BAVirtual

Operations Manual
Part A
Flight Crew Procedures

0 Preface

0.1 Record of Amendments

Rev. No	Date Entered
2	June 2021
3	March 2025

0.2 Revision Highlights

0.2.1 Revision 3, March 2025

References to CIRRUS replaced with "Operational Flight Plan"

4.1.2.1.3 Minimum Operating Altitude

Amended for further clarity.

4.1.3.2 Instrument Approach Procedure Approval

Added approval for LTS Cat I and OTS Cat II

Added restriction on SRA

Updated authorised final approaches per aircraft type to align with current fleet capability

Added list of of non-precision approaches authorised to be flown without CDFA technique

Updated list of prohibited instrument approach procedures

4.1.4.1.2 Application of Forecast Conditions

Summarised into table

4.1.4.6 Approach Minima

Added clarification re: use of QFE

Added clarification re: use of MDA(H) as DA(H)

4.1.7 Altitude and Terrain Information on Flight Documents

Added section providing detail regarding display and practical use of altitude and terrain detail on charts and OFP.

4.3.3.7 Altimeter Setting Procedures

Added text clarifying procedure for initating and confirming altimeter setting

Added policy for verification of TA/TL

Added policy for "Climb Via" and "Descend Via"

4.3.5 Communication

Updated policy regarding responsibility for communications and R/T phraseology

Replaced referenced to UNICOM with "Advisory Frequency" and provided additional clarification on BAVirtual policy for use of Advisory Frequencies on VATSIM

Minor amendments to AIREP reporting requirements and procedures

Added background information regarding callsign allocation

4.3.7 Performance Based Navigation (RNAV) Operations

Complete overhaul of PBN policy and procedures to bring up to date with current policy, fleet equipment fit and latest approvals.

4.3.9 (E)GPWS Policy and Procedures

Updated policy regarding (E)GPWS activations

Added section regarding operations without EGPWS Look-Ahead/Terrain Function

4.3.14.7 Standard Callouts on Takeoff – V Speeds

Added policy

4.3.14.8 MSA

Added definition of 'relevant MSA'

Updated policy for acceptance of clearance through MSA

4.3.15 Descent and Approach Procedures

Added policy for Approach Briefing

Updated policy for flight below MSA

Added policy for minimum altitude in MCP/FCU

4.3.15.9 Safe Landing Policy

Replaces Stable Approach Policy.

4.3.15.13 Radio Altimeter Monitoring

Added clarification on procedure on first indication of radio altitude

4.3.15.16 Cold Temperature Altimeter Correction

Added policy for application of Cold Temperature Altimeter Corrections

4.4 Low Visibility Operations

Updated policy

4.5 Extended Range Twin Operations (ETOPS)

Updated Interpretation of Forecasts

4.8 Augmented Crew Procedures

New section added with new policy.

5 Handling, Notifying and Reporting Accidents, Incidents and Occurrences

New section added.

0.2.2 Revision 2, June 2021

Duties and Responsibilities of the Commander

Added section detailing responsibilities of the Commander.

Fuel Checks and Management

Updated and enhanced detail regarding the conduct of in-flight fuel checks and action to be taken in the event of a fuel shortfall.

Communications – General

Added information detailing which pilot handles R/T and when (primarily for Shared Cockpit operations).

Contents

0.3 Introduction

This manual forms part of the BAVirtual Operations Manual. The Operations Manual is divided in to four sections:

Part A: "What we do" – general information relating to BAVirtual policies

Part B: "How we do it". How the operational policies outlined in Part A are executed on each particular aircraft type. This section includes General Procedures applicable to all fleets, and type-specific manuals (FCOMs etc).

Part C: Route Information Manual. This comprises of aerodrome and area briefings and information. Aerodrome charts also fall under this category.

Part D: Training Manual. This section outlines how training is organised and conducted, and details of training courses specific to each aircraft type.

This manual – Part A – contains general information relating to flying procedures and policies. The policies within this manual are based on real British Airways procedures applicable to all fleets. Merlin FDM events will never be more restrictive than the policies outlined in this manual.

1 Glossary and Definitions

1.1 Glossary

A/C	Aircraft
AAIB	Air Accident Investigation Branch
AAL	Above Aerodrome Level
ABP	Able Bodied Passenger
ACARS	Aircraft Communication Addressing & Reporting System
AIP	Air Information Publication
AIS	Aerodrome Information Service
AFI	Assistant Flight Instructor
AFT	Advanced Flying Training
AML	Aircraft Maintenance Log
ANO	Air Navigation Order
AOC	Air Operator Certificate
AOM	Aerodrome Operating Minima
APIS	Advanced Passenger Information System
APU	Auxiliary Power Unit
AR	Authorisation required
Art	Article
ASP	Aviation Safety Program
ASR	Air Safety Report
ATC	Air Traffic Control
BA	British Airways
BAV	BAVirtual
BALS	Basic Approach Light System
BCF	Bromochlorodifluoromethane
C/C	Cabin Crew
CAA	Civil Aviation Authority
CARD	Computerised Aeroplane Runway Data
CDSS	Cockpit Door Surveillance System

CMV	Converted Meteorological Visibility
CRC	Crew Report Centre
CRM	Crew Resource Management
CP	Chief Pilot
CS	Certification Specification
DFCM	Duty Flight Crew Manager
DfT	Department for Transport
DOM	Duty Operations Manager
EASA	European Aviation Safety Agency
EFB	Electronic Flight Bag
EICAS	Engine Indicating and Crew Alerting System
ELT	Emergency Locator Transmitter
ERA	En Route Alternate aerodrome
eRM	electronic Route Manual (charting app)
ETA	Estimated Time of Arrival
EU	European Union
EVAC	Evacuation
FAF	Final Approach Fix
FALS	Full Approach Light System
FAP	Final Approach Point
FARs	Federal Aviation Regulations (USA)
FCOM	Flight Crew Operating Manual
FCPM	Flight Crew Procedures Manual
FCTM	Flight Crew Training Manual
FCR	Flight Crew Report
FDP	Flying Duty Period
FI	Flight Instructor
FLS	FMS Landing System
FMT	Flight Manager Technical
FO	First Officer

FOSG	Flight Operations Standards Group
Ft	Feet
FTD	Flight Technical Dispatch
FTL	Flight Time Limitation
FTM	Flight Training Manager
GBAS	Ground-Based Augmentation System
GLS	GBAS Landing System
GPS RFI	Global Positioning System Radio Frequency Interference.
H or h	Hour
HAC	Heathrow Airport Centre
HF	High Frequency
HM	His Majesty
HoFT	Head of Flight Technical
HUD	Head Up Display
IAF	Intermediate Approach Fix
IALS	Intermediate Approach Light System
IAN	Integrated Approach System
IATA	International Air Transport Association
ICAO	International Civil Aviation Organisation
ICC	International Cabin Crew
ID	Identification
IFE	In Flight Entertainment
IFCE	In Flight Customer Experience
IFT	Initial Flying Training
JAA	Joint Aviation Authorities
JAR-FCL	Joint Aviation Requirements – Flight Crew Licensing
kg	Kilogram
km	Kilometre
L or l	Left
LDA	Localiser-type Directional Aid

LGW	London Gatwick
LHR	London Heathrow
LMC	Last Minute Change
LPV	Localiser Performance with Vertical guidance
lt	Litre
LTS Cat I	Lower Than Standard Category I approach
m	Metres
MDH/A	Minimum Descent Height/Altitude
MEL	Minimum Equipment List
MGA	Minimum Grid Altitude
ml	Millilitre
MLS	Microwave Landing System
MSA	Minimum Safe Altitude
MTCA	Minimum Terrain Clearance Altitude
NALS	No Approach Light System
NHP	Non-Handling Pilot
NITS	Nature, Intentions, Time, Special Instructions
nm	Nautical Mile(s)
NOTAM	Notices to Airmen
NOTOC	Notification to Captains
NUBRF	New Brief
OAT	Outside Air Temperature
OCIC	Operations Control Incident Centre
OFP	Operational Flight Plan
OIS	Onboard Information System
OMN	Operations Manual Notice
OPS	Commission Regulation (EC) No 859/2008 of 20 August 2008 (EU-OPS)
OPT	Onboard Performance Tool
OTS Cat II	Other Than Standard Category II approach
PA	Passenger or Public Address

PBN	Performance Based Navigation
PC	Personal Computer
PIC	Pilot in Command
PRM	Precision Runway Monitor
QM	Queen's Messengers
QRH	Quick Reference Handbook
R or r	Right
RNAV	Area Navigation
RNP	Required Navigation Performance
RVR	Runway Visual Range
SAAAR	Special Aircraft and Aircrew Authorisation Required (USA)
SATCOM	Satellite Communication
SCCM	Senior Cabin Crew Member
SEP	Safety Equipment and Procedures
SFO	Senior First Officer
SG	Specific Gravity
SOP	Standard Operating Procedure
SSA	Sector Safe Altitude
SSB	Single Side Band
T3	Terminal 3
T5	Terminal 5
TAH	Training Appointment Holder
TC	Training Captain
TRI(V)	Type Rating Instructor (Virtual)
TSC	Training Standards Captain
TOB	Total on Board
TOW	Take off weight
TRM	Turn Round Manager
UK	United Kingdom
UM	Unaccompanied Minor

US	United States
UTC	Universal Time Coordinated
VHF	Very High Frequency
VIP	Very Important Person
YP	Young Person
ZFW	Zero Fuel Weight

2 EU-Ops Definitions (OPS 1.192)

2.1 Adequate Aerodrome

An aerodrome which the operator considers to be satisfactory, taking account of the applicable performance requirements and runway characteristics; at the expected time of use, the aerodrome will be available and equipped with necessary ancillary services such as ATS, sufficient lighting, communications, weather reporting, navaids and emergency services.

2.2 ETOPS (Extended range operations for two engine aeroplanes)

ETOPS operations are those with two engine aeroplanes approved by the Authority (ETOPS approval), to operate beyond the threshold distance determined in accordance with OPS 1.245 (a) from an Adequate Aerodrome.

2.3 Adequate ETOPS en-route alternate aerodrome

An adequate aerodrome, which additionally, at the expected time of use, has an ATS facility and at least one instrument approach procedure.

2.4 En-route alternate (ERA) aerodrome

An adequate aerodrome along the route, which may be required at the planning stage.

2.5 3 % ERA

An en-route alternate aerodrome selected for the purposes of reducing contingency fuel to 3 %.

2.6 Isolated aerodrome

If acceptable to the Authority, the destination aerodrome can be considered as an isolated aerodrome, if the fuel required (diversion plus final) to the nearest adequate destination alternate aerodrome is more than:

For aeroplanes with reciprocating engines, fuel to fly for 45 minutes plus 15 % of the flight time planned to be spent at cruising level or two hours, whichever is less; or

For aeroplanes with turbine engines, fuel to fly for two hours at normal cruise consumption above the destination aerodrome, including final reserve fuel.

2.7 Equivalent position

A position that can be established by means of a DME distance, a suitably located NDB or VOR, SRA or PAR fix or any other suitable fix between three and five miles from threshold that independently establishes the position of the aeroplane.

2.8 Critical phases of flight

Critical phases of flight are the take-off run, the take-off flight path, the final approach, the landing, including the landing roll, and any other phases of flight at the discretion of the commander.

2.9 Contingency fuel

The fuel required to compensate for unforeseen factors which could have an influence on the fuel consumption to the destination aerodrome such as deviations of an individual aeroplane from the expected fuel consumption data, deviations from forecast meteorological conditions and deviations from planned routings and/ or cruising levels/altitudes.

2.10 Separate runways

Runways at the same aerodrome that are separate landing surfaces. These runways are permitted to overlay or cross provided it is in such a way that if one of the runways is blocked, it will not prevent the planned type of operations on the other runway. Each runway shall have a separate approach procedure based on a separate navigation aid.

2.11 Approved one-engine-inoperative cruise speed

For ETOPS, the approved one-engine-inoperative cruise speed for the intended area of operation shall be a speed, within the certified limits of the aeroplane, selected by the operator and approved by the regulatory authority.

2.12 ETOPS area

An ETOPS area is an area containing airspace within which an ETOPS approved aeroplane remains in excess of the specified flying time in still air (in standard conditions) at the approved one-engine-inoperative cruise speed from an adequate ETOPS route alternate aerodrome.

2.13 Dispatch

ETOPS planning minima applies until dispatch. Dispatch is when the aircraft first moves under its own power for the purpose of taking off.

3 Crew Composition

3.1 Flight Crew

3.1.1 Personal Flying Log Books

BAVirtual maintains a record of all flights recorded using the Merlin software. This forms the crew member's Personal Flying Log Book.

3.2 Authority, Duties and Responsibilities of the Commander

The authority of a Captain comes through two sources: the law, and his/her position within the airline.

The UK Air Navigation Order states:

Every person in an aircraft registered in the United Kingdom shall obey all lawful commands which the commander of that aircraft may give for the purpose of securing the safety of the aircraft and of persons or property carried therein, or the safety, efficiency or regularity of air navigation.

In addition, EU-OPS 1.090 states: *All persons carried in the aeroplane shall obey all lawful commands given by the commander for the purpose of securing the safety of the aeroplane and of persons or property carried therein.*

The Captain is ultimately responsible for all aspects of safety, security and customer service whenever our customers are under the sole supervision of the crew. The operating co-pilot is their nominated deputy. The SCCM is responsible for the delivery of cabin service and is accountable to the Captain for safety and security.

The designated Captain has ultimate responsibility for the safety of the aircraft, passengers and crew, throughout the period of command. The Captain is also directly responsible for the conduct of flight operations in accordance with OPS Part 1, The Air Navigation Order, BAVirtual Policies and BAVirtual's Operations Manual.

In addition, the Captain has the delegated authority, capability and responsibility to impact positively upon BAVirtual's competitive position and commercial success. In exercise of command, the Captain is expected to exhibit qualities of leadership, together with those skills and attributes which will influence all those involved in flight operations to maximise their contribution to the successful completion of the flight.

The Pilot in Command signs flight documents as Captain of the aircraft, irrespective of their rank or seniority, and this officially confers their authority and responsibility for the aircraft.

3.2.1 General Responsibilities

By their actions, the Captain is expected at all times and in all circumstances to uphold the prestige and reputation of BAVirtual.

The Captain is accountable and responsible for:

- The safety and security of the aircraft during the period of command
- The expeditious and cost effective operation of the flight
- The welfare of the passengers and crew

Captains are expected to exhibit qualities of leadership together with skills and attributes which will influence all those involved in BAVirtual to maximise their contribution to the success of the VA.

Captains are expected to demonstrate a high level of self-awareness, lead by example and motivate fellow members, particularly First Officers and Senior First Officers, to conduct themselves in accordance with the values of the organisation and in accordance with BAVirtual’s aims, objectives and SOP. Through their interactions on the BAVirtual forums and Discord server, they should always be looking to assist co-pilots to develop the skills, knowledge and experience they will require in order to themselves achieve promotion.

At all times and in all settings, BAVirtual Captains should:

- Lead by example
- Motivate fellow members
- Develop the skills of fellow members and ensure the provisions and requirements of the BAVirtual SOP are followed at all times
- Engender a positive atmosphere within the BAVirtual community
- Project the image of the VA by personal example
- Engender confidence in the quality and professionalism of the VA by his/her leadership
- Alert the organisation to any opportunity for improvement, expansion or other development he/she encounters, and be provided with feedback on the decision reached

The Captain must consider the impact of any decisions they make on the individual, the operation and the team.

In exercising operational control of their aircraft, the Captain is expected to use their initiative in the best commercial interests of BAVirtual. They should make every effort to accede to any request concerning the conduct of their flight from Operations Control or BAV Management.

In fulfilling their responsibilities for the welfare of crew, the Captain must consider whether any actions they take will have further consequences that also require planning or management, particularly downroute where support from the company is likely to be limited or unavailable.

As the senior manager on board the aircraft, the Captain should always be aware of the business implications of any decisions they or their crew make, including those which potentially impact on safety, security or customer service. In addition, the Captain has the delegated authority and responsibility to impact positively on BAV’s competitive position and commercial success.

The Captain has a shared responsibility for co-pilot development. This shall be achieved in part by setting high operating and customer service standards, and by ensuring adherence to and understanding of BAV SOPs and policies.

They should be prepared to give balanced and constructive feedback to co-pilots, and be open to feedback from other members.

If a Captain has a concern about the performance or behaviour of any member, they should in the first instance try to resolve the issue at the time. If they judge that further management or training intervention is required they should discuss their concerns with the member prior to submitting a report to BAV Management.

3.2.2 Specific Responsibilities

The Commander must take all reasonable steps to:

- Maintain familiarity with relevant online network regulations as applicable, and agreed aviation practices and procedures

  Note: BAV discharges this responsibility on behalf of Flight Crew by incorporation of relevant regulations in the Operations Manuals

- Maintain familiarity with the BAV Operations Manuals

In addition the Commander shall:

- Be responsible for the safe operation of the aeroplane and safety of its occupants and cargo. This responsibility starts when they enter the aeroplane with the intention of carrying out a flight, or when they first sign the flight documents. The command continues until transferred for operational reasons, or when the aeroplane has been handed over on completion of the command period.
- Subject only to the above, act at all times to the benefit of BAV's commercial advantage.
- Have authority to give all commands they deem necessary for the purpose of securing the safety of the aeroplane and persons or property carried therein, and all persons carried in the aeroplane shall obey such commands.
- Have authority to disembark any person or any part of the cargo which in their opinion mat represent a potential hazard to the safety of the aeroplane or its occupants
- Ensure all passengers are briefed on the location of emergency exits and the location and use of relevant safety equipment
- Ensure all operational procedures and checklists are complied with
- Confirm that the aeroplane's performance will enable it to safely complete the proposed flights and take all reasonable steps to ensure that mass and balance remains within limits
- Take all reasonable steps to ensure that whenever the aeroplane is taxiing, taking off or landing, or whenever they consider it advisable, that all passengers are properly secured in their seats and that all cabin baggage is stowed in the approved stowages

The Captain must comply with established policies and procedures unless they have urgent and compelling reasons to depart from them. A degree of flexibility is essential in aircraft operations, however, and the Captain has discretion to use non-standard practices to meet unexpected or unusual circumstances in the interests of safety.

The Commander shall, in an emergency situation that requires immediate decision and action, take any action they consider necessary under the circumstances. In such cases they may deviate from rules, operational procedures and methods in the interests of safety (see above).

The Commander has the authority to apply greater safety margins, including aerodrome operating minima, if deemed necessary.

3.2.3 Aircraft Handling by First Officers

3.2.3.1 Captain’s Responsibilities

3.2.3.1.1 Multi-Crew (Shared Cockpit) Flights

Role reversal and PICUS operation entails an exchange of the normal allocation of duties laid down for the Captain and First Officer for each aircraft type. During role reversal it is emphasised that the Captain’s responsibility for the safe and efficient operation of the aircraft remains unchanged. The pre-flight briefing will be given by the First Officer and must show that the First Officer is clearly aware of the required action in the event of an emergency arising when in control of the aircraft. All significant decisions and actions taken by the First Officer must be supervised by the Captain. Where necessary, the Captain will terminate the role reversal and PICUS operation. Thereafter the normal allocation of duties for both Captain and First Officer will be restored.

The aircraft should be operated using the procedure detailed in the type specific manuals.

The Captain will apply judgement and discretion in deciding whether the First Officer carries out the take-off and/or landing or operates complete sectors, flying as Pilot in Command under supervision.

The Captain will give due regard to their own and the First Officer's experience, both overall and on type, the First Officers known or demonstrated capabilities and specifically:

a. The cloud ceiling, visibility/RVR and cross-wind must not be outside the First Officer limits.

b. When conditions are close to the Cat 1 minima and Cat 2 or 3 facilities are available, consideration should be given to terminating the role reversal and making full use of the lower limits.

c. Due regard must be given to weather conditions below decision altitude/height e.g. cross-wind, gustiness, precipitation and runway state.

d. If the aerodrome to be used is “Restricted” (i.e. Category B or C), consideration should be given to the Captains own recency and experience of operation in the area.

3.2.3.2 Co-pilots’ Limits

a. Co-pilots may carry out take-offs in visibilities of 600 m RVR or greater.

b. Co-pilots may land from an approach conducted to Category 1 Precision or Non-Precision AOM.

c. Crosswind limitations for take-off and landing are 2/3rd of those promulgated for the aircraft type in the prevailing conditions.

d. First Officers under Command PICUS training as part of a command course are subject to the same wind limits as Captains.

3.3 Pilot's Area and Aerodrome Qualification

BAVirtual requires all Flight Crew to ensure that they are adequately briefed for each flight. This can be achieved by reference to the OM-C section of DocStore which contains briefings for a growing number of BAV-served airfields, as well as area briefings and other useful information.

The Area Briefing should be studied prior to flight in to, out of or over the relevant area.

If available, the Aerodrome Briefing should also be studied prior to flight in to or out of the aerodrome in question.

3.3.1 Aerodrome Briefing Requirements

3.3.1.1 Classifications

3.3.1.1.1 Category A (Unrestricted)

An aerodrome which satisfies all of the following requirements:

a. An approved instrument approach procedure;

b. At least one runway with no performance limited procedure for take-off and/or landing;

c. Published circling minima not higher than 1,000 feet above aerodrome level;

d. Night operations capability.

3.3.1.1.2 Category B (Restricted)

An aerodrome which does not satisfy the Category A requirements or which requires extra considerations such as:

a. Non-standard approach aids and/or approach patterns; or

b. Unusual local weather conditions; or

c. Unusual characteristics or performance limitations; or

d. Any other relevant considerations including obstructions, physical layout, lighting etc.

Prior to operating to a Category B aerodrome, the commander should be briefed, or self-brief, on the Category B aerodrome(s) concerned and should certify that they have carried out these instructions.

3.3.1.1.3 Category C (Restricted)

An aerodrome which requires additional considerations to a Category B aerodrome.

Prior to operating to a Category C aerodrome, the commander should be briefed and visit the aerodrome as an observer and/or seek instruction and guidance from the Training Department.

3.3.2 Emergency Aerodromes

Flight over substantially uninhabited areas emphasises the importance of emergency diversion aerodromes. Such areas, and associated aerodromes, are listed in the Route

Information Manual (OM C). It is the Captain’s responsibility to ensure that they are adequately briefed for the appropriate emergency diversion aerodromes.

4 Operating Procedures

4.1 Flight Preparation Instructions

4.1.1 AIS and Met Briefing

Before every flight the Captain must ensure that they are in possession of all necessary AIS and Met information relevant to the intended flight and any diversion which might be required. They must be satisfied that ground facilities and services required for the planned flight are available and adequate. The company NUBRF (provided with the Operational Flight Plan when generated via the BAVirtual website) meets this requirement. Information must include details of all ATC procedures and restrictions, navigation and communications facilities and restrictions, aerodromes and ground aids. During winter, snow and slush states and their effect on take-off performance and braking action must be considered.

The Met information reviewed should include significant weather charts, the relevant forecasts covering en route flight conditions and anticipated landing conditions at the destination aerodrome and at all other aerodromes which might be used for diversion, including the departure aerodrome or alternate. The Captain must ensure they are fully and properly briefed.

4.1.2 Minimum Flight Altitudes

4.1.2.1 Definitions

4.1.2.1.1 Minimum Safe Altitude (MSA)

The MSA is the minimum altitude which gives the vertical clearance in 4.1.2.3 below over all terrain and known obstacles within the specified area.

4.1.2.1.2 Sector Safe Altitude (SSA)

The SSA applicable to a quadrant of an Instrument Approach Chart is the minimum altitude which gives vertical clearance in 4.1.2.3 below over all terrain and known obstacles within that quadrant.

4.1.2.1.3 Minimum Operating Altitude (MOA)

The MOA for any flight or part of a flight is the minimum altitude at which the flight may be planned or operated, taking account of the minimum standards and operating procedures defined below.

The MOA for any part of a BAV flight, including a test flight, must never be less than the following:

- FOR NIGHT OR IMC FLYING – the relevant MSA (see Relevant MSA), or, when under the control of an approved radar unit, the Radar Cleared Altitude;

Note: The minimum clearance provided by Radar Cleared Altitudes when under the control of approved radar unit is 1000 ft with a minimum band width of ±5 nm. Conflict may, therefore, occur between clearances based on these criteria and MSAs based on the wider margins used in BAV documentation. Such clearances may be accepted in accordance with the conditions in OM A

4.3.15.4. However, if there is any doubt about the aircraft's position, the operation must be conducted with reference to the relevant MSA.

- For VMC FLYING BY DAY – 500 ft above all obstacles.

In addition, in adverse meteorological conditions, corrections must be applied to the MOA, as described in the paragraphs below.

4.1.2.1.4 Corrections to Minimum Operating Altitude

The minimum standards specified above, for calculating MSAs are not necessarily the safe minima in all meteorological conditions. For example very low air temperatures cause an altimeter to overread and mountainous terrain can generate abnormal turbulence and lee waves, particularly in strong winds.

4.1.2.1.4.1 Strong Wind Adjustment

The MOA must be increased to ensure that the relevant MSA or SSA is not infringed when strong winds, moderate or severe turbulence or mountain wave conditions are forecast, reported or experienced.

When the wind speed at the relevant MSA or SSA exceeds 50 kts, the MOA must be increased by at least 2,000 ft. When flying over mountainous terrain in mountain wave conditions a vertical clearance over the highest ridge at least equal to the height of the ridge above the surrounding terrain should be selected.

4.1.2.1.4.2 Deviation from Flight Planned Route

The Captain must ensure that the flight planned altitude for each segment of the route complies with the relevant MSA. If any deviation from the flight planned track becomes necessary, all terrain and obstructions near the intended track must be carefully considered and adequate allowance made to avoid them, taking account of the following factors:

a. The relative merits of a direct route over high ground and of an indirect route avoiding it.

b. The possibility of maintaining visual contact with the ground or water as against flying IFR.

c. The accuracy and reliability of navigational aids.

d. The forecast met conditions, including the type and height of cloud over high ground, wind velocity, down draughts, icing layers, and any sudden and unpredictable changes in barometric pressure and temperature.

e. The accuracy of maps and charts in certain parts of the world.

4.1.2.2 Obstacle Clearance Standards

Irrespective of any Radar or ATC clearances, the Captain remains responsible for maintaining adequate obstacle clearance.

These standards apply from the end of the initial climb until the start of the approach to land.

The standards for initial climb are those of the performance requirements contained in either the UK Air Navigation (General) Regulations or EASA CS 25 as amended, and those for the approach are met by adherence to approved Instrument or Visual Approach procedures, as applicable.

4.1.2.3 Vertical Clearances

In order to establish a SSA or MSA, the following vertical clearances are observed:

Elevation of Obstacle	Vertical Clearance
Up to and including 5000 ft	1000 ft
Above 5000 ft	2000 ft

4.1.2.4 MSAs & SSAs on Flight Documents

4.1.2.4.1 General

MSA and SSA figures are rounded up to the next 100 ft and quoted in hundreds of feet, i.e. excluding the last 2 zeros, e.g. 76 indicates 7600 ft.

MSAs for operation off the Operational Flight Plan planned route can be obtained from en-route navigation charts (e.g. Navigraph).

4.1.2.4.2 Operational Flight Plan (Simbrief) Flight Plans

MSA figures are provided on Simbrief Operational Flight Plans for each route leg in thousands of feet, e.g. 4.5 = 4,500 ft.

The band width used for calculating MSAs for flight plan tracks is 20 nm on each side of track. Displayed MSAs are subject to a minimum of 2000 ft.

Between the departure aerodrome and the first fix, and between the last fix and the arrival aerodrome, the MSA shown relates to the direct track between the points. When transferring from Operational Flight Plan to aerodrome charts, care must be taken to ensure that any relevant MSAs are not infringed.

4.1.2.4.3 Enroute Charts

MSAs are shown on Navigraph enroute charts as a screened overprint covering a 1° latitude by 1° longitude grid square.

4.1.2.4.4 Aerodrome Related Charts

SSAs are quoted for up to four quadrants, centred on a given reference point. Each figure is normally valid for a 25 nm radius from the reference point.

The SSA is derived by taking the elevation of the highest obstacle in the quadrant rounded up to the next 100 ft, then adding the appropriate clearance given in 4.1.2.3.

4.1.2.5 MSA Critical Points

MSA Critical Points and escape procedures may be published in Performance Manuals for each airframe where this information is available.

On sectors where driftdown escape routes are published the route options should be entered into RTE 2 of the FMC or the SEC F-PLN of the FMGC prior to reaching the start of the escape route.

4.1.2.6 Navigation Documents

In approving the use of navigation documents, BAV accepts the standards to which they were produced. If when using a mix of third party documents a conflict exists, the higher or more restrictive figure should be used.

4.1.2.7 Operating Procedures

4.1.3 Criteria for Determining the Usability of Aerodromes

4.1.3.1 Legislation

Legislation relating to Aerodrome Operating Minima (AOM) is contained in OPS. The following instructions ensure compliance both with OPS and other Regulations which may apply (e.g. applicable FARs in the USA).

4.1.3.2 Instrument Approach Procedure Approval

All aircraft in the BAVirtual fleet are authorised to fly the following types of approach:

ILS (Uncategorised, Cat I, II and III), ILS Lower than Standard Cat I (LTS Cat I), ILS Other Than Standard Cat II (OTS Cat II), Localiser (LOC), Localiser Back-Course, LDA, PRM, SOIA, PAR, SRA*, VOR (with or without DME), NDB (with or without DME), Locator (with or without DME), Circling.

*SRAs are only authorised at specific destinations. These are:

- Gibraltar (LXGB/GIB)

In addition, all aircraft in the British Airways fleet are authorised to fly the following types of approach in the USA:

a. Circling approaches with visibility minima less than 3 sm. Such approaches are specifically authorised by the BAV USA Operations Specification.

b. Cat II ILS approaches with a published RVR of 1000 ft. Such approaches are specifically authorised by the BAV USA Operations Specification.

c. Cat II ILS approaches which contain a Note saying ‘Special aircrew and aircraft authorisation/certification required’

d. Cat III ILS approaches which contain a Note saying ‘Special aircrew and aircraft authorisation/certification required’ and/or ‘Special Autoland evaluation required’; where Cat III minima are also published

e. Authorised final approaches for specific aircraft type are listed in the table below:

Approach Type	Chart Title	Chart Minima Heading	Airbus Single Aisle	A350	A380	B777	B787	E190
MLS			Yes	No	No	No	No	No

Note: See Performance Based Navigation (PBN Procedures) below for information about permitted PBN procedures.

4.1.3.2.1 Authorisation of Non-precision Approaches Flown Without Using the CDFA Technique

UK Air Ops requires authorisation from the CAA to fly any Non-Precision Approach other than by using the CDFA technique. The following approaches are authorised in this category:

- KJFK VOR or GPS Rwy 13 L/R (The 'Canarsie Approach')
- LGSK LCTR Rwy 01 (BA CityFlyer only)
- LGSK LCTR Rwy 19 (BA CityFlyer only)

4.1.3.2.2 AR (Authorisation Required), or SAAAR (Special Aircraft and Aircrew Authorisation Required) Approaches

Some instrument approach charts state Special Aircrew and Aircraft Authorisation, or simply Special Authorisation required. The charts may refer to ILS approaches or to RNAV approaches. AR/SAAAR **ILS** approaches **are** authorised for use by all aircraft in the BAV fleet (but see Prohibited Instrument Approach Procedures below about Cat I ILS Special Authorisation Procedure in the USA). See Performance Based Navigation (PBN) Procedures for information concerning RNP AR (PBN) approaches. Prohibited Instrument Approach Procedures

All BAVirtual aircraft are explicitly prohibited from flying the following types of final approach:

Approach Type	Chart Title	Chart Minima Heading	Notes
ILS (USA only)	ILS	ILS	'Cat I ILS Special Authorisation Procedure' (USA Only)

Note: See Performance Based Navigation (PBN) Procedures below for information about prohibited PBN procedures.

4.1.3.3 General Planning Principles

For every flight, the following questions should be asked:

- Is a take-off alternate required?
- Is a destination alternate required?
- Is an extra destination alternate required?
- Is an en route alternate required?
- Does the weather at the destination and any required alternates meet planning minima? (It may be possible to depart if the Destination is below planning minima if an extra destination alternate is planned)
- Are the required alternates operationally and politically acceptable?
- Is the flight an ETOPS flight?
- Is the flight to an Australian, US, Canadian or Saudi Arabian destination or alternate?
- Is the fuel sufficient for the flight?

The minima requirements at alternates and destination differ, but, with one exception all are subject to the same requirements for the applicable time windows, (the times between which the weather minima must be satisfied (See 'Planning Minima') and the application of the forecasts (for example in the treatment of gusts and TEMPOs). The one exception is the departure aerodrome, where current conditions determine the need for a take-off alternate (See 'Take-off Alternate').

4.1.3.4 Take-off Alternate

a. Requirement:
A take-off alternate shall be specified and annotated on the flight plan if it would not be possible to return to the aerodrome of departure for meteorological or performance reasons based on weather conditions at the time of departure.

Normal operating minima apply and engine failure limitations must be considered.

If the flight is planned using the BAVirtual Simbrief integration, Simbrief will check the requirement and select a take-off alternate when necessary. The selected take-off alternate will be one of the approved destination alternates for the departure airfield and aircraft type. The requirements below are not included automatically in the Simbrief calculation and must be checked manually.

b. The take-off alternate shall be located within:

i. For two-engined aeroplanes: 60 minutes at the one-engine-inoperative cruising speed.
ii. For three and four-engined aeroplanes: 120 minutes at the one-engine-inoperative cruising speed.
iii. For ETOPS approved aeroplanes and crews, additionally, for all states except USA and Saudi Arabia: 120 minutes, or the approved ETOPS diversion time if this is less, at the one-engine-inoperative cruising speed.

4.1.3.5 Destination Alternate

At least one destination alternate shall be selected for each IFR flight unless either:

a. The duration of the planned flight from take-off to landing does not exceed 6 hours.

And

Two separate runways are available and useable at the destination and the meteorological conditions prevailing are such that, for the period from 1 hour before until 1 hour after the expected time of arrival at destination, the ceiling will be at least 2000 ft or Circling height + 500 ft, whichever is greater, and the visibility will be at least 5 km.

Or

b. The destination is isolated and no adequate destination alternate exists.

It is generally BAV policy always to plan for a destination alternate (except in the case of an isolated destination aerodrome). The rule above is included for completeness as it represents the absolute limit for flight planning purposes, and could be invoked in the case of, for example, technical or political difficulty that prevents a normal fuel uplift, or to avoid minor fuel uplifts.

Note: If the flight is to be dispatched without fuel for a destination alternate, extra fuel must be added to permit holding for 15 minutes at 1,500 ft above the destination aerodrome in standard conditions. For guidance, that amount equates to half Final Reserve fuel.

Two destination alternates must be selected when the weather conditions at the destination aerodrome are forecast to be below the applicable planning minima (See 'Destination Aerodrome (except Isolated Destination Aerodrome')), or no meteorological information is available. When the weather at destination is below minima, fuel must be loaded for the most distant of the two selected alternates.

There are two types of destination alternate: Fuel Alternates and Commercial Alternates.

a. Fuel Alternate
This is the Designated Alternate for which fuel may be planned provided that the forecast conditions at Destination, e.g. weather, ATC delays etc. are such that a diversion is considered unlikely. There is a possibility that there could be a lack of ground handling facilities, so again, such an alternate should only be used if a diversion seems unlikely. It is shown by default as the first alternate on the Flight Plan if generated through the Simbrief integration.

b. Commercial Alternate
This is the Designated Alternate to which a diversion would be planned at the Flight Planning stage, or in flight should diversion be likely. It is designated taking into account such factors as ability to handle and disperse passengers and the availability of BAV staff or representatives. The commercial preference of the selected alternates for each destination are identified on the Operational Flight Plan using a C and the preference number e.g. C1. Up to 3 commercial alternates, subject to availability, can be shown in addition to the fuel alternate.

4.1.3.6 Alternates – General Considerations

4.1.3.6.1 Political Considerations

Before nominating any alternate, consideration must be given to the political or diplomatic consequences of a diversion into that country.

4.1.3.6.2 LGW – LHR Diversion Policy

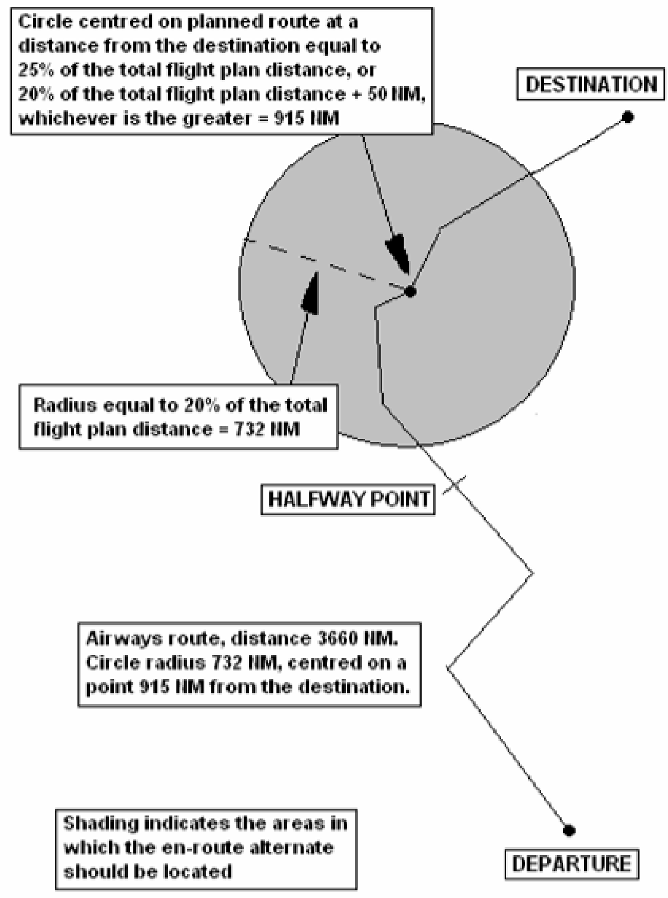
LHR is generally the fuel alternate for LGW, however, due to the limited availability of handling facilities aircraft should not normally divert to LHR.

4.1.3.7 En-Route Alternate – Selection Criteria

This is an alternate which may be used in addition to a conventional Destination Alternate, allowing reduced contingency fuel to be planned (See 'Contingency Fuel'.).

