ENR 1.5 HOLDING, APPROACH AND DEPARTURE PROCEDURES

1 Holding and Approach to Land Procedures

1.1 General

1.1.1 UK Holding and Instrument Approach Procedures are designed using criteria contained in ICAO Document 8168-OPS/611 (PANS-OPS) VOL II. These criteria include:

(a) The use of Obstacle Clearance Height (OCH) as the basic obstacle clearance element in calculating minima;

(b) aeroplane categories related to speed, which can result in a reduction of Obstacle Clearance Heights for the more manoeuvrable aeroplanes;

(c) the definition of a Missed Approach Point for non-precision procedures;

(d) the use of the term 'Decision Height' in relation to precision procedures and 'Minimum Descent Height' in relation to nonprecision and Visual (Circling) procedures.

1.1.2 The UK Holding and Instrument Approach Procedures appear at AD 2.24.

1.1.3 PANS-OPS stresses the need for flight crew and operational personnel to adhere strictly to the published procedures in order to achieve and maintain an acceptable level of safety in operations. →

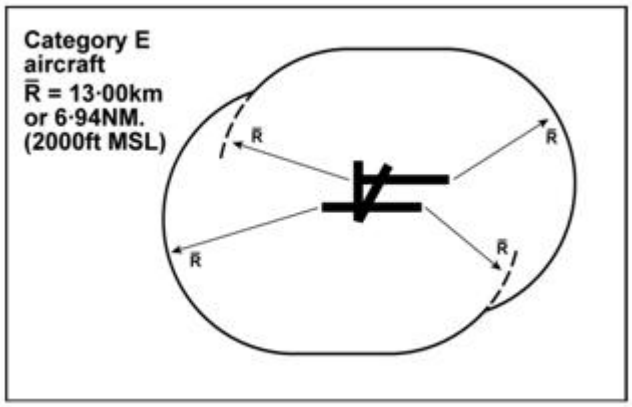
2 Visual Manoeuvring (Circling) VM(C) in the Vicinity of the Aerodrome after Completing an Instrument Approach

2.1 Introduction

2.1.1 Visual Manoeuvring (Circling) VM(C) is the term used to describe the visual phase of flight, after completing an Instrument Approach, where an aircraft is manoeuvred into position for a landing on a runway which is not suitably located for a straight-in approach.

2.1.2 The VM(C) area is the area in which obstacle clearance has been considered for aircraft manoeuvring visually before landing. Aircraft performance has a direct effect on the airspace and visibility needed to perform the circling manoeuvre; since the most significant factor in performance is speed, the size of the VM(C) area varies with the category of the aircraft. The limits of the area applicable to each category of aircraft are defined by combining arcs centred on the threshold of each usable runway; the total area thus enclosed is the VM(C) area - see example at Figure 1.

Figure ENR 1.5-1: Construction of Visual Manoeuvring (Circling) Area for a Category E Aircraft



2.2 Obstacle Clearance

2.2.1 When the VM(C) area has been established, the Obstacle Clearance Height (OCH) is determined for each category of aircraft. The criteria used to determine the OCH is as follows:

Table ENR 1.5-1: Table 1 - Visual Manoeuvring (Circling) - Criteria for Determining OCH.

Aircraft Category	Maximum Speeds for Circling (kt)	Circling Area Maximum radii from RWY THR (nm)	Minimum Obstacle Clearance (ft)	Lowest Permissible OCH aal (ft)
A	100	1.68	300	400
B	135	2.66	300	500
C	180	4.20	400	600
D	205	5.28	400	700
E	240	6.94	500	800

2.3 Sectorization of Visual Manoeuvring (Circling) Area

2.3.1 It is permissible to eliminate from obstacle clearance consideration a particular sector, within the total VM(C) area, where the sector lies outside the final approach and missed approach areas; this 'eliminated' sector is determined by the dimensions of the ICAO Annex 14 instrument approach surfaces - see example at Figure 2.

