►This Manual has been substantially re-written; for clarity no change marks are presented – please read in its entirety◄

Defence Safety Authority

Manual of Military Air Traffic Management (MMATM)

Military Aviation Authority

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CHAPTER 1: Introduction

Purpose

1. The purpose of the MMATM is to supplement Regulatory Articles (RAs) 3201 – 3313 that provide the Regulatory requirements for the safe and efficient provision of Air Traffic Services (ATS) which is a key enabler in ensuring that Aircraft are operated safely within the air domain.

2. It also offers guidance to the Regulated Community (RC), including those organizations required to manage the provision of ATS, on the Air Traffic Control (ATC) procedures and techniques routinely used and where deemed appropriate, provide additional details on procedures that are Aircraft type specific.

3. The MMATM has evolved over many years since its introduction, informed and updated by technological developments, operational experience, and best practice from civil aviation. It does not expand upon every ATC procedure that may be required, but instead aims to focus on those techniques and procedures most used or that are specific to military application. Safe and effective provision of ATS requires consistency and standardization of application which can be achieved by following the guidance offered in the MMATM, and compliance with the corresponding RAs.

Layout

4. Chapter 1 describes the purpose and layout of the MMATM, with the addition of cross-references to aid the RC.

5. Chapter 2 offers guidance on the application of general ATC procedures and pilot specific information that Controllers are to have an awareness and understanding of.

6. Chapter 3 provides detail on Director procedures and outlines the standard application for the radar pattern.

7. Chapter 4 provides detail on Approach procedures.

8. Chapter 5 explains emergency procedures and includes a range of specific procedures according to Aircraft type.

9. Chapter 6 explains the processes for the establishment, disestablishment or changes to Airspace.

Cross-References

10. Further details on requirements can be gained from reference to the following groups of Regulations and other references:

a. **RAs**

(1) RA 2120 – Pilots' Instrument Rating Scheme.

(2) RA 3201 to RA 3208: Administration.

(3) RA 3221 to RA 3241: Radar Services.

(4) RA 3261 to RA 3279: Aerodrome.

(5) RA 3291 to RA 3295: Precision Approach Radar.

(6) RA 3301 to RA 3302: Meteorology.

(7) RA 3311 to RA 3313: Emergencies.

b. **Other References**

(1) MAA01: Military Aviation Authority Regulatory Principles.

(2) MAA02: Military Aviation Authority Master Glossary.

(3) MAA03: Military Aviation Authority Regulatory Processes.

(4) CAP 1616: Airspace Change Process.

(5) CAP 413: Radiotelephony Manual.

(6) CAP493: Manual of Air Traffic Services (MATS) Part 1.

(7) CAP 774: UK Flight Information Services: Fourth Edition

(8) UK Aeronautical Information Publication (UK AIP).

(9) International Civil Aviation Organization (ICAO) Doc 8168: Vol I Flight Procedures (Sixth Edition).

(10) ICAO Doc 8168: Vol II Construction of Visual and Instrument Flight Procedures (Seventh Edition).

(11) UK Reg (EU) No 965 / 2012 – Annex I – Definitions.

(12) UK Reg (EU) No 965 / 2012 – Annex IV - Commercial Air Transport Operations (Part-CAT).

(13) North Atlantic Treaty Organization (NATO) Standardization Agreement (STANAG) 7048 – Crash Fire Fighting and Rescue Response Readiness.

CHAPTER 2: Air Traffic Control Procedures

Instrument Approach Procedures

1. Prior to the introduction of Performance Based Navigation (PBN) procedures, there was a simple relationship between instrument approach procedures and instrument approach operations:

   a. Non-precision approach procedures were published which were flown as a two-dimensional (2D) operation; and

   b. Precision approach procedures were published which were flown as a three-dimensional (3D) operation.

2. With the introduction of a variety of PBN vertically guided approaches (for example, Approach with Vertical Guidance (APV) / Barometric Vertical Navigation (Baro-VNAV) approach and Satellite-Based Augmentation System (SBAS) APV-I approach) there is no longer a simple relationship between the approach procedure and the type of operation.

3. From a Controller perspective, instrument approach procedures are still commonly referred to as either a non-precision or precision approach. A pilot, from an operational perspective, will classify them as either a 2D or a 3D approach operation.

3D Approach Operation[1]

4. 3D instrument approach operation uses both lateral and vertical navigational guidance. The navigational guidance can be provided by either:

   a. A ground-based radio navigation aid such as an Instrument Landing System (ILS); or

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

5. A manually calculated rate / angle of descent is not considered vertical guidance, therefore it is not to be considered a 3D approach operation.

6. 3D approach operations are conducted to a Decision Height (DH) / Decision Altitude (DA), which allows for Height loss after the commencement of the missed approach. They can either be:

   a. Type A – DH / DA of 250 ft (75 m) or above; or

   b. Type B – DH / DA less than 250 ft (75 m).

7. An Aircraft is permitted to descend on the glidepath to the declared DH / DA; the options at this point are either to continue the approach visually or go around if the required visual references[2] have not been obtained. If a go around is carried out, the Aircraft is only permitted to descend below DH / DA during the transition from descent to climb using the minimum Height loss technique.

[1] Refer to ICAO Doc 8168 Vol 1 Ed 6 Part II-Sect 5-Chap 2 – Instrument Approach Operations.
[2] Refer to MMATM Chapter 2 paragraph 29d.

2D Approach Operation[1]

8. A 2D instrument approach operation uses only lateral navigation guidance and is conducted to a Minimum Descent Height (MDH) / Minimum Descent Altitude (MDA), below which the Aircraft will not descend without the required visual references[2]. 2D approach operations can only be Type A with a MDH of 250 ft (75 m) or above.

9. Descent to MDH / MDA can be permitted at any stage during the final approach, and it therefore remains a matter of personal preference or standard operating procedure whether an immediate descent is carried out at the Final Approach Fix (FAF) or whether a notional glideslope is flown. However, other factors (such as limited radar cover, Aircraft sequencing requirements or local population considerations) may mean that only a notional glidepath technique is approved. Where such a limit applies, a note will be included in the remarks column of the relevant Terminal Approach Procedure (TAP) chart. Of note, a No 1 Aeronautical Information Documents Unit (AIDU) chart specification will show a level off at the MDA / MDH until the Missed Approach Point (MAPt) is reached.

10. The Final Approach Segment (FAS) begins at the FAF / Final Approach Point (FAP) and ends at the MAPt. The FAF / FAP will be crossed at or above the specified Altitude before descent is initiated. When no FAF / FAP is shown, descent will not be initiated until the Aircraft is established inbound within 5° of the final approach track.

Continuous Descent Final Approach (CDFA)

11. A CDFA is a technique for flying the FAS of a 2D instrument approach operation as a continuous descent, without level-off, from an Height / Altitude at or above the FAF Height / Altitude / Height to a point approximately 50 ft (15 m) above the landing Runway threshold or the point where the flare manoeuvre begins for the type of Aircraft flown. Where step-down fixes are depicted, associated Height / Altitude figures will be annotated; these will either be advisory or ‘not below’ figures.