If a suitable ERA is located in the circle shown in the diagram below, it is possible to reduce the standard 5% contingency fuel figure to 3%. The airfield must be approved for the aeroplane type and promulgated as open. Planning minima specified in are required. It is planned so that should the calculated fuel remaining at destination fall below the minimum required then a diversion to it could be initiated to uplift extra fuel.

However, in most cases Statistical Contingency Fuel (SCF) is used (see 'Contingency Fuel') making this method redundant for most normal operations.



4.1.3.8 Additional Rules for Two Engined A/C

4.1.3.8.1 Non-ETOPS Flights

Two engined aircraft which are not operating in accordance with ETOPS criteria should be flown not more than 60 minutes flying time at the one engine inoperative cruising speed from an adequate airfield. There is no formal requirement to check the weather at these aerodromes for suitability. It is BAV policy however to provide, as far as possible, sufficient Met briefing for the intended route.

Note: Three or four engine aircraft requirements are specified in type specific manuals.

See also Extended Range Twin Operations (ETOPS).

4.1.3.9 Airbus A380 En-Route Diversion Policy

Due to the size of the Airbus A380, there are relatively few airfields around the world that can accept this aircraft type. Those airfields that can accept the A380 have varying levels of ground handling and medical facilities available. Airfields are categorised as either Primary, Medical Secondary, Secondary or Aircraft Emergency alternates and the definitions of each category is given below.

Primary Alternate (P)
These airfields have runways, taxiways and aprons which are capable of A380 operations. The basic provisions of ATC, airfield lighting, communications, weather reporting and

safety services are also available as well as a full range of ground handling facilities. These airfields are the primary alternates in all circumstances including medical diversions.

Medical Secondary Alternate (MS)
These airfields have runways, taxiways and aprons which are capable of A380 operations. The basic provisions of ATC, airfield lighting, communications, weather reporting and safety services are also available. Some ground handling facilities may be available but this has not been checked and therefore cannot be assured. In these regards, Medical Secondary Alternates are identical to Secondary Alternates. Medical Secondary Alternates have additionally been evaluated as having valuable Medical facilities for use in the case of a Medical Diversion. This information is based on a medical review of facilities and experience of other A380 operators.

Secondary Alternate (S)
These airfields have runways, taxiways and aprons which are capable of A380 operations. The basic provisions of ATC, airfield lighting, communications, weather reporting and safety services are also available. Some ground handling facilities may be available but this has not been checked and therefore cannot be assured. The categorisation of some airfields as Medical Secondary alternates does not alter the ability for a Captain to divert to a Secondary Alternate in the case of a Medical Emergency, however, there is an increased risk of there being little or no Medical support on arrival at a Secondary Alternate.

Aircraft Emergency Alternate (E)
These airfields have at least one runway which is capable of A380 operations. The basic provisions of ATC, airfield lighting, communications, weather reporting and safety services are also available. Some ground handling facilities may be available but this has not been checked and therefore cannot be assured. The flight crew must only choose to land at an Aircraft Emergency Alternate if there is a risk of hull loss by not doing so.

4.1.4 Determining Aerodrome Operating Minima

4.1.4.1 Planning Minima

4.1.4.1.1 Time windows for applicability of planning minima for all aerodromes (except aerodrome of departure and ETOPS en-route alternates)

At the planning stage, the appropriate weather reports or forecasts, or any combination thereof, must indicate that, during a period commencing 1 hour before and ending 1 hour after the estimated time of arrival at the aerodrome, the weather conditions will be at or above the applicable planning minima shown in the tables below.

For ETOPS en-route alternates the time window for assessing suitability of weather conditions commences at the earliest potential time of landing and ends one hour after the latest nominated time of use of that aerodrome.

Note: In normal circumstances, the weather reports and forecasts referred to above will be for the relevant aerodrome; it is, however, permissible to use weather reports from neighbouring aerodromes to determine whether the requirements are met if the normal reports and forecasts are not available.

4.1.4.1.2 Application of Forecast Conditions

Forecast conditions should be applied based on the following table:

APPLICATION OF AERODROME FORECASTS (TAF & TREND) TO PRE-FLIGHT PLANNING (ICAO Annex 3 refers)

i. APPLICATION OF INITIAL PART OF TAF

a. **Application time period:** From the start of the TAF validity period up to the time of applicability of the first subsequent 'FM…*' or 'BECMG'; or if no 'FM' or 'BECMG' is given, up to the end of the validity period of the TAF.

b. **Application of forecast:** The prevailing weather conditions forecast in the initial part of the TAF should be fully applied with the exception of the mean wind and gusts (and crosswind) which should be applied in accordance with the policy 'in the column 'BECMG AT and FM' in the table below. This may however be overdue temporarily by a 'TEMPO' or 'PROB**' if applicable according to the table below.

ii. APPLICATION OF FORECAST FOLLOWING CHANGE INDICATION IN TAF AND TREND

TAF or TREND for AERODROME PLANNED AS:	**FM** (alone) and **BECM AT:**	**BECMG** (alone), **BECMG FM, BECMG TL, BECMG FM…*TL** in case of:		**TEMPO** (alone), **TEMPO FM, TEMPO FM…TL, PROB30/40** (alone)			**PROB TEMPO**
	Deterioration and Improvement	**Deterioration**	**Improvement**	**Deterioration**		**Improvement**	**Deterioration and Improvement**
				Transient/ Shower Conditions in connection with short-lived weather phenomena, e.g. thunderstorms, showers	**Persistent Conditions** in connection with e.g. haze, mist, fog, dust/sandstorm continuous precipitations	In any case	

APPLICATION OF AERODROME FORECASTS (TAF & TREND) TO PRE-FLIGHT PLANNING (ICAO Annex 3 refers)

DESTINATION at ETA ± 1 HR **TAKE-OFF ALTERNATE** at ETA ± 1 HR **DEST. ALTERNATE** at ETA ± 1 HR **EN-ROUTE** Alternate ETA ± 1 HR	Applicable from the **start of the change;** **Mean wind:** Should be within required limits; **Gusts:** May be disregarded.	Applicable from the time of **start of** the change; **Mean wind:** Should be within required limits; **Gusts:** May be disregarded.	Applicable from the time of **the end of** the change; **Mean wind:** Should be within required limits; **Gusts:** May be disregarded.	Not applicable **Mean wind and gusts:** exceeding required limits may be disregarded.	Applicable **Mean wind:** Should be within required limits; **Gusts:** May be disregarded;	Should be disregarded.	Deterioration may be disregarded; Improvement should be dis regarded including mean wind and gusts.
ETOPS ENRT ALTN at earliest/latest ETA ± 1 HR	Applicable from the **time of start** of the change; **Mean wind:** Should be within required limits; **Gusts** exceeding crosswind limits should be fully applied.	Applicable from the **time of start** of the change; **Mean wind:** Should be within required limits; **Gusts** exceeding crosswind limits should be fully applied.	Applicable from the **time of end** of the change; **Mean wind:** Should be within required limits; **Gusts** exceeding crosswind limits should be fully applied.	**Applicable if below applicable landing minima;** **Mean wind:** Should be within required limits; **Gusts** exceeding crosswind limits should be fully applied.	**Applicable if below applicable landing minima;** **Mean wind:** Should be within required limits; **Gusts** exceeding crosswind limits should be fully applied.		

Note 1: 'Required limits' are those contained in the Operations Manual.
Note 2: If promulgated aerodrome forecasts do not comply with the requirements of ICAO Annex 3, operators should ensure that guidance in the application of these reports is provided.
* The space following 'FM' should always include a time group e.g. 'FM1030'.

4.1.4.2 Planning Minima

When flight planning, or replanning in flight, the weather at the nominated Destination alternate must be forecast to be equal to or better than the appropriate alternate minima. If an in-flight diversion is made, the alternate becomes the destination and normal destination minima apply.

4.1.4.2.1 Take-Off Alternates

a. All States except USA, Canada and Saudi Arabia

Normal operating minima apply, engine failure limitations must be considered. The ceiling must be taken into account when the only approaches available are non-precision and/or circling approaches.

b. USA, Canada and Saudi Arabia

At the time of departure, the weather at the take-off alternate (if required) shall not be below the alternate planning minima specified for that aerodrome.

4.1.4.2.2 Destination Aerodrome (except Isolated Destination Aerodrome)

a. The forecast RVR must be at or above the RVR required for the available approach with the lowest minima, or

b. For non-precision or circling approaches, the forecast cloud ceiling must be at or above the minimum specified on the Instrument Approach Charts

4.1.4.2.3 Isolated Destination aerodromes, Destination Alternates or Required En-route Alternates

Lowest Minima Available	Planning Minima
Cat II or III ILS	Cat 1 RVR (Notes 1 & 2)
Cat I ILS	Non-precision RVR and ceiling (Notes 1 & 3)
Non-precision	Non-precision RVR plus 1000 m and Ceiling plus 200 ft (Notes 1 & 3)
Circling	Circling (Notes 1 & 3)

Note 1: In the absence of an RVR forecast, forecast meteorological visibility converted for lighting and time of day may be used.

Note 2: Cloud ceiling is not a factor in this case

Note 3: Cloud ceiling is the height above aerodrome level of the lowest layer of cloud covering more than half the sky (i.e. 'BKN' or 'OVC').

4.1.4.2.4 Planning Minima for Non-UK Airfields

4.1.4.2.4.1 Special Rules for Australia

BAVirtual's fuel policy, which meets the requirements of OPS and is approved by the UK CAA, is more restrictive than that required by the Australian AIP. Therefore detailed knowledge of the Australian requirements is not necessary for operations conducted under the BAV AOC.

NOTAMed Traffic Holding Requirements (Australia)

When Traffic Holding is expected at the destination, as promulgated by NOTAM, then the following additional fuel requirements must be complied with:

a. Weather at the destination is forecast to be better than its own Alternate Minima.

Standard BAV fuel rules apply, provided there is sufficient fuel on board upon arrival at destination to absorb any NOTAM-ed traffic holding period.

Note that with these forecast weather conditions the Australian Authority does not require an aircraft to carry Alternate fuel and BAs requirements are satisfied when Alternate Fuel may be used for holding as long as a landing at Destination is assured.

b. Weather at destination is forecast to be worse than its own alternate minima

In addition to the normal BAV requirements, extra fuel must be carried to cover the NOTAMed traffic holding period at the Alternate.

4.1.4.2.4.2 Special Rules for the USA

USA standard alternate minima are 600 ft/2 sm (precision approach) or 800 ft/2 sm (non-precision approach).

Where an airport is served by two operational navigational facilities (Note 1), each providing a straight in approach (Note 2) to suitable but different runways (Note 3), alternate minima of 200 ft/0.5 sm above the lower of the regular landing minima (Note 4) of the two approaches can be used.

However, 400 ft/1 sm (whichever is higher) are the lowest minima allowable.

These reduced minima are authorised provided appropriate weather reports, or forecasts, or any combination thereof, indicate that the weather conditions will, at the time the flight arrives at the alternate airport, permit a straight in instrument approach.

Note 1: An ILS with its back beam approach does NOT comply.

Note 2: Straight in approach: An approach within 30 degrees of the runway heading.

Note 3: Different Runways: Runways with different numbers i.e. two ILS to the same strip is acceptable, e.g ILS 04R & ILS 22L is acceptable.

Note 4: Normal Landing Minima: As published in the Instrument Approach Chart.

4.1.4.2.4.3 Special Rules for Canada

Alternate minima for Canadian airfields are determined from the table below.

Facilities at Alternate	Weather Requirements
2 or more usable precision approaches, each providing straight in minima to separate suitable runways	**400 ft-1 sm** or 200 ft-0.5 sm above the lowest usable DH and visibility, whichever is greater
One usable precision approach only	**600 ft-2 sm** or 300 ft-1 sm above the lowest usable DH and visibility, whichever is greater

Non-precision only	**800 ft-2 sm** or 300 ft-1 sm above the lowest usable DH and visibility, whichever is greater
No IFR approach available	Forecast weather must be no lower than 500ft above a minimum IFR altitude that will permit a VFR approach and landing

4.1.4.2.4.4 Special Rules for Saudi Arabia

The standard alternate minima applicable to alternate airfields designated for despatch or flight release are 600 ft ceiling and 3.2 km visibility for runway served by precision approach procedures, or 800 ft ceiling and 3.2 km visibility for runways served by non-precision approach procedures.

At airfields served by two operational ILS facilities, alternate minima of 300 ft and 800 m above the lowest ILS landing minima, or 500 ft and 1600 m (whichever is higher) are authorised, provided that weather reports and/or forecasts indicate that weather conditions at the estimated time of arrival at the alternate airfield will permit a straight in instrument approach and landing.

4.1.4.3 Aircraft Speed Categories

Aircraft are divided in to speed related categories for the purposes of instrument approach and minima as follows:

Type	Category
C172	A
BE58	B
Airbus Single Aisle, A380, E190	C
A350, B777, B787	D

4.1.4.4 Aerodrome Reference Codes

Taxiways and aprons may be allocated reference codes to define the maximum size of aeroplane which they can accommodate. The codes range from A (smallest) to F (largest). A code E aeroplane, for instance, may not use a Code D taxiway. BAV aeroplanes come under the following codes:

Type	Code
C172, BE58	A
A318-321, E190	C
A350, B777, B787	E
A380	F

4.1.4.5 Takeoff RVR Minima

Takeoff minima are dependent upon the aircraft category and the airfield facilities available, as follows:

Facilities	RVR/Visibility

Nil (day only)	500 m
Runway edge lighting and/or centreline marking	250/300 m*
Runway edge and centreline lighting	200/250 m*
Runway edge and centreline lighting and multiple RVR information	150/200 m*
Runway edge and centreline lighting, multiple RVR information when specifically authorised	125/150 m*
Runway edge and 15m centreline lighting, multiple RVR information andelectronic guidance (e.g. PVD or HUD)	75 m (A350/ B777/B787 only)

*The higher value applies to Category D aeroplanes

For night operations at least runway edge and runway end lights are required.

LVPs must be in force for any takeoff in RVRs below 400m.

Minima shown on aerodrome charts will override the values in the table above if they are higher.

4.1.4.6 Approach Minima

All BAV landing minima are expressed in terms of (M)DA/H and RVR or Visibility. Minima published on the Instrument Approach Chart must be used.

Decision Altitudes/Heights may be quoted as:

- Altitudes based on QNH
- Radio heights using radio altimeters

For non-precision and category 1 ILS approaches, the barometric decision altitude must be used. The radio altimeter is only used for Category 2 and 3 ILS approaches where specifically stated on the approach chart.

Commerically-produced (i.e. Lido/Jeppesen) format charts from Navigraph/Aerosoft have pre-calculated minima which should be used directly from the chart with no adjustment.

There is no requirement to adjust charted minima for non-precision approaches where a continuous descent final approach is to be conducted.

Most state-produced (e.g. UK AIP) charts show raw Obstacle Clearance Altitude/Height (OCA/H) data only and it will be necessary to manually calculate the appropriate (M)DA as follows:

1. Take the Obstacle Clearance Height from the chart and compare to the System Minima for the procedure (see table below)
2. Take the higher of the OCH or System Minima
3. Add the aerodrome elevation to this figure to give the Decision Altitude based on QNH

Type of Approach Aid	Lowest DH/MDH
Cat 1 ILS	200 ft

Localizer only	250 ft
RNAV (LNAV only or LNAV/VNAV)_	250 ft
VOR/DME	250 ft
VOR only	300 ft
NDB/DME	300 ft
NDB only	350 ft
SRA (terminating at 2NM)	350 ft

BAV AOM are not usually quoted as barometric heights based on QFE (B777/B787 fleet DH/MDH to be calculated in accordance with B777/B787 FCOM). In those states still using the QFE datum (mostly ex 'Eastern Bloc'), tables are provided on the Instrument Approach Chart to convert Decision Heights to Decision Altitudes at destinations and planned alternates. When operating to off-line aerodromes in those States, the Commander must ensure that Decision Altitudes are used, based on a derived QNH.

4.1.4.6.1 Approach Minima – Use of MDA(H) as a DA(H)

It is BAvirtual policy that, when flying an instrument approach operation to an MDA(H), the Commander is authorised to treat that minimum as a DA(H). Specifically, there is no requirement to add any height increment to the value of MDA(H) extracted from the relevant Instrument Approach Chart.

4.1.4.6.2 Approach Minima – Use of MDA(H) as a DA(H) Background

BA has a specific safety case authorising use of MDA(H) as a DA(H) as with no height add-on which has been accepted by the UK CAA. The safety case relies on three important surrounding elements:

- The instrument approach shall be flown using the Continuous Descent Final Approach technique
- Except for those approaches specifically authorised in Authorisation of Non-precision Approaches Flown Without Using the CDFA Technique, and Circling Approaches, there shall be no level-flight segment at MDA(H); and
- If the required visual references are not visible to the PF at MDA(H), the go-around must be executed promptly to minimise height-loss during the manoeuvre.

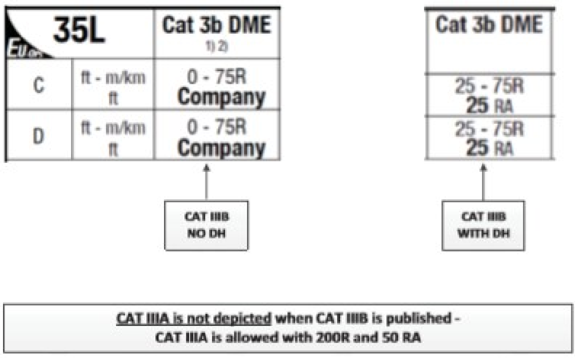
4.1.4.7 Presentation of Minima

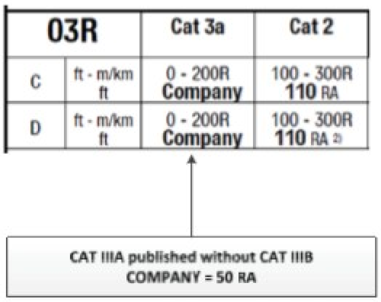
4.1.4.7.1 CAT III

The decision height decode for LIDO charts where 'Company' is shown in the minima box is as follows:

ACFT	CAT 3B NO DH	CAT 3B WITH DH	CAT 3A
A32N	**No DH**	**25 RA**	**50 RA**
B777	**No DH**	**15 RA**	**50 RA**
B787	**No DH**	**15 RA**	**50 RA**
A380	**No DH**	**15 RA**	**50 RA**

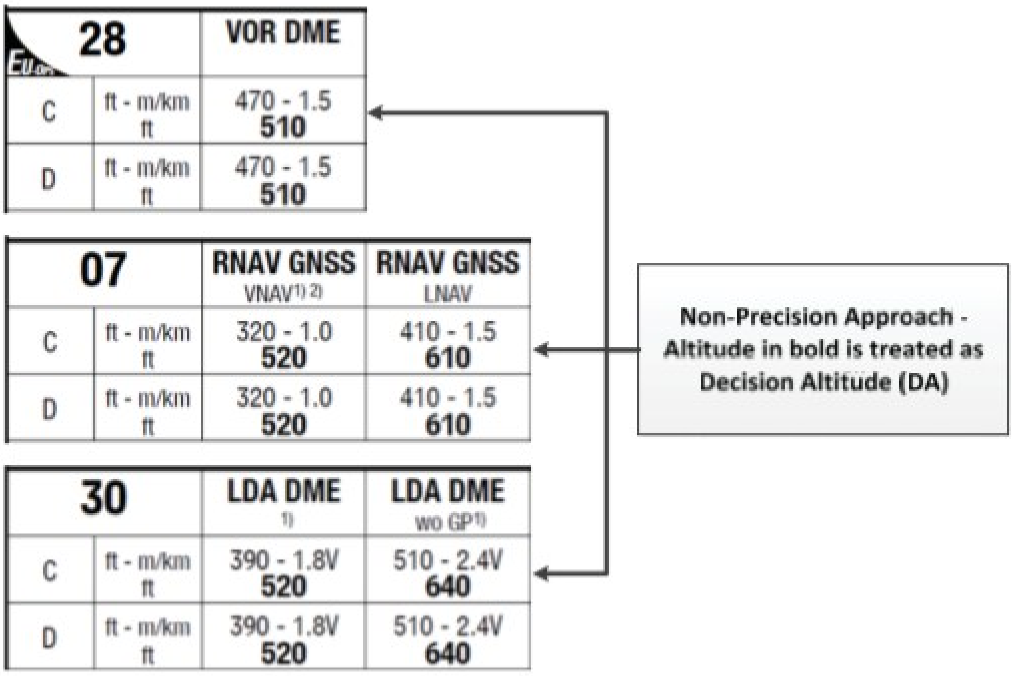
E190	**Not Authorised**	**Not Authorised**	**50 RA**





4.1.4.7.2 Non-precision Approach

The altitude in bold is treated as DA, for example:



4.1.4.8 Instrument Approach: Visual Reference Requirements

At or below the DA/H, an approach shall be discontinued by an immediate Go-around unless the visual reference requirements specified below remain satisfied.

4.1.4.8.1 CAT I ILS/GLS/MLS or Non-precision Approach:

At least one of the following visual references for the intended runway is distinctly visible and identifiable to the pilot:

- Elements of the approach light system.
- The threshold.
- The threshold markings.
- The threshold lights.
- The threshold identification lights.
- The visual glide slope indicator.
- The touchdown zone or touchdown zone markings.
- The touchdown zone lights.
- Runway edge lights.

Note: Whenever the approach is not coupled to a glideslope or glidepath, visual reference must be established sufficiently before reaching DA to confirm that the proper descent path is maintained (a period of about 3 seconds, equivalent to 30 ft at normal approach speeds, is normally considered adequate).

4.1.4.8.2 CAT II Operation:

A segment of at least 3 consecutive lights being the centre line of the approach lights, or touchdown zone lights, or runway centre line lights, or runway edge lights, or a combination of these. This visual reference must include a lateral element of the ground pattern, i.e. an approach lighting crossbar or the landing threshold or a barrette of the touchdown zone lighting.

4.1.4.8.3 CAT III Operation:

For Category IIIA operations, a segment of at least 3 consecutive lights, being the centreline of the approach lights, or touchdown zone lights, or runway centre line lights, or runway edge lights, or a combination of these is attained and can be maintained.

For Category IIIB operations with a decision height a visual reference containing at least one centreline light.

For Category IIIB operations with no decision height there is no requirement for visual contact with the runway prior to touchdown.

4.1.4.9 Instrument Approach: RVR Requirements

The last RVR received before 1000 ft or the FAF, as appropriate, 'controls' the approach. RVR information received after passing the 1000 ft point, or FAF, is for information only. Thus, subsequent RVR deterioration after passing the 1000 ft point or FAF does not require an immediate go-around: the approach may continue to DA/H where an assessment of visual reference can be made. Descent below the DA/H without adequate visual reference is prohibited.

4.1.4.10 Instrument Approach: Approach Ban (OPS)

An aircraft, while making an approach to land, shall not continue a precision approach below 1000 ft, or a non-precision approach beyond the Final Approach Fix (FAF), or below 1000 ft if there is no FAF, if at the time it arrives at that position:

- The TDZ RVR, or Visibility is reported to be below the appropriate minimum specified in the Instrument Approach Chart.
- The midpoint RVR, when reported, is below 125 m or the TDZ RVR minimum when that is lower.
- The stop-end RVR, when reported and if so specified on the AOM notes, is below 125 m or the TDZ RVR minimum when that is lower.

4.1.4.10.1 Approach Ban: USA

When operating in the USA the following rules apply:

An aircraft, while making an approach to land, shall not continue a precision approach below 1000 ft AAL, or a non-precision approach beyond the Final Approach Fix (FAF), or below 1000 ft AAL if there is no FAF, if, at the time it arrives at that position.

- The TDZ RVR, or Visibility is reported to be below the appropriate minimum specified on the approach chart.
- The midpoint RVR, when reported, is below 400 ft or the TDZ RVR minimum when that is lower.
- The rollout (stop-end) RVR, when reported and if so specified on the AOM notes, is below 400 ft or the TDZ RVR minimum when that is lower.

Note: When Cat III operations with TDZ RVR less than 700 ft are being conducted, all 3 RVR reporting systems are required and controlling (i.e. published TDZ RVR 600: minima required 600/400/400; published TDZ RVR 300: minima required 300/300/

300). However, one RVR reporting system may be temporarily inoperative provided that the other two systems are used. If the mid-point RVR is used in place of the TDZ RVR it must be greater than or equal to the published TDZ minimum RVR.

4.1.4.10.2 Approach Ban: Canada

Category II approaches are banned in Canada when TDZ RVR is less than 1200 ft, or the Mid Point RVR is less than 600 ft. If only one RVR value is reported, it must be at or above 1200 ft.

Category III approaches are banned in Canada if either TDZ RVR or Mid Point RVR are less than 600 ft.

In both cases the rollout (stop end) RVR if available, is advisory only.

4.1.4.11 Instrument Approach: Australia

For Cat IIIB operations in Australia, all 3 RVR measurements must be greater than or equal to the published TDZ RVR minimum.

Maximum crosswind for landing below 550 m RVR: 15 kts.

Maximum crosswind for landing below 200 m RVR: 10 kts.

4.1.4.12 Visual Flight Manoeuvres

4.1.4.12.1 Visual Approaches - Definition

A visual approach is an approach when either part or all of an instrument approach procedure is not completed and the approach is executed with visual reference to the terrain.

4.1.4.12.1.1 Visual Approach Visibility Requirements

An aircraft shall not conduct a visual approach if the visibility is less than 5 km. If established on the extended centreline and visual with the runway this requirement may be reduced to 800 m RVR.

4.1.4.12.2 Circling

Circling is the visual phase of an instrument approach to bring an aircraft into position for landing on a runway which is not suitably located for a straight-in approach.

4.1.4.12.2.1 Circling Minima

Circling minima should be the higher of the circling minima published for the initial instrument approach flown or 1000' AAL.

If circling minima allows (and crews expect to achieve sufficient visual reference) consideration should be given to flying a 1500' AAL circuit. In this scenario either the circling procedure or a standard visual traffic pattern may be flown.

At or below the relevant circling minima an approach shall be discontinued by an immediate go-around unless sufficient visual reference of the terrain, and either the approach lights or the runway itself, are continuously in view to ensure clearance from the terrain.

If these conditions cannot be satisfied, descent from Circling Minimum to the start of a Visual Final may be made with the help of a Visual Approach Chart, provided that there is sufficient visual reference to allow navigation along the tracks specified on that chart, and that all altitude/height restrictions on it are observed.

4.1.5 Fuel Policy

4.1.5.1 Fuel Planning and Management

The total fuel carried must be sufficient for the intended flight and must include a safe margin for contingency, alternate and holding to meet EU-OPS regulatory requirements.

4.1.5.2 General Factors

A Computerised Flight Plan (CFP) will normally be generated for every intended flight using approved software such as Simbrief or PFPX. Tankering fuel should only be carried where recommended by the Operations team, and to a maximum of that sufficient for the aircraft's next sector only. Tankering of fuel when not recommended is uneconomical and should be avoided.

4.1.5.3 Planning Factors

The total fuel required for a safe flight comprises the following components:

4.1.5.3.1 Taxi Fuel

- Fuel for APU usage, engine start and taxi from the stand to the departure runway. Aircraft manufacturers' taxi fuel flows may be found in the relevant FCOM.

The BAVMS Simbrief dispatch system calculates taxi fuel based on average taxi times recorded at the airfield in question by previous BAVirtual flights.

4.1.5.3.2 Trip Fuel:

- Takeoff, Acceleration, SID and Climb
- Cruise including any step climbs
- Descent
- STAR and Instrument Approach Procedure to land

4.1.5.3.3 Alternate Fuel

- Fuel to fly a missed approach from the applicable MDA/DH at the destination aerodrome to the missed approach altitude, taking in to account the entire missed approach procedure
- Fuel from the missed approach altitude to climb, cruise and descent to the alternate aerodrome from an en-route transition point using the expected arrival procedure
- Fuel for the approach and landing at the alternate aerodrome
- When two destination alternates are required, alternate fuel should be sufficient to proceed to the alternate which requires the greater amount of alternate fuel

4.1.5.3.4 Contingency Fuel

- Normally 5% of the trip fuel

- May be reduced to 3% of the trip fuel if a suitable En-Route Alternate (ERA) is available
- Statistical contingency fuel may be carried if appropriate route statistics are available

The BAV integrated Simbrief dispatch system makes use of statistical contingency fuel based on previous BAVirtual flights. Full details can be found in the Operational Flight Plan Guide and FCSI 03.

4.1.5.3.5 Final Reserve Fuel

- Fuel to fly for 30 minutes at holding speed at an altitude of 1,500ft above the destination aerodrome elevation in standard conditions, calculated with estimated weight on arrival at the alternate, or the destination when no alternate is required

4.1.5.3.6 Additional Fuel (if required)

Fuel which should permit:

- Holding for 15 minutes at 1,500ft above aerodrome elevation in ISA conditions, when the flight is operated without a destination alternate.

Following the possible engine failure or loss of pressurisation at the most critical point along the route the aeroplane will:

- Descend as necessary and proceed to an adequate alternate aerodrome
- Hold there for 15 minutes at 1,500ft above aerodrome elevation in ISA conditions
- Make an approach and landing

Additional fuel for engine failure or loss of pressurisation is only required if the fuel calculated above (from Trip Fuel up to Final Reserve Fuel) is not sufficient for such an event. Additional fuel for no alternate operations may be calculated by dividing the Operational Flight Plan Final Reserve fuel figure by two (2), or by referring to the relevant FCOM.

4.1.5.3.6.1 Isolated Aerodrome

An isolated aerodrome is one for which the alternate and final fuel reserve required to the nearest adequate destination alternate is more than:

- Fuel to fly for 2 hours at normal cruise consumption above the destination aerodrome, including final reserve fuel.

The use of an isolated aerodrome exposes the aircraft and passengers to a greater risk than to operations where a destination alternate aerodrome is available. Using an isolated aerodrome requires specific IFR planning minima and fuel planning/management rules.

BAVirtual holds specific approval to operate to isolated aerodromes and there are several such aerodromes on the long-haul route network.

4.1.5.3.7 Extra Fuel

This is fuel carried which is extra to the REQUIRED fuel. This should **not** be carried unless there are sound operational or economic reasons for doing so. The BAVMS integrated Simbrief planning system provides statistical contingency fuel data for most flights and where a CONT 95 fuel value is shown on the Simbrief flight plan this gives at least a 95%

probability that all diversion and reserve fuel will still remain on arrival. For this reason extra fuel will only need to be loaded in relatively abnormal conditions (i.e. about 5% of occasions).

The following guidelines may be of use when considering whether extra fuel may be prudent:

- Thunderstorms are forecast
- Destination weather is forecast or reported to be at or near operational landing limits.
- An unscheduled runway closure, affecting the arrival rate, is likely because of:
  - Freezing precipitation (runway treatment).
  - Moderate to heavy intensity snowfall (snow removal).
  - Crosswind/contaminated runway limitations (aircraft specific).
- ATC - Anticipated departure and arrival delays (e.g. a significant online event)

The penalty for carriage of extra fuel is normally 3.0% of extra fuel per hour of flight (i.e. on a 6 hour sector up to 18% of the extra fuel uplifted will be burned off due to the increased aircraft weight.)

It is the Captain's responsibility to ensure that sufficient fuel is carried to operate the aircraft in accordance with BAV procedures. However, it is policy that the Operational Flight Plan TANKS fuel should be uplifted unless the Captain can identify **good reasons** for carrying extra fuel.

4.1.5.3.7.1 Tankering

It may be commercially expedient to tanker fuel to a destination where fuel prices are high or where there are fuel shortages. The commercial decision to tanker fuel is made by Flight Operations and a list of tankering destinations is in development.

The Captain is responsible for deciding how much fuel will be tankered. When take off or landing on a contaminated or icy/slippery runway is anticipated tankering is not advised. Tankering in excess of fuel required on the subsequent sector is uneconomic.

4.1.5.3.7.2 Extra Fuel – Winter Restrictions

The following paragraph does not apply to operations into London Heathrow:

During winter months, when the OAT at the destination airport is between -2°C and +10°C with precipitation or high humidity (dew point within 2°C of OAT), experience has shown that wing icing will occur, where 'sub zero' fuel contacts the upper and/or lower surfaces of the wing. On sectors of between 1 hour 15 minutes and 4 hours, when the flight fuel temperature will fall significantly below 0°C, tankering fuel should not be carried if the above conditions are forecast for the time of arrival.

This restriction applies equally to turnaround and nightstop A/C.

4.1.6 Mass and Centre of Gravity

4.1.6.1 Definitions

4.1.6.1.1 Weights

Basic Weight and Index: The empty weight of the aircraft – it includes furnishings, fixed, loose and safety equipment plus toilet fluid and system fluids (i.e. engine oil, hydraulic fluid, unusable fuel). The Basic Index is derived from a calculation involving the Centre of Gravity and Basic Weight of the aircraft.

Dry Operating Weight (DOW) and Index: The Dry Operating Weight and Index is obtained by adding to the Basic Weight and Index, the Crew and Pantry Weights and Indices and any other adjustments, including Potable Water, to the Basic Weight and Index.

Maximum Zero Fuel Weight (MZFW): The maximum permissible weight of an aircraft with no usable fuel. The weight of the fuel contained in particular tanks must be included in the zero fuel weight when it is explicitly mentioned in the Aircraft Flight Manual limitations.

Zero Fuel Weight (ZFW): The weight obtained by addition of the total traffic load and the dry operating weight.

Maximum Structural Landing Weight (MLW or MLAW): The maximum permissible total aircraft weight upon landing under normal circumstances.

Landing Weight (LW or LAW): The weight at landing at the destination airport. It is equal to the Zero Fuel Weight plus the fuel reserves.

Maximum Structural Take-off Weight (MTOW): The maximum permissible total aircraft weight at the start of the take-off run.

Take-off Weight (TOW): The weight at take-off at the departure airport. It is equal to the landing weight at destination plus the trip fuel (fuel needed for the trip), or to the zero fuel weight plus the take-off fuel (fuel needed at the brake release point including reserves).

Take-off Fuel: The weight of the fuel on board at take-off.

Trip Fuel: The weight of the fuel necessary to cover the normal leg without reserves.

Traffic Load: The total weight of the passengers, baggage and cargo, including non-revenue loads.

TOW = DOW + Traffic load + Reserve fuel* + Trip fuel

LAW = DOW + Traffic load + Reserve fuel*

ZFW = DOW + Traffic load

*Reserve fuel = Contingency + Alternate + Final Reserve + Additional fuel

4.1.6.2 Mass and Centre of Gravity Calculations

The Commander is responsible for ensuring before each flight that the aircraft is loaded such that it complies with all weight and Centre of Gravity limitations.

The maximum weights for each airframe can be found in the type-specific OM B, normally the FCOM Limitations section.

It is important to use the BAV FCOM for this information rather than a generic FCOM supplied with an add-on as in many cases BA have reduced the maximum certified weights to less than the manufacturer's maximum structural weights.

This is primarily because landing and navigation charges are based on maximum certified takeoff weight; thus if the full structural takeoff weight is never or very rarely reached in normal operations it can be very economically advantageous to 'write down' the MTOW (though it should be noted that the airframe, wing, engines etc are all identical to an aircraft certified at the maximum structural weights).

4.1.6.3 Passenger and Cargo Weights

Flights planned using the BAV Simbrief dispatch system will always be loaded in such a way that the weight limitations are respected, provided that a specific aircraft registration is selected from the drop-down menu at the planning stage – see the Operational Flight Plan Guide for more details.

4.1.6.4 Fuel Weights

The weight of fuel on board the aircraft is directly provided by the Fuel Quantity Indication (FQI) of the aircraft.

The Commander should assess this quantity by comparing this figure with the quantity on board before refuelling, plus the quantity uplifted. A small discrepancy may be evidenced due to, e.g.:

- Fuel consumed by the APU
- FQI and fuel tanker inaccuracies

The total fuel on board must be checked prior to departure to ensure that it is in accordance with the fuel required by the Operational Flight Plan.

4.1.6.5 Loading

There are several options available for flight planning.

The preferred option is the BAVMS Simbrief dispatch system. This will automatically provide a Zero Fuel Weight value which is in accordance with the aircraft limitations. The pilot may also input their own ZFW and/or passenger and cargo figures at the planning stage; instructions on how to do this may be found in the Operational Flight Plan Guide.

If the pilot wishes to use an external flight planning service, the flight is booked using the "plan without Simbrief" option. In order to confirm the booking, the pilot must either generate automatically-provided weights, or enter their own weight details and confirm.

In any event, the pilot should load the aircraft in FS to the specified Zero Fuel Weight rather than loading the specified number of passengers/bags. The passenger/bag values are supplied for interest using standard BA weights, but because every aircraft addon uses different passenger and baggage weights internally, and only a very few allow for customisation of the DOW, the only way to achieve consistent results is to load the aircraft to the supplied ZFW.

4.1.6.6 Last Minute Change Procedures

British Airways operates a late closeout procedure to improve on-time performance. The normal process is:

- A provisional loadsheet using estimated weights and bookings is supplied prior to departure and is used for flight planning and performance data requests
- A final loadsheet using actual figures is transmitted to the aircraft via ACARS some time after doors closed

In all cases, the ACARS final loadsheet must be received, checked and acknowledged before takeoff.

In BAV operations, the weights provided through the Flight Booking/Dispatch centre and displayed on the Simbrief Operational Flight Plan can be considered to be the provisional loadsheet values. A full BA-format provisional loadsheet is provided in addition to the Operational Flight Plan when planning using the integrated Simbrief system.

It is usual practice when requesting takeoff performance data to request the figures for the planned takeoff weight plus the fleet-specific upper tolerance for a ‘compliance with’ message in order to reduce the need for updating the critical data during taxi.

If the final loadsheet is ‘in compliance’ then there is normally no need to enter updated figures in to the FMS until a convenient moment of low workload after takeoff (e.g. minimum FL100/10,000 ft AAL).

If the final loadsheet has ‘revisions’ then the full Critical Data Entry Procedure will need to be performed prior to takeoff. Details of the Critical Data Entry Procedure can be found in the BAV type-specific FCOMs.

4.1.7 Altitude and Terrain Information on Flight Documents

The information in this section should be read in conjunction with the Lido/Jeppesen chart legends which have more detailed information about the depiction of terrain and minimum altitudes used in the respective chart products. Within the broad scope of the Operations Manual, the term Minimum Safe Altitude is used (for example, in the provision of drift-down information) to indicate the altitude below which the flight crew will need to pay particular attention to the mitigation of the threat of Controlled Flight Into Terrain (CFIT). Sustained flight above Minimum Safe Altitude is therefore, by definition, not (as) susceptible to CFIT risk.

