Approach Runway Markings

© Oxford Aviation Services Limited



KEY

1. Not displaced.
2. Permanently displaced or temporarily displaced for more than six months.
   (i) Pre-threshold area of runway fit for movement of aircraft.
   (ii) Pre-threshold area of runway unfit for movement of aircraft and unsuitable as stopway.
   (iii) Pre-threshold area of runway fit for use by aircraft as a stopway, but not for normal movement of aircraft.
3. Temporarily displaced fpr six months or less, (Runway designator is NOT moved)
   (i) Pre-threshold area of runway fit for movement of aircraft.
   (ii) Pre-threshold area of runway unfit for movement of aircraft.

NOTE

1. Overall dimensions are given at Fig 7-22(d)

Fig 14.8c Visual Runway Markings

© Oxford Aviation Services Limited

14.9 TAXIWAY MARKINGS.

14.9.1 Requirements. Taxiway markings and aircraft stand markings are yellow. Apron safety lines are to be of a conspicuous colour which shall contrast with that used for aircraft stand markings.

14.9.2 Taxiway centre line marking. Taxiway centre line marking shall be provided on a paved taxiway, de/anti-icing facility and apron where the code number is 3 or 4 (recommended for code 1 and 2) in such a way as to provide guidance from the runway centre line to the point on the apron where aircraft stand markings commence. 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.

14.9.3 Runway-holding position marking. A runway-holding position marking is to be displayed at a runway-holding position. The actual holding position is indicated by the mandatory sign (see signs later in this chapter) which will be displayed at least on the left hand side of the taxiway as the aeroplane approaches the runway. Ideally the sign should be on both sides of the taxiway. The marking is to extend all the way across the taxiway. The position may be augmented by stop bars or runway guard lights (see lighting later in this chapter). The distance between a runway-holding position and the centre line of the associated runway is specified in table 14.5.7 and in the case of a precision approach runway, will be such that a holding aircraft (or vehicle) will not interfere with the operation of radio navigation aids.

14.9.3.1Patterns. There are two distinct patterns for runway-holding markings. These are defined as 'Pattern A' and 'Pattern B' (see fig 14.9.3).

14.9.3.2Pattern A. At an intersection of a taxiway and a non-instrument, non-precision approach or take-off runway, the taxi-holding position marking will be Pattern A. Where a single taxi-holding position is provided at an intersection of a taxiway and a precision approach category I II or III runway, the taxi-holding position marking shall be Pattern A.

14.9.3.3Pattern B. Where two or three taxi-holding positions are provided at such an intersection, the taxi-holding position marking closer (closest) to the runway shall be as shown in pattern A and the markings farther from the runway shall be pattern B.

© Oxford Aviation Services Limited

14.9.4 Intermediate holding position marking. A taxiway intersection marking should be displayed at an intersection of two paved taxiways where it is desired to designate a specified holding limit. It should be located across a taxiway at sufficient distance from the near edge of an intersecting taxiway to ensure safe clearance between taxiing aircraft. It should be coincident with a stop bar or clearance bar, where provided. A taxiway intersection marking shall consist of a single broken yellow line.

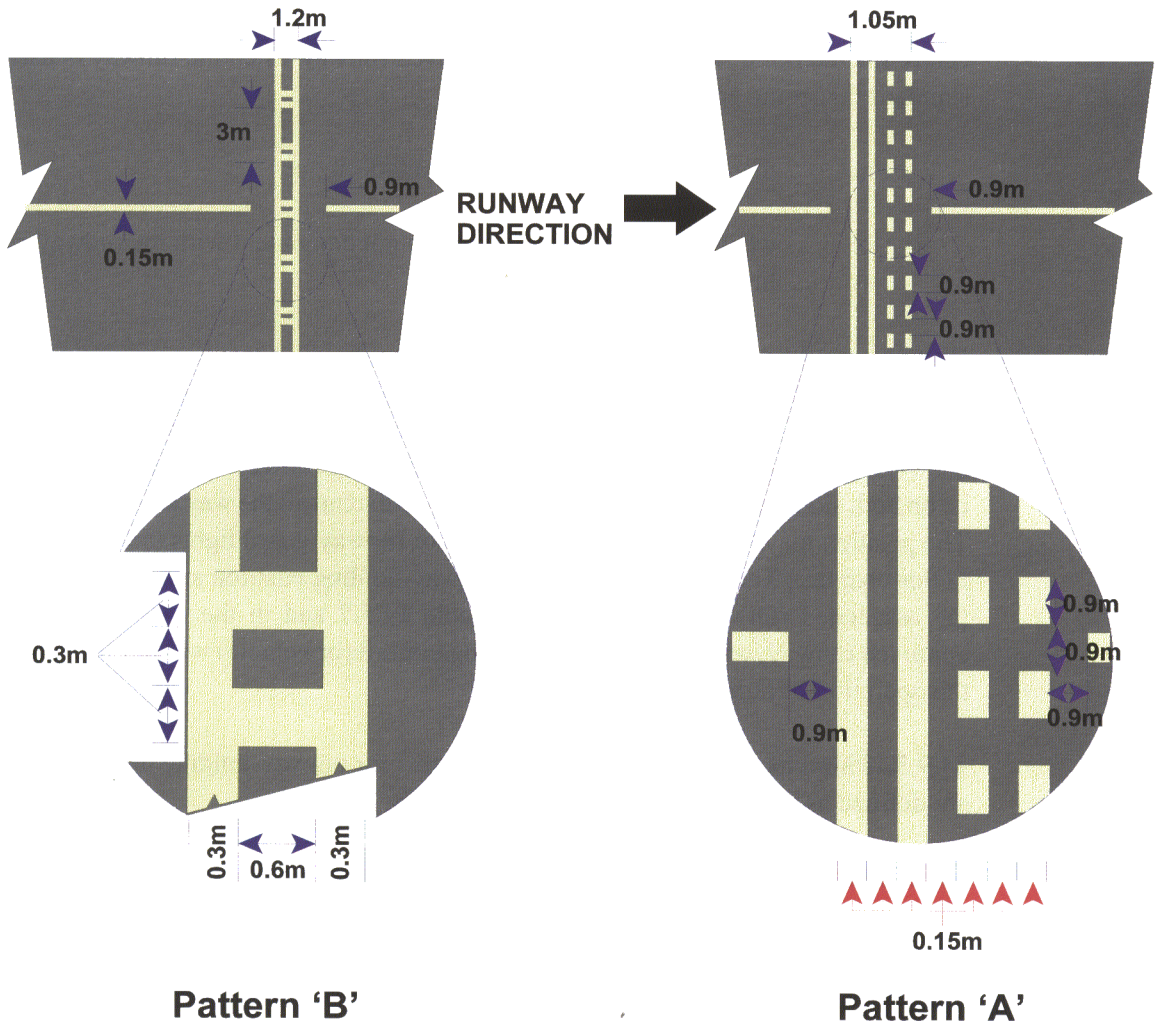


Fig 14.9.3 - Runway Holding Position Markings

© Oxford Aviation Services Limited

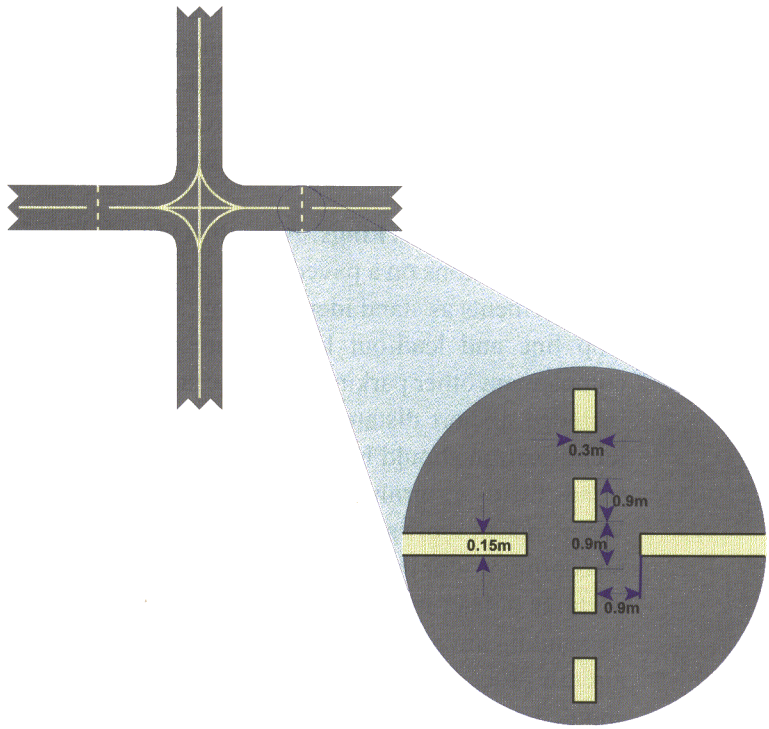
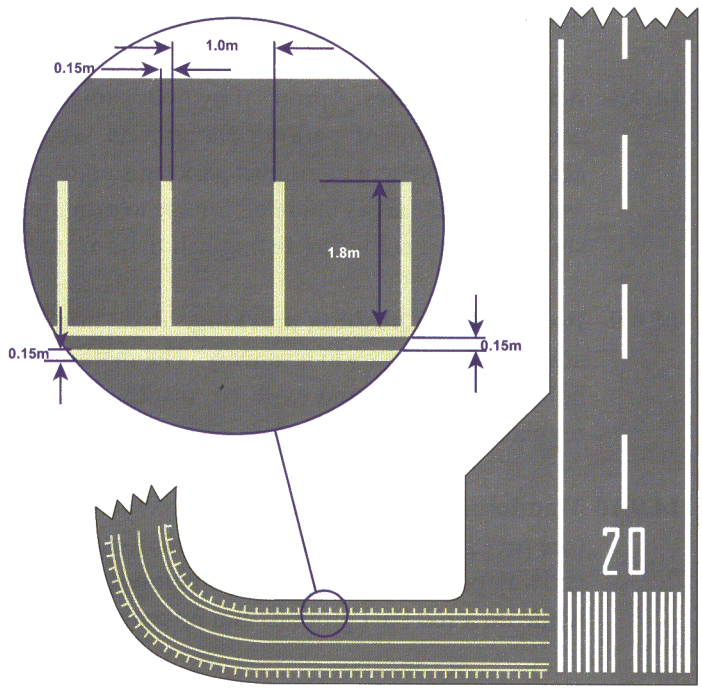


Figure 14.9.4 Intermediate Holding Position Markings

14.9.5 Taxiway Edge Markings. Taxiway edge markings are used where the area beyond the taxiway edge is paved but not normally available for use by aircraft. See fig 14.9.5



Note (1) On long straight sections of taxiway this distance may be increased to 2 m.

Figure 14.9.5. Taxiway Edge Markings.

© Oxford Aviation Services Limited

14.9.6 VOR Aerodrome Check Point Marking. Where required, a specific point on the aerodrome is designated for checking the aircraft's VOR receiver system. The point is marked by a marking and a sign board. The marking consists of a white circle on a black background (if required). It may have an arrow added to show the direction in which the aircraft should be pointing to receive the best signal.

14.9.7 Aircraft stand markings. Aircraft stand markings should be provided for designated parking positions on a paved apron and on de/anti icing facilities. They 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. The stand identification letter and/or number should be included 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. Where one or more sets of stand markings are superimposed on a stand, the lines should be continuous for the most demanding aircraft and broken for other aircraft. The curved portions of lead-in, turning and lead-out lines should have radii appropriate to the most demanding aircraft type for which the markings are intended. Where it is intended that aircraft proceed in one direction only, arrows pointing in the direction to be followed should be added as part of the lead-in and lead-out lines. A turn bar should be located at right angles to the lead-in line, abeam the left pilot position at the point of initiation of any intended turn. The distances to be maintained between the turn bar and the lead-in line may vary according to different aircraft types, taking into account the pilot's field of view. An alignment bar should be placed so as to be coincident with the extended centre line of the aircraft in the specified marking position and visible to the pilot during the final part of the parking manoeuvre. A stop line should be located at right angles to the alignment bar, abeam the left pilot position at the intended point of stop.

14.9.8 Apron safety lines. Apron safety lines should be provided on a paved apron to mark the acceptable limit of parking for ground servicing vehicles, air-bridges and ground equipment adjacent to aircraft parking stands on an apron. The lines shall be located so as to define the areas intended for use to provide safe separation from aircraft. The lines should be in a colour to distinguish them from taxiway or apron markings.

14.9.9 Road-holding position marking. Road holding position markings are to be provided at all road entrances to a runway. The markings are to be located across the road at the holding position, and will be marked in accordance with the local road traffic regulations.

14.9.10 Mandatory information marking. Where it is impracticable to install a mandatory sign (see sect 14.11), a mandatory instruction marking is to be marked on the surface of the taxiway pavement. Mandatory markings are holding point signs (runway designator in white on a red background) and no entry signs.

© Oxford Aviation Services Limited

14.9.11 Information marking. Where an information sign would normally be installed but it is physically impracticable, the information is to be displayed on the surface of the pavement. Where operationally required an information sign should be supplemented by an information marking. The information markings 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. An information marking shall consist of an inscription in yellow, when it replaces or supplements a location sign; and 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 black background where the inscriptions are in yellow; and a yellow background where the inscriptions are in black.

© Oxford Aviation Services Limited

CHAPTER FIFTEEN - AERODROME LIGHTS AND SIGNS

Contents

		Page
15.1	AERODROME LIGHTS	15 - 1
15.2	APPROACH LIGHTING SYSTEMS	15 - 3
15.3	RUNWAY LIGHTING	15 - 11
15.4	TAXIWAY LIGHTING	15 - 15
15.5	SIGNS	15 - 20
15.6	MARKERS	15 - 26
	REVISION QUESTIONS	15 - 35

© Oxford Aviation Services Limited

15.1 AERODROME LIGHTS

15.1.1 Introduction. Aerodromes at night are lit up like Christmas trees. The profusion of lights can be both confusing and disorientating, but each light or lighting system has a purpose and most are to do with aircraft safety. In this chapter the various lighting systems are described and their uses explained. The learning objectives state that a knowledge of lighting systems is required, but the spacing of lights or groups of lights (excluding approach lighting systems) is outside the scope of the course. The design of lighting systems is also beyond this course. It is an unfortunate fact of life that there is no standard system of lighting in use although ICAO has laid down the standards and recommended practices in Annex 14. In general, metric measurement is used although systems using imperial measure still exists (Brize Norton's Cat II approach system being an example).

15.1.2 Lights which may endanger aircraft. A non-aeronautical light near an aerodrome which might endanger the safety of an aircraft is to be extinguished, screened or otherwise modified so as to eliminate the source of danger. It is recommended that such lights be defined:

a. For code 4 instrument runways - within the areas before the threshold and beyond the end of the runway extending at least 2 500 m and 750 m either side of the extended runway centre line.

b. For code 2 or 3 instrument runways - as above except that the length should be at least 3 000 m

c. For code 1 instrument and non-instrument runways - within the approach area.

15.1.3 Elevated lights. Elevated runway, stopway and taxiway lights shall be frangible. Their height shall be sufficiently low to preserve clearance for propellers and for the engine pods of jet aircraft. Where not sufficiently conspicuous, they are to be suitably marked.

15.1.4 Light intensity and control. In dusk or poor visibility conditions by day, light can be more effective than marking. For lights to be effective in such conditions or in poor visibility by night, they must be of adequate intensity. To obtain the required intensity, it will usually be necessary to make the light directional, in which case the arcs over which the light shows will have to be adequate and so orientated as to meet the operational requirements. The runway lighting system will have to be considered as a whole, to ensure that the relative light intensities are suitably matched to the same end. The intensity of runway lighting shall be adequate for the minimum conditions of visibility in ambient light in which use of the runway is intended, and compatible with that of the nearest section of the approach lighting system when provided. While the lights of an approach lighting system may be of higher intensity than the runway lighting, it is good practice to avoid abrupt changes in intensity as these could give a pilot a false impression that the visibility is changing during approach.

© Oxford Aviation Services Limited

Where a high intensity lighting system is provided, a suitable intensity control shall be incorporated to allow for adjustment of the light intensity to meet the prevailing conditions. Separate intensity controls or other suitable methods shall be provided to ensure that the following systems, when installed, can be operated at compatible intensities:

a. approach lighting system;
b. runway edge lights;
c. runway threshold lights;
d. runway end lights;
e. runway centre line lights;
f. runway touchdown zone lights; and
g. taxiway centre line lights.

15.1.5 Emergency lights. Normally, an aerodrome will have an alternate power supply to cope with general power failures. Where no such back-up supply exists, emergency lights are to be available for at least the primary runway.

15.1.6 Aeronautical beacons. Where operationally necessary an aerodrome beacon or an identification beacon is to be provided where the aerodrome is intended for use at night. The need for a beacon is to be determined having regard to the requirements of the air traffic using the aerodrome, the conspicuity of the aerodrome features in relation to its surroundings and the installation of other visual and non-visual aids useful in locating the aerodrome.

15.1.6.1 Beacon Characteristics. An aerodrome beacon is to 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 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. The light from the beacon will show at all angles of azimuth. The vertical light distribution shall extend upwards from the elevation of not more than 1° to an elevation determined by the appropriate authority to be sufficient to provide guidance at the maximum elevation at which the beacon is intended to be used and the effective intensity of the flash shall be not less than 2000cd. Beacons are to 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.

© Oxford Aviation Services Limited

15.1.7 Identification beacon. An identification beacon shall be provided at an aerodrome which is intended for use at night and cannot be easily identified from the air by any other means. An identification beacon at a land aerodrome shall show at all angle of azimuth. The vertical light distribution shall extend upwards from an elevation of not more than 1° to an elevation determined by the approximate authority to be sufficient to provide guidance at the maximum elevation at which the beacon is intended to be used and the effective intensity of the flash shall not be less than 2000cd. An identification beacon shall show flashing green at a land aerodrome (red at a UK military aerodrome) and flashing yellow at a water aerodrome. The identification characters shall be transmitted in the International Morse Code. The speed of transmission should be between six and eight words per minute, the corresponding range of duration of the Morse dots being from 0.15 to 0.2 seconds per dot.

15.2 APPROACH LIGHTING SYSTEMS

15.2.1 General. Approach lighting systems are patterns of fixed lights of variable intensity, designed to give the pilot guidance to the threshold (or aiming point) of a runway, in poor met conditions or at night. The light patterns may include distance coding and give an indication of aircraft attitude. The arrangement may also give an indication of aircraft height above the approach plane. Systems can range in complexity from a simple centre line and cross bar, to the highly intricate layouts associated with Cat III precision instrument approach systems. The determination of the visual criteria for landing can be met by the visual acquisition of the approach light system and the design must cater for the requirement of the most restrictive decision heights and minimum descent heights. Systems have evolved roughly in line with advances in instrument approach accuracy and demands. Older (basic) systems, the 5 bar and centre line systems are known as Calvert patterns (after the designer) or the military equivalent, the NATO system. At some older aerodromes, the approach lighting systems may be laid out to imperial measurement (as at Brize Norton) but the ICAO standard is metric. The primary unit of design is the length of the segments, set by ICAO at 300 m. ICAO requires that all the existing lighting systems not conforming to the ICAO specification standards are to be replaced by 1 Jan 2005. Any ILS or MLS azimuth antenna protruding through the plane of the lights shall be treated as an obstacle and marked and lit accordingly.

15.2.1.1 Barrettes. The individual lights that make up the lighting systems may be arranged either as single light units (the older method) or in the form of groups of three or more lights arranged as a bar (the ICAO method). For instance the centre line of a system may consist of either single point source lights or a bar of 5 lights close together. The arrangement of 5 close together is called a 'barrette' (pronounced barre - et meaning small bar). They are called barrettes so that they are not confused with the bar constituent parts of any approach lighting system.

© Oxford Aviation Services Limited

15.2.2 **Simple approach lighting system**. A simple approach lighting system consists 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. 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 30m is used, gaps may be left on each side of the centreline. These gaps shall be kept to a minimum to meet local requirements and each shall not exceed 6m. The lights forming the centre line shall be placed at longitudinal intervals of 60m, except that, when it is desired to improve the guidance, an interval of 30m may be used. The innermost light shall be located either 60m or 30m 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 60m 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.

15.2.2.1 Characteristics. The lights of a simple approach lighting system shall be fixed lights and the colour of the lights (normally white) 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 single source or a barrette at least 3m in length.

a. **Non-instrument runway**. Where provided for a non-instrument runway, the lights should show at all angles in azimuth necessary to a pilot on base leg and final approach. The intensity of the lights should be adequate for all conditions of visibility and ambient light for which the system has been provided.

b. **Non-precision runway**. Where provided for a non-precision approach runway, the lights should show at all angles in azimuth necessary to the pilot of an aircraft which on final approach does not deviate by an abnormal amount from the path defined by the non-visual aid. The lights should be designed to provide guidance during both day and night in the most adverse conditions of visibility and ambient light for which it is intended that the system should remain usable.

© Oxford Aviation Services Limited

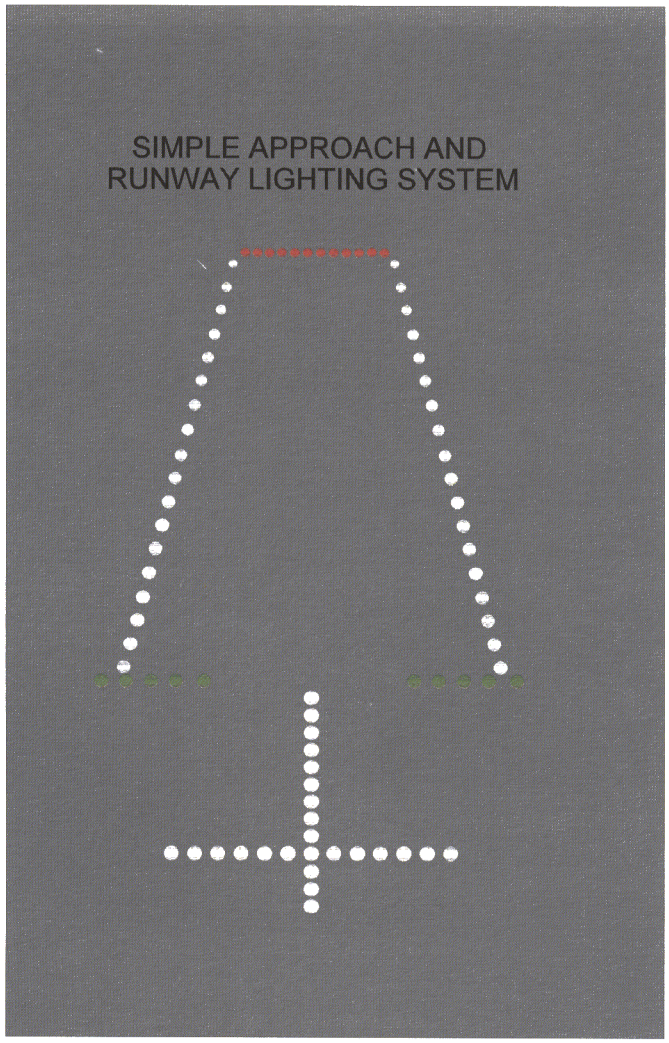


Fig 15.2.2 Simple Approach Lighting System

15.2.3 Precision approach CAT I lighting system. 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 900m from the runway threshold with a row of lights forming a crossbar 30m in length at a distance of 300m from the runway threshold. The installation of an approach lighting system of less than 900m 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 6m. Spacings for the crossbar lights between 1m and 4m are 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 30m with the innermost light located 30m from the threshold.

© Oxford Aviation Services Limited

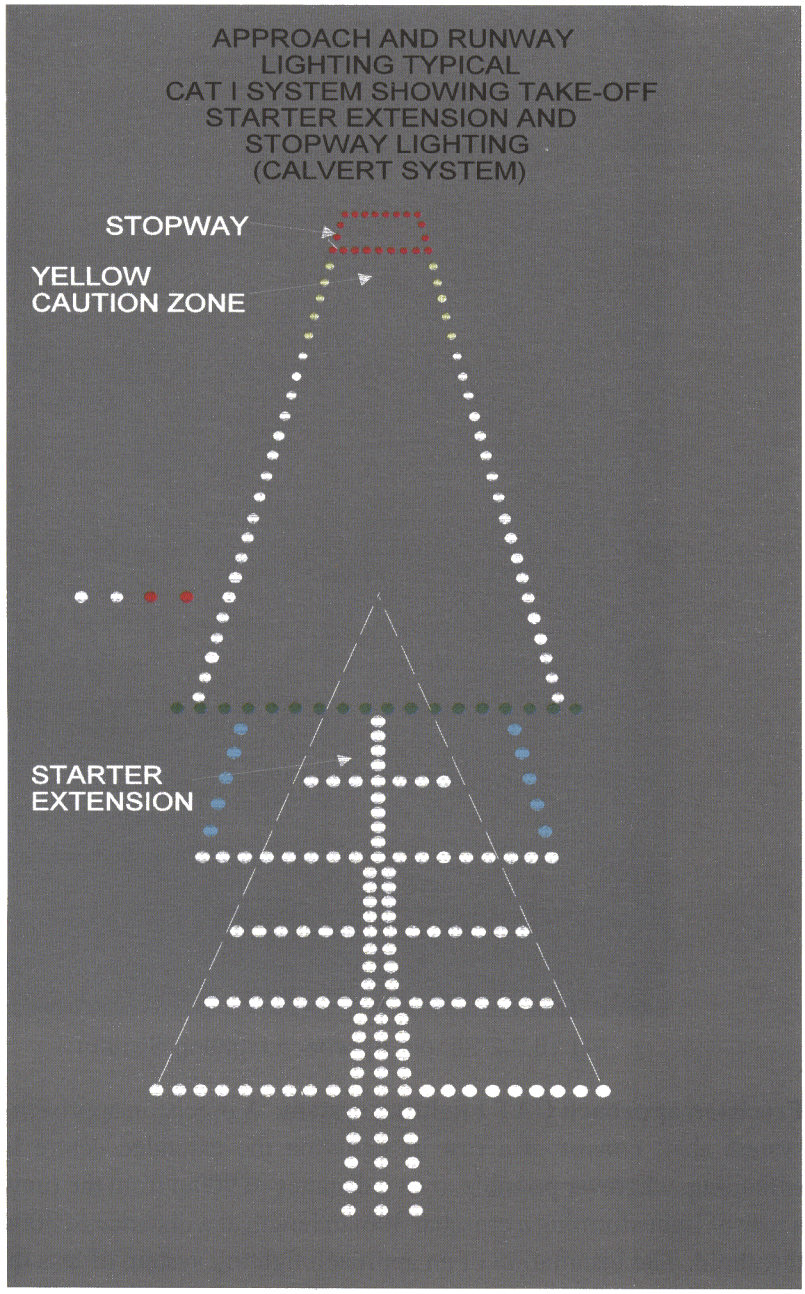


Fig 15.2.3a Cat I Precision Approach Lighting System

15.2.3.1 Description. The system shall lie as nearly as practicable in the horizontal plane passing through the threshold, provided that no object other than an ILS or MLS azimuth antenna shall protrude through the plane of the approach lights within a distance of 60m from the centre line of the system; and 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. **Note:** Any ILS or MLS azimuth antenna protruding through the plane of the lights shall be treated as an obstacle and marked and lighted accordingly.

© Oxford Aviation Services Limited

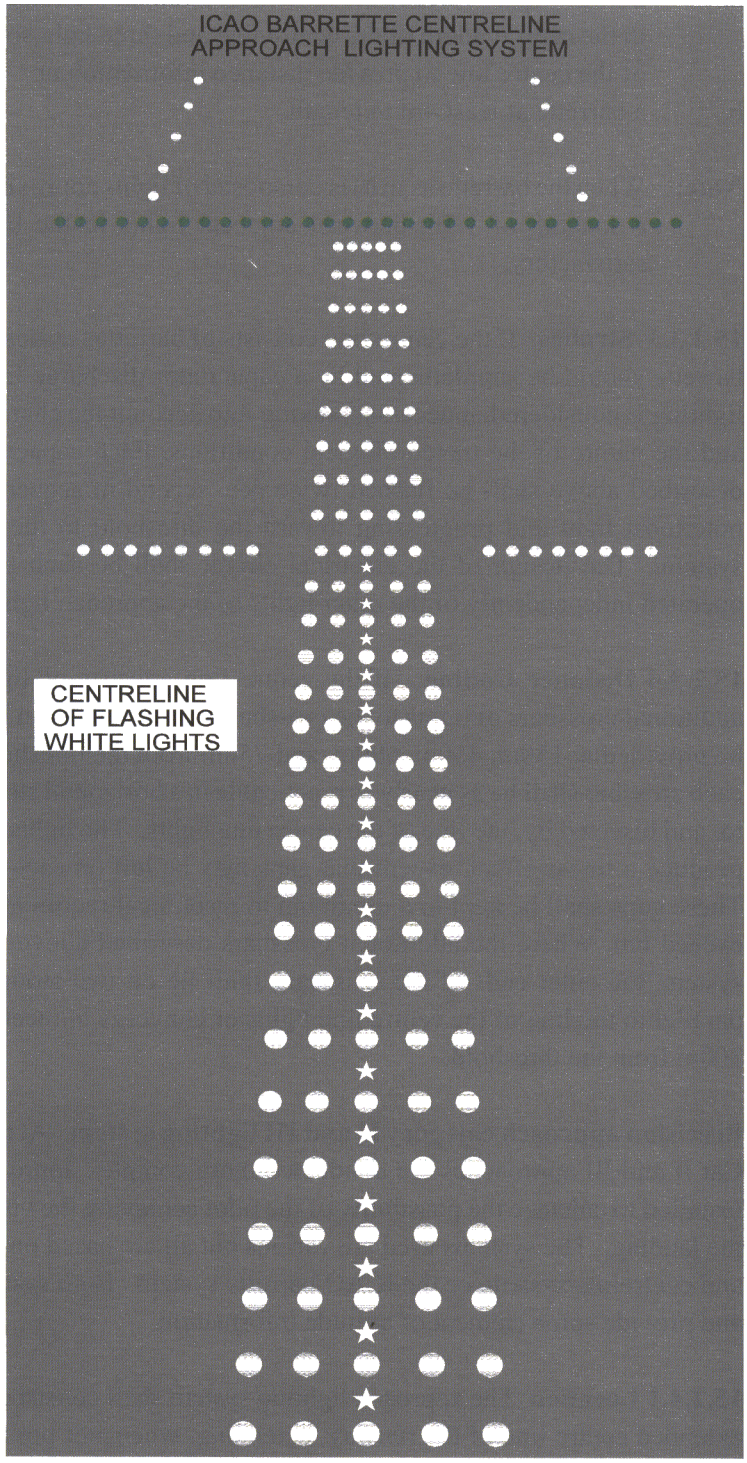


Fig 15.2.3b ICAO Barrette Centreline Approach Lighting System

15.2.3.2 Characteristics. The centre line of the crossbar lights of a precision approach category I lighting system shall be fixed lights showing variable intensity white. Each centre line light shall consist of either:

© Oxford Aviation Services Limited

a. a single light source in the innermost 300m of the centre line, two light sources in the central 300m of the centre line and three light sources in the outer 300m of the centre line to provide distance information or

b. a barrette at least 4m in length.

Note: When the barrette as in b) is composed of lights approximating to point sources, a spacing of 1.5m between adjacent lights in the barrette has been found satisfactory.

15.2.3.3 Strobes. If the centre line consists of barrettes as described in b) above each barrette should be supplemented by a capacitator discharge light, except where such lighting is considered unnecessary taking into account the characteristics of the system and the nature of the meteorological conditions. Each capacitator discharge light as described above shall be flashed twice per second in sequence, beginning with the outermost light and progressing toward the threshold to the innermost light of the system. The design of the electrical circuit shall be such that these lights can be operated independently of the other lights of the approach lighting system.

15.2.3.4 Distance Coding. If the centre line consists of lights as described in a) additional crossbars of lights to the crossbar provided at 300m from the threshold shall be provided at 150m, 450m, 600m, and 750m from the threshold. The lights forming each 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 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 6m. Where the additional crossbars described above are incorporated in the system, the outer ends of the crossbars shall lie on two straight lines that either are parallel to the line of the centre line lights or converge to meet the runway centre line 300m from the threshold.

15.2.4 Precision approach category II and III lighting system. At those aerodromes where Cat II and III approaches are conducted more complex approach lighting system are installed to enhance the possibility of the pilot achieving the visual criteria to complete the landing. The systems used are various but all are based on either the Calvert 5 bar and centreline system, or the ICAO barrette system. Both systems are distance coded and provide some element of attitude information.

15.2.4.1 Location The 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 900m from the runway threshold. In addition, the system shall have two side rows of lights, extending 270m from the threshold, and two crossbars, one at 150m and one at 300m from the threshold, all as shown in Figure. **Note:** The length of 900m is based on providing guidance for operations under category I, II and III conditions. Reduced lengths may support category II and III operations but may impose limitations on category I operations.

© Oxford Aviation Services Limited

15.2.4.2 Description. The lights forming the centre line shall be placed at longitudinal intervals of 30m with the innermost lights located 30m 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 30m from the threshold. The lateral spacing (or gauge) between the innermost lights of the side row shall be not less than 18m nor more than 22.5m, and preferably 18m, but in any event shall be equal to that of the touchdown zone lights. The crossbar provided at 150m from the threshold shall fill in the gaps between the centre line and side row lights. The crossbar provided at 300m from the threshold shall extend on both sides of the centre line lights to a distance of 15m from the centre line lights. If the centre line beyond a distance of 300m from the threshold consists of lights as described below, additional crossbars of lights shall be provided at 450m, 600m and 750m from the threshold. Where the additional crossbars described above are incorporated in the system, the outer ends of these crossbars shall lie on two straight lines that either are parallel to the centre line 300m from the threshold. The system shall lie as nearly as practicable in the horizontal plane passing through the threshold, provided that:

a. no other object other than an ILS or MLS azimuth antenna shall protrude through the plane of the approach lights within a distance of 60m 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.

Note: Any ILS or MLS azimuth antenna protruding through the plane of the lights shall be treated as an obstacle and marked and lighted accordingly.

15.2.4.3 Characteristics. The centre line of a precision approach category II and III lighting system for the first 300m from the threshold shall consist of barrettes showing variable white, except that, where the threshold is displaced 300m or more, the centre line may consist of single light sources showing variable white. The barrettes shall be at least 4m in length. When barrettes are composed of lights approximately to point sources, the lights shall be uniformly spaced at intervals of not more than 1.5m. Beyond 300m from the threshold each centre line light shall consist of either a barrette as used on the inner 300m; or two light sources in the central 300m of the centre line and three light sources in the outer 300m of the centre line, all of which show variable intensity white.

15.2.4.4 Strobes. If the centre line beyond 300m from the threshold consists of barrettes as described in a) above, each barrette beyond 300m should be supplemented by a capacitor discharge light, except where such lighting is considered unnecessary taking into account the characteristics of the system and the nature of the meteorological conditions. Each capacitor discharge light shall be flashed twice a second in sequence, beginning with the outermost light and progressing toward the threshold to the innermost light of the system. The design of the electrical circuit shall be such that these lights can be operated independently of the other lights of the approach lighting system.

© Oxford Aviation Services Limited

15.2.4.5 Colour of Lights. 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. The lights forming the crossbars shall be fixed lights showing variable white. The lights shall be uniformly spaced at intervals of not more than 2.7m. The intensity of the red lights shall be compatible with the intensity of the white lights.