12. CDFAs with advisory vertical navigational (VNAV) guidance calculated by on-board equipment are considered 3D instrument approach operations. CDFAs with manual calculation of the required Rate of Descent (ROD) are considered 2D instrument approach operations.

Non-Standard Approach Procedures

13. Instrument let-downs which hasten, short-cut or in some other way do not follow the full published or authorized ATC procedure, but which are carried out under an ATS, may be permitted. However, the Controller will descend the Aircraft in accordance with (iaw) the ATC Surveillance Minimum Altitude Chart (ATC SMAC) or Radar Vector Chart (RVC), whichever is applicable, until the Aircraft regains the normal procedure at either the initial, intermediate or FAF.

14. Instrument Approach minima will not be applied to let-downs or approaches which for any reason are not under an ATS or which do not, or cannot, comply with a recognized and authorized instrument procedure.

Flying at or Descending Aircraft on a Flight Level (FL)

15. When an Aircraft transits at or descends to a FL, the FL selected needs to provide adequate terrain clearance at all points along the route being flown. The Transition Level and Minimum Instrument Flight Rules (IFR) cruising level[3] do not take into account terrain clearance safe level and therefore are not necessarily terrain safe.

16. **Terminal Procedures.** To aid Controllers in assigning initial homing Flight Levels or levels for transit Aircraft within their area of responsibility, they are to take the highest Altitude displayed on the ATC SMAC, and adjust to a FL using the pressure difference between the Standard Altimeter Setting (SAS) and the Aerodrome QNH, rounding up to the next useable FL. This is the lowest terrain safe FL the Aircraft can use.

17. **Area Radar Procedures.** To calculate the lowest FL that an Aircraft can descend to and remain terrain safe, Area Radar Controllers are required to take the Area Safe Altitude (ASA) on the route being flown and adjust to a FL using the pressure difference between the SAS and the Regional Pressure Setting (RPS) before rounding up to the next useable FL.

Descent to Low Level

18. When a pilot receiving a radar service requests descent to operate low level, or descend to achieve Visual Meteorological Conditions (VMC), the Controller will:

a. **At Area Radar Units**. Pass the relevant RPS in hPa / ins and clear the pilot to descend to the ASA.

b. **At Terminal Units**. Pass the QFE / QNH in hPa / ins and clear the pilot to descend to a Height / Altitude that accords with the ATC SMAC or RVC. Beyond the lateral limits of the ATC SMAC or RVC, pilots will be passed the RPS and descended to an Altitude not below the ASA pertinent to the Aircraft’s position and track.

19. The appropriate ATS may be provided down to the level specified in local orders. On completion of the procedure, the Controller will pass the relevant RPS if not already set. Phraseology to be used is given in CAP 413.

Pilot Calculation of DH / DA / MDH / MDA

20. The appropriate procedure minimum will be passed to the pilot by the Controller as early in the procedure as practicable. The pilot is required to inform the Controller of the minimum they will use, after allowance has been made for any additions.

a. **Additional Allowances.** The following additional allowances may need to be added to the procedure minimum before DH / MDH (DA / MDA) is declared:

(1) Instrument rating.

(2) Engine Out Allowance (EOA).

[3] Refer to RA 3302 – Altimeter Settings.

b. **EOA.** EOA values, applicable to 3D approach operations only, are quoted in the Air System Document Set (ADS) for the multi-engine Aircraft for which they are appropriate.

c. **Allowances Specific to Aircraft Type.** Allowances specific to Aircraft type will also be taken into account, these allowances or corrections would not normally be declared. Where appropriate, they are laid down in the ADS (or Flight Information Handbook for Temperature Error Correction (TEC)) and may consist of:

(1) Pressure error correction.

(2) TEC.

(3) Helicopter type allowance.

(4) Standby pressure instrument allowance.

21. **Procedure for Calculating DH / DA - 3D Approach Operations.** The procedure for calculating DH / DA for 3D approach operations is as follows:

a. **Fixed-wing Aircraft.** Procedures for fixed-wing Aircraft are:

(1) **Full Power Available.** Pilots are required to obtain the procedure minimum from ATC or Flight Information Publications. White and Amber rated pilots will add the appropriate ratings allowance to this minimum.

(2) **One or More Engines Inoperative.** After calculating the minimum Height / Altitude iaw Chapter 2 paragraph 21a.(1), pilots will add the appropriate Aircraft EOA to obtain their minimum Height / Altitude for an engine(s)-out Instrument Approach.

b. **Helicopters.** Pilots are required to obtain the procedure minimum from ATC or Flight Information Publications. White and Amber rated pilots will add the appropriate ratings allowance to this minimum.

22. **Procedure for Calculating MDH / MDA - 2D Approach Operations.** The procedure for calculating MDH / MDA for 2D approach operations is as follows:

a. **Fixed-wing Aircraft.** Full power available or one or more engines inoperative. The procedure minimum for fixed-wing Aircraft carrying out 2D approach operations will be calculated iaw the procedure detailed in Chapter 2 paragraph 21a. EOA is not added directly to MDH / MDA but pilots will take this into account to avoid descending below this Height / Altitude.

b. **Helicopters.** The procedure minimum for helicopters carrying out 2D approach operations will be calculated iaw the procedure detailed in Chapter 2 paragraph 21b.

23. **Allowances Specific to Aircraft Type.** Pilots need to take the allowances specific to Aircraft type listed in Chapter 2 paragraph 20c into consideration in order to convert the true Height / Altitude of DH / DA or MDH / MDA into an indicated cockpit value. Because these allowances have no bearing on the true value of DH / DA or MDH / MDA they will not be declared to ATC. Although TEC is not specific to an Aircraft type, it is treated as such for simplicity. Where the sum of these allowances is 20 ft or less it may be ignored.

Aircraft Categories

24. All Aircraft are categorized according to their approach speed[4]. Where a range of speeds is possible, an Aircraft may be capable of operating in more than one category. For simplicity the basis for categorization is the normal approach speed at DH / MDH (DA / MDA) or V_{at} + 15 knots, where V_{at} is the target threshold speed. Helicopters are classified as category A, or where published category H but the stall speed method of calculating Aircraft category does not apply to helicopters[5]. Therefore, for helicopters, speed will not be reduced below 70 knots until after the visual references[2] necessary for landing have been acquired and the decision has been made that an instrument missed approach will not be performed[6]. This is to ensure that, in the event of a missed approach being flown, the climb out trajectory remains within the missed approach protection area designed into the procedure.

25. Fixed-wing Aircraft categories are:

a. Category A - Speed less than 91 knots.

b. Category B - Speed 91-120 knots.

c. Category C - Speed 121-140 knots.

d. Category D - Speed 141-165 knots.

e. Category E - Speed over 165 knots.