4.1.7.1 Operational Flight Plan

MSAs are shown on Simbrief-generated flight plans and represent the MSA on the direct track between two points. Care must be taken when transferring from the Operational Flight Plan to aerodrome documentation to ensure that any relevant MSAs are not infringed; the MSA/SSA shown on aerodrome charts should be considered to override MSAs shown on the OFP during departure and arrival.

MSAs shown on the Operational Flight Plan are subject to a minimum of 2000ft.

```
POSITION    ID/FREQ
  MSA    AWY   /ITT/    -TRM-

HEATHROW BPK7F
  2.3  BPK7F   /276/    -VAR-

D268D
  2.3  BPK7F   /297/    -296-

D278F
  2.3  BPK7F   /349/    -349-
```

4.1.7.2 MSA Critical Points

MSA Critical Points and escape procedures may be published in Performance Manuals.

On sectors where driftdown escape routes are published the route options should be entered in to RTE 2 or the SEC F-PLN of the FMS prior to reaching the start of the escape route.

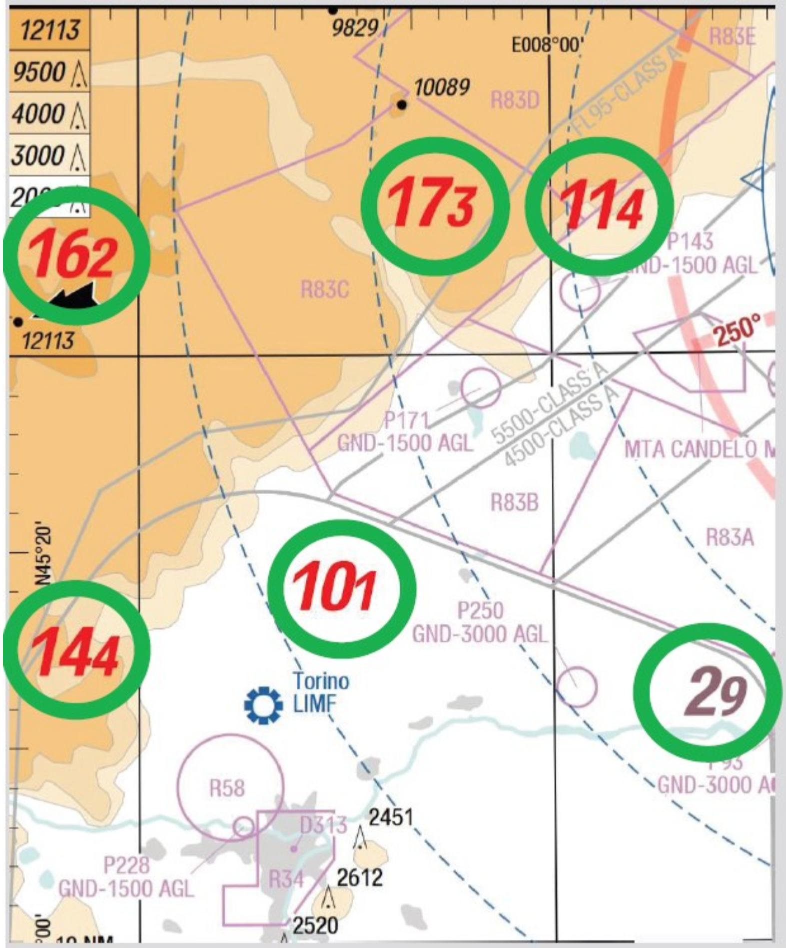
4.1.7.3 Regulated Altitudes on Charts

The following regulated altitudes appear on LIDO and Jeppesen (Navigraph) charts, and are relevant to the policies for climb, cruise and descent.

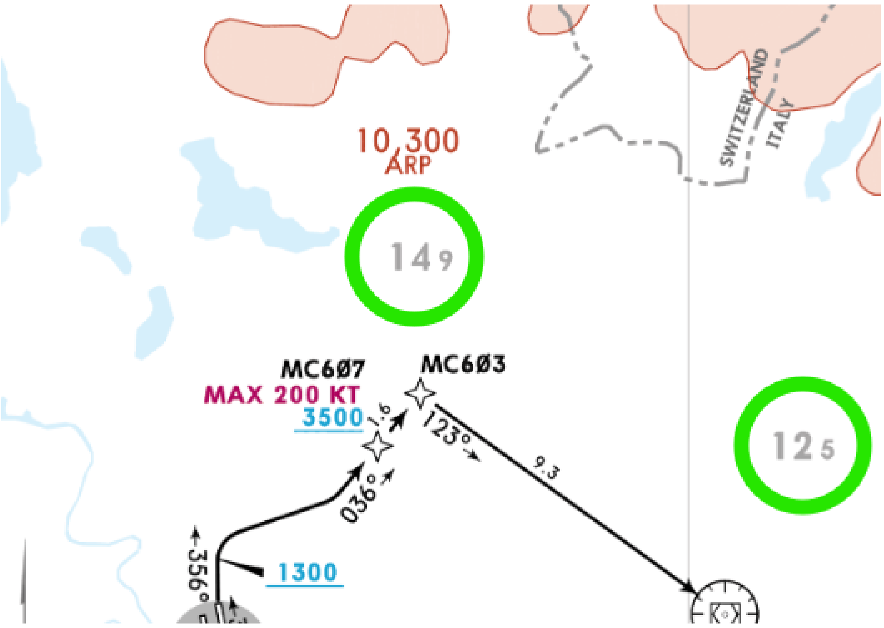
Minimum Grid Altitude (MGA): MGA shows the lowest safe altitude which may be flown off-track. MGA is calculated by rounding up the elevation of the highest obstruction within the respective grid area and adding an increment of:

- 1000 ft for terrain or obstructions up to 6000 ft
- 2000 ft for terrain or obstructions above 6000 ft.

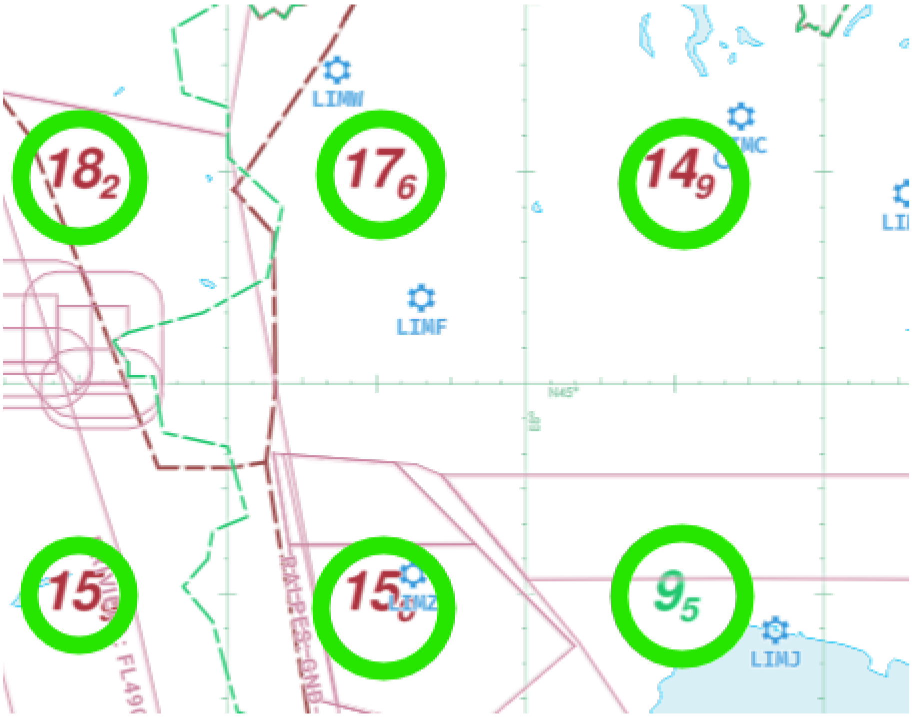
MGAs below 10,000 ft are shown in purple on LIDO charts; at and above 10,000 ft in red. MGAs may be found on Enroute, SID, STAR, MRC and AFC charts.



MGAs to the south and west of Milan Malpensa, on LIDO SID chart



MGAs shown on Navigraph/Jeppesen SID chart



MGAs shown on Navigraph/Jeppesen enroute chart

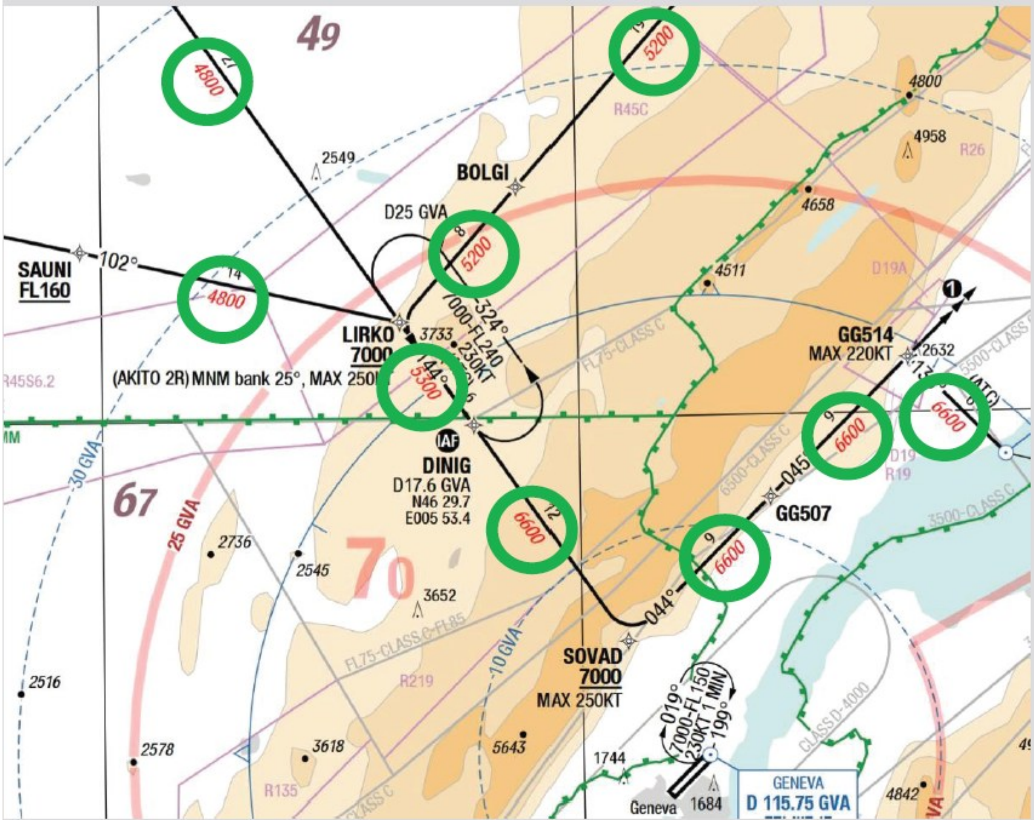
Minimum Terrain Clearance Altitude (MTCA): MTCA covers, exclusively, terrain and obstacles relevant for air navigation. For SIDs and STARs, the MTCA is calculated for an area either 5 nm either side of the procedure centreline, and around a Navaid or waypoint. For airways the buffering extends to up 10 nm either side of the centreline. MTCA is calculated by rounding up the elevation of the highest obstruction within the respective area and adding an increment of:

- 1000 ft for terrain or obstructions up to 6000 ft; or
- 2000 ft for terrain or obstructions above 6000 ft

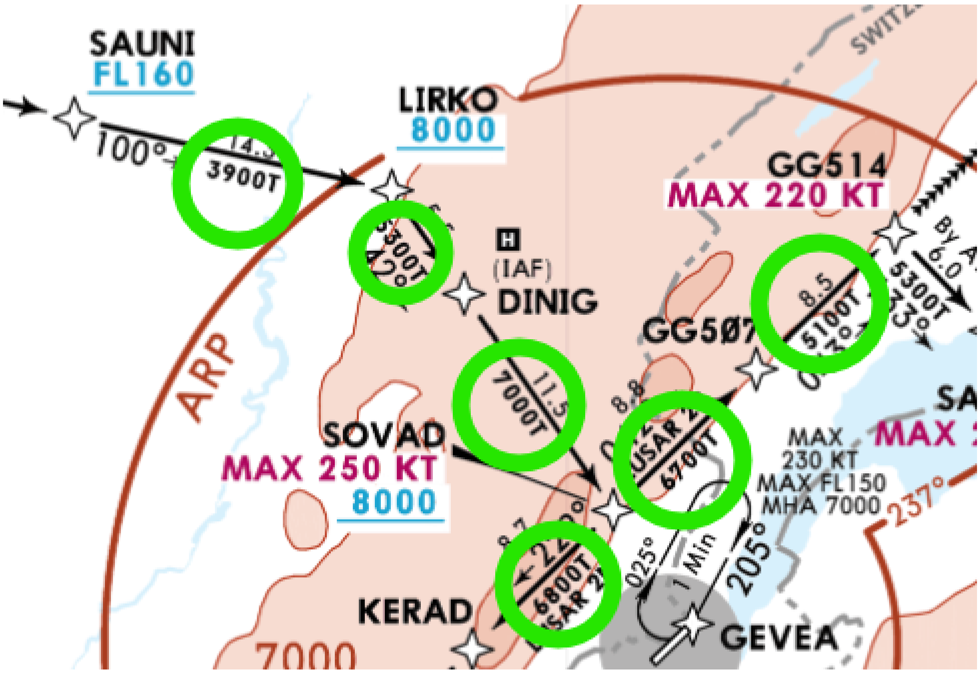
The lowest MTCA which will be shown on a chart is 3100 ft, which means that if no MTCA value is shown 3000 ft can be considered a safe flight altitude. Occasionally the MTCA for a specific segment can be higher than the official MEA, as a consequence of different asusmptions used in calculating the two parameters; if that is the case, flight crew should consider the MTCA value to be the minimum usable altitude.

MTCAs on LIDO charts are shown in red, italicised font. On Jeppsen charts the level is appended with a “T”.

MTCA is provided by LIDO for all airway segments, for all STARs up to IAF or equivalent end point, and, exceptionally, for SIDs at selected airport.



MTCAs on STAR chart for Geneva (LIDO)

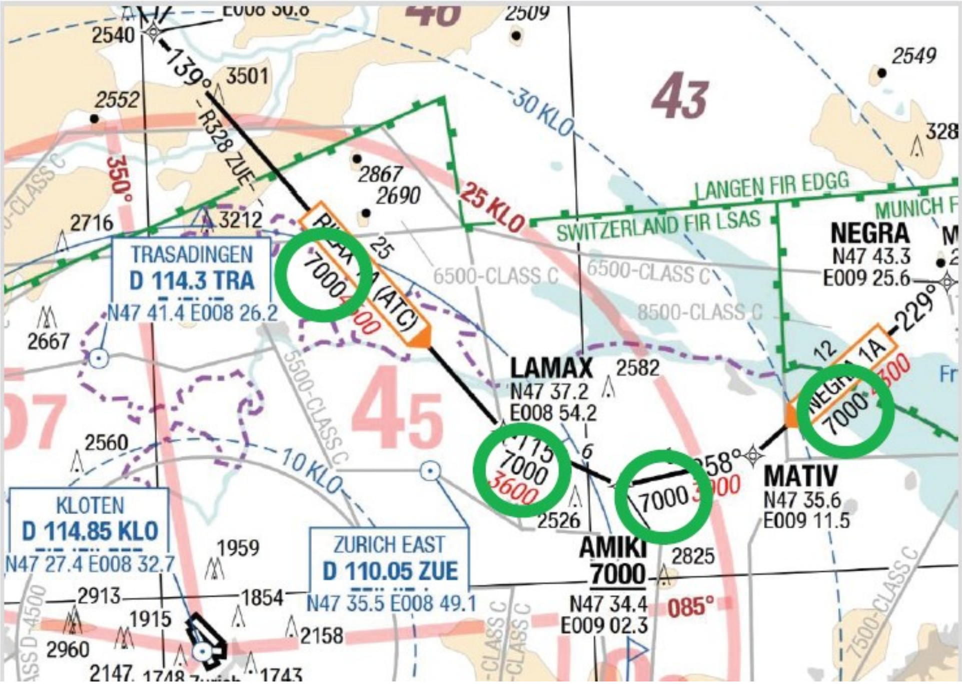


MTCAs on STAR chart for Geneva (Navigraph/Jeppesen)

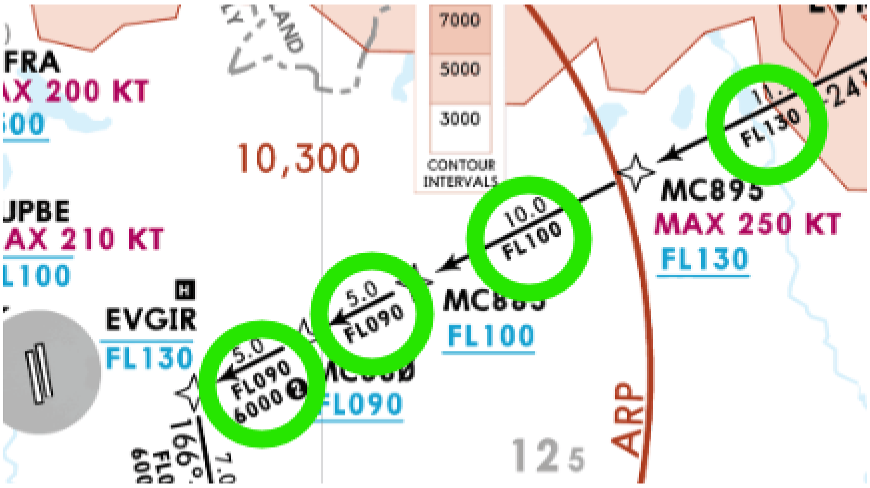
Minimum Enroute Altitude (MEA): MEA is shown only if published by the relevant state. It represents the lowest altitude, or lowest usable IFR flight level, for a given route segment. As noted above, MEA may, occasionally, be lower than MTCA for the same segment because of the different assumptions used in calculating the two parameters. If that is the case, flight crew should consider the MTCA value to be the minimum usable altitude.

MEA, if published, is shown in black text below the relevant route segment, to the left of (or above) the MTCA value.

MEAs may be found on LIDO Enroute, SID, STAR and IAC charts.



MEAs on STAR chart for Zurich (LIDO)

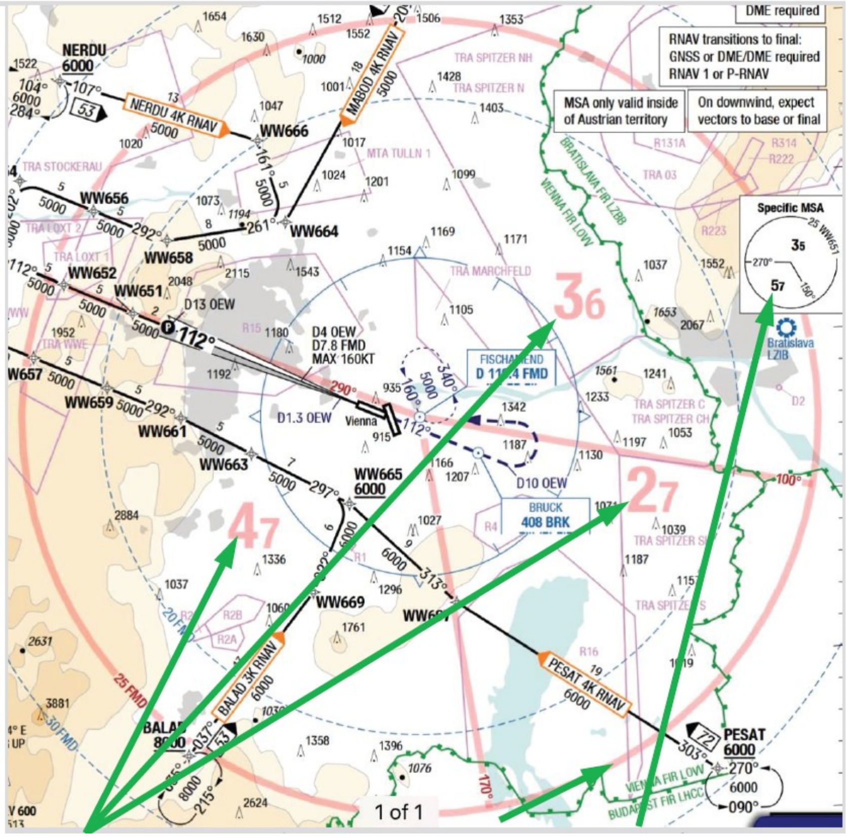


MEAs on STAR chart for Milan Malpensa (Jeppesen/Navigraph)

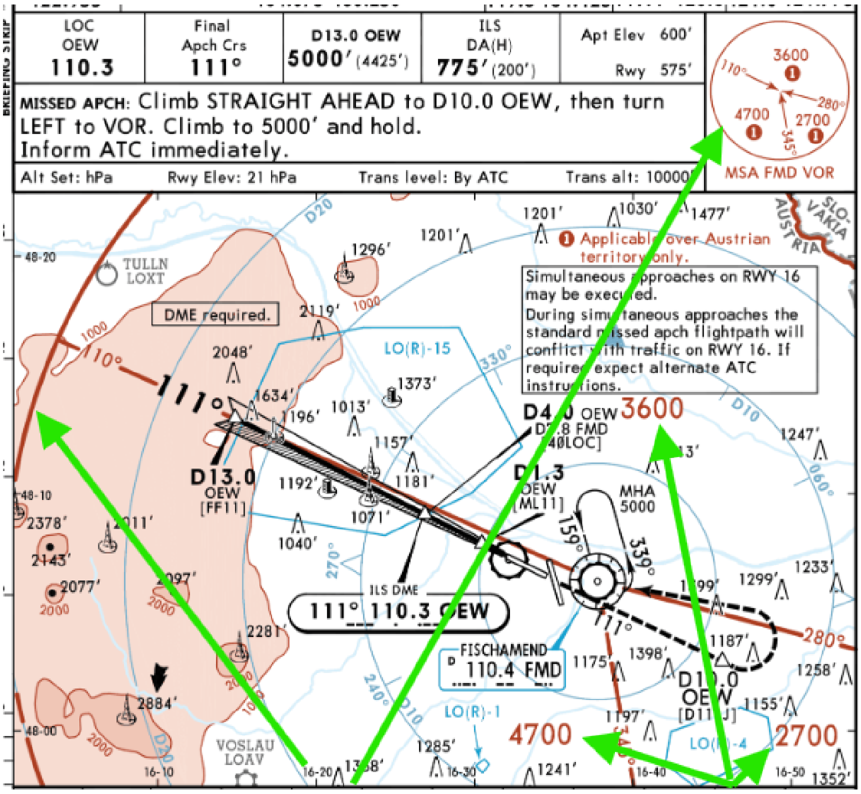
Minimum Sector Altitude. Minimum Sector Altitude (still referenced in a number of Operations Manual publications as Sector Safe Altitude (SSA)) is shown for sectors formed by radials, QDRs or tracks (depending on the reference facility) and a limiting circle. The Minimum Sector Altitude provides obstacle clearance of at least 300 m/1000 ft. The sectors and altitudes are published by states.

The Minimum Sector Altitude Limiting Circle is shown centred on a reference NAVAID or the Aerodrome Reference Point; if no other information is shown, the radius is 25 nm. A Minimum Sector Altitude Pictogram is used when the chart plan view is only able to show partial Minimum Sector Altitude sector information.

Minimum Sector Altitudes may be found on SID, STAR, IAC, MRC and AFC charts.

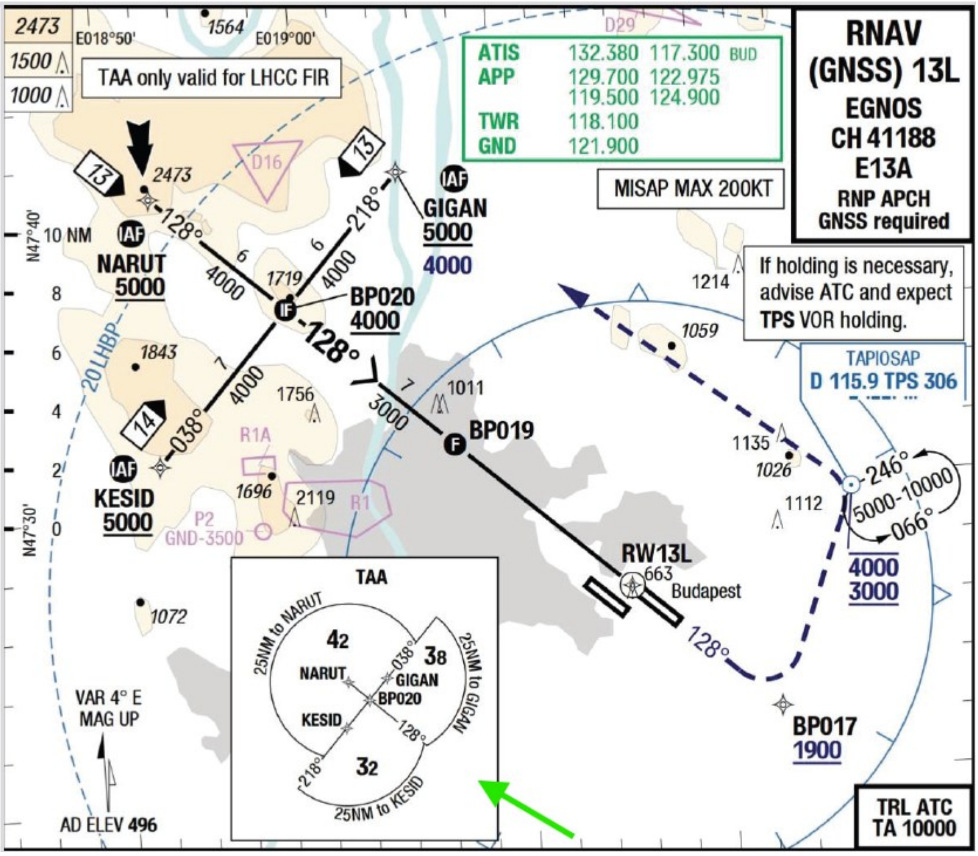


Minimum Sector Altitude information, Limiting Circle and Pictogram (in this case based on waypoint WW651, not the aerodrome reference point) on IAC for Vienna (LIDO).

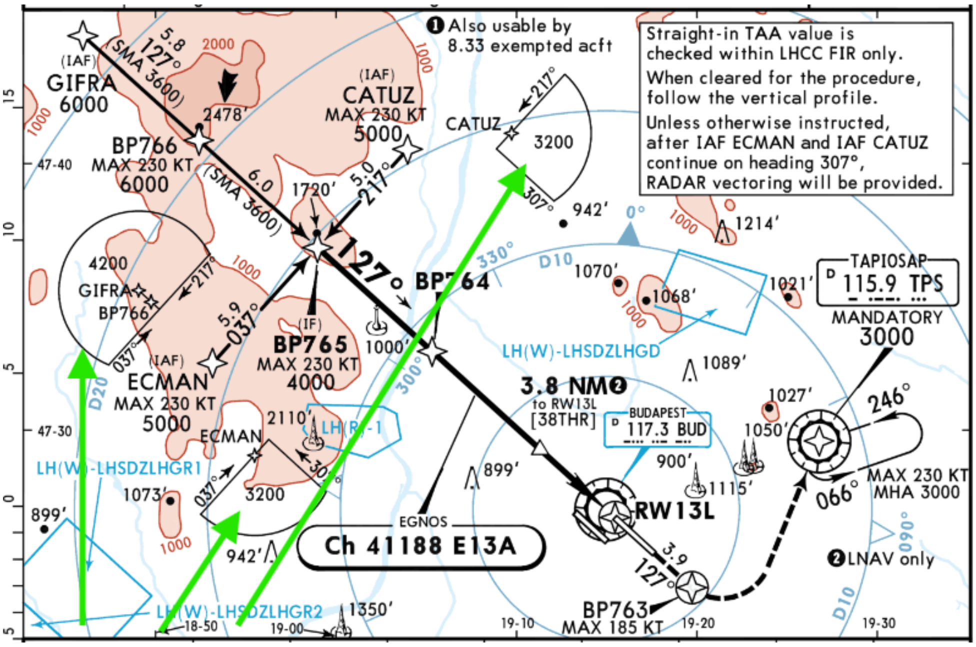


Minimum Sector Altitude information, Limiting Circle and Pictogram (in this case based on FMD VOR, not the aerodrome reference point) on IAC for Vienna (Navigraph/Jeppesen).

Terminal Arrival Altitude (TAA): TAA sectors and altitudes are only depicted for RNAV/RNP approaches, replacing Minimum Sector Altitude on some charts (but not all: TAA information is only depicted if officially published by states). Similarly to Minimum Sector Altitude information, a TAA pictogram is shown if the full sector information is not clearly visible on the chart plan view; and the TAA provides obstacle clearance of at least 300 m/1000 ft.



TAA Pictogram on RNAV Approach chart for Budapest.



TAA Pictogram on RNAV Approach chart for Budapest (Jeppesen/Navigraph)

4.1.7.4 Altitude Depictions on Charts

Minimum or Maximum Altitudes are rounded up to the nearest 100 ft and either:

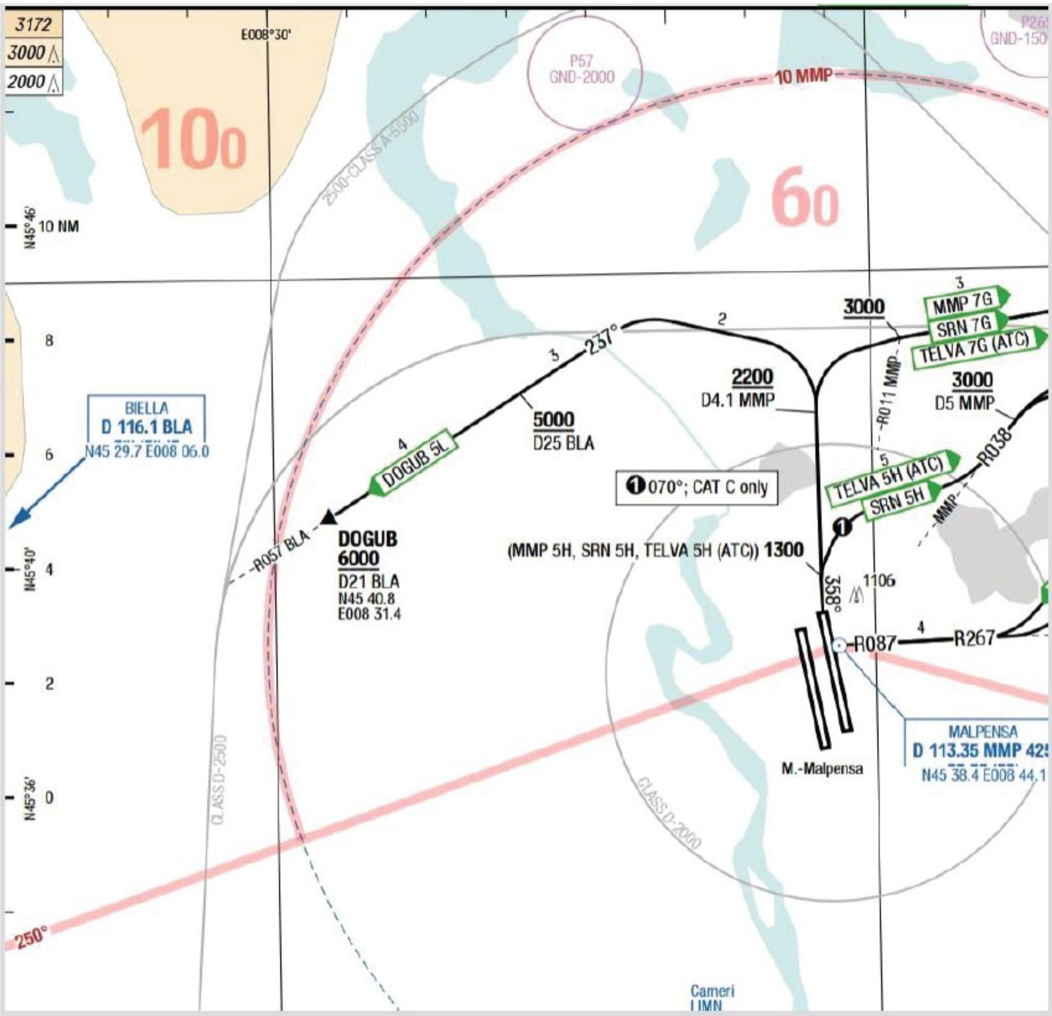
- For MGA, Minimum Sector Altitude and TAA: quoted in hundreds of feet, excluding the last two zeros (e.g. 76 indicates 7600 ft); or:
- For MEA, MTCA and MRC: shown as whole figures (e.g. 6600).

Aerodrome elevation, terrain and obstacles are depicted to the nearest foot.

4.1.7.5 Background Information

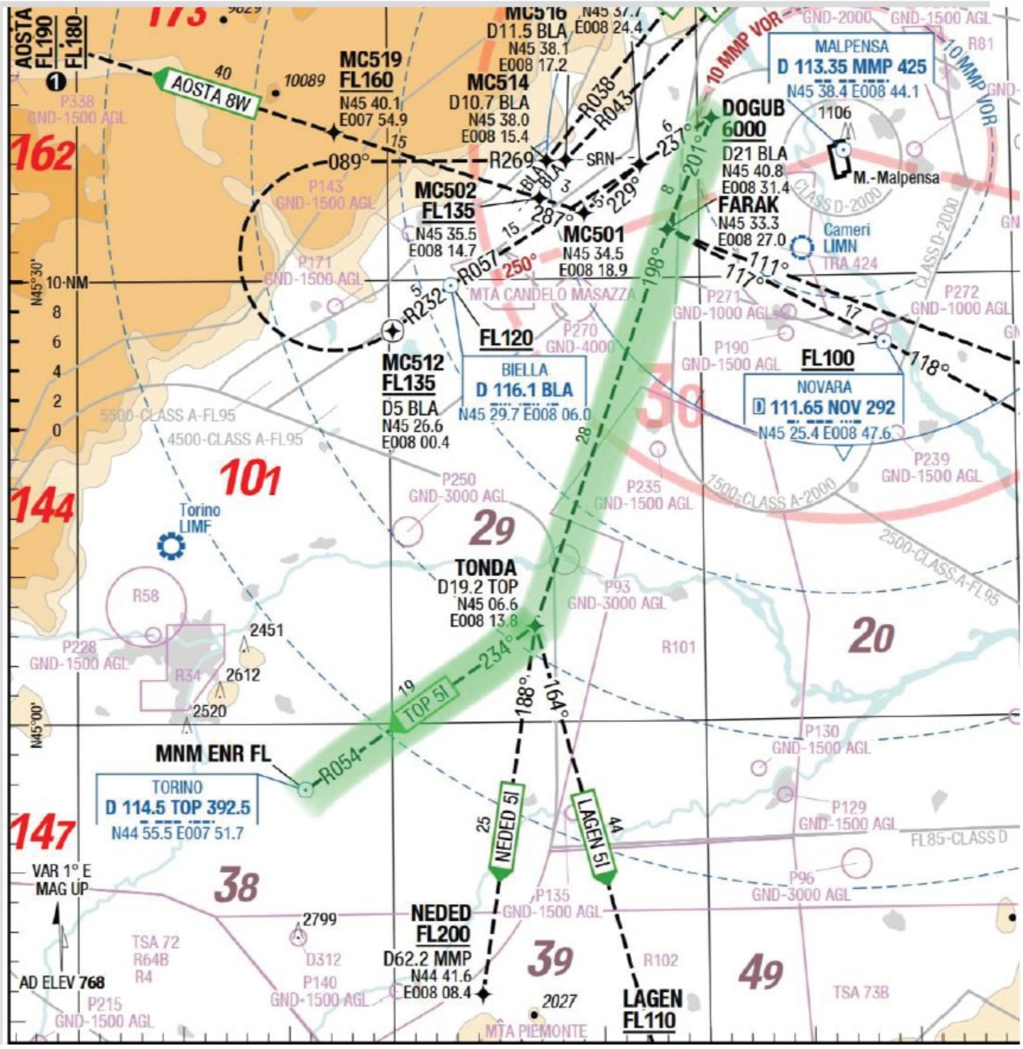
The information below shows how the various minimum altitude depictions could be relevant to operations, using an example flight from Milan Malpensa to Grenoble. It is empahsised that this example is simply intended to be an illustration of how the various chart types can be sued to build situational awareness about proximity to terrain.

Our fictitious flight takes off from Runway 35R at Malpensa. The MSA from the Operational Flight Plan plan is 15.4. The aircraft is cleared via a DOGUB 5L SID:



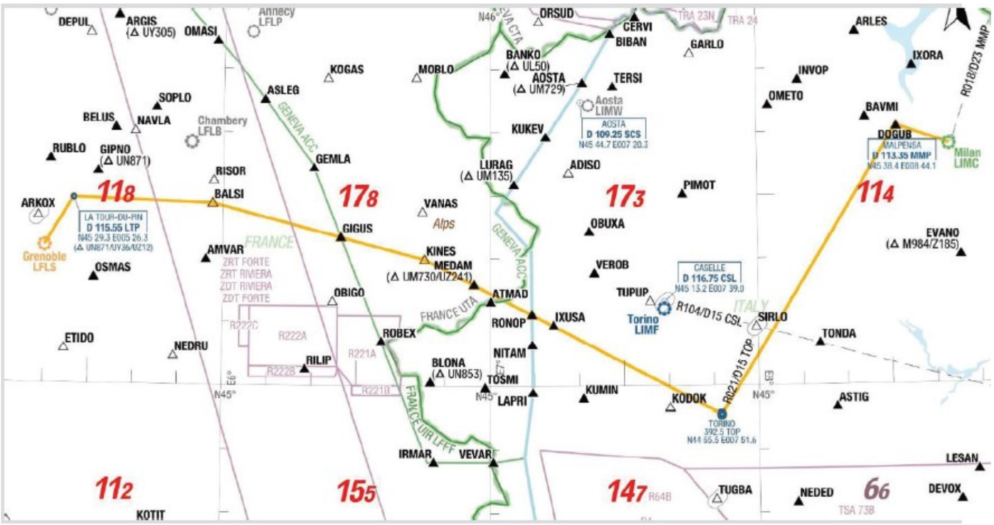
Based on the Minimum Sector Altitude depiction, the relevant MSA until DOGUB is 6000 ft.