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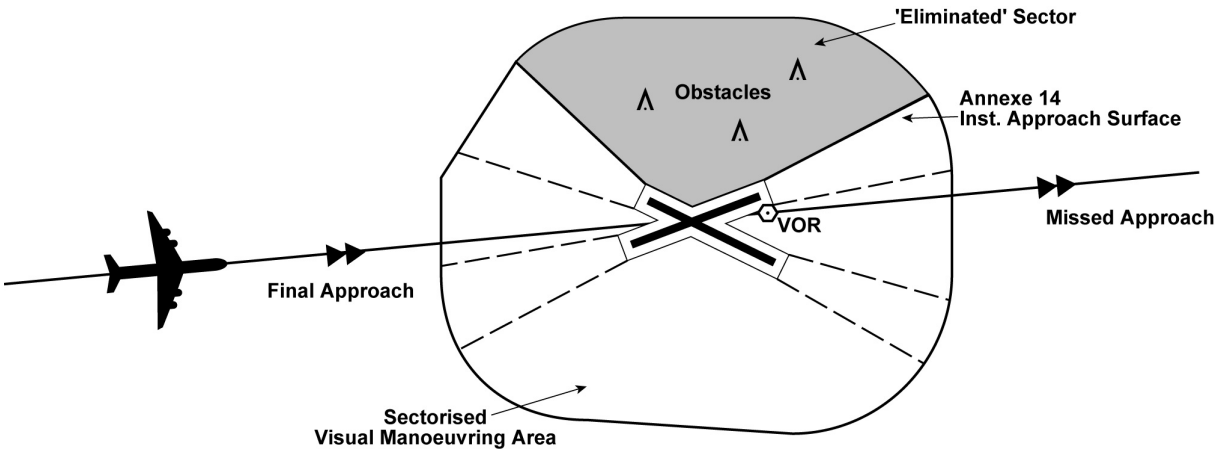
Figure ENR 1.5-2: Sectorized Visual Manoeuvring (Circling) Area



2.4 **Obstacle Clearance Heights for Aerodromes with Published Instrument Approach Procedures**

2.4.1 When the principle of sectorization has been applied to a particular aerodrome, two OCHs for VM(C) will be promulgated at AD 2.24. The first OCH will allow a pilot to manoeuvre safely within the total VM(C) area and the second OCH is for the pilot who exercises the option to avoid manoeuvring within the eliminated sector and restricts his visual manoeuvring to the remaining sectorized area.

3 Summary of Holding and Approach to Land Procedures at Individual Aerodromes

Introductory Notes

3.1 † For precision approach procedures (ILS) QFE values are above threshold elevation of the runway direction to which the procedure applies. For non-precision approach procedures QFE values are above aerodrome elevation except for those approaches indicated on the IAC by '†' which are above threshold elevation of the runway direction to which the procedure applies. QNH and amsl values are shown in **bold** and QFE values (other than OCHs) in parentheses ( ).

3.2 In the missed approach procedure the altitudes (heights) given are those to be attained on Go-Around in the absence of ATC instructions and should normally be flown using QNH altimeter setting for the aerodrome.

3.3 Where the term 'straight ahead' is used in missed approach procedures, pilots should maintain Final Approach Track (FAT) unless a different track is given.

3.4 There are two types of VDF procedure, QDM and QGH. In the QDM procedure the pilot calls for a series of QDM and uses them to follow the published approach pattern, making his own adjustment to heading and height. In the QGH procedure the controller obtains bearing from the aircrafts transmissions, interprets this information and passes to the pilot headings and heights to fly designed to keep the aircraft in the published pattern. Normally, at civil aerodromes, only QDM procedure is available; however, in some cases, for specific operational reasons, there will be provision for QGH procedure. Those aerodromes that have been approved to carry out both types of VDF procedure will have this provision shown against the procedure. Pilots are reminded that it is their responsibility to ensure with ATC that the correct procedure is being flown.

3.5 These procedures have been established in accordance with the ICAO PANS-OPS, except for those UK differences shown at GEN 1.7. While certain specified allowances for wind effect have been made in determining the areas which will contain the various procedures, it is emphasized that these Holding and Approach to Land procedures are based on still air conditions and in practice due allowances must be made for wind.

3.6 **Shuttle Procedure:** is a procedure designed to allow for descent and/or positioning after arrival and prior to the commencement of the instrument descent procedure.