26. Aircraft Commanders have discretion to move the Aircraft into a higher category when circumstances dictate a significantly higher approach speed than normal[7].

Instrument Approach Minima

27. The policy determining the applicability of the published minima stated on TAP charts and whether this overrules the following minima will be promulgated by appropriate Aviation Duty Holders (ADH) or Accountable Managers (Military Flying) (AM(MF)) and Aircraft Commanders. The lowest minima[8] to which military Aircraft are authorized to make Instrument Approaches are:

a. **Fixed-wing.**

(1)	DH Category I	+200 ft true	550 m RVR.
(2)	MDH	+250 ft true	800 m RVR.
(3)	DA Category I	TDZE +200 ft true	550 m RVR.
(4)	MDA	TDZE +250 ft true	800 m RVR.

b. **Helicopter.**

(1)	DH	+200 ft true	500 m RVR.
(2)	MDH	+250 ft true	600 m RVR

[4] Refer to ICAO Doc 8168 Vol 1 Ed 6 Part II-Sect 5-Chap 1-Table II-5-1-2 – Speeds for procedure calculations in knots (KIAS).
[5] Refer to ICAO Doc 8168 Vol 2 Ed 7 Part I-Sect 4-Chap 1-Para 1.8.8 – Categories of Aircraft – Helicopters.
[6] Refer to ICAO Doc 8168 Vol 1 Ed 6 Para 2.1.3.2.4 – Helicopter Procedures to Runways – Operational Constraints.
[7] Aircraft Commanders may choose a *lower* category only when operationally essential and authorized.
[8] Refer to UK Reg (EU) No 965 / 2012 – Annex IV – Commercial Air Transport Operations (Part-CAT).

(3)	DA	TDZE +200 ft true	500 m RVR.
(4)	MDA	TDZE +250 ft true	600 m RVR.

Note:

Runway Visual Range (RVR) and Touchdown Zone Elevation (TDZE).

c. Aircraft that are appropriately equipped, cleared and flown by suitably trained and qualified crews can fly precision approaches to Category II and III minima at suitably equipped and cleared Aerodromes. The minima for Category II and Category III approaches are[9];

(1) For Category II approaches, a DH below 200 ft but not lower than 100 ft and a RVR of not less than 300 m.

(2) For Category IIIA approaches, a DH lower than 100 ft and a RVR not less than 200 m.

(3) For Category IIIB approaches, a DH lower than 100 ft, or no DH, and a RVR lower than 200 m but not less than 75 m.

Duties and Responsibilities of Controllers with regard to Pilots' Instrument Ratings

28. Controllers will not query or challenge a pilot with regard to their instrument rating, or the weather conditions in which the pilot intends to fly, or the Height / Altitude to which the pilot descends on approach. These matters are the Responsibility of the authorizing officer and the pilot concerned. However, Controllers may ask for a pilots' instrument rating to assist them in obtaining a suitable diversion. In addition, Controllers observing marked weather deterioration before take-off or during an approach may use their initiative to advise the pilot and / or the authorizing officer as appropriate. Having given such advice, the Controller is not to question the action of the pilot or the authorizing officer, nor are they in any way responsible for their subsequent actions. RA 2120 contains details of the pilots' Instrument Rating scheme.

Application of DH / DA and MDH / MDA

29. DH / DA and MDH / MDA are applied as follows:

a. **DH / DA**. If, during a precision approach, the required visual references, as referenced below in paragraph 29d, have not been established when the DH / DA is reached, a missed approach will be initiated using the minimum Height loss technique.

b. **MDH / MDA**. A visual straight-in approach to land can be attempted only when the final approach track is within a maximum of 30° of the Runway centreline to be used for landing. When the final approach track differs by more than 30° from the Runway centreline, the MDH / MDA will not be less than the circling minimum. Descent can only be continued below the MDH / MDA if the required visual reference[2] is available. Otherwise the Aircraft will be levelled off at or above MDH / MDA and descent can only be resumed if the visual reference[2] becomes available in time to permit a visual approach. The Aircraft may be circled for landing

[9] Refer to UK Reg (EU) No 965 / 2012 – Annex I – Definitions.

only if the conditions for a circling approach can be met. If the conditions for descent below MDH / MDA cannot be met, a missed approach will be initiated.

c. **DH / DA, MDH / MDA and Procedure Minimum**. If the DH / DA or MDH / MDA is well above the procedure minimum due to the allowances added, pilots will, in effect, be going around early. If a planned turn is required early in the missed approach, this could result in the Aircraft turning before reaching the safe climb-out segment. The same situation could occur during an intentional early go around before MAPt. In these circumstances it is the pilot's Responsibility to delay initiating the turn until the MAPt is reached.

d. **Required Visual References**. No approach can be continued below the DH / DA or MDH / MDA unless at least one of the following visual references for the intended Runway is distinctly visible to, and identifiable, by the pilot:

(1) **Category I Precision Approach or Non-Precision Approach**.

(a) Elements of the approach lighting system.

(b) The threshold, or its markings, lights or identification lights.

(c) The visual glideslope indicator(s).

(d) The Touchdown Zone (TDZ), zone markings or zone lights.

(e) The Runway edge lights.

(2) **Circling Approach**. As for non-precision approach, except that for circling approaches pilots will maintain visual references to the Runway environment at all times, ie with features such as the Runway threshold, approach lighting aids or other features identifiable with the intended Runway.

(3) **Category II Approach**. A segment of at least 3 consecutive lights; either the centreline of the approach lights, TDZ lights, Runway centreline lights, Runway edge lights, or a combination of these. The visual reference will include a lateral element of the ground pattern, ie an approach lighting crossbar or the landing threshold or a barrette of the TDZ lighting.

(4) **Category III Approach**.

(a) **Category IIIA Approach**. A segment of at least 3 consecutive lights; either the centreline of the approach lights, TDZ lights, Runway centreline lights, Runway edge lights, or a combination of these is attained and can be maintained.

(b) **Category IIIB Approach with a DH / DA**. At least one centreline light.

(c) **Category IIIB Approach with no DH / DA**. There is no requirement for visual contact with the Runway prior to touchdown.

Commencement and Continuation of Approach[10]

30. An Instrument Approach can be commenced regardless of the reported RVR / visibility. If however the reported RVR / visibility is less than the applicable minimum, an approach to land or touch and go will not be continued:

a. Below 1000 ft above the Aerodrome; or

b. Beyond the FAF if the DH / DA or MDH / MDA is more than 1000 ft above the Aerodrome.

31. Where the RVR is not available, RVR values can be derived by converting the reported visibility[11]. If, after passing 1000 ft above the Aerodrome, the reported RVR / visibility falls below the applicable minimum, the approach can be continued to the DH / DA or MDH / MDA. The approach can be continued below DH / DA or MDH / MDA and the landing completed, provided that the required visual reference(s)[2] for the type of approach and intended Runway are established at the DH / DA or MDH / MDA and are maintained.