The onward clearance is a TOP 5I transition:

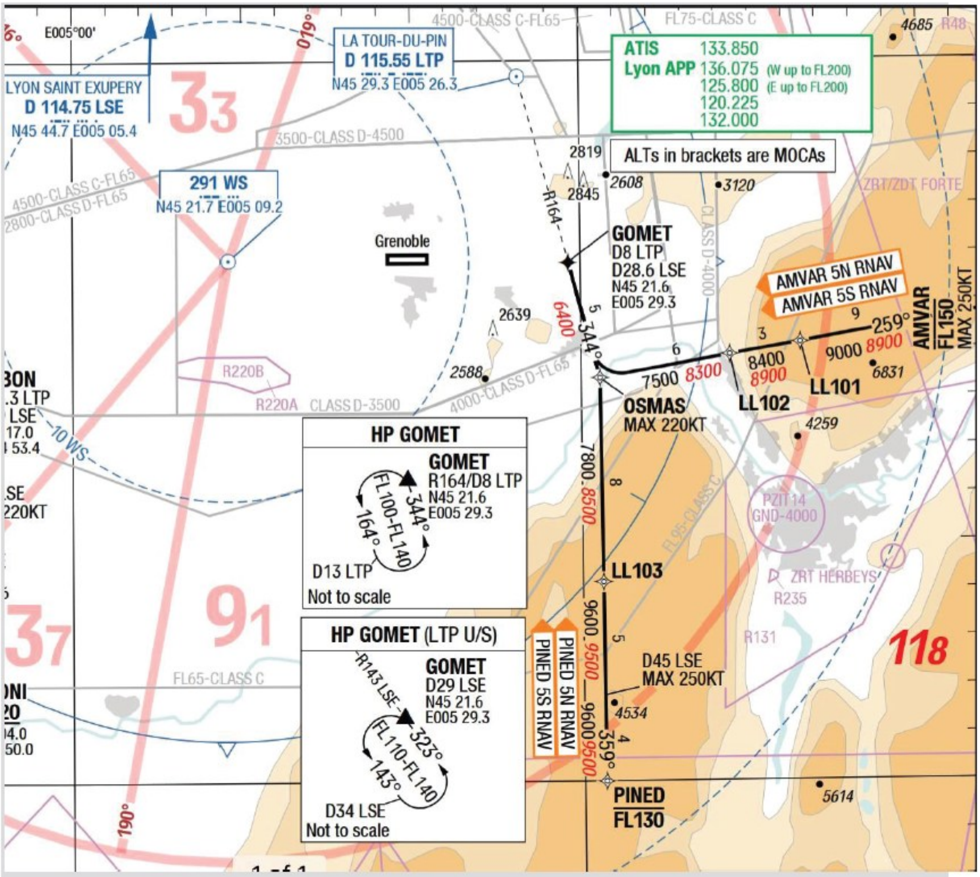


After passing FARAK, with the aircraft flying over the Po Valley, the Minimum Sector Altitude, and MGAs, show that the highest relevant MSA until reaching TOP is 3800 ft.

Half way between FARAK and TONDA, ATC issues a clearance direct to MEDAM; because the clearance is off the planned track, the crew refer to the Route charting in the Lido enroute charts and note the MGA values, which give a relevant MSA of 17,300 ft until passing 7° East then 17,800 ft – higher than the value from OFP:



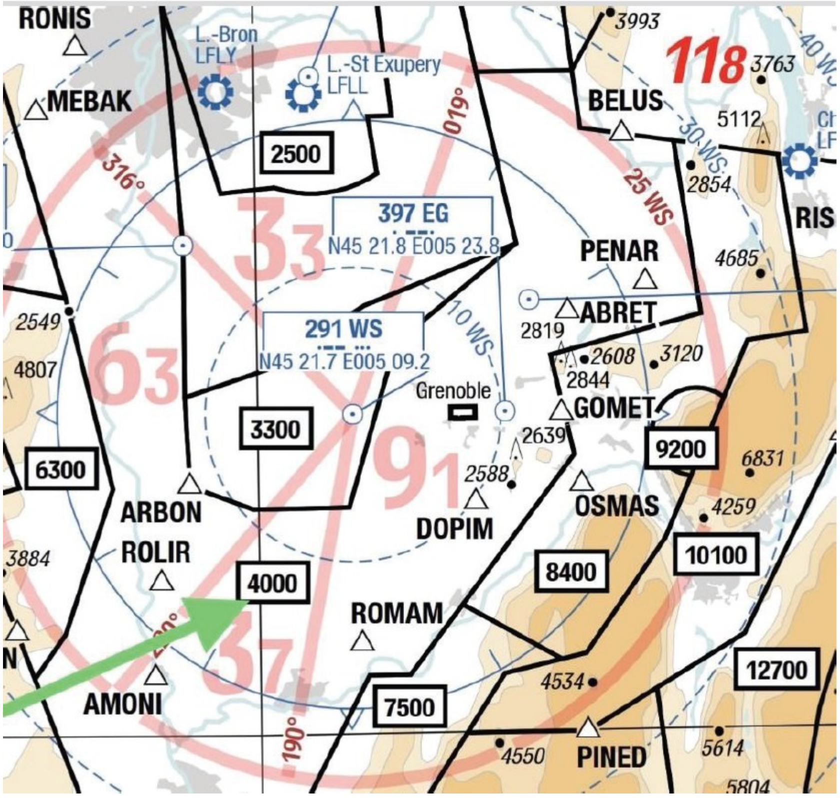
After being handed-over to French ATC, the flight is cleared to AMVAR for an AMVAR 5S arrival, to hold at GOMET. The crew note the MGAs of 17,800 ft and 11,800 ft from the chart above.



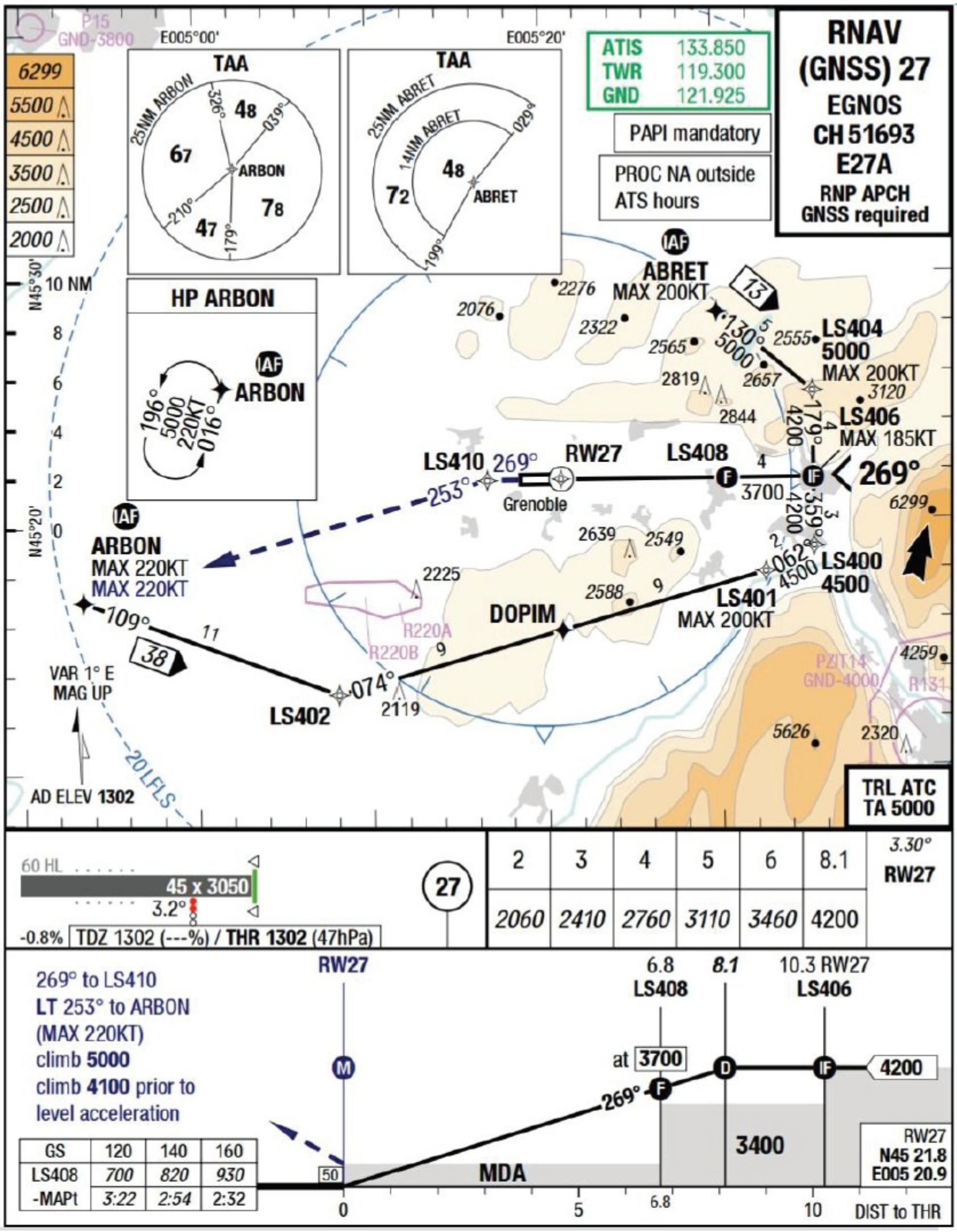
After AMVAR the highest MTCA before GOMET is 8900 ft – higher than the state-published MEA between LL101 and LL102! Once within 25 nm of NDB WS, the Minimum Sector Altitude information gives a relevant MSA of 9100 ft. The aircraft is cleared to hold at GOMET at FL100.

GNB is using Runway 27. ATC clears the aircraft to leave GOMET heading 250 degrees and to descend to altitude 5000 ft. The crew determines that the relevant MSA is 9100 ft, from the Minimum Sector Altitude depiction on the STAR chart above.

A glance at the MRC for GNB shows 4000 ft to be the minimum radar-vectoring altitude in that area:



The aircraft is then cleared direct to ABRET, at 5000 feet, to fly the RNAV (GNSS) approach to Runway 27, and to descend in accordance with the procedure:



Referring to the TAA pictogram, the crew notes that 4800 ft is the relevant MSA to the north-west of ABRET, and they will expect to descend below that altitude when past LS404. They make sure they are aware of the QNH, review the vertical profile (noting that the Intermediate Approach Fix altitude is 4200 ft, the FAF altitude is 3700 ft and the approach has a vertical slope of 3.3 degrees) and discuss that the radio altimeter activation may well happen on the leg from ABRET to LS404. At the call of “Radio Altimeter”, about 2.5 miles past ABRET, the crew confirm they have the correct QNH set and that they are where they were expecting to be – thus justifying continuation of the approach.

4.1.8 Air Traffic Services Flight Plan

An IFR flight plan must be filed for all BAVirtual online flights and the flight plan must not be cancelled in flight. The conditions under which VMC clearances may be requested or accepted in flight are described in OM A Adherence to IFR Clearances.

For flights planned using the BAVMS Simbrief dispatch system, a link to the VATSIM flight plan pre-filing system is provided on the Briefing page for convenience. To pre-file a flight plan with VATSIM, click the link provided. This will open the VATSIM flight plan form, pre-filled with all relevant data.

Check all the data is correct before submitting the flight plan.

For all flights, whether conducted online or offline, the ATC flight plan must be entered in to Merlin. This will be auto-populated with the planned route if the flight has been planned using the BAVMS Simbrief dispatch system. For flights planned using external software, the route must be entered manually.

The ATC Flight Plan, in ICAO format, is reproduced on the last page of the OFP.

The ICAO designator for British Airways is “BAW, or “SHT” for UK domestic flights and these should be used in online flying clients. All commercial applications (e.g. ACARS, communication with Operations, flight booking etc) use “BA” and the commercial flight number.

BA Euroflyer use the ICAO designator “EFW”. BA CityFlyer use the designator “CFE”.

4.1.9 Operational Flight Plan

The BAV Simbrief dispatch centre provides an operational flight plan in British Airways format. There is no requirement for a paper OFP on each flight, provided an electronic copy has been obtained.

The Captain is responsible for ensuring that the flight plan generated takes account of the available meteorological and operational information and at the flight planning stage the Operational Flight Plan should be checked for:

- Aircraft type and registration.
- Departure, destination and alternate aerodromes.
- Flight Levels.
- Cost Index/Mach No.
- Performance penalties.
- Gross Error Check on:
    - Fuel Distance or Flight Time.
    - Aircraft Weights.
    - Fuel quantities
- Remarks

When the loadsheet is obtained, the actual ZFW/TOW should be used to cross-check the assumed ZFW/TOW on the Operational Flight Plan.

It is essential that crew and ATC have the same flight plan details, with particular attention being given to the initial departure/exit routing. In the event of a discrepancy instigate remedial action as early as possible.

It is BAV policy to provide an Operational Flight Plan based on providing the correct amount of fuel necessary to complete the flight in normal operational conditions. It is the Commander’s responsibility to ensure that sufficient fuel is carried to operate the aircraft in accordance with BAV procedures; however, it is policy that Minimum Block Fuel should be uplifted unless the Commander can identify good reasons for carrying discretionary fuel.

4.2 Ground Handling Procedures

4.2.1 Fuelling Procedures

The Commander is responsible for ensuring that the correct technical and safety procedures are in place during the fuelling operation, though this may be delegated to another qualified member of the flight crew or engineer.

- Strobe lights must not be operated during refuelling
- HF radios must not be operated during refuelling
- Observe local procedures associated with running the APU during refuelling and consult the refueller/TRM prior to starting the APU during refuelling

4.2.1.1 Refuelling with Passengers on board

Refuelling with passengers on board, disembarking or boarding is permitted provided:

- The FASTEN SEAT BELT signs are turned OFF and the NO SMOKING signs are turned ON
- The main door must be open and steps or jetbridge in position
- Ideally the rear passenger door(s) will also be open with steps in position but it is acceptable for the rear door(s) to be closed provided the emergency escape slide is serviceable

4.2.2 Parking and Chocking of Aircraft

Where available, suitable chocks shall be placed fore and aft of the main landing gear wheels.

The parking brake must remain ON at all times when the aircraft is parked, even if chocks are in place.

It is not permitted to flash aircraft lights close to the stands as the meaning of this signal is ambiguous and may cause temporary blindness with considerable pain to ground crew.

4.2.3 Pushback and Powerback

During pushback/tow cross-bleed engine starts must not be accomplished unless adequate air pressure is available with ground idle power set.

Powerback procedures are not approved unless specifically authorised by the appropriate Fleet Chief Pilot.

4.2.4 APU Policy

The APU provides a convenient electrical power and air supply to facilitate efficient departures and arrivals. The following guidelines should be followed to efficiently manage the use of the APU.

4.2.4.1 Arrival

The APU should be started only when approaching stand and should be shutdown at the earliest opportunity when arriving on stand regardless of disembarking passengers.

On aircraft that require the APU to be running prior to shutting down one or more engines while taxiing, the APU should be started after landing to allow the engine(s) to be shut down.

4.2.4.2 Departure

The APU should be started as late as possible prior to the removal of ground power. If the APU is found running when crew arrive at the aircraft consideration should be given to shutting down the APU.

Note 1: If ground air is not available and if environmental factors dictate, the APU may be started to provide air conditioning to the cabin and flight deck.

Note 2: Comply with local airport operating requirements if more restrictive.

4.2.5 De-Icing and Anti-Icing

4.2.5.1 At London Heathrow

De-icing and anti-icing is normally carried out on stand. If remote de-icing is required this is normally carried out at the JEDI pads at the south end of Taxiway D (JEDI South and JEDI Delta).

Remote de-icing is carried out with engines shut down, with the exception of Airbus narrowbody aircraft.

After remote de-icing is completed, ATC clearance is not required to taxi clear of the de-icing pad. However, ATC clearance **must** be obtained before proceeding beyond hold point D2 (for JEDI Delta) or the hold short of Taxiway E (for JEDI South).

4.2.5.2 At Remote Stations

De-icing may be carried out on stand or remotely. Details of local procedures will normally be contained within the aerodrome chart textual data sections (Lido AOI/Jeppesen 10-1).

4.2.5.3 Holdover Times

Generic **estimated** holdover times are available from the Cold Weather Operations Card available in DocStore.

4.2.5.4 Taxiing

When taxiing out in active freezing or frozen precipitation, delay the deployment of flaps/slats until just prior to entering the active runway. Complete the Before Takeoff procedure and checklist after flaps have been selected. This will ensure that frozen deposits do not accumulate on the newly exposed surfaces, which have not been protected by de-icing/anti-icing fluid. Merlin SESMA reports for taxi without flap selected in these conditions are to be disregarded.

Carry out any required engine run ups as defined in fleet specific procedures.

4.2.5.5 Pre Takeoff Check

The Captain is responsible for carrying out a pre-take-off check. This is an assessment normally performed from within the flight deck to validate that the actual holdover time has not expired. This assessment is based on **estimated** holdover times and prevailing weather conditions.

A visual check is required if there is any doubt that frozen deposits have begun to accumulate on aircraft surfaces after de-icing/anti-icing has been completed. This check should be completed just prior to entering the active runway for take-off, to confirm they have remained free of frozen contaminants.

It must not be assumed that snow will be blown off during take-off.

4.2.5.6 Landing

When landing on a snow or slush covered runway, leave flaps/slats extended (as per fleet specific procedures), until they can be inspected by Engineering. When the surfaces have been confirmed to be free of frozen deposits, clearance will be given to retract flaps/slats.

4.3 Flight Procedures

4.3.1 Definitions

Captain
The legal Commander of the aircraft. Where two Captains are flying together, one will be designated as the Aircraft Commander.

First Officer
Operating pilot who is not the Aircraft Commander.

Pilot Flying (PF)
The pilot handling the aircraft at a given time – i.e. controlling the flight path either manually or through the AFDS.

Pilot Monitoring (PM)
The pilot not handling the aircraft at a given time. The Pilot Monitoring shares an active role in ensuring continued safe flight path at all times.

P1
Duties allocated to the Captain, which may be assigned to the other pilot at their discretion.

P2
Duties allocated to the First Officer. In role reversal or PICUS, at the Captain's discretion, P1 and P2 duties may be exchanged wholly or in part.

4.3.2 Allocation of Duties

In most cases BAV pilots operate alone and therefore must complete both P1 and P2 duties.

4.3.2.1 Shared Cockpit Operations

In multi-crew (e.g. Shared Cockpit) scenarios, the following allocation of duties is specified for the workload associated with normal operation. However, the Captain must assess any exceptional workload associated with non-normal conditions and assign revised duties as necessary.

4.3.2.1.1 General

P1 and P2 roles must be allocated for every flight. Each flight starts with:

- PF duties undertaken by P1.
- PM duties undertaken by P2.

It is BAVirtual policy to employ a monitored approach policy. Prior to top-of-descent:

- PF duties are undertaken by P2.
- PM duties are undertaken by P1.

For a planned manual landing PF duties revert to P1 if:

- Stable Approach Requirements are met; and
- Visual Reference Requirements are met.

For a planned autoland PF duties revert to P1 if:

- Stable Approach Requirements are met; and
- The aircraft passes 1000R.

Note: Only Captains (or First Officers undergoing training) may operate as P1 during Low Visibility Operations (takeoff in <600m RVR or landing in worse than Cat 1 conditions).

4.3.2.1.2 Cruise

During cruise, aircraft control and R/T may be alternated between either pilot as desired by the P1, depending upon sector length, aircraft status and operational circumstances. However, in the event of any significant abnormality in either aircraft status or operational circumstances, it is strongly recommended that the Captain assigns aircraft control to the First Officer making effective use of CRM principles.

4.3.2.1.3 Descent and Approach

Before Top of Descent, the P1 must assess the likely weather conditions and workload expected for landing and brief for the type of approach and procedure to be used. If it is anticipated that the required visual reference for landing will not be achieved by 1000 ft above Decision Altitude (DA), maximum use must be made of the autopilot, any available precision approach aids, and in more limiting weather conditions autoland. Manual approaches should only be practised in suitable weather and workload conditions.

4.3.3 Operating Policy

4.3.3.1 Checklists

Checklists are provided for each BAV mainline aircraft type and can be found in the OM B section of DocStore.

The purpose of checklists is to ensure that the procedures in the Operations Manual have been followed and all the appropriate actions for the phase of flight completed.

For most aircraft types, the panel scan sequence (found in the type-specific FCOM) is completed from memory and then the appropriate checklist used to confirm that the most critical items have been correctly actioned.

4.3.3.2 Monitoring and Crosschecking

It is the responsibility of the PF to ensure the aircraft is at the correct attitude, speed and configuration, and using the correct lateral and vertical modes during each flight phase.

It is essential that control of the aircraft is maintained and the necessary monitoring does not break down. In the final 1000 ft prior to cleared altitude the attention of the PF must be concentrated on achieving a satisfactory altitude capture.

4.3.3.3 Configuration Changes

Before making any configuration change (e.g. flap or gear selections):

- Check that the airspeed and bank angle are appropriate
- Make the selection
- Check the configuration change commences

The phrase **“Limitation – Operation – Indication”** is a good principle to apply.

4.3.3.4 FMS

To avoid too much heads-down time at a late stage of the approach, (re)programming the FMS should not be attempted once the approach has commenced. It is recommended that only simple (re)programming of the FMS should be attempted below 10,000 ft aal.

4.3.3.5 Autopilot Flight Director System (AFDS)

When available, it is recommended that the comprehensive AFDS facilities be used throughout flight to achieve maximum efficiency of aircraft operation and to reduce workload and exposure to errors. This particularly applies at times of high workload.

Autothrottle and Flight Directors should be engaged for take-off, go-around and at any time the autopilot is engaged.

Following engagement of the autopilot, the PF should ensure that the aircraft is maintaining the required flight path prior to carrying out an IAS/MACH/mode change.

All available autopilots will be engaged for all automatic coupled precision approaches irrespective of weather conditions and type of landing intended, autoland or manual. This will provide greater redundancy during all approaches and enable autoland. Autoland should be used where possible in limiting weather conditions. Regular Autoland practice is recommended to ensure Flight Crew familiarity and to verify the aircraft capability.

In the event of autopilot failure, it is imperative that the PF assumes manual control immediately. When a manual landing is intended, if the autopilot or the primary approach radio aid failure occurs below 1000 RA the approach may be continued manually, to the appropriate DA. When an autoland is intended, if autopilot failure occurs below 1000 RA such that an autoland is no longer possible, the go-around procedure will be initiated unless the remainder of the approach and landing can be completed solely by visual reference and the RVR is greater than Cat 1 limits.

4.3.3.6 Manual Flying

It is recommended that the autopilot is engaged to reduce workload and exposure to errors; however, manual flight is permitted after due consideration of the workload constraints and suitable briefing. PF should be prepared to re-engage the Autopilot/Autothrust should a change in workload or conditions change.

4.3.3.7 Altimeter Setting Procedures

Changes to altimeter settings should be initiated by PF and communicated to PM. Should the PF not initiate the relevant altimeter setting change as soon as is practicable the PM will prompt with the call “ALTIMETERS”.

Altimeter setting procedures and altitude alerting system procedures are covered within the relevant aircraft-specific manuals.

Altimeters should be set according to the following principles:

Flight Phase	Captain	First Officer	Standby
Prior to departure	Departure airfield QNH	Departure airfield QNH	Departure airfield QNH
When cleared to a flight level	STD	STD	QNH until above MSA and TA
Cruise (if above TA)	STD	STD	STD
Prior to descent	STD	STD	Destination airfield QNH
When cleared to an altitude	Destination airfield QNH	Destination airfield QNH	Destination airfield QNH

Where the initial climb is to a Flight Level, both primary altimeters should be set to STD at acceleration altitude. The standby altimeter should still remain on QNH until above MSA and TA.

4.3.3.7.1 Verification of Transition Altitude/Level

Prior to take-off or approach, flight crew should verify that the Transition Altitude and/or Transition Level (when published or available) are correctly programmed in the Flight Management System.

4.3.3.7.2 Altimeter Setting Procedures for “Climb Via” and “Descend Via” Clearances

When given a “climb via” or “descend via” clearance along a SID/STAR, the vertical profile published on the applicable chart must be followed. To allow the FMS to provide correct vertical guidance, the relevant altimeter setting for each constraint must be set (i.e. QNH for an Altitude constraint and STD for a FL constraint).

Consequently, when a “climb via” or “descent via” clearance is expected or received, it will be necessary to delay the change in altimeter setting from STD to QNH (or vice-versa). In such cases, flight crew must establish and agree:

- The relevant Altitude/FL target to set in the MCP/FCU
- When the altimeter setting will be changed to the next setting

Any ambiguity concerning an ATC clearance must be resolved without delay.

A number of States publish SIDs and STARs which contain both altitude and Flight Level restrictions at sequential waypoints. If instructed by ATC to either “climb via” SID or “descend via” a STAR, the published vertical profile must be followed in accordance with ATC Clearances on SIDs and STARs.

Such clearances require the change in altimeter setting to be delayed until past any applicable constraints. In turn, this increases the risk of the Flight Crew omitting to change the altimeter setting entirely. Such an omission would raise the threat of mid-air collision and/or CFIT and must therefore be mitigated against through careful briefing and monitoring.

4.3.3.8 Look Out

In visual conditions an adequate look out should be maintained to aid the detection of conflicting aircraft and the ability of the crew to react to traffic alerts from ATC or TCAS. This is particularly important when flying online and no ATC is available.

In order to satisfy this requirement, cockpit lighting should be adjusted to achieve optimum night vision whenever possible.

4.3.4 Air Traffic Services

4.3.4.1 General

Though not a requirement, BAV pilots are encouraged to fly online on the network of their choice. The policies below should be followed at all times when flying online.

4.3.4.2 Clearances

All clearances, except where permitted by an approved local procedure, must be read back in full.

The following are particularly important:

- Instructions to hold short, clearance to enter, land on, take-off from, cross and back-track an active runway.
- Airways, Route or Departure clearance.
- Flight Levels, Altitudes and Heights.
- Altimeter settings and Transition Levels.
- Tracks and Headings.
- Speed instructions.
- SSR (Transponder) operating instructions.
- Radio Frequencies.

If there is any doubt about the content of any clearance, clarification from ATC should be sought.

When obtaining initial departure and arrival clearance or re-clearance from ATC, it is good practice to record the actual clearance on the Operational Flight Plan flight plan. The FMS/FMGC must be cross-checked to confirm correct programming of take off/landing runway and departure/arrival routing.

Flight Crew are permitted to use the Abbreviated Departure Clearance Read Back Procedure, published in the aerodrome charts, for certain airfields in the USA. This procedure requires aircraft to acknowledge receipt/understanding of their departure clearance by stating only their aircraft identification and assigned transponder code.

4.3.4.3 Start-up Clearance

Details of the procedures at individual aerodromes are contained with the relevant aerodrome charts. In the event of any delay precluding the ability to commence push-back, start-up and/or taxi after start-up clearance has been requested or received, ATC must be informed immediately.

4.3.4.4 Rate of Climb and Descent

Within the UK, ATC normally expect a rate of descent of at least 500 ft/min within the terminal control area. If this cannot be achieved ATC should be informed.

Aircraft operating in UK airspace, within the London and Scottish FIR/ UIR, should not exceed 8,000 fpm in the climb or descent. Aircraft in an emergency situation are exempt from this maximum rate of climb/ descent.

4.3.4.5 Transfer of Aircraft Communication between ATS Units

The transfer of communication from one ATS unit to another usually takes place at a radio facility, or reporting point, and in these cases any required frequency change should be made as soon as possible. When a change-over time or Flight Level is specified, however, the frequency change must not be made until the stated time or Flight Level is reached.

4.3.4.6 "Land After" Procedure

Captains are authorised to accept the "Land after" procedure, by which aircraft are "cleared to land after …(aircraft) …" instead of being "Cleared to land".

Responsibility for ensuring adequate separation between the two aircraft rests with the pilot of the second aircraft.

4.3.4.7 Land and Hold Short Operations (LAHSO)

BA policy is not to participate in LAHSO for landing or departure, neither actively (cleared to land and hold short), nor passively (other aircraft cleared to land and hold short). If ATIS advises LAHSO in use, advise ATC "UNABLE TO PARTICIPATE" on first contact. Crews should refuse any LAHSO offered by ATC.

If in doubt confirm with ATC that other aircraft will not carry out LAHSO on any intersecting runway that may be in use for your arrival or departure.

4.3.4.8 Visual Approach Clearances

An IFR flight may be cleared to execute a Visual Approach by day or night, provided the Captain has the aerodrome in sight and can maintain adequate visual reference as described in Visual Approach Visibility Requirements.

4.3.4.9 Adherence to IFR Clearances

For all BAV flights in controlled airspace and as far as practicable in uncontrolled airspace:

a. IFR Flight Plans must not be cancelled in flight.

b. VFR ON TOP and VFR clearances must not be requested or accepted.

c. Except in the LONDON and MANCHESTER TMAs, VFR climb and descent clearances may be requested or accepted by DAY, through a Flight Level or Altitude occupied by another aircraft "known" to the Captain, provided they are satisfied that adequate separation can be maintained; the Captain must take account of the flight visibility, sun position, and flight deck workload, and ensure that the best possible look-out is maintained.

d. In uncontrolled airspace at NIGHT, the Flight Information Centre should be advised of any intended change of Flight Level or Track, and when information on other aircraft indicates that separation will be inadequate, the change should not be made relying solely on a visual look-out.

e. Changes from flight plan cruise speed by more than + 20 kts or by 0.04 Mach should be notified with the reason when outside Oceanic Area Control to ATC.

4.3.4.10 VFR Traffic

It is emphasised that, even in Controlled Airspace, ATC may not provide information on VFR traffic and that when operating on an IFR flight plan but maintaining VMC the Captain is entirely responsible for collision avoidance.

4.3.4.11 Reporting

4.3.4.11.1 Flight Level and Altitude Reporting

Captains must ensure that when reporting Flight Levels and Altitudes on climb and descent, a vacating report is only made when the aircraft has actually left the stated level, and that only the terms “Leaving”, “Passing” and “Reaching” are used. Such terms as “approaching”, and “coming up (or down) to” are too vague, can be misleading and must not be used.

When reporting Flight Levels, the altimeter reading should be passed to the nearest 100 ft to facilitate checking SSR Mode C altitude reporting.

In the event that a cleared level is inadvertently exceeded, this must be reported to ATC immediately.

4.3.4.11.2 Position Reports

Every BAV flight must conform to the ATC reporting procedures laid down by the State in which the aircraft is operating.

The correct ICAO R/T procedure and sequence, including aircraft call-sign, position, time, Flight Level or Altitude, and estimated time at the next position, must be used.

When flying in a Flight Information Region (FIR) for which no reporting procedures are laid down, aircraft must report when entering and leaving the FIR and at least every 30 minutes.

4.3.4.12 Airspace Infringements

4.3.4.12.1 Aerodrome Traffic Zones

Captains must ensure that their aircraft do not enter Aerodrome Traffic Zones without clearance from ATC or the appropriate authority.

4.3.4.12.2 Danger and Prohibited Areas

Captains must ensure that any deviations from the flight-planned route, whether to avoid weather or to fly a more direct route, are made taking account of any Danger or Prohibited Areas in the vicinity.

4.3.5 Communication

4.3.5.1 General

The PM will operate the R/T and be responsible for correct frequency selections, as specified within OM B specific fleet manuals. Both pilots must monitor the ATC clearance. Additionally, UK Regulations stipulate that on the ground, when receiving the ATC departure clearance via voice communication, the headset shall be used as the primary device for voice communications with ATS. In cases where the First Officer would have to refer to the Captain for a decision, it is recommended that the Captain responds directly.

The PF must normally monitor R/T at all times. If the PF wishes to leave the primary ATC control frequency for any reason, temporary control of the aircraft must be passed to the other pilot. If, for any reason, a pilot has to leave the ATC frequency the remaining pilot must check that his/her own audio panel is set correctly to maintain communications with ATC. When the pilot has completed his/her other activities they must re-check that the audio panel is set correctly to re-establish communication with ATC. The returning pilot will be briefed on any changes to communications by other crew members.

Standard R/T phraseology must be used for communications with ATC. All communication must be carried out in accordance with UK CAA CAP 413 and the aircraft callsign used in all transmissions.

Contact must be maintained with the Air Traffic Control Centre (ATCC) or Flight Information Centre (FIC) prescribed by the Air Traffic Services controlling the area in which the aircraft is flying, and clearance must be obtained from one station before changing to another. Frequency transfer by means of datalink (CPDLC) is acceptable for that purpose.

R/T frequencies must only be used for the purposes for which they are promulgated; in particular, ground movement frequencies should not be used while airborne. In exceptional circumstances however, or where communication is difficult, any suitable means of contact may be used.

A continuous R/T listening watch must be maintained with the appropriate ATS Authority throughout flight unless:

- Permission has been given by the appropriate ATS Authority to discontinue radio watch; or
- SELCAL watch has been established; or
- Use of defective radio equipment might endanger the safety of the aircraft

The ICAO Phonetic Alphabet and phraseology must be used for all R/T communications. The use of idiomatic or colloquial expressions should be avoided where foreign controllers have a limited knowledge of English and may well only understand standard phraseology and procedures.

4.3.5.2 International VHF Emergency Frequency (121.5 MHz)

The frequency 121.5 is provided at area control centres, flight information centres, aerodrome control towers and approach control offices.

Crews operating long over-water flights or over designated areas where the carriage of an Emergency Locator Transmitter (ELT) is required, should continuously monitor (‘guard’) the emergency frequency 121.5 except:

- When carrying out communications on other channels;
- When flight deck duties do not permit the simultaneous guarding of two channels;
- When airborne equipment limitations exist.

In addition, the guarding of 121.5 shall be made in areas or over routes where the possibility of interception or other situations may exist as notified.

Crews operating in areas other than the above, e.g. Europe, should guard 121.5 when practical and when communication difficulties using the normal channels exist.

4.3.5.3 VATSIM Advisory Frequencies

When no ATS is available on the VATSIM network, particularly on the ground and between aircraft taking off and landing, the relevant Advisory Frequency must be used to facilitate coordination between aircraft.

En-route, 122.800 MHz is used as the global common advisory frequency and must be monitored at all times when no ATS is available. The maximum range of voice transmissions on 122.800 MHz is approximately 30 nm.

On the ground and in the vicinity of an aerodrome, the relevant CTAF frequency must be monitored and 'blind' transmissions made to advise other traffic in the vicinity of your intentions.

In the USA, Canada, Mexico and the Caribbean, discrete CTAF frequencies are used for each airfield. The relevant CTAF frequency may be found by typing .ctaf <ICAO> in to your VATSIM pilot client, e.g. .ctaf KJFK will return the CTAF frequency for JFK. It is strongly recommended to monitor 122.800 MHz on a second VHF radio whilst operating on discrete CTAF frequencies due to the lack of compliance by other pilots.

In all other areas, 122.800 MHz is used as the common advisory frequency for use in the vicinity of aerdromes as well as enroute.

Voice transmission is encouraged but pilots are reminded of the requirement to monitor the text frequency as well and to be mindful that there may be pilots who are unable to receive voice communications in the area.

Transmissions on the advisory frequency must be limited to those which are operationally necessary. 'Blind' transmissions should be kept short, and contain:

- The name of the airfield the aircraft is operating from or to
- The aircraft callsign
- The pilot's intentions
- End with the name of the airfield the aircraft is operating from to to

For example: "Heathrow traffic, Speedbird 123, taking off runway 27L, Heathrow".

Where the Captain is certain there is no other traffic to affect operations 'blind' transmissions may be omitted.

Where co-ordination with other aircraft is necessary this should be kept as brief and unambiguous as possible.

Pilots are reminded that not all other aircraft will be monitoring or transmitting on the advisory frequency. A sharp visual and TCAS lookout is therefore essential and, in conjunction with the right-of-way rules, remains the foremost means of collision avoidance.

Likewise, pilots are reminded that the blind transmission of intentions does not confer any particular priority or right of way or obligate other aircraft to give way.

Pilots must not engage in non-operational conversations or arguments on the advisory frequency.

4.3.5.4 Met Information – Ground to Air

Full use must be made of met broadcast frequencies (e.g. ATIS) and ACARS (e.g. pilot client, weather engine, built-in aircraft ACARS functionality etc) to obtain weather information during flight. Requests to air/ground communications stations must be limited to information that cannot be obtained from broadcasts or via ACARS.

4.3.5.5 Met Information – Air to Ground – AIREP

Position reports to ATC should be followed by an AIREP message according to the following rules:

Europe – not required.

Outside Europe on established airways – report at points marked “M” on Radio Navigation Charts and “AIREP” on the Operational Flight Plan.

On the North Atlantic Track System – report, **only if requested**, for the reporting point and the midpoint. The midpoint observation should retained for transmission with the report at the next reporting point.

On Atlantic routes which are not on the NAT system – report at each Oceanic Reporting Point (only if requested).

In order to minimise workload on short sectors AIREPS need not be made if flight duration is less than 2 hours or if the aircraft is within 1 hour of landing.

AIREPs should contain – Position, Flight Level, Temperature, Wind Velocity and, if applicable, Significant Weather as required in an AIREP Special.

4.3.5.6 AIREP Special

An AIREP Special should be made to ATC during, or as soon after the occurrence as possible if any of the Sigmet conditions listed in Section 5 are encountered. If the condition persists then routine AIREPs should contain a reference to the condition.

4.3.5.7 R/T Callsigns

In communications with ATC, R/T callsigns must always be given in full, including the designator “SPEEDBIRD” except in the case where the aircraft registration is used where this may be abbreviated after initial contact. e.g. Callsign “G-BNLL” can be abbreviated to “G-LL”; Callsign “SPEEDBIRD G-BNLL” can be abbreviated to “SPEEDBIRD LL”. The three letter designator BAW is used in ATC flight plans, e.g. “BAW11M” is spoken as “Speedbird 1 1 Mike”.

Aircraft operating British Airways Shuttle will use the three letter designator SHT, spoken as “Shuttle” e.g. “SHT6J” becomes “Shuttle 6 Juliet”.