3.7 For availability of Instrument Approach Charts, see GEN 3.2.

3.8 Aircraft Categorization

Aircraft Category A	- nominal V_{at} less than 91 kt IAS
Aircraft Category B	- nominal V_{at} 91 kt to 120 kt IAS
Aircraft Category C	- nominal V_{at} 121 kt to 140 kt IAS
Aircraft Category D	- nominal V_{at} 141 kt to 165 kt IAS
Aircraft Category E	- nominal V_{at} 166 kt to 210 kt IAS

Note: *Nominal V_{at} is defined as 1.3 x the stalling speed in the landing configuration at maximum certificated landing mass.*

3.9 **Descent Gradient**

3.9.1 To permit the approximate rates of descent required in the intermediate and final approach segments of non-precision Instrument Approach Procedures to be calculated, whenever an Intermediate Fix (IF) or Final Approach Fix (FAF) is included in a

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nonprecision procedure, the descent path required in the corresponding approach segment will be specified, as a percentage gradient.

3.9.2 The approximate rate of descent required, in feet per minute, in a particular segment, is equal to the product of Groundspeed (kt) and Gradient (%).

3.9.3 A table of rounded rate of descent values for a selection of Groundspeed (G/S) and gradient values is given below:

Rate of Descent from Groundspeed and % Gradient, feet/minute (Rounded Values)

	Groundspeed							
% Gradient	**60**	**80**	**100**	**120**	**140**	**160**	**180**	**200**
0.1	5	10	10	10	15	15	20	20
0.2	10	15	20	25	30	30	35	40
0.3	20	25	30	35	40	50	55	60
0.4	25	30	40	50	55	65	70	80
0.5	30	40	50	60	70	80	90	100
0.6	35	50	60	70	85	95	110	120
0.7	45	55	70	85	100	115	130	145
0.8	50	65	80	100	115	130	145	165
0.9	55	75	90	110	130	145	165	185
1.0	60	80	100	120	140	160	180	200
2.0	120	160	200	240	280	320	370	410
3.0	180	240	300	360	420	480	550	610
4.0	240	320	400	490	570	650	730	810
5.0	300	400	510	610	710	810	910	1010
6.0	360	490	610	730	850	970	1090	1220

eg % gradient 5.2, G/S 120 kt, Rate of Descent required 635 ft/min

3.10 **Visual Manoeuvring (Circling) OCHs**

3.10.1 Visual Manoeuvring (Circling) (VM(C)) OCHs are listed for the total VM(C) area, and where operational advantage can be gained by sectorization, for the relevant sectorized VM(C) area also.

3.10.2 Where the OCH, appropriate to Aircraft Category, of the Instrument Approach Procedure (IAP) which precedes the visual manoeuvre is higher than the relevant VM(C) OCH listed for that Aircraft Category, the OCH of the IAP shall be the lowest OCH for Visual Manoeuvring (Circling) following that approach.

3.11 **Procedure Turns**

3.11.1 Except where an 80°/260° procedure turn is specifically prescribed, procedure turns specified in instrument approach procedures may be flown as 45°/180° or 80°/260° type, at pilots discretion.

3.11.2 Since the 80°/260° procedure turn occupies less airspace along track than the 45°/180° type, aircraft completing an 80°/260° manoeuvre will normally return to the extended Final Approach Track approximately 1 nm closer to the FAP or FAF (when provided) than if a 45°/180° manoeuvre had been used; pilots using an 80°/260° manoeuvre should allow for this factor when preparing for any subsequent inbound descent. Where an 80°/260° procedure turn is specifically prescribed, due allowance for this factor will already be provided in the procedure design.

3.12 **Alternative Race-track Procedure**

3.12.1 Extensions to holding patterns may be specified in some cases as alternative procedures for use after holding. Where such alternative procedures are joined without first entering the hold, they should be joined and flown as race-track procedures. However, because of the requirement to intercept the inbound track before returning to the facility following a Sector 1 parallel entry in such procedures, and its effect on the distance available for any subsequent descent, aircraft joining a race-track procedure from Sector 1 are recommended to join the hold prior to entering the race-track.

3.13 **Established**

3.13.1 Aircraft are considered to be 'established' when they are within half full scale deflection for the ILS and VOR, or within ± 5° of the required bearing for NDB(L).