32. Where RVR is used, the controlling RVR[12] is the touchdown RVR, unless otherwise stated. If reported and relevant, the mid-point and stop-end RVR can also be controlling. The minimum RVR value for the mid-point is 125 m or the RVR required for the TDZ if less, and 75 m for the stop-end. For Aircraft equipped with a rollout guidance or control system, the minimum RVR value for the mid-point is 75 m.

Note:

> *'Relevant' in this context, means that part of the Runway used during the high speed phase of the landing down to a speed of approximately 60 kts.*

Reduced Vertical Separation Minimum (RVSM) for United Kingdom Military Fast Jet (FJ) Aircraft

33. Controllers are to deem all United Kingdom (UK) Military FJ Aircraft as being negative RVSM (RVX) as none are RVSM Approved (RVA) and currently there is no Modification plan in place. Therefore, Controllers are not required to include the RVSM status of these Aircraft when conducting verbal handovers or coordination with other military Area Radar Units iaw RA 3230(2)[13]. This is not to be applied to foreign military FJ Aircraft, including UK based United States Air Force (USAF) FJ Aircraft, or any military non-FJ Aircraft. Therefore, Controllers are to ascertain the RVSM status of these Aircraft and include this information when conducting all verbal handovers and coordination.

Restriction of Rate of Climb and Descent (ROCD) in Controlled Airspace (CAS)

34. In order to comply with Civil Aviation Authority (CAA) Regulations put in place to support the Safety nets of Airborne Collision Avoidance System (ACAS) and Short Term Conflict Alert (STCA), a ROCD restriction of 8000 feet per minute (fpm) was imposed within UK CAS on 5 July 2007. Notwithstanding

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[10] Refer to UK Reg (EU) 965 / 2012: Annex IV Commercial Air Transport Operations (Part-CAT) – Sub Part B: Operating Procedures – Sect 1 – Motor Powered Aircraft CAT.OP.MPA.305.
[11] The procedure for doing this is contained in the Guidance Material of RA 3275 – Runway Visual Range.
[12] Controlling RVR means the reported values of one or more RVR reporting locations (touchdown, mid-point and stop-end) used to determine whether the operating minima are or are not met.
[13] Refer to RA 3230(2): Approved Methods of Coordination.

this restriction it is understood that there remains a requirement for Military Aircraft - that have the ability to operate a ROCD that exceeds the 8000 fpm limit - to utilise this aspect of their performance to enhance operational flexibility where to do so will not invalidate the Safety nets in place. Equally there may be occasions when to increase an Aircraft's ROCD beyond the 8000 fpm limit would have beneficial consequences for other Aircraft operators by more efficiently releasing airspace / levels that would otherwise have been occupied.

35. The conditions under which higher ROCD, exceeding the 8000 fpm restriction, can be used when operating inside CAS (Classes A, C, D and E) are set out below:

a. Aircraft in an emergency.

b. Aircraft responding to an airspace threat or an Air Defence priority flight where a high rate of climb is essential to the successful outcome of the mission.

c. Aircraft in receipt of avoiding action instructions to resolve an impending loss of standard separation or to avert a potential collision.

d. Aircraft under special arrangements made for research or test flying.

e. Aircraft participating in exercise activity notified / co-ordinated via an Airspace Co-ordination Notice.

f. MOD ATC / Air Surveillance and Control System (ASACS) Controllers can release pilots from the 8000 fpm climb / descent restriction providing that there is no likelihood of interaction between the Aircraft under their control and General Air Traffic (GAT). The interpretation of interaction is as follows:

'A situation where co-ordination of Operational Air Traffic (OAT) against GAT will be necessary, by the application of either vertical or lateral separation, or in any situation where the Controllers involved are likely to be concerned by the presence of conflicting traffic.'

(1) Individual Controllers use their inherent spatial and situational awareness to decide whether co-ordination is or would be necessary between their own Aircraft and GAT before authorizing the pilot to climb / descend at rates in excess of 8000 fpm. However, if there is any doubt as to whether the civil Controller may be concerned by an Aircraft manoeuvring in excess of 8000 fpm (ie the Secondary Surveillance Radar (SSR) label disappearing due to the ROCD exceeding National Air Traffic Services (NATS) radar's capacity to track the Aircraft) then the ROCD restriction is not to be lifted. Controllers are to initially plan to operate within CAS using ROCD not exceeding 8000 fpm until they are certain that no interaction will take place before the ROCD restriction is lifted.

(2) Where MOD ATC / ASACS Controllers remove the ROCD restriction, they are to understand that Aircraft under their control are operating outside the normal requirements and that, as a consequence, established Safety nets may not operate. Under these circumstances, there is to be consideration of the implications of the

potential workload this may have on both civil and military Controllers.

g. Under those circumstances where Military Aircraft are manoeuvring within a block of CAS above FL195 and co-ordination is required (ie an interaction exists, or is likely to occur, with GAT on an ATS route above or below) the ROCD restriction can only be removed when the following conditions are applied:

(1) To guard against spurious ACAS RAs, there is at least 2000 ft between the vertical limits of the allocated manoeuvring block and GAT tracks transiting above or below.

(2) The Controller reminds the Aircraft under their control of the vertical limit of the block in which they are operating when it is likely civil traffic will come into planned confliction.

(3) The Controller monitors the situation closely to prevent a vertical level bust.

36. Controllers are to be aware that pilots may exceed the 8000 fpm ROCD without prior Approval of the Controller when operating under the conditions of Chapter 2 paragraph 35 a – e. However, to instruct a pilot to exceed the ROCD restriction under the conditions of Chapter 2 paragraphs 35 f and g, the phraseology contained in figure 1 is to be adhered to.

37. Occasionally, for traffic reasons and for an advantageous use of an Aircraft's performance, a higher than normal rate of climb or descent may be required. However, due to the ROCD restriction within CAS there are variances in the meaning of phraseology dependent on the airspace classification that the Aircraft is operating within. See figure 1 below:

Figure 1: ROCD Phraseology

Phraseology	Classification of Airspace	Definition
Climb / Descend	G	To require a pilot to climb / descend with no restriction on ROCD.
Climb / Descend	A - E	To require a pilot to climb / descend but at a rate not exceeding 8000 fpm.
Expedite	G	To require a pilot to climb / descend at best rate but with no restriction on ROCD.
Expedite	A - E	To require a pilot to climb / descend at best rate but not exceeding 8000 fpm.
Expedite, no restriction (at end of transmission).	A - E	To require a pilot to climb / descend at best rate and without any restriction to their ROCD.
No restriction (at end of transmission)	A - E	To inform a pilot that they may, at their own discretion, climb/descend at best rate and without any restriction to their ROCD.
Climb / descend restricted at 8000 fpm, acknowledge	All	To instruct the pilot to climb / descend at a rate not exceeding 8000 fpm. Pilots must acknowledge the ROCD restriction.