Aircraft operating BA Euroflyer will use the three letter designator EFW spoken as “Griffin”, e.g. “EFW8SM” is spoken as “Griffin 8 Sierra Mike”.

Aircraft operating BA CityFlyer will use the three letter designator CFE, spoken as "Flyer", e.g. "CFE35E" is spoken as "Flyer 3 5 Echo".

The Simbrief Operational Flight Plan should contain the callsign to be used.

4.3.5.8 Avoidance of Confusion

In order to reduce the potential confusion associated with similar flight numbers, it is BAV policy to use ATC callsigns which may differ from the published flight number. Alpha-numeric callsigns are used extensively on Shuttle, Domestic and selected European flights.

In some cases on long-haul flights, a callsign using the 9000 series or alpha-numeric may be allocated, providing overflight clearances are not compromised.

Prior coordination with ATC authorities and relevant stations ensures acceptance of a callsign not directly related to flight numbers.

Care must be taken that ATC instructions intended for another aircraft are not accepted due to nearly similar flight numbers or omission of the airline designator by the ground station.

If the Captain becomes aware that there is a risk of their flight number callsign becoming confused with that of another aircraft, he must request permission from ATC to change to their aircraft registration letters preceded by "SPEEDBIRD", "GRIFFIN" or "FLYER" as appropriate.

4.3.6 Navigation Procedures

This section contains the general responsibilities in respect of navigation procedures. In order to satisfy these general responsibilities, fleet specific procedures are developed giving consideration to the equipment fit and the type of navigation airspace in the area of operation. The type specific responsibilities are included in the Fleet specific manuals.

4.3.6.1 Ground Navigation Responsibilities

Accurate navigation and collision avoidance on the ground is the responsibility of the pilot. The relevant taxi chart should be visible at all times when taxiing to ensure correct interpretation of ATC taxi instructions, to monitor taxi progress and to achieve a general situational awareness of the airfield.

Except where ground surveillance radar is available to assist ATC, the separation of traffic is entirely dependent upon the information originated on the flight deck. With the ever increasing traffic density at all levels, it is essential that this information be as accurate as possible. A high standard of navigation must be maintained at all times.

4.3.6.2 Navigation Documents

The master navigation document is the Operational Flight Plan log.

The following information should be recorded on the Operational Flight Plan for each sector:

- Departure and arrival times and total sector time
- Fuel ordered, on board, used and remaining
- Alternate, if used ('ringed' if different from planned alternate)

- Initial ATC clearance and enroute clearances which differ from the flight plan (unless received by ACARS/CPDLC)
- Oceanic clearances
- Fuel checks
- Airborne time or ATA over a waypoint early in the flight. Others should be filled in where sector lengths are such that they are significant.

4.3.6.3 Flight Plan Check

The flight plan entered in to the aircraft navigation system should be checked to ensure that it matches that planned.

When the route stored in the navigation system differs from the Operational Flight Plan route, the revised routing must be cross-checked against the Operational Flight Plan.

For waypoints, which are not stored in the navigation system data bank the Operational Flight Plan should be annotated as follows.

- When the co-ordinates of the waypoint have been checked, the waypoint designator, or lat/long, on the Operational Flight Plan should be circled.
- When the track and distance have been checked, they should be ticked.

It may not be possible to insert the whole route prior to take-off in which case the checks will be carried out during flight.

4.3.6.4 ATC Re-routing

When an ATC re-routing is received it is recommended that a new flight plan is prepared for the changed portion of the flight. If, however, the change is small then the original document may be used. In this case the old waypoints should be clearly crossed out and the new waypoints entered in their place.

Whenever the navigation system is being reprogrammed in flight, cockpit management must ensure that basic control and monitoring of the aircraft flight path and AFDS engagement status is maintained.

4.3.6.5 Airways Sectors

On Airways sectors defined by point source navigation aids there are usually sufficient aids to provide continuous updating and monitoring of the navigation system. On such routes or route segments, the Navigation System will normally fly the aircraft. The navigation system performance should be monitored using the procedures specific to the aircraft type.

The similarity between some waypoint designators can be the source of navigation system loading errors. Following any changes to the planned route the new waypoints inserted into the navigation system must be verified as correct by checking the track and distance or co-ordinates as specified in the fleet specific manuals. Direct routing clearances to points included on the Operational Flight Plan should be recorded on the log by the use of a direct track line.

4.3.6.6 Scheduled Areas and MNPS Airspace

On these sectors point source aids may be insufficient to provide Navigation System updating and monitoring. Under these circumstances navigation will be achieved by reference to FMS/INS as the sole navigation aid.

Prior to entering an area where FMS/INS provides the prime navigation reference, confirm the accuracy of the navigation system as required in the fleet specific manuals. The navigation system performance should be monitored using the procedures specific to the aircraft fleet.

4.3.6.6.1 Waypoint Crossing Procedures

When crossing waypoints in Scheduled Areas and MNPS airspace the following procedures must be used.

- Check the actual position of each navigation system against the cleared route on the Operational Flight Plan.
- Record the time.
- Check the next waypoint co-ordinates, true track, distance and ETA.
- Confirm that the aircraft turns in the correct direction and takes up a new heading and track appropriate to the leg to the next waypoint.

These procedures are applicable on the North Atlantic Track System, in the Canadian MNPS Area (including Polar routes between 60°W and 141°W) and on North Pacific routes.

4.3.6.6.2 ATC Clearances

When operating on these routes particular care must be taken to ensure that the ATC clearance is for the track as filed and listed on the Operational Flight Plan.

When operating on the NAT Track system all waypoint co-ordinates should be read back in full if required by ATC. If an R/T clearance is received which refers to a specific NAT track and a Track Message Identification number, the waypoints must be cross-checked with the track message provided at the flight briefing.

If the aircraft is cleared by ATC on a different track from that flight-planned, it is strongly recommended that a new flight plan showing the details of the cleared track be prepared.

Experience suggests that when ATC issues a re-clearance involving re-routing and new way-points, there is a consequent increase in the risk of errors being made. Therefore, this situation should be treated virtually as the start of a new flight, and the procedures employed with respect to copying the ATC re-clearance, amending or re-drafting the Operational Flight Plan, loading and checking waypoints, verifying tracks and distances and the preparation of a new chart must be identical to the procedures employed at the beginning of a flight.

4.3.6.7 Aircraft Lighting

4.3.6.7.1 Navigation Lights

Navigation lights will be switched on during operations at night, and normally be switched off during daylight.

4.3.6.7.2 Anti-Collision Lights

The red anti-collision light (beacon) will be switched on before pushback and remain on until the engines have been shut down after landing.

4.3.6.7.3 High Intensity/Strobe Lights

White Strobe lights will be switched on prior to entering or crossing any active runway. They should be switched off when the runway is vacated after landing (or crossing).

4.3.6.7.4 Other Lights

Other lights may be used on the ground at the Commander's discretion with due regard for the airfield conditions and the safety of ground crew.

Type-specific lights are used in accordance with the type-specific FCOM when operating below FL100. When operating to aerodromes at elevations above 2000 ft these lights are used during operations below 10,000 ft AAL.

4.3.7 Performance Based Navigation (RNAV) Operations

Aircraft shall only be operated in designated airspace, on routes or in accordance with procedures where performance-based navigation (PBN) specifications are established if the aircraft are technically capable of such operations and the flight crew members each hold a PBN endorsement to the Instrument Rating.

Specific approval is required to conduct RNP AR Approach operations. BAVirtual aircraft are authorised for the following PBN Operations:

<table>
<tr><th>PBN Navigation Specification</th><th>Airbus Single Aisle</th><th>A380</th><th>A350</th><th>B777</th><th>B787</th><th>E190</th></tr>
<tr><td>RNAV/RNP-10</td><td>Yes</td><td rowspan="8">Yes</td><td rowspan="8">Yes</td><td rowspan="8">Yes</td><td rowspan="8">Yes</td><td rowspan="2">Yes</td></tr>
<tr><td>RNAV-5</td><td>Yes</td></tr>
<tr><td>RNP 4</td><td>No</td><td rowspan="2">No</td></tr>
<tr><td>RNP 2</td><td rowspan="5">Yes</td></tr>
<tr><td>RNAV 1 (P-RNAV)</td><td rowspan="4">Yes</td></tr>
<tr><td>RNP 1</td></tr>
<tr><td>RF LEGS (Note 2)</td></tr>
<tr><td>RNP APCH (LNAV/VNAV)</td></tr>
<tr><td>RNP APCH LPV/LP</td><td colspan="2">Not approved</td><td>Yes</td><td colspan="2">Not approved</td><td rowspan="3">Not approved</td></tr>
<tr><td>RNP AR APCH</td><td>Yes (Note 1)</td><td>Not approved</td><td>Yes</td><td>Not approved</td><td>Yes</td></tr>
<tr><td>GLS (Note 3)</td><td colspan="4">Not approved</td><td>Yes</td></tr>
</table>

Note 1: Only A320neo and A321neo aircraft with RNP AR certification as detailed in FCOM-PRO-LIM Auto Flight System-Flight Management Function can execute an RNP AR Approach.

Note 2: Except when a fleet is authorised to conduct RNP AR operations, RF legs may only be flown on SIDs and STARs, the initial and intermediate segments of an instrument approach, RNAV Visual, Visual with Prescribed Track and Circling with Prescribed Track operations (when coded in the FMS) and the final segment of a missed approach (that segment when 50 m [164 ft] obstacle clearance can be achieved and maintained).

Note 3: GLS approaches are only permitted to CAT I minima, followed by manual landing.

4.3.7.1 Identification of Approved PBN Approach Procedures

In 2015 ICAO published Circular 336, which is a new protocol for the naming of RNAV final approach procedures. In accordance with the general move away from the older term 'RNAV' to the newer concept of Performance Based Navigation, a final approach designed to be flown using RNAV techniques will be referred to as an RNP approach. However, there remains doubt about global implementation of the Circular and therefore it is likely that pilots will encounter a variety of terms for RNP approaches.

Common terms which may be used to label an approved RNP approach are:

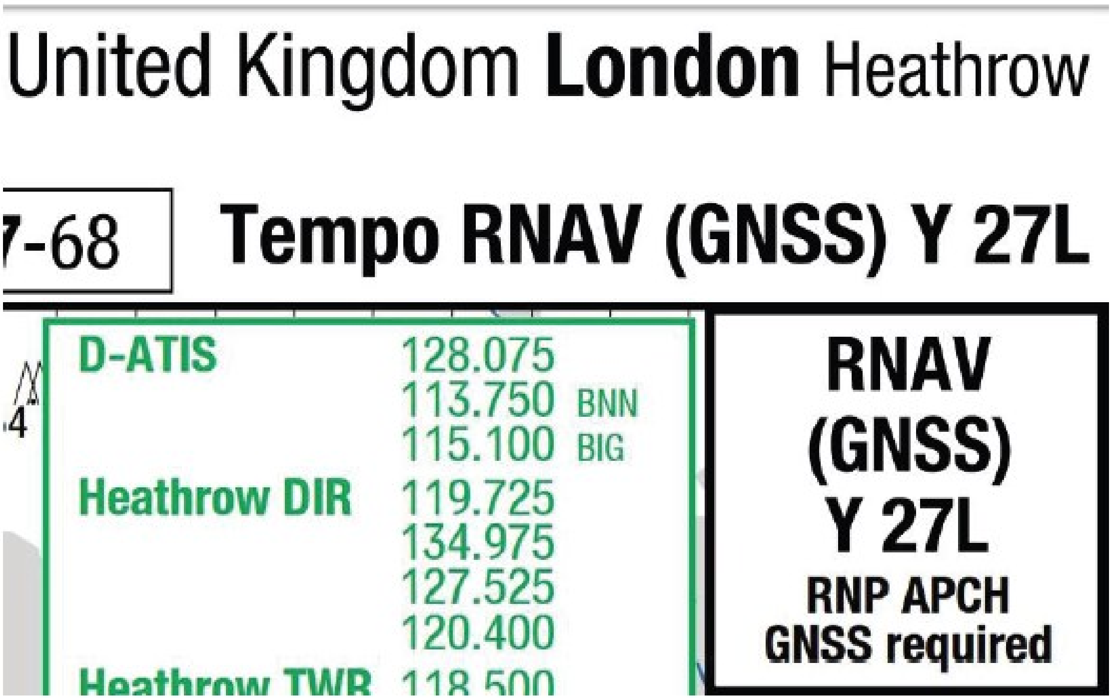
- RNAV (GNSS)
- RNAV (GPS)
- RNP
- GLS (approved fleets only)

Approved minima for RNP approaches may be titled RNAV GNSS, RNAV GPS or RNP followed by:

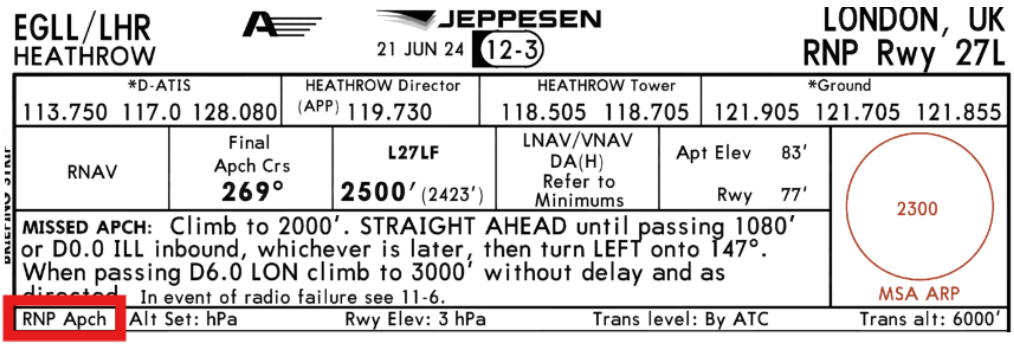
- LNAV, or
- LNAV/VNAV, or
- VNAV, or
- LPV*, or
- LP*

(*Approved fleets only)

In each case, the title of the navigation specification box in the top-right corner of LIDO IACs should contain the designation RNP APCH, for example:



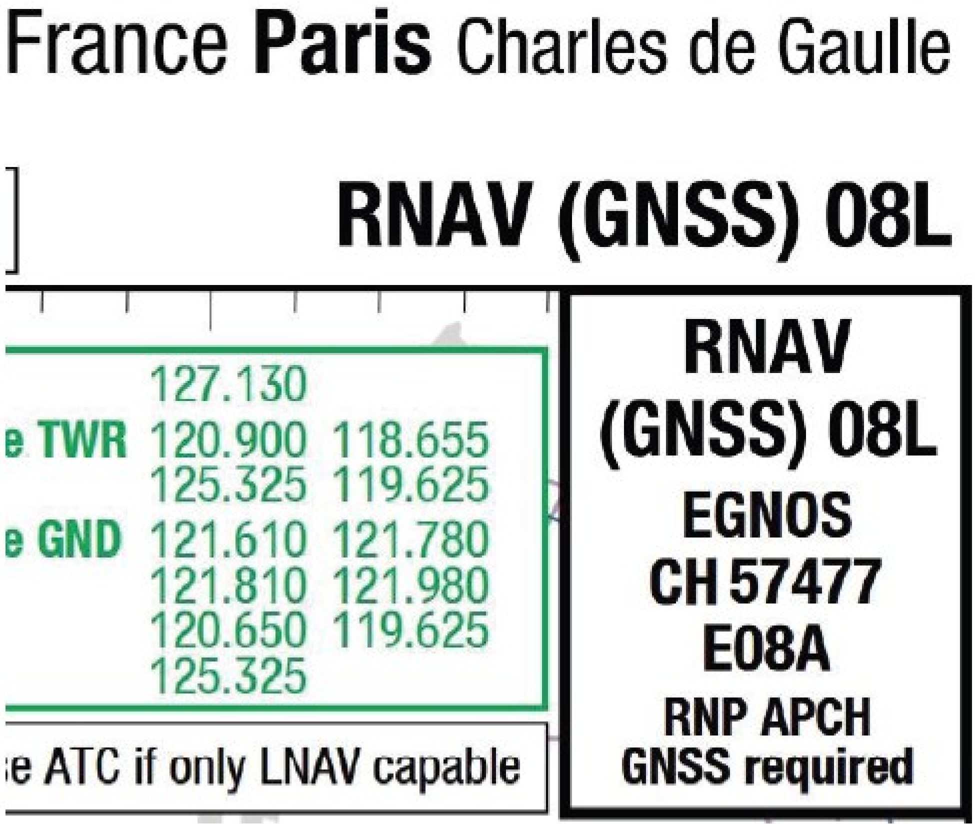
Jeppesen (Navigraph) charts have this information in the Briefing Strip:



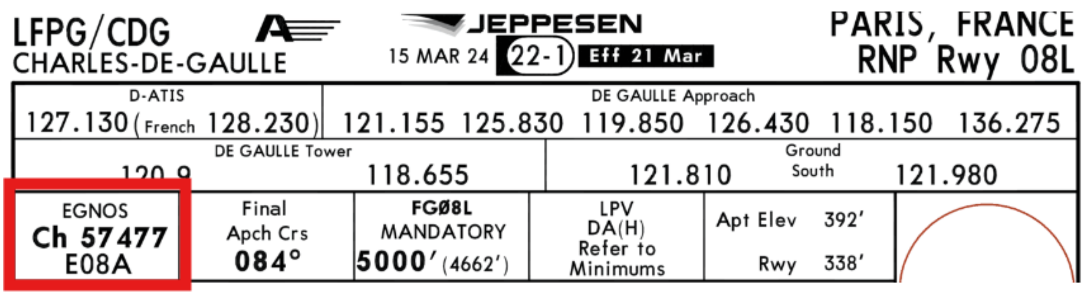
4.3.7.2 Identification of PBN Approach procedures using SBAS

Some RNP approaches (especially in the USA and France) have both conventional minima and minima predicated on the use of Satellite-Based Augmentation of the accuracy of the GPS.

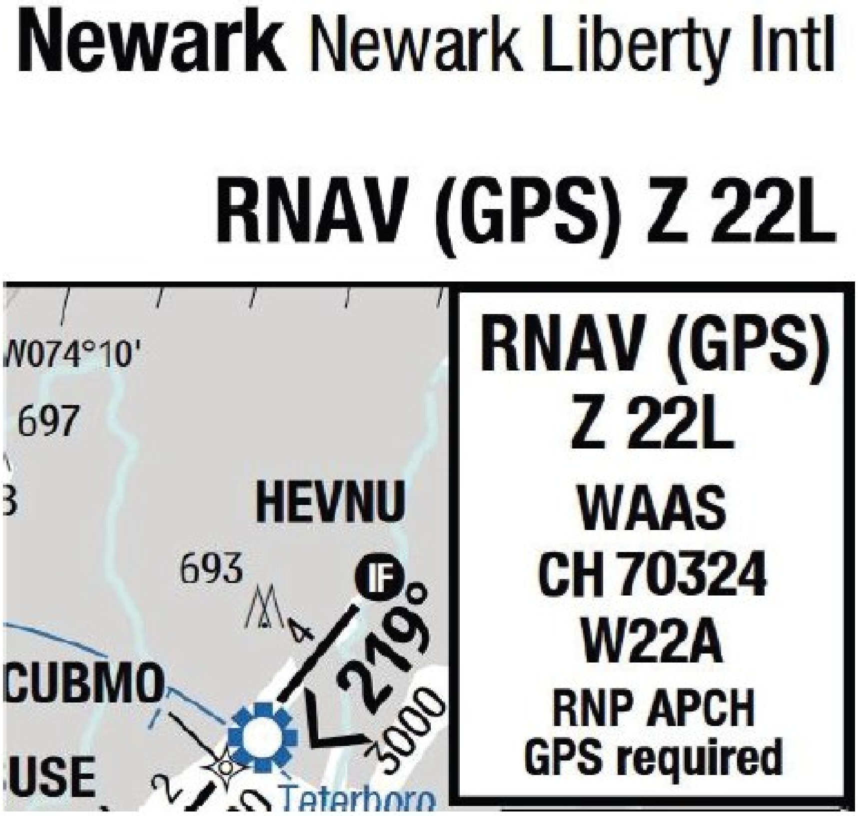
The Navigation Specification box on the relevant LIDO IAC will contain information about the SBAS constellation which is used to support LPV or LP minima. For example:



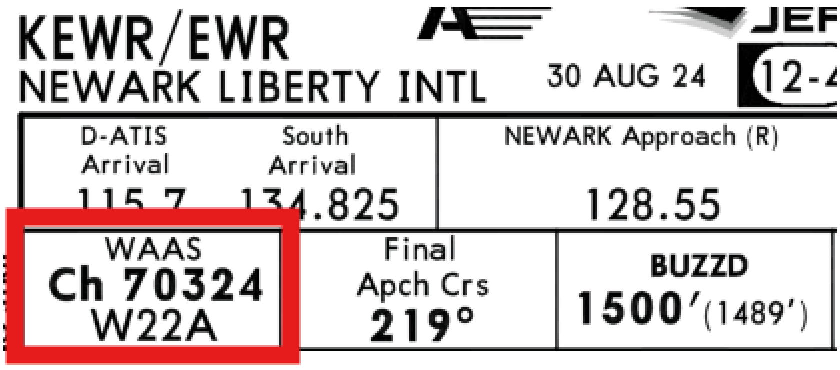
Again, the equivalent information on Navigraph charts is found in the Briefing Strip:



The above examples relate to the European Geostationary Navigation Overlay Service; the USA's Wide Area Augmentation System is shown similarly:



(LIDO)



(Navigraph/Jeppesen)

Approaches with LPV (or LP) minima will generally also have LNAV and/or VNAV minima. The SBAS information applies only to LPV/LP minima and does not affect the ability to fly to LNAV or VNAV minima. Considering the approach to EWR 22L, the minima box shows:

22L TERPS		RNAV GPS LPV	RNAV GPS VNAV 1)	RNAV GPS VNAV APL U/S 1)	RNAV GPS LNAV		Circling 2) New TERPS
C	ft - ft/SM ft	200 - 2400R/0.5V **220**	420 - 5000R/1.0V **430**	420 - 1.38V **430**	530 - 5500R/1.0V **540**		890 - 2.75V **900**
D	ft - ft/SM ft	200 - 2400R/0.5V **220**	420 - 5000R/1.0V **430**	420 - 1.38V **430**	530 - 5500R/1.0V **540**		890 - 3.0V **900**

1) Uncompensated BARO VNAV NA below -13°C (9°F) or above 54°C (130°F)
2) To RWY 29 HJ only

(LIDO)

TERPS	STRAIGHT-IN LANDING RWY 22L							CIRCLE-TO-LAND	
	LPV DA(H) 211′(200′)			LNAV/VNAV DA(H) 462′(451′)		LNAV MDA(H) 560′(549′)		C Not Authorized South of Rwy 11/29	
		TDZ/CL out	ALS out		ALS out		ALS out	Max Kts	MDA(H)
C	RVR 18 or 1/2	1 RVR 24 or 1/2	RVR 40 or 3/4	RVR 45 or 7/8	1 3/8	RVR 60 or 1 1/4	1 3/4	140	900′ (883′) -2 3/4
D								165	900′ (883′) -3

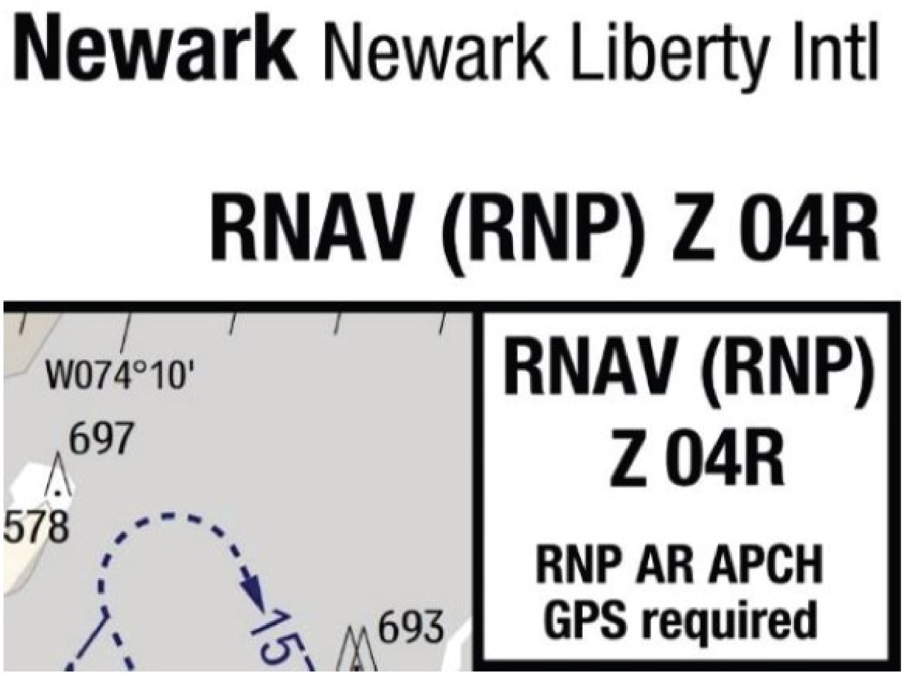
1 RVR 18 with Flight Director or Autopilot or HUD to DA.

(Navigraph/Jeppesen)

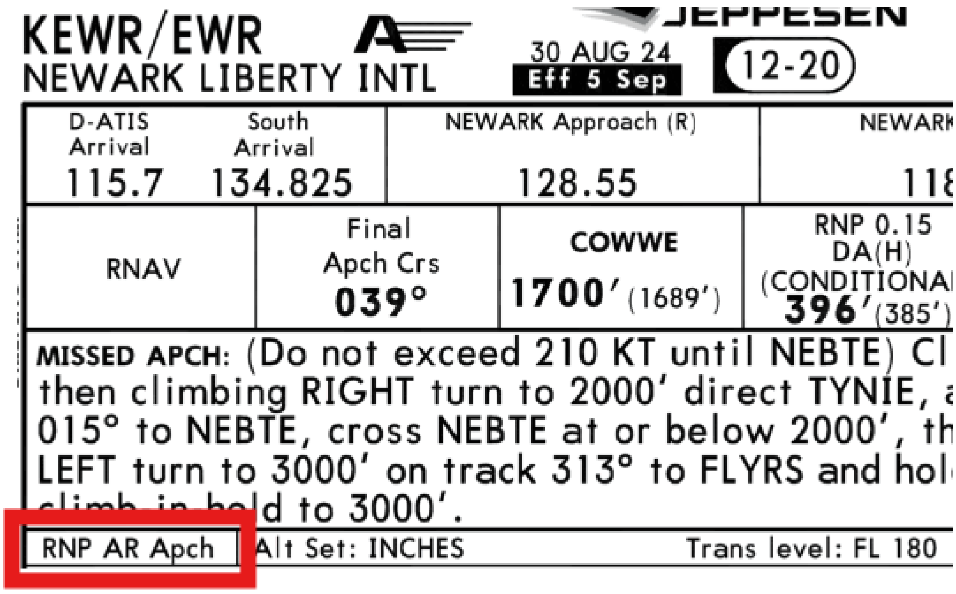
Of those, the LPV minima may only be used by specifically-authorised fleets; VNAV and LNAV minima may be used as normal.

4.3.7.3 Identification of RNP (AR) Approaches

RNP (AR) approaches may be identified in two ways. Firstly, an approach chart for an RNP (AR) approach may have the letters AR or RNP in brackets at the end of the relevant chart name, in IAC section of the charts list. Seocndly, the chart itself will either contain a note saying ‘authorisation required’ or will be labelled ‘RNP AR APCH’ in the navigation specification box at the top right of LIDO IACs, or in the Briefing Strip for Jeppesen/Navigraph IACs. For example:



(LIDO)



(Jeppesen/Navigraph)

RNP (AR) Approaches are only authorised for use in accordance with the table above.

4.3.7.4 Identification of Approved Procedures using RF Legs

The authorisation to fly procedures using RF legs is mainly designed to be of benefit when flying SIDs and STARs, as well as RNAV Visual, Visual with Prescribed Track and Circling with Prescribed Track operations. See below for related operating procedures. Examples of approved procedures which use RF legs are (as of January 2025) certain SIDs from 25L/R at Hong Kong and the VEBIT 2K SID from Runway 34 at Zurich. In each case the relevant chart will contain a note which states 'RF Required'. Crew should be aware than an RNP Approach procedure which requires the use of RF legs is very likely to be an RNP (AR) approach; such approaches are only authorised for use in accordance with the table above.

4.3.7.5 Performance Based Navigation – General

There are two types of navigation specification: Area Navigation (RNAV) and Required Navigation Performance (RNP). The specifications are similar, but the key difference is that a specification which includes a requirement to have an on-board performance monitoring and alerting system is referred to as an RNP specification, whereas RNAV specifications do not have such requirements. The performance monitoring and alerting system monitors system performance and alerts the flight crew when the RNP parameters are not met, or cannot be guaranteed with a sufficient level of integrity.

RNAV and RNP functioning is expressed by the Total System Error (TSE). This is the deviation of the aircraft's true position from the nominal or desired position, measured in nautical miles. The TSE should remain equal or less than the required accuracy expected to be achieved at least 95% of the flight time by the population of aircraft operating within the airspace, route or procedure.

4.3.7.6 RNP Capability

In order to achieve a given RNP value, the FMS-estimated position accuracy (also called Estimated Position Error) must be smaller, i.e. more accurate, than the RNP value.

Obviously this is dependent on the navigation sensor or sensors feeding positional information to the FMS (GPS, DME/DME, VOR/DME or IRS).

On the FMS CDU/MCDU, the required and estimated position accuracy are displayed. The required accuracy can be a default value, which is either a function of the flight phase or a value taken from the navigation database associated with a loaded procedure, or a value entered manually by the flight crew.

4.3.7.7 Definitions

Accuracy
In the context of PBN operations, the degree of conformance between the estimated, measured or desired position and/or the velocity of a platform at a given time, and its true position or velocity. Navigation performance accuracy is usually presented as a statistical measure of system error and is specified as predictable, repeatable and relative.

Aircraft-Based Augmentation System (ABAS)
A system that augments and/or integrates the information obtained from the other GNSS elements with information available on board the aircraft. The most common form of ABAS is Receiver Autonomous Integrity Monitoring (RAIM).

ANP
Actual Navigational Performance

Area Navigation (RNAV)
A method of navigating which allows operation on any desired flight path using self-contained or ground based aids, or a combination thereof. Also refers to terminology used to define minima for final approaches flown without reference to ground-based navaids.

Availability
In the context of PBN operations, an indication of the ability of the system to provide usable service within the specified coverage area and is defined as the portion of time during which the system is to be used for navigation during which reliable navigation information is presented to the crew, autopilot or other system managing the flight of the aircraft.

Coding
The information contained within the FMS which determines flight path and trajectory control in the Final Approach.

Instrument Approach Operation
An approach and landing using instruments for navigation guidance based on an instrument approach procedure. There are two methods for executing instrument approach operations:

- A two-dimensional (2D) instrument approach operation, using lateral navigation guidance only
- A three-dimensional (3D) instrument approach operation, using both lateral and vertical navigation guidance

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

- A ground-based radio navigation aid; or

- Computer-generated navigation data from ground-based, space-based, self-contained navigation aids or a combination of these.

Localiser Performance (LP) and Localiser Performance with Vertical Guidance (LPV)
Minima available when an RNP APCH procedure is flown using guidance augmented by SBAS.

Overlay
An approach which is defined conventionally using ground-based navaids but flown using LNAV. BA aircraft may fly overlay approaches as detailed in fleet-specific manuals.

Performance-Based Navigation (PBN)
Performance Based Navigation. The general concept of ensuring with >95% certainty that a navigation system is capable of accuracy within a specified value.

Receiver Autonomous Integrity Monitoring (RAIM)
A technique whereby a GNSS receiver/processor determines the integrity of the GNSS navigation signals. RAIM detects faults with the redundant GNSS-range measurements. That is, when more satellites are available than needed to produce a position fix, the exta range measurements should all be consistent with the computed position. A range measurement which differs significantly from the expected value (an outlier) may indicate a fault with the associated satellite or another signal integrity problem (e.g. ionospheric dispersion). Traditional RAIM uses fault detection only, but newer GNSS receivers incorporate fault detection and exclusion which enables them to continue to operate in the event of a GNSS failure.

BAVirtual approval for RNP AR APCH operations requires specific assessment of RAIM availability at every airfield where such approaches are authorised. For other PBN operations (e.g. RNP APCH, RNP 1, RNP 2 etc) flight crew may assume that RAIM prediction is satisfactory unless information is received to the contrary. RAIM prediction will be provided via the Brief or technical handout.

In the event that a RAIM outage of 5 minutes or more is predicted, crew may not fly any part of an approach procedure (RNP APCH or RNP AR APCH) – from the Initial Approach Fix to the end of the Missed Approach - during that outage time.

RNP
Required Navigational Performance

RNP AR APCH
RNP Authorisation Required Approach. Such approaches require individual approval before crews may fly them. Each operator and each individual approach is specifically authorised. Such approaches may include low RNP flight segments (<0.3), use of curved (RF) legs, and managed track keeping accuracy during the go-around phase (e.g. TOGA to LNAV). Where BA have specific approval to fly a procedure this will be noted in the OM C or on the Planning Portal.

B-RNAV (RNAV 5)
A navigation specification used in the UK, Europe and Middle East. Applicable in the UK on all ATS routes and in certain European states above FL95. Requires aircraft navigational accuracy to within 5 nm. The minimum equipment required is an FMS capable of RNAV 5 specification. The ICAO Navigation Specification RNAV 5 is identical to B-RNAV.

P-RNAV (RNAV 1)

A European navigation specification for SIDs, STARs and runway transitions requiring a track keeping accuracy of at least 1 nm. DME/DME and IRS updating may be used if GNSS is not available. P-RNAV terminates at the FAF. The ICAO Navigation Specification RNAV 1 is identical to P-RNAV for aircraft with radio (DME) updating and an underlying IRS.

Radius to Fix Legs

A Radius to Fix (RF) procedure provides a means of coding a fixed-radius curved path in a PBN procedure. The RF leg is defined by radius, arc length and fix. RNP systems supporting this leg type provide the same ability to confirm to track-keeping accuracy during the turn as in straight-line segments. Bank angle limits for different aircraft types and winds aloft are taken into account in procedure design. An RF leg provides a predictable and repeatable ground track during a turn and prevents to dispersion of tracks experienced in other types of turn construction (owing to varying aircraft speeds, turn anticipation, bank, roll rate etc). Therefore, RF legs can be employed where a specified path must be flown during a turn.

BAVirtual aircraft authorised to fly RF legs may fly procedures which use them in the initial and intermediate segments of an instrument approach, RNAV Visual, Visual with Prescribed Track and Circling with Prescribed Track operations (when coded in the FMS), the final phase of the missed approach, SIDs and STARs. However, if an RF leg is used in the final approach segment of an instrument approach, or the initial or intermediate phases of a missed approach, the relevant procedure would be designated as RNP AR; only aircraft which are authorised to fly RNP AR approaches may use those procedures.

RNP 10

An Oceanic or remote area en-route RNAV specification which requires an accuracy of at least 10 nm without regular updates from ground-based navaids and which can support 50 nm track-spacing. Although RNAV 10 airspace is, for historical reasons, also called RNP 10 airspace, there is no requirement for on-board monitoring and alerting systems. RNP 10 approval is based upon IRS performance.

RNP 10 navigation is unlimited in time provided GPS updating is available to the FMS. Should GPS updating be unavailable, RNP 10 navigation is limited to 6.2 hours from the time the FMS is placed in the 'Navigation' Mode unless the aircraft enters an area where radio updating is available. Should radio updating be discontinued, the aircraft can continue RNP 10 operations for a maximum of 5.9 hours following loss of DME/DME radio updating, or a maximum of 5.7 hours following the loss of VOR/DME updating.

For aircraft to operate in RNP 10 airspace a minimum of two independent long-range navigation systems based on GPS and/or IRS sensor information are required to be fitted.

RNP 4

nmRNP4 is an en-route airspace specification which does not require any ground-based navaid infrastructure. For RNP 4 operations in oceanic or remote airspace, at least two fully-serviceable independent long-range navigation systems (LRNSs) must be fitted to the aircraft, with integrity such that the navigation system does not provide misleading information. GNSS must be used, and can be used either as a standalone navigation system or as one of the sensors in a multi-sensor system. During operations in airspace or on routes designated as RNP 4, the lateral total system error must be within ±4 nm for at least 95% of the total flight time. Unlike the case of RNP 10 (where no ATS surveillance service is required), in the case of RNP 4, ADS contract (ADS-C or CPDLC) is used.

For RNP 4, at least two LRNSs capable of navigating to RNP 4 and listed in the FCOM or QRH Operational Information section, should be operational at the point of entry of the RNP 4 airspace. If an item of equipment required for RNP 4 operations is unserviceable, the flight crew may consider an alternative route or diversion. For multi-sensor systems, the FCOM may permit entry if one GNSS sensor is lost after departure, provided one GNSS and one inertial sensor remain available.

RNP 1
RNP 1 is a terminal airspace specification which may also be applied in the en-route phase. RNP 1 generally requires GNSS as the primary navigation sensor unless DME/DME is authorised by the state. It is designed to connect en-route airspace structure to instrument approaches (STARs and runway transitions) and for departures (SIDs). As in the case of P-RNAV, RNP 1 terminates at the FAF. During operations in airspace or on routes designated as RNP 1, the lateral total system error must be within ±1 nm for at least 95% of the total flight time.

RNP 2
RNP 2 is primarily intended for a diverse set of en-route applications, particularly in geographic areas with little or no ground navaid infrastructure, limited or no ATS surveillance and low to medium density traffic. Use of RNP 2 in continental applications requires a lower continuity requirement than used in oceanic/remote applications. Duuring operations in airspace or on routes designated as RNP 2, the lateral total system error must be within ±2 nm for at least 95% of the total flight time.

RNP APCH
The ICAO term to describe RNAV (GNSS) approaches. The charting and avionics will retain the existing labels as a legacy to existing operations. However, the approach operations conform to RNP principles. Refers to any approach which relies solely on RNAV guidance. Such approaches require approval of the operator and crew training. The default RNP value for an RNP APCH is 0.3 nm.

RNP AR APCH
RNP Authorisation Required Approach. Such approaches require individual approval before crews may fly them. Each operator and each individual approach is specifically authorised. Such approach procedures may include low RNP flight segments (<0.3 nm), use of curved path transitions (RF) and managed track keeping accuracy during the go-around phase, e.g. TOGA to LNAV/NAV. Specific approval will be promulgated for each approach.