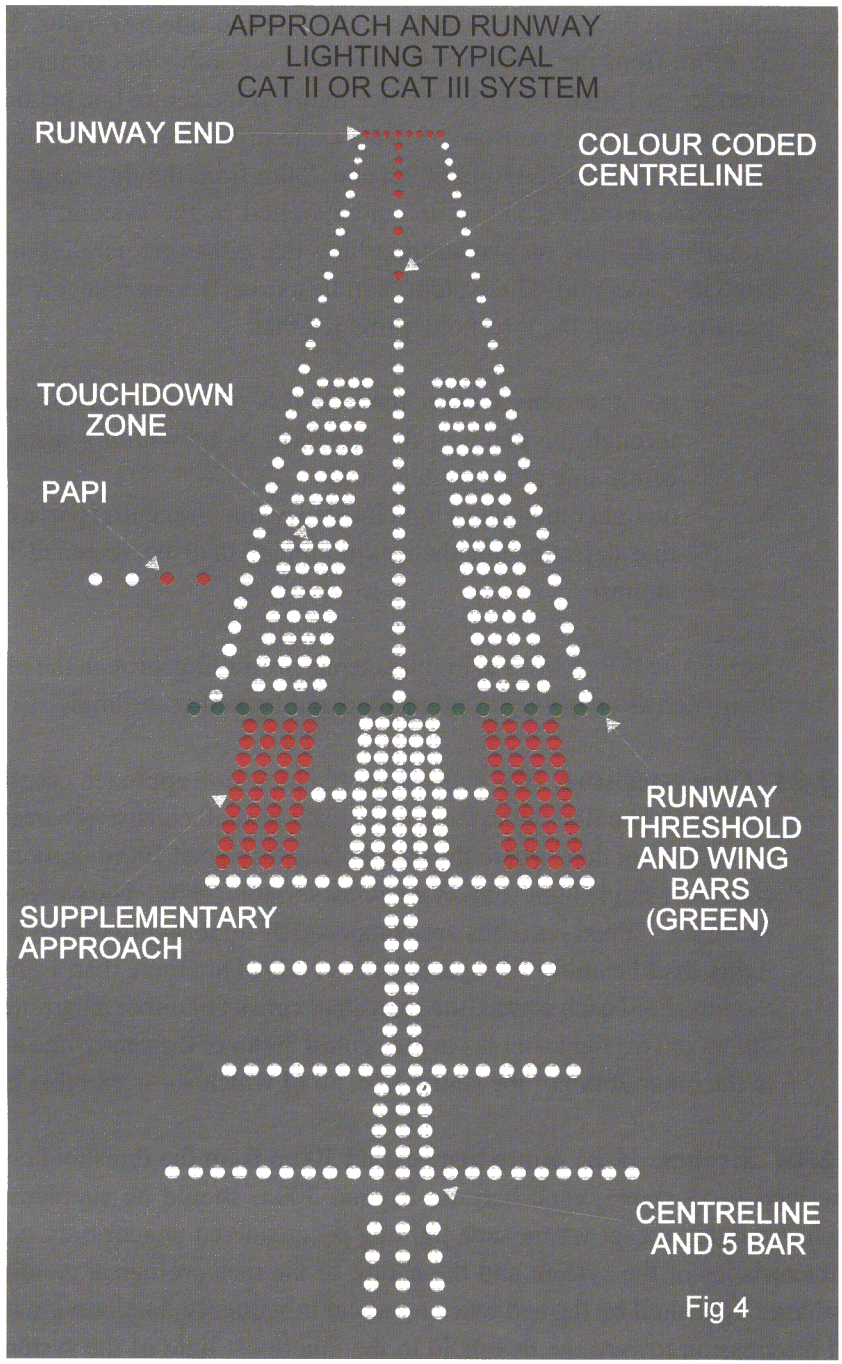


Fig 15.2.4a Cat II/III Calvert Precision Approach Lighting System

© Oxford Aviation Services Limited

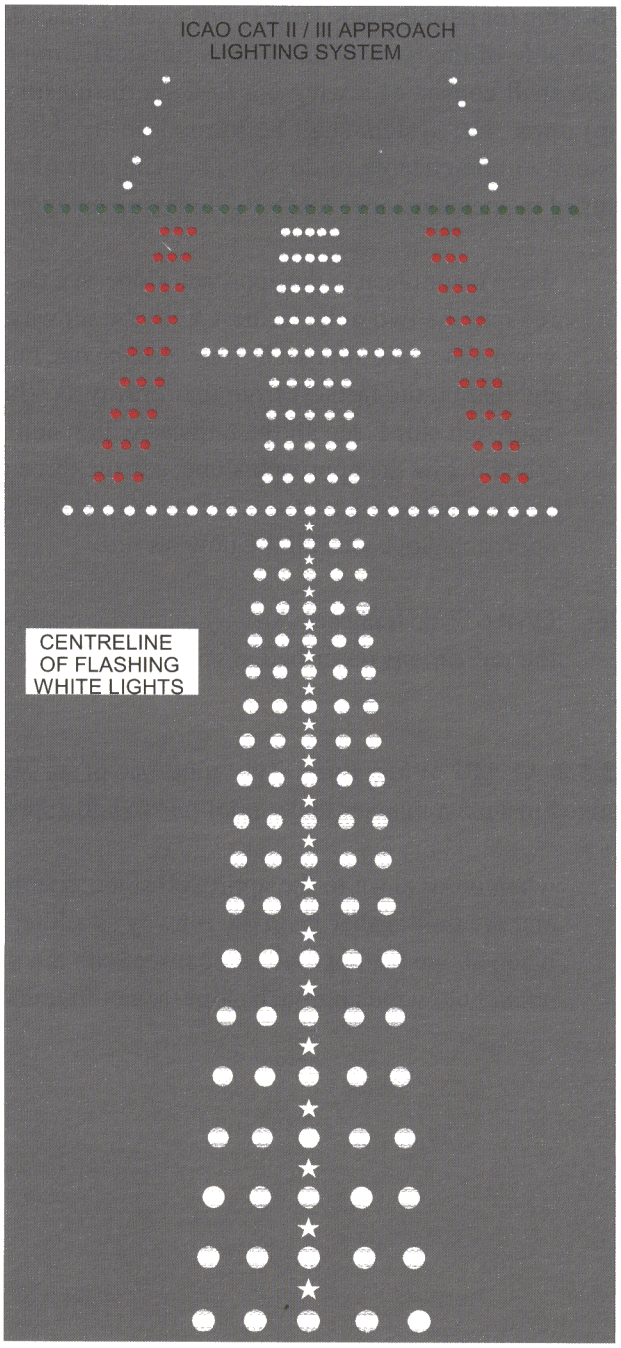


Fig 15.2.4b ICAO Cat II/III Precision Approach Lighting System

15.2.5 Precision Approach Path Indicator (PAPI) and Abbreviated Approach Path Indicator (APAPI). PAPIs are used to provide additional guidance for precision approaches. The give a visual indication of aircraft vertical position with respect to the glide path and (if fitted on both sides of the runway) roll attitude. APAPIs are similar to PAPIs but use two lights instead of four.

© Oxford Aviation Services Limited

15.2.5.1 Description. The PAPI system shall consist of a wing bar of 4 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. The APAPI system shall consist of a wing bar of 2 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. The wing bar of a PAPI shall be constructed and arranged in such a manner that a pilot making an approach will:

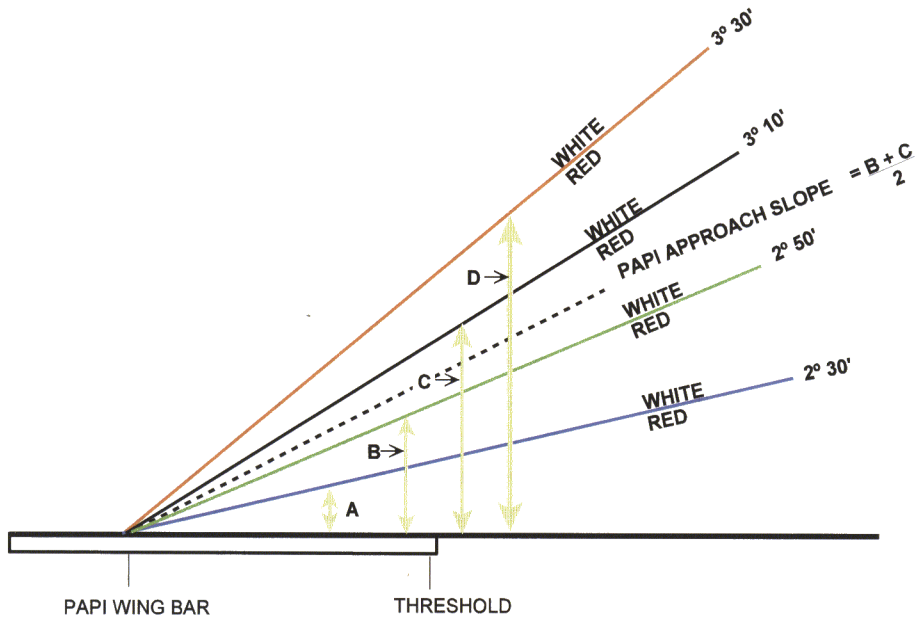
a. when on or close to the approach slope, see the two units nearest the runway as red and the two units farthest from the runway as white;
b. when above the approach slope, see the one unit nearest the runway as red and the three units farthest from the runway as white; and when further above the approach 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.

Note: CAP 637 or Jeppesen Airway manual contain diagrammatic representation of the indications described at 15.2.5.1 a-c.

15.2.5.2 APAPI Wing Bars. 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 units as red.

© Oxford Aviation Services Limited



The height of the pilot's eye above the aircrafts ILS glide path/MLS antenna varies with the type of aeroplane and approach altitude. Harmonization of the PAPI signal and ILS glide path and/or MLS minimum glide path to a point closer to the threshold may be achieved by increasing the on-course sector from 20' to 30'. The setting angles of 3° glide slope would then be 2°25' , 2°45' , 3°15' and 3°35'.

Figure 15.2.5a. 3° PAPI Illustrated

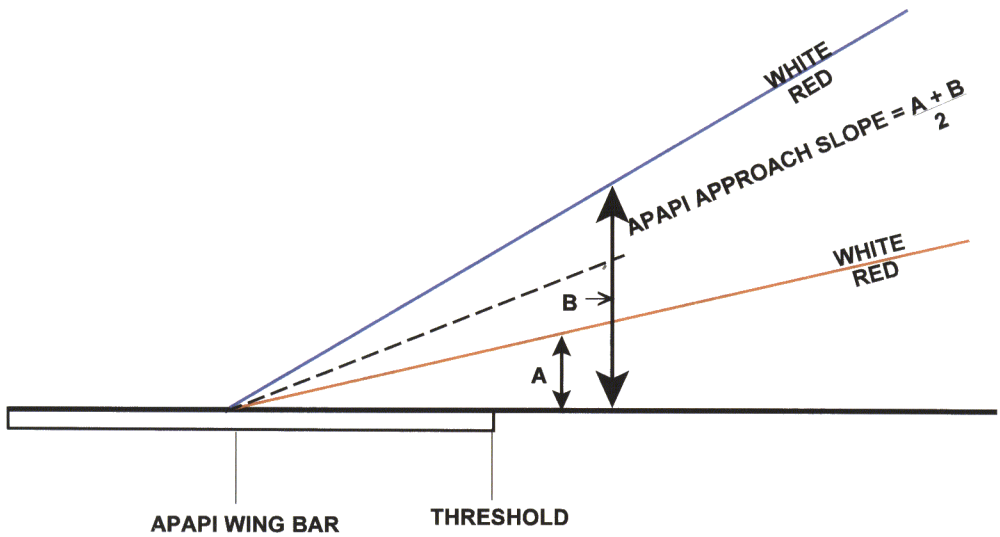


Figure 15.2.5b. 3° APAPI Illustrated.

© Oxford Aviation Services Limited

15.2.5.3 Minimum Eye Height (MEHT). If the PAPI system was located exactly at the threshold of the runway, and the pilot flew a visual approach keeping the aircraft exactly at the 'on glide path' position, the wheels of the aircraft would hit the ground before the aircraft reached the threshold. The distance before the threshold where the wheels hit the ground being a function of the distance from the pilots eye to the bottom of the undercarriage. To overcome this, the visual aiming point is set a distance down the runway, usually so that the aeroplanes normally using the aerodrome are catered for. On code 4 instrument runways at least 2 400 m in length, the aiming point is set 400 m from the threshold in which case, for a normal 3 °glide path, the pilots eye would be 65 ft above the surface on crossing the threshold. This assumes that the 'on glide path' indication is a point source, when in fact it is encompassed in a bandwidth of angles where the 'on glide path' indication is visible. If the height of the pilots eye can be established when the aircraft is over the threshold with the lowest possible 'on glide path' indication, this could be used to determine if an aircraft can use the PAPI system as set up for that runway. The figure quoted on the ICAO aerodrome chart is the MEHT (minimum eye height) printed alongside the location of the PAPI on the chart. During type rating instruction, you will be made aware of the 'eye to undercarriage' requirement of the type, so that you can assess the useablitiy of the PAPIs. The MEHT for the PAPIs on runway 02 at Oxford is 17' with a glide path angle of 3.5° and displaced threshold.

15.3 RUNWAY LIGHTING

15.3.6 Runway edge lights. 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. Runway edge lights should be provided on a runway intended for take-off with an operating minimum below an RVR of the order of 800m by day.

15.3.6.1.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 3m.Where the width of the area which could be declared as runway exceeds 60m, 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 60m for an instrument runway, and at intervals of not more than 100m 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.

© Oxford Aviation Services Limited

15.3.6.2 Characteristics Runway edge lights shall be fixed lights showing variable intensity white, except that 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 a section of the lights 600m or one third of the runway length, whichever is the less, at the remote end of the runway from the end at which the take-off run is started, may show yellow (the caution zone). The runway edge lights shall show at all angles in azimuth necessary to provide guidance to a pilot landing or taking off in either direction. When the runway edge lights are intended to provide circling guidance, they shall show at all angles in azimuth. In all angles of azimuth required above runway edge lights shall show at angles up to 15° above the horizontal with an intensity adequate for the conditions of visibility and ambient light in which use of the runway for take-off or landing is intended. In any case, the intensity shall be at least 50cd except that at an aerodrome without extraneous lighting the intensity of the lights may be reduced to not less than 25cd to avoid dazzling the pilot.

15.3.7 Runway threshold and wing bar 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.

15.3.7.1Location 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 3m 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 runway or non-precision approach runway, at least six lights;
b. on a precision approach runway category I, at least the number of lights that would be required if the lights were uniformly spaced at intervals of 3m between the rows of runway edge lights; and
c. on a precision approach runway category II and III, lights uniformly spaced between the rows of runway edge lights at intervals of not more than 3m.

The lights prescribed in a) and b) above should be either:

d. equally spaced between the rows of runway edge lights or
e. symmetrically disposed about the runway centre line in two groups, with the lights uniformly spaced in each group 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.

© Oxford Aviation Services Limited

15.3.7.2 Application of wing bar lights. 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.

15.3.7.3 Location of wing bar lights. Wing bar lights shall be symmetrically disposed about the runway centre line at the threshold in two groups ie wing bars. Each wing bar shall be formed by at least five lights extending at least 10m 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.

15.3.7.4 Characteristics of runway threshold and wing bar lights. Runway threshold 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.

15.3.8 Runway end lights. 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. Runway end lights shall be fixed unidirectional lights showing red in the direction of the runway. The intensity and beam of the lights shall be adequate for the conditions of visibility and ambient light in which use of the runway is intended.

15.3.8.1 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 3m outside the end. Runway end lighting should consist of at least six lights. The lights should be either equally spaced between the rows of runway edge lights, or 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 6m.

15.3.9 Runway centre line lights. Runway centre line lights shall be provided on a precision approach runway category II or III and 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 50m. Runway centre line lights shall be provided on a runway intended to be used for take-off with an operating minimum below an RVR of the order of 400m. 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 60cm where it is not practicable to locate them along the centre line. The lights shall be located from the threshold to the end at a longitudinal spacing of approximately:

a. 7.5m or 15m on a precision approach runway category III; and

© Oxford Aviation Services Limited

b. 7.5m, 15m or 30m on a precision approach runway category II or other runway on which the lights are provided.

15.3.9.1 Displaced Threshold. Centre line guidance for take-off 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 take-off and it does not dazzle the pilot of an aircraft taking off; or
b. runway centre line lights; or
c. barrettes of at least 3m length and spaced at uniform intervals of 30m, designed so that their photomeric characteristics and intensity setting afford the guidance required during take-off without dazzling the pilot of an aircraft taking off.

15.3.9.2 Landing. Where necessary, provision should be made to extinguish those centre line lights specified in b) 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 where the runway is being used for landing.

15.3.9.3 Characteristics. Runway centre line lights shall be fixed lights showing variable white from the threshold to the point 900m from the runway end; alternate red and variable white from 900m to 300m from the runway end; and red from 300m to the runway end, except that:

a. where the runway centre line lights are spaced at 7.5m intervals, alternate pairs of red and variable white lights shall be used on the section from 900m to 300m from the runway end; and
b. for runways less than 1,800m in length, the alternate red and variable white lights shall extend from the mid-point of the runway usable for landing to 300m from the runway end.

15.3.10 Runway touchdown zone lights. Touchdown zone lights shall be provided in the touchdown zone of a precision approach runway category II or III. Touchdown zone lights shall extend from the threshold for a longitudinal distance of 900m, except that, on runways less than 1,800m 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 30m or 60m. A barrette shall be composed of at least three lights with a spacing between the lights of not more than 1.5m. A barrette should be not less than 3m nor more than 4.5m in length. Touchdown zone lights shall be fixed unidirectional lights showing variable white.

© Oxford Aviation Services Limited

Note: To allow for operations at lower visibility minima, it may be advisable to use a 30m longitudinal spacing between barrettes.

15.3.12 Stopway lights. Stopway lights shall be provided for a stopway intended for use at night. 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 3m, outside the end. Stopway lights shall be fixed unidirectional lights showing red in the direction of the runway.

15.3.12 Circling Guidance Lights. If existing approach and runway lights are insufficient to provide circling guidance during the visual phase of an approach to land, then circling guidance lights are provided. The lights are to be sufficient to allow the pilot to join downwind or adjust and align the aircraft's track whilst keeping the runway threshold in sight. The lights consist of a portion of the approach lights or dedicated lights that indicate the extended centre line of the landing runway; lights indicating the position of the threshold, or lights indicating the direction or location of the runway. They should be fixed or flashing, and if flashing must be white.

15.3.13 Runway Lead In Lights. If it is felt necessary to provide visual guidance along a specific approach path, runway lead in lights are provided which start from a determined point and lead the pilot to a position where the approach lights or the runway lights are visible. These consist of groups of at least three flashing white lights (which may be augmented by steady white lights) which define the approach path. The flashing lights 'run' towards the runway. (These are commonly known as running rabbits!) It is imperative that the succeeding group of lights is visible from the lights being overflown. The groups should not normally be more than 1 600 m apart. The system may be either curved or in a straight line.

15.4 TAXIWAY LIGHTING

15.4.1 Application. Taxiway lighting provides pilots with guidance and information during the taxi to and from the runway. It consists of centreline lights, edge lights, guard lights, and stop lights at holding points. A representation of the taxiway lighting systems is shown at figure 15.4.

15.4.1.1 Taxiway Edge Lighting. Taxiway edge lighting is provided along the edges of holding bays, de/anti-icing facilities, aprons etc. It is intended for use at night and on taxiways not provided with taxiway centre line lighting where the taxiway is intended for use at night. If, however, sufficient alternative illumination is available (ie stadium lighting) then the edge lights may be dispensed with. Where a runway forms part of a standard taxi route intended for use at night and no taxiway centre line lighting exists, edge lights are to be provided. The lights are to be of fixed variable intensity showing blue, showing all round and up to 30° above the horizontal, such that guidance is provided to a pilot taxiing in either direction. At intersections, curves or exits, the lights may be shielded to prevent confusion.

© Oxford Aviation Services Limited

15.4.2 Taxiway centre line lights. Taxiway centre line lights shall be provided on an exit taxiway, taxiway and apron intended for use in runway visual range conditions less than a value of 350m, in such a manner as to provide continuous guidance from the runway centre line to the point on the apron where aircraft commence manoeuvring for parking, except that these lights need not be provided where there is a low volume of traffic and taxiway edge lights and centre line marking provide adequate guidance. Also taxiway centre line lights should be provided on a taxiway intended for use at night in runway visual range conditions of 350m or greater, and particularly on complex taxiway intersections and exit taxiways. Taxiway centre line lights shall be provided on a runway forming part of a standard taxiway route and intended for taxiing in runway visual range conditions less than a value of 350m, except that these lights need not be provided where there is a low volume of traffic 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 eg on a rapid exit taxiway, narrow taxiway or in snow conditions, this may be done with taxiway edge lights or markers.

15.4.2.1 Characteristics Taxiway centre line lights on a taxiway other than an exit taxiway and on a runway forming part of a standard taxi-route shall be fixed light showing green with beam dimensions such that the light is visible only from the 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 the 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. The light nearest to the centre 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. Taxiway centre line lights should normally be located on the taxiway centre line marking, except that they may be offset by not more than 30cm where it is not practicable to locate them on the marking.

15.4.3 Stop bars. One or more stop bars, as appropriate, should be provided at a taxiway intersection or taxi-holding position when it is desired to supplement markings with lights and to provide traffic control by visual means. The provision of stop bars requires their control by air traffic services. A stop bar shall be provided at every taxi-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 350m, except where:

a. appropriate aids or procedures are available to assist in preventing inadvertent incursions of aircraft and vehicles onto the runway; or

b. operational procedures exist to limit, in runway visual range conditions less than a value of 550m, the number of:

© Oxford Aviation Services Limited

i. aircraft on the manoeuvring area to one at a time; and

ii. vehicles on the manoeuvring area to the essential minimum.

15.4.3.1 Location Where the normal stop bar lights might be obscured (from a pilot's view), for example, by snow or rain, or where a pilot may be required to stop the aircraft in a position close to the lights that they are blocked from view by the structure of the aircraft, the a pair of elevated lights should be added to each end of the stop bar. Stop bars shall be located across the taxiway at the point where it is desired that traffic stop. Where the additional lights specified above are provided, these lights shall be located not less than 3m from the taxiway edge. Stop bars shall consist of lights spaced at intervals of 3m across the taxiway, showing red in the intended direction(s) of approach to the intersection of taxi-holding position. Stop bars installed at a taxi-holding position shall be unidirectional and shall show red in the direction of approach to the runway. Where the additional lights above are provided, these lights shall have the same characteristics as the lights in the stop bar, but shall be visible to approaching aircraft up to the stop bar position. Selectively switchable stop bars shall be installed in conjunction with at least three taxiway centre line lights (extending for a distance of at least 90m from the stop bar) in the direction that it is intended for an aircraft to proceed from the stop bar.

15.4.4 Taxiway intersection lights. Taxiway intersection lights should be provided at an intersection where it is desirable to define a specific aeroplane holding limit and there is no need for stop and go signals provided by a stop bar. Taxiway intersection lights shall be located at a point between 30m to 60m from the near edge of the intersecting taxiway. Taxiway intersection lights shall consist of at least three fixed unidirectional lights showing yellow in the direction of approach to the intersection with a light distribution similar to taxiway centre line lights if provided. The lights shall be disposed symmetrically about, and at 90° to, the taxiway centre line, with individual lights spaced 1.5m apart.

15.4.5 Runway guard lights. There are two configurations of runway guard lights. Configuration A and Configuration B. See figure 15.4.5.

15.4.5.1Configuration A. A 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 550m where a stop bar is not installed; and

b. runway visual range conditions of values between 550m and 1,200m where the traffic density is high.

© Oxford Aviation Services Limited

15.4.5.2 Other Combinations. Runway guard lights, Configuration A or Configuration B or both, should be provided at each taxiway/runway intersection where enhanced conspicuity of the taxiway/runway intersection is needed, such as on a wide throat taxiway, except that Configuration B should not be collated with a stop bar. For Configuration B, adjacent lights shall be alternately illuminated and alternative lights shall be illuminated in unison. The lights shall be illuminated between 30 and 60 cycles per minute and the light suppression and illumination periods shall be equal and opposite in each light.

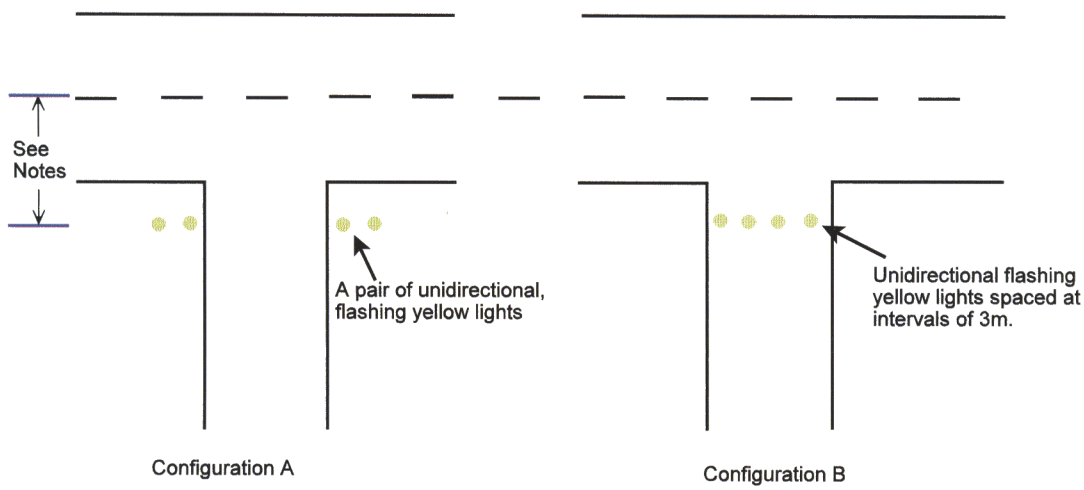


Fig. 15.4.5 Runway guard lights.

15.4.6 Road holding position light. A road-holding position light shall be provided at each road-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 350m. The road holding position light shall be located adjacent to the holding position marking 1.5m (±0.5m) from one edge of the road ie left or right as appropriate to the local traffic regulations. The road holding position light shall comprise:

a. a controllable red (stop)/green (go) traffic light; or
b. a flashing-red light.

Note: It is intended that the lights specified in sub paragraph a) be controlled by the air traffic services.

15.4.6.1 Specification. The road-holding position light beam shall be unidirectional and aligned so as to be visible to the driver of a vehicle approaching the holding position. The intensity of the light beam shall be adequate for the conditions of visibility and ambient light in which the use of the holding position is intended, but shall not dazzle the driver. The flash frequency of the flashing red-light shall be between 30 and 60 per minute.

© Oxford Aviation Services Limited

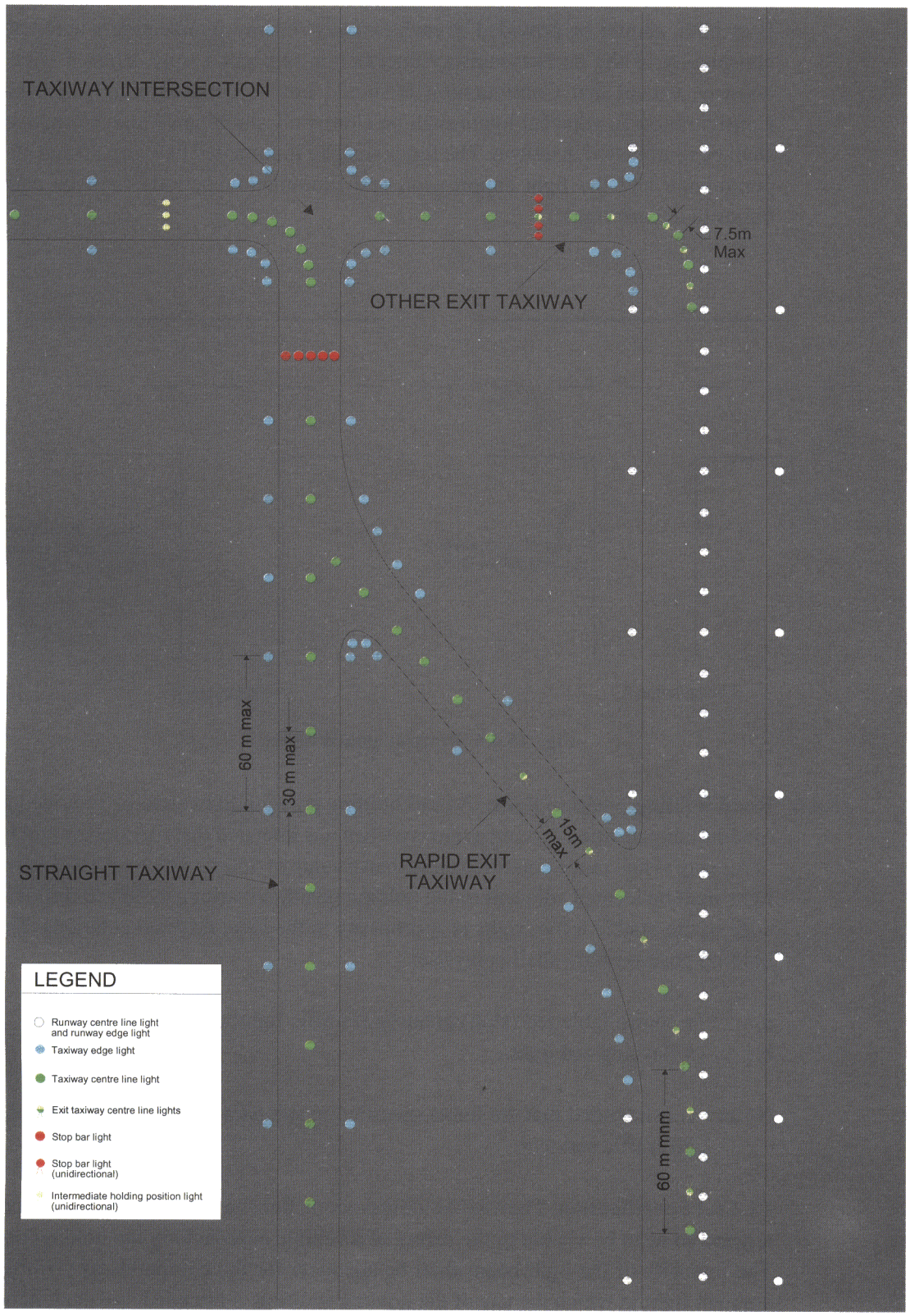


Figure 15.4 Taxiway Lighting

© Oxford Aviation Services Limited

15.5 SIGNS

15.5.1 General Specification. Signs are provided on aerodromes to convey a mandatory instruction, information on a specific location or destination on a movement area, or to provide other information as required.

15.5.1.1 Characteristics. 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 shown in the appropriate column. Signs shall be rectangular, with the longer side horizontal. The only signs on the movement area utilizing red shall be mandatory instruction signs. Signs shall be retroflective and/or illuminated when intended for use at night in association with non-instrument runways where the code number is 1 or 2. Signs shall be illuminated when intended for use:

a. in runway visual range conditions less than a value of 800m; or

b. at night in association with instrument runways; or

c. at night in association with non-instrument runways where the code number is 3 or 4.

15.5.2 Mandatory instruction signs. A mandatory instruction sign shall be provided to identify the location beyond which an aircraft taxiing or vehicle shall not proceed unless authorised by the aerodrome control tower. Mandatory instruction signs shall include runway designation signs, category I, II and III holding position signs, taxi-holding position signs, road-holding position signs and **NO ENTRY** signs. A pattern "A" taxi-holding position marking shall be supplemented at a taxiway/runway intersection or a runway/taxiway intersection with a runway designation sign. A pattern "B" taxi-holding position marking shall be supplemented with a category I, II or III holding position sign. A runway designation sign at a taxiway/runway intersection should be supplemented with a location sign in the outboard (farthest from the taxiway) position as appropriate. A **NO ENTRY** sign shall be provided when entry into an area is prohibited.

15.5.2.1Locations of signs. Signs are to be located in positions such that those to whom the instruction or information is applicable, are able to see the sign. Signs are not to be positioned so as to create hazards to aircraft. Signs are positioned as follows:

a. A runway designation sign at a taxiway/runway intersection shall be located at least on the left side of a taxiway facing the direction of approach to the runway. Where practicable a runway designation sign shall be located on each side of the taxiway.

© Oxford Aviation Services Limited

b. A **NO ENTRY** sign shall be located at the beginning of the area to which the entrance is prohibited at least on the left hand side of the taxiway as viewed by the pilot. Where practicable, a **NO ENTRY** sign shall be located on each side of the taxiway.

c. A category I, II or III holding position sign shall be located on each side of the holding position marking facing the direction of the approach to the critical area.

d. A taxi-holding position sign shall be located at least on the left-side of the taxi-holding position facing the approach to the obstacle limitation surface or ILS/MLS critical/sensitive area, as appropriate. Where practicable, a holding position sign shall be located on each side of the taxi-holding position.

Sign height (mm)				Perpendicular distance from defined taxiway pavement edge to near side of sign	Perpendicular distance from defined runway pavement edge to near side of sign
Code Number	Legend	Face (min.)	Installed (max.)		
1 or 2	200	400	700	5-11m	3-10m
1 or 2	300	600	900	5-11m	3-10m
3 or 4	300	600	900	11-21m	8-15m
3 or 4	400	800	1100	11-21m	8-15m

Table: Location distances for taxiing guidance signs including runway exit signs.

15.5.2.1 Characteristics A mandatory instruction sign shall consist of an inscription in white on a red background. The inscription on a runway designation sign shall consist of the runway designations of the intersecting runway properly oriented with respect to the viewing position of the sign, except that a runway designation sign installed in the vicinity of the runway extremity may show the runway designation of the concerned runway extremity only. The inscription on a category I, II or III or joint II/III holding position sign shall consist of the runway designator followed by CAT I, CAT II, CAT III, or CAT II/III, as appropriate. The inscription on a taxi-holding position sign shall consist of the taxiway designation and number. Where appropriate, the following inscriptions/symbol shall be used:

© Oxford Aviation Services Limited

Inscription/Symbol	Use
25 CAT I	To indicate a category I taxi-holding position at the threshold of runway 25.
25 CAT II	To indicate a category II taxi-holding position at the threshold of runway 25.
25 CAT III	To indicate a category III taxi-holding position at the threshold of runway 25.
25 CAT II/III	To indicate a joint category II/III taxi-holding position at the threshold of runway 25.
NO ENTRY symbol	To indicate that entry to an area is prohibited.
Runway designation of a runway extremity	To indicate a taxi-holding position at a runway extremity
Runway designation of both extremities of a runway	To indicate a taxiway holding position located at other taxiway/runway intersections or runway/runway intersections.
B2	To indicate a taxiway holding position located at other taxiway/runway intersections or runway/runway or taxiway/taxiway intersections.

Table: Mandatory signs

15.5.3 **Information signs**. An information sign shall be provided where there is an operational need to identify by a sign, specific location, or routing (direction or destination) information. Information signs include: direction signs, location signs, destination signs, runway exit signs and runway vacated signs. Information signs, wherever practicable, are located on the left-hand side of the taxiway. At a taxiway intersection, information signs are located before the intersection and in line with the taxiway intersection marking. Where there is no taxiway intersection marking, the signs is installed at least 60m from the centre line of the intersecting taxiway where the code number is 3 or 4, and at least 40m where the code number is 1 or 2. A location sign installed beyond a taxiway intersection may be installed on either side of the taxiway. Runway exit signs are located on the same side of the runway as the exit is located (ie left or right). A runway vacated sign shall be located at least on one side of the taxiway to indicate when the aircraft is clear of the sensitive area. Where a runway vacated sign and a taxiway location sign are sited, the taxiway location sign is outboard of the runway vacated sign. A taxiway location sign installed in conjunction with a runway designation sign shall be positioned outboard of the runway designation sign. An information sign other than a location sign shall not be collocated with a mandatory instruction sign.