Note:

For flights approved to manoeuvre in excess of standard ROCD, the following phraseology is to be used (by terminal / area units):

“Callsign operate in the block FL XXX to FL XXX, no restriction”.

Procedural Crossing of CAS

38. The following conditions apply when a Controller obtains a procedural crossing clearance from the CAS sector Controller:

a. The crossing clearance is to be passed to the pilot as if they had requested it.

b. Radar service is to be terminated before the Aircraft enters CAS.

39. Radar identification is to be maintained, where possible, if a radar service is to be provided after the Aircraft leaves CAS.

40. Procedures for Aircraft to cross an ATS Route in IFR are located in the UK AIP En-Route (ENR) 1.1 General Rules.

High Intensity Radio Transmission Areas (HIRTAs)

41. A HIRTA is airspace of defined dimensions within which there is radio energy of an intensity which may cause interference with, and on rare occasions damage to, communications and navigation equipment. The location of UK HIRTAs can be found in the UK AIP ENR 5.3.

42. While the avoidance of HIRTAs is the pilot’s responsibility, Controllers are to be aware of the possible need for some types of Aircraft to deviate from track in order to avoid HIRTA exclusion zones. Controllers are to advise pilots of the proximity of a HIRTA and ask if a re-route for avoidance is required. Controllers are then to act iaw the pilot’s response.

Embellish Aircraft

43. ‘EMBELLISH’ is a codeword signifying that an Aircraft is prepared to act as a target for fighter interception.

44. When under the control of an ATC Radar Unit (ATCRU), an EMBELLISH Aircraft could be placed in a potentially hazardous situation if it is given avoiding action against conflicting traffic which, unbeknown to the Controller, is a fighter carrying out interceptions under the control of a Tactical Command and Control (Tac C2) Agency[14]. Therefore, when an Intelligence Surveillance Target Acquisition and Reconnaissance, Airborne Early Warning or ASACS unit selects an EMBELLISH Aircraft for interception, details of the flight are required to be passed to the appropriate ATCRU. The ATCRU Supervisor will brief the relevant ATCRU Controller of the intended interception and the Controller will notify the Aircraft and take this into account when passing information on conflicting traffic or initiating avoiding action. Notification of an immediate interception and identification of the fighter involved will be passed to the ATCRU by the Fighter Allocator.

[14] This list is not exhaustive but an example would be; a Control and Reporting Centre, E-7 Wedgetail or a Type 45 destroyer.

Basic Flying Student Callsigns / Foreign Pilots

45. In addition to the guidance in CAP 413 Chapter 2, Controllers providing a service to student pilots are to:

a. Speak slowly.

b. Avoid complex instructions.

c. Ensure that all instructions are acknowledged.

d. Assist the pilot as far as workload permits.

Note:

The additional use of 3-figure suffix is frequently associated with unqualified military student pilots (pre-wings) and pilots on Operational Conversion Units, but Controllers are not to assume that the use of a 3 digit callsign requires the above action to be taken as they can also be allocated to qualified pilots, ie Air Experience Flight pilots.

46. Controllers are to adopt the same methodology when providing control instructions to pilots, where English is not their first language. Additionally, Controllers are to be aware that it is highly unlikely that foreign pilots will be aware of all UK FIS and national / local procedures. Units are to consider providing a verbal or written brief on ATS and local airspace issues during the booking in procedure to mitigate any problems with communicating on frequency.

Reporting of Hazardous Flying Conditions

47. Hazardous flying conditions are considered to be anything that could present a danger to airspace users, such as adverse weather conditions, unknown Remotely Piloted Air Systems (RPAS) or lasers[15]. To facilitate safe flight, it is paramount that reports of hazardous flying conditions are disseminated to affected airspace users in a timely manner.

48. When Controllers receive reports of hazardous flying conditions from Aircraft, they will note the details and read them back to ensure accuracy. The information will be passed to other Aircraft on frequency that are operating in or approaching the area concerned and a re-route will be offered where possible. Additionally, the Controller will provide their Supervisor with details of the hazardous flying conditions to be recorded in the Air Traffic Watch Log.

49. The Supervisor will arrange for details of the hazardous flying conditions to be promulgated such that other Controllers and Aircrew are aware of the Hazard. They will also notify Supervisors at adjacent Air Traffic Service Units (ATSUs) that could be providing an ATS to Aircraft that are likely to be affected by the hazardous flying conditions. Supervisors will either update reports, where necessary, or cancel the warning when it can be confirmed that the hazardous flying conditions are no longer affecting the ATSU's area of operation.

[15] This is not an exhaustive list and the actions to be taken in the event of an unknown RPAS or laser sighting will be contained in Local Orders.

Bandboxing / Splitting Control Positions

50. Before an ATS is provided from the bandboxed or split Sector / Control position, Controllers will ensure that the position has been correctly configured and that relevant parties have been notified.

51. Unit Cdrs / Senior ATC Officers will ensure that checklists are readily available to Controllers to enable them to confirm that all necessary action has been completed. The checklists, which will be specific to every Sector / Control position that could be bandboxed or split, will include the following:

a. Radiotelephony (RT) frequencies that will be selected or de-selected as appropriate.

b. Selection or de-selection of the landline connections relevant to the responsibility of the bandboxed / split Sector / position.

c. Surveillance selection, if appropriate.

d. Frequency and landline confidence checks.

e. List of parties that will be notified of the new Sector / Control position configuration.

Heavy Aircraft Jet Exhaust

52. There is a Risk that when heavy Aircraft, such as the C-17, uses full thrust on take off the jet exhaust can damage the Arrestor Barrier or other such frangible objects in the undershoot of the Runway. It is therefore advisable that the Controller and Aircraft Commander consider where the Aircraft lines up on the Runway prior to issuing / receiving a take off clearance to ensure that they are a safe distance away from such objects. Where the full Runway is required, it is advisable to remove the Arrestor Barrier but where this is not possible, a physical inspection will be carried out once the Aircraft has departed.

Tilt Rotor Aircraft Operations

53. Tilt-Rotor Aircraft can configure from fixed wing to rotary flight and vice versa. When flying in the visual circuit the Aircraft may be unable to lower the gear until short finals; leading to the situation where Controllers are required to issue a clearance *without* a gear down confirmation. However, US Air Force Manual 11-217[16] details USAF pilot responsibilities for Instrument Approaches stating that the Aircraft must be configured for landing no later than the FAF. Following consultation with 7th SOS Mildenhall it has been agreed that the following phraseology is to be used:

a. **Visual Circuit.** “Callsign…with your gear down…clearance.”

b. **Instrument Approach.** A gear check is to be carried out in the normal manner and clearance issued iaw local procedures.

54. Where possible, a visual check of the gear at short finals is to be undertaken and where any doubt exists the Controller is to check with the pilot.

[16] Refer to US Air Force Manual 11-217, Vol 1, Chap 9.7.2.