Vertical Navigation
A method of navigation which permits aircraft operation on a vertical flight path using altimetry sources, external flight path references or a combination of these.

Vertical Navigation (VNAV) Guidance System

A VNAV guidance system uses the aircraft's FMS to compute and display a vertically-guided path. That vertical path is neither computed by nor broadcast from ground-based navigation aids (as is the case with ILS). The altitude input to the system comes from either the aircraft's barometric altimeter (in which case it the system is referred to as Baro-VNAV) or GPS Geometric Altitude, for those aircraft fitted with SBAS receivers or GLS. The type of approach being flown will determine which altimetery source is used: plain RNAV/RNP approaches always use barometric altimetry, whereas approaches flown to LPV or LP minima (when authorised), and GLS approaches, use GPS Geometric Altitude. The altimetry source is automatically selected by the aeroplane depending on the type of approach being flown.

Some Baro-VNAV systems are able to make automatic compensation for temperature differences from ISA (e.g. Airbus FLS) and therefore any temperature limitations published on instrument approach charts for RNAV/RNP approaches do not apply. Other Baro-VNAV systems are unable to compensate for temperature variation (e.g. VNAV, FINAL APP, APP-DES) and therefore any published temperature limitations shown on instrument approach charts must be adhered to.

Within the text of OM A, the generic term “VNAV” is used to refer to the angular vertical guidance generated by an aircraft’s FMS and used to fly the vertical path of an RNAV or RNP approach (including approaches flown to LPV/LP minima, and GLS). The various modes and terminology are described in type-specific FCOMs.

Note: Use of AFDS vertical speed or flight path angle modes do not constitute VNAV guidance.

4.3.7.8 Flight Crew Procedures

4.3.7.8.1 Integrity of the Database

For RNAV 1, RNAV 2, RNP 1, RNP 2 and RNP APCH, the flight crew should neither insert nor modify waypoints by manual entry into a procedure (departure, arrival or approach) which has been retrieved from the database except as defined in 4.3.7.8.3 below. User-defined data for altitude/speed constraints may be inserted where those constraints are not included in the navigation database coding.

For RNP 4 operations, the flight crew should not modify waypoints which have been retrieved from the database. User-defined data (e.g. for un-named waypoints) may be entered and used.

The lateral and vertical definition of the flight path between the FAF and the Missed Approach Point (MAPt) retrieved from the database should not be modified by the crew.

4.3.7.8.2 Modification of Flight Plan – RNP AR Approaches

Flight crew are not authorised to fly a published RNP AR APCH procedure unless it is retrievable by the procedure name from the aircraft navigation database and it conforms to the charted procedure. The lateral path should not be modified; with the exception of accepting a clearance to go direct to a fix in the approach procedure which is before the FAF and does not immediately precede an RF leg. The only other acceptable modification to the loaded procedure is to change altitude and/or airspeed waypoint constraints on the initial, intermediate or missed approach segments flight plan fixes (e.g. to apply temperature corrections or comply with an ATC clearance/instruction).

4.3.7.8.3 Modification of Waypoint Constraints

Vertical and speed constraints may be modified either for the purposes of profile and energy management (e.g. to ‘harden up’ an ‘at or above’ constraint in a STAR to become an ‘at’ constraint) or in accordance with ATC instructions. Lateral path changes (e.g. a DIR TO) must be in accordance with ATC instructions. The insertion of new waypoints into a procedure, or the creation of a procedure using manual waypoint entry, is not permitted.

Consequently, if there is an ‘at or above’ altitude restriction before the FAF, it may be changed to an ‘at’ restriction using the same altitude. Speed modifications are permitted provided the maximum published speed is not exceeded. However, NO changes are permitted between the Final Approach Fix of any kind of RNP approach and the Missed Approach Point (inclusive).

4.3.7.8.4 Integrity of Database - RNAV and RNP SIDs

During pre-flight preparation:

- Confirm the waypoint sequence
- Ascertain which waypoints are FLY BY or OVERFLY and verify the ND track passes through any OVERFLY waypoints

When using an RNAV procedure in the TMA, the creation of new waypoints by manual entry in to the RNAV system by the flight crew is **not permitted.**

Use of DIR TO **is** permitted. However, when using DIR TO an OVERFLY waypoint the waypoint may change to a FLY BY waypoint. On certain procedures this may reduce terrain clearance or cause infringement of noise-sensitive areas.

4.3.7.8.5 Integrity of Database – RNAV and RNP STARs and Transitions

- Review the STAR and Transition loaded in to the FMS and crosscheck against the approach plate and ND

The coding of the vertical profile is designed, wherever possible, to achieve a continuous descent on a 3 degree gradient. However, the FMS descent profile must conform to the vertical constraints of the procedure.

4.3.7.8.6 Displays and Automation

For RNAV 1, RNP 1 and RNP APCH operations, the flight crew should use a lateral deviation indicator, where available, and flight director and/or autopilot in lateral navigation mode.

The appropriate display should be selected so that the following information can be monitored:

- The computed desired path
- Aircraft position relative to the lateral path (cross-track deviation) for FTE monitoring
- Aircraft position relative to the vertical path (for a 3D operation)

The flight crew of an aircraft with a lateral deviation indicator (e.g. CDI) should ensure that the lateral deviation indicator scaling is suitable for the navigation accuracy associated with the various segments of the procedure.

The flight crew should maintain procedure centrelines unless authorised to deviate by Air Traffic Control (ATC) or unless emergency conditions dictate.

Cross-track error/deviation should normally be limited to ±½ the RNAV/RNP value associated with the procedure. Brief deviations from this standard (e.g. overshoots or undershoots during and immediately after turns) up to a maximum of 1 x the RNAV/RNP value are allowable.

In the event of sustained cross-track error greater than ±½ the RNAV/RNP value associated with a procedure, and at any time if the cross-track error is greater than the procedure's RNAV/RNP value, the flight crew should discontinue the procedure; if flying an RNP APCH/RNP AR APCH, flight crew should execute a missed approach if the lateral deviation exceeds these criteria, unless the visual references required to continue the approach are in sight.

For a 3D approach operation, the flight crew should use a vertical deviation indicator and, where required by AFM limitations, a flight director or autopilot in vertical navigation mode.

Deviations below the vertical path should not exceed 75 ft at any time, or half-scale deflection where angular deviation is indicated, and not more than 75 ft above the vertical profile, or half-scale deflection where angular deviation is indicated, at or below 1,000 ft above aerodrome level. The flight crew should execute a missed approach if the vertical deviation exceeds this criterion unless the visual references required to continue the approach are in sight.

4.3.7.8.7 Operating Procedure for using RF Legs

i. Crew should refer to the type-specific information in the relevant fleet's FCOM/FCTM

ii. Procedures with RF legs will be identified on the relevant charts
iii. The aircraft must be established on the procedure prior to beginning the RF leg – it is not permissible to perform a DIRECT TO the beginning of the RF leg
iv. The crew are expected to maintain the centreline of the desired path on RF legs. For normal operations, the cross-track error/deviation should be limited to half the navigation accuracy associated with the procedure (e.g. 0.5 nm for RNP 1)
v. If an aircraft system failure results in the loss of capability to follow an RF turn, the PF should maintain the current bank angle and roll out on the charted RF exit course. The crew should advise ATC of the system failure as soon as possible
vi. When initiating a missed approach operation during or shortly after the RF leg, the crew should be aware of the importance of maintaining the published path as closely as possible
vii. The crew must not exceed the maximum airspeed values shown in the table below throughout the RF leg. A missed approach operation prior to DA/H may require compliance with speed limitation for that segment.

Indicated Airspeed (Knots)					
Segment	**Indicated Airspeed by Aircraft Category**				
	Cat A	**Cat B**	**Cat C**	**Cat D**	**Cat E**
Initial and Intermediate (IAF to FAF)	150	180	240	250	250
Final (FAF to DA)	100	130	160	185	As specified
Missed approach (DA/H to Missed Approach Holding Procedure)	110	150	240	265	As specified
Airspeed restriction*	As specified				

*Airspeed restrictions may be used to reduce turn radius regardless of aircraft category

4.3.7.8.8 Operating Procedure for RNP AR Approaches

Prior to conducting an RNP AR approach, the Commander must satisfy themselves that the following requirements have been met:

i. Both pilots are qualified to conduct RNP AR operations
ii. The RNP AR approach has been authorised for BAV operations. Refer to the RNP AR authorisation table published in the BAV Forum. Crew should check the desired runway is specifically approved in the RNP AR table. If an RNP AR approval is not present in the BAV Forum, RNP AR approaches are not approved for that airfield.
iii. Any procedure-specific training requirements for an individual RNP AR approach have been completed by both pilots.

In addition to the general requirements for RNP APC – Alerting and Abort (see below), the following operating requirements and procedures must be adhered to prior to and during an RNP AR Approach:

iv. EGPWS/TAWS must be serviceable prior to commencing the approach
v. The Navigation Database must be current
vi. If GPS RFI effects are present, an RNP AR approach should not be conducted. Crews should refer to fleet-specific guidance for further information.

4.3.7.8.9 RNAV (Visual) Procedures

This policy applies to procedures which are titled:

- RNAV (Visual)
- Visual with Prescribed Tracks
- XXX *(Procedure Name)* with Prescribed Tracks (e.g. JFK VOR 13L Good Weather)

In order to aid flight crew to conduct approach operations to airfields which may have challenging terrain or other operational constraints, Flight Operations has started to commission a number of purpose-designed procedures which code visual approaches, or the visual segment of circling approaches, as 'RNAV' (strictly PBN) procedures. Some examples of these include the RNAV Visual to Runway 09 at Gibraltar, or the RNAV Visual to Runway 29 at Dubrovnik, both of which are based upon the corresponding RNP (AR) procedures. Since these are custom procedures not all are available in the Navigraph database which is comprised only of publicly available procedures. Where such a procedure is based upon an existing public RNP approach the corresponding public procedure from the Navigraph database can be used.

Regardless of whether an official RNAV Visual approach which is publicly available is being flown, or whether a public RNP AR approach from Navigraph is being used in lieu of a corresponding visual procedure used by BA, important points to note are:

- On true RNAV Visual charts the visual part of the procedure should be depicted with a series of arrows instead of solid lines
- The visual segment will be coded from a specific point, which may or may not be the missed approach point of the preceding instrument approach, to the runway; therefore a guided missed approach may not be available
- Although the procedure will be <u>coded</u> (and, given the constraints of Navigraph, possibly <u>titled)</u> as an RNP approach within the FMS (and flight crew will be expected to use fleet-specific PBN procedures to fly such approaches), it is a <u>visual approach</u>; therefore terrain-clearance is assured by flying the procedure in VMC
- The visual part of the procedure may contain RF legs: this does not breach policy concerning RNP AR approaches because the procedure is a <u>visual approach</u> (as opposed to an instrument approach) and will be <u>flown in VMC</u>.
- Any specific training or recency requirements will be included in the relevant aerodrome briefing in OM C
- Weather minima for conducting such approaches are as detailed in Visual Flight Manoeuvres

4.3.7.8.10 LNAV or VNAV Minima

If both LNAV and VNAV minima are available for an RNP APCH, flight crew should use fleet-specific procedures and fly to the lower minima.

Note: If flying to VNAV minima, VNAV must be used – it is not permissible to use VNAV minima whilst controlling the vertical path using V/S or Flight Path Angle.

In adopting this philosophy, flight crew should be aware that an approach with VNAV minima is designed as an Approach with Vertical Guidance, with a DA; whereas an approach with LNAV minima is designed as a Non-Precision Approach with an MDA.

However, both can be flown as 3D approach operations. Moreover, BAVirtual's policy is to treat an MDA as a DA (see 4.1.3.2.1 above); therefore providing normal procedures are used – specifically that a go around is executed promptly at DA so as to minimise height-loss during the manoeuvre – there is no degradation of safety.

4.3.7.8.11 Temperature Corrections on PBN Procedures

All (RNAV/RNP) procedures: Vertical revisions to the active FMS route in order to correct for temperature MUST NOT be made. Where a temperature limitation (i.e. a minimum and/or maximum temperature) is published, this refers to the surface temperature at the airfield.

Note: P-RNAV SIDs are not subject to temperature limitations.

Where temperature limitations are published on RNAV (RNP) Approach charts they must be observed; if no minimum temperature is published crew should assume a minimum of ISA -25°C. Overlay Approaches, or RNAV approaches designed only with LNAV minima, do not have a minimum temperature published on the approach chart; however a generic minimum of ISA -25°C should be applied if VNAV is to be used. Below this temperature, revert to lateral-only guidance and use of FPA or V/S.

Note: There is no prohibition on the use of LNAV/NAV to fly the lateral portion of an RNAV approach whatever the temperature.

Some aircraft types have the ability to compensate for temperature-differences from ISA automatically when flying RNAV/RNP approaches (e.g. the FLS function on the A320neo, A350 and A380). When an RNAV/RNP approach is flown using the equipment and procedures which compensate for temperatures below ISA, the minimum temperature published on the relevant instrument approach chart is not applicable, and VNAV minima can be used. Likewise, LPV and LP minima can be used at any temperature. See fleet-specific FCOMs for fleet-specific procedures.

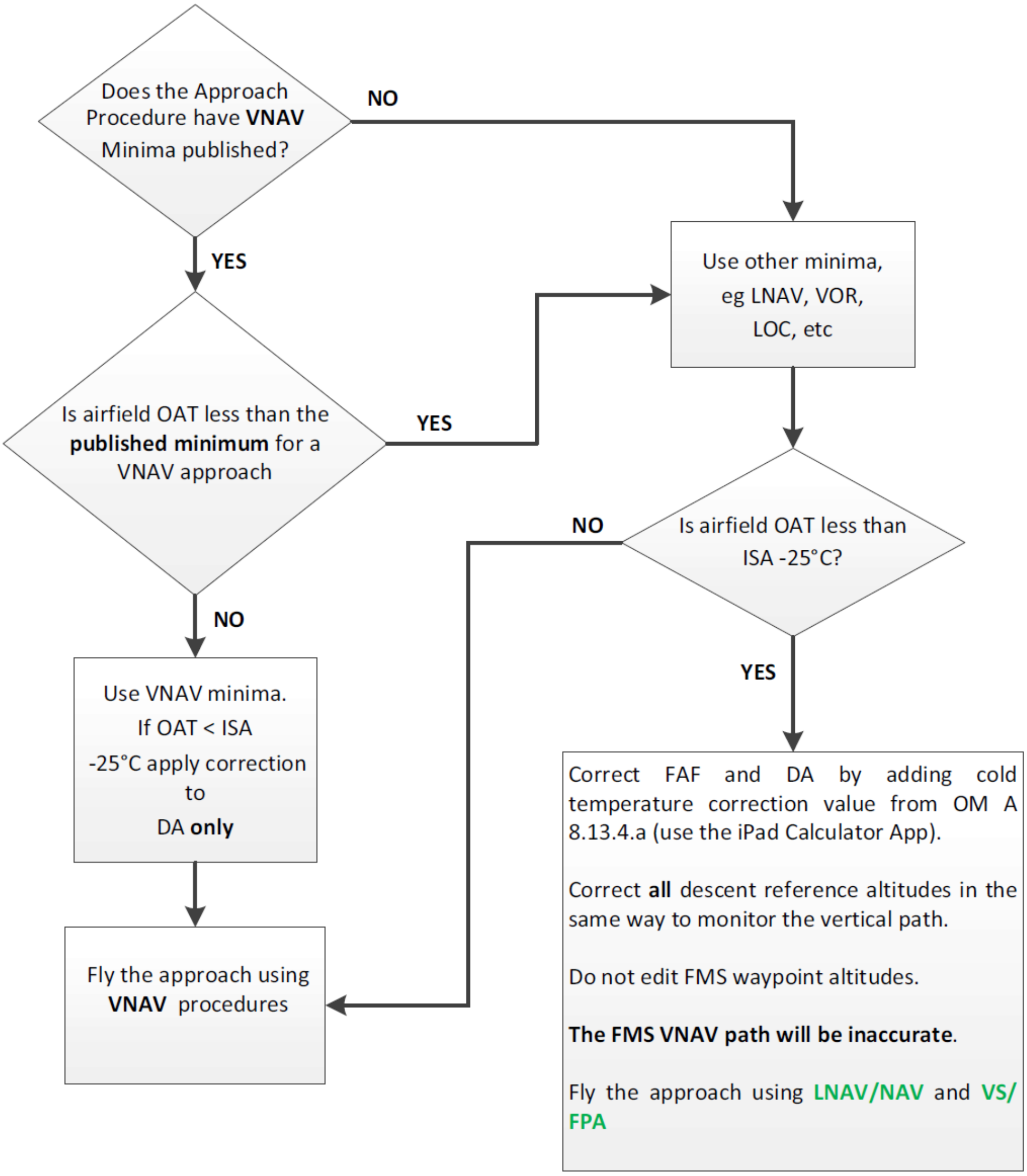
The automatic temperature-compensation systems fitted to BAVirtual aircraft only correct for temperature devisations below ISA, so as to minimise the risk of CFIT. They do not correct for temperatures above ISA. Therefore, any maximum temperature limitations published on PBN approach charts must be observed.

Some airfields publish a minimum temperature associated with VNAV minima which is above ISA -25°C; for example, the RNP APCH procedures at DXB all assume a minimum temperature for VNAV of 5 degrees Celsius (ISA -10°C). If that is the case, and the temperature at the airfield is less than the minimum on the chart, flight crew should revert to using LNAV minima for the approach.

However, given that LNAV minima are produced using conventional non-precision approach design criteria – with no minimum temperature assumed – flight crew may fly to the LNAV minima using fleet-specific VNAV procedures, until the temperature falls below ISA -25°C.

The rationale behind this policy is that use of a vertical-navigation mode to fly the final segment of an RNP APCH, or a conventional non-precision approach flown as a database/overlay approach (when no minimum temperature is stipulated) is acceptable without correction down to ISA -25°C.

The following flow chart explains the policy, if intending to use VNAV minima in cold conditions.



4.3.7.8.12 Contingency Procedures

Flight crew should make the necessary preparation to revert to a conventional arrival procedure where appropriate. The following conditions should be considered:

- Failure of the navigation system components including navigation sensors, and a failure affecting flight technical error (e.g. failures of the flight director or autopilot)
- Multiple system failures affecting aircraft performance
- Coasting on inertial sensors beyond a specified time limit, and
- RAIM (or equivalent) alert or loss of integrity function

In the event of loss of PBN capability, flight crew should invoke contingency procedures and navigate using an alternative means of navigation. Flight crew should notify ATC of any problem with PBN capability. In the event of communication failure, flight crew should continue with the operation in accordance with published lost communication procedures.

4.3.7.9 Take-off Position Update

If runway position update fails to take place and the aircraft position is significantly in error it may not be possible to fly a SID accurately.

- Manual intervention may be required
- Inform ATC when airborne
- Follow ATC instructions or continue on the SID using conventional navigation aids where possible

The RNAV procedure may be rejoined once radio updating or GPS coverage is re-established.

An RNP SID may not be commenced if there are any ECAM/EICAS warnings that navigation accuracy is downgraded (e.g. Unable RNP, GPS Primary Lost, NAV ACCY downgrade etc).

4.3.7.10 Altimeter Setting

For RNP APCH operations, the vertical path of the approach is calculated with reference to the aerodrome QNH. It is, therefore, imperative that the QNH is set before the final approach is commenced.

ATC may provide QNH when giving clearance below transition level, but not in all circumstances. For example, the prompt to change from STD pressure setting to QNH may occur when the aircraft passes a geographical position or other constraint represented on the approach plate, and not by ATC instruction. The QNH setting requirement should be included in the approach brief and crew must be aware of the risks of distraction. At the appropriate time, the PF will then initiate the change to QNH.

Refer to 4.3.3.7 above for further guidance on the altimeter setting procedures applicable in such circumstances.

The flight crew should complete an altimetry cross-check ensuring both pilots' altimeters agree within ±100 ft prior to the FAF but no earlier than when the altimeters are set for the aerodrome of intended landing. If the alimetry cross-check fails, the approach operation should not be continued.

Especially when conducting RNP APCH operations, the cross-check of altitude at the Final Approach Fix is particularly important to ensure that the correct vertical profile is being flown.

When flying the final approach using VNAV, there is no regulatory requirement to cross-check distance from the runway with altitude. The pre-approach check of the database coding, check of altitude at the Final Approach Fix, and adherence to the calculated vertical path will assure the approach profile is correct.

4.3.7.11 PBN Operations With Specified Minimum Navigation Performance

Before entering Scheduled Navigation Areas or before conducting P-RNAV or RNP operations, the crew must verify that the RNAV system equipment is serviceable. For non-GPS aircraft operating outside ground-based navaid coverage (e.g. MNPS Operations over the North Atlantic), the system is operational if there are no warnings apart from an anticipated 'IRS NAV ONLY' warning (fleet specific).

The RNAV STAR and RNAV transition provide a vertical and lateral flight profile terminating at a defined Final Approach Fix. At the FAF the aircraft may continue on an RNP APCH (if approved) or establish on a conventional approach procedure (e.g. ILS). Where an approach plate states that Dual RNAV systems are required, two independent FMS, an A/P or F/D and two sensors (either two GPS and/or two DME and/or two VOR) must be serviceable.

4.3.7.11.1 RNAV Substitution

RNAV Substitution is a navigation technique that allows procedures based on conventional navaids to be flown using a coded procedure from the FMS without reference to, or in the absence of, those navaids.

Provided that:

i. The aircraft is capable of at least RNAV 1 performance;
ii. The flight crew are qualified for PBN operations;
iii. The coded overlay procedure is selected from the FMS navigation database and flown in a managed lateral mode (e.g. LNAV or NAV modes);
iv. Normal procedures associated with PBN Operations are used (refer to 4.3.7.8 above)

Then the following operations are permitted by way of RNAV Substitution:

i. Navigation to/from a VOR or NDB;
ii. Holding over a VOR, NDB or DME fix;
iii. Flying a DME arc;
iv. Using a coded procedure selected from the FMS to fly a conventionally defined route or procedure (e.g. flying a SID/STAR, or the Initial, Intermediate or Missed Approach segments of an instrument approach procedure defined by a conventional navaid(s))

RNAV Substitution must not be used if shown as ‘Not Authorised’ on an instrument approach chart or prohibited by NOTAM.

It is not permitted to use RNAV Substitution for lateral navigation in the Final Approach Segment of an instrument approach procedure. For guidance on navigation within the Final Approach Segment, refer to fleet-specific FCOMs.

4.3.7.12 ATC Procedures

P-RNAV/RNP STARs and RNAV approaches may utilise specific phrases which identify the method of intercept, navigation, climb or descent to be used. Details will be published on relevant approach charts.

ATC must be advised of any deterioration or failure of navigation equipment below that required for entry into a scheduled navigation area or continued operation in such airspace.

4.3.7.12.1 Vectoring and Positioning

ATC tactical interventions in the terminal area may include radar headings, ‘direct to’ clearances which bypass the initial legs of an approach, interceptions of initial or intermediate segments of an approach or the insertion of additional waypoints loaded from the database. In complying with ATC instructions, flight crew should be aware of the implications for the navigation system.

'Direct to' clearances may be accepted to the Intermediate Fix (IF) provided that it is clear to the crew that the aircraft will be established on the final approach track at least 2 miles from the FAF.

'Direct to' clearance to FAF is not acceptable. Modifying the procedure to intercept the final approach course prior to the FAF is acceptable for radar vectored arrivals or at other times with ATC approval.

The final approach trajectory should be intercepted no later than the FAF in order for the aircraft to be correctly established on the final approach course before starting the descent (to ensure terrain and obstacle clearance).

'Direct to' clearances to a fix that immediately precede an RF leg are not permitted.

For parallel offset operations enroute (in RNP 4), transitions to and from the offset track should maintain and intercept angle of between 30 and 45° unless specified otherwise by ATC.

4.3.7.13 RNP APCH – Alerting and Abort

There is no requirement to cross-check the navigation system's performance with conventional Navaids as the absence of an integrity alert is considered sufficient to meet the integrity requirements. However, the flight crew should monitor the reasonableness of the navigation solution and report any loss of RNP capability to ATC.

An RNP APCH procedure should be discontinued:

i. If navigation system failure is annunciated (e.g. warning flag);
ii. If lateral or vertical (if provided) FTE exceeds the tolerances of the approach RNP; if, where applicable, VNAV trajectory is not consistent with aircraft altimetry system information or vertical speed information;
iii. If integrity failure is annunciated (e.g. RAIM alert);
iv. If integrity monitoring is lost (e.g. RAIM loss);

Unless the pilot has sufficient visual reference to continue the approach to a safe landing.

Where vertical guidance is lost while the aircraft is still above 1000 ft AGL, the flight crew may decide to continue the approach to LNAV minima, when supported by the navigation system.

The missed approach should be flown in accordance with the published procedure. Use of PBN navigation during the missed approach procedure is acceptable, provided:

i. The navigation system enabling PBN is operations (e.g. no loss of function, no RAIM alert, no failure indication etc.). Where the missed approach is triggered by the failure or failure of integrity of one sensor system, it does not preclude the use of a different sensor for the missed approach procedure.
ii. The whole procedure (including the missed approach) is loaded from the navigation database.

Where the approach requires specific RNP values to be met during the go-around a statement to this effect will be included on the approach plate. Such approaches usually require special authorisation. When G/A RNP is a requirement, LNAV/VNAV must be engaged at the earliest opportunity.

4.3.7.14 Navigational Errors

Whenever a significant RNAV/RNP navigational error occurs or would occur without crew intervention, other BAV members should be informed through a post on the Flight Operations forum detailing:

- The addon used
- The navigation database provider, cycle and version
- The erroneous procedure

Examples of errors include:

- Significant navigation errors attributed to incorrect data or a navigation coding error
- Unexpected deviations in lateral or vertical flight path not caused by pilot input or erroneous operation of equipment
- Significant misleading information without a failure warning
- Total loss or multiple navigation equipment failure
- Loss of integrity, e.g. RAIM function, when integrity was predicted to be available during pre-flight planning
- Problems with ground navigation facilities leading to significant navigation errors not associated with transitions from an inertial navigation mode to radio navigation mode.

4.3.7.15 Performance Based Operations – Background Information

4.3.7.15.1 Introduction

ICAO has published a PBN manual (Doc 9613) which defines the concept of PBN operations.

The PBN concept specifies that aircraft RNAV or RNP system performance requirements be defined in terms of accuracy, integrity, continuity and functionality required for the proposed operations in the context of a particular airspace concept, when supported by the appropriate Navaid infrastructure. The PBN concept represents a shift from sensor-based navigation to PBN. Performance requirements are identified in navigation specifications, which also identify the choice of navigation sensors and equipment that may be used to meet the performance requirements.

4.3.7.15.2 Benefits

PBN offers a number of advantages over the sensor-specific method of developing airspace and obstacle clearance criteria. For instance, PBN:

i. Reduces the need to maintain sensor-specific routes and procedures and their associated costs. For instance, moving a single VOR ground facility an impact dozens of procedures as VOR can be used on routes, VOR approaches, missed approaches etc. Adding new sensor-specific procedures will compound this cost and the rapid growth in available navigation systems would soon make sensor-specific routes and procedures unaffordable;

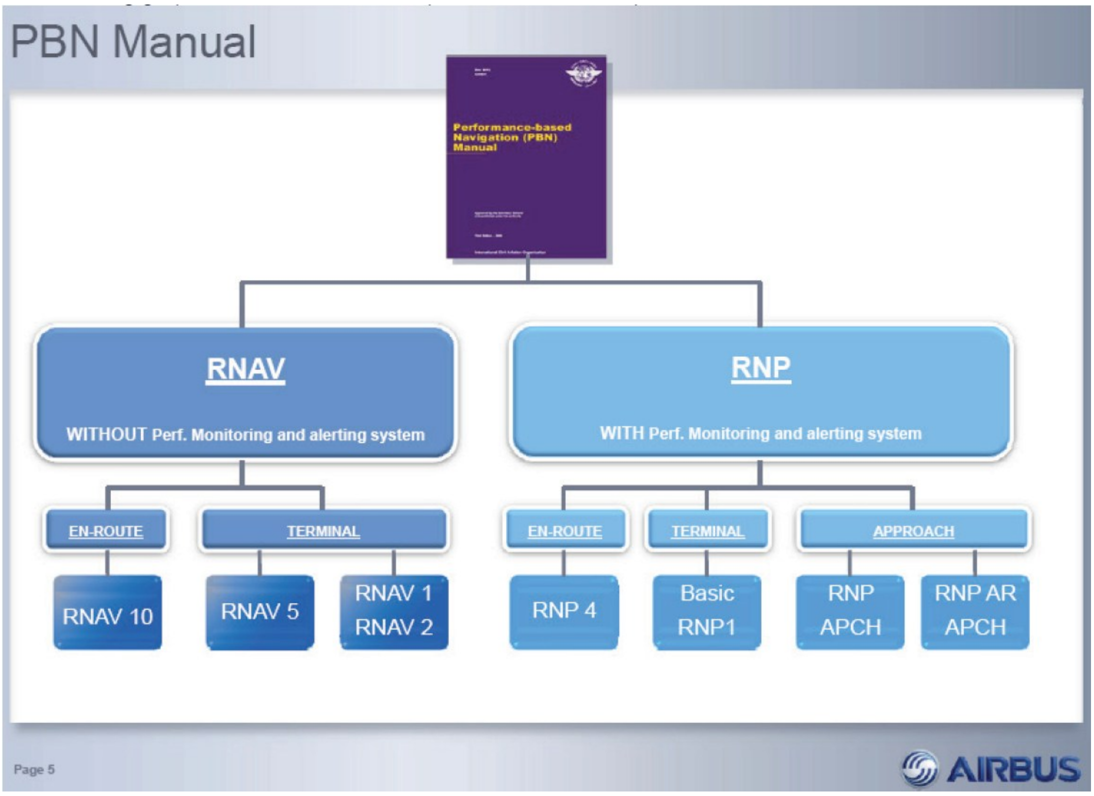
ii. Avoids the need for development of sensor-specific operations with each new evolution of navigation systems, which would be cost-prohibitive. The expansion of satellite navigation systems is expected to contribute to the continued diversity of RNAV and RNP systems in different aircraft.

iii. Allows for more efficient use of airspace (route placement, fuel efficiency, noise abatement etc)

iv. Clarifies the way in which RNAV and RNP systems are used, and

v. Facilitates the operational approval process for operators by providing a limited set of navigation standards intended for global use

The following graphic illustrates the development of PBN concepts:



4.3.7.15.3 World Geodetic System 1984 (WGS-84)

There are many different geodetic reference systems in use throughout the world for charting particular areas. This is because the true shape of the Earth (the ‘geoid’) is not perfectly spherical. As a result, each coordinate system attempts to fit a particular mathematical model of the Earth (the ‘ellipsoid’) to the geoid in such a way as to minimise the differences between the ellipsoid and the geoid in the particular area being charted. These different systems result in different latitude and longitude grids and hence different sets of geographical coordinates.

These differences do not have a significant effect if the primary means of navigation is based on the use of VOR or NDB to define tracks to or from a beacon, with turning points either at the beacon or at a distance from it defined by DME. However, with RNAV or RNP systems which navigate based entirely on geographic coordinates, it becomes apparent that if the standard used by the navigation system is different to that used by the procedure designer, the situation is changed dramatically.

This led to the introduction of a common global geodetic reference system, which has been defined and developed by the United States Department of Defence (World Geodetic System Committee) and is known as WGS-84. To use GPS to fly RNAV final approach procedures, the coordinates of the procedure waypoints must be referenced to WGS-84. Almost all state AIPs specify that coordinates are to be in WGS-84.

4.3.7.15.4 Global Navigation Satellite Systems (GNSS)

GNSS is a generic term for a constellation of satellites used for navigation. The United States Global Positioning System (GPS) is one such group. The Russians have a similar system called GLONASS, a third system, Galileo is operated by the Europeans and the Chinese operate a system known as BeiDou.

4.3.7.15.4.1 Global Navigation Satellite Systems (GNSS) Interference

GNSS jamming, spoofing and system outages are becoming more prevalent in the commercial aviation environment and reports confirm increases in frequency, severity and locations of occurrences. Onboard navigation system architecture provides multiple layers of redundancy and resilience, but it is important for flight crew to be aware of the possible flight deck effects of these events, associated procedures and mitigations.

GPS ***jamming*** blocks the GPS signal, presenting crew with a system failure and corresponding alert. GPS ***spoofing*** provides an erroneous signal, “tricking” a GNSS receiver in to thinking it is at a different location and/or altitude. Spoofing technology is an emerging threat and is becoming increasingly prevalent. All of BAV’s aircraft types will generate an alert when there is a significant difference between the IRS and GNSS calculated positions, but depending on the nature of the interference and the aircraft type there may be other alerts or failures. In all cases, crews should follow type-specific procedures associated with the alerts.

Verification of action position using ground navigation aids (e.g. VOR/DME) is a useful tool to support situational awareness.

Note: GNSS position updating should not be disabled unless required by a published procedure or location-specific NOTAM.

The emergence of GNSS spoofing has resulted in reports of ‘map shift’, which is rare on current-generation aircraft, but does elevate the risk of unusual AFDS behaviour, particularly during departure and arrival. Various flight deck effects include:

- Significant map shifts
- GNSS faults and other navigational system failures, with some persisting well outside the area of interference
- Activation of the EGPWS system at any altitude, including on approach

When the loss of GNSS signal (jamming) and/or false GNSS data is being accepted by the aircraft, or persistent GNSS interference is affecting aircraft performance, fleet specific guidance may necessitate the requirement to switch off the GNSS and/or (E)GPWS systems for approach and landing. In such circumstances, follow fleet specific guidance which may also affect the aircraft’s approach capability.

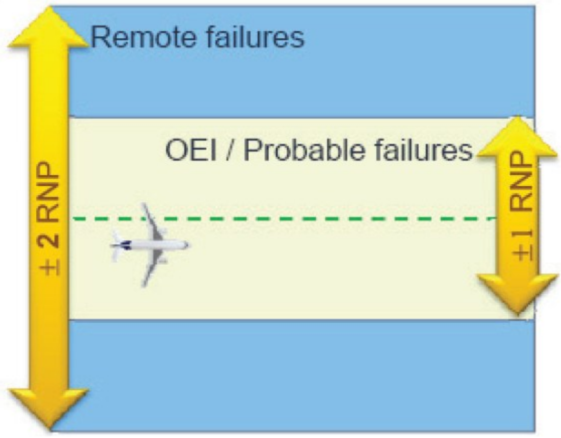
Should (E)GPWS look-ahead functionality be turned off or inoperative refer to Operations Without EGPWS Look-Ahead/Terrain Function for further guidance.

4.3.7.15.5 Receiver Autonomous Integrity Monitoring (RAIM)

Receiver Autonomous Integrity Monitoring (RAIM) involves the onboard GPS receiver/processor determining the integrity of the GPS navigation. This determination is achieved by a consistency check among redundant measurements, called pseudo- ranges. When more satellites are available than needed to produce a position fix, the extra pseudo-ranges should all be consistent with the computed position. A pseudo-range which differs significantly from the expected value (i.e., an outlier) may indicate a fault of the associated satellite or another signal integrity problem (e.g., ionospheric dispersion). Traditional RAIM uses fault detection (FD) only, however newer GPS receivers incorporate fault detection and exclusion (FDE) which enables them to continue to operate in the presence of a GPS failure. At least one satellite in addition to those required for navigation must be in view for the receiver to perform RAIM. Four satellites will give a navigation solution but five are needed for the equipment to conduct RAIM and six or more will allow the equipment to lock out a rogue satellite The aircraft turning, or terrain masking during approach, can block the signals from the satellites and cause short duration RAIM outages.

4.3.7.15.6 RNP Containment

An RNP value, expressed in nautical miles, defines the maximum lateral distance from the required track, within which the aircraft must remain. Procedures are designed which assume, for normal operation and in the case of remote failures of equipment, that the aircraft will remain laterally within 2 x RNP of the centre of the defined track. So, for example, an approach procedure designed for RNP 0.3 (the default value) will take account of obstacles within +/- 0.6 nm of the defined centreline of the approach. This concept is called containment, illustrated below:



4.3.7.15.7 ANP/EPE Definition

RNP operation is Sensor-Independent. Operational criteria specify the need for the crew to be able to monitor the RNP capability during flight; however, because mixed sensors can be used, monitoring would be a cumbersome task for the pilot. So the industry solution to the problem was to provide the pilot with an indication of the accuracy of the FMS position (it is actually a measure of the position uncertainty based on navigation sensor error models contained in the FMS). This measure of FMS position uncertainty is called:

- Actual Navigation Performance (ANP-Boeing); or
- Estimated Position Error (EPE-Airbus)

If this estimated error approaches the RNP value, an 'UNABLE RNP' or 'NAV ACCUR DOWNGRADE', warning is generated. ANP/EPE consists of a calculated Navigation System Error and an assumed model of the Flight Technical Error, it is not a direct measure of the actual FMS position error.

4.3.7.15.8 Localiser Performance (LP) and Localiser Performance with Vertical Guidance (LPV)

LPV approaches take advantage of improvement in the accuracy of the lateral and vertical guidance, achieved by SBAS, to provide an approach procedure very similar to a Category

I ILS. Like an ILS, an LPV has vertical guidance and is flown to a Decision Altitude. The design of an LPV approach incorporates lateral guidance with increasing sensitivity the closer an aircraft flies to the runway threshold. Sensitivities, and therefore corrections to regain the inbound course, are nearly identical to those of an ILS at similar distances. Depending on the SBAS coverage and procedure design, an LPV approach can support CAT I minima: 200 feet DH/550 m RVR. An LPV approach is therefore deemed to be a precision approach, by definition.

LPV approach guidance must be displayed on a lateral and vertical deviation display including a failure indicator. The deviation display must have a suitable full-scale deflection based on the required track-keeping accuracy. The lateral and vertical full scale deflections are angular and associated with the lateral and vertical definitions of the Final Approach contained in the navigation database.

LP approach procedures: at some airports, it may not be possible to meet the requirements to publish an approach procedure with LPV vertical guidance. This may be a consequence of obstacles and terrain along the desired final approach path, airport infrastructure, or the inability of SBAS to provide the desired availability of vertical guidance (i.e. an airport located on the fringe of the SBAS service area). When this occurs, a state may provide an LP approach procedure based on the lateral performance of SBAS. An LP approach procedure is a non-precision approach procedure with angular lateral guidance, equivalent to a localizer-only approach. As a non-precision approach, an LP approach procedure provides lateral navigation guidance to an MDA; however, the SBAS integration provides no vertical guidance.