© Oxford Aviation Services Limited

15.5.3.1 Characteristics The colour and symbology of information signs is as follows:

a. Information signs (except location signs), consist of an inscription in black on a yellow background.

b. A location sign shall consists of an inscription in yellow on a black background and where it is a stand alone sign, has a yellow border.

c. The inscription on a runway exit sign consists of the designator of the exit taxiway and an arrow indicating the direction to follow.

d. The inscription on a runway vacated sign depicts the pattern A taxi-holding position marking.

e. The inscription on a destination sign is an alpha, alphanumerical or numerical message identifying the destination plus an arrow indicating the direction to proceed.

f. The inscription on a direction sign is an alpha or alphanumerical message identifying the taxiway(s) plus an arrow or arrows appropriately oriented.

g. The inscription on a location sign is the designation of the location taxiway, runway or other pavement the aircraft is on or is entering and shall not contain arrows.

Note: Where it is necessary to identify each of a series of taxi-holding positions on the same taxiway, the location sign should consist of the taxiway designation and number.

15.5.3.2 Combination Signs. Where a location sign and direction signs are used in combination:

a. all direction signs related to left turns are placed on the left side of the location sign and all direction signs related to right turns are placed on the right side of the location sign. Exception: Where the junction consists of one intersecting taxiway, the location sign may be placed on the left hand side;

b. the direction signs are placed such that the direction of the arrows departs increasingly from the vertical with increasing deviation of the corresponding taxiway;

c. an appropriate direction sign is placed next to the location sign where the direction of the location taxiway changes significantly beyond the intersection; and

© Oxford Aviation Services Limited

d. adjacent signs are delineated by a vertical black line.

15.5.3.3 Taxiway Designators. Taxiways are identified by a designator comprising a letter(s) or a combination of a letter(s) followed by a number. When designating taxiways, the use of the letters I, O or X and the use of words such as inner and outer should be avoided wherever possible to avoid confusion with the numerals 1, 0 and closed marking. The use of numbers alone on the manoeuvring area shall is reserved for the designation of runways.

15.5.3.4 Aircraft stand identification signs. An aircraft stand identification marking should be supplemented with a sign where feasible. The sign should be located so as to be clearly visible from the cockpit of an aircraft prior to entering the stand. The sign consists of an inscription in black on a yellow background.

15.5.4 Road-holding position sign. Road-holding position signs are provided at all road entrances to runways. The road-holding position sign is to be located 1.5m from the edge of the road (left or right as appropriate to the local traffic regulations) at the holding position. A road-holding position marking sign consists of an inscription in white on a red background. If the sign is intended for night use, it is to be retroflective or illuminated. The inscription on a road-holding position sign is to be in the national language, must conform with the local traffic regulations and include the following:

a. a requirement to stop; and where appropriate:

b. a requirement to obtain ATC clearance; and

c. location designator.

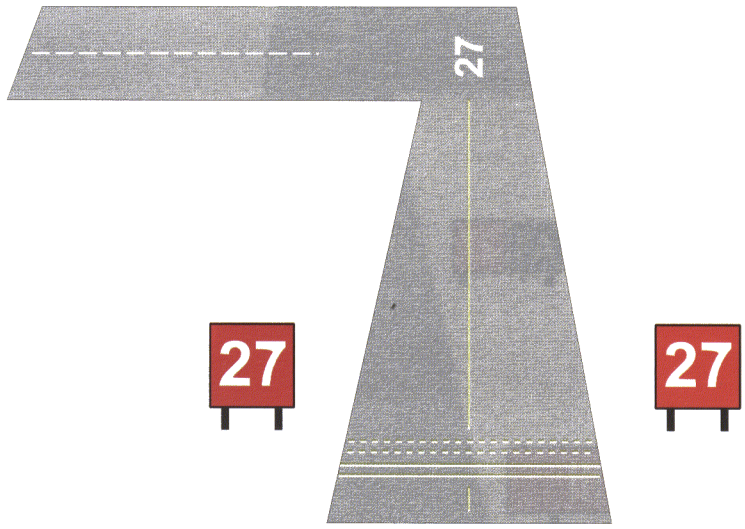


Figure 15.5.2a Visual Taxi Holding Position

© Oxford Aviation Services Limited

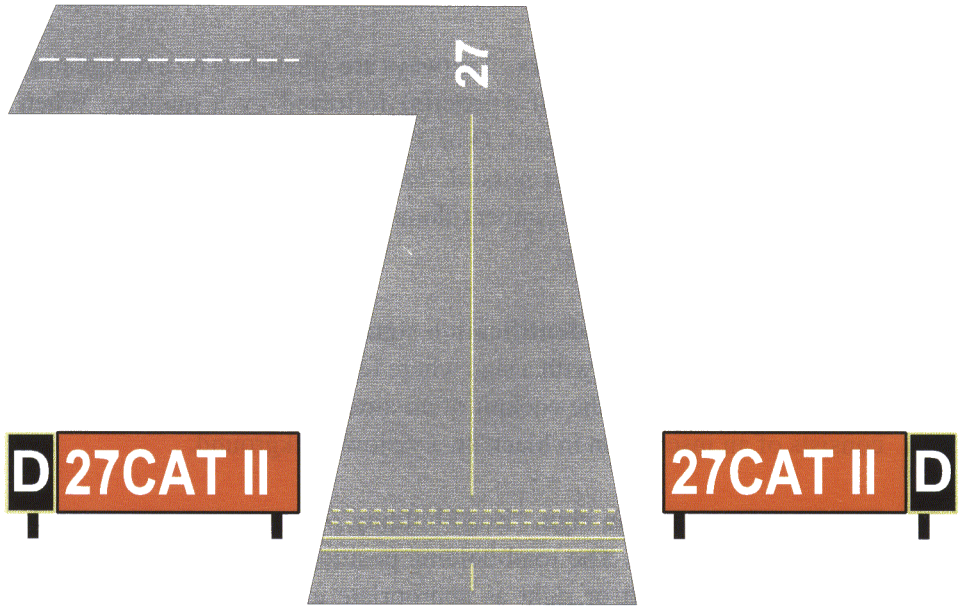


Fig 15.5.2b Instrument Taxi Holding Position

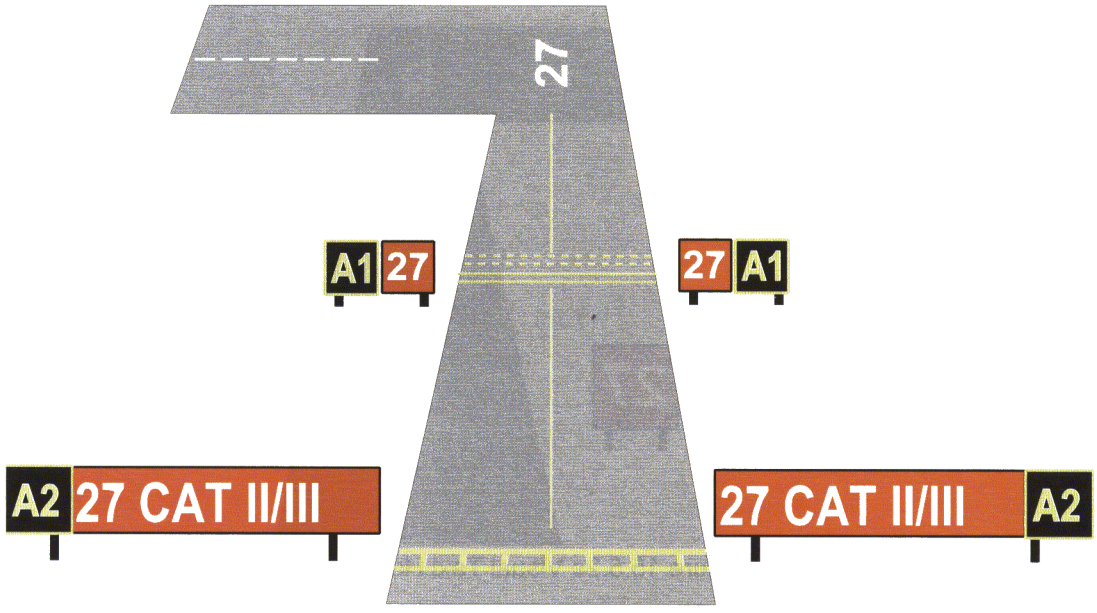


Fig 15.5.2c Multiple Taxi Holding Positions

© Oxford Aviation Services Limited

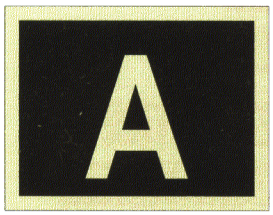
(a) **Visual Runway Taxi-Holding Position Sign** -denotes the Visual Taxi-Holding Position and also the ILS CAT I Holding Position where the Visual and CAT I holding position are co-located	(i)	
	(ii)	
(b) **CAT I Runway Taxi-Holding Position Sign** -denotes the ILS CAT I Taxy-Holding Position only where a Visual Taxi-Holding Position is established closer to the runway in order to expedite traffic flow.	(i)	
	(ii)	
(c) **CAT II Runway Taxi-Holding Position Sign** -marks the ILS CAT II Taxy-Holding Position - a Visual Taxi-Holding Position may be established closer to the runway when it is necessary to expedite traffic flow.	(i)	
	(ii)	
(d) **CAT III Runway Taxi-Holding Position Sign** -marks the ILS CAT III Taxy-Holding Position - a CAT II Taxi-Holding Position and a Visual Taxi-Holding Position may be established closer to the runway when it is necessary to expedite traffic flow.	(i)	
	(ii)	
(e) **Combined Runway Taxi-Holding Position Sign** - marks the Taxy-Holding Position where the ILS Taxi-Holding Positions are co-incident. A Visual Taxi-Holding Position Sign may be stablished closer to the runway where it is necessary to expedite traffic flow.	(i)	
	(ii)	
(f) **Intermediate Taxi-Holding Position Sign** - marks a Holding Position established to protect a priority route.		
(g) **No Entry Sign**		

Note 1 The signs at (i) should be used where the taxiway normally serves only one runway direction. The signs at (ii) should be used where the taxiway normally serves both runway directions.

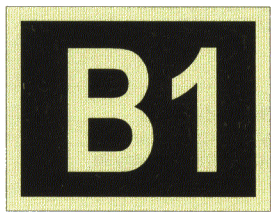
2 Where a runway Taxi-Holding Position serves more than one runway, the sign layout at Fig 7.18 shoiuld be used.

Fig 15.5.3d Mandatory Signs

© Oxford Aviation Services Limited



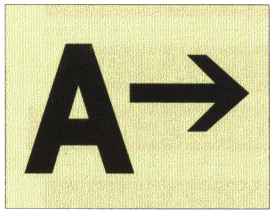
(i)



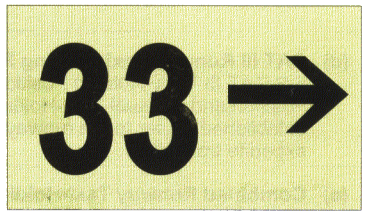
(ii)

(a) Taxiway Location Signs

(b) Runway Location Sign



(c) Direction Sign

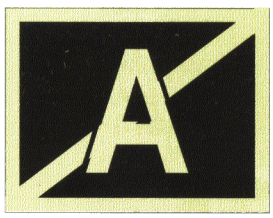


(d) Runway Destination Sign

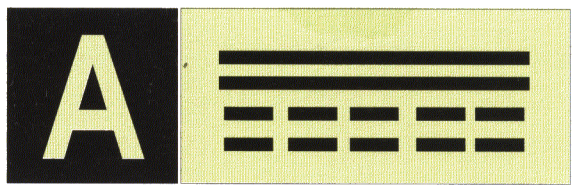
Note the use of a hyphen to separate repricrocal designators and the use of a dot to separate other designators

(e) Destination Sign to Different Runways

(f) Inbound Destination Sign



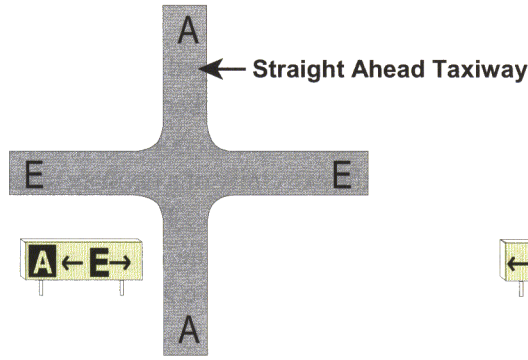
(g) Taxiway Ending Sign



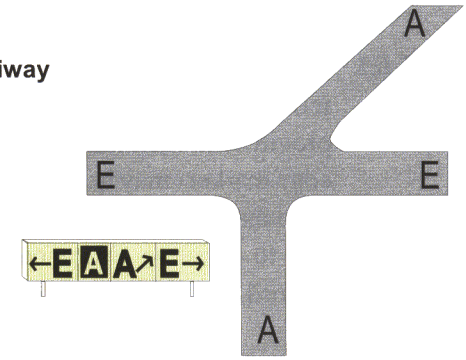
(h) Runway vacated sign (left side of taxiway)

Fig 15.5.3 Information Signs

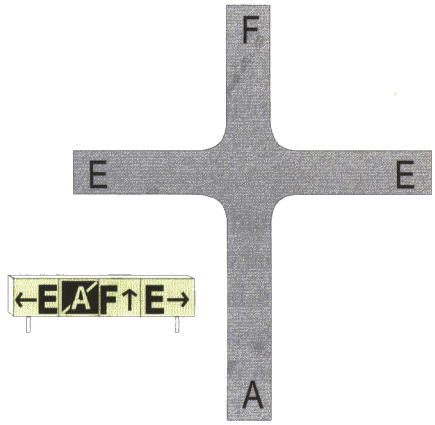
© Oxford Aviation Services Limited



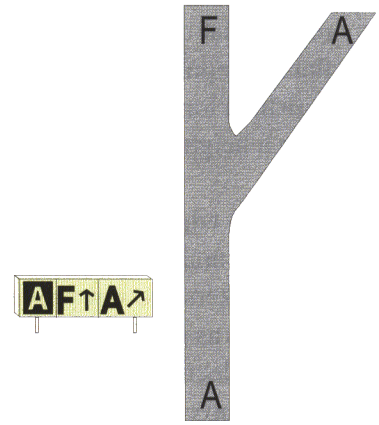
(a) Standard 4-Way Intersection



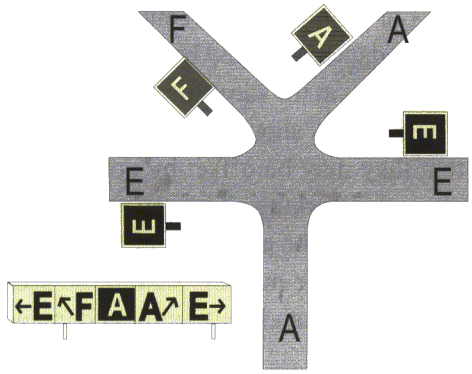
(b) Straight ahead Taxiway has direction change greater than 25°



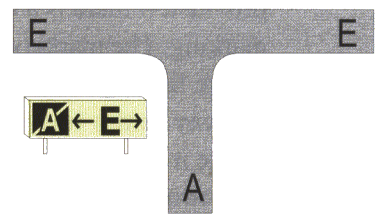
(c) Straight ahead Taxiway has changed designation.



(d) Y configuration with Taxiway 'A' changing direction.



(e) Location signs indicating exit from intersection.



(f) Taxiway ending sign.

Fig 15.5.3.2 Taxi Guidance Signs at Intersections

© Oxford Aviation Services Limited

5.6 MARKERS

15.6.1 Definition. A marker is an object which is displayed above ground level in order to indicate an obstacle or delineate a boundary. Markers are used where lights are not provided or where lighting (or ground markings) do not serve the purpose. Typically, edge markers may be used to indicate the extremity of a taxiway where snow has fallen, or to mark areas of bad ground on a grass aerodrome. Their height shall be sufficiently low to preserve clearance for propellers and for the engine pods of jet aircraft. At Oxford, the refuelling area is marked by retroflective green markers.

15.6.2 Unpaved runway edge markers. Markers should 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. Where runway lights are provided, the markers should be incorporated in the light fixtures. Where there are no lights, markers of flat rectangular or conical shape should be placed so as to delimit the runway clearly. The flat rectangular markers should have a minimum size of 1m by 3m and should be placed with their long dimension parallel to the runway centre line. The conical markers should have a height not exceeding 50cm.

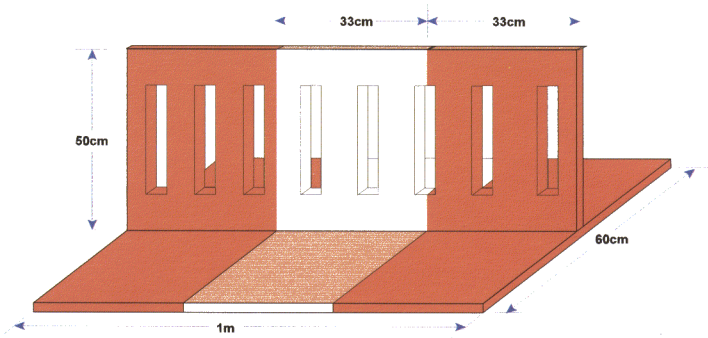
15.6.3 Taxiway edge markers. Taxiway edge markers should be provided on a taxiway where the code number is 1 or 2 and the taxiway centre line or edge lights or taxiway centre line markers are not provided. The markers should be installed at least at the same locations as would the taxiway edge lights had they been used. Markers are required to be retroflective blue. The marker, as viewed by the pilot, should be a rectangle and should have a minimum viewing area of $150cm^2$. Taxiway edge markers shall be frangible.

15.6.4 Taxiway centre line markers. Taxiway centre line markers should be provided on a taxiway where the code number is 1 or 2 and taxiway centre line or edge lights or taxiway edge markers are not provided. Taxiway centre line markers should be provided on a taxiway where the code number is 3 or 4 and taxiway centre line lights are not provided if there is a need to improve the guidance provided by the taxiway centre line marking. The markers should be installed at least at the same location as would taxiway centre line lights had they been used. The markers should normally be located on the taxiway centre line marking , except that they may be offset by not more than 30cm where it is not practicable to locate them on the marking. Taxiway centre line markers are retroflective green. The marker, as viewed by the pilot, should be rectangular and should have a minimum viewing area of $20cm^2$. The markers shall be so designed and fitted to withstand being run over by the wheels of an aircraft without damage either to the aircraft or to the markers themselves.

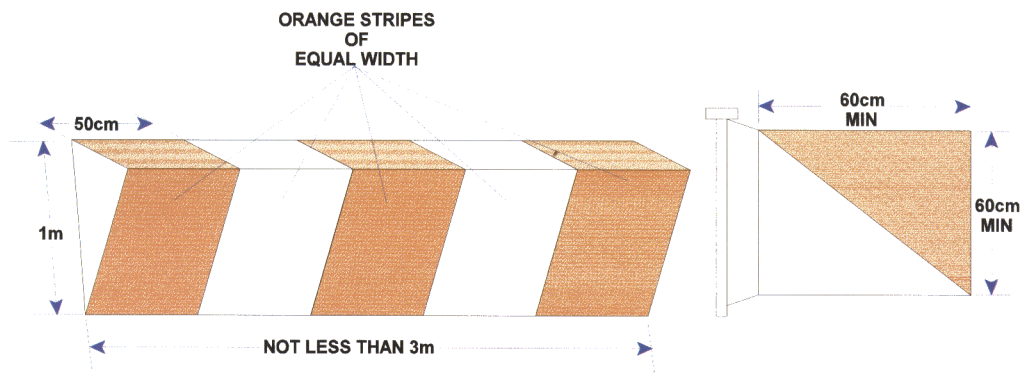
© Oxford Aviation Services Limited

15.6.5 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. Where taxiway lights are provided, the markers should be incorporated in the light fixtures. Where there are no lights, markers of conical shape should be placed so as to delimit the taxiway clearly.

15.6.6 Boundary markers. Boundary markers shall be provided at an aerodrome where the landing area has no runway. Boundary markers shall be spaced along the boundary of the landing area at intervals of not more than 200m, if the type shown below is used, or approximately 90m, if the conical type is used with a marker at any corner. Boundary markers should be of a form similar to that shown in Figure 10. below, or in the form of a cone not less than 50cm high and not less than 75cm in diameter at the base. The markers should 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, should be used, except where such colours merge with the background.



TYPE A



TYPE 'B' TYPE 'C'

© Oxford Aviation Services Limited

15.7 VISUAL DOCKING GUIDANCE SYSTEMS

15.7.1 Introduction. Visual Docking Guidance systems (sometimes referred to as Nose-in Docking Guidance systems or Stand Entry Guidance systems) provide guidance where pilot interpreted alignment and stopping information is required for accurate parking, particularly at air-bridges. ICAO states that aircraft stand manoeuvring guidance lights should be provided to facilitate the positioning of an aircraft on an aircraft stand on a paved apron, or on a de/anti icing facility intended for use in poor visibility conditions, unless adequate guidance is provided by other means. There are no learning objectives concerning Visual Docking Systems, but students are advised to read Chapter 4 of CAP637, just in case a question comes up in the examination.

© Oxford Aviation Services Limited

REVISION QUESTIONS CHAPTERS 14 AND 15

1. What does a number 4 in the aeroplane referenced field length element of the aerodrome reference code mean?

   a. Landing distance required =>1800m
   b. Take off run required (TORR) =>1800m
   c. Take off distance required =>1800m
   d. Runway length not less than 1800m

2. In the code element 2 part of the aerodrome reference code the largest aeroplane would be indicated by which letter?

   a. C
   b. D
   c. E
   d. F

3. Which of the following does TORA include?

   a. The stopway
   b. The runway strip
   c. The runway prior to the displaced threshold
   d. The runway end safety area

4. What is ASDA?

   a. Aircraft stop distance available
   b. Asphalt stand and dispersal area
   c. Accelerate stop distance available
   d. A local supermarket

5. Can the landing distance available ever be less than the runway length?

   a. Never
   b. Yes – if there is a displaced threshold
   c. Yes - if there is a stop way that has the full load classification category of the main runway
   d. It depends upon the runway code number

© Oxford Aviation Services Limited

6. Which of the following conditions is to be reported to the AIS?

   a. It's snowing!
   b. Runway subsidence
   c. The ident beacon is being repaired
   d. The electricians are testing the lighting

7. It has been raining, but there are no patches of standing water on the runway. How would ATC describe the condition of the runway?

   a. Damp
   b. Wet
   c. Dry
   d. Flooded

8. Frozen water on a runway can variously be described as:

   a. Snow, sleet or slush
   b. Snow, sleet or rain
   c. Rime ice, clear ice or snow ice
   d. Ice, slush or snow

9. Can ATC close an aerodrome if it is snowing?

   a. No – an aerodrome cannot be closed because of weather
   b. Yes
   c. Yes – but it must be re-opened immediately it stops snowing
   d. Yes – but only if the snow freezes as it settles

10. What is added to the end of a METAR if an aerodrome is closed because of snow?

    a. SNOWTAM
    b. NOTAMS
    c. SNOCLO
    d. SNOWCLEAR

11. How long is a SNOWTAM valid for?

    a. 6 hours
    b. 12 hours
    c. 18 hours
    d. 24 hours

© Oxford Aviation Services Limited

12. What does a runway strip include?

a. The runway and cleared zone
b. The runway and stopway
c. The runway and clearway
d. The runway and runway end safety area

13. What are the names of the types of runways used in commercial aviation?

a. Visual; Instrument; Precision and Non-precision
b. Instrument and Non-Instrument
c. Precision and Visual
d. Paved and grass

14. A runway strip is required to be 150m wide if the runway type is what?

a. Code 1 instrument
b. Code 3 non-precision
c. Code 3 precision
d. Code 4 non-instrument

15. When is a runway strip required to be graded?

a. For all instrument runways
b. For all instrument runways and code 3-4 non-instrument runways
c. For all precision runways and code 3-4 non-instrument runways
d. For all non-instrument runways

16. For what runways is a runway end safety are (RESA) a mandatory requirement?

a. None
b. All runways
c. Code 3-4 precision runways
d. All instrument runways

17. What is the width of a stopway?

a. 150 m
b. Not less than 30 m
c. The same as the runways
d. 1.5 times the width of the runway

© Oxford Aviation Services Limited

18. How far from the threshold of a runway should the Radio Altimeter Operating Area extend?

a. 15 km
b. 3000 m
c. 300 m
d. 60 m

19. What must the radius of curvature of a taxi-way turn cater for?

a. All aircraft likely to use the aerodrome
b. Aircraft for which the taxiway is intended
c. The largest aeroplane reference field length code number
d. All aircraft, and widening strips are to be provided is normal width is insufficient

20. How many wind indicators (wind-socks) are required at a code 4 aerodrome?

a. One
b. One at each end of the longest runway
c. One at the threshold of each runway
d. Two (the master indicated by a white circle around the base)

21. What colour re runway markings?

a. Red
b. Green
c. Yellow
d. White

22. What colour are apron safety markings?

a. Yellow
b. White
c. Green/yellow
d. A contrasting colour to the taxiway markings

23. What colour are runway designator markings?

a. Yellow
b. Blue
c. Black on a white background
d. White

© Oxford Aviation Services Limited

24. For which type of runways are centre line markings required?

a. All runways
b. All paved runways
c. All instrument runways
d. All code 3-4 runways

25. For what type of runway are threshold markings required?

a. All runways
b. All paved runways
c. All paved instrument runways
d. All paved runways and non instrument paved runways code 3 or 4

26. How is a displaced threshold indicated?

a. Yellow chevrons pointing towards the threshold point
b. Arrows pointing towards the threshold along the runway
c. A white X on the unusable part of the threshold
d. A transverse white stripe added to the threshold marking

27. How would the centre of three parallel runways be designated?

a. By adding M (middle) to the QDM
b. By adding C (centre) to the QDM
c. By leaving the centre QDM without an addition and the others marked L (left) and R (right)
d. By using a different QDM

28. What is the minimum number of stripes that can make up the threshold markings?

a. 4
b. 6
c. 8
d. 0

29. What is the purpose of aiming point marking?

a. To show where the visual and instrument glide paths coincide
b. To define a safe landing area on a runway
c. It is an alternative method of indicating a displaced threshold
d. To provide additional conspicuity of the aiming point

© Oxford Aviation Services Limited

30. On what type of runways are touchdown zone markings required?

a. All instrument runways
b. All runways code 3 or 4
c. Paved precision runways code 2, 3 or 4
d. All precision runways

31. What do touchdown zone markings look like?

a. Four or more bars side by side across the threshold
b. A line across the runway with arrows point to it from the approach direction
c. Double length centre line markings
d. Pairs of rectangular markings symmetrically disposed about the centreline

32. When are runway side stripe markings required?

a. Where the edge of the runway is lower than the surrounding ground (ie there is a kerb)
b. Where the runway is greater than 30m wide
c. Where the edge of the runway is not well defined
d. When the runway has centreline markings

33. Do all taxiways require centreline markings?

a. Yes, but only where the aerodrome is used at night
b. No, only code 3 or 4 paved taxiways
c. Only if there is no edge lighting
d. Yes, if the runway has centreline markings

34. There are two types of taxiway holding point markings. Which type is always the closest to the runway?

a. Pattern A
b. Pattern B
c. It depends upon the category of Instrument landing operations in progress
d. There is now fixed requirement

35. How is the taxiway holding point marking to be augmented?

a. It is to be marked on the approach plate for the runway
b. A mandatory sign on the left side of the taxiway
c. A mandatory sign and a position information sign on both sides of the taxiway
d. A stop bar

© Oxford Aviation Services Limited

36. At the taxiway holding point for a runway there are two holding points (a pattern A and a pattern B). The aerodrome is closed but you have the owners permission to use the aerodrome out of hours. At which hold do have to stop at prior to taking off?

a. Both
b. The pattern A
c. The pattern B
d. It depends upon the category of instrument landing taking place

37. What is the minimum distance from the runway centreline for a precision approach cat I, II or III combined holding point to be positioned for a runway where all three category of operations are carried out?

a. 75m
b. 90m
c. 60m
d. There is no set distance

38. What is the critical factor affecting the distance of a precision runway taxi holding point from the centre of the runway?

a. The category of landing operations
b. The sensitivity of the ILS/MLS system
c. The size of the aeroplanes using the aerodrome
d. The width of the taxiway

39. Where two taxiways cross, there is a requirement for holding points to be established prior to the intersection so that aeroplanes can cross clear of others waiting to cross. What do the markings look like?

a. Pattern A
b. Pattern B
c. A single broken line
d. A single solid line

40. When are aircraft stand markings required?

a. For designated parking positions on paved aprons
b. For all parking bays without ground movement control systems
c. For all parking locations on a aerodromes of code 3C-E or 4C-E
d. For all parking bays with airbridges

© Oxford Aviation Services Limited

41. What is the purpose of apron safety lines?

a. To mark the limit of a surface capable of supporting the largest aeroplane for which the apron is designed
b. To mark an area of the apron safe for people to walk in
c. To mark safe areas for the taxiing of aeroplanes
d. To mark areas where it is safe to position ground equipment, vehicles etc..

42. What do road holding positions look like?

a. Pattern A holding marks
b. A single solid line across the holding point
c. A single dotted line with traffic lights
d. The same as on the local roads

43. Where will you NOT find information markings?

a. On a taxiway closer to the runway that the closest holding point
b. On aprons
c. On runways
d. On a rapid exit taxiway

44. When are information markings used?

a. To supplement information signs
b. To give information where it is not safe to use a sign
c. Where signs can be blown down by jet blast
d. Where the aerodrome authority deems that signs are unsightly

45. Do information markings require a contrasting background?

a. Yes, either yellow or black
b. No
c. Yes, but only if the surface does not provide sufficient contrast
d. Yes but only on code 3 or 4 aerodromes

46. What is the required physical property of all elevated runway, stopway and taxiway lights?

a. Where there is insufficient clearance from propellers, jet engine pods etc.. the light posts are to frangible
b. Lights are not to protrude through the obstacle identification surface (OIS)
c. They are to be frangible
d. All glass is to be contained in plastic enclosures

© Oxford Aviation Services Limited

47. Which of the following defines the characteristics of aerodrome lighting?

a. Colour, direction, intensity, visibility
b. Colour, intensity, visibility
c. Colour, intensity, visibility, mode of operation
d. Colour, intensity, direction

48. Which of the following are aeronautical beacons?

a. All obstacle lights on obstacles over 150m high
b. All obstacle lights and lighthouses
c. Aerodrome beacons and aerodrome identification beacons
d. Any light that aids navigation

49. When is an aerodrome beacon required?

a. Where operationally necessary at an aerodrome used at night
b. At all aerodromes used at night or in poor visibility
c. At aerodromes where only visual approaches are permitted
d. Where cat I or cat II operations are used

50. Which of the following are the characteristics of an aerodrome beacon?

a. Flashing the Morse code ident letters for an aerodrome in either red (military) or green (civil)
b. Flashing white only
c. Flashing white or green, or both
d. White flashes alternating with coloured flashes, or white only

51. What does a simple approach lighting system consist of?

a. Five bar and centre line
b. Centreline and barrettes
c. Single centreline and crossbar
d. Threshold lights and runway edge lights

52. What type(s) of runway can a simple approach system used for?

a. All runways
b. Grass runways
c. Visual and precision runways
d. Non-instrument and non-precision runways

© Oxford Aviation Services Limited

53. Over what distance from the threshold is a cat I lighting system to extend?

a. 300m
b. 600m
c. 900m
d. more than 600m but not more than 900m

54. What does a cat I lighting system consist of?

a. 5 bar and centreline originating from the aiming point
b. 5 bar and centreline with supplemental lighting in the inner segment
c. 5 bar and centreline or barrettes replacing the bars
d. 5 bar and centreline originating from the threshold

55. For a Cat II/III lighting system, how far does the centreline extend from the threshold in the approach direction?

a. 900m
b. 900m if Cat I operations are also permitted at the aerodrome
c. Recommended 900m but may be less
d. Not less than 840m

56. "No obstacles are permitted to protrude through the plane of the approach lights." Is this statement true or false?

a. True
b. False

57. For a Cat II/III approach lighting system how many light sources comprise the centreline between 600m and 300m from the threshold?

a. 1
b. 2
c. 3
d. It is optional

58. What does the abbreviation APAPI stand for?

a. Adjustable PAPI
b. Abbreviated PAPI
c. Attenuated PAPI
d. Airfield PAPI

© Oxford Aviation Services Limited

59. What is required to be added to a PAPI or APAPI system to provide roll guidance?

a. Gyro-stabilised gimbals
b. An additional wing bar on the same side of the runway
c. An additional wing bar on the other side of the runway
d. PAPIs cannot provide roll guidance

60. If you are slightly below the glide slope, what indications would you expect to see from a PAPI system?

a. Three white lights and one red – the red nearest to the runway
b. Three red lights and one white – the white nearest to the runway
c. Three white lights and one red – the red farthest from the runway
d. Three red lights and one white – the white farthest from the runway

61. What doe the abbreviation MEHT mean?

a. Minimum Eye Height
b. Mean Eye Height
c. Maximum Eye Height
d. Manual/Electronic Height Transmission

62. MEHT is quoted for all PAPI/APAPI installations. What is MEHT referenced to?

a. Eye on glidepath to threshold
b. Eye just above glidepath to threshold
c. Eye just below glidepath to threshold
d. Eye at lowest point on glidepath to threshold

63. If a MEHT of 57' is quoted, what does it mean?

a. With an 'on glidepath' indication there is 57 ft below the aircraft over the threshold
b. With an 'on glidepath' indication there is 57 ft below the pilot's eye over the threshold
c. With an 'on glidepath' indication there is 57 ft from the pilot's eye to the lowest point on the undercarriage over the threshold
d. With an 'on glidepath' indication the aircraft is 57 ft above the threshold

64. What colour are runway edge lights?

a. Blue
b. White
c. Yellow
d. Green

© Oxford Aviation Services Limited

65. What colour are runway edge lights between the end of the runway and a displaced threshold showing in the direction of the approach?

a. White
b. Yellow
c. Green
d. Red

66. You see yellow runway edge lights, what does this mean?

a. They have run out of the normal colour bulbs
b. You are within 600m of the end of the runway or have less than one third of the runway remaining
c. You have run into the stopway
d. The ground beyond the edge of the runway is unfit for aeroplane movements

67. Through what angle should runway edge lights be seen?

a. Through all angles of azimuth where the lights are used to provide circling guidance
b. Through all angles of elevation necessary to provide guidance to a pilot landing or taking off in either direction
c. All round always
d. Only through 15° either side of the centre line

68. Where are runway threshold lights provided?

a. On all runways with lights
b. On all Instrument runways
c. On all runways with edge lights but without a displaced threshold
d. On all paved runways with centreline lighting

69. On which runways are runway end lights provided?

a. On all paved runways
b. On all non-instrument runways code 3 and 4
c. On all runways with edge lights
d. On runways where the end of one runway is the threshold of the runway in the opposite direction (lights showing red in one direction and green in the other)

70. What type of runway requires touchdown zone lighting?

a. All instrument runways
b. All instrument runways of code 3 or 4 over 2400m long
c. All Cat II/III precision runways
d. All precision runways

© Oxford Aviation Services Limited

71. Which of the following statements is true?

a. Taxiway centre line lights are green/yellow and only visible when taxiing towards them
b. Taxiway centreline lights are blue and omni-directional
c. Taxiway centre line lights are green and omni-directional
d. Taxiway lights are green/yellow in an ILS sensitive area