CHAPTER 3: Director Procedures

Directing Patterns

1. Controllers will use normal pattern radar circuits and Short Pattern Circuits (SPC) to establish Aircraft on the final approach of an Instrument Approach as follows:

   a. **Normal Pattern.** The main elements of a normal pattern are a base leg, a converging heading and final approach. For multiple circuits, a downwind leg will also be included. See Figure 2 Director Procedures – Radar Circuit.

   b. **SPC.** An Aircraft on a go around from an Instrument Approach and precluded by weather conditions, or other reasons, from carrying out a visual circuit or normal pattern radar circuit, can be repositioned on final approach using the SPC procedure with the minimum expenditure of fuel. See Figure 3 Director Procedures – Short Pattern Circuit.

Monitored Approaches

2. Monitored approaches will be given at the request of the pilot or as laid down in local orders or other instructions. The Controller monitoring the approach will:

   a. Advise distances from touchdown if required.

   b. Be prepared to take over control.

   c. Give warning of other traffic.

   d. Give warning if the Aircraft is, or will be, well below the glidepath or if for any other reason the approach is becoming hazardous.

   e. Obtain and pass to the pilot, clearances, surface wind and circuit information normally associated with a Precision Approach Radar (PAR) approach.

Note:

If the ILS localizer is offset from the Runway, the precision radar centreline will not coincide with the centreline of an ILS approach as interpreted by the pilot.

The Radar Circuit

3. The Radar Circuit is divided into four parts; the circuit pattern and procedures are illustrated in Figure 2 and consists of the following:

   a. **The Downwind Leg.** This is the leg extending from a point abeam the threshold of the Runway concerned to a point “A”, situated ± 25° from the reciprocal of the Runway QDM depending on the circuit direction, at a range of 10 nm (this range may be varied to suit the Aircraft type and adjacent traffic patterns).

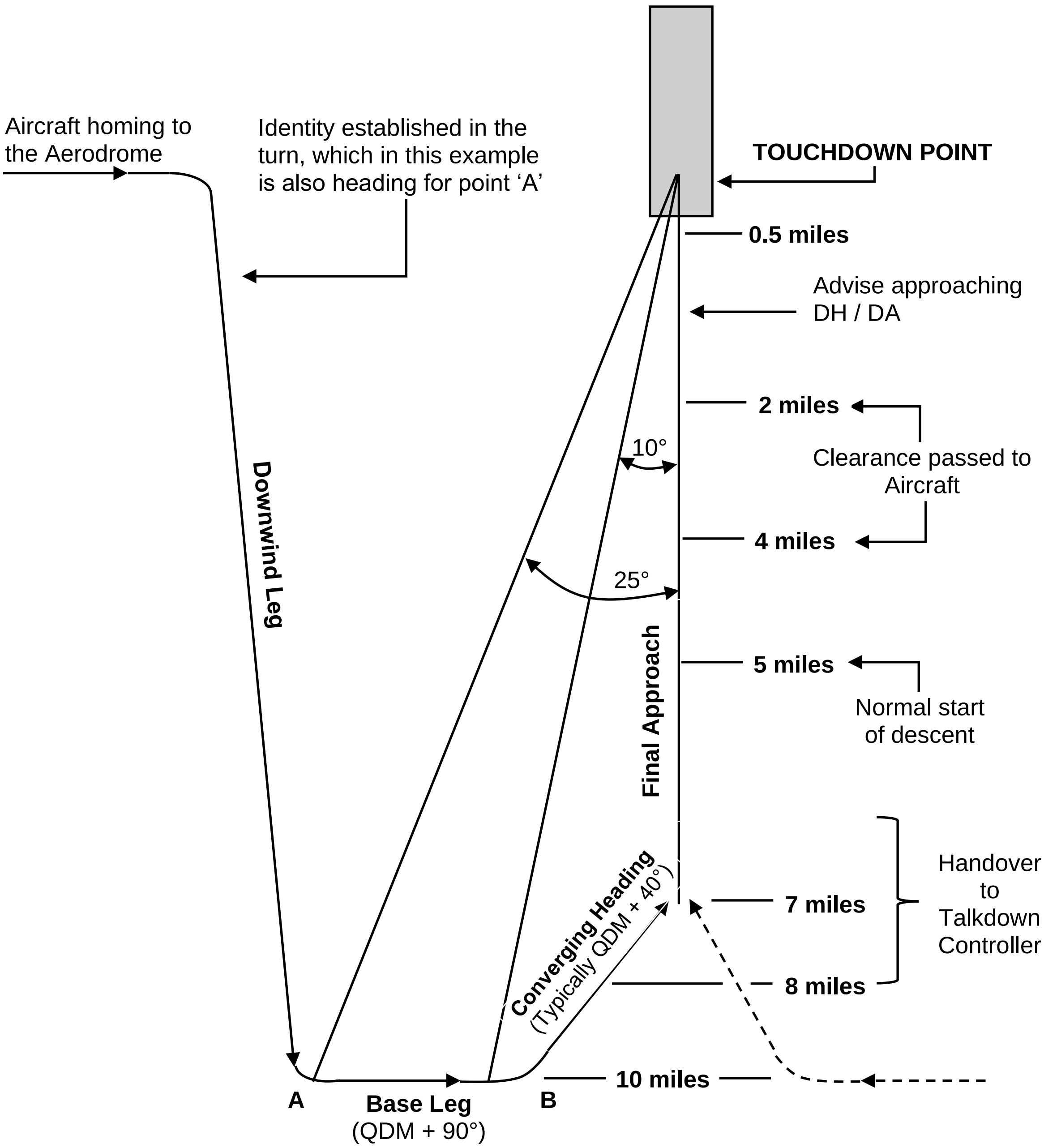
   b. **Base Leg.** That leg of the pattern from point ‘A’ to point ‘B’, a position on the base leg where a line of bearing ± 10° from the reciprocal of the

Runway QDM intercepts the base leg. The heading of this leg, in still air, is equal to the Runway QDM ± 90° depending on the circuit direction.

c. **Converging Heading.** This splits the 90° turn between base leg and final approach to the advantage of the Controller and the pilot.

d. **Final Approach.** From the converging heading, the Aircraft is turned to close with the extended centreline of the Runway. This phase of the procedure will be arranged such that the Aircraft is established inbound, with the handover to the Talkdown Controller complete, prior to arrival at the descent point.

Figure 2: Director Procedures – Radar Circuit



Note:

a. The 10 mile distance can be varied to suit the Aircraft type and adjacent traffic patterns.

b. Position of handover to Talkdown Controller may be varied to suit Aircraft Type.

c. QFE / QNH is to be set prior to commencing final approach.

d. Where applicable, a gear check is to be conducted prior to a clearance being issued.