LPV and LP approaches are only available in areas where SBAS coverage is provided – e.g. in the USA using WAAS or in Europe using EGNOS. An approach designed with LPV or LP minima includes extra information, coded in the aircraft’s FMS navigation database, to instruct the multi-mode receivers which SBAS constellation provides the augmentation information. Unlike PBN approaches flown using Baro VNAV, the vertical path of an LPV approach is produced with reference to GPS geometric altitude, augmented by SBAS. Therefore, it is not susceptible to temperature variation (hot or cold) and does not require correction. However, the DA(H) is still determined by reference to barometric altimetry; therefore, the policy for cold-temperature correction of a procedure minimum (OM A) still applies – just as it would with a Cat I ILS.

4.3.7.15.9 LNAV or LNAV/VNAV Minima

A problem with the development of PBN terminology is that aerodrome operating minima are listed under headings which refer to aeroplane autopilot modes specific to Boeing aeroplanes. In fact minima titled LNAV or VNAV refer to the way in which an approach was designed, not the autopilot modes required to fly it. Unfortunately, pilots sometimes see a minimum specification labelled ‘LNAV’ and assume they have to use that MCP mode.

An approach designed with only LNAV minima is a conventional NPA, but using RNAV as the lateral-guidance medium. VNAV minima imply an approach is designed as an RNP APCH. But one approach can have both LNAV minima, for the simple case, and VNAV minima for the RNP APCH case. The difference in the minima arises from the use of different obstacle-assessment criteria. In some cases VNAV minima can be higher than LNAV.

Confusion arises because all fleets fly FMS database approaches using VNAV. It is perfectly acceptable to fly an approach which only has LNAV minima (e.g. BDA 12, BOD 05 & 23) using VNAV, providing the appropriate (fleet-specific) procedures are used.

4.3.7.15.10 Aircraft RNAV Systems

The RNAV system consists of an FMS with associated Navigation sensors along with the Auto flight and Display systems. Commercial aircraft navigation systems are certificated as Multi-sensor systems. The FMS position is usually based on a combination of the outputs from one, two or three Inertial Reference Systems (IRS) refined by inputs from other navigation sensors. Preference is vested in the navigation sensor resulting in the most accurate position. Before using a navigation sensor, the FMS performs a reasonableness check on the data. Typical position accuracy figures (FMS position) in order of sensor accuracy:

- GPS – 100 meters.
- DME/DME – 0.3 nm dependent on geometry.
- VOR/DME – 1.0 nm depends on distance from facility.
- IRS (multiple fit) – 2.0 nm/hr (approx.) drift from alignment.

4.3.8 RVSM Operations

4.3.8.1 General

RVSM airspace is now implemented globally between FL290 and FL410 inclusive and allows for a minimum of 1,000 ft vertical separation between aircraft.

4.3.8.2 Aircraft Approval

All BAV aircraft can be considered RVSM compliant assuming all required equipment (see 4.3.8.3.1 below) is fully serviceable.

4.3.8.3 RVSM Procedures

4.3.8.3.1 Before Flight

The following are minimum requirements for entry in to RVSM airspace:

- Two serviceable primary altitude measuring systems
- One serviceable automatic altitude control system
- One serviceable transponder
- One serviceable altitude-alerting device

4.3.8.3.2 Prior to Entering RVSM Airspace

The two primary altimeter systems must agree within ±200 ft. Any greater discrepancy must be resolved (e.g. check subscale setting).

Any unresolved problem with the height keeping, altimetry or altitude alerting system should be reported to ATC prior to entry to RVSM transition airspace and as soon as possible after it has been detected.

TCAS should remain in the TA/RA mode.

4.3.8.4 Within RVSM Airspace

An autopilot should normally be engaged throughout flight in RVSM airspace.

When changing flight level care should be exercised to ensure that accurate levelling off at cleared levels is achieved.

If traffic is seen on TCAS at 1000 ft above or below the cleared flight level, crews should be aware of the possibility of a TCAS RA, particularly after the '1000 to go' call has been made.

Intervene if the autopilot attempts to level off more than 150 ft from the cleared flight level.

Any disengagement of the autopilot should be kept to an absolute minimum.

Any equipment failure which may adversely affect the aircraft's height-keeping performance should be reported to ATC immediately. ATC may require non-compliant aircraft to descend out of RVSM airspace to FL290 or below.

Any deviations from assigned Flight Level of more than 300 ft must be reported to ATC.

4.3.9 (E)GPWS Policy and Procedures

This policy covers both Enhanced and basic GPWS systems.

4.3.9.1 (E)GPWS Warnings

Below FL250, or MSA if higher, (E)GPWS warnings must never be ignored.

In the event of an (E)GPWS Warning below FL250, or MSA if higher, the Pilot Flying shall immediately execute the fleet-specific procedure.

The aircraft will be climbed until known to be clear of terrain or MSA as appropriate.

Inform ATC as soon as practical.

All BAV aircraft use GPS as the position reference for the (E)GPWS.

With valid GPS data (E)GPWS is an extremely accurate, reliable and effective system. Over the last 30 years there has never been a CFIT accident to a western-built aeroplane equipped with (E)GPWS, where the pilots have followed a pull-up command. There have been CFIT accidents, but only when pull-up warnings have been ignored.

Rarely, GPS interference can lead to an (E)GPWS registering an incorrect altitude. This can result in (E)GPWS Cautions/Alerts being triggered at high altitudes, including during the cruise phase.

To mitigate the effect of GPS interference, an (E)GPWS Warning received above FL250, or the MSA if higher, can be considered spurious in nature.

4.3.9.2 (E)GPWS Cautions

In the event of an EGPWS Caution the Flight Crew must take appropriate corrective action. This may include fleet specific procedures, or where not specifically detailed an adjustment to, or confirmation of the correct flight path, a configuration change, a check of the altimeter sub-scale setting or a navigation accuracy check.

To mitigate the effects of GPS interference, an (E)GPWS Caution received above FL250, or MSA if higher, can be considered spurious in nature.

4.3.9.3 GPWS Procedures

(E)GPWS circuit breakers must never be pulled unless called for by a type-specific non-normal procedure.

To enhance situational awareness during the departure, arrival or over high terrain the crew should consider the use of the Terrain display. Where terrain is a significant feature one pilot should normally display Terrain until passing MSA on departure and from top-of-descent on arrival. The decision to display the Terrain function should take into account display clutter or systems restrictions, e.g. the need to use Weather Radar.

The Glideslope Inhibit function of the (E)GPWS system may be used to avoid nuisance cautions, where appropriate, (e.g. ILS side-step manoeuvre, LOC only or circling approach).

4.3.9.4 Operations Without EGPWS Look-Ahead/Terrain Function

If operating without EGPWS Look-Ahead/Terrain function (referred to from here on as Look-Ahead), the following policies must be briefed and followed. Refer to fleet-specific manuals for exact Look-Ahead functionality according to type.

Even without the Look-Ahead functionality, GPWS immediate alerting capability may still be available and any ground proximity alerts that are received are valid and must be followed in accordance with fleet standard operating procedures.

4.3.9.4.1 Departure Procedures

If departing without Look-Ahead capability, ensure the departure briefing considers the following:

- Terrain and departure routing to build and maintain terrain situational awareness
- Consider the routing of any emergency turn and have a good awareness of terrain relative to the emergency turn routing
- Use the available terrain depictions on charts to enhance the briefing
- Crews should ensure the departure adheres to OM A MSA and the briefing of relevant MSA and Clearance Through MSA with the required justifications for the departure routing
- Particular care and focus on the relevant MSA must be taken if any direct routings are given by ATC.

4.3.9.4.2 In-flight Procedures

Crews should ensure other procedure barriers, such as descent below MSA SOPs and position checks are effectively utilised to maximise position and terrain situational awareness throughout the approach.

Current standard operating procedure mitigations against CFIT should be followed and comprehensively briefed. These include:

- QNH monitoring – OM A Altimeter Setting Procedures
- FL100/FL200 altimeter checks – Standard Calls, FCOM
- Transition to QNH check – Standard Calls, FCOM
- Clearance through MSA – OM A (E)GPWS Cautions
- Rate of Descent Limit – OM A Rate of Descent Limit
- Position Check at Radio Altimeter activation – OM A Radio Altimeter Monitoring
- Glide Path check – OM A Descent on the ILS Glide Path
- Altimeter/DME checks during non-precision approaches – OM A Non-Precision Approaches
- Altimeter callouts – Standard Calls, FCOM

- Approach Briefing – OM A Approach Briefing

4.3.9.4.3 Additional Position Checks at FL200 and FL100 in the Descent

As well as the procedures listed above, additional CFIT barriers are required if a flight operates without the Look-Ahead function, to compensate for reduced terrain situational awareness. Crews are required to add a position check and justification for continued descent below relevant MSA at both the FL200 and FL100 checks. The intent behind these additional position checks is to bolster Terrain Situational Awareness.

4.3.9.4.4 Final Approach Without Look-Ahead Function

Crews should ensure full autopilot capability is utilised to preserve capacity and compensate for the loss of terrain awareness due to lack of Look-Ahead functionality. This includes the preferential use of ILS for all approaches where possible. Crews should ensure standard operating procedure mitigations against CFIT are followed, and if there is any doubt about the position of the aircraft the approach should be discontinued.

4.3.10 Use of TCAS and Transponders

4.3.10.1 Normal Procedures

Published procedures using standard R/T phraseology must always be followed.

Transponders should be on, with Mode C and the allocated code selected, at all times from commencement of pushback until parked on stand after landing, unless ATC specifically order otherwise.

After engine shutdown, with the transponder at standby, the default code of 2000 should be selected.

If not receiving a radar service, e.g. in en-route remote airspace, squawk 2000 unless directed otherwise by ATC.

TCAS Resolution Advisories should always be complied with, using fleet-specific procedures, unless the Captain believes there are overriding safety reasons not to do so. Pilots are authorised to deviate from their current ATC clearance to the extent necessary to comply with a TCAS RA.

4.3.10.2 TCAS R/T

TCAS events must be reported to ATC using the following calls:

- After a pilot starts to deviate from any Air Traffic Control (ATC) Clearance or instruction in order to comply with an RA:
    - “(Callsign) TCAS RA”
- After the response to an RA is completed and a return to the ATC clearance is initiated:
    - “(Callsign) CLEAR OF CONFLICT RETURNING TO (assigned clearance)”
- After the response to an RA is completed and the assigned ATC clearance or instruction has been resumed:
    - “(Callsign) CLEAR OF CONFLICT (assigned clearance) RESUMED”
- In the event of an ATC clearance or instruction contradictory to the RA being subsequently received, the pilot should continue to follow the RA and inform ATC directly.

- "(Callsign) UNABLE, TCAS RA"

4.3.10.3 TCAS Inhibition

TCAS should not be inhibited and should be operated in TA/RA mode at all times when airborne, unless the use of 'TA' only is required by a non-normal QRH drill.

4.3.11 Fuel Checks and Management

4.3.11.1 Fuel Checks

Operational Flight Plans provide a fuel figure required at the end of each segment. However, note that these figures are only correct if the Flight Plan conditions of weight, wind and temperature and calculated step climbs are encountered for the rest of the flight. The FMS may give a more accurate prediction of fuel at destination provided that all anticipated variables and predicted step climbs are taken in to account.

A fuel check should be carried out at the first convenient waypoint past the top of climb, and subsequently at least every hour to establish the anticipated fuel remaining at destination.

For a fuel check at a waypoint, record the actual fuel on board from the aircraft fuel totaliser and subtract the Operational Flight Plan waypoint to destination fuel. The resulting figure is the predicted fuel remaining at destination.

Fuel checks shall include a check to ensure that the calculated fuel on board is correctly balanced and distributed.

4.3.11.2 Cruise

A fuel check must be completed as soon as practical after top of climb, and at least hourly thereafter.

For all flights other than those planned with Island Reserve or Reclearance, the flight plan will include sufficient fuel for flight to destination, diversion to an alternate and reserve. If the destination is forecast to be below planning minima, an extra destination alternate is required. Therefore, at the planning stage all flight plans should include sufficient fuel to fly to at least two aerodromes where landing is assured with at least reserve fuel on arrival.

If a fuel check shows that the aircraft will arrive with less than Diversion + Reserve fuel in tanks, action should be taken to reduce fuel consumption for the rest of the flight, and/or to select a closer Destination Alternate.

The following fuel conservation measures should be considered in the event of a fuel shortfall:

1. Decrease aircraft speed (down to Max Range Speed/Cost Index minimum).
2. Obtain a more direct route.
3. Fly closer to the optimum FL (taking the wind into account).
4. Select a closer alternate aerodrome.
5. Land and refuel.

4.3.11.3 Action in the event of a fuel shortfall

It is permissible to continue the flight towards destination when a fuel check shows that there will be less than Diversion + Reserve fuel remaining at destination provided:

a. **Maximum delay not known and EAT not received:** it is possible to reach at least two aerodromes at which landing is assured (see below) with at least reserve fuel remaining at touchdown. Two independent runways within a flying time of two hours may be considered to be equivalent to two aerodromes, provided that account is taken of any likely ATC delay.

b. **Maximum delay known, or an EAT received:** the flight may continue to destination or to hold, regardless of the number of runways, as long as landing at destination is assured and it is possible to reach the destination with at least reserve fuel remaining at touchdown.

Forecasts should be used to assess the probability of landing success when more than 2 hours from the relevant aerodrome. Within 2 hours, actual weather reports and trend information may be used.

4.3.11.3.1 Landing Assured

A landing is "assured" if, in the judgement of the Commander, it could be completed in the event of any forecast deterioration in the weather and plausible single failures of ground and/or airborne facilities, e.g. CAT II/III to CAT I.

4.3.11.4 Low Fuel State

If at any time it becomes apparent that the aircraft **may** land with less than Reserve Fuel (30 minutes), an emergency "PAN" call must be made to ATC, reporting fuel remaining in minutes. ATC must thereafter be kept fully informed of the situation.

If at any time it becomes apparent that the aircraft **will** land with less than Reserve Fuel (30 minutes) remaining, an emergency "MAYDAY" call must be made, reporting fuel remaining in minutes.

In the USA, the term "MINIMUM FUEL ADVISORY" must be used.

4.3.11.5 Post Flight

The remaining fuel "on blocks" is automatically recorded by Merlin. If the aircraft lands with fuel remaining less than a figure equivalent to 30 minutes at 1500 ft at **maximum** landing weight a SESMA event will be recorded. Note that this fuel quantity will in most cases by higher than the planned reserve fuel which is based on 30 minutes at 1500 feet at the **planned** landing weight.

4.3.12 Adverse Weather

4.3.12.1 SIGMET

Any of the following SIGMET conditions must be reported to ATC immediately by R/T if the Captain considers that they are likely to affect the safety of other aircraft:

- All heavy, severe or widespread cases of hail.
- Icing.
- Line squalls.

- Mountain waves.
- Sandstorms or dust storms.
- Thunderstorms.
- Tropical revolving storms.
- Turbulence.

Such messages must be prefixed “AIREP SPECIAL”.

4.3.12.2 Turbulence

Levels of turbulence are defined as follows:

Light: **Light Turbulence:** Slight changes in attitude or altitude, or changes in IAS of 5-15 kt

Light Chop: Slight bumpiness without changes in attitude, altitude or IAS.

Moderate: **Moderate Turbulence:** Similar to light turbulence but of greater intensity. Changes in attitude and/or altitude occur, IAS fluctuates 16-25 kt but the aircraft remains in positive control at all times.

Moderate Chop: Similar to light chop but of greater intensity causing rapid bumps or jolts without appreciable changes in attitude or altitude.

Severe: **Severe Tubulence:** Turbulence that causes large, abrupt changes in attitude or altitude. Aircraft may be momentarily out of control. IAS fluctuates by more than 25 kts.

The continuity of turbulence should be described as:

Occasional: Less than 1/3 of the time

Intermittent: 1/3 to 2/3 of the time

Continuous: More than 2/3 of the time.

Severe turbulence must be reported to ATC giving position, time (GMT), FL/altitude, aircraft type, intensity, in or near cloud and duration.

4.3.12.3 Windshear

Windshear encountered on take-off or approach must be reported to ATC immediately by R/T if considered a hazard, giving details of height and severity.

Severe windshear is considered to be uncontrollable changes from normal steady flight conditions below 1000 AGL, in excess of the following:

- 15 kts indicated airspeed.
- 500 fpm vertical speed.
- 5° pitch attitude.
- 1 dot displacement from the glideslope/glidepath.
- Unusual thrust levels for a significant period of time.

If severe windshear is reported or forecast – **DO NOT TAKE-OFF**.

Full thrust must be used if the nature or severity of the windshear cannot be determined.

Reduced thrust may be used if any windshear expected during or after take-off is caused by strong winds not associated with CBs or frontal activity.

4.3.12.3.1 Windshear Go-Around

On aircraft fitted with aural windshear warning systems, if a GPWS “Windshear” warning is received, a Windshear Go-Around must be carried out. Exceptionally, in conditions of extreme turbulence associated with strong winds and not Cb or frontal activity, a warning may be treated as advisory provided that this warning has been anticipated, briefed for in the Approach Briefing and appropriate allowance made.

In the event of a go-around the call “Windshear go-around” will be used to indicate to other crew members that a positive rate of climb would be maintained at the expense of airspeed, even to the point of stall warning. If a subsequent approach is thought prudent, then the conditions should be carefully evaluated and appropriate compensation made, e.g. higher speed, in accordance with fleet specific instructions and procedures.

If, on the subsequent approach, another warning is received and believed to be genuine, then a go-around should be made and diversion considered.

4.3.13 Wake Turbulence

4.3.13.1 Wake Vortex Notification

Aircraft in the Wake Vortex Category “H” are required to notify ATC as “Heavy” on first contact with an ATC unit.

Aircraft in the Wake Vortex Category “J” are required to notify ATC as “Super” on first contact with an ATC unit.

4.3.13.2 Wake Vortex Categories

For the purpose of Flight Plan completion the ICAO categories listed below will be used:

Category	Max TOW (kg)
Super (J)	A380
Heavy (H)	136,000 or greater
Medium (M)	Less than 136,000 and more than 7,000
Light (L)	7,000 or less

4.3.13.3 Wake Vortex Separation - Departure

Preceding Aircraft	Following Aircraft	Separation
Super (J)	Super	#
	Heavy	2 minutes
	Medium	3 minutes
Heavy (H)	Heavy	4 nm or time equivalent
	Medium	2 minutes
Medium (M)	Medium	#

Signifies that separation for wake turbulence reasons alone is not required.

4.3.13.4 Wake Vortex Separation – Final Approach

Preceding Aircraft	Following Aircraft	Separation (UK)	Separation (ICAO)
Super (J)	Super	#	#
	Heavy	6 nm	6 nm
	Medium	7 nm	7 nm
Heavy (H)	Super	#	#
	Heavy	4 nm	4 nm
	Medium	5 nm	5 nm
Medium (M)	Super	#	#
	Heavy	#	#
	Medium	#/4 nm (see Note)	3 nm

Note: The UK divides the Medium category in to Upper and Lower. At UK aerodromes aircraft of MTOW between 104,000 and 136,000 kg, plus the B757, B707, DC-8, VC10 and IL-62, are treated as Upper Medium and 4 nm wake separation shall be applied between these types and a following Lower Medium category aircraft (MTOW 40,000 – 104,000 kg)

4.3.14 Take-off Procedures

4.3.14.1 Cabin Crew Signal

The cabin crew should be signalled, usually by cycling the No Smoking sign or specific Cabin Signal function if provided, when take-off is imminent (i.e. shortly before lining up).

4.3.14.2 Pre Take-off

Before each takeoff, the Captain must check:

- The cloud ceiling and RVR are at or above the relevant takeoff minima
- The aircraft is at the correct runway threshold or designated take-off position, especially when more than one take-off position is available. This check is especially important in low visibility conditions.
- Confirm visually (or using TCAS in low visibility) that the approach is clear and it is safe to line up
- Be prepared to commence the take-off roll immediately when cleared, or advise ATC prior to entering the runway if the take-off will be delayed for any reason
- Confirm that any preceding traffic is safely airborne using TCAS as necessary (if neither visual nor TCAS confirmation is available it may mean that the preceding aircraft has not in fact taken off)

4.3.14.3 Low Visibility Takeoff

A takeoff in RVR <400m shall only be commenced when the Captain has ensured that:

- Visual and non-visual aids are adequate
- Appropriate LVPs are in force

4.3.14.4 Use of Stopwatch

If required for the departure procedure the stopwatch must be started at the commencement of the take-off run to ensure that time-critical procedures (e.g. Emergency Turns) can be accurately flown and takeoff thrust time limits are not exceeded.

4.3.14.5 Immediate Take-off Clearance

If cleared by ATC for immediate take-off:

- If lined up on the runway already, take off immediately
- If holding clear of the runway, enter the runway and commence a ‘rolling take-off’ without stopping

4.3.14.6 Crosswind Components

Maximum permissible crosswind components are quoted in aircraft type-specific manuals. Limits quoted for takeoff must not knowingly be exceeded.

4.3.14.7 Standard Callouts on Takeoff – V Speeds

During takeoff, the PM should call “V1” if the V1 speed is less than VR. If V1 and VR are the same speed, the PM should only call “Rotate”. For those fleets with automatic callout of V1, the PM will only call “Rotate”.

4.3.14.8 MSA

4.3.14.8.1 Relevant MSA

During the departure and arrival phases of a flight, the Commander must ensure that the flight crew maintains situational awareness about the aircraft’s proximity to terrain so as to mitigate effectively the threat of CFIT. The ultimate ‘back-stop’ to that mitigation is the requirement that a GPWS warning must never be ignored (see OM A (E)GPWS Policy and Procedures).

This policy requires the crew to identify the 'relevant' MSA during climb and descent. In general, the Operational Flight Plan (OFP) will show the highest MSA which is likely to be encountered during the departure and arrival phases of the flight, assuming that the routing followed is the one in the OFP. That MSA value may well be sufficient as a once-for-all figure when flying from or to airports where terrain is not a factor.

However, it may be the case that, in addition to the information from the OFP, the crew will need to identify pertinent values of:

- During departure: Minimum Sector Altitude, MTCA and MGA; and
- During arrival: MGA, MTCA, Minimum Sector Altitude and/or TAA as well as the MRC if the aircraft is being vectored by ATC.

4.3.14.8.2 Any of those values could be 'relevant' for the purposes of determining MSA, depending upon the stage of flight, especially if higher than the value published on the OFP.Clearance through MSA

When a clearance is received which results in flight through the relevant MSA, the Pilot Flying will call "Clearance above/ below MSA". The Pilot Monitoring will respond with the relevant MSA figure and justification to continue flight below MSA if required. During the departure process, a SID/ATC cleared altitude above/below MSA must be acknowledged and briefed as part of the Take-off briefing as per OM A . During the climb or descent, if a clearance is received that changes the expected lateral or vertical profile below MSA, crews should ensure that their situational awareness with regard to terrain clearance is maintained and that flight below MSA continues to be justified. In the case of subsequent lateral and vertical clearances below MSA, the need to make further verbal justifications may be removed if the relevant MSA has not changed.

On the rare occasion that a crew is unable to justify flight below the relevant MSA, they should immediately ascertain their position and clearance in relation to terrain. If doubt still exists, the clearance to remain below the relevant MSA must be challenged and if necessary the crew must take appropriate action to discontinue flight below the relevant MSA if required.

The obligation for avoidance of terrain always resides in the flight-deck. Air traffic control never assumes that responsibility (see OM A Radar Control Standards and Procedures). Therefore, when being given radar vectors or 'direct-to' clearances, the crew must continue, in the words of OM A MSA (above), to 'justify flight below the relevant MSA'. Phrases like "under radar" or "under ATC control" are not sufficient justification to meet the intent of the policy.

4.3.15 Descent and Approach Procedures

4.3.15.1 Approach Briefing

Before starting an approach to land the Commander must satisfy themselves that according to the information available to them, the weather at the aerodrome and the condition of the runway intended to be used should not prevent a safe approach, landing or missed approach. They will brief their flight crew on their intentions, the type of approach, method to be used to identify the aerodrome and landing runway, and the go-around checklist. Before an instrument approach, the briefing must include reference to all radio aids to be used and the relevant go around procedure. During the approach each flight crew member must monitor that all headings and altitudes are consistent with the appropriate facilities and runway.

The Commander must ensure that a comprehensive brief is completed which facilitates situational awareness of terrain throughout the descent and approach to touchdown. The terrain brief should include all relevant MSA figures that may be encountered during a re-route as well as other relevant terrain factors. Examples of such factors include: barometric altitude vs radio altitude, approach and runway in use, expected altimeter pressure setting and the expected position of the radio altimeter activation. The brief should also include the expected factors of the 'Position Check' call and the criteria to justify continued descent. If at any time continued descent cannot be justified, or there is doubt over terrain separation, the conflict must be resolved or the approach discontinued.

For approaches with a Variation to the Stable Approach Criteria (See OM A Approaches with Variations to Stable Approach Criteria) the Manual 1000 ft AAL Callout Altitude must be stated in the brief.

4.3.15.2 Continuous Descent Approach

It is BAV policy that continuous descent approaches should be flown whenever appropriate in order to minimise fuel burn and aircraft noise impact.

4.3.15.3 ATC Clearances

An ATC clearance does not guarantee terrain or obstruction clearance and does not constitute authority to descend below the relevant MSA or SSA.

4.3.15.4 Flight Below Minimum Safe Altitude (MSA)

An ATC clearance does not guarantee terrain or obstruction clearance, and does not constitute authority to descend below the relevant MSA.

When a clearance is received which results in flight through the relevant MSA, the Pilot Flying will call "Clearance above/below MSA". The Pilot Monitoring will respond with "MSA of XXXX". If cleared to descend through MSA, the PM will state the justification to continue the descent below MSA.

The crew must continue to maintain awareness of the controlling MSA when operating below it and if required re-confirm their justification to continue.

On the rare occasion that a crew is unable to justify continued flight below MSA, they should immediately ascertain their position and clearance in relation to terrain. If doubt still exists, flight below the controlling MSA must be discontinued.

4.3.15.4.1 Minimum Operating Altitude

Refer to Minimum Operating Altitude (MOA) above.

4.3.15.4.2 IMC Flight Below Minimum Safe Altitude (MSA)

Reliance on any one radio navigation aid or navigation system when establishing position for the purpose of descent below MSA must be avoided if practicable.

The aircraft's navigation is effectively reduced to reliance on a single navigation aid when:

- The FMS/FMGS is radio updating from a single VOR/DME; and

- The same VOR is being used for the approach; and
- No radar surveillance is available.

If conducting a single aid approach with no other independent navigation cross-check available, (e.g. GPS displayed position or GPS PRIMARY on MCDU PROGRESS page), the only independent back-up available is the expected heading, track, and radio altimeter information. Any discrepancy between expected and displayed values must be resolved to continue the approach.

- Descent to the relevant MSA is permitted in accordance with the information provided on charts
- Descent to radar cleared altitude is permitted when under positive radar control OM A Radar Control Standards and Procedures.

Further descent is permitted using a published instrument approach procedure or in accordance with VMC Descent Below MSA below.

4.3.15.5 VMC Flight Below Minimum Safe Altitude (MSA)

Visual descent below MSA is permitted:

- **By Day (except RNAV Visual):** If the descent can be continued so as to ensure clearance from all obstacles on the intended track (see note) **By Night:** Only if the line of sight is also the line of flight (i.e. flight is directly towards an identifiable lit area, in general the runway) and distance is checked against height by means of radio or radar aids. If this is not possible the relevant MSA or SSA must be maintained until over the aerodrome.
- **RNAV Visual procedures (day or night unless promulgated as DAYLIGHT ONLY):** When flying an RNAV (Visual) procedure, visual reference is the main source of obstacle identification and clearance at all times. The guidance provided by an RNAV (Visual) procedure is utilised to reduce workload during a visual approach manoeuvre. A descent may continue towards the published procedure waypoints without maintaining 'line of sight, line of flight' towards an identifiable lit area, as long as VMC is maintained and the lateral and vertical profile is followed. Fleet specific PBN procedures must be used if conducting an RNAV (Visual) procedure. Should a navigation accuracy downgrade occur, e.g. UNABLE RNP or NAV ACCUR DOWNGRAD, the descent may be continued if the aircraft trajectory is towards an identifiable lit area and position is checked using all available aids. If a visual reference toward a lit and identifiable area at night cannot be maintained on receipt of a navigation accuracy downgrade, the approach must be discontinued and the aircraft climbed to MSA as appropriate. Further information on RNAV (Visual) procedures can be found at OM A RNAV (Visual) Procedures.

Note: It is not essential for obstacles to be individually identified; descent over terrain obscured by low cloud or fog is permitted if the flight path remains clear of any such obscuration.

4.3.15.6 Minimum Altitude in MCP/FCU

Unless allowable under an FCOM-approved procedure (e.g. RNAV Final Approach) the minimum selectable altitude in the MCP/FCU Altitude window will be 1000 ft above airfield elevation.

4.3.15.7 Rate of Descent Limit

The maximum rate of descent must not exceed 3,000fpm when descending below 3,000ft above the relevant MSA or SSA. High rates of descent must be avoided on approach.

4.3.15.8 Aerodrome and Runway Identification

Navigation procedures must not be considered complete until the aircraft has landed at the intended aerodrome on the correct runway. Positive identification can best be achieved by proper use of radio navigation facilities for cross-checking and establishing the aircraft position right down to the touch-down point. Radio facilities must be checked for frequency, identification and, whenever possible, location in relation to other known facilities or positions. At an aerodrome with no radio facilities, positive identification of the aerodrome and runway must be made visually.

4.3.15.9 Safe Landing Policy

The Safe Landing Policy comprises four main elements:

i. Inflight Landing Performance Assessment
ii. Stable Approach Criteria
iii. Safe Touchdown Criteria
iv. Safe Rollout Criteria

Suitable gates shall be identified to assure a stable approach. In accordance with the Safe Touchdown and Rollout Criteria, the Commander shall establish a Latest Touchdown Point (by default this is the end of the Touchdown Zone), a safe braking strategy and a provisional runway exit point.

Awareness of conditions which degrade the stop margin must be maintained throughout the approach and touchdown. Degrading conditions may eliminate the stop margin and/or affect the Latest Touchdown Point. The Commander must be prepared to cease the approach or landing should there be any doubt that a safe stop is assured.

4.3.15.9.1 Inflight Landing Performance Assessment

In accordance with fleet specific guidance, a calculation of the Landing Distance at Time of Arrival (LDTA) must be completed, taking in to account:

- The prevailing approach, runway(s) of intended use and runway conditions
- Aircraft weight
- Approach configuration
- Any planned aeroplane ground deceleration devices and/or retardation device deficiencies
- Missed Approach climb gradient (if published)

The calculated landing distance will be compared to the LDA to establish the stop margin available. The Inflight Landing Performance must remain valid throughout all stages of the approach and landing. If the PIC is not satisfied that the Landing Performance calculation remains valid at any stage of the approach or landing, then a go-around must be flown.

4.3.15.9.2 Stable Approach Criteria

On all approaches, the aircraft must be flown to be stable by the 1,000 ft auto-callout (see Note 3).

If the stable approach criteria have not been achieved by the 1,000 ft auto-callout (see Note 3) then a go-around must be flown.

An approach is considered stable when **all** of the following criteria are met:

- In the planned landing configuration (gear down, landing flap achieved)
- Stabilised on the correct vertical and lateral profile (see Note 1)
- Stabilised at the target approach speed (see Note 2)

In all cases, the landing checklist must be completed by the 500 ft auto-callout.

Note 1: For the purposes of these criteria, the vertical and lateral profile is defined as either:

- A 3D Instrument approach, or;
- A 2D final approach path/track, or;
- A visual profile, which may include FMS guidance

In the complete absence of electronic or instrument approach guidance, the method of defining the correct visual profile should be agreed at the briefing stage. The correct visual vertical profile is that defined by either:

- A Visual Approach Slope Indicator System if available. Once established on the extended centreline, unless otherwise specified, an indication of ‘All Whites’ or ‘All Reds’ would not satisfy the stabilised approach criteria, or:
- Where no VASIS guidance is provided the required profile will default to that commensurate with a 3° approach slope

Note 2: **Only** in circumstances of rapid wind changes, turbulence or adherence to appropriate ATC speed requirements where speed stability has not been achieved by the 1000 ft auto-callout (see Note 3) **and** speed is no more than 20 kts above the target approach speed, and reducing, can the approach be continued.

If the aircraft is not stable at the target approach speed before the 500 ft auto-callout then a go-around must be flown.

In response to the 1000 auto-callout (see Note 3) the P1 will respond with one of the following calls:

- “Unstable, Go-around”
- “Stable”, or
- “Speed” – the subsequent call of “Stable” must occur before the 500 ft auto-callout (see Note 2).

Note 3: On specified approaches, the 1000 auto-callout is substituted by P2 manually announcing the 1000 ft AAL Altitude stipulated in the OM C airfield briefing (See Approaches with Variations to Stable Approach Criteria).

In the absence of the 1000 auto-callout of P2 manual 1000 ft AAL callout, P1 must still assesss stability at the required point, and make the applicable call.

On all approaches, the P2 should fly the approach and the P1 should not take control before the stable approach criteria have been achieved. By implication, this handover will not normally occur until after the 1000 ft auto-callout.

There may be occasions where it might be appropriate to raise the Stable Approach assessment higher than 1000 ft AAL (e.g. high MDA). In such cases the assessment point should be clearly defined and briefed.

There is no requirement for P1 to take control immediately after the assessment of stability. There are occasions where continued lateral manoeuvring is required after 1000 ft AAL (e.g. an offset approach). In such circumstances it may be beneficial for P1 to delay taking control until all manoeuvring has been completed.

Both pilots (and P3 IAW Augmented Crew Procedures) must monitor that the stable approach criteria are maintained with the aim to deliver the aircraft to the point in space above the runway from which a flare manoeuvre will result in touchdown at the right speed and attitude and within the touchdown zone. If the criteria cannot be maintained then a go-around must be flown.

Additional guidance and clarification on the application of these criteria for visual/circling approaches is published at OM B 2.8.4 Allocation of Duties for Circling or Visual Approaches.

4.3.15.9.3 Approaches with Variations to Stable Approach Criteria

On approaches where the 1000 ft auto-callout occurs at a height significantly different to 1000 ft AAL, there are multiple auto-callouts or location-specific factors that impact the Safe Landing Policy, alternative station-specific procedures for achieving Stable Approach Criteria will be published in OM C. Any variation to OM C SAC entries will be ratified via the Flight Operations governance process.

4.3.15.9.4 Safe Touchdown Criteria

On all approaches the aircraft must be flown to achieve a safe touchdown.

If the safe touchdown criteria have not been achieved, then a rejected landing manouevre must be flown.

A rejected landing can be conducted at any time until reverse thrust is selected.

A touchdown is considered safe when all of the following criteria are met:

- Main Gear Touchdown within the Touchdown Zone (see Note 1, 2)
- Main Gear Touchdown and trajectory within runway edge is guaranteed
- Normal Runway contact within the aircraft geometric landing limits.

Note 1: If the aircraft is still airborne at the end of the TDZ, or it is obvious that the landing will not be within the TDZ, a rejected landing shall be initiated. The crew need not wait until the aircraft physically touches down to perform the rejected landing.

Note 2: If no Touchdown Zone is painted on the runway, the aircraft must touch down as close to the aiming point as possible. Pilots should use all available sources to define an appropriate Latest Touchdown Point. OM C airfield satellite imagery (where provided) may help with identification.

If the Safe Touchdown Criteria are not achieved, PM will use the following call:

- "Go-Around"

PF can initiate a Rejected Landing at any time if they consider the touchdown to be, or likely to be, unsafe. To facilitate this, PF shall not remove their hand from the thrust levers until all elements of the Safe Touchdown Criteria have been satisfied.

4.3.15.9.5 Safe Rollout Criteria

On all rollouts the aircraft must be decelerated in such a manner to assure a safe stop prior to the runway end and to routinely achieve taxi speed by at least 300m from the runway end.

If at any stage following initial selection of reverse thrust stopping is not assured, maximum braking and the maximum reverse as permitted by fleet-specific guidance shall be used.

A safe rollout is achieved by:

- Timely use of all deceleration devices that were included in the Inflight Landing Performance Assessment
- Maintaining deceleration (see Note) until stop is assured and an appropriate runway exit speed is reached.

Note: Cancelling Autobrake systems early in the rollout and coasting at high speed can increase the threat of runway overrun and lateral excursion, even after a safe touchdown. Braking action at the stop-end of the runway is not guaranteed to be consistent with that achieved during the initial rollout.

4.3.15.10 Radar Control Standards and Procedures

The aircraft must be navigated in accordance with the Flight Plan, even when under the control of an approved radar unit, until identified by radar and instructed to deviate from the planned route. The term "radar contact" indicates that the aircraft has been seen and identified on the radar display but may not mean that the aircraft is under radar control. If in doubt as to the air traffic control service being provided, request clarification from ATC.

Captains are authorised to accept radar clearances, subject to the following conditions:

- The Captain retains the responsibility for ensuring adequate obstacle clearance
- The Captain must check the initial identification of the aircraft by the radar unit, and confirm the aircraft position by independent navigational aids e.g. INS, SSR, VOR/DME, NDB, or aircraft radar.
- The Captain must check the aircraft position as frequently as necessary by independent navigational aids, as being within the area covered by the relevant MSA or SSA, before and during the period of radar control.
- The Captain may use their discretion when requested by the radar unit to descend to Radar Cleared Altitudes, and if in doubt about the standard of the radar control, must climb the aircraft to the relevant MSA or SSA.

4.3.15.11 Monitoring of Radio Aids

In normal circumstances the accuracy of the primary aid can be monitored using normal cross checking and monitoring other aids. The primary aid must be identified once.

If one radio aid alone is used the ident must be monitored or re-identified as follows:

4.3.15.11.1.1 ILS

- When established on the localiser (if no other means of verifying correct localiser tracking exists)
- Whenever warning flags appear
- If the reliability of the indications is in doubt

4.3.15.11.1.2 VOR

- When established on the inbound radial (if no other means of verifying correct tracking exist)
- After warning flags have appeared, even temporarily (including an apparently correct overhead position, unless the aircraft's position can be verified through other information e.g. DME)
- If the reliability of the indications is in doubt

4.3.15.11.1.3 NDB

The ident must be monitored continuously by one crew member throughout the approach. If the second ADF receiver is not being used for other purposes (e.g. cross-cut/missed approach etc) it should be tuned to the prime aid frequency.