72. When are taxiway centreline lights required?

a. In RVR <350m or RVR=>350m at night
b. At night
c. On code 3-4 taxiways
d. On taxiways without edge lights

73. What is the name of the lights spaced at 3m across a taxiway showing red in the direction of taxi?

a. Traffic lights
b. Stop bar
c. End lights
d. Holding lights

74. What colour are runway guard lights?

a. Yellow
b. Green
c. Red
d. Blue

75. What is the background colour of a mandatory sign?

a. White
b. Red
c. Yellow
d. Black

76. Which of the following is NOT a mandatory sign?

a. No entry sign
b. Runway holding point sign
c. Apron sign
d. Runway designation sign

© Oxford Aviation Services Limited

77. What sign must a pattern B holding point marking be supplemented by?

a. A runway designation sign
b. A runway vacated sign
c. A threshold direction sign
d. A cat I/II/III holding sign

78. Where a runway designation sign is provided at a taxiway/runway intersection it should be supplemented by a position sign. Which part of the sign should be closest to the taxiway edge?

a. The runway designation sign
b. The position sign
c. It doesn't matter
d. It depends upon which side of the taxiway it is positioned

79. What must the inscription on a Cat I, Cat II, Cat III or Cat II/III holding position sign also contain?

a. The runway designator
b. The taxiway designator
c. A no entry sign for vehicles
d. The taxiway designation and number

80. Which of the following are all information signs?

a. Direction signs; location signs; holding signs; runway vacated signs
b. Runway exit signs; destination signs; no entry signs; runway designation signs
c. Location signs; runway vacated signs; direction signs; destination signs
d. Runway exit signs; runway vacated signs; runway designation signs

81. Which of the following is true?

a. Information signs are black on a yellow background
b. Location signs are yellow an a black background
c. All information signs can be co-located with a mandatory sign
d. All location signs are to have a yellow border

82. Which holding point marking pattern is depicted on a runway vacated sign?

a. Pattern A
b. Pattern B
c. It must correspond with the marking on the taxiway
d. What ever is convenient

© Oxford Aviation Services Limited

83. You see a sign on the manoeuvring area consisting of numbers only. To what must it refer?

a. A parking stand designator
b. A taxiway number
c. A runway QDM
d. Elevation

84. What type of sign is a road holding sign?

a. Information sign
b. Mandatory sign
c. Location sign
d. Direction sign

85. What is required if a road holding sign is intended to be seen at night?

a. Contrasting colours
b. Sign to be retroflective or illuminated
c. It must be positioned in an area that is illuminated by stadium lighting
d. It must be lit by lights controlled by ATC such that as a aeroplane approaches it the lights can be switched off

86. Where are unpaved runway edge markers required?

a. At the extremities of all grass runways
b. Where grass runways cross paved runways
c. Only for grass instrument runways
d. Where there is no contrast between the runway and the surrounding ground

87. Where are taxiway edge markers required?

a. On code 1 or 2 taxiways without centreline markers/lights or edge lights
b. Where the authority deems necessary
c. On all taxiways without edge lights
d. On taxiways where the contrast between the taxiway and the surrounding ground is not well defined

88. Which of the following correctly describes a taxiway centreline marker?

a. Retroflective blue only
b. Retroflective green or green yellow
c. Retroflective green only
d. Retroflective yellow only

© Oxford Aviation Services Limited

89. What obstacles (if any) are permitted to protrude through the plane of an approach lighting system?

a. Only an ILS or MLS antenna
b. None
c. Anything provided it is correctly marked
d. Only obstacles less than 150m high within 900m of the threshold

90. If the erection of a temporary obstacle in the approach transition zone is unavoidable which negates the OCL for that approach, what can the aerodrome authority do to allow the runway to continue to be used?

a. Increase the glidepath angle to restore the OCH
b. Light the obstacle with high intensity lights
c. Temporarily displace the threshold to restore the OCH
d. Reduce the speed of aircraft using the runway

91. Where are taxiway centreline markings on paved runways required to be provided?

a. For all code 1 and 2 taxiways on code 3 or 4 runways
b. For all taxiways on runways
c. For taxiways on runways that are part of the standard taxi-route
d. For taxiways on runways without taxiway edge lighting

92. Where would runway lead-in lights be used?

a. Where it is felt necessary to provide visual guidance along a specific approach path
b. Where a portion of taxiway is an extension of the pre-threshold area of a runway
c. Where entrance to a runway can be in the reverse direction of a rapid exit taxiway
d. Where an instrument approach terminates before the threshold of the runway

93. Where are circling guidance lights provided?

a. Where a precision approach leads to a visual circuit join, the lights provide visual guidance to the down-wind position
b. Where the existing approach lights are not of the required standard for an instrument approach
c. Where the existing approach and runway lights are insufficient to provide guidance during the visual phase of an approach to land
d. At aerodromes where aircraft are required to carry out an orbit in the overhead prior to joining downwind visually

© Oxford Aviation Services Limited

94. Control of lighting intensity is essential, but differing intensities can be confusing and disorientating. How is this prevented?

a. By adjusting the intensity of all aerodrome lights together
b. By ensuring that all runway lighting systems (approach; edge; centre; PAPI; TDZ) are adjusted together
c. By having separate intensity controls for each element of lighting
d. By shading no 'navigation' lights from view

95. Why do longer runways (code 4) have aiming points further down the runway than lesser length runways? (Hint - think logically)

a. If the space is available it should be used.
b. Longer runways can be used by bigger and therefore less manoeuvrable aircraft so it makes sense give more space
c. Its all about making sure that there is adequate clearance below the undercarriage when the aircraft crosses the threshold
d. To counter the visual illusion of reduced runway length in big aeroplanes

96. What defines the 'main runway'?

a. The longest length of concrete
b. The instrument runway on which ILS available
c. The runway that allows compliance with noise abatement procedures
d. The runway most used for take-offs and landings

97. What starts at the threshold of a runway?

a. The portion of the runway suitable for landing
b. The portion of the runway suitable for take off
c. The portion of the runway suitable for take off and landing
d. The portion of the runway suitable for the movement of aeroplanes on the ground

98. Can a 'take-off runway' be used in any weather conditions?

a. Yes
b. No - the weather minima must be specified for that runway

99. According to ICAO, what are the RVR and DH minima for CATIIIB operations on a precision approach runway?

a. RVR not less than 200m; DH not lower than 100 ft
b. RVR not less than 350m; DH not lower than 100 ft
c. RVR not less than 75m; DH below 50 ft
d. RVR not less than 50m; DH below 50 ft

© Oxford Aviation Services Limited

100. What defines 'aerodrome elevation'?

a. The height (AMSL) of the aerodrome reference point (ARP)
b. The height (AMSL) of the highest runway threshold
c. The highest point on the landing area
d. The highest point on the movement area

© Oxford Aviation Services Limited

ANSWERS TO REVISION QUESTIONS FOR CHAPTERS 14 AND 15

1	C
2	D
3	C
4	C
5	B
6	B
7	B
8	D
9	A
10	C
11	D
12	B
13	B
14	C
15	A
16	D
17	C
18	C
19	B
20	A
21	D
22	D
23	D
24	B
25	C

26	D
27	B
28	A
29	D
30	C
31	D
32	C
33	B
34	A
35	B
36	B
37	B
38	B
39	C
40	A
41	D
42	D
43	C
44	A
45	C
46	C
47	D
48	C
49	A
50	D

51	C
52	D
53	C
54	A
55	B
56	B
57	B
58	B
59	C
60	D
61	A
62	D
63	B
64	B
65	D
66	B
67	A
68	C
69	C
70	C
71	D
72	A
73	B
74	A
75	B

76	C
77	D
78	A
79	A
80	C
81	B
82	A
83	A
84	B
85	B
86	D
87	A
88	C
89	A
90	C
91	C
92	A
93	C
94	B
95	C
96	D
97	A
98	B
99	D
100	C

© Oxford Aviation Services Limited

CHAPTER SIXTEEN - AERODROME OBSTACLES AND EMERGENCY SERVICES

Contents

		Page
16.1	OBSTACLES	16-1
16.2	VISUAL AIDS FOR DENOTING OBSTACLES	16-2
16.3	VISUAL AIDS FOR DENOTING RESTRICTED USE AREAS	16-7
16.4	EMERGENCY AND OTHER SERVICES	16-8
16.5	BIRD HAZARD	16-10
	REVISION QUESTIONS	16-13

© Oxford Aviation Services Limited

16.1 OBSTACLES

16.1.1 Introduction. The marking and/or lighting of obstacles is intended to reduce hazards to aircraft by indicating the presence of obstacles. It does not necessarily reduce operating limitations which may be imposed by obstacles. The responsibility for marking/lighting of obstacles on or near aerodromes must be determined between the aerodrome licensee and the owners of the structures. Licensees are responsible for the marking and lighting of all obstacles on the movement area irrespective of ownership. During the establishment of instrument approach and departure procedures, obstacles were identified to allow the calculation of operating minima and obstacle clearance height/altitude. The treatment of obstacles in this chapter is concerned with the identification and marking of obstacles on and in the vicinity of aerodromes, which may be collision hazards to local flying and en-route operations. Obstacles inside and outside the aerodrome boundary may result in limitations on the distance available for take-off and landing and on the range of meteorological conditions in which operations can be undertaken. For these reasons certain areas of local airspace must be regarded as integral parts of the aerodrome environment. The degree of freedom from obstacles in these areas is as important in the granting and retention of an aerodrome licence as the more obvious physical requirements of the runways and their associated runway strips.

16.1.2 Obstacle Identification Surfaces (OIS). The method of assessing the importance of obstacles is from the use of obstacle identification surfaces. An obstacle would be considered significant if it protruded through the OIS. Clearly, there must be a degree safety margin applied and the variations in aeroplane performance during the various phases of flight. For instance, the take-off OIS would be a smooth plane with the base increasing in height as distance from the DER increases. For an approach OIS, the worst case is the non-precision approach where varying profiles will apply from the FAP to the threshold. For precision approaches the OIS profile will vary according to category of approach. The OISs consists of take-off and approach profiles, the transition surface, the inner horizontal surface, the conical surface, the outer horizontal surface and the obstacle free zone (OFZ).

16.1.3 Inner Horizontal Surface. This is a horizontal plane located above an aerodrome and its vicinity. It represents the level above which consideration needs to be given to the control of new obstacles and the removal or marking of existing obstacles to ensure safe visual manoeuvring of aeroplanes in the vicinity of the aerodrome. The level of the plane is 45 m above elevation of the lowest runway threshold. If the length of the longest runway is 1 800 m or more, the shape of the surface is an oblong with radius of ends 4 000 m from each threshold. If the length of the runway is less than 1 800 m, the radius is 3 000 m.

© Oxford Aviation Services Limited

16.1.4 Outer Horizontal Surface. From the edge of the inner horizontal surface, the conical surface exists rising from 45 m at 5% (1:20) to a height of 105 m above the inner horizontal surface. The outer horizontal surface extends from the limit of the conical surface to a minimum radius of 15 000 m.

16.1.5 Aerodrome Obstacles. Any obstacle which protrudes through either the inner, conical or outer surfaces are described as aerodrome obstacles. Obstacles of significant height (usually above 150 m) outside of the outer horizontal surface are considered to be en-route obstacles.

16.2 VISUAL AIDS FOR DENOTING OBSTACLES

16.2.1 Requirement for marking/lighting . The marking and/or lighting of obstacles is intended to reduce hazards to aircraft by indicating the presence of the obstacles. A fixed obstacle that extends above a take-off climb surface, within 3 000 m of the inner edge, should be marked and, if the runway is used at night, lighted, except that such marking and lighting may be omitted when the obstacle is shielded by another fixed obstacle; the marking may be omitted when the obstacle is lighted by high intensity obstacle lights by day; and the lighting may be omitted where the obstacle is a lighthouse and an aeronautical study indicates the lighthouse light to be sufficient. A fixed object, other than an obstacle, adjacent to a take-off climb surface should be marked and, if the runway is used at night, lighted if such marking and lighting is considered necessary to ensure its avoidance (note: the marking may be omitted when the obstacle is lighted by high intensity obstacle lights by day). A fixed object that extends above an obstacle protection surface shall be marked and, if the runway is used at night, lighted.

16.2.2 Obstacle on the Movement Area. 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. 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.

16.2.3 Wires, Cables and Pylons. Overhead wires, cables, etc crossing a river, valley or highway should be marked and their supporting towers marked and lighted if an aeronautical study indicates that the wires or cables could constitute a hazard to aircraft, except that the marking of the supporting towers may be omitted when they are lighted by high intensity obstacles lights by day. When it has been determined that an overhead wire, cable etc needs to be marked but it is not practicable to install markers on the wire, cable, etc then high-intensity obstacle lights should be provided on their supporting towers.

© Oxford Aviation Services Limited

16.2.4 Marking of objects. All fixed objects to be marked shall, whenever practicable, be coloured, 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 should 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 1.5m and not more than 3m 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. An object should be coloured to show alternating contrast bands if it has essentially unbroken surfaces and has one dimension, horizontal or vertical, greater than 1.5 m, and the other dimension, horizontal or vertical, less than 4.5 m; or it is of skeletal type with either a vertical or a horizontal dimension greater than 1.5 m. The bands should be perpendicular to the longest dimension and have a width approximately 1/7 of the longest dimension or 30m, whichever is less. The colours of the bands should contrast with the background against which they will be seen. Orange and white should be used, except where such colours are not conspicuous when viewed against the background. The bands on the extremities of the object should be of the darker colour. An object should be coloured in a single conspicuous colour if its projection on any vertical plane has both dimensions less than 1.5m. Orange or red should be used, except where such colours merge with the background. Against some backgrounds it may be found necessary to use a different colour from orange or red to obtain sufficient contrast.

16.2.5 Vehicles and Mobile Objects. When mobile objects are marked by colour, a single conspicuous colour, preferably red or yellowish green for emergency vehicles and yellow for service vehicles should be used.

16.2.6 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 recognisable in clear weather from a distance of at least 1000m for an object to be viewed from the air and 300m 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 the 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.

16.2.6.1 Wires and cables. A marker displayed on an overhead wire, cable etc., should be spherical and have a diameter of not less than 60cm. Where multiple wires, cables etc., are involved, a marker should be located not lower than the level of the highest wire at the point marked with a marker of one colour. When installed, white and red, or white and orange markers should be displayed alternately. The colour selected should contrast with the background against which it will be seen.

© Oxford Aviation Services Limited

16.2.7 Use of flags. Flags used to mark objects shall be displayed around, on top of or around the highest edge of, the object. When flags are used to mark extensive objects or groups of closely spaced objects, they shall be displayed at least every 15m. Flags shall not increase the hazard presented by the object they mark. Flags used to mark fixed objects shall not be less than 0.6m square and flags used to mark mobile objects, not less than 0.9m square. Flags used to mark fixed objects should be orange in colour or a combination of two triangular sections, one orange and the other white, or one red and the other white, except that where such colours merge with the background, other conspicuous colours should be used.

16.2.7.1 Flags on vehicles. Flags used to mark mobile objects shall consist of a chequered pattern, each square having sides of not less than 0.3m. The colours of the pattern shall contrast each with the other and with the background against which they will be seen. Orange and white or alternatively red and white shall be used, except where such colours merge with the background.

16.2.8 Lighting of objects. 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. (**Note**: High-intensity obstacle lights are intended for day use as well as night use.)

16.2.8.1 Low Intensity Lights. Low-intensity obstacle lights on fixed objects shall be fixed red lights and have an intensity sufficient to ensure conspicuity considering the intensity of the adjacent lights and the general level of illumination against which they would normally be viewed. Low intensity obstacle lights on objects with limited mobility such as aerobridges shall be steady-red. The intensity of the lights shall be sufficient to ensure conspicuity considering the intensity of the adjacent lights and the general levels of illumination against which they would normally be viewed. Where the use of low-intensity obstacle lights would be inadequate or an early special warning is required, then medium or high-intensity obstacle lights should be used.

16.2.8.2 Medium Intensity Lights. Medium-intensity obstacle lights shall be flashing red lights, except that when used in conjunction with high-intensity obstacle lights they shall be flashing white lights. The flash frequency shall be between 20 and 60 per minute. Medium intensity obstacle lights located on an object should flash simultaneously. Medium intensity obstacle lights should be used, either alone or in combination with low-intensity obstacle lights, where the object is an extensive one or its height above the level of the surrounding ground is greater than 45m. (**Note:** A group of trees or buildings is regarded as an extensive object).

© Oxford Aviation Services Limited

16.2.8.3 High Intensity Lights. High intensity obstacle lights, shall be flashing white lights. High intensity obstacle lights, located on an object should flash simultaneously at a rate between 40 and 60 per minute. High-intensity obstacle lights, located on a tower should flash sequentially; first the middle light, second the top light and last the bottom light. High intensity obstacle lights, should be used to indicate the presence of an object if its height above the level of the surrounding ground exceeds 150m and an aeronautical study indicates such lights to be essential for the recognition of the object by day. High-intensity obstacle lights, should be used to indicate the presence of a tower supporting overhead wires, cables etc where:

a. an aeronautical study indicates such lights to be essential for the recognition of the presence of wires, cables etc; or
b. it has not been found practicable to install markers on the wires, cables etc.

16.2.9 Location of obstacle lights. One or more low-, medium- or high-intensity obstacle lights shall be located as close as practicable to the top of the object. The top lights shall be so arranged as to at least indicate the points or edges of the object highest in relation to the obstacle limitation surface. In the case of chimney or other structure of like function, the top lights should be placed sufficiently below the top so as to minimise contamination by smoke etc. In the case of a guyed tower or antenna where it is not possible to locate a high-intensity obstacle light on the top, such a light shall be located at the highest practicable point and a medium-intensity obstacle light, showing white, mounted on the top.

16.2.9.1 Extensive or Groups of Objects. In the case of an extensive object or a group of closely placed objects, top lights shall be displayed at least on the points or edges of the objects highest in relation to the obstacle limitation surface, so as to indicate the general definition and the extent of the objects. If two or more edges are of the same height, the edge nearest the landing area shall be marked. Where low-intensity lights are used, they shall be spaced at longitudinal intervals not exceeding 45m. Where medium intensity lights are used, they shall be spaced at longitudinal intervals not exceeding 900m.

16.2.9.2 Tall objects. Where an object is indicated by low- or medium- intensity obstacle lights, and the top of the object is more than 45m above the level of the surrounding ground or the elevation of tops of nearby buildings (when the object to be marked is surrounded by buildings) additional lights shall be provided at intermediate levels. These additional intermediate lights shall be spaced as equally as practicable, between the top lights and ground level or the level of tops of nearby buildings, as appropriate, with the spacing not exceeding 45m. The number and arrangement of low-, medium- or high-intensity obstacle lights at each level to be marked shall be such that the object is indicated from every angle in azimuth. Where a light is shielded in any direction by an adjacent object, additional lights shall be provided on that object in such a way as to retain the general definition of the object to be lighted, the shielded light being omitted if it does not contribute to the definition of the object to be lighted.

© Oxford Aviation Services Limited

16.2.10 Lighting of Aircraft. The lighting of aircraft is detailed at Chapter 6 Rules of the Air. This subject is covered in detail in the OP syllabus. It should be noted that aircraft parked on the manoeuvring area are obstacles and should be lit either by the aircraft navigation lights or by ancillary lighting that determines the extremities of the aeroplane.

16.2.11 En-route Obstacles. Objects located beyond 15 km radius of the aerodrome are normally considered to be obstacles to aircraft in flight only if they exceed 150 m in height. Prominent object of less height may be regarded as obstacles if they are on or adjacent to routes regularly used by helicopters. En-route obstacles are usually lit by steady red lights at night and high intensity flashing white lights by day. Environmental considerations may preclude the use of high intensity lights.

16.2.12 Lighting of Vehicles. Aerodrome operators are responsible for ensuring that vehicles on the movement area of an aerodrome are lit and/or marked as required irrespective of ownership. These include maintenance vehicles, ATC vehicles, 'Follow Me' vehicles, aircraft towing vehicles, refuellers etc. Whenever a permitted vehicle is on the movement area the lights are to be switched on. Vehicle obstacle lights are low intensity flashing yellow. The lights specified are to be fitted at the highest point of the prime mover. Trailers are to be lit with low intensity steady red lights at the highest point. Objects with limited mobility (air bridges etc.) are to be lit with low intensity steady red lights.

16.2.12.1 Emergency Vehicles. Aerodrome ambulances, police/security, fire and rescue appliances should in addition to the requirements of para 16.2.12 also carry blue flashing lights for use whilst carrying out emergency duties. Vehicles which are not normally based on the aerodrome (civilian fire/rescue vehicles) when called upon for assistance, are to show flashing blue lights.

© Oxford Aviation Services Limited

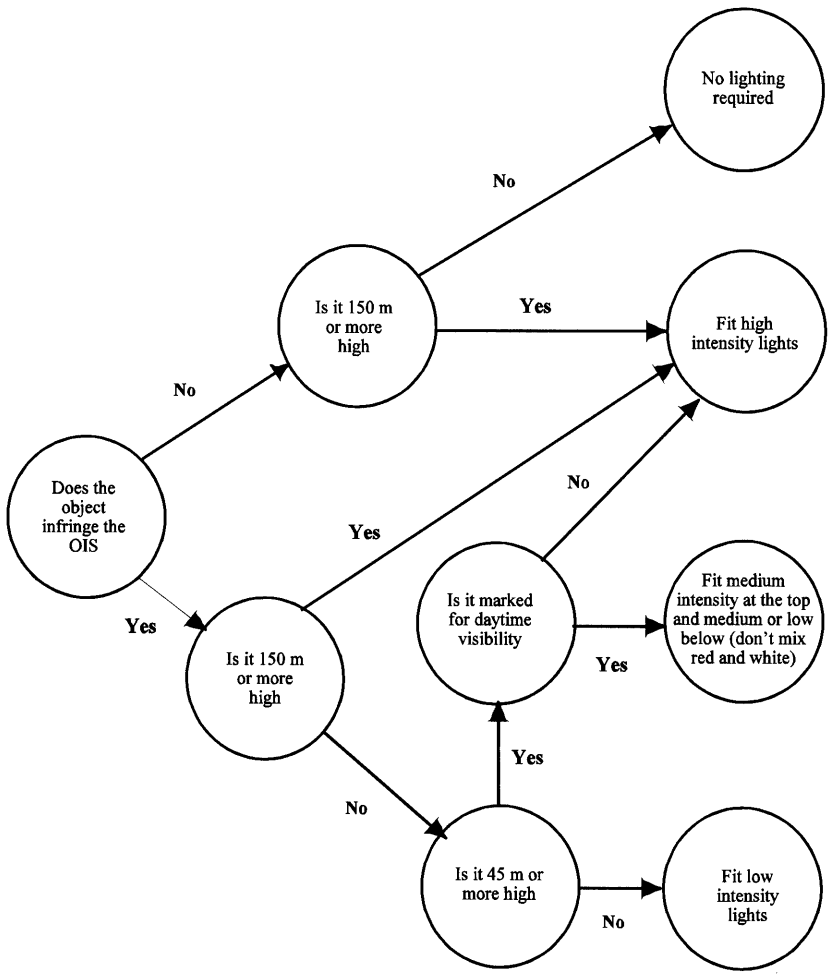


Fig 16.2 Simplified Guide to Obstacle Lighting

16.3 VISUAL AIDS FOR DENOTING RESTRICTED USE AREAS

16.3.1 Closed runways and taxiways. 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. On a runway a closed marking shall be placed at each end of the runway, or portion thereof, declared closed, and additional markings shall be so placed that the maximum interval between markings does not exceed 300m. On a taxiway a closed marking shall be placed at least at each end of the taxiway or portion thereof closed. The marking shall be white when displayed on a runway and shall be yellow when displayed on a taxiway. (**Note:** When an area is temporarily closed, frangible barriers or markings utilizing materials other than paint or other suitable means may be used to identify the closed area). When a runway or taxiway or portion thereof is permanently closed, all normal runway and taxiway markings shall be obliterated. Lightings on a closed runway or taxiway or portion thereof shall not be operated, except as required for maintenance purposes.

© Oxford Aviation Services Limited

16.3.2 **Non-load bearing surfaces.** Shoulders for taxiways, holding bays and aprons and other non-load bearing surfaces which cannot readily be distinguished from load-bearing surfaces and which, if used by aircraft might result in damage to the aircraft shall have the boundary between such areas and the load bearing surface marked by a taxi side stripe marking.

16.3.3 **Pre-threshold area**. When the surface before a threshold is paved and exceeds 60m in length and is not suitable for normal use by aircraft, the entire length before the threshold should be marked with a chevron marking. The chevron marking should point in the direction of the runway.

16.4 EMERGENCY AND OTHER SERVICES

16.4.1 **Aerodrome Emergency plan.** Aerodrome emergency planning is the process of preparing an aerodrome to cope with an emergency occurring at the aerodrome or in its vicinity. The objective of aerodrome emergency planning is to minimize the effects of an emergency, particularly in respect of saving lives and maintaining aircraft operations. The aerodrome emergency plan sets forth the procedures for co-ordinating the response of different aerodrome agencies (or services) and of those agencies in the surrounding community that could be of assistance in responding to the emergency.

16.4.2 **Rescue and firefighting**. The principal objective of a rescue and firefighting service is to save lives. For this reason, the provision of means of dealing with an aircraft accident or incident occurring at, or in the immediate vicinity of, an aerodrome assumes primary importance because it is within this area that there are the greatest opportunities of saving lives. This must assume at all times the possibility of, and need for, extinguishing a fire which may occur either immediately following an aircraft accident or incident, or at any time during rescue operations. The most important factors bearing on effective rescue in a survivable aircraft accident are: the training received, the effectiveness of the equipment and the speed with which personnel and equipment designated for rescue and fire fighting purposes can be put into use. Requirement to combat building and fuel farm fires, or to deal with foaming of runways, are not taken into account. Public or private organisations, suitably located and equipped, may be designated to provide the rescue and firefighting service. It is intended that the fire station housing these organisations be normally located on the aerodrome, although an off aerodrome location is not precluded provided the response time can be met.

16.4.3 **Level of protection to be provided.** The level of protection provided at an aerodrome for rescue and firefighting shall be appropriate to the aerodrome category. Exceptionally, 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 may be (from 1 January 2000) not less than one category below the determined category. The aerodrome category shall be determined from Table 16.4, based on the longest aeroplanes normally using the aerodrome and fuselage width. (**Note:** To categorise the aeroplanes using the aerodrome, first evaluate

© Oxford Aviation Services Limited

their over-all length and second, their fuselage width). If, after selecting the category appropriate to the longest aeroplane's over-all length, that aeroplanes fuselage width is greater than the maximum width for that category, then use one category higher. During anticipated periods of reduced activity, the level of protection available shall be no less than that needed for the highest category of aeroplane planned to use the aerodrome during that time irrespective of the number of movements.

Category	Aeroplane over-all length	Max width
1	0m up to bur not including 9m	2m
2	9m up to bur not including 12m	2m
3	12m up to bur not including 18m	3m
4	18m up to bur not including 24m	4m
5	24m up to bur not including 28m	4m
6	28m up to bur not including 39m	5m
7	39m up to bur not including 49m	5m
8	49m up to bur not including 61m	7m
9	61m up to bur not including 76m	7m
10	76m up to bur not including 90m	8m

Table 16.4 Rescue and Firefighting categories

16.4.4 Response time. The operational objective of the rescue and fire fighting service should be to achieve response times of two minutes, and not exceeding three minutes, to the end of each runway, as well as to any other part of the movement area, in optimum conditions of visibility and surface conditions. Response time is considered to be the time between the initial call to the rescue and fire fighting service, and the time when the first responding vehicle(s) is (are) in position to apply foam at a rate of at least 50% of the discharge rate specified. To meet the operational objective as nearly as possible in less than optimum conditions of visibility it may be necessary to provide guidance for rescue and firefighting vehicles.

16.4.5 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 1,000m 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. **Note:** Aerodrome service roads may serve as emergency access roads when they are suitable located and constructed.

16.4.6 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.

© Oxford Aviation Services Limited

16.4.7 Number of rescue and firefighting vehicles. Recommendation. The minimum number of rescue and firefighting vehicles provided at an aerodrome should be:

Aerodrome Category	Rescue and fire fighting vehicles
1	1
2	1
3	1
4	1
5	1
6	2
7	2
8	3
9	3
10	3

Table 16.4.7 Vehicle Requirement

16.5 BIRD HAZARD

16.5.1 Introduction. Birds represent a constant threat to the safety of aeroplanes. Pilots re required to report all instances of bird strikes to the appropriate authority. Further consideration of the problems presented by birds is covered in OP. When a bird strike hazard is identified at an aerodrome, the appropriate authority should take action to decrease the number of birds constituting a potential hazard to aircraft operations by adopting measures for discouraging their presence on, or in the vicinity of, an aerodrome. Garbage disposal dumps or any such other attracting bird activity on, or in the vicinity of, an aerodrome should be eliminated or their establishment prevented, unless an appropriate study indicates that they are unlikely to create conditions conducive to a bird hazard problem

16.5.2 Bird hazard reduction. The bird strike hazard, on, or in the vicinity of, an aerodrome should be assessed through:

a. the establishment of a national procedure for recording and reporting bird strikes to aircraft; and

b. the collection of information from aircraft operators, airport personnel etc on the presence of birds on or around the aerodrome.

16.5.3 ICAO Bird Strike Information System(IBIS). IBIS is designed to collect and disseminate information on bird strikes to aircraft. Information on the system is included in the Manual on the ICAO Bird Strike Information System (IBIS).

© Oxford Aviation Services Limited

16.6 OTHER AERODROME SERVICES

16.6.1 Apron management service. When warranted by the volume of traffic and operating conditions, an appropriate apron management service (not to be confused with Ground Control), should be provided on an apron by an aerodrome ATS unit, by another aerodrome operating authority, or by a co-operative combination of these. When the aerodrome control tower does not participate in the apron management service, procedures should be established to facilitate the orderly transition of aircraft between the apron management unit and the aerodrome control tower. An apron management service shall be provided with radiotelephony communications facilities. Where low visibility procedures are in effect, persons and vehicles operating on an apron shall be restricted to the essential minimum. An aircraft stand shall be visually monitored to ensure that the recommended clearance distances are provided to an aircraft using the stand. The purpose of the apron management service is to:

a. regulate movement with the objective of preventing collisions between aircraft, and between aircraft and obstacles;

b. regulate entry of aircraft into, and co-ordinate exit of aircraft from, the apron with the aerodrome control tower; and

c. ensure safe and expeditious movement of vehicles and appropriate regulation of other activities.

16.6.2 Emergency Vehicles. An emergency vehicle responding to an emergency shall be given priority over all other surface movement traffic. A vehicle operating on an apron shall:

a. give way to an emergency vehicle; an aircraft taxiing, about to taxi, or being pushed or towed; and

b. give way to other vehicles in accordance with local regulations.

16.6.3 Ground servicing to aircraft. Fire extinguishing equipment suitable for at least initial intervention in the event of a fuel fire and personnel trained in its use shall be readily available during the ground servicing of an aircraft, and there shall be a means of quickly summoning the rescue and fire fighting service in the event of a fire or major fuel spill. When aircraft refuelling operations take place while passengers are embarking, on board or disembarking, ground equipment shall be positioned so as to allow:

a. the use of sufficient number of exits for expeditious evacuation; and

b. a ready escape route from each of the exits to be used in an emergency.

© Oxford Aviation Services Limited

REVISION QUESTIONS CHAPTER 16

1. What is the purpose of marking or lighting of obstacles?

   a. To reduce hazards to aircraft by indicating the presence of obstacles
   b. To draw the attention of pilots to the presence of obstacles
   c. To distinguish between old and new (unmarked) obstacles
   d. To show the presence of obstacles in poor visibility

2. When is an obstacle that extends above a runway take-off climb surface within 3 000m of the inner edge, required to be lit?

   a. If it above 150m high
   b. If it not a lighthouse
   c. If it is not sufficiently obvious by its colour and shape
   d. If the runway is used at night

3. Are aircraft servicing vehicles that are used exclusively on the apron required to be marked or lit?

   a. Yes
   b. No

4. What colour are fire/crash rescue vehicles required to be painted?

   a. Red
   b. Dayglo yellow
   c. Red or yellowish green
   d. Red and white check

5. Which of the following correctly identifies how obstacles may be lit?

   a. High/medium/low intensity flashing red lights
   b. High intensity red lights, medium and low intensity flashing red lights
   c. High intensity white lights; medium and low intensity white flashing lights
   d. High intensity flashing white; medium intensity red flashing, low intensity steady red

6. When are high intensity white lights used?

   a. For tall structures that may extend above the cloud base
   b. En route obstacles 150m or more high, by day and night
   c. Obstacles within 15 km of aerodrome but less than 150m high by night
   d. In conditions of RVR less than 350m

© Oxford Aviation Services Limited

7. What are the two types of obstacles?

a. Fixed and mobile
b. Aerodrome and en route
c. 150 m and lower; above 150m
d. Climb out and approach

8. If an obstacle is over a certain height it must be lit by multiple lights. What is the height?

a. 50m
b. 150m
c. 3000m
d. 45m

9. All obstacles within a 15km radius of an aerodrome are considered obstacles to aircraft in flight or manoeuvring on the ground. How are these obstacles to be treated?

a. Normally lit at night
b. Lit at night or in conditions of RVR less than 350m
c. Lit if not sufficiently conspicuous by shape and colour
d. Illuminated from the ground if not able to have lights attached

10. On what type of obstacles is low intensity lighting used?

a. Aerodrome obstacles less than 150m high
b. Aerodrome obstacles less than 50m high
c. Aerodrome obstacles of fixed or limited mobility
d. Aerodrome obstacles within 3000m of the inner edge of the climbout transition zone

11. How are high intensity lights to flash?

a. Simultaneously 40 – 60 flashes per minute
b. Sequentially 40 – 60 flashes per minute
c. Simultaneously 20 – 60 flashes per minute
d. Irregularly 20 – 60 flashes per minute

12. What is the principle objective of a firefighting and rescue service?

a. To prevent the loss of aeroplanes by fire
b. To attend all crashed aircraft to prevent the spread of fire
c. To save life
d. To save property

© Oxford Aviation Services Limited

13. Training and effectiveness of equipment are two of the three most important factors bearing on effective rescue in a survivable aircraft accident. What is the third?

a. Crew procedures
b. Speed of reaction of the rescue/firefighting personnel and equipment
c. Location of the accident site
d. Crash/rescue aerodrome category

14. An aerodrome has recorded 1500 movements per month throughout the past year. According to the aerodrome category the cover required for rescue/firefighting services should be 7. On any day, what is the lowest category that can actually be provided at that aerodrome?

a. Cat 6
b. Cat 7
c. Cat 5
d. If not Cat 7 then the Authority must decide an appropriate level of cover

15. What physical factors of aeroplanes using an aerodrome determine the category of firefighting/rescue cover required?

a. Maximum take off mass
b. Maximum ramp weight
c. Length and width of the fuselage
d. Maximum number of passengers and crew on board

16. An aerodrome has peak hours of operation between 0800 and 2100. Outside of this period movements are sporadic and between 0200 and 0500 movement on the aerodrome is banned due to noise restrictions. The normal firefighting/rescue category is 10. Can this be reduced outside of the peak flow hours?

a. Yes, but only between 0200 – 0500
b. Yes but only to cat 8
c. Yes, between 2100 and 0800 reduced to 9
d. No

17. How is response time for an aerodrome firefighting/rescue service defined?

a. The time between the initial call and the time when the first appliance is in position to apply foam at a rate of at least 50% of the rate required
b. Not greater than 2 minutes to any point on the aerodrome
c. It is not defined but is an individual assessment for each aerodrome
d. Not more than 3 minutes in all weather conditions

© Oxford Aviation Services Limited

18. An aeroplane is 37.5m overall length with a maximum fuselage width of 5.2m. For firefighting/rescue category, the length of the aeroplane would qualify for category 6 (28m to 39m) but the max fuselage width for category 6 is 5m. For cat 7 the max width is also 5m and then goes up to 7m for category 8. Which category of cover does this aeroplane require?

a. Cat 6
b. Cat 7
c. Cat 8
d. Cat 7 but may be 6 during periods of reduced movement activity

19. What is the name of the ICAO bird strike information system?

a. BSIS
b. ISIS
c. IBIS
d. SIBI

20. How would the appropriate authority take action to reduce the number of birds at an aerodrome if it is considered that they constitute a hazard to aircraft?

a. Cut the grass very short
b. Let off bird scaring cartridges to create a high intensity noise source
c. Encourage birds of prey to visit aerodromes and scare away the birds which create the hazard
d. Adopt measures for discouraging the presence of birds

21. Which of the following is most likely to create a bird hazard at an aerodrome?

a. Establishment of a garbage disposal site near the aerodrome
b. The proximity of water
c. Agricultural activity
d. Letting the grass grow on the aerodrome

22. What is the purpose of an Apron Management Service?

a. To relieve ATC of the responsibility for movement of aircraft and vehicles on the apron
b. To provide maintenance services on the apron
c. To regulate the flow of vehicular traffic on the apron
d. To prevent collisions between aircraft and aircraft and obstacles on the apron

© Oxford Aviation Services Limited

23. Over what do fire/crash/rescue vehicles have priority whilst en-route to an incident?

a. All other vehicular traffic
b. All vehicular traffic and aircraft being towed
c. All aircraft and vehicular movement on an aerodrome
d. All other surface movement traffic

24. Are refuelling operations permitted whilst passengers are on board the aeroplane?

a. No
b. Yes

25. If an aircraft was parked on the manoeuvring area of an aerodrome, would it need to be lit at night?

a. Yes, but only if it infringes the OIS
b. Yes, but only if it is a hazard to other aircraft
c. No, providing the surrounding area is well lit
d. Yes

© Oxford Aviation Services Limited

ANSWERS TO REVISION QUESTIONS FOR CHAPTER 16

1	A	26		51		76	
2	D	27		52		77	
3	A	28		53		78	
4	C	29		54		79	
5	D	30		55		80	
6	B	31		56		81	
7	B	32		57		82	
8	D	33		58		83	
9	A	34		59		84	
10	C	35		60		85	
11	B	36		61		86	
12	C	37		62		87	
13	B	38		63		88	
14	B	39		64		89	
15	C	40		65		90	
16	D	41		66		91	
17	A	42		67		92	
18	B	43		68		93	
19	C	44		69		94	
20	D	45		70		95	
21	A	46		71		96	
22	D	47		72		97	
23	D	48		73		98	
24	B	49		74		99	
25	D	50		75		100	

© Oxford Aviation Services Limited

CHAPTER SEVENTEEN - FACILITATION

Contents

		Page
17.1	AIM	17-1
17.2	ENTRY AND DEPARTURE OF AIRCRAFT	17-1
17.3	ENTRY AND DEPARTURE OF PERSONS AND THEIR BAGGAGE	17-4
	REVISION QUESTIONS	17-7

© Oxford Aviation Services Limited

17.1 AIM

17.1.1 Article 37. The Standards and Recommended Practices on Facilitation contained in Annex 9, are the outcome of Article 37 of the Convention, which provides, inter alia, that the "International Civil Aviation Organisation shall adopt and amend from time to time, as may be necessary, international standards and recommended practices and procedures dealing with..... customs and immigration procedures.... and such other matters concerned with the safety, regularity and efficiency of air navigation as may from time to time appear appropriate". The policy with respect to the implementation by States of the Standards and Recommended Practices on Facilitation is strengthened by Article 22 of the Convention, which expresses the obligation accepted by each Contracting State "to adopt all practicable measures, through the issuance of special regulations or otherwise, 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", and by Article 23 of the Convention, which expresses the undertaking of each Contracting State "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".