Information Required for an Instrument Approach Procedure

4. Information relevant to the procedure is given to or obtained from the pilot. This is normally carried out during the downwind leg and prior to cockpit checks, on a normal radar pattern. The sequence is optional but is to include or update as required the following items:

a. Positioning instructions.

b. Weather information.

c. Aerodrome information.

d. Radio frequency information.

e. Missed Approach Communication Failure (MACF) procedure.

f. Procedure minimum.

g. Pilot intentions.

Cockpit Checks

5. On radar assisted procedures cockpit checks are instigated by Controllers; however, pilots usually instigate their own cockpit checks on pilot interpreted non-radar assisted procedures.

Variation of Radar Circuit and Information

6. To accommodate differences in Aircraft performance or approach procedures, the basic radar circuit and sequence of information can be adjusted as required prior to the final leg. The downwind leg, base leg and converging heading may be varied as a means of delay to ensure adequate sequencing between successive Aircraft is maintained and to prevent overloading the Talkdown Controller.

Short Pattern Circuits (SPC)

7. The direction and Height of the SPC for a particular Runway will be laid down in unit / local orders. Factors that may be considered in deciding the circuit direction include high ground, traffic patterns, relative position of neighbouring Aerodromes, Restricted Areas, type of approach control radar, etc. With certain surveillance equipment it may be possible to derive advantage from precision radar coverage of the final approach area by turning the Aircraft in a particular direction. The procedure, illustrated in Figure 3, is designed for use by short endurance Aircraft which have been unable to land from their

previous approach and require a further radar approach with the minimum expenditure of fuel.

8. Normally, an Aircraft committed to a SPC will be instructed by the Talkdown Controller to contact the Director, as it will cease to be in precision radar coverage. The Aircraft will be controlled by Director until it is once again in precision radar coverage, when the Talkdown Controller will resume control and complete the approach. Whenever possible, the SPC and subsequent approach will be completed on a single frequency. The Director will adjust the flow of other traffic so that the Aircraft on a SPC is not delayed but is given the priority the situation warrants.

Missed Approach Point (MAPt)

9. All instrument procedures have a specific MAPt which defines the last point at which a go around will be initiated and the missed approach followed if safe obstacle clearance is to be ensured. For precision approaches, the MAPt is normally the intersection of the electronic glidepath with the published procedure minimum; however, UK **R**egulations (both civil and military) state that all pilots will go around at their personal DH / DA even though this may occur before the facility in use, a particular fix point or a specific distance from the FAF. The TAP chart for the relevant approach will always indicate the MAPt as the point where the descent / level portion is shown to change to a climb. Alternatively, the information can be obtained from ATC; all procedures assume a climb gradient of not less than 2.5% during the missed approach.

Internal Aids Approach

10. An internal aids approach can only be used by Aircraft equipment combinations cleared for that purpose in the Aircraft's Release To Service. The following criteria apply:

a. Only conducted at Aerodromes with authorized Aerodrome surveillance procedures; approaches are not required to be surveillance monitored.

b. The procedure is non-precision, therefore the MDH / MDA will be based on the procedure minimum for the surveillance radar procedure.

c. By using an airborne aid independent of the one in use for the approach, or a ground radar fix, the Aircraft Commander is required to ensure that the Aircraft is within the correct FAS before initiating the descent on final approach. Subsequently, if any doubts arise about the Aircraft's position within the FAS, the approach will be terminated.

Circling Approach

11. Some instrument procedures do not meet the criteria for straight-in approaches in that the Runway centreline and the final approach track differ by more than 30°. When this happens, the instrument procedure will end in a circle to land manoeuvre, termed a circling approach. The procedure minimum for this indicates the lowest Height / Altitude to which an Aircraft can safely descend within a specified area yet still maintain the required obstacle clearance.

12. A pilot may carry out a circling approach only if the following conditions are met:

a. The visual circuit or partial circuit is carried out at or above the specified minimum circling Height / Altitude and within the specified circling approach area.

b. The in-flight visibility assessed by the pilot is not less than the minimum value for circling approaches specified by their ADH / AM(MF).

c. The Aircraft position relative to the Aerodrome or approach facility in use has been established and can be continually monitored either visually or by range and bearing.

13. **Circling Approach Minima**. The circling approach Height / Altitude ensures adequate vertical separation from obstacles on the ground during manoeuvring flight. When circling is intended following a precision or non-precision approach, the instrument minimum adopted will be treated as an MDH / MDA and will not be lower than the circling MDH / MDA. Circling approach minima will not normally be applied to helicopters. The lowest MDH, according to the Aircraft category[17], for circling approaches is:

a. Category A – 400 ft.

b. Category B – 500 ft.

c. Category C – 600 ft.

d. Category D – 700 ft.

e. Category E – 800 ft.

The lowest MDA is TDZE plus figures quoted above iaw Aircraft category.

Holding Procedures

14. If a Controller is required to hold an Aircraft for sequencing purposes, generally the procedure is to hold the Aircraft at a given Altitude, Height or Flight Level in an oval orbit aligned with a given bearing with radio navigation or visual reference to a given datum.

Standard Oval Orbit

15. The standard oval orbit is performed by flying on a given bearing (QDM[18]) and reciprocal (QDR) linked together by rate one turns to the left or right. Depending on the aid in use, the oval orbit is normally 4 nm long or the distance given by a one-minute timed run (in still air) up to FL140 on the QDR or by a 1½ minute timed run (in still air) above FL140 on the QDR. When holding on an aid that gives continuous range reference (Distance Measuring Equipment, Tactical Air Navigation (TACAN)), the orbit will be flown between 2 predetermined ranges 4 nm apart. In the absence of continuous range reference (ILS), the Aircraft will be turned over the marker beacon, and the one-minute timed run will start when the Aircraft is steady on the QDR of the orbit. When holding on omni-directional aids, timing will start when passing abeam the holding aid. A timed orbit may also be flown when the reference is to a visual object such as a ground feature.

[17] All military Aircraft are categorized according to their approach speed. Where a range of speeds is possible, an Aircraft may be capable of operating in more than one category.
[18] QDM is the magnetic bearing from the Aircraft.

16. **Selection of Holding (QDM[18])**. When holding on aids which provide track guidance (ILS, TACAN) the orbit will be aligned to the QDM of the beacon and its QDR. When holding on omni-directional aids (Non-Directional Beacon (NDB), visual landmark) the pilot will be given a holding QDM by ATC. This QDM will be selected to avoid:

a. Adjacent holding patterns.

b. Other Aerodromes.

c. Danger and prohibited areas.

d. Dangerous terrain.

e. Built-up or crowded areas.

17. If possible, Aircraft will be held in the direction of improving weather and at Altitudes which avoid icing.

Tactical Air Navigation (TACAN)

18. The basic procedure by pilots using a TACAN beacon as an Aerodrome approach aid may be varied to suit local conditions. Descent is continued until the pilot has obtained the required visual references[2] or has reached the MDH. Details of procedures for specific Aerodromes are contained in TAP charts. Appropriate phraseology is given in CAP 413.