4.3.15.12 Discontinuance of Instrument Approach

An instrument approach must be discontinued:

- If the identification of the prime aid ceases to be received
- If warning flags indicate a failure
- If the reliability of the information is in doubt

Unless the approach can be completed visually.

4.3.15.13 Radio Altimeter Monitoring

At the first indication of radio altitude (typically 2500 RA) both pilots must confirm correct altimeter setting and include a positive statement to justify continued descent. Pilots must ensure that their position in relation to terrain and the approach in use are as expected.

4.3.15.14 Non-Precision Approaches

Non-precision approaches should always be flown using the Continuous Descent Final Approach (CDFA) technique except for specifically authorised procedures which use a stepped-descent or level-flight segment at MDA (e.g. Canarsie approach at JFK).

Pilots should ensure a CDFA is flown once leaving the platform altitude. In the case of a low platform altitude, altitudes should be extrapolated against distance or time to establish a more appropriate platform. This must be considered in the approach briefing.

When available an autopilot must be engaged when a non-precision approach is flown.

Once established on the final approach segment monitor the vertical profile. Promulgated altitudes on non-precision approaches are minimums unless otherwise stated. Where permitted by fleet specific procedures a database approach (VNAV, IAN or FINAL APP) should be flown, provided the vertical profile complies by being at or above these minimum altitudes.

An immediate go-around shall be carried out on reaching DA or the Missed Approach Point, whichever comes first, if the required visual reference has not been achieved. A go around from a non-precision approach must always be flown via the Missed Approach Point for obstacle-clearance purposes.

Once the required visual reference has been achieved, the approach should be adjusted to establish the correct descent path as soon as practicable.

4.3.15.15 Precision Runway Monitoring (PRM) and Simultaneous Offset Instrument Approach (SOIA)

PRM and SOIA are approved BAV operations.

4.3.15.15.1 Precision Runway Monitoring

These types of approach facilitate independent parallel ILS approaches to runways with 3000 ft-4300 ft separation, down to CAT 1 minima. In addition to the primary ATC frequency, pilots must monitor a dedicated “Secondary” frequency (as promulgated on the approach plate) which will transmit an instruction to carry out a 'Breakout Manoeuvre' should there be a conflict. The airfield specific instructions in the aerodrome charts must be fully reviewed. The brief should include:

- The requirement to disengage the A/P and F/Ds and avoid the use of go-around switches.
- Actions required to establish the Heading & Pitch Attitude to achieve the clearance.
- Discussion of the most appropriate time to re-engage the A/P, F/D and re-configure.
- Reminder that A/T without F/D will still provide speed control.

The Breakout Manoeuvre instruction will require a turn and a “climb”, “maintain altitude” or in rare instances a “descend” instruction. Should there be a TCAS RA, the aircraft must continue in the turn and follow the vertical guidance of the RA.

4.3.15.15.1.1 Approach

The use of A/P is strongly recommended for all ILS PRM approaches. During the approach transition, descent should be achieved using idle power unless otherwise instructed by ATC. (These approaches specifically require aircraft **not** to fly a CDA to facilitate a capture of the Glideslope from level flight.)

4.3.15.15.1.2 Breakout Manoeuvre

The immediate handling of a breakout manoeuvre should not require the use of go-around switches nor require immediate aircraft configuration changes. When workload permits the A/C should be re-configured appropriately.

Note 1: ATC will give a descending breakout only when there is no other reasonable option available, but in no case will the descent be below the Minimum Vectoring Altitude.

Note 2: VHF 1 radio should be set to the tower frequency and the required volume when instructed and is "transmit and receive", VHF 2 radio should be set, when instructed.

4.3.15.15.2 Simultaneous Offset Instrument Approach

These procedures facilitate independent offset approaches to runways with 750 ft – 2999 ft separation.

The operation combines an ILS PRM straight in approach and a 2.5° to 3.0° offset Localizer Directional Aid (LDA) approach with G/S followed by a visual segment. The offset LDA aircraft will be positioned to follow the ILS PRM aircraft and the cloud ceiling minima will be set to enable the LDA aircraft to visually acquire the ILS aircraft prior to reaching the LDA MAPt.

Use the autopilot until LDA MAPt. The LDA aircraft must continue on the LDA offset course until reaching the LDA MAPt after which the aircraft must be manoeuvred to establish on the centreline of the landing runway by 500 ft AAL. In order to continue the approach beyond the MAPt, the LDA aircraft must have the ILS traffic in sight, must report the traffic in sight to ATC and must have the landing runway in sight. If any of these cannot be achieved or are subsequently lost, a go-around must be carried out.

Breakout manoeuvre requirements are the same as ILS PRM breakout manoeuvres.

4.3.15.16 Cold Temperature Altimeter Correction

Pressure altimeters are calibrated to indicate true altitude under ISA conditions. Any deviation from ISA will result in an erroneous reading on the altimeter. In the case of the temperature being lower than ISA, the true aircraft altitude will be lower than indicated. The altimeter error may be significant, and becomes important when considering obstacle clearances in very cold temperatures.

In conditions where the surface temperature at an airport is less than ISA -25 degrees, pilots should add the values derived from OM C – Cold Temperature Corrections to the published procedure altitudes at the Final Approach Fix and the MDA/DA to ensure adequate obstacle clearance.

With respect to altitude corrections, the following procedures apply:

i. IFR assigned altitudes may be either accepted or refused. Refusal in this case is based upon the pilot's assessment of temperature effect on obstruction clearance.
ii. IFR assigned altitudes accepted by a pilot shall not be adjusted to compensate for cold temperatures, i.e. if a pilot accepts "maintain 3000", an altitude correction shall not be applied to 3000 feet.
iii. When corrections are applied to a published FAF altitude, pilots should advice ATC how much of a correction is to be applied.

Note: Should the crew have doubt about the terrain clearance afforded by an ATC clearance it must be challenged immediately.

4.3.15.17 ILS Approaches

4.3.15.17.1 ILS Coverage

The localiser coverage sector normally extends from the antenna to a range of 25 nm within a minimum of ±10° of the localiser centre-line. The sector widths vary with operational requirements, alternative navigation facilities and the topographical features, e.g. in the UK the average sector width extends to ±35° of the centre-line. Installations with limited coverage i.e. less than ±35° must be used with care, especially when carrying out an automatic coupled approach, and in these cases the ILS Instrument Approach Chart contains a note in the Warnings box, e.g. “Narrow Beam ILS”.

Aircraft must be established on the localiser before descending on the glideslope, because some systems provide extreme accuracies on the centre-line and reduced accuracy at the edge of the glideslope azimuth coverage, which normally extends to ±8° of the localiser centre-line.

4.3.15.18 Descent on the ILS Glide Path

A gross error check of the glideslope must be carried out before initiating descent below SSA or, the last radar cleared altitude or, from the Final Approach Point (FAP); the means by which this should be achieved must be agreed in the Descent Brief.

Additionally:

- Descent must not be made using glideslope information as the sole means of descent guidance until established on the localiser and within 10 nm from touch-down.
- When the glideslope is intercepted from a Flight Level a glide path check referenced to QNH, or where appropriate QFE, is required once descent is commenced.
- When established on the glideslope, the aircraft must not be allowed to descend below the half scale deflection “fly up” indication.
- The actual rate of descent must be checked with the pre-computed rate of descent
- When only one serviceable ILS receiver is in use, or there is a discrepancy between displays, maximum use must be made of other aids and all final approach altitude checks shown on the instrument approach chart should be performed.
- Altitude/Height and rate of descent cross checks should reveal most glideslope errors. The very rare case of constant nil deviation (almost certainly due to a maintenance error) will be difficult to detect especially if the aircraft has been positioned close to the intended glideslope. If the deviation does not change with change of rate of descent, an erroneous glideslope could be the cause; regard as suspicious any glideslope indication that has never been seen to move from zero deviation from the time of its first appearance.
- If the validity of the glideslope indication cannot be verified and satisfactory visual reference for landing has not been achieved, then an immediate Go-Around must be carried out.

4.3.15.18.1 Cat 1 Autoland

Without the appropriate ILS protection, i.e. if Low Visibility Procedures are not promulgated as being in force, Autolands may be performed, using the published Category 1 DA, but the possibility of poor performance, particularly in azimuth, cannot be ignored and must be anticipated.

4.3.15.19 Cat 2 and Cat 3 Approach Procedures

- Descent below the Category 1 DH without visual reference may only be carried out if the appropriate Category 2 or 3 AOM are published in the Instrument Approach Chart or NUBRF and the appropriate Category 2 or 3 procedures are in force and the Captain has checked that they are. Terminology is not standardised, but references in ATIS broadcasts or ATC transmissions to 'Low Visibility procedures in force', or 'Cat 2 approaches in operation', etc. are sufficient.
- A Captain intending to make an approach for which Cat 2 (or Cat 3) minima apply must request this, giving the RVR to which they can operate, on first contact with Approach Control at the aerodrome of intended landing, and in addition, in the case of LHR, on first contact with London Control.
- Landing clearance must be obtained before descending below 200 ft Radio Height without visual reference, otherwise a go-around must be flown.

4.3.16 Missed Approach/Go Around

4.3.16.1 Go Around

All go-arounds must be carried out promptly to ensure a minimum loss of height. This is particularly important:

- Whenever the required visual reference for landing has not been achieved or,
- Whenever the aircraft is displaced laterally or vertically from the desired approach profile or,
- Whenever the Go-Around is carried out from the DA/H or below 200 ft AAL, whichever is the higher,
- Following a Ground Proximity warning, or
- The speed over the runway threshold exceeds V_{REF} + 15 kts during a landing on a runway which is performance limiting in the prevailing conditions, then a go-around must be carried out.

Discontinued approaches initiated at or below 1,000 ft AAL should be carried out using the normal go-around procedure. Above this height the procedure is at the Captains discretion.

If, in marginal weather conditions, two go-arounds have been carried out at an Aerodrome, consideration should be given to diverting or holding until an improvement in the weather occurs.

The decision to attempt a third approach immediately should normally only be made if a significant improvement in the weather conditions has been reported or observed from the flight deck. The options of diverting or holding will be affected by fuel considerations and by forecast weather conditions at the destination and at the alternate.

4.3.17 Minimum Runway Occupancy

Although runway occupancy time is only critical at a few airports that run full most of the day, the following is good practice at any time.

Minimum Runway Occupancy – Departure

- Think ahead.
- Complete pre take off check list in good time.

- Be in position and ready to roll when so cleared.
- If cleared to line up behind departing, do not wait for the departure to start roll before crossing hold line, start pulling forward as soon as possible.
- Most avoidable delay is caused by failure to be in position and aligned when clearance is received, not by any lack of speed of applying thrust.

Minimum Runway Occupancy – Arrival

Although runway occupancy time is only critical at a few airports which run full most of the day, the following is good practice at at any time.

- The object is to avoid excess occupancy, not to be the fastest off the runway.
- Discuss stopping and turn offs during Descent Brief.
- Set autobrakes for appropriate turn off. Add 200 m for a rapid exit taxiway if available.
- Aim for an exit that can be achieved relatively easily rather than an earlier one that might be missed, and be prepared to change plan quickly if it doesn't work out – just missing and then crawling to the next exit is the most wasteful use of the runway imaginable and will certainly cause a go-around behind you.
- Use TCAS relative height data to warn of possibly tight separation situations (±07 = about 1 minute separation).

4.3.18 Landing

4.3.18.1 Overweight Landings

The maximum structural landing weight is a Flight Manual Limitation which must be observed unless a delay to jettison or burn off fuel would expose the aircraft and/or its occupants to additional hazard. On no account may overweight landings be made for commercial reasons.

On aircraft that do not have the ability to jettison fuel and are directed to ‘land at the nearest suitable airport’ or ‘Land ASAP’ by QRH or ECAM drill; once all landing preparations have been completed it is not a requirement to continue burning fuel to achieve MLW.

If an overweight landing is made, landing performance must be assessed for the actual weather conditions and runway at the anticipated landing weight.

4.3.18.2 Crosswind Components

Crosswind limits quoted for landing in type-specific manuals may only knowingly be exceeded in a case of ‘force majeure’.

In operations approaching the crosswind limit the Captain must take account of personal experience on type, experience of any airfield characteristics, wind/gust behaviour and runway surface conditions, e.g. Dry, Wet or Slippery. The maximum reported gust speed and change of wind direction must be taken into account when computing the crosswind component.

4.4 Low Visibility Operations

4.4.1 Preparation

In addition to normal pre-flight planning:

- Check that the destination aerodrome is able to operate to Category 2 or 3
- Consideration should be given to loading extra fuel for holding purposes.
- Check familiarity with Category 2/3 holding points for the take-off runway and any special taxiway routings that should or should not be used.

4.4.2 Taxiing

Make a careful note of the taxi instructions.

Before taxiing, confirm the intended routing clearance, making full use of the aircraft heading reference, airfield chart and low visibility routing chart when available. If available, make full use of ATC ground radar.

Taxi slowly. In poor visibility expect to see bright lights but not unlit or poorly lit objects such as aircraft wingtips or tails. From certain angles aircraft navigation lights do not show up well and the greatest distance from which a white painted aircraft may be visible in 100 m RVR may be less than 50 m.

Pilots should be aware of the effect fog or mist will have in reducing the level of contrast between objects and background, making it difficult to identify potential hazards, and reducing the time available to react to any hazard.

Fog and mist will also degrade the pilots peripheral vision and may impair judgement of taxi speed. Use should be made of the ground speed on the ND. When taxiing, make use of all aircraft lights, i.e. wing, runway turn off, taxi lights, etc. Be prepared to switch off any light which restricts visibility due to glare. DO NOT USE STROBE LIGHTS UNLESS OCCUPYING THE ACTIVE RUNWAY.

During taxiing in poor visibility ensure that procedures and checklists do not conflict with the need to maintain a good look out. If necessary carry out the majority of taxi procedures at, or just before approaching, the holding point. Keep track of the aircraft position at all times and monitor R/T transmissions in order to determine the position of other aircraft and vehicles on the airfield. The crew must ensure that the Category 2/3 holding point is not passed.

After landing, when the aircraft has vacated the runway, the taxiway should not be entered until contact has been made with the appropriate ground movement control, and instructions given and acknowledged. Prior to a turn careful look out should be made in both directions.

4.4.3 Take-off

When lining up on the runway confirm that the aircraft is situated on the runway centreline lights and not the edge lights. Use the ILS centreline indication if available. Check that the number of centreline lights is consistent with the reported RVR. Use the centreline lights and/or markings for directional guidance. As speed increases, the streaming effect of these improves and directional control becomes easier.

Rejected Take-off

If it is necessary to reject the take-off in low visibility conditions, directional control with reference to the centreline lights may become relatively less easy as speed is reduced. Apply full braking to ensure aircraft stops before the end of the runway. The centreline lights change to alternate red and white at 900 m of runway remaining, ground speed at this point should not be greater than 90 kts. The centreline lights change to continuous red lights at 300 m remaining.

4.4.4 Approach

It is BAVirtual policy that following any LVO approach to minima below Cat I, an Autoland followed by auto rollout (if capable) should be completed. LTS Cat I, Cat II, OTS Cat II and Cat III approach procedures are approved for use if the associated minima are published on the relevant approach chart, unless a contrary restriction is published on the airfield OM C brief.

LTS Cat I, Cat II, OTS Cat II and Cat III approach procedures may only be utilised operationally if Low Visibility Procedures (or equivalent in non-EU countries) are in force, including RVR reporting – it is not permissible to conduct LVO approaches using reported meteorological visibility. Terminology is not standardised, but references in ATIS broadcasts or ATC transmissions to 'Low Visibility procedures in force' or 'Cat II approaches in operation', etc, are sufficient.

Note: A minima column which contains 'ACFT MAX 65/7' indicates that the minima values are only usable by aircraft with a maximum wing span of 65 m and, when in the landing configuration, a vertical distance between the flight path of the landing gear and glide path antenna of a maximum of 7 m. In BAVirtual, these minima may be used by all aircraft except the A380.

A Commander intending to make an approach for which Cat II or Cat III minima apply must request this, on first contact with Approach Control at the aerodrome of intended landing, and in addition, in the case of LHR, on first contact with London Control.

Landing clearance must be obtained before descending below 200 ft Radio Height without visual reference, otherwise a go-around must be flown.

In order to make an approach to Cat IIIB minima (with or without Decision Height), an aeroplane is required to be equipped with a fail-operational autopilot, which must be functioning. If the aircraft capability downgrades to fail-passive, the lowest minima which may be used are Cat IIIA. The functional capabilities of the aircraft are indicated to the crew as follows:

Aircraft Capability	Airbus Fleets	Boeing Fleets	E190	Lowest Usable Minima
Fail Passive	CAT 3 SINGLE/ LAND 3 SINGLE	LAND 2	AUTOLAND 1	Cat IIIA
Fail Operational	CAT 3 DUAL/ LAND 3 DUAL	LAND 3	Not Authorised	Cat IIIB

4.4.4.1 Before Commencing Approach

Prior to commencing a Cat 2/3 approach confirm that:

- A Cat 2/3 approach is available
- Low Visibility Procedures are in force
- Aircraft technical status allows for a Cat 2/3 approach/landing

4.4.4.2 Briefing

In addition to the normal approach briefing, the following items should be covered:

- Low visibility procedures confirmed in force
- Alternate – check weather above required minima, sufficient fuel for holding and for diversion if a landing at destination is not assured
- Downgrade options – consider available options with regard to current RVR
- Flight deck lighting – internal lighting should be set to the minimum brightness consistent with viewing the instruments. Consider leaving landing, taxi and turnoff lights switched OFF to reduce glare.
- Seat position – confirm a good view over the aircraft nose

4.4.4.3 Commencing Approach

When the RVR is close to, or below, minimum, and it is necessary to make a decision either to remain in the holding pattern for an improvement or to divert, Captains should bear in mind that the weather conditions in-sim will only change with a new METAR. The time of the current METAR and the expected next METAR (normally at 30 minute intervals) should be considered.

It is particularly important to include the phrase “Request CAT 2/3” as appropriate on first contact with the Approach Controller. Note that the protections applied to CAT 2/3 conditions may be relaxed if the visibility improves to CAT 1 or better; the initial call prompts ATC to pass the current operational status.

If the RVR falls below minimum the Captain may continue the approach to 1000 ft AAL but must discontinue the approach by that height if the RVR is still below minimum. If the RVR falls below minimum after passing 1000 ft AAL then the approach may be continued to the briefed decision height. RVRs passed after the 1000 ft point are advisory only.

4.4.4.4 Final Approach

Normal approach procedures should be observed. Flap and gear selection should be slightly earlier than usual to allow for the weather conditions.

1000R
At 1,000 ft Radio Height the “1000” auto-callout will sound. Check the aircraft configuration and, if stable, announce “Autoland X Radio”, where X is the DH in use. If operating with no DH, the call is simply “Autoland”. Monitor for any abnormalities, deviations from the flight path or unexpected changes to FMAs.

Approaching Decision Height
Approaching DH you should be seeking visual reference and respond promptly to the “Minimums” or “Decide” call. If the required visual references are satisfied the approach may be continued. If visual reference is lost below DH a go-around must be carried out.

Landing
Do not report “runway vacated” until the aircraft is well clear of the runway or outside the protected area if applicable. It is important to fully aware of the runway exit point you have used as it will provide a reference point for the taxi in routing.

If at any time you become uncertain of your position on the airfield you must inform ATC immediately.

4.4.4.5 Go-around

If, at the “Decide” call, the Captain is not satisified that there is adequate visual reference to continue the approach, the call should be “go around” and the go around manoeuvre initiated. A go around initiated below 10ft, whether auto or manual, may result in ground contact. Runway length permitting, a go around may be initiated at any time during the landing process prior to selection of reverse thrust.

4.5 Extended Range Twin Operations (ETOPS)

4.5.1 Definitions

4.5.1.1 Adequate Airport

An adequate airport is an airport which satisfies the aircraft performance requirements applicable at the expected landing weight, and which is sufficiently equipped to be safely used. In particular, at the anticipated time of use, it should be available and equipped with the necessary services, including ATC, weather information and at least one let down aid for an instrument approach.

4.5.1.2 Suitable Airport

A suitable airport is an adequate airport which satisfies the dispatch weather minima requirements for ceiling and visibility within the required validity period. Airport conditions should also ensure that a safe landing with one engine and/or airframe system inoperative is possible.

4.5.1.3 Equal Time Point

A point along the intended route at which the estimated time needed to fly direct to two En-route Alternates is equal. Equal Time Points for the nominated ETOPS alternates are published on the Operational Flight Plan.

4.5.1.4 ETOPS Segment

The part of the aircraft's route where it is more than the Threshold Distance (qv) from a Suitable Airport (qv).

4.5.1.5 ETOPS Significant Systems

Aircraft systems contributing to the safe conduct of the flight to the extent that defects necessitate either diversion, or rectification before further ETOPS flights, or reporting to the relevant authority in accordance with the aircraft's ETOPS approval.

4.5.1.6 Maximum Approved Diversion Time

See *Rule Time*.

4.5.1.7 One-engine Inoperative Speed

The speed, approved by the CAA, for the calculation of Rule Distance and Threshold Distance.

4.5.1.8 Rule Distance

The distance travelled in still air in the Rule Time, at the normal one-engine inoperative cruise speed.

4.5.1.9 Rule Time

The maximum permitted still-air flying time which any point on the route may lie from a Suitable Airport (qv).

4.5.1.10 Threshold Distance

The distance travelled in still air in 60 minutes at the normal one-engine inoperative cruise speed.

4.5.1.11 Fuel and Oil Supply

The aircraft fuel and oil supply must be adequate to allow the aircraft to reach its destination or a planned alternate after the combined failures of an engine and pressurisation or the failure of pressurisation alone at the critical point on the route.

4.5.1.12 Electrical Generators

Three generators are required for dispatch under 180 minutes ETOPS.

Refer to MEL for detailed requirements.

4.5.2 ETOPS Alternate Airfields

ETOPS En-route Alternates should, at the time of anticipated use:

a. Be available, and equipped with necessary ancillary services, such as ATC, sufficient lighting, communications, weather reporting, navigation aids and safety cover; and

b. Have at least one instrument approach procedure. a. and b. together constitutes an ‘Adequate Airfield’.

c. Be a ‘Suitable Airfield’, at which weather reports and/or forecasts indicate that, between the anticipated time of landing until one hour after the latest possible time of landing, the weather conditions are above the appropriate planning minima.

Note: This implies that the appropriate time window should be within ATC hours of watch, either normal or, when necessary, specially extended.

4.5.3 ETOPS Planning Minima

Owing to the variability of weather conditions, the en-route alternate weather minima for ETOPS planning purposes are higher than normal minima and must meet the criteria contained in the following table:

Approach Facility	Alternate Airfield Ceiling	Weather Minima Visibility/RVR
Precision approach procedure	Authorised DH/DA plus 200 ft	Authorised visibility plus 800 m
Non-precision approach or circling approach	Authorised DH/DA plus 400 ft	Authorised visibility plus 1500 m

Note: METAR winds are in degrees True. Crosswind limits are unaffected by engine status.

These planning minima will only be used if the expected crosswind (mean wind and gusts) does not exceed the maximum permitted for landing, taking into account the surface conditions. For an ETOPS en-route alternate, the latest available forecast weather conditions must equal or exceed the planning minima. Simbrief will make the appropriate assessments and automatically select ETOPS alternates which meet the criteria at the anticipated time of use.

4.5.4 ETOPS En-route Minima

Once the ETOPS flight has been dispatched, suitability of an en-route alternate airfield in terms of weather conditions is determined by reference to the normal minima.

If weather conditions at an en-route alternate deteriorate to the point that, in the event of a diversion to that airfield, a successful approach and landing is in doubt, Captains should consider re-routing so that any diversion could be made to a more suitable airfield.

4.5.5 Captain's Responsibility

The Captain must satisfy himself that suitable airfields are available for the intended operation and that any ATC clearance, including any re-route, complies with ETOPS rules. The Captain must not accept any clearance which does not comply. It is the Captain's responsibility to be aware of the nearest suitable alternate airfield at all times.

4.5.6 Interpretation of Forecasts

The Flight Planning system interpretation of TEMPO, PROB and BCMG in forecasts, when determining airfield suitability, complies with normal guidance in accordance with Application of Forecast Conditions. Cloud amounts of FEW and SCT do not define the ceiling; thus, a forecast of FEW003 SCT005 BKN008 is interpreted as a ceiling of 800 ft.

4.5.7 ETOPS Critical Fuel Reserves

Regulations for ETOPS specify that, at the flight planning stage, in addition to normal fuel requirements, fuel must be available to permit a diversion to a suitable alternate airfield. This Critical Fuel must include an allowance for holding and approach. Cases which must be considered are:

- Total pressurisation failure, followed by two-engine diversion.
- Engine failure and simultaneous pressurisation failure, followed by a single-engine diversion.
- Engine failure, followed by drift-down to stabilising altitude and a single-engine diversion.

Simbrief will automatically compare anticipated fuel on board and the critical fuel at each ETP to ensure compliance with the Critical Fuel Scenario requirements and add extra fuel as necessary. The critical fuel calculation includes allowances at each ETP for both engine and airframe icing, 15 minutes holding and 5% contingency. In adverse conditions it is expected that contingency fuel may be partly or entirely used en route.

When contingency fuel is used en route, it is recognised that, occasionally, the actual fuel on board at an ETP may be less than the Critical Fuel figure published on Operational Flight Plan. This is acceptable owing to the extremely low probability of a decompression occurring precisely at the ETP in those particular adverse conditions, and the margins built in to the Critical Fuel figure ensure that it should always be possible to reach the alternate, albeit with reduced holding potential.

4.5.8 Fuel Management

During a flight which contains an ETOPS segment, a fuel check should be performed at each waypoint of the ETOPS portion of the flight. If the flight is re-routed away from the original Operational Flight Plan routing, fuel checks should be performed when the distance to destination is equal to that of a waypoint on the original Operational Flight Plan routing. On ETOPS sectors, full use should be made of meteorological information to monitor the weather at the declared ETOPS and other en-route alternates.

4.5.9 ETOPS Significant Systems

ETOPS significant systems are those which have a fundamental influence on flight safety and can be adversely affected by an engine shutdown. Confirmation of serviceability is especially important for the ETOPS significant systems to ensure that any defects are rectified prior to departure.

4.6 Punctuality

4.6.1 General

4.6.1.1 Policy

BAVirtual policy is to operate its services on schedule and therefore punctuality must have high priority.

BAV policy is to have doors closed by STD-3 ready for an on time departure.

BAV pilots are **not** required to operate flights at the real-world time published in the flight schedules and may operate at any time they desire. Punctuality at BAV is therefore measured in terms of the scheduled block duration (pushback to shutdown) against the actual block duration.

4.6.2 Transits and Turnarounds

Every effort must be made to make up time if an aircraft arrives late on a turn round or transit. However, the Captain must ensure that safety is not compromised when reducing turnaround times to regain schedule.

4.6.3 Arrivals

Normal policy at all stations is that the Flight Crew should plan to arrive on stand between STA-15 and STA (for BAV purposes, scheduled block duration to scheduled block duration -15 minutes).

In particular, at LHR every effort should be made not to land before STA-20, with the objective of being on the gate between STA-15 and STA.

If the ETA at LHR/ LGW is earlier than the appropriate target time, including any estimate of holding, taxi as slow as possible and fly at a speed to land as close to the appropriate target duration as possible.

It is not policy to load extra fuel with a view to increasing speed. However, Captains may use contingency fuel if necessary to ensure a punctual arrival.

4.6.3.1 Arrival Restrictions

Flights into LHR scheduled with a STA of 0615(L) or earlier must not land before 0432(L).

Other flights must not land before 0602(L), except in an emergency or where a landing before 0602(L) is specifically requested by ATC.

Except in an emergency, no flight into LGW should land before 0602(L) unless scheduled with a STA of 0615(L) or earlier.

LCY cannot accept arrivals before 0630(L) – crews must not land before this time, and will be asked to hold.

Crews should also consider that it is possible to depart and arrive across two different seasonal boundaries and allowances for time change must be calculated pre-departure to avoid arriving before a restricted time.

4.7 Abnormal and Emergency Procedures

4.7.1 Flight Continuation Policy for 4-Engined Aircraft

Following an engine failure, the decision to continue the flight will be made after reviewing the following factors:

1. **Cause of Engine Failure/Shutdown**

   The circumstances leading to the engine failure/shutdown should be carefully considered to ensure that the aircraft is in a safe condition for extended onward flight. Unless an immediate landing is required the flight should continue en-route.

2. **Second Engine Failure**

   From the 2 engine performance data in the FCOM/In-Flight performance application, extract the final 2 engine altitude, drift down distance and speed. By reference to the immediate and future MSAs on the Operational Flight Plan, decide whether a turnback or re-routing is required. Any necessary escape routes should be considered.

3. **Diversion Airfields**

   Whatever course of action is chosen, suitable diversion airfields need to be selected for use in the case of a second engine failure. Both Alternate and Emergency airfields should be considered and weather reports obtained. These should be continually updated as the flight progresses.

4. **Range and Endurance**

   From the 2 engine flight planning chart/In-flight performance application, extract range and endurance to ascertain how far the flight can continue in the event of a second engine failure. From this information likely suitable diversions can be planned. The range and likely diversion airfields should be updated as the flight progresses. The FMS is unable to supply fuel and time predictions for 2 engine flight until the second engine has failed. There is no FMS facility to look ahead at this data whilst flying on three engines.

Once the above considerations have been satisfied BAV policy is generally to continue to destination or to a BAV served airfield as close as possible to it.

4.8 Augmented Flight Crew Procedures

4.8.1 General Policy

These guidelines detail the operational proceduers for augmented flight crew operations.

All BAV aircraft are certified for a two-crew operation; therefore the help of the RP(s) or P3 should not interfere with the normal crew operation. For example, the RPs should not operate systems (e.g. ACARS) unless asked to do so by the operating crew.

Previous incidents have highlighted that there is a risk of reduced vigilance by the operating crew when relief crew are carried. It is essential that the operating crew continue to apply the highest standards of threat and error management – the intervention or assistance of the P3 should not be relied upon.

4.8.2 In-flight Rest Periods

All crew members must be rested and fit for duty at report. On the day, allocation of crew rest periods is the responsibility of the operating Commander. Operating crew who are taking in-flight rest in bunks or passenger seats must be woken not less than one hour before landing. They should be seated at the controls at least 30 minutes before top of descent.

These are minimum times and should be extended as required when operating to an unfamiliar destination, in non-normal circumstances or in difficult weather conditions.

4.8.3 Acting Pilot in Command and Operating Roles

The aircraft Commander, when taking rest, will explicitly designate the acting pilot-in-command (APIC) before leaving the flight deck. This will normally be in order of rank, but the Commander will determine the most appropriate APIC taking into account suitability, experience and seniority. First officers who are currently designated as Category C are ineligible for APIC, and must notify the Commander of their status.

When occupying an operating seat, the RP(s) will assume the role of either PF or PM. Following a crew change, the Commander (or APIC) will explicitly agree and designate which pilot is undertaking which role. The new operating crew must be absolutely clear on the allocation of PF/PM tasks.

4.8.4 Flight Planning

All flight crew members should be involved in and contribute to the planning and briefing process. Maximum use should be made of the knowledge and experience of all crew members. It is accepted that in certain circumstances it may be advisable for the RP(s) to proceed to the aircraft to start the departure procedures whilst the operating crew carry out the pre-flight briefing process. In these cases, a comprehensive briefing should be given to the RP(s) before departure.

4.8.5 Monitoring

Any RP(s) present in the flight crew compartment should be prepared to alert the operating crew to any unsafe condition or situation at any time. When taxiing, RP(s) should be aware of the risk of ground collision and contribute to maintaining an effective lookout and high situational awareness.

When carried, at least one RP shall be designated as P3 to remain in the flight crew compartment for taxi, take-off, climb to and descent below FL200 (or MSA, if higher) and landing. The P3 must occupy the first observer's seat (behind and between the operating seats), with a clear view of the EICAS/ECAM and flight instruments.

4.8.5.1 Briefing

The Commander will ensure that the P3 is briefed before departure and again before approach. Where possible, the P3 should be present for and contribute fully to the operating crew's briefing. Where it has not been possible for the P3 to be present for the operating crew's briefing, a specific brief will be given to the P3. This will include salient threats, avoidance/mitigation strategies, appropriate intervention by the P3 and any special considerations. The P3 must have a clear understanding of the plan, and in particular any potential threats, in order to be able to effectively and proactively monitor.

4.8.5.2 Intervention

The primary role of the P3 is to act as a second monitoring pilot during critical phases of flight.

The P3 is authorised and encouraged to intervene where necessary, as briefed by the operating crew. The timing and necessity of any such intervention should be carefully considered so as to avoid unnecessary distraction to the operating crew. During take-off and final approach, the P3 must be ready to intervene verbally, and should have their Discord settings in voice activation mode if possible.

During take-off, the P3 will alert the Commander to any malfunction or unsafe condition that has not already been called out by the operating crew.

During approach, the P3 will intervene to alert the operating crew to any unsafe condition or a potentially high-energy or unstable approach. At or below the 1000 ft auto-callout, this may include calling "Go-Around", though consideration should be given to alerting the operating crew with enough time to prepare for a go-around without having to initiate it immediately.

Once the flare manoeuvre has been commenced, the P3 may not have sufficient visual reference to accurately judge the touchdown point. Whilst in the flare, the P3 should only call "Go-Around" if it is immediately obvious that the aircraft is at risk.

4.8.5.3 Other Duties

The Commander may ask the RP(s) to perform certain other duties to assist the operating crew. Duties that may be completed by RP(s) preflight include the external check, cabin inspection and delegated duties in the flight crew compartment. Post-flight, the RP(s) may assist with administrative duties, as requested by the Commander.

4.8.6 Crew Change Handover

A full handover briefing must be given to the crew taking over the flying duties, as defined in OM B Crew Change Handover Briefing.

Relief pilots are required to review the location of safety critical equipment and switches, and relevant emergency procedures when operating in an unfamiliar seat. This need not be achieved on every sector but sufficiently frequently to maintain individual competency.

4.8.7 Non-normal Operations

During any non-normal situation, full use may be made of any RP at the discretion of the Commander. The Commander must ensure that this does not disrupt the completion of non-normal procedures and SOPs, which are written in the assumption of a two-crew operation. The primary role of the RP(s) will be to monitor and assist where requested, they should not be used to action non-normal checklists.

4.8.8 Line Checks and Safety Pilots

In circumstances where a line check is being conducted, the training captain will only be considered as part of the flight crew complement when they are seated in an operating seat. The flight will otherwise be conducted as a two-crew operation, with the training captain normally taking no active part other than to observe. In emergency situations or where safety is impacted, maximum use may be made of the training captain and they must intervene in accordance with OM A Monitoring above. The training captain will brief the operating crew in accordance with OM D Line Check with the LCC having Additional In-flight Relief Duties. Where a safety pilot is carried, they will be designated as P3 and act in accordance with OM A Monitoring above.

5 Handling, Notifying and Reporting Accidents, Incidents and Occurrences

5.1 Notification to ATC

The Commander should notify Air Traffic Control as soon as practicable in the event of an in-flight incident in any of the following categories:

- ACAS (TCAS) Resolution Advisory
- Dangerous goods

Any of the following SIGMET conditions must be reported to ATC immediately by R/T if the Commander considers that they are likely to affect the safety of other aircraft.

- All heavy, severe or widespread cases of hail
- Icing
- Line squalls
- Mountain waves
- Sandstorms or dust storms
- Thunderstorms
- Tropical revolving storms
- Volcanic ash
- Turbulence
- Runway braking action below reported RWY condition code

Such messages must be prefixed “AIREP SPECIAL”.

In the event of a lightning strike an ASR should be filed, and the effect of the strike on the aircraft’s instrumentation or systems should be noted. If flight instrumentation was not affected this should be stated.

5.1.1 Turbulence

Levels of turbulence are defined as:

- Light: Light Turbulence: Slight changes in attitude or altitude or changes in IAS of 5-15 kt
- Light Chop: Slight bumpiness without changes in attitude, altitude or IAS. Occupants may feel a slight strain against seat belts though no difficulty is encountered in walking.
- Moderate: Moderate Turbulence: Turbulence that is similar to light turbulence but of greater intensity, changes in attitude and or altitude occur, IAS fluctuates 16–25 kts but the aircraft remains in positive control at all times.
- Moderate Chop: Turbulence that is similar to light chop but of greater intensity causing rapid bumps or jolts without appreciable changes in attitude or altitude. Occupants feel definite strain against seat belts or shoulder harness. Unsecured objects are dislodged. Food service and walking are difficult.
- Severe: Severe Turbulence: Turbulence that causes large, abrupt changes in attitude or altitude. Aircraft may be momentarily out of control. IAS fluctuates by more than 25 kts. Occupants are forced against seat belts or shoulder harness. Unsecured objects are tossed about. Food service and walking are impossible.

The continuity of turbulence should be described as:

- Occasional: Less than 1/3 of the time
- Intermittent: 1/3 to 2/3 of the time
- Continuous: More than 2/3 of the time

Severe turbulence must be reported to ATC giving position, time (GMT), FL/Altitude, A/C type, intensity, in or near cloud and duration.

If severe turbulence is encountered an ASR must be raised.

If the Commander considers the turbulence experienced is severe enough to warrant an engineering check of structural integrity on the aircraft, they must inform Engineering so that a turbulence check may be made.

5.1.2 Windshear

Windshear encountered on take-off or approach must be reported to ATC immediately by R/T if considered a hazard giving details of height and severity.

Severe windshear is considered to be uncontrollable changes from normal steady flight conditions below 1000 AGL, in excess of the following:

- 15 kts indicated airspeed
- 500 fpm vertical speed
- 5° pitch attitude
- 1 dot displacement from the glideslope/glidepath
- Unusual thrust levels for a significant period of time

5.1.3 Bird Strikes and Hazards

The Commander shall immediately inform the appropriate ground station whenever a potential bird hazard is observed.

5.1.4 Runway Braking Action

If the Commander considers the braking action encountered during the landing roll to be worse than reported, ATC must be notified as soon as practicable by means of AIREP Special.