17.1.2 Documentation. The documentation required by States for the entry and departure of aircraft, crew and passengers have evolved from the same documentation required for shipping and much of the terminology has been retained. The rapid movement of aircraft and the philosophy of expediting the movement of aircraft, has led to procedures where the old documents are now out of date and where still necessary, have been replaced by electronic data systems and digital transmission systems.

17.2 ENTRY AND DEPARTURE OF AIRCRAFT

17.2.1 General. Government regulations and procedures applicable to the clearance of aircraft shall be no less favourable than those applied to other forms of transportation. Contracting States shall make provision whereby procedures for the clearance of aircraft, including those normally applied for aviation security purposes, as well as those appropriate for narcotics control, will be applied and carried out in such a manner as to retain the advantage of speed inherent in air transport.

17.2.2 Drug Trafficking. The appropriate control authorities of each Contracting State should enter into Memoranda of Understanding with the airlines providing international services to that State and with the operators of its international airports, setting out guidelines for their mutual co-operation in countering the threat posed by international trafficking in narcotics and psychotropic substances. Such Memoranda of Understanding should be patterned after the applicable models developed by the World Customs Organisation for this purpose. In addition, Contracting States are encouraged to conclude Memoranda of Understanding amongst themselves.

© Oxford Aviation Services Limited

17.2.3 **Documents**. No documents other than those provided for in this Chapter, shall be required by the public authorities from operators for the entry and departure of aircraft. **(Note:** It is part of the intention of this provision that standard forms shall not be varied by the inclusion of national markings). Where a Contracting State introduces electronic data interchange (EDI) techniques for a clearance function, authorities should also execute a plan for migration to complete reliance on the electronic system for the exchange of required information with a view towards phasing out the requirement for preparation and exchange of paper documents.

17.2.4 **Health**. In accordance with the International Health Regulations of the World Health Organisation, Contracting States should not interrupt air transport services for health reasons. In cases where, in exceptional circumstances, such service suspensions are under consideration, Contracting States should first consult with the World Health Organisation and the health authorities of the State of occurrence of the disease before taking any decision as to the suspension of air transport services.

17.2.5 **General Declaration.** A general declaration is an internationally recognised form which contains details of the aircraft (Reg Mark and nationality) the flight number, date and place of departure, and destination. It also contains details of the flight routing and the number of crew and passengers boarding and disembarking at the various locations. It contains a health declaration and a certificate signed by the PIC or an authorised agent. It is the eventual aim to eliminate from the general declaration, any reference to passengers. Contracting States will not require the presentation of the General Declaration when this information can be readily obtained in an alternative and acceptable manner. A Contracting State which continues to require the presentation of a General Declaration shall limit its requirements to the items on the form and shall follow the format laid down in in Appendix 1 of Annex 9 (General Declaration).A Contracting State which continues to require the presentation of the General Declaration shall accept it when signed by either the authorised agent or the pilot-in-command, but may, when necessary, require the health section thereof to be signed by a crew member when the General Declaration itself has been signed by a non-crew member. Where Contracting States require the presentation on entry and departure of aircraft of information relating to crew members, such information shall be limited to the number of crew on board. Where the General Declaration continues to be required, this information shall be provided in the column headed "Total number of crew".

17.2.6 **Manifests**. In addition to the General Declaration, Passenger and Cargo manifests are additional internationally recognised documents that detail names of passengers and the nature of goods embarked on the aeroplane. When a Contracting State has eliminated the Passenger Manifest and no longer requires the General Declaration (except for purposes of attestation) it shall accept, at the option of the operator, either a General Declaration or an appropriate attestation, signed by the authorised agent or pilot-in-command, on one page only of the Cargo Manifest. The attestation on the Cargo Manifest can be provided by means of a rubber stamp.

© Oxford Aviation Services Limited

Contracting States shall not normally require the presentation of a Passenger Manifest, but when this type of information is required it may also be provided in an alternative and acceptable manner. In Contracting States where the presentation of a list of passenger names is not required, public authorities should not require more information than the number of passengers embarking or disembarking, as the case may be, and the number going through the airport on the same flight. Where the General Declaration continues to be required, this information should be provided in the column headed "Number of Passengers on this Stage". When information included in the Cargo Manifest can be readily provided in an alternative manner legally acceptable to the competent authorities, Contracting States shall not require the presentation of the Cargo Manifest in writing. A Contracting State which continues to require the presentation of Cargo Manifest shall, apart from the information indicated in the heading of the format of the Cargo Manifest not require more than the air waybill number; the number of packages related to each air waybill number; and the nature of the goods. The Cargo Manifest shall be accepted either when it follows the above-mentioned format, or a clear and understandable format adapted to electronic data-processing techniques.

17.2.7 Mail. Contracting States shall not require the presentation of a written declaration of the mail other than the form AV7 prescribed in the Acts in force of the Universal Postal Union. Operators carrying mail shall, upon the request of the customs authorities, present to them for inspection and return a copy of the aforementioned AV7 mail form in cases where it has not otherwise been made available for customs clearance purposes by the postal authorities.

17.2.8 Passenger baggage. Contracting States shall not require the presentation of a list of the number of pieces of accompanied baggage. Operators carrying baggage shall, upon request from the authorities, provide them with any available information where it is not otherwise been provided for customs clearance purposes by the passenger.

17.2.9 Oral Declaration. An oral (spoken) declaration is acceptable concerning the content of crew and passenger baggage. A random inspection of baggage is acceptable.

17.2.10 Aircraft Stores. There is no requirement for a declaration for stores (oil, fuel, food, expendable equipment) remaining onboard. Some states still require such information and where given is limited to the absolute minimum to simplify clearance.

17.2.11 Outbound Procedures. The following copies of documents (where still required) are to be delivered to the public authorities before departure of the aircraft:

a. two copies of the general declaration

b. two copies of the cargo manifest

c. two copies of a simple stores list

© Oxford Aviation Services Limited

17.2.12 Inbound Procedures. On arrival, Contracting States will not require the PIC of an aircraft, to deliver more than:

a. three copies of the general declaration

b. three copies of the cargo manifest (including unaccompanied baggage)

.c. two copies of a simple stores list.

17.2.13 Completion of Documents. Documents may be typewritten, produced in electronic data form or handwritten providing it is in a legible form.

17.2.14 Advanced Notification of Arrival. Where non-schedule flights are made by an aircraft registered in an ICAO contracting state which wish to land in another contracting state for non traffic purposes (2nd freedom flight), the submission of a flight plan is considered sufficient advanced notification to the State of Landing that the flight is to be conducted. However, the authority of State of Landing will accept that flight providing the flight plan is received at least two hours in advance of the arrival and that landing occurs at a previously designated international airport. Where such addressees are required to be notified (customs, immigration, police etc.) the flight plan is to be addressed to the appropriate authorities of the state concerned.

17.3 ENTRY AND DEPARTURE OF PERSONS AND THEIR BAGGAGE

17.3.1 Compatibility with other forms of transport. Regulations and procedures applied to persons travelling by air shall be no less favourable than those applied to persons travelling by other means of transport. Contracting States shall make provision whereby the procedures for clearance of persons travelling by air, including those normally applied for aviation security purposes, as well as those appropriate for narcotics control, will be applied and carried out in such a manner as to retain the advantage of speed inherent in air transport. No documents other than those provided for in Annex 9 shall be required by Contracting States for the entry into and departure from their territories of visitors.

17.3.2 Crew and other operators' personnel. Contracting States shall ensure that when inspection of crew members and their baggage is required on arrival or departure, such inspection shall be carried out as expeditiously as possible. Contracting States shall provide facilities which will enable crew members of their airlines to obtain without delay and without charge, crew members' certificates (CMC), valid for the crew members' term of employment. (**Note:** The CMC was developed as a card for use for identification purposes by both flight crew and cabin attendants, leaving the crew licences to serve their primary purpose of attesting to the professional qualifications of the flight crew). In the case of airline flight crew and cabin attendants who retain their crew member certificates in their possession when embarking and disembarking, remain at the airport where the aircraft has stopped or within the confines of cities adjacent

© Oxford Aviation Services Limited

thereto, and depart on the same aircraft or their next regularly scheduled flight, each Contracting State shall accept such crew member certificates for temporary admission to the State and shall not require a passport or visa.

Note 1: It is the intent of this provision that a crew member certificate shall be recognized as a satisfactory identity document even if the holder is not a national of the State of Registry of the aircraft on which he serves. It is not desired to discourage Contracting States from issuing such crew member certificates to resident alien crew members if they are willing to do so.

Note 2: The implementation of this permits rapid and efficient disposition of personnel by airlines. The full benefit cannot be derived from these provisions while some States withhold acceptance of them.

17.3.2.1 Non-scheduled operations. Each Contracting State shall extend privileges of temporary admission to flight crew and cabin attendants of an aircraft operated for remuneration or hire but not engaged in scheduled international air services, subject to the requirement that such flight crew and cabin attendants must depart on the aircraft on its first flight out of the territory of the State.

17.3.2.2 Non-operating Crew. When it is necessary for an airline crew member, in the exercise of his duties, to travel to another State as a passenger by any means of transportation in order to join an aircraft, each State shall accept from that crew member, in lieu of a passport and visa for temporary admission and for the necessary freedom of movement within its territory to join such aircraft, a crew member certificate where required, with a document from the crew members' employer certifying the purpose of the journey.

17.3.2.3 Overseas Residency. Contracting States should make arrangements to expedite the admission, for residence in their territories, of ground and flight personnel of foreign airlines operating to or through such territories, to the extent that such personnel are necessary to perform supervisory and technical duties directly connected with the operation of the international air services being performed by such airlines.

17.3.2.4 Maintenance Personnel. Contracting States shall make arrangements to ensure entry without delay into their territories on a temporary basis of technical personnel of foreign airlines 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. In the event of States requiring a guarantee of, for instance, the subsistence in, and return from, such State, this shall be negotiated without delaying the immediate admission of such personnel.

© Oxford Aviation Services Limited

17.3.3 Passenger Requirements. Visitors by air to contracting states are not required to have any additional documentation other than a valid passport and where required, a visa. Some states require additional information from passengers which is gathered in the form of Embarkation/Disembarkation cards. Except in special circumstances, states will not require the collection of individual identity documents from passengers or crew.

17.3.3.1 Public Health. Contracting states may require a medical examination for persons arriving by air from areas infected with plague; cholera; yellow fever, where those persons arrive within the incubation period of the diseases. The International Certificate of Vaccination or Re-vaccination issued by the WHO is acceptable means of evidence of protection against yellow fever.

17.3.4 Admissibility. States will not required exit or entry visas from their own nationals after a visit abroad by air. Where non nationals require visas, operators will be liable to return non admissible passengers to the point of departure at the expense of the carrier.

17.3.5 Deportees. Operators are to be informed where persons are travelling after having been ordered to be removed from the territory of a state. The state should issue a notice to all states en-route and to the state of destination containing:

a. The identity of the deportee

b. The reason for deportation

c. Names of escorts (if any)

d. A risk assessment by a competent authority

© Oxford Aviation Services Limited

REVISION QUESTIONS CHAPTER 17

1. What Annex to the Chicago Convention covers 'Facilitation'?

   a. Annex 6
   b. Annex 9
   c. Annex 12
   d. Annex 15

2. What specifically do the SARPS concerning facilitation address?

   a. Customs and immigration procedures
   b. The provision of radio navigation aids
   c. The establishment of bilateral international agreements
   d. The regulations for the certification of aircraft and aircrew

3. What do the SARPS concerning facilitation hope to achieve?

   a. To permit free and easy access to contracting states by bona-fide aircrew
   b. Expeditious navigation by aircraft between contracting states and the prevention of unnecessary delays by administration
   c. Elimination of customs and immigration formalities for entry into contracting states
   d. Implementation of the Schenngen agreement and the treaty of Rome

4. Which of the following is true?

   a. Because aeroplanes travel faster than other means of mass transport, the C H and I procedures for entry and exit are required to be complementary with regard to speed
   b. All aircrew are exempt from C H and I regulations for entry into contracting states
   c. Regulations governing the clearance of aircraft for C H and I are to be no less favourable than for other means of transport
   d. All licensed aerodromes are customs aerodromes

5. Can electronic data interchange techniques be used to replace paperwork for the entry and exit of aeroplanes, crew, passengers and cargo?

   a. Yes
   b. No

6. Is a General Declaration required?

   a. Yes
   b. No
   c. Yes, if no other acceptable alternative is available
   d. Yes, but may be limited to the agent's attestation only

© Oxford Aviation Services Limited

7. The original documentation required was the General Declaration, a passenger manifest and a cargo manifest. If a state has eliminated the passenger manifest and no longer requires a Gen Dec, is a cargo manifest still required?

a. Yes
b. No
c. No, but a form of attestation is required signed either by the agent or the PIC
d. Yes, and it must be attested by signature and rubber stamp

8. What information concerning crew is to be provided for entry into a contracting state?

a. Name, Date of Birth, Nationality and crew duty, for each crew member
b. Name and crew duty only for each crew member
c. Number of crew on board or on a Gen Dec – total number of crew
d. Name, crew duty, passport number and aircrew licence number

9. What is the purpose of the Crew Member Certificate?

a. To replace the crew licence
b. To negate the need to carry your passport
c. To confirm that you work for an operator whose AOC is issued by a contracting state
d. Identification of crew including cabin attendants

10. If you are working for Aer Lingus but are not an Irish national, can Aer Lingus issue you with a crew member certificate?

a. Yes the document is only a means of identity for aircrew
b. No, the purpose of the document is to replace the passport so must be issued by the state of normal residency of the aircrew member
c. Yes providing you hold the necessary visas and entry permits with your passport
d. Yes providing your passport has been issued by the state of your birth and that is a contracting ICAO state

11. Are contracting states permitted to inspect crew members baggage?

a. Yes, but only to search for narcotics and psychotropic substances
b. Not without the permission and attendance of a member of the embassy or legation staff of the state of registry of the aircraft present
c. Yes, but such inspections shall be carried out expeditiously
d. No

© Oxford Aviation Services Limited

12. You are a 747 Captain. The Captain of the aircraft that went to Cairo this morning has gone sick and his place has been taken by the slip Captain at Cairo. Your operations department tells you to get out to Egypt quickly and books you on an Olympic Airways A300 leaving in 3 hours time. Do you require a passport and visa for Egypt or is your CMC sufficient?

a. Your CMC is sufficient as Egypt is a contracting state
b. You still require a passport and visa because you are travelling as a passenger
c. Your CMC will suffice if Olympic Airways put you on the crew list
d. You will require a passport and visa because the Olympic Airways aeroplane may be forced to divert to another state en route

13. It normally takes 28 days to get a visa to travel to Saudi Arabia. A Virgin 747 on charter to the MoD suffers a failure of the main hum-grimmit gear at Riyadh. The only person who can fix it is Fred Smith, a licensed aircraft engineer working for Virgin at Gatwick. Fred doesn't have a Saudi visa. Would he be permitted temporary entry to Saudi without a visa just to fix the sick Jumbo?

a. Yes, contracting states are required to make arrangements to ensure entry to their territories on a temporary basis for technical personnel to make an aircraft airworthy
b. No, where a state requires a visa there is no compromise

14. You are the pilot of an aeroplane flying charter flights for Sunshine Holidays into and out of the Caribbean. There is only one flight a week. Can you stop over in Antigua for 7 days and then fly out on the next aeroplane?

a. Yes, but you cannot stay for more than 7 days without a visitors visa
b. No, crew of a non-scheduled flight are required to leave the destination state with the aeroplane
c. Yes, but you are not permitted to travel 'beyond the locality ' of the aerodrome
d. Yes, but you must travel back home as a passenger

15. If you enter the UK from the EEC do you need to land at a customs aerodrome?

a. Yes
b. No

16. If you enter the UK from a non-EEC State but en-route you land in France, do you need to land at a customs aerodrome in the UK?

a. Yes, but only if the entry to the EEC was not cleared in France
b. No, because the flight is technically originating in France
c. Yes all flights that originate outside of the EEC must land at customs aerodromes
d. No, you may use another aerodrome if HM Customs and excise approve

© Oxford Aviation Services Limited

17. You are flying to Bermuda and an intoxicated passenger becomes aggressive and threatens a flight attendant when she refuses to supply him with more booze. You authorise the crew to use the minimum necessary force to restrain the passenger. You decide to off load him at Boston. He doesn't have a visa for the USA, are you permitted to land and off load him?

a. No, the US immigration department will refuse him entry and you will have to take him back on board
b. No because your flight plan doesn't include Boston
c. Yes, he has committed an offence against international law (drunk on an aeroplane) and the US will prosecute him
d. Yes, providing you declare an emergency or squawk 7500

18. If a passenger loses his ticket and presents himself for check-in, is the operator legally entitled to refuse to carry him?

a. Yes
b. No, the ticket is incidental and is only a receipt that a contract exists. If the passenger can identify himself and prove that the contract exists by other means he is legally entitled to expect to be supplied with the service which he has paid for
c. Yes, if he has luggage he wants to check in
d. Yes, all passengers must have a ticket (Paris 1919

19. Are passengers and crew required to make a written declaration concerning their 'check in' baggage?

a. Yes
b. No, an oral declaration is acceptable
c. Yes, if the passenger intends an onward journey (ie transitting through)
d. Passengers yes; crew no

20. If still required, how many copies of the documents are required to be delivered to the authorities before the departure of an international flight?

a. 2 copies of the Gen Dec; 2 copies of the cargo manifest; 2 copies of the stores list
b. 3 copies of the Gen Dec; 2 copies of the cargo manifest; 1 copy of the stores list
c. 2 copies of the Gen Dec; 2 copies of the cargo manifest; 1 copy of the stores list
d. 1 copy of the Gen Dec; 1 copy of the cargo manifest; 1 copy of the stores list

© Oxford Aviation Services Limited

21. What is the maximum number of copies of the documents that can be required by a state for an arriving international flight?

a. 2 copies of the Gen Dec; 2 copies of the cargo manifest; 2 copies of the stores list
b. 3 copies of the Gen Dec; 3 copies of the cargo manifest; 2 copies of the stores list
c. 2 copies of the Gen Dec; 3 copies of the cargo manifest; 3 copies of the stores list
d. 3 copies of the Gen Dec; 2 copies of the cargo manifest; 3 copies of the stores list

22. If a person attempts to enter a state for which a visa is required by doesn't have one, who is responsible for returning that person to his state of residency?

a. The Operator
b. The Authority of the State of attempted entry
c. The police in the State of attempted entry
d. ICAO

23. Who is required to be informed where the passengers include deportees?

a. The Commander
b. The Police
c. The Operator
d. ICAO

24. Apart from those required by Q23, who else is the deporting State required to inform about the presence of deportees on an aircraft?

a. All en-route states and the state of destination
b. ECAC (where European nationals are concerned)
c. The JAA, if the Operator is a JAA operator
d. All other passengers on the aeroplane

25. There is a basic philosophy applied to the regulations and procedures for air transport. What is this?

a. That the exercising of the rules and regulations will not unduly delay passengers travelling by air
b. That passengers travelling by air shall not be subjected to regs and procedures less favourably to passengers travelling by other means
c. Rules and regulations must be flexible to cater for the uncertainties of air transport
d. Passengers must be made aware of the requirements of the authorities for strict compliance with the passenger manifest so that in the event of a crash, all the bodies can be accounted for

© Oxford Aviation Services Limited

ANSWERS TO REVISION QUESTIONS FOR CHAPTER 17

1	B	26		51		76	
2	A	27		52		77	
3	B	28		53		78	
4	C	29		54		79	
5	A	30		55		80	
6	C	31		56		81	
7	C	32		57		82	
8	C	33		58		83	
9	D	34		59		84	
10	A	35		60		85	
11	C	36		61		86	
12	A	37		62		87	
13	A	38		63		88	
14	B	39		64		89	
15	B	40		65		90	
16	A	41		66		91	
17	C	42		67		92	
18	B	43		68		93	
19	B	44		69		94	
20	A	45		70		95	
21	B	46		71		96	
22	A	47		72		97	
23	C	48		73		98	
24	A	49		74		99	
25	B	50		75		100	

© Oxford Aviation Services Limited

CHAPTER EIGHTEEN - SEARCH AND RESCUE

Contents

		Page
18.1	DEFINITIONS	18 - 1
18.2	ESTABLISHMENT AND PROVISION OF SEARCH AND RESCUE SERVICE	18 - 1
18.3	CO-OPERATION BETWEEN STATES.	18 - 2
18.4	CO-OPERATION WITH OTHER SERVICES	18 - 3
18.5	OPERATING PROCEDURES	18 - 4
	REVISION QUESTIONS	18 - 13

© Oxford Aviation Services Limited

18.1 INTRODUCTION

18.1.1 The Requirement for SAR. Article 25 of the Chicago Convention obliges all contracting states to provide assistance to aircraft in distress. Annex 12 covers SAR. ICAO also publishes a Search and Rescue Manual (Doc 7333). The alerting service described as part of the Air Traffic Services is one part of the Search and Rescue organisation and serves to alert other agencies of the need to prepare to provide the necessary assistance. The ability of a state to provide SAR services depends to a certain extent upon finance and the historic provision of SAR through the military. Clearly, there will be a difference in the SAR services provided by, for instance, Switzerland and that provided by Bermuda. In one case the nature of the mountainous terrain would tend towards a land based alpine rescue service whereas, the island situation of the other would predicate a maritime search service. In the UK, the SAR service provides long range maritime operations provided by Royal Air Force and Royal Navy units. Land based mountain rescue teams (civilian and military) cover the mountainous and remote areas, and Royal Air Force, Royal Navy, Coast Guard and civilian helicopters provide rescue facilities in coastal and inshore waters.

18.1.2 Areas of Responsibility. Contracting states are required to delineate the areas in which they will provide SAR support. Where possible, the SAR region boundary should coincide with the FIR boundaries of the state. It is imperative that the areas of adjacent states do not overlap. Where a state is unable, due to financial or resources reasons, to provide the required level of support (ie Iceland and Greenland), other states may provide the service. In the case of Iceland, the SAR service is provided by the United States Navy. The RAF provides SAR coverage for Cyprus.

18.1.3 Regional Air Navigation Agreements (RAN). Those portions of the high seas or areas of undetermined sovereignty for which search and rescue service will be established shall be determined on the basis of regional air navigation agreements. A Contracting State having accepted the responsibility to provide search and rescue service in such areas shall thereafter arrange for the service to be established and provided.The phrase "regional air navigation agreements" refers to the agreements approved by the Council of ICAO normally on the advice of Regional Air Navigation Meetings. Where a state has responsibility for Oceanic Control Areas (Shanwick, Gander etc..) in accordance with the RAN, that state is responsible for the provision of SAR services in the OCA. The United Kingdom provides long range coverage for the Irish Republic which shares responsibility for Shanwick. .

18.2 DEFINITIONS AND ABBREVIATIONS

18.2.1 Definitions. The following definitions are required knowledge.

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

© Oxford Aviation Services Limited

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

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

d. **Operator.** A person, organisation or enterprise engaged in or offering to engage in an aircraft operation.

e. **Pilot-in-command (PIC).** The pilot responsible for the operation and safety of the aircraft during flight time.

f. **Radio direction-finding station.** A radio station intended to determine only the direction of other stations by means of transmissions from the latter.

g. **Rescue co-ordination centre (RCC).** A unit responsible for promoting efficient organisation of search and rescue service and for co-ordinating the conduct of search and rescue operations within a search and rescue region.

h. **Rescue unit.** A unit composed of trained personnel and provided with equipment suitable for the expeditious conduct of search and rescue.

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

k. **Uncertainty phase**. A situation wherein uncertainty exists as to the safety of an aircraft and its occupants.

18.2.2 Abbreviations. The following abbreviations are used in the regional navigation plans with regard to SAR facilities:

a. **ELR - extra long range**. Search aircraft with a radius of action of 1 500 nm or more with 2½ hours search remaining.

b. **VLR - very long range**. Search aircraft with a radius of action of 1 000 nm or more with 2½ hours search remaining.

c. **LR - long range**. Search aircraft with a radius of action of 750 nm or more with 2½ hours search remaining.

d. **MRG - medium range**. Search aircraft with a radius of action of 400 nm or more with 2½ hours search remaining.

e. **SRG - short range**. Search aircraft with a radius of action of 150 nm or more with ½ hours search remaining.

© Oxford Aviation Services Limited

f. **HEL-M - medium helicopter.** Helicopter with (in normal circumstances) a radius of action 100 - 200 nm and the capacity to evacuate 6 - 15 persons.

g. **HEL -H - heavy helicopter**. Helicopter with (in normal circumstances) a radius of action more than 200 nm and the capacity to evacuate more than 15 persons.

h. **RB - rescue boat**. Short range coastal or river craft with a speed approaching 14 kt or better.

j. **RV - rescue vessel**. Vessel of sea going qualities, long range and reasonable speed.

k. **PRU** - parachute rescue unit.

l. **MRU** - mountain rescue unit.

m. **AMVER** - automated mutual assistance vessel rescue system.

n. **Greenpos** - Greenland ship position reporting system.

18.3 ESTABLISHMENT AND PROVISION OF SEARCH AND RESCUE SERVICE

18.3.1 Basis of Establishment. Contracting States shall arrange for the establishment and provision of search and rescue services within their territories. Such services shall be provided on a 24-hour basis. In providing assistance to aircraft in distress and to survivors of aircraft accidents, Contracting States shall do so regardless of the nationality of such aircraft or survivors.

18.3.2 Establishment of search and rescue regions. Contracting States shall delineate the search and rescue regions within which they will provide search and rescue service. Such regions shall not overlap. Boundaries of search and rescue regions should, in so far as is reasonably practicable, be coincident with the boundaries of corresponding flight information regions.

18.3.3 Establishment and designation of search and rescue service units. Contracting States shall establish a rescue co-ordination centre (RCC) in each search and rescue region. Contracting States should establish rescue sub-centres whenever this would improve the efficiency of search and rescue services. In areas where public telecommunications facilities would not permit persons observing an aircraft in emergency to notify the rescue co-ordination centre concerned directly and promptly, Contracting States should designate suitable units of public or private services as alerting posts.

© Oxford Aviation Services Limited

18.4 CO-OPERATION BETWEEN STATES.

18.4.1 Requirement. Contracting States shall co-ordinate their search and rescue organisations with those of neighbouring Contracting States. Contracting States should, in so far as practicable, develop common search and rescue procedures to facilitate co-ordination of search and rescue operations with those of neighbouring States. Subject to such conditions as may be prescribed by its own authorities, a Contracting State shall permit immediate entry into its territory of rescue units of other States for the purpose of searching for the site of aircraft incidents and rescuing survivors of such accidents. The authorities of a Contracting State which wishes its rescue units to enter the territory of another Contracting State for search and rescue purposes shall transmit a request, giving full details of the projected mission and the need for it, to the rescue co-ordination centre of the State concerned or to such other authority as has been designated by that State. The authorities of Contracting States shall:

a. immediately acknowledge the receipt of such a request, and

b. as soon as possible indicate the conditions, if any, under which the projected mission may be undertaken;

18.4.2 Agreement with other states. Contracting States should enter into agreements with neighbouring States setting forth the conditions for entry of each others rescue units into their respective territories. These agreements should also provide for expediting entry of such units with the least possible formalities. Each Contracting State should authorise its rescue co-ordination centres to:

a. request from other rescue co-ordination centres such assistance, including aircraft, vessels, personnel or equipment, as may be needed;

b. grant any necessary permission for the entry of such aircraft, vessels, personnel or equipment into its territory; and

c. make the necessary arrangements with the appropriate customs, immigration or other authorities with a view to expediting such entry.

18.4.2.1 Assistance to other states. Each Contracting State should authorise its rescue co-ordination centres to provide, when requested, assistance to other rescue co-ordination centres, including assistance in the form of aircraft, vessels, personnel or equipment.

18.4.2.2 Mutual training. Contracting States should make arrangements for joint training exercises involving their search and rescue units, those of other States and operators, in order to promote search and rescue efficiency.

© Oxford Aviation Services Limited

18.4.2.3 Periodic Liaison. Contracting States should make arrangements for periodic liaison visits by personnel of their rescue co-ordination centres and subcentres to the centres of neighbouring States.

18.5 CO-OPERATION WITH OTHER SERVICES

18.5.1 Non SAR Organisations. Contracting States shall arrange for all aircraft, vessels and local services and facilities which do not form part of the search and rescue organisation to co-operate fully with the latter in search and rescue and to extend any possible assistance to the survivors of aircraft accidents. Contracting States shall ensure that their search and rescue services co-operate with those responsible for the care of those who suffered from the accident.

18.5.2 Satellite systems. States shall designate a search and rescue point of contact (SPOC) for the receipt of COSPAS-SARSAT distress data.

18.6 OPERATING PROCEDURES

18.6.1 Information concerning emergencies. Contracting States should encourage any person observing an accident or having reason to believe that an aircraft is in an emergency to give immediately all available information to the appropriate alerting post or to the rescue co-ordination centre concerned. Any authority or any element of the search and rescue organisation having reason to believe that an aircraft is in an emergency shall give immediately all available information to the rescue co-ordination centre concerned. Rescue co-ordination centres shall, immediately upon receipt of information concerning aircraft in emergency, evaluate such information and determine the extent of the operation required. When information concerning aircraft in emergency is received from other sources than air traffic service units, the rescue co-ordination centre shall determine to which emergency phase the situation corresponds and shall apply the procedures applicable to that phase.

18.6.1.1 Uncertainty phase. During the uncertainty phase, the rescue co-ordination centre shall co-operate to the utmost with air traffic services units and other appropriate agencies and services in order that incoming reports may be speedily evaluated.

18.6.1.2 Alert phase. Upon the occurrence of an alert phase the rescue co-ordination centre shall immediately alert the appropriate search and rescue services units and rescue units and initiate any necessary action.

18.6.1.3 Distress phase. When an aircraft is believed to be in distress, or when a distress phase exists, the rescue co-ordination centre shall (the order in which these actions are described shall be followed unless circumstances dictate otherwise):

a. initiate action by appropriate search and rescue services units in accordance with the detailed plan of operation;

© Oxford Aviation Services Limited

b. ascertain the position of the aircraft, estimate the degree of uncertainty of this position and, on the basis of this information and the circumstances, determine the extent of the area to be searched;

c. notify the operator, where possible, and keep him informed of developments;

d. notify adjacent rescue co-ordination centres, the help of which seems likely to be required, or which may be concerned in the operation;

e. notify the associated air traffic services unit, when the information on the emergency has been received from another source;

f. request at an early stage such aircraft, vessels, coastal stations, or other services not specifically included in a) as are in a position to do so, to:

g. maintain a listening watch for transmission from the aircraft in distress or from an emergency locator transmitter; (**Note:** The frequencies contained in the specifications for emergency locator transmitter (ELT) 121.5Mhz and 406Mhz).

h. assist the aircraft in distress as far as practicable;

j. inform the rescue co-ordination centre of any developments;

k. from the information available, draw up a plan for the conduct of the search and/or rescue operation required and communicate such plan for the guidance of the authorities immediately directing the conduct of such an operation;

l. amend as necessary, in the light of circumstances, the guidance already given in g)

m. notify the State of Registry of the aircraft;

n. notify the appropriate accident investigation authorities.

18.6.2 Procedures for pilot-in-command intercepting a distress transmission. Whenever a distress signal and/or message or equivalent transmission is intercepted on radiotelegraphy or radiotelephony by a pilot-in-command of an aircraft, he shall;

a. record the position of the craft in distress if given;

b. if possible take a bearing on the transmission;

c. inform the appropriate rescue co-ordination centre or air traffic services unit of the distress transmission, giving all available information;

© Oxford Aviation Services Limited

d. at his discretion, while awaiting instructions, proceed to the position given in the transmission.