3.14 **Missed Approach Climb Gradient**

3.14.1 Unless otherwise specified, the normal climb gradient upon which Missed Approach Procedures are based is 2.5% (1 in 40).

4 Radar Approach Procedures - Obstacle Clearance Heights and Missed Approach Procedures

4.1 **Operating Information**

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4.1.1 During the Intermediate phase of the procedure the pilot will be asked to check both his Minima and the Missed Approach Point (MAPt); he will not be given the Obstacle Clearance Height (OCH) for his category of aircraft nor the location of the MAPt unless he specifically requests this information.

4.1.2 SRA procedures designed to ICAO PANS-OPS criteria permit descent on final approach to the OCH (subject to any specified height/distance (Step Down Fix (SDF) limitation), without regard to the 'advisory heights' given by the Controller. These 'advisory heights' are not essential for obstacle clearance and are only provided as a guide to pilots wishing to maintain a constant angle descent path.

(a) Pilots flying an SRA requiring the alternative datum profile, will be passed advisory altitudes/heights based on the appropriate datum and rounded up to the nearest 10 ft.

4.1.3 Pilots are recommended to fly to the radar advisory heights. However, where an SDF is specified as part of the procedure the SDF 'not-below' height is mandatory. Adherence to the nominal glidepath defined by advisory heights will ensure compliance with SDF minimum height requirements.

4.1.4 A MAPt is designated for each procedure; it is normally located at the point where the radar approach terminates (Radar Termination Range (RTR)). However, where operationally advantageous, the MAPt for the 2 nm SRA may be designated as 1 nm after RTR (ie 1 nm before threshold).

Note: *Where the MAPt is designated as 1 nm after RTR, talkdown will still cease at 2 nm (RTR), and it will be the pilots responsibility to determine when the MAPt has been reached.*

4.1.5 QNH values in the Missed Approach Procedures are shown in bold and QFE values in (parentheses). QFE values are above aerodrome elevation except for those procedures indicated '†' which are above threshold elevation of the runway served by the procedure. Threshold elevations are shown against the relevant aerodrome in the aerodrome/airport schedules in the AD Section.

4.2 **Advisory Heights for Surveillance Radar Approach Procedures**

4.2.1 The nominal glidepaths upon which the advisory heights for particular procedures are based, are annotated in the procedure descriptions within the IACs.

4.2.2 The table below shows the advisory heights applicable to approximate 2.75°, 3°, 3.25° and 3.50° glidepath.

Range from Touchdown (nm)	2.75° Glidepath	3° Glidepath	3.25° Glidepath	3.5° Glidepath
4.5	1350	1400	1575	1650
4	1200	1250	1400	1500
3.5	1050	1100	1225	1300
3	900	950	1050	1125
2.5	750	800	875	925
2	600	650	700	750
1.5	450	500	525	550
1	300	350	350	375

5 FM Broadcast Interference

5.1 Aircraft ILS/VOR equipment may experience interference from high powered FM broadcast stations in the radio frequency band 88 - 108 MHz (GEN 3.4 refers). Pilots are warned that instrument approach procedures based on ILS/VOR may not be available.

6 Protection of Instrument Approach Procedures at Aerodromes outside Controlled Airspace

6.1 Aerodromes located outside Controlled Airspace, for which Instrument Approach Procedures (IAP) are published, are identified by a 'cone' symbol on the Aeronautical Charts ICAO Scale 1: 500 000 United Kingdom and the Topographical Air Charts of the United Kingdom Scale 1: 250 000. Portrayal on these charts is provided in order to assist pilots of VFR flights to avoid confliction with IFR traffic at these aerodromes. Pilots are urged to take this information into account in their pre-flight planning.

6.2 A number of these aerodromes have notified Visual Reference Points (VRP) and Visual Routes (VR) which are geographically deconflicted from the instrument patterns and, notwithstanding that their use is voluntary, VFR pilots may be requested to route with reference to these. VRP and VR are described at AD 2 and AD 3.

6.3 Pilots should note for guidance at GEN 3.3 under Responsibilities of Approach Control.

7 ATC Assistance and Responsibilities (Refer to GEN 3.3)