18.6.3 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, he shall, unless he is unable, or in the circumstances of the case considers it unreasonable or unnecessary:

a. keep in sight the aircraft in distress until such time as his presence is no longer necessary;

b. if his position is not known with certainty, take such action as will facilitate the determination of it;

c. report to the rescue co-ordination centre or air traffic services unit as much of the following information as possible:

i. type of craft in distress, its identification and condition;

ii. its position expressed in geographical co-ordinates or in distance and true bearing from a distinctive landmark, or from a radio navigation aids;

iii. time of observation expressed in hours and minutes GMT (UTC);

iv. number of persons observed;

v. whether persons have been seen to abandon the craft in distress;

vi. number of persons observed to be afloat;

vii. apparent physical condition of survivors;

d. act as instructed by the rescue co-ordination centre or the air traffic services unit.

18.6.3.1 First Aircraft on Scene. If the first aircraft to reach the scene of an accident is not a search and rescue aircraft the PIC of that aircraft shall take charge of on-scene activities of all other aircraft subsequently arriving until the first dedicated search and rescue aircraft reaches the scene of the accident. If, in the meantime, the aircraft is unable to establish communication with the appropriate rescue co-ordination centre or air traffic services unit, it shall, by mutual agreement, hand over to an aircraft capable of establishing and maintaining such communications until the arrival of the first search and rescue aircraft.

© Oxford Aviation Services Limited

18.6.3.2 Direction of Surface Craft. When it is necessary for an aircraft to direct a surface craft to the place where an aircraft or surface craft is in distress, the aircraft shall do so by transmitting precise instructions by any means at its disposal. All ships at sea maintain a radio watch on the HF Maritime Distress and calling frequency 2 182 Khz (2.182 Mhz). In coastal waters, all shipping maintains a watch on VHF FM Chan 16. Aircraft do not normally carry VHF FM transmitters but may be able to relay through Coast Guard units or coastal radio stations. If no radio communication can be established the aircraft shall use the appropriate signal to attract the attention of the vessel (See para 18.6.5 below). If the PIC can identify the vessel by name and port of registration (painted on the stern), the RCC can pass messages to the vessel through the maritime communications system.

18.6.4 Communication with Survivors. When it is necessary for an aircraft to convey information to survivors or surface rescue units, and two way communication is not available, it shall, if practicable, drop communication equipment that would enable direct contact to be established, or convey the information by dropping the message. When a ground signal has been displayed, the aircraft shall indicate whether the signal has been understood or not, or if this is not practicable, by use of the appropriate signal.

18.6.5 Signals with surface aircraft The following manoeuvres performed in sequence by an aircraft mean that the aircraft wishes to direct a surface craft towards an aircraft or a surface craft in distress (repetition of such manoeuvres has the same meaning):

a. circling the surface craft at least once;

b. crossing the projected course of the surface craft close ahead at low altitude and:

i. rocking the wings; or

ii. opening and closing the throttle; or

iii. changing the propeller pitch.

Note: Due to high noise level on board surface craft, the sound signals in ii) and iii) may be less effective than the visual signal in i) and are regarded as alternative means of attracting attention.

c. heading in the direction in which the surface craft is to be directed.

18.6.5.1 Assistance no longer required. The following manoeuvre by an aircraft means that the assistance of the surface craft to which the signal is directed is no longer required:

a. crossing the wake of the surface craft close astern at a low altitude and:

© Oxford Aviation Services Limited

i. rocking the wings; or

ii. opening and closing the throttle; or

iii. changing the propeller pitch.

18.6.6 Search and rescue signals. The signals detailed below shall when used, have the meaning indicated therein. They shall be used only for the purpose indicated and no other signals likely to be confused with them shall be used. Upon observing any of the signals, aircraft shall take such action as may be required by the interpretation if the signal.

18.6.6.1 Ground-Air visual signal code. In order to communicate basic messages and instructions from ground parties to aircraft, an internationally agreed system of signals has been established. There are two sets: Signals from crash survivors; signals from search teams.

18.6.6.2 Ground air visual signal code for use by survivors. The following signals may be set out in some form (marked in snow, oil on sand, burned grass in open areas) to ask for help.

No.	Message	Code Symbol
1	Require assistance	V
2	Require medical assistance	X
3	No or Negative	N
4	Yes or affirmative	Y
5	Proceed in this direction	←

Table 18.6.6.2 Ground/Air signal from survivors

18.6.6.3 Ground-air visual signal code for use by rescue units. Where search parties do not have two-way radio contact with the RCC, or where they are co-operating with aircraft without RTF, the following signals can be used by making the signals in the same manner as that used by survivors:

© Oxford Aviation Services Limited

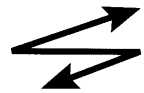
No.	Message	Code Symbol
1	Operation completed	LLL
2	We have found all personnel	LL
3	We have found only some personnel	+ +
4	We are not able to continue. Returning to base	XX
5	Have divided into two groups. Each proceeding in direction indicated.	
6	Information received that aircraft is in this direction	
7	Nothing found. Will continue to search	NN

Table 18.6.6.3 Ground/Air from search parties

18.6.6.4 Air to ground signals. To indicate that the ground signals have been understood (lack of the above signal indicates that the ground signal is not understood), during the hours of daylight rock the aircraft's wings; during the normal 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.

18.6.7 Marking of droppable supplies. Packages of supplies to survivors may be dropped from aircraft. In such circumstances the content of the packages is to be indicated by the attachment of colour coded streamers. Doc 7333 specifies the following:

a. Red — Medical supplies and first aid equipment

b. Blue — Food and water.

c. Yellow — Blankets and protective clothing

d. Black — Miscellaneous equipment such as stoves, axes, cooking utensils, etc..

© Oxford Aviation Services Limited

18.7 SAR COMMUNICATIONS

18.7.1 Applicability. Perhaps the most important role that a civilian aircraft can play in the initial stages of a search and rescue operation is that of relaying communications. Dedicated SAR aircraft (RAF Nimrod; USN, Dutch, Norwegian, Spanish P3 Orion; Canadian Aurora; French, Italian, German Atlantique), have sophisticated communications systems including VLF, MF, HF, VHF, UHF and Satcom. However, with HF and VHF, a civilian airliner is a useful asset as a platform for communications with the RCC or to relay through OCA radio stations. The following is a list of RTF frequencies allocated to Emergency and SAR communications:

Frequency	Application	Modulation	Silence Periods
500 kHz*	MF International distress safety and calling	CW morse	H+15; H+45
2 182 kHz	HF International distress safety and calling	AM voice	H+00; H+30
4 125 kHz	Air/Ship HF SAR	AM voice	none
3 023 kHz 5680 kHz	SAR scene of search HF	AM voice	none
8 364 kHz	Lifeboat HF	AM voice	none
121.500 mHz	International aeronautical distress	AM voice	none
156.8 mHz*	VHF maritime distress (channel 16)	FM voice	none
123.100 mHz	Aeronautical SAR scene of search VHF	AM voice	none
243.000 mHz	International aeronautical distress UHF	AM voice	none
406 mHz*	Emergency locator beacon (As of 1 Jan 02, simultaneous transmission on 121.5mHz)	AM (sweeping tone repeated. Some may have voice capability)	none

Table 18.7.1 SAR frequencies (* denotes not usually capable of being transmitted from aircraft)

18.7.2 Communications procedure. If a civilian aircraft is diverted to SAR duty, the PIC should either contact the operator directly (on company frequency) or request that ATC relays his intentions. At the earliest opportunity the PIC should inform the RCC (or the ATCU) what the endurance of the aircraft is assuming a diversion to the nearest suitable aerodrome. When attempting to communicate with surface vessels by RTF, transmission should be addressed to the vessel as follows:

© Oxford Aviation Services Limited

"British tanker Esso Venture, this is aircraft GCRFM on 2182 over"

If the vessel is a warship initially try 121.5 mHz (they usually have to speak to helicopters).

"Warship F123 this is aircraft GCRFM on 121.5 over"

If the vessel is registered in say Pireaus and responds in Greek, don't give up, you may have somebody on board who speaks the language!

© Oxford Aviation Services Limited

REVISION QUESTIONS CHAPTER 18

1. During what period is a state required to provide a Search and Rescue service to aeroplanes flying in its area of responsibility?

   a. During day light hours
   b. From 2 hours before the first flight enters the FIR until 2 hours after the last flight leaves
   c. On a 24 hour basis; 365 days per year
   d. When a SAR incident is in progress

2. Can a state be required to provide a SAR service for areas of the high seas?

   a. Yes
   b. No
   c. Yes, but only for areas of the high seas within a FIR
   d. No, ICAO provides SAR over the high seas

3. Where SAR regions overlap, who provides the SAR service?

   a. Both states
   b. ICAO
   c. Irrelevant – SAR regions do not overlap
   d. Whichever state is notified first

4. What is required to be established in each SAR region?

   a. A Rescue Co-ordination Centre (RCC)
   b. Helicopter SAR units
   c. SAR communications networks
   d. Close liaison between the SAR organisation and the ATCUs

5. Can one state assume the SAR responsibility for another state?

   a. No, each state is legally obliged to provide a SAR service
   b. Yes, a state can delegate the provision of SAR services to another state
   c. Yes, but only where the state shows that it is financially unable to support an efficient SAR service
   d. Yes, where the extremities of the states SAR region is well outside of the normal operating range of its dedicated SAR aeroplanes

© Oxford Aviation Services Limited

6. You are flying over the North Atlantic and you hear a Mayday call on the Shanwick HF frequency. Shanwick acknowledges it and asks you to help. You arrive on the scene to find the aircraft in distress has ditched and there are survivors in the water. What do you do?

   a. Stay until the dedicated SAR aircraft arrives
   b. Take charge as Scene of Action commander and allocate tasks to other aircraft that arrive to assist
   c. Act as a comms link to Shanwick – there is little else you can do
   d. Call your operator on company HF frequency and ask if you can assist

7. If you intercept a distress message what are you required to do?

   a. Listen to the frequency and if nobody on the ground answers ask for a repeat and copy it down
   b. call the aircraft in distress and ask if you can help
   c. Log the position, get a DF bearing if possible, inform the ATCC or the RCC giving all available information
   d. Listen out for 5 minutes, if there are no further calls, ignore it – it was probably spurious

8. What frequency is the VHF aeronautical distress frequency?

   a. 123.0Mhz
   b. 121.0Mhz
   c. 119.1Mhz
   d. 121.5Mhz

9. What frequency is the international HF maritime distress and calling frequency?

   a. 5695 Khz
   b. 2182 Khz
   c. 3095 Khz
   d. 406 Mhz

10. What frequency is the UHF distress frequency?

   a. 243 Mhz
   b. 300 Mhz
   c. 406 Mhz
   d. 225 Mhz

© Oxford Aviation Services Limited

11. What frequencies are monitored by the COSPAS ELT system?

a. 121.5 Mhz and 243 Mhz
b. 121.5 Mhz and 406 Mhz
c. 243 Mhz and 406 Mhz
d. Only 406 Mhz

12. Which of the following is **NOT** a SAR ground to air signal?

a. Z
b. N
c. V
d. R

13. If you see a signal from the air during the day, how can you acknowledge that you have seen it?

a. Flash the letter "R" in morse on your landing lamps
b. Switch your navigation lights on and off
c. Rock your wings
d. Change the engine noise

14. What is the Annex of the Chicago Convention that covers SAR?

a. Annex 10
b. Annex 12
c. Annex 14
d. Annex 16

15. What does the ground signal **LL** mean ?

a. Mission completed
b. Returning to base
c. All personnel found
d. Resting for lunch

16. If you wished to drop food and water to survivors, what colour streamer would you attach to the canister?

a. Red
b. Blue
c. Black
d. Green

© Oxford Aviation Services Limited

17. What does the abbreviation ELR mean?

a. Extra Long Range
b. Electronic Location Receiver
c. Emergency Listening Receiver
d. Emergency Location Radar

18. If you are the first aeroplane to arrive at the scene of an incident and you see survivors and/or wreckage in the water, what should you do?

a. Search the immediate area for surface vessels and if found, direct the vessel to the survivors
b. Keep the survivors in sight at all times until relieved by another aircraft or surface vessel
c. Climb as high as possible and report what you have seen to the ATCU
d. Stay long enough to be sure that the survivors were aware that you have seen them and then continue en-route

© Oxford Aviation Services Limited

ANSWERS TO REVISION QUESTIONS FOR CHAPTER 18

1	C	26		51		76	
2	A	27		52		77	
3	C	28		53		78	
4	A	29		54		79	
5	B	30		55		80	
6	B	31		56		81	
7	C	32		57		82	
8	D	33		58		83	
9	B	34		59		84	
10	A	35		60		85	
11	B	36		61		86	
12	D	37		62		87	
13	C	38		63		88	
14	B	39		64		89	
15	C	40		65		90	
16	B	41		66		91	
17	A	42		67		92	
18	B	43		68		93	
19		44		69		94	
20		45		70		95	
21		46		71		96	
22		47		72		97	
23		48		73		98	
24		49		74		99	
25		50		75		100	

© Oxford Aviation Services Limited

CHAPTER NINETEEN - SECURITY

Contents

		Page
19.1	AIMS AND OBJECTIVES	19 - 1
19.2	ORGANISATION	19 - 1
19.3	PREVENTATIVE SECURITY MEASURES.	19 - 3
19.4	MANAGEMENT OF RESPONSE TO ACTS OF UNLAWFUL INTERFERENCE...	19 - 4
19.5	FURTHER SECURITY INFORMATION	19 - 5

© Oxford Aviation Services Limited

19.1 AIMS AND OBJECTIVES

19.1.1 General. The aim of aviation security shall be to safeguard international civil aviation operations against acts of unlawful interference. Safety of passengers, crew, ground personnel and the general public shall be the primary objective of each Contracting State in all matters related to safeguarding against acts of unlawful interference with international civil aviation.

19.1.2 Organisation. Each Contracting State shall establish an organisation, develop plans and implement procedures, which together provide a standardized level of security for the operation of international flights in normal operating conditions and which are capable of rapid expansion to meet any increased security threat.

19.1.3 Facilitation. Each Contracting State should whenever possible arrange for the security measures and procedures to cause a minimum of interference with, or delay to the activities of, international civil aviation.

19.2 ORGANISATION

19.2.1 National Organisation. Each Contracting State shall:

a. establish a national civil aviation security programme

b. ensure that the objective of their national civil aviation security programme is to safeguard international civil aviation operations against unlawful interference, through regulations, practices and procedures which take account of the safety, regularity and efficiency of flights.

c. designate an appropriate authority within its administration to be responsible for the development, implementation and maintenance of the national civil aviation security programme.

d. specify to ICAO the appropriate authority designated

e. keep under constant review, the level of threat within its territory taking into account the international situation and adjust relevant elements of its national civil aviation security programme accordingly.

f. require the appropriate authority to establish means of co-ordinating activities between the departments, agencies and other organisations of the State concerned with or responsible for, various aspects of the national civil aviation security programme.

© Oxford Aviation Services Limited

g. require the appropriate authority to define and allocate the tasks for implementation of the national civil aviation security programme as between agencies of the State, airport administrations, operators and others concerned.

h. ensure the establishment of an airport security programme, adequate to the needs of international traffic, for each airport serving international civil aviation.

j. make available to its airport administrations, airlines operating in its territory and others concerned, a written version of the appropriate parts of its national civil aviation security programme.

k. arrange for an authority at each airport serving international civil aviation to be responsible for co-ordinating the implementation of security measures.

l. arrange for the establishment of airport security committees to advise on the development and co-ordination of security measures and procedures at each airport serving international civil aviation.

m. ensure that arrangements are made for the investigation of suspected sabotage devices or other potential hazards at airports serving international civil aviation and for their disposal.

n. ensure that duly authorised and suitably trained officers are readily available for development at their airports serving international civil aviation to assist in dealing with suspected, or actual, cases of unlawful interference with international civil aviation.

p. ensure that the appropriate authority arranges for the supporting facilities required by the security services at each airport serving international civil aviation.

q. ensure that the contingency plans are developed and resources made available to safeguard airports and ground facilities used in international civil aviation, against acts of unlawful interference.

r. require the appropriate authority to ensure the development and implementation of training programmes to ensure the effectiveness of its national civil aviation security programme.

s. ensure that persons engaged to implement security controls are subject to pre-employment checks, are capable of fulfilling their duties and are adequately trained.

© Oxford Aviation Services Limited

t. require operators providing service from the State to implement a security programme appropriate to meet the requirements of the national civil aviation security programme of the State.

u. promote research and development of new security equipment which will better satisfy international civil aviation security objectives.

19.2.2 International co-operation. The most effective means of combatting international terrorism is to act within a co-ordinated framework and to common standards. Each contracting state is therefore required:

a. To co-operate with other States in order to adapt their respective national civil aviation security programmes as necessary.

b. To make available to other States on request a written version of the appropriate parts of its national civil aviation security programme.

c. To include in its bilateral agreements on air transport, a clause related to aviation security.

d. To ensure that requests from other states for special security measures in respect of a specific flight or specified flights by operators of such other States, as far as may be practicable, are met.

e. To co-operate with each other in the development and exchange of information concerning training programmes.

f. To co-operate with other States in the field of research and development of new security equipment which will better satisfy international civil aviation security objectives.

19.3 PREVENTATIVE SECURITY MEASURES.

19.3.1 Weapons etc.. Each contracting state shall establish measures to prevent weapons, explosives or any other dangerous devices which may be used to commit an act of unlawful interference, the carriage or bearing of which is not authorised, from being introduced, by any means whatsoever, on board an aircraft engaged in international civil aviation. **Note:** In applying this standard, special attention must be paid to the threat posed by explosive devices concealed in, or using electric, electronic or battery operated items carried as hand baggage and/or in checked baggage. Each Contracting State shall:

a. ensure that pre-flight checks of originating aircraft assigned to international flights include measures to discover suspicious objects or anomalies that could conceal weapons, explosives or any other dangerous devices;

© Oxford Aviation Services Limited

b. establish procedures, which include notification to the operator, for inspecting aircraft, when a well-founded suspicion exists that the aircraft may be the object of an act of unlawful interference, for concealed weapons, explosives or other dangerous devices;

c. establish measures to safeguard aircraft when a well-founded suspicion exists that the aircraft may be attacked while on the ground and to provide as much prior notification as possible of the arrival of such aircraft to airport authorities;

d. arrange for surveys to identify security needs, arrange for inspections of the implementation of security controls, and arrange tests of security controls to assess their effectiveness.

19.3.1.1 Law Enforcement Officers. Contracting States should ensure that the carriage of weapons on board aircraft, by law enforcement officers and other authorised persons, acting in the performance of their duties, requires special authorisation in accordance with the laws of the States involved. The pilot-in-command is notified as to the number of armed persons and their seat location.

19.3.1.2 Other weapons. The carriage of weapons in other cases is allowed only when an authorised and duly qualified person has determined that they are not loaded, if applicable, and then only if stowed in a place inaccessible to any person during flight time.

19.3.2 Passengers and their baggage. Each contracting state is required to ensure that adequate measures exists to control the transfer and transit of passengers and their cabin baggage to prevent unauthorised article being taken on board aircraft engaged in international civil aviation.

19.3.2.1 Segregation of passengers. States are to ensure that there is no possibility of mixing or contact between passengers subjected to security control and other persons not subjected to security control, after the security screening at airports has been applied. If mixing does occur, the passengers and their baggage will be re-screened before boarding an aeroplane.

19.3.2.2 Deportees and persons in custody. States are required to establish procedures to ensure that the operator and the PIC are informed when deportees and persons in custody are travelling so that the appropriate security measures can be enforced. Operators are to ensure that procedures are detailed for the carriage of deportees and persons in custody.

19.3.3 Checked baggage and other goods. States are required to establish measures to ensure that operators do not transport the baggage of passengers who are not on board the aeroplane unless the baggage is stowed in separate compartments from the passengers, and it has been the subject of other security control measures.

© Oxford Aviation Services Limited

19.3.4 Access. States are required to establish procedures and identification systems to prevent unauthorised access by persons or vehicles to the airside of an aerodrome serving international civil aviation, and other areas of importance to the security of the aerodrome (ie ATC etc..).

19.4 MANAGEMENT OF RESPONSE TO ACTS OF UNLAWFUL INTERFERENCE

19.4.1 Safety of Passengers and Crew. Each Contracting 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.

19.4.2 Air Traffic Control. Each Contracting State responsible for providing air traffic services for an aircraft which is the subject of an act of unlawful interference shall collect all pertinent information on the flight of that aircraft and transmit that information to all other State responsible for the Air Traffic Services units concerned, including those at the airport of known or presumed destination, so that timely and appropriate safeguarding action may be taken en route and at the aircraft's known, likely or possible destination. Each Contracting State should ensure that information received as a consequence of action taken is distributed locally to the Air Traffic Services units concerned, the appropriate airport administrations, the operator and others concerned as soon as practicable.

19.4.3 Provision of assistance. Each Contracting State shall provide such assistance to an aircraft subjected to an act of unlawful seizure, including the provision of navigation aids, air traffic services and permission to land as may be necessitated by the circumstances.

19.4.4 Detention on the ground. Each Contracting State shall take measures, as it may find practicable, to ensure that an aircraft subjected to an act of unlawful seizure which has landed in its territory is detained on the ground unless its departure is necessitated by the overriding duty to protect human life, recognizing the importance of consultations, wherever practicable, between the State where that aircraft has landed and the State of the operator of the aircraft, and notification by the State where the aircraft has landed to the States of assumed or stated destination.

19.5 FURTHER SECURITY INFORMATION .

19.5.1 Other Annexes and Documents. The content of other ICAO Annexes and Documents relates directly to security. The student is required to revise the following.

© Oxford Aviation Services Limited

19.5.2 Extracts from Annex 2 - Rules of the Air

a. **Unlawful interference**. An aircraft which is being subjected to unlawful interference shall endeavour to notify the appropriate ATS unit of this fact, any significant circumstances associated therewith and any deviation from the current flight plan necessitated by the circumstances, in order to enable the ATS unit to give priority to the aircraft and to minimise conflict with other aircraft. The following procedures are intended as guidance for use by aircraft when unlawful interference occurs and the aircraft is unable to notify an ATS unit of this fact.

b. **Action by PIC.** Unless considerations aboard the aircraft dictate otherwise, the pilot-in-command should attempt to continue flying on the assigned track and at the assigned track and at the assigned cruising level at least until able to notify an ATS unit or within radar coverage.

c. **Departure from assigned track.** 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, wherever possible:

i. attempt to broadcast warnings on the VHF emergency frequency and other appropriate frequencies, unless considerations aboard the aircraft dictate otherwise. Other equipment such as on-board transponders, data links, etc should also be used when it is advantageous to do so and circumstances permit; and

ii. proceed in accordance with applicable special procedures for in-flight contingencies, where such procedures have been established and promulgated

iii. if not applicable regional procedures have been established, proceed at a level which differs from the cruising levels normally used for IFR flight in the area by 300m (1,000ft) if above FL290 or by 150m (500ft) if below FL290.

19.5.3 Extracts from Annex 6 - Operation of Aircraft (Part I - International Commercial Air Transport).

19.5.3.1 Security of the flight crew compartment. In all aeroplanes which are equipped with a flight crew compartment door, this door shall be capable of being locked. It shall be lockable from within the compartment only.

© Oxford Aviation Services Limited

19.5.3.2 Aeroplane search procedure checklist. An operator shall ensure that there is on board a checklist of the procedures to be followed in searching for a bomb in case of suspected sabotage. The checklist shall be supported by guidance on the course of action to be taken should a bomb or suspicious object be found and information on the least risk bomb location specific to the aeroplane.

19.5.3.4 Training programmes. An operator shall establish and maintain a training programme which enables crew members to act in the most appropriate manner to minimize the consequences of acts of unlawful interference. An operator shall also establish and maintain a training programme to acquaint appropriate employees with preventive measures and techniques in relation to passengers, baggage, cargo, mail, equipment, stores and supplies, intended for carriage on an aeroplane so that they contribute to the prevention of acts of sabotage or other forms of unlawful interference.

19.5.3.5 Reporting acts of unlawful interference. Following an act of unlawful interference the pilot-in-command shall submit, without delay, a report of such an act to the designated local authority.

19.5.3.6 Least Risk-bomb Location. Specialised means of attenuating and directing the blast should be provided for use at the least-risk bomb location.

19.5.3.7 Carriage of Weapons. Where an operator accepts the carriage of weapons removed from passengers, the aeroplane should have provision for stowing such weapons in a place so that they are inaccessible to any person during flight time.

19.5.4 Extracts from Annex 9 - Facilitation

19.5.4.1 Transit and Transfer of Passengers and Crew. Contracting States should ensure that physical facilities at airports are provided, where the volume and nature of the traffic so require, whereby crew and passengers in direct transit on the same aircraft, or transferring to other flights, may remain temporarily without being subject to inspection formalities, except for aviation security measures, or in special circumstances. **Note:**This provision is not intended to prevent the application of appropriate narcotics control measures.

19.5.5 Extracts from the procedures for air navigation services - Rules of the Air and Air Traffic Services (DOC 4444)

19.5.5.1 Emergency procedures. The various circumstances surrounding each emergency situation preclude the establishment of exact detailed procedures to be followed. The procedures outlined herein are intended as a general guide to air traffic services personnel. Air traffic control units shall maintain full and complete co-ordination, and personnel shall use their best judgement in handling emergency situations. To indicate that it is in a state of emergency, an aircraft equipped with an SSR transponder might operate the equipment as follows:

© Oxford Aviation Services Limited

a. on Mode A, Code 7700; or

b. on Mode A, Code 7500, to indicate specifically that it is being subjected to unlawful interference.

19.5.5.2 Priority. An aircraft known or believed to be in a state of emergency, including being subjected to unlawful interference, shall be given priority over other aircraft.

19.5.5.3 Unlawful interference. Air traffic services personnel shall be prepared to recognize any indication of the occurrence of unlawful interference with an aircraft.

19.5.5.4 Verification of special SSR codes. Whenever unlawful interference with an aircraft is suspected, and where automatic distinct display of SSR Mode A Code 7500 and Code 7700 is not provided, the radar controller shall attempt to verify his suspicion by setting the SSR decoder to Mode A Code 7500 and thereafter to Code 7700. An aircraft equipped with an SSR transponder is expected to operate the transponder on Mode A Code 7500 to indicate specifically that it is the subject of unlawful interference. The aircraft may operate the transponder on Mode A Code 7700, to indicate that it is threatened by grave and imminent danger, and requires immediate assistance.

19.5.5.5 ATC Response. Whenever unlawful interference with an aircraft is known or suspected, ATS units shall promptly attend to requests by or to anticipated needs of the aircraft, including requests for relevant information relating to air navigation facilities, procedures and services along the route of flight and at any aerodrome of intended landing, and shall take such action as is necessary to expedite the conduct of all phases of the flight. ATS units shall also:

a. transmit, and continue to transmit, information pertinent to the safe conduct of the flight, without expecting a reply from the aircraft;

b. monitor and plot the progress of the flight with the means available, and co-ordinate transfer of control with adjacent ATS units without requiring transmissions or other responses from the aircraft, unless communication with the aircraft remains normal;

c. inform and continue to keep informed, appropriate ATS units, including those in adjacent flight information regions, which may be concerned with the progress of the flight;

© Oxford Aviation Services Limited

Note: In applying this provision, account must be taken of all the factors which may affect the progress of the flight, including fuel endurance and the possibility of sudden changes in route and destination. The objective is to provide, as far in advance as is practicable in the circumstances, each ATS unit with appropriate information as to the expected or possible penetration of the aircraft into its area of responsibility.

d. notify:

i. the operator or his designated representative;

ii. the appropriate rescue co-ordination centre in accordance with appropriate alerting procedures;

iii. the designated security authority. It is assumed that the designated security authority and/or the operator will in turn notify other parties concerned in accordance with pre-established procedures.

e. relay appropriate messages, relating to the circumstances associated with the unlawful interference, between the aircraft and designated authorities.

© Oxford Aviation Services Limited

CHAPTER TWENTY- AIRCRAFT ACCIDENT AND INCIDENT INVESTIGATION

Contents

Page

20.1 INTRODUCTION ..... 20 - 1

20.2 DEFINITIONS ..... 20 - 1

20.3 OBJECTIVE OF THE INVESTIGATION ..... 20 - 2

20.4 PROTECTION OF EVIDENCE, CUSTODY AND REMOVAL OF AIRCRAFT ..... 20 - 3

20.5 NOTIFICATION ..... 20 - 4

20.6 INVESTIGATIONS ..... 20 - 5

20.7 EXAMPLES OF SERIOUS INCIDENTS ..... 20 - 6

© Oxford Aviation Services Limited

20.1 INTRODUCTION

20.1.1 Annex 13. The ICAO standards and recommended practices for the investigation of aircraft accidents and incidents are contained in Annex 13.

20.1.2 Applicability. Unless otherwise stated, the specifications for investigations apply to activities following accidents and incidents wherever they occurred. In Annex 13 the specifications concerning the State of the Operator apply only when the aircraft is leased, chartered or interchanged and when that State is not the State of Registry and if it discharges, in respect of the Annex, in part or in whole, the functions and obligations of the State of Registry.

20.2 DEFINITIONS

20.2.1 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 as a result of:

i. being in the aircraft, or
ii. direct contact with any part of the aircraft, including parts which have become detached from the aircraft, or
iii. direct exposure to jet blast.

Except when the injuries are from natural causes, self inflicted or inflicted by other persons, or when the injuries are to a stowaway hiding outside the areas normally available to the passengers and crew, or

b. the aircraft sustains damage or structural failure which:

i. adversely affects the structural strength, performance or flight characteristics of the aircraft, and
ii. would normally require major repair or replacement of the affected component,

Except for engine failure or damage, when the damage is limited to the engine, its cowlings or accessories; or for damage limited to propellers, wing tips, antennas, tyres, brakes, fairings, small dents or puncture holes in the aircraft skin; or

c. the aircraft is missing or completely inaccessible.

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

© Oxford Aviation Services Limited

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

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

20.2.5 Investigation. A process conducted for the purpose of accident prevention which includes the gathering and analysis of information, the drawing of conclusions, including the determination of causes and, when appropriate, the making of safety recommendations.

20.2.6 Maximum mass. Maximum certificated take-off mass.

20.2.7 Operator. A person, organisation or enterprise engaged in or offering to engage in aircraft operation.

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

20.2.9 Serious injury. An injury which is sustained by a person in an accident and which:

a) requires hospitalisation for more than 48 hours commencing within seven days from the date the injury was received; and
b) results in a fracture of any bone (except simple fractures of fingers, toes, or nose); or
c) involves lacerations which cause severe haemorrage, nerve, muscle or tendon damage; or
d) involves injury to an internal organ; or
e) involves second or third degree burns, or any burns affecting more than 5% of the body surface; or
f) involves verified exposure to infectious substances or injurious radiation.

20.2.10 State of manufacture. The State having jurisdiction over the organisation responsible for the final assembly of the aircraft.

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

20.3 OBJECTIVE OF INVESTIGATION

20.3.1 Objective. The objective of the investigation of an accident or incident shall be the prevention of accidents and incidents. It is not the purpose of this activity to apportion blame or liability.

© Oxford Aviation Services Limited

20.4 PROTECTION OF EVIDENCE, CUSTODY AND REMOVAL OF AIRCRAFT

20.4.1 Responsibility of the state of occurrence. The state of occurrence shall take all reasonable measures to protect the evidence and to protect the aircraft and its contents for such a period as may be necessary for the period of an investigation. Protection of evidence shall include:

a. photographic evidence, or

b. other means of evidence which might be removed, effaced or destroyed

20.4.1.1 Safe Custody. Safe custody includes measure employed to achieve:

a. protection against further damage

b. denial of access by unauthorised personnel

c. prevention of pilfering

d. prevention of deterioration

20.4.1.2 Flight Data Recordings. Protection of FDR evidence requires that the recovery and handling of the recorder and its recordings be assigned to qualified personnel.

20.4.2 Requests from State of Registry/Operator. If a request is received from the state of registry or the state of the operator that the aircraft, its contents and any other evidence remain undisturbed pending inspection by representatives of those states, the state of occurrence is to take all measures necessary to comply with this request, providing that:

a. the aircraft may be moved to the extent necessary to extricate persons, animals and valuables

b. to prevent destruction by fire or other causes

c. to eliminate any danger or obstruction to air navigation, to transport or the public

20.4.3 Requests from State of Manufacture. If a request is received from the state of manufacture that the aircraft remains undisturbed pending inspection by representatives of the requesting state, the state of occurrence is to take all measures necessary to comply This must, however, be in accordance with the proper conduct of the investigation and does not result in undue delay in returning the aircraft into service where practicable.

© Oxford Aviation Services Limited

20.4.4 Release from Custody. The state of occurrence will release custody of the aircraft, its contents or any parts, when no longer required in the investigation, to any person or persons duly designated by the state of registration or operator.

20.5 NOTIFICATION

20.5.1 Responsibility of the State of Occurrence. The state of occurrence is to forward notification of an accident or serious incident with a minimum of delay and by the moist suitable and quickest means available to:

a. the state of registry

b. the state of the operator

c. the state of design

d. the state of manufacture

e. ICAO when the aircraft involved has a max take off mass greater than 2 250 kg

20.5.2 Responsibility of the State of Registration/Operator. When notified, the state of registration/operator is to, as soon as possible, provide the state of occurrence with any relevant information regarding the aircraft and flight crew concerned. Each state is also required to inform the state of occurrence if it intends to be represented at the investigation, and if so to indicate the probable date of arrival of its accredited representative(s).

20.5.2.1 Instigation by State of Registry. When an investigation is instigate by the state of registration concerning an aeroplane with max take off mass greater than 2 250 kg, the following are to be informed:

a. the state of the operator

b. the state of design

c. the state of manufacture

d. ICAO

20.5.2.2 Participation by State of Design/Manufacture. Once notified by the state of registry of an investigation, the state of design or manufacture is to, upon request, provide the state of registration with any relevant information available to them regarding the flight crew and the aircraft involved. These state shall also inform the state of registration if it is their intention to attend the investigation.

© Oxford Aviation Services Limited

20.6 INVESTIGATIONS

20.6.1 Responsibility for Instigating an Investigation. Where an accident or serious incident occurs in the territory of a contracting state (other than the state of registry or the state of the operator), the state of occurrence is to instigate the investigation. If the accident or incident occurred in a non contracting state, the state of registry should endeavour to instigate an investigation. If the accident or incident occurred outside the territory of any state or the location of the occurrence cannot be determined, the state of registry is to instigate the investigation.

20.6.2 Participation. The state of registry, the state of the operator, the state of design and the state of manufacture, are entitled to be represented at any investigation. Any state, which when requested provides information, facilities, or experts to the state conducting the investigation, is entitled to be represented at the investigation. Where the citizens of a state have suffered fatalities or serious injuries, that state, if a request has been made, will be permitted to appoint an expert who should be entitled to:

a. visit the scene of the accident
b. have access to the relevant factual information
c. participate in the identification of the victims
d. assist in questioning survivors who are citizens of that state
e. receive a copy of the final report

20.6.3 Reports. When the aircraft involved has a maximum take off mass greater than 2 250 kg the state conducting the investigation is to send a copy of the preliminary and final reports to:

a. the state of registry or the state of occurrence as appropriate
b. the state of the operator
c. the state of design
d. the state of manufacture
e. any state which provided relevant information , significant facilities or experts
f. ICAO (note 1)
g. any state who's citizens have suffer fatalities or injuries. (note 2)

Note 1. Preliminary report only and in code.

Note 2 Final report only.

20.6.3.1 International dissemination. Where an investigation has been conducted into an accident or serious incident to an aircraft with max take off mass over 5 700 kg wherever it occurred and a final report published , the state conducting the investigation is to send a copy of the report to ICAO.

© Oxford Aviation Services Limited

20.7 EXAMPLES OF SERIOUS INCIDENTS

The incidents listed are typical examples of incidents that are likely to be serious incidents. The list is not exhaustive and only serves as guidance to the definition of serious incident.

a) Near collisions requiring an avoidance manoeuvre to avoid a collision or an unsafe situation or when an avoidance action would have been appropriate.

b) Controlled flight into terrain only marginally avoided.

c) Aborted take-offs on a closed or engaged runway.

d) Take-offs from a closed or engaged runway with marginal separation from obstacle(s).

e) Landings or attempted landings on a closed or engaged runway.

f) Gross failures to achieve predicted performance during take-off or initial climb.

g) 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.

h) Events requiring the emergency use of oxygen by the flight crew.

i) Aircraft structural failures or engine disintegrations not classified as an accident.

j) Multiple malfunctions of one or more aircraft systems seriously affecting the operation of the aircraft.

k) Flight crew incapacitation in flight.

l) Fuel quantity requiring the declaration of an emergency by the pilot.

m) Take-off or landing incidents. Incidents such as undershooting, overrunning or running off the sides of runways.

n) Systems failures, weather phenomena, operations outside the approved flight envelope or other occurrences which could have caused difficulties controlling the aircraft.

o) Failures of more than one system in a redundancy system mandatory for flight guidance and navigation.

© Oxford Aviation Services Limited

CHAPTER TWENTY ONE - NATIONAL LAW

Contents

		Page
21.1	INTRODUCTION.	21-1
21.2	MAJOR UK DIFFERENCES	21-1
21.3	DEFINITIONS	21-3
21.4	ROYAL FLIGHTS	21-4
21.5	MILITARY AERODROME TRAFFIC ZONES PENETRATION SERVICE.	21-6
	REVISION QUESTIONS	21-9
	PRACTICE EXAMINATION PAPER 2	21-18

© Oxford Aviation Services Limited

21.1 INTRODUCTION.

21.1.1 Applicability. It is something of a contradiction to consider the law of the United Kingdom as part of a course where the philosophy of 'international law' and the application of European and ICAO standards prevail. However, the syllabus for the JAA ATPL(A) requires a knowledge of the national law of the state in which the examination is taken and to date questions have been set concerning material that is 'UK only'.

21.1.2 Flight in the UK. Until the JAA regulations become the law of the UK (presently only JAR-FCL is UK law) flight over the territory of the UK will be regulated in accordance with the Air Navigation Order (ANO). Of direct importance to students are the differences between the Rules of the Air as specified in the ANO and those specified in Annex 2 and Doc 4444. In the UK AIP (the Air Pilot) the differences notifies under article 38 of the Chicago Convention are recorded, as required, in GEN 1.7. Some of the more important differences are detailed below.

21.2 MAJOR UK DIFFERENCES

21.2.1 VFR Flight Levels. The UK does not apply VFR flight levels. Where VFR flight is permitted in CAS the level allocated by ATC in clearances will not take flight rules into account. This does not, however, relieve the pilot of the responsibility for maintaining a good lookout in VMC.

21.2.2. Quadrantal Rules. For IFR flight outside of CAS and above the transition level, the flight level to be flown at is determined by the magnetic heading of the aircraft and is allocated from division of the magnetic compass rose into four quadrants. The quadrants are:

a.	000 to 089	Odd flight levels (ie FL70; FL90 etc..)
b.	090 to 179	Odd flight levels plus 500 ft (ie FL 75; FL95 etc..)
c.	180 to 269	Even flight levels (ie FL80; FL100 etc..)
d.	270 to 359	Even flight levels plus 500 ft (ie FL85; FL105 etc..)

21.2.3 Airspace Limits. The upper limit of the FIR in the UK is FL245. The airspace above this level is the UIR (extending to FL660) and in this region the semi-circular system of allocation of flight levels (as per ICAO) is applied but only the IFR flight levels of the table of cruising levels are used. It is not a rule in the UK that the limits of airspace must be VFR levels.

© Oxford Aviation Services Limited

21.2.4 Low Flying. The ANO requires aircraft flying over towns and cities to fly 1 500 ft above the highest obstacle within 600 m of the aircraft track. (Annex 2 - 1 000ft and 600 m). In the UK aircraft are not permitted to be flown closer than 500 ft to any person, vessel, vehicle or structure. Over clear areas or over the sea flight below 500 ft is permitted. Annex 2 forbids flight below 500 ft except for the purpose of take off and landing. The ANO specifies that flight over open air gatherings of more than 1 000 person shall not be conducted within 1 000m of the gathering. Annex 2 also forbids flying in the proximity of such gatherings, but does not specify numbers or a distance.

21.2.5 Controller Aerodromes. In the UK a controlled aerodrome is not defined.

21.2.5 VFR at Night. In the UK flight under VFR is not permitted at night.

21.2.6 VFR flight above FL200. In the UK VFR flight is permitted above FL200.

21.2.7 RTF in Class F and G airspace. In the UK there is no requirement for continuous two-way RTF in class F and G airspace under IFR.

21.2.8 Departure Separation. In the UK departure separation for aircraft departing the same aerodrome is 2 minutes.

21.2.9 Radar Separation. In the UK where SSR is used alone (no PSR) the minimum horizontal separation is increased to 10 nm.

21.2.10 Wake Turbulence Categories. In the UK four categories exists: Heavy, Medium, small and light.

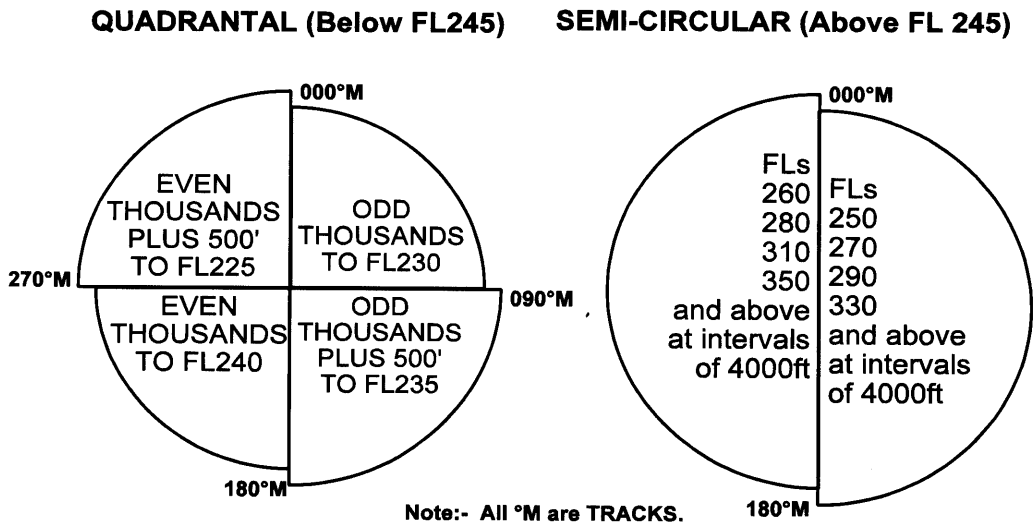


Fig 21.2.5 Allocation of Cruising Levels in the UK

© Oxford Aviation Services Limited

21.3 DEFINITIONS

21.3.1 UK differences. In the UK certain ICAO (Annex 2 and Doc 4444) definitions have interpretations which differ from the ICAO definition. These are:

a. Aerodrome Traffic Zone - UK defines relative to length of runway

b. Apron - UK wording difference

c. Decision Height - Additional definition to state that DH is the minimum height to which an approach may be made without visual reference to the ground

d. Holding point - UK additional meaning: A point on the manoeuvring area where an aeroplane carries out engine run-ups or is held before entering the runway for take-off.

e. IMC - In the UK, no mention of ceiling.

f. Manoeuvring area - UK adds definition of taxiing.

g. SSR - UK adds range and position derived.

h. SVFR - UK adds requirement for class A CTRs at all times not just in IMC, and requirement to remain clear of cloud and in sight of the surface.

21.3.2 UK Definitions (no ICAO equivalent). The table below details definitions used in the UK which have no definition in Annex 2 or Doc 4444.

Definition	Meaning
Aerodrome Approach	An Instrument procedure that ends when the aircraft has broken cloud
AIRPROX	A situation in which the distance between aircraft is such that the safety of the aircraft has been compromised
Cloud ceiling	In relation to an aerodrome, vertical distance above aerodrome elevation to the lowest part of any cloud which obscures more than half the sky
Competent ATS Authority	The CAA
Dropping Zone	Airspace in which parachute descents are made
General Air Traffic (GAT)	Flights conducted in accordance with the Regs and Procedures published by the CAA and operating under the control of the civil ATS authority
Known traffic	Traffic which is known to the controller concerned and with which he/she has direct communication

© Oxford Aviation Services Limited

Night	Half an hour after sunset until half an hour before sunrise (defined at surface level)
Operational Air Traffic	Flights conducted under the control of the military ATS organisation
Quadrantal cruising levels	Cruising levels determined in relation to magnetic tracks within quadrants of the compass
Radar departure	Use of surveillance radar to control departing aircraft
Radar handover	Transfer of responsibility between two controllers using radar
Radar Vectoring Area	A defined area in the vicinity of an aerodrome in which minimum safe levels allocated by a radar controller vectoring IFR flights, have been determined
Radial	A magnetic bearing extending from a VOR/VORTAC/TACAN
Stack departure time	Tinme at which an aircraft is required to leave the holding facility to commence its approach
Upper ATS route	A designated route within the Upper Airspace CTA

Table 21.3.2 UK Definitions

21.4 ROYAL FLIGHTS

21.4.1 Definition. The term 'Royal Flight' refers to a flight made by Her Majesty the Queen or certain other members of the Royal Family. The procedures described below may be adopted on the occasion of a visit by air of another Reigning Sovereign, Head of State or Foreign Dignitary.

21.4.2 General Arrangements For Royal Flight. Most Royal Flights within the United Kingdom are made in Aircraft of the Queen's flight, RAF. These may also be used for non-state visits overseas by members of the Royal Family, other than Her Majesty, the Queen. Royal Flights may also be made in aircraft of other RAF commands, as well as in helicopters of the Queen's Flight and the Royal Navy. Overseas Flights for State Visits are normally made in specially chartered aircraft of **British Airways**, exceptionally in aircraft of a Foreign Government o Commonwealth airline.

21.4.3 Special ATC Procedures for Royal Flights in Fixed-wing Aircraft. To safeguard a Royal Aircraft from the risk of collision with other aircraft, particularly when the flight is made outside existing controlled airspace, the following procedures have been formulated and are to be observed by all aircraft for the periods of time specified in the appropriate Royal Flight NOTAM (RNOTAM; not to be confused with a NOTAMR).

21.4.4 General. Whenever possible, Royal Flights are conducted within existing controlled airspace. When this is not possible, temporarily controlled airspace is established in the form of Airways along the Royal route and in the form of control zones at the aerodromes of departure and destination.

© Oxford Aviation Services Limited

To ensure that all aircraft using controlled airspace through which a Royal Flight is planned to pass are under positive Air Traffic Control irrespective of weather, such airspace (whether existing or temporarily established as above mentioned) will be notified as airspace to which Rule 21 is applied. The effect of this is to apply the main Instrument Flight Rules in the controlled airspace notified for the purpose of the Rule irrespective of weather conditions; this means that all flights must be conducted on a flight plan and ATC clearance. It should be noted that it is not permitted for gliders to cross or enter purple airspace.

21.4.5 Temporary Control Zones. Whenever a Royal Flight is made to or from an aerodrome which is not within an existing Control Zone, a temporary Control Zone is established for a period (for outbound flights) of 15 minutes prior to, until 30 minutes after, the ETD of the Royal aircraft or (for inbound flights) for a period of 15 minutes prior to, until 30 minutes after, the ETA of the Royal aircraft at the aerodrome concerned. Normally, the temporary Control Zone will be centred on the aerodrome to be used by the Royal aircraft and the dimensions, both horizontally and vertically, will be determined and notified in relation to the requirements of individual flights. The period of operation, the controlling authority, call -sign and radio frequencies of each temporary Control Zone will be promulgated in the RNOTAM for the Royal Flight concerned.

21.4.6 Rules Governing Flight in Control Zones. In IMC, flights in Control Zones, including temporary control zones, will be subject to the normal provisions of the Instrument Flight Rules. In VMC, flights which are not conducted under the Instrument Flight Rules must nevertheless be made in accordance with a flight plan and ATC clearance. Control Zones (whether existing or temporarily established as above mentioned) which are to be used in the course of a Royal Flight or in some cases the lower portion only of such Zones, will therefore be notified as Class 'A' Airspace. Thus, irrespective of weather conditions, all flights within such Control Zones within the specified period must be preceded by the filing of a flight plan and must be conducted under ATC clearance as required by the Rule. The only flights excepted from these requirements are those made in entry/exit lanes which may continue to be conducted without ATC clearance provided that, even in VMC, they remain within the lateral and vertical limits of the lanes.

21.4.7 Purple Airways. When a Royal Flight is made within a National Airway, a height band is selected for the operation and notified in the RNOTAM concerning the flight. When a Royal Flight cannot be conducted along a National Airway, special temporary airways normally 10 nm wide are established for that part of the route which lies outside existing controlled airspace. Such temporary airways, and the selected height bands within National Airways are known as Purple Airways. Purple Airways will be established by the RNOTAM issued concerning each Royal Flight, which will specify the period of time for which they are established, their dimensions relevant radio frequencies and any other information necessary for their due operation. Pilots will regulate their flights accordingly.

© Oxford Aviation Services Limited

21.4.8. Period of Operation. Purple Airways will normally be established for a period extending from 15 minutes before the time the Royal aircraft is scheduled to enter the Airway until 30 minutes after it is scheduled to leave the Airway. When the Royal Flight will take longer than an hour, the Purple Airway may be divided into parts. Each part will remain in force from 15 minutes before ETA of the Royal aircraft at its beginning until 30 minutes after ETA at its end.

21.4.9 Procedures for use of Purple Airways. Flights along, joining or crossing Purple Airways irrespective of weather conditions must, in accordance with the provisions of Rule 21, ie conducted with the procedures set out in the earlier paragraphs dealing with Flight on Airways. Pilots are reminded that before entering an Airway a flight plan must be filed, a clearance obtained from ATC and their aircraft must carry radio equipment which will enable it to:-

a. Maintain two way communication with the appropriate ATC Unit.
b. Navigate the aircraft in accordance with the flight plan or instructions from ATC.

Note:- Clearances to climb or descend in maintaining VMC will not be given to aircraft in the vicinity of a Royal Aircraft. Gliders shall not fly in purple airspace.

21.4.10 Royal Flights in Helicopters. Purple airspace is not normally established for royal flights in helicopters. A Royal Low Level Corridor (RLLC) is established for royal flights in helicopters marked by a series of check points promulgated by RNOTAM. These check points are approximately 20 nm apart and will usually be turning points. The RNOTAM will indicated the ETDs/ETAs for given check points. Within the RLLC, protected zones applying to military aircraft only are established extending 10 nm either side of the helicopter's intended track and from ground level to 1000 feet above the maximum cruise altitude. Civilian aircraft pilots flying near the routes should keep a good look out and maintain adequate separation from the royal helicopters. The RNOTAM will include a list of callsigns and frequencies of certain nominated aerodromes from which pilots may obtain information on the progress of the Royal helicopter.

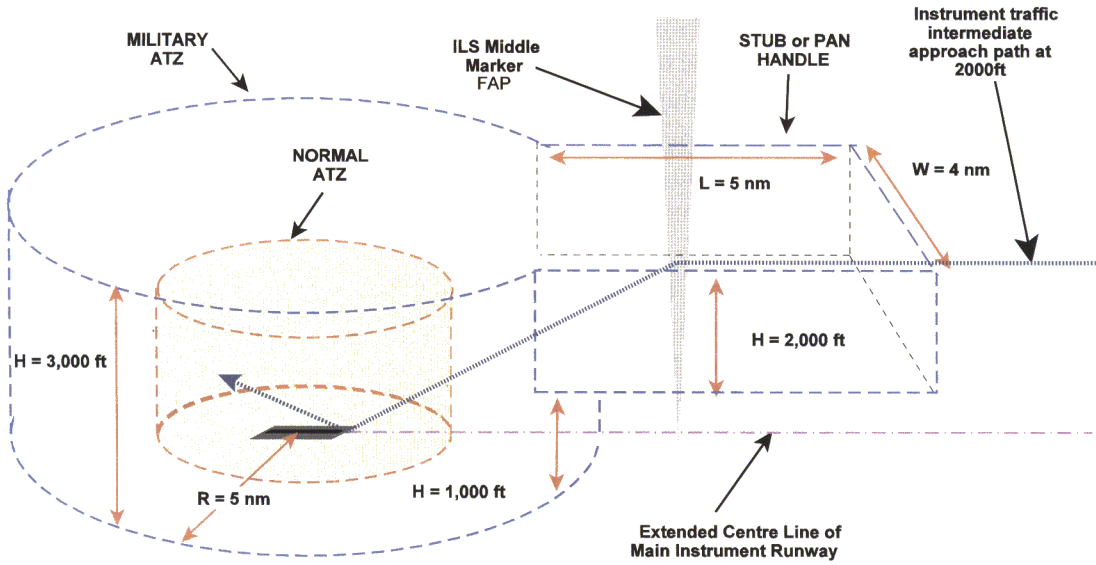
21.5 MILITARY AERODROME TRAFFIC ZONES PENETRATION SERVICE.

21.5.1 Military aerodrome traffic zones (MATZ). At certain military aerodromes, zones have been established known as a 'Military Aerodrome Traffic Zone' (MATZ). The purpose of a MATZ is to provide a volume of airspace within which increased protection may be given to aircraft in the critical stages of circuit, approach and climb-out. The airspace is of the following defined dimensions:

a. The airspace within 5 nm radius of the Aerodrome Reference Point from the surface to 3000 feet above aerodrome level.

© Oxford Aviation Services Limited

b. The airspace within a 'stub' projected from the above airspace having a length of 5 nm along its centreline, aligned with a selected final approach path, and a width of 4 nm (2 nm either side of the centreline), from 1000 feet above aerodrome level to 3000 feet above aerodrome level. In some Zones the 'stub may be absent or reduced in size.



MILITARY AERODROME TRAFFIC ZONE (MATZ)
Showing instrument traffic approach path

Fig 21.5

21.5.2 Multiple or Combined MATZ. Where two or more Zones overlap to form a combined Zone (CMATZ), the upper limit of the combined Zone is measured from the level of the higher or highest aerodrome of the combined Zone. Where MATZs are contiguous or less than 10 nm apart, a pilot wishing to proceed directly through two or more of them should, while obtaining clearance through the first, state his intention to penetrate the other(s). The Controlling Aerodrome first providing the service will endeavour to co-ordinate the flight with the adjacent aerodromes concerned, but pilots should not assume clearance to penetrate until it is explicitly given.

21.5.3 Procedures For Penetration of MATZ by Civil Aircraft. At the aerodromes listed in the ENR Section of the UK Air Pilot, a service is available for the provision of increased protection to VHF/RTF equipped civil aircraft within MATZs. Pilots of civil aircraft wishing to penetrate any of the MATZs are requested to observe the following procedures:-

a. When 15 nm or 5 minutes flying time from the Zone boundary, whichever is the greater, establish two-way RTF communication with the Controlling Aerodrome on the appropriate frequency (listed in the ENR section of the UK AIP) using the phraseology:-

" Benson Approach this is GAWYF, request MATZ penetration

© Oxford Aviation Services Limited

b. The controller at the aerodrome concerned may be engaged on another frequency; the pilot may, therefore, be asked to 'stand-by for the controller'. When safe lateral or vertical separation cannot be achieved, the pilot will be advised to avoid the MATZ. When asked to go ahead, the pilot should pass the following information:

i. Callsign.
ii. Type of aircraft.
iii. Position.
iv. Heading.
v. Altitude.
vi. Intentions (e.g. destination)

c. Comply with any instructions issued by the controller.
d. Maintain a listening watch on the allocated RTF frequency until the aircraft is clear of the MATZ.
e. Advise the controller when the aircraft is clear of the MATZ.

21.5.3.1 Flight Conditions. Flight conditions are not required unless requested by the controller.

21.5.3.2 Traffic Information. The ATC Unit providing the MATZ penetration service will give traffic information and any instructions necessary to achieve safe separation from known or observed traffic in the zone. The service will, whenever possible, be based on radar observations but when radar separation cannot be applied, vertical separation of at least 500 feet between known traffic may be used.

21.5.4 Altimeter Setting. To enable vertical separation to be applied, all aircraft will be given an altimeter setting for use within the Zone which will be the aerodrome QFE. In the case of a combined Zone, the altimeter setting given will be the aerodrome QFE of the higher or highest aerodrome of the combined Zone. This will be transmitted as 'clutch QFE'. When penetration is completed the controlling authority will pass the regional pressure setting (QNH).

21.5.5 Availability of the MATZ Penetration Service. Participating aerodromes will provide the MATZ penetration service during the ours of watch of their ATC Units. For aerodromes not open H24, these will usually by from 0800 hours to 1700 hours local time, Mondays to Fridays. However, as some participating aerodromes may remain open to serve evening, night or weekend flying, pilots should call for the penetration service irrespective of the normal hours of watch. If, outside, normal operating hours, no reply is received to two consecutive calls, pilots are advised to proceed with caution. Information on the operation of the aerodromes listed in the Air Pilot outside the normal hours may be obtained by telephoned from the appropriate Military Air Traffic Control Centre.

© Oxford Aviation Services Limited

REVISION QUESTIONS CHAPTERS 19 - 21

1. What is the aim of aviation security?

   a. To prevent unauthorised personnel from having uncontrolled access to aeroplanes
   b. To make sure that all baggage carried on an aeroplane has been searched for prohibited articles
   c. To prevent hi-jacking of aeroplanes
   d. To prevent breaches of international law in aeroplanes

2. What is the Annex of the Chicago Convention that covers Security?

   a. Annex 14
   b. Annex 15
   c. Annex 16
   d. Annex 17

3. What are states required to do with respect to the safety of crew and passengers of an aeroplane which has been subjected to unlawful interference?

   a. Prevent the aircraft landing so as to deny the hi-jacker(s) publicity
   b. Make it clear to the hi-jacker(s) that he/they will be shot if anybody is harmed
   c. Impress upon the hi-jacker(s) that he/they face inevitable prison and the maximum penalties under international law
   d. Make sure that all measures are taken to ensure the safety of passengers and crew until their journey can be continued

4. What are states required to do regarding the aeroplane which has been unlawfully interfered with when it lands?

   a. Detain it unless to do so would prejudice human life
   b. Disable it at the earliest possible opportunity
   c. Deny the provision of services, food and water to the occupants
   d. Surround it by anti-terrorist police/special military forces

5. Where are aircraft that have been subjected to unlawful interference to be parked on an aerodrome?

   a. In the middle so as to limit the effects of explosions
   b. Out of sight of the media so as to deny the terrorists publicity
   c. At a convenient position to allow special forces to storm the aircraft without alerting the terrorists
   d. On a parking bay specially allocated that is not less than 100m from an adjacent bay

© Oxford Aviation Services Limited

6. If a passenger has passed through the security check and checked hold luggage in and he subsequently meets a person who has not been through the security check, what should happen?

   a. The passenger who has not been through security is to be arrested for attempting to breach the security arrangements
   b. The passenger that has been through security will have to be searched again including his hand luggage
   c. If the second passenger goes through security there is no need for the first one to be rechecked
   d. Both are to be detained and all their luggage (hand and check-in) removed from the aeroplane and thoroughly searched

7. The flight dispatcher trips and falls down the steps is this an accident?

   a. No, he is not a passenger
   b. Yes, because the steps are technically part of the aeroplane
   c. It could be, if there were passengers on board
   d. It would depend if there were passengers on board and if he was seriously injured

8. A stowaway is hiding in the undercarriage bay. At FL 390 the temperature is –55C and after 6 hours he adopts the consistency of a solid block of ice. As the aeroplane is approaching the initial approach fix at Heathrow, the PIC selects undercarriage down and as the gear begins to travel, the now extinct stowaway falls out. Unfortunately the aeroplane was passing over Wentworth at the time and the stowaway lands on top a golfer who suffers a broken wrist. Is this an accident or an incident?

   a. It is an incident because the stowaway was hiding outside the normal passenger areas of the aeroplane
   b. It is an accident because the stowaway was killed (suffered serious injury)
   c. It is an accident because something fell off the aeroplane whilst passengers were on board which seriously injured (broken bone) a person on the ground
   d. It is neither an accident or an incident because the death of the stowaway is considered self inflicted

9. A Boeing 777 aeroplane suffers total engine failure and is ditched in the North Atlantic. All the crew and passengers get out with only minor bruising. They are promptly rescued by a nearby ship. Is this an accident or an incident?

   a. It is an incident because nobody is seriously injured
   b. It is an accident because the passengers could have died
   c. It is an incident because the only damage was to the engines
   d. It is an accident because the aeroplane is now totally inaccessible

© Oxford Aviation Services Limited

10. You are a passenger in an aeroplane which encounters severe turbulence at FL 290 and you do not get your seat strap on quick enough. You are thrown out of your seat and hurt your neck when you land back in your seat. No body else is hurt and there is no damage to the aeroplane. The pain in your neck persists and you suffer severe headaches. Two days later you go to hospital and the casualty officer diagnoses that you may have broken your neck and admits you to hospital. However, the x-rays reveal no broken bones and you are discharged after 24 hours with pain killers. It this a serious injury?

a. No because it is only a sore neck
b. No because there are no broken bones
c. Yes because you were admitted to hospital not more than 7 days after the incident
d. No because you were not detained in hospital more than 48 hours

11. What is the name given to airspace in which a notified Royal Fight is to operate?

a. Blue airspace
b. Red airspace
c. Purple airspace
d. Golden airspace

12. For what period does the restrictions to airspace associated with a notified Royal Flight exist?

a. Throughout the duration of the flight
b. From ETD – 15mins to ETA + 30 mins
c. It depends upon the duration of the Royal Flight (the route may be sectored)
d. From ETD +10 mins until ETA + 30 mins

13. What is the name of the NOTAM that is sent to notify a Royal Flight?

a. Purple NOTAM
b. RNOTAM
c. NOTAMR
d. NOTANC

14. If Royal Flight restricted airspace does not exist, it is created. What class of airspace is it?

a. A danger area
b. A restricted area
c. Class A
d. Class F

© Oxford Aviation Services Limited

15. What is the radius of a military aerodrome traffic zone (MATZ)?

a. It depends upon the length of the longest runway
b. 5nm
c. 4nm
d. 2.5nm

16. To what height does the MATZ go up to?

a. 2000ft
b. 3000ft
c. 1000ft
d. 5000ft

17. How wide is the 'pan handle'?

a. 2 nm
b. 3nm
c. 4nm
d. 5nm

18. What pressure setting do you use when crossing a MATZ?

a. QFE
b. QNH
c. Regional QNH
d. QNE

19. You want to cross a MATZ. When should you call the controlling military ATC for clearance to cross?

a. 10 nm before the boundary
b. 15 nm before the boundary
c. 10 nm or 5 minutes flying time before the boundary
d. 15 nm or 5 minutes flying time before the boundary

20. What type of service should you expect from the military when crossing a MATZ?

a. None
b. Procedural ATC
c. Radar control
d. Radar Advisory or Radar Information

© Oxford Aviation Services Limited

21. What is inside a MATZ?

a. Class D airspace
b. An aerodrome traffic zone
c. A prohibited area
d. Danger areas

22. How long is the pan handle of a MATZ?

a. 5nm
b. 10 nm
c. 15 nm
d. 4nm

23. What class of airspace is a MATZ?

a. G
b. D
c. The same as the surrounding airspace
d. It doesn't have a class of airspace – it is a military danger area

24. An aircraft is tracking 295°Mag in class G airspace over the UK in IMC. What is the correct quadrantal flight level the pilot should fly at?

a. FL70
b. FL75
c. FL80
d. FL85

25. An aircraft is flying northbound (actually tracking 355°Mag) along an airway (R1) in the UK. Which of the following would be an appropriate FL to fly at?

a. FL175
b. FL180
c. FL185
d. The pilot doesn't have a choice. Airways in the UK are class A airspace and require an IFR clearance. The FL will be allocated by ATC in order to apply separation.

© Oxford Aviation Services Limited

26. A pilot is flying in class B airspace in the UK. He is good VMC and elects to fly VFR. Why would ATC not permit him to fly at FL295?

a. FL295 is above FL245 and therefore in the UIR not the FIR and VFR is not permitted in the UIR
b. FL295 is above FL 200 and VFR flight above FL200 is not permitted
c. VFR is not permitted in class B airspace.
d. All the UIR in the UK above FL290 is RVSM airspace and VFR is not permitted above FL285 in areas where RVSM is applied

27. What is the method by which the JAA regulations (when adopted by the UK legislature) are published as UK law?

a. JAR OPS-1
b. The UK Air Navigation Order
c. CAP 393
d. ICAO Annex 2

28. ICAO Annex 2 does not permit flight below 500' except in an emergency and in the process of landing and taking off from an aerodrome. Can you legally fly over the UK below 500'?

a. No, ICAO rules apply to the UK as it is a contracting state
b. Yes, but again only in an emergency or to take off and land
c. Yes, you can fly as low as you like providing you do not fly over any person, vessel, vehicle or structure
d. Yes but only over the sea (or if you are flying a helicopter, along the middle of the River Thames in London between the limits of low water)

29. Who in the UK is the competent ATS authority?

a. ICAO
b. The CAA
c. The JAA
d. National Air Traffic Services (NATS) Ltd

30. In the UK, during what period is night deemed to exist?

a. Half an hour after sunset until half an hour before sunrise
b. When the centre of the sun's disc is more than 6° below the horizon
c. When the centre of the sun's disc is more than 12° below the horizon
d. From the start of evening civil twilight until the start of morning civil twilight

© Oxford Aviation Services Limited

31. There is a subtle difference in the UK concerning the applicability of SVFR, to that stated by ICAO. What is it?

a. In the UK, SVFR is permitted in all types of airspace
b. In the UK, SVFR is applicable in class A airspace at all times not just in IMC
c. In the UK, SVFR is only permitted in VMC
d. In the UK, all SVFR flights must be separated from each other

32. Which of the following statements is true?

a. In the UK VMC does not exist at night
b. In the UK there is no such thing as a controlled aerodrome
c. In the UK the radius of an Aerodrome Traffic Zone is a factor of the length of the main runway
d. In the UK radar separation is reduced where SSR is used

The following questions concern the definitions and abbreviations covered in chapter one of the notes.

33. Which of the following is defined as an ATS route where an air traffic advisory service is available?

a. Class F airspace
b. An advisory Route
c. A special rules route
d. An ATS route with suffix G

34. Which of the following defines altitude?

a. Height above sea level
b. Height above mean sea level
c. What the altimeter reads with QNH set
d. The vertical distance of a level measured from mean sea level

35. Does cargo include mail?

a. Yes
b. No

36. How long is an ICAO Nautical Mile?

a. 1.15 statute miles
b. 6080 feet
c. 1852 m
d. 3×10^{-8} AU

© Oxford Aviation Services Limited

37. Which of the following will be required to re-validate a type rating?

a. A proficiency check
b. A skill test
c. Day and night pilot currency
d. A written test

38. For what is a skill test required?

a. To re-validate an instrument rating
b. For the issue of a type rating
c. For the re-validation of a pilots licence
d. For the issue of a commander's certificate

39. Which of the following is not a synthetic flight trainer?

a. A Flight Crew procedure trainer
b. A Flight Simulator
c. A Flight Procedure Trainer
d. A Basic Instrument Flight Trainer

40. Where would a Terminal Control Area (TCA) be established?

a. At the end of an airway
b. At the confluence of ATS routes in the vicinity of one or more major aerodromes
c. In the vicinity of international aerodromes where international schedule services terminate
d. It replaces a control zone where the CTR is inadequate due to the number of major aerodromes to be served ie. The London TMA serves Heathrow, Stansted, Gatwick and Luton.

© Oxford Aviation Services Limited

ANSWERS TO REVISION QUESTIONS FOR CHAPTERS 19 - 21

1	C	26	D	51		76	
2	D	27	B	52		77	
3	D	28	C	53		78	
4	A	29	B	54		79	
5	D	30	A	55		80	
6	B	31	B	56		81	
7	D	32	B	57		82	
8	A	33	B	58		83	
9	D	34	D	59		84	
10	D	35	A	60		85	
11	C	36	C	61		86	
12	B	37	A	62		87	
13	B	38	B	63		88	
14	C	39	A	64		89	
15	B	40	B	65		90	
16	B	41		66		91	
17	C	42		67		92	
18	B	43		68		93	
19	D	44		69		94	
20	D	45		70		95	
21	B	46		71		96	
22	A	47		72		97	
23	C	48		73		98	
24	D	49		74		99	
25	D	50		75		100	

© Oxford Aviation Services Limited

PRACTICE EXAMINATION PAPER 2

1. It has been raining but the surface of a runway has no patches of standing water on it. How would ATC describe the state of the runway in this situation?

   a. Wet
   b. Damp
   c. Not dry
   d. Braking action poor

2. What information concerning contaminants on an aerodrome is reported by SNOWTAM?

   a. Clear ice, rime ice and snow
   b. Light snow, heavy snow and blizzard
   c. Snow, ice and standing water
   d. Wet snow, dry snow and frozen snow

3. What is the principle requirement of a signals area on an aerodrome?

   a. It must not be green
   b. It must be clearly visible from 300M AAL
   c. It must be clearly visible from all parts of the manoeuvring area
   d. It indicates that VFR operations are in progress

4. Where a parking bay is provided at an aerodrome for the use by aircraft that have been subject to unlawful interference, what is the minimum distance that parking bay is to be from other bays?

   a. 50 m
   b. 100 m
   c. 150 m
   d. 200 m

5. What colour is taxiway centre line markings?

   a. White
   b. Green
   c. Yellow
   d. Green/yellow

© Oxford Aviation Services Limited

6. What does a white line drawn across a runway indicate?

a. The threshold
b. A temporary displaced threshold
c. A displace threshold
d. 1000 ft from the end zone

7. What do alternating yellow/green centreline lights of a taxiway indicate?

a. An ILS/MLS sensitive area
b. A fast turn off lane
c. Special care required whilst taxiing
d. Runway proximity

8. What marks a runway holding position?

a. One of three different line arrangements painted across the taxiway
b. Occulting yellow 'guard' lights
c. A red marker board either side of the taxiway
d. A red light stop bar

9. What colour are apron safety lines?

a. White
b. Red
c. Green
d. A contrasting colour from the aircraft stand markings

10. Do all runways require centreline markings?

a. No, only paved runways
b. No, only runways over 50 m wide
c. No, only instrument runways
d. Yes, but temporary grass runways may be exempt if less than 1200m long

11. Which of the following has had a significant effect on the role and importance of aeronautical information and flight data?

a. ICAO
b. The introduction of RNAV, RNP and computer systems
c. The speed of aeroplanes
d. The increased use of upper airspace

© Oxford Aviation Services Limited

12. At least how many days in advance of the effective date must AIRAC information be distributed?

a. 14
b. 28
c. 42
d. 60

13. A NOTAM is to be issued to addressees for whom the information is of operational significance provided they would not have ..... days prior notification. What number of days correctly fills the space?

a. 3
b. 5
c. 7
d. 9

14. What is an ASHTAM used for?

a. Notification of no smoking areas
b. Volcanic activity
c. Predicted volcanic eruptions
d. Aerodromes closed by volcanic ash contamination

15. On a runway with a length of 2500 m, how far is the aiming point from the threshold?

a. 150 m
b. 250 m
c. 300 m
d. 400 m

16. On a runway with a length of 2500 m, how many pairs of touchdown zone markings are required?

a. 6
b. 5
c. 4
d. 3

© Oxford Aviation Services Limited

17. For planning purposes, an aerodrome is categorised by aerodrome reference code. This consists of two elements: A number, and a letter. What does the number relate to?

a. Load classification number
b. Single wheel loading classification
c. Crash/Rescue category
d. Take-off distance required for an aeroplane

18. Which would you expect to find on a taxiway, at the closest point to a runway?

a. A stopbar
b. A pattern A runway holding position
c. Cat I holding point
d. A taxiway/runway intersection sign

19. For an instrument runway, how far from the centre line of the runway is a 'runway vacated' sign positioned?

a. 30 m
b. at the end of the ILS/MLS sensitive area
c. 60 m
d. A distance equal to twice the width of the runway

20. Crash/rescue (emergency) services provision is categorised according to physical characteristics of the type of aeroplane using the aerodrome. The categories are 1 – 10. Upon what are the categories based?

a. Length and max take-off mass
b. Max number of passengers and crew
c. Overall length and fuselage width
d. Max landing mass and max number of passengers

21. What is the ICAO bird strike information system called?

a. IBSI
b. IBIS
c. IRIS
d. BSIS

© Oxford Aviation Services Limited

22. An obstacle that is required to be marked in the vicinity of an aerodrome where night operations are carried out, is 180 m high. How is it to be lit?

a. High intensity white flashing lights
b. Red flashing lights
c. Steady (non flashing) red lights
d. A combination of red lights every 50 m and high intensity flashing white at 90 m and 180 m.

23. How is a paved pre-threshold area which is not suitable for use by aircraft, marked?

a. By white arrows directing approaching aircraft to the displaced threshold
b. By yellow chevrons pointing towards the threshold
c. By a yellow X
d. By white crosses evenly spaced

24. What documentation is required by persons travelling by air, for entry into a state?

a. Passport and visa
b. Passport and confirmation of inclusion on the general declaration passenger manifest
c. No more than would be required if the person arrived by ship or train
d. Passport, visa and any necessary health documentation (vaccination certificates etc..)

25. What is the purpose of a Crew Member's Certificate (CMC)?

a. To permit aircrew temporary residence in en route countries
b. To allow flight crew to be exempt customs, health and immigration formalities at an en-route aerodrome
c. To replace the crew member's licence
d. To provide identification of aircrew

26. When are Search and Rescue facilities are to be provided in the airspace of a state?

a. From 2 hours before until 2 hours after any flight enters/leaves the airspace
b. On a 24 hour basis
c. When a state of emergency has been declared
d. When the authority of the state deems necessary

© Oxford Aviation Services Limited

27. Which of the following are Emergency/SAR frequencies?

1. 121.500Mhz; 2. 243.000Mhz; 3. 2182 Khz; 4. 406Mhz

a. All of them
b. 1,2 and 3 only
c. 1 and 2 only
d. 1 and 3 only

28. If you are flying over the NAT region and maintaining a Selcal watch on HF, which freq(s) would you set on the VHF boxes?

a. 121.500 Mhz and 131.800 Mhz
b. 123.456 Mhz and 121.500 Mhz
c. 121.500 Mhz and the company VHF frequency
d. 125.000Mhz (Shanwick long range VHF) and 121.500 Mhz

29. What is the meaning of this SAR visual signal when used by survivors on the ground?
Z

a. Require assistance
b. Negative
c. Affirmative
d. Require medical assistance

30. You are flying over the NAT region when you intercept a distress call. You record the message, get a bearing on it from the ADF, and tell Shanwick. The radio operator at Shanwick tells you to standby. What should you consider doing whilst awaiting instructions?

a. Make a general call on 121.500 asking other aeroplanes to assist
b. Proceed to the position given in the distress message
c. Call your operator and advise him that you are now on SAR duty and will need to divert to the nearest aerodrome at the end of your duty
d. Descend to low level and carry out a surface search for ships

31. 25% of the runway of a runway is covered with standing water. How would ATC describe the state of the runway?

a. Water patches
b. Flooded
c. Damp
d. Wet

© Oxford Aviation Services Limited

32. What is the vertical separation minima applied in designated airspace subject to a regional air navigation agreement below FL410?

a. 1000 ft
b. 2000 ft
c. 500 ft
d. 1500 ft

33. 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. 15° 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 nm or more
d. 30° and a distance of 15 Km or more

34. Aircraft entering Oceanic airspace from domestic airspace are required to be laterally separated by flying tracks separated by 15° and at a distance of 15nm or more from the same VOR. What is the additional proviso to this case?

a. Vertical separation is also to be applied
b. Lateral separation of 15 nm is to be maintained at all times
c. The tracks are required to diverge by 30° thereafter
d. Tracks are to continue diverging by 15° until the required lateral separation is achieved

35. What track divergence angle is required immediately after take off to allow a departure interval of one minute between successive departures from the same runway to be achieved?

a. 10°
b. 15°
c. 30°
d. 45°

36. If two aeroplanes are departing from the same runway on the same track, and the second intends to climb through the level of the preceding one, what separation must be applied?

a. 5 minutes
b. 3 minutes
c. 10 nm
d. 5 nm

© Oxford Aviation Services Limited

37. For a separation of 2 minutes to be applied between successive departures on the same track, what is the required speed difference?

a. The preceding aircraft must be 20kts faster than the following aircraft
b. The preceding aircraft must be 40kts faster than the following aircraft
c. The preceding aircraft must be 50kts faster than the following aircraft
d. The preceding aircraft must be 60kts faster than the following aircraft

38. What classifies an aeroplane as 'heavy' for wake turbulence separation?

a. Wing span of 35m or more
b. Four turbo jet engines
c. Take off mass of 145 000 kg
d. 245 passenger seats

39. According to JAR OPS, if the ground visibility is reported as 1000 metres, can a special VFR flight take off from an aerodrome in a control zone?

a. Yes
b. No
c. Yes providing the cloud ceiling is greater than 500 ft
d. Yes providing the pilot remains in visual contact with the ground

40. What type of air traffic service is provided in class F airspace?

a. Air traffic advisory service to IFR flights and flight information to VFR
b. Air traffic advisory to all participating IFR traffic and flight information to others
c. Radar advisory service to participating traffic and flight information where no radar is available
d. Air traffic control to participating traffic and advisory ATC to all other

41. What is required for aircraft flying IFR in advisory airspace but not electing to use the air traffic advisory service?

a. Keep clear of all notified advisory routes
b. Fly at VFR flight levels
c. File a flight plan
d. Maintain a good look out for other IFR traffic using the service

© Oxford Aviation Services Limited

42. An IFR flight not in receipt of an advisory service wishes to cross an advisory route. What procedure shall be used to cross the route?

a. Cross at an intermediate level i.e FL75; FL95 etc..
b. Cross at 90° to the centre line at the appropriate IFR level
c. Cross at 90° to the centre line at the appropriate VFR level
d. Such crossings are only to be made at the base of the airway

43. What is an air traffic controller, using radar to provide the service, required to do prior to providing an aircraft with ATC based on the radar information?

a. Check the serviceability of the radar system
b. Confirm the serviceability of the aeroplane SSR system
c. Carry out a mode C check against the aircraft pressure altimeter
d. Radar identify the aeroplane and inform the pilot

44. Which of the following is NOT a valid SSR mode A squawk?

a. A/0000
b. A/5678
c. A/7700
d. A/7777

45. Which of the following is an approved method of identifying a contact on radar as an aeroplane to which a service is to be given?

a. The aircraft reporting his position as a range and bearing from the radar head
b. Observation of a SSR squawk
c. Observation on radar of a turn made by the aircraft
d. Aircraft compliance with an instruction to squawk ident

46. Which of the following is true concerning radar separation minimum?

a. May be reduced to 3 nm if radar capabilities permit
b. Never less than 5 nm
c. The minimum is not defined, it depends upon wake turbulence category
d. May be reduced to 2.5 nm if 1000 ft vertical separation is also maintained

47. A MEDIUM wake turbulence category aircraft is following a HEAVY category aircraft on a radar vectored approach to land. What is the minimum radar separation to be applied?

a. 5 nm
b. 4 nm providing 1000 ft vertical separation also maintained
c. 6 nm until the speed of the heavy is reduced below wake turbulence threshold
d. There is no specified minimum for this case

© Oxford Aviation Services Limited

48. ILS CAT II/III operations are being carried out on parallel runways. When is wake turbulence separation to be applied?

a. At all times
b. When the runways are physically separated by 850 m
c. If one aircraft is required to cross behind another within 1000 ft
d. When aircraft are approaching the same runway within 1000 ft vertically of each other

49. If radar separation of 5 nm during vectoring is being applied, what is the closest an aircraft may be vectored to the boundary of the radar vectoring area?

a. 5 nm
b. 3 nm
c. 2.25 nm
d. 2.5 nm

50. You are flying IFR in controlled airspace and are advised that radar service is terminated. What must you do?

a. Resume position reports
b. Squawk standby
c. Squawk A/2000
d. Leave controlled airspace

51. If you are flying a surveillance radar approach (non-precision), what information must the radar controller pass to you?

a. Your distance from touchdown and observed deviation from the glide path
b. Distance from touchdown and advisory height information
c. Range and bearing from touchdown and when you are at MDH
d. Distance to run to your MDH and deviation from the extended centre line

52. What is to be given consideration in deciding the minimum altitude in radar vectoring areas (RVA)?

a. Not flying below the minimum safe altitude (MSA) in the RVA
b. Minimising activation of ground proximity warnings
c. Procedures to keep the aircraft clear of areas where GPWS warnings would occur
d. Disabling the GPWS system to prevent level busts due to automatic responses to warnings

© Oxford Aviation Services Limited

53. Which of the following defines a visual approach?

a. When an instrument approach is not completed and visual reference to terrain is subsequently maintained
b. An approach made under VFR using instrument height and track guidance
c. Any part of an instrument approach that is carried out in VMC
d. The circling portion of a precision approach to a runway other than the runway on which the landing is to be made

54. What is the only item permitted to protrude through the plane of an approach lighting system within 60 m of the centre line?

a. An ILS or MLS azimuth (centreline guidance) antenna
b. A fixed object not more than 45 ft high
c. The ILS glidepath antenna
d. The aerodrome boundary security fence

55. What colour are runway edge lights?

a. Blue
b. Yellow
c. Red
d. White

56. Where a runway has a displaced threshold what colour are the edge lights between the end of the runway and the displaced threshold, showing in the direction of the approach?

a. Blue
b. White
c. Red
d. Green

57. Are runway edge lights required to show all round (omni-directionally)?

a. No, only in the direction of the approach
b. Yes where they are intended to provide guidance during circling
c. No, they are only required to show in azimuth in both runway directions
d. Yes but not vertically (limited to 15° above the horizontal)

58. Which of the following correctly describes runway end lights?

a. Fixed; uni-directional; red
b. Fixed, omni-directional; red
c. Fixed; uni-directional; green
d. Fixed; omni-directional; green

© Oxford Aviation Services Limited

59. What lighting is required for runways to be used for take-off in an operating minimum below an RVR of approximately 400 m?

a. Edge lighting and centre line lighting
b. Centre line lighting
c. Edge lighting
d. None

60. Where a runway has a displaced threshold and the whole of the runway is used for take-off, which of the following can be used to indicate the centre of the runway from the end to the displaced threshold?

a. Approach lighting (such that it does not dazzle the pilot taking off)
b. Red centre line lighting
c. Green/yellow alternating taxiway lights
d. Unidirectional green lights

61. Generally, when and where are stop bars provided?

a. They are used as traffic lights on aerodromes to control vehicles in poor ground visibility
b. They are used specifically to indicate "stop here" to non radio traffic in IMC conditions
c. They are positioned at all taxi-holding positions for runways when RVR is less than 350m
d. At runway entrances to prevent vehicular movement in RVR equal to or less than 550m

62. What is/are required if a stop bar is not provided at a runway entrance and the runway is intended to be used in RVR conditions less than 550m?

a. Traffic lights
b. Taxi guidance systems
c. Ground movement radar
d. Runway guard lights

63. The main instrument runway at an aerodrome is 1875 m long. What is the radius of the Aerodrome Traffic Zone (ATZ)?

a. 2 nm
b. 2.5 nm
c. 5 nm
d. sufficient for the protection of aerodrome traffic

© Oxford Aviation Services Limited

64. Which of the following correctly defines aerodrome operating minima?

a. Cloud base and ground visibility for take off
b. Cloud ceiling and ground visibility for take off
c. Cloud base and RVR for take off
d. Cloud ceiling and RVR for take off.

65. What is the name of the part of an aerodrome used for the positioning of aircraft for the embarkation/disembarkation of passengers?

a. Apron
b. Ramp
c. Stands
d. Parking Bays

66. What is the proper name given to a business that includes the provision of flights for the purpose of public transport of passengers or cargo?

a. A scheduled air service
b. A commercial air operation
c. An air transport undertaking
d. An airline

67. 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. Final approach
c. Approach to landing
d. Go around/Missed approach

68. Where a final approach fix (FAF) is specified for a non-precision approach procedure, what is the minimum obstacle clearance fixed margin that is applied for all aircraft?

a. 75 m (247 ft)
b. 90 m (295 ft)
c. 100 m (316 m)
d. 120 m (400 ft)

© Oxford Aviation Services Limited

69. For a non-precision approach, what is (normally) the maximum distance the Final Approach Fix (FAF) can be from the threshold of the landing runway?

a. 9 Km (5 nm)
b. 19 Km (10 nm)
c. 28 Km (15 nm)
d. 38 Km (20 nm)

70. When is a glide path in excess of 3.5° not to be used?

a. For obstacle clearance
b. For runways less than 1875m length
c. For noise abatement
d. In RVR less than 800m

71. What is the maximum permitted intercept angle between the initial approach track and the intermediate approach track for a precision instrument approach?

a. 30°
b. 45°
c. 60°
d. 90°

72. Where does the missed approach procedure start?

a. At DH/MDH
b. At any point that the criteria to continue the approach is lost
c. At the missed approach point
d. Over the threshold of the instrument runway

73. If the ILS glide path transmitter fails during an instrument procedure can the approach be continued?

a. Yes, but DH now becomes MDH
b. Yes, but the non-precision criteria must be complied with
c. It depends if the descent on the GP has already been initiated
d. Yes if the flight is in VMC

74. Why is the descent gradient kept as low as possible in the intermediate approach segment?

a. This is the segment in which speed and configuration are adjusted
b. It is not possible to guarantee full obstacle clearance in this segment
c. Usually track guidance is poor in this segment resulting in a requirement for a high MOC
d. Pilots cannot cope with track maintenance and a high rate of descent

© Oxford Aviation Services Limited

75. A Visual Manoeuvring (Circling) Area may be sectored to exclude a prominent obstacle. Under what circumstances is this is permitted?

a. Flight visibility of 1500 m or more and cloud ceiling of 850ft or more
b. The obstacle is outside the final approach or missed approach areas
c. The obstacle lies on the other side of the aerodrome from the threshold of the landing runway
d. The obstacle height for that obstacle is not more than 10% higher than the OCH calculated without consideration of that obstacle

76. At what height is visual circling carried out?

a. VM(C) DH for the instrument (non landing) runway
b. VM(C) OCH for the aerodrome
c. VM(C) MDH for the approach (non landing) runway
d. VM(C) OCH for the runway on which it is intended to land

77. A holding pattern is established on a fix position with an inbound heading of 180° mag. You are approaching the fix from the southwest. What type of joining procedure is required?

a. Offset join (sector 2)
b. Reverse direct (sector 3)
c. Teardrop procedure (sector 2)
d. Sector 1 (parallel)

78. You are required to carry out a sector 2 (offset) joining procedure to a holding pattern. What is the required track divergence from the reciprocal inbound track from on top the fix towards the outbound end?

a. 20°
b. 30°
c. 45°
d. 60°

79. It is normal for holding procedures at 14 000 ft and below to include an outbound leg of 1 minute duration. How long is the outbound leg above 14 000 ft?

a. 1½ minutes
b. 2 minutes
c. 2½ minutes
d. not specified

© Oxford Aviation Services Limited

80. How much obstacle clearance is guaranteed at the edge of the buffer area (5 nm outside of the holding area) of a holding pattern?

a. 300 m (1000 ft) (2000 ft in mountainous areas)
b. 150 m (500 ft)
c. 90 m (300 ft)
d. nil

81. Is the length of the outbound leg of a holding pattern always expressed in terms of time?

a. Yes
b. No, where DME is used it may be specified in terms of distance
c. Yes even where DME is used the maximum length is always a time
d. No, where G/S is less than 65kts, the outbound leg must be at least 2 nm long

82. The QNH at an aerodrome is 985Mb. The transition altitude is 3000 ft. How deep is the transition layer? (Assume 1 Mb = 30 ft)

a. 840 ft
b. 360 ft
c. 160 ft
d. 450 ft

83. The QNH is 1040 Mb and you are flying over the sea at 800 ft. What (assuming the T/Alt is MSL) would your flight level be?

a. FL 10
b. FL 0
c. FL -10
d. You have no intention of flying over the Dead Sea, therefore the question is totally academic!

84. After setting 1013 Mb at the transition altitude you have to climb 350 ft to the transition level (FL 40) which is the level you intend to fly en-route. Whilst climbing you are asked to report you vertical position. How would you do this?

a. As a height above the transition altitude
b. As an altitude AMSL
c. As a FL with respect to the standard pressure setting of 1013 Mb
d. Tell the air traffic controller that you are already at FL 40 (it will take a short time to get there anyway!)

© Oxford Aviation Services Limited

85. Which of the following is true concerning the Transition Altitude?

a. It can be a general altitude applicable to all aerodromes in a state
b. The calculated height should be rounded down to the nearest 1000 ft
c. The transition altitude shall not be less than 3000 ft
d. The transition altitude must allow 1000 ft clearance above the top of the aerodrome traffic zone

86. When is the QNH to be communicated to aircraft prior to take off?

a. When taxi clearance is given
b. When the ATC clearance is delivered
c. When start clearance is given
d. When take off clearance is given

87. Within a certain tolerance, what is an altimeter required to read?

a. The height of the altimeter above the reference point
b. The altitude of the position of the aeroplane plus the height of the altimeter
c. The vertical displacement of the altimeter with respect to the highest point on the aerodrome
d. The specified height of the main Apron

88. When parallel runway operations are in progress and reduced radar separation of 3 nm between approaching aeroplanes is maintained what type of operations are being carried out?

a. Mode 1
b. Mode 2
c. Mode 3
d. Mode 4

89. Two aeroplanes are approaching to land on parallel runways on independent parallel approaches and one drifts into the No Transgression Zone (NTZ). What would the monitoring radar controller be required to do?

a. Advise the transgressing aircraft to break-off the approach and go around
b. Order the transgressing aircraft to climb immediately
c. Pass instructions to manoeuvre the threatened aircraft on the adjacent approach
d. Give instructions to the transgressing aircraft to turn away from the other traffic

© Oxford Aviation Services Limited

90. Where does the NTZ extend from and to?

a. From the final approach fix to end of the nearest runway
b. From the start of the farthest glide path to the touchdown point of the first runway
c. From the point at which 1000 ft separation is reduced between aircraft to the threshold of the nearer runway
d. From the runway threshold to the point at which both aircraft are established on the centre line of the runways

91. What is a controlled flight?

a. A flight under IFR and in accordance with an Air Operators Certificate
b. A flight which is subject to an ATC clearance
c. A flight in controlled airspace in IFR or VFR
d. A flight by a manned aeroplane

92. What defines a danger area?

a. A zone where military activity includes firing projectiles in the air
b. Notified airspace (zone or area) where activities dangerous to flight may exist
c. NOTAM activated airspace where the normal flight rules are disregarded
d. Airspace of defined dimensions where activities dangerous to flight may exist

93. Which of the following correctly defines flight visibility?

a. The ability to determine in the air the distance and identity of unlit objects by day and lit objects by night
b. Visibility determined in flight not obscured by cloud, dust, haze or precipitation
c. The forward distance at which objects can be discerned in the airwith reference to atmospheric conditions
d. The forward visibility from the cockpit of an aeroplane

94. When does night exist?

a. During the hours of darkness
b. From 30 minutes after sunset until 30 minutes after sunrise
c. From the beginning of evening civil twilight until the beginning of morning civil twilight
d. During the period when the centre of the Sun's disc is 6° below the horizon

© Oxford Aviation Services Limited

95. In order to fly as pilot-in-command for commercial air transport, you must hold a type rating on the type of aeroplane you are required to fly. What must you pass to achieve the type rating?

a. A skill test including oral examinations as required
b. A proficiency check including oral examinations as required
c. Theoretical knowledge tests both written and oral
d. A flying performance check and written (or oral) examination

96. Which of the following correctly defines Special VFR?

a. 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
b. A flight cleared by ATC to operate within a CTR in conditions below VMC
c. A flight in IMC for which the pilot and/or the aeroplane is unable to comply with the requirements of IFR
d. A VFR procedure to enable an aeroplane to transit a control zone or area in IMC without compliance with IFR

97. What is the name for a taxiway connected to a runway at an acute angle designed to allow aeroplanes to turn off at higher speeds than would be permitted at a right angled turn on to a normal taxiway?

a. Rapid turn off lane
b. High speed exit lane
c. Rapid exit taxiway
d. Acute angle exit

98. What type of airspace is normally established at the confluence of ATS routes in the vicinity of one or more major aerodromes?

a. Control Zone (CTR)
b. Terminal Manoeuvring Area (TMA)
c. Terminal Control Area (TMA)
d. Special Rules Area (SRA)

99. Which of the following would be described as aerodrome traffic?

a. All the traffic on the movement area of an aerodrome
b. All traffic on the manoeuvring area of an aerodrome and flying in the vicinity of the aerodrome
c. Local flying aeroplanes in or adjacent to the visual circuit
d. Any traffic flying through the aerodrome traffic zone

© Oxford Aviation Services Limited

100. What is defined as: 'A control area or portion thereof established in the form of a corridor equipped with radio navigation aids'?

a. A terminal manoeuvring area
b. An upper air route
c. An airway
d. A SVFR entry/exit corridor

© Oxford Aviation Services Limited

Answer Sheet for Practice Paper 2

	A	B	C	D
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				
16				
17				
18				
19				
20				
21				
22				
23				
24				
25				

	A	B	C	D
26				
27				
28				
29				
30				
31				
32				
33				
34				
35				
36				
37				
38				
39				
40				
41				
42				
43				
44				
45				
46				
47				
48				
49				
50				

	A	B	C	D
51				
52				
53				
54				
55				
56				
57				
58				
59				
60				
61				
62				
63				
64				
65				
66				
67				
68				
69				
70				
71				
72				
73				
74				
75				

	A	B	C	D
76				
77				
78				
79				
80				
81				
82				
83				
84				
85				
86				
87				
88				
89				
90				
91				
92				
93				
94				
95				
96				
97				
98				
99				
100				

© Oxford Aviation Services Limited

PRACTICE EXAMINATION 2 – DEBRIEF

	✔	Reference
1	A	13.11.1
2	C	13.6.8
3	B	14.7.2
4	B	14.6.2
5	C	14.9.1
6	C	14.8.5
7	A	15.4.2.1
8	C	14.9.3
9	D	14.9.1
10	A	14.8.3
11	B	13.1.1
12	C	13.7.1
13	C	13.6.7
14	B	13.6.9
15	D	14.8.6.1
16	A	14.8.7.1
17	D	14.2.3
18	B	6.9.3.1l
19	B	15.5.3
20	C	16.4.3
21	B	16.5.3
22	A	Fig 16.2
23	D	Fig 14.8a
24	C	17.2.1
25	D	17.3.2

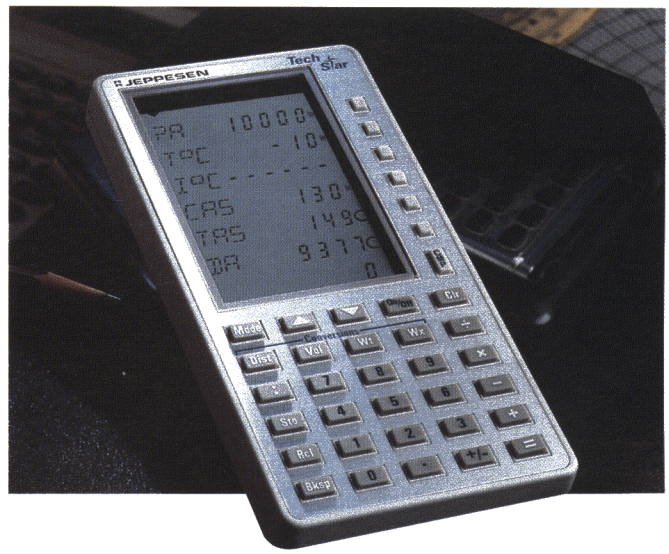
	✔	Reference
26	B	18.3.1
27	A	18.7.1
28	A	OP
29	B	18.6.6.2
30	B	18.6.2d
31	A	13.11.2
32	A	10.1.4
33	C	10.2.2.1b2
34	D	10.2.2.4b
35	D	11.2.2.3a
36	A	11.2.2.3c
37	B	11.2.2.3b
38	C	12.5.1a
39	B	12.4.7
40	B	12.14.1
41	C	12.14.3
42	B	12.14.3
43	D	12.7.1
44	B	Radio
45	D	12.7.2.1f
46	A	12.10.4
47	A	12.10.5
48	C	12.10.5c
49	D	12.8.3c
50	A	12.7.4.2

	✔	Reference
51	B	12.12.6
52	B	12.8.2
53	A	11.3.3.3
54	A	15.2.2
55	D	15.3.6.2
56	C	15.3.6.2
57	B	15.3.6.2
58	A	15.3.8
59	A	15.3.6/9
60	A	15.3.9.1
61	C	15.4.3
62	D	15.4.5.1a
63	D	Def p1-6
64	D	Def p1-6
65	A	14.2
66	C	Def p1-8
67	C	Def p1-9
68	A	7.5.6
69	B	7.7.5.1
70	C	7.5.10
71	D	7.7.3
72	C	7.8.2
73	B	7.7.5.3
74	A	7.7.4
75	B	7.9.2

	✔	Reference
76	B	7.9.3
77	D	7.11.5a
78	B	7.11.5b
79	A	7.11.6
80	D	7.11.8
81	C	7.11.6
82	C	7.12.6
83	B	7.12.5
84	C	7.12.6
85	A	7.12.4
86	A	7.12.7
87	A	7.12.8b
88	B	7.13.1a(ii)
89	C	7.13.3
90	C	Fig 7.13.3
91	B	Def p1-12
92	D	Def p1-12
93	D	Def p1-14
94	D	Def p1-17
95	D	5.6.1
96	B	Def p1-18
97	C	14.5.6
98	C	Def p1-20
99	B	Def p1-6
100	C	Def p1-8

© Oxford Aviation Services Limited

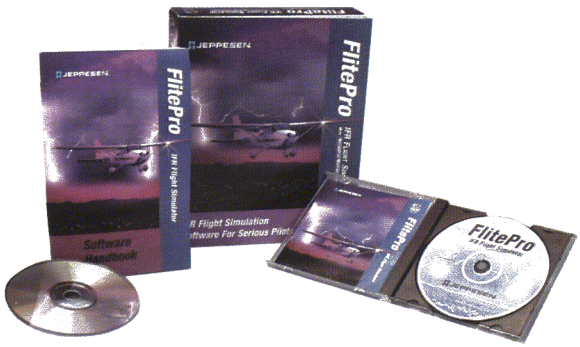
Aviation Products From Jeppesen



TechStar

• Over 25 Aviation Calculations • 55 Conversions Available • 6 Independent Memory Registers • Enter Values In Any Order, Or Change Them At Any Time • Pilot Friendly Use • Work On One Problem While Another On-Screen Calculation Is Being Completed • Weight And Balance Calculations Include Weight Shift Formulas • Three-Year Warranty • Batteries Included • Approved For Use On FAA Knowledge Examinations

Order Code - TECH



Software-only Package

The Software-only Package includes: FlitePro Software CD-ROM • FliteSchool instrument course CD-ROM • Installation handbook • 10 ATC scenarios • 200 selected Jeppesen SIMCharts approach plates • Jeppesen worldwide database

Order Code - FLTPRO

Maneuvers Training on CD-ROM

Each CD-ROM is organized into a flexible, easy-to-use format. The design format allows you to choose what topics you would like to review and in what order you would like to study them in. Combine the Private Pilot Manual with the Maneuvers CD-ROM Course for the most exciting way to learn to fly. Order the complete Private Pilot Manuevers Multimedia Course or order individual topics. Includes a Student Tracking Disk for keeping track of your progress through the course and five CD-ROMs covering the following topics:

GFDCD1	Ground Operations CD-ROM
GFDCD2	Basic Maneuvers CD-ROM
GFDCD3	Airport Operations CD-ROM
GFDCD4	Emergency Landing Procedures / Flight Maneuvers CD-ROM
GFDCD5	Ground Reference Maneuvers CD-ROM
GFDPMA	Private Pilot Maneuvers Software Course (5 CDs)
JS202500	Private Pilot Maneuvers Software Course (5 CD-ROM's and *Private Pilot Manual)*

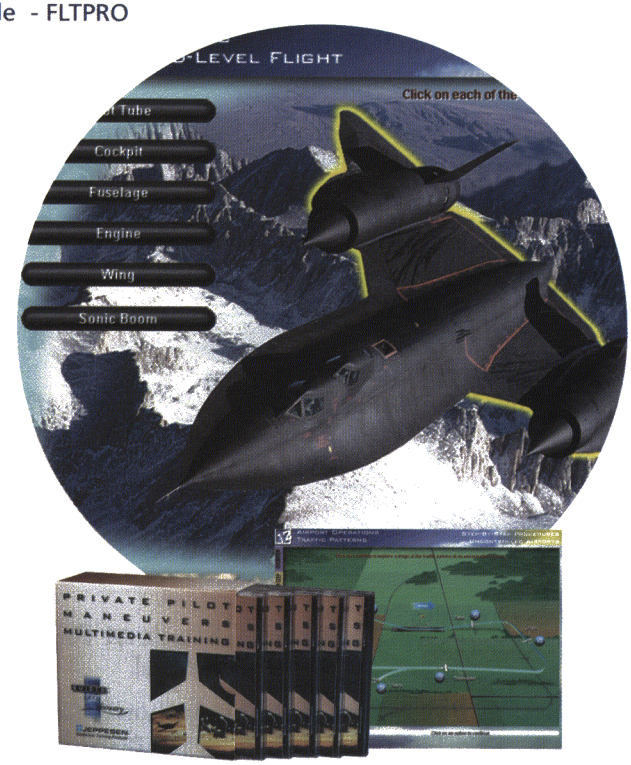


Chart Series

Professionally designed and produced, the FlighTime Chart Series Videos and DVD cover Jeppesen enroute charts and approach charts, as well as SIDs and STARs.

CHTS3V	Videos
JS200300	DVD

Approach Charts includes a detailed introduction of Jeppesen's approach charts, featuring the Briefing Strip™ format. RNAV and GPS procedures are also covered. Order Code - CAPPV

Enroute Charts features Jeppesen four-color enroute charts and is based primarily on US-LO series charts. Order Code - CENRV

Departures and Arrivals presents the unique characteristics of SID and STAR charts. Order Code - CSIDV

JEPPESEN

To see our full range of products, please request the Jeppesen Catalog or visit our website: www.jeppesen.com

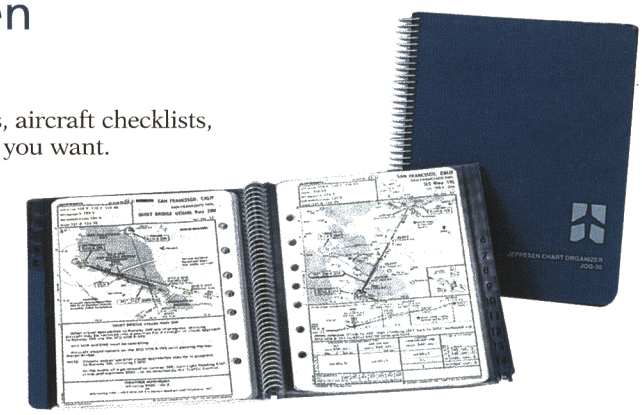
Aviation Products From Jeppesen

JOG-15/JOG-30 Chart Organizers

Transparent pockets are ideal for holding trip charts, flight plans, aircraft checklists, etc. Index tabs and spiral binding make it easy to access the chart you want.

Order Code - JOG-15 (15 Pockets)

Order Code - JOG-30 (30 Pockets)



Airline Flight Case

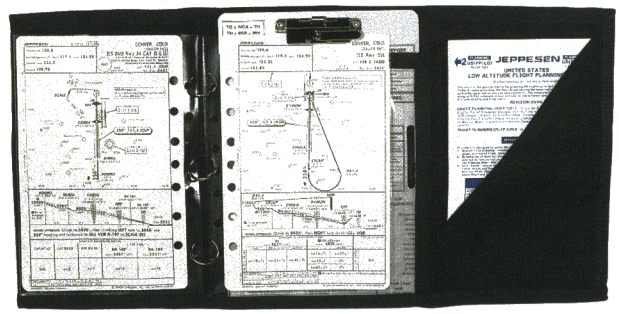
Designed by the pilots of Swiss Airline Crossair, this rugged, black leather Pilot's Case incorporates longer carrying handles rather than the briefcase-type grip. End flaps keep rain and dust out and serve to protect your valuable paperwork. Room for 4 Jeppesen binders. (Size: 46 x 29 x 19 cm) Order Code - FC-AIR

Three-Ring Trifold Kneeboard

Great for approach charts! Includes 3 approach chart pockets, pen/pencil or penlight holder and a metal
clipboard. Comes with FREE flight planning chart. Measures 10" x 20" open.

TRKNEE Kneeboard/Clipboard

TRCLIP Clipboard only with Leg Strap



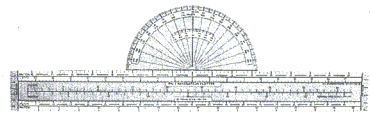
Metal CSG (E6-B)

Solves low and high speed problems. Non-glare finish. Complete with instruction manual and carrying case. Order Code - CSG-AL

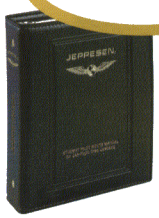
PN-1 Navigation Plotter

Allows easy identification of WAC and Sectional chart scales. Calibrated in statute and nautical miles. (Size: 12¼"x4")

Order Code - PN-1



Now Includes VFR Chart Set!



JAR FCL Student Pilot Route Manual

The Joint Aviation Authority (JAA) has requested Jeppesen provide the definitive Student Route Manual for the JAA Airline Transport Rating exams. In order to comply with the JAA syllabus, this manual is not revised. Student pilots will need the manual during the JAA ATPL exams and can familiarize themselves with the material in advance by ordering a personal copy.

Order Code - STPRM

Order Code - STPRMVFR (Add VFR Supplement to existing manual)

Professional European Pilot Logbook

Complies with JAR 1.080 regulations for logging flight time in Europe. Handles 10 years of data. (Size: 17.1 cm x 28.6 cm)

Order Code - JAALOG

For more information please contact your local Dealer or Jeppesen directly:

JEPPESEN

Frankfurter Strasse 233, 63263 Germany • Phone: +49 61 02 50 82 50
FAX: +49 61 02 50 82 82 • E-mail: fra-services@jeppesen.com
www.jeppesen.com