Instrument Landing System (ILS)

19. An ILS is a Runway approach aid based on two radio beams which together provide pilots with both vertical and horizontal guidance during an approach to land. The localiser (LOC) provides azimuth guidance, while the glideslope (GS) defines the correct vertical descent profile. If only the LOC is used then it becomes a 2D approach operation with an increased procedure minimum. Details of procedures for specific Aerodromes are contained in TAP charts and appropriate phraseology is given in CAP 413. The Regulations on Controller monitoring of an ILS are detailed in RA 3292[19].

Radar to ILS

20. Aircraft may be recovered for positioning within the localizer beam using a radar pattern similar to the Ground Controlled Approach pattern in Figure 2 Director Procedures – Radar Circuit.

Non-Directional Beacon (NDB)

21. **Basic Procedure.** The basic procedure employed by pilots using an NDB as an Aerodrome approach aid may be varied to suit local conditions. Details of procedures for specific Aerodromes are contained in TAP charts and appropriate phraseology is given in CAP 413. The basic procedure is as follows:

a. **Initial Approach.** The Aircraft is homed towards the beacon at an appropriate terrain safe, FL, Altitude or Height. The pilot is given details of the outbound bearing associated with the procedure and the MDH / MDA. The pilot reports when overhead the beacon and descent clearance is given, together with the appropriate altimeter pressure setting.

[19] Refer to RA 3292 – Instrument Landing System - Approach Monitoring.

b. **Holding Procedure.** The standard holding procedure is an oval orbit, employing a timed leg, or a 4 mile leg when the beacon provides range information.

c. **Intermediate Approach.** If necessary, the Aircraft descends in the holding pattern to a specified Height / Altitude and the Aircraft is turned onto the outbound bearing and descent is continued for three minutes or to the intermediate approach Height / Altitude. A left / right-hand procedure turn is then made onto the inbound heading.

d. **Final Approach.** When steady inbound, descent is continued until the pilot has obtained the required visual references[2] or has reached the MDH / MDA.

e. **Missed Approach.** If an Aircraft reaches the facility at the MDH / MDA without the pilot acquiring the required visual references[2], the pilot is required to initiate a missed approach. The TAP chart for the relevant approach will always indicate the MAPt as the point where the descent / level portion is shown to change to a climb. Alternatively, the information can be obtained from ATC. All procedures assume a climb gradient of not less than 2.5% during the missed approach.

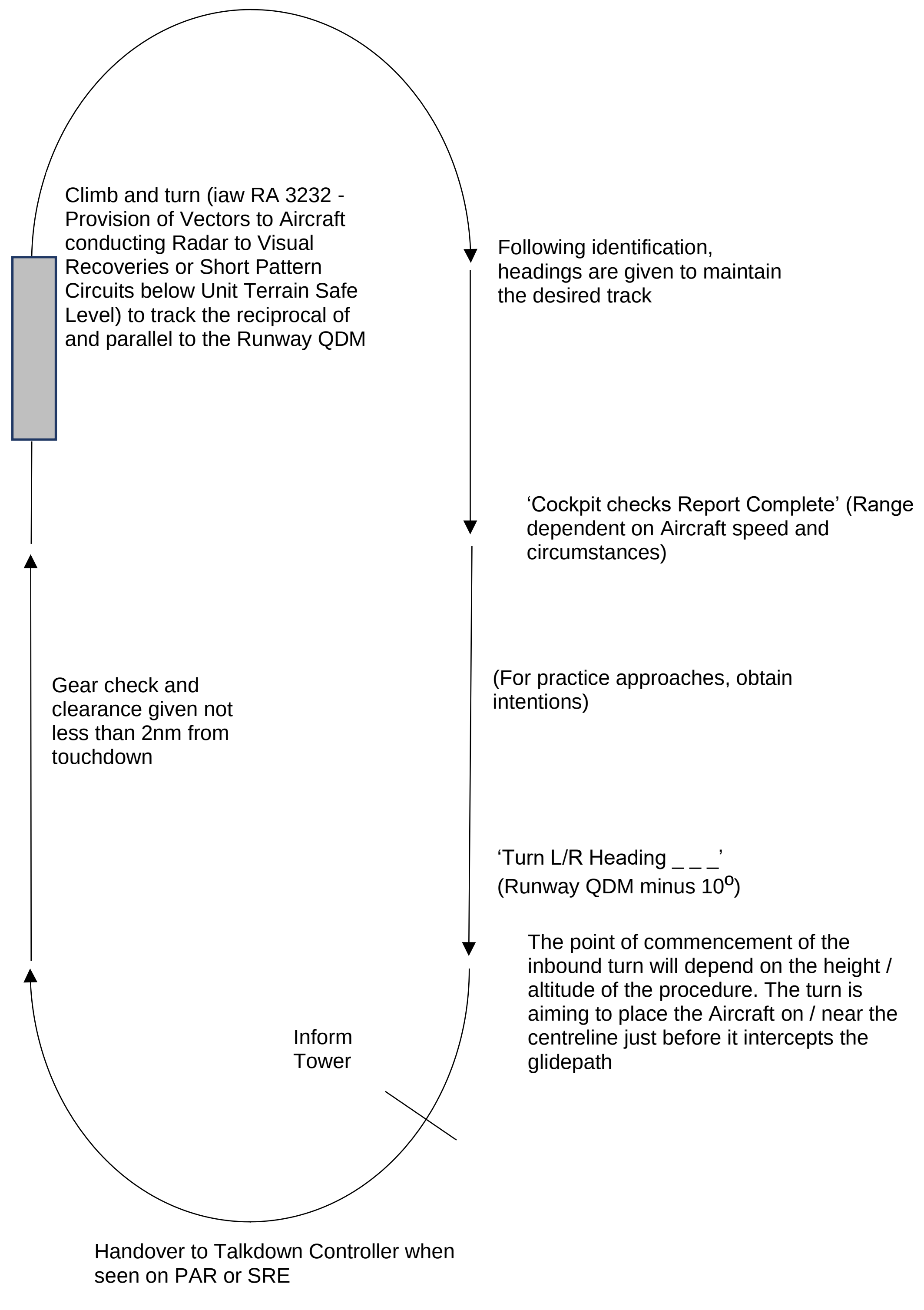
Spiral Descents

22. Spiral descent procedures are conducted as follows:

a. **Practice Approaches.** For practice forced landings, when Direction Finding is used initially to recover the Aircraft to the overhead and subsequently to spiral in the descent, the weather minima for Radar to Visual (R-Vis) approaches will be applied and used as the lowest MDH / MDA.

b. **Emergency Approaches.** For emergency forced landings, bearings at the cardinal points will ensure that the Aircraft is kept within the Category E Aerodrome circling area (4.5 nm). The Category E circling MDH / MDA can therefore be used as the basis for the procedure.

Figure 3: Director Procedures – Short Pattern Circuit



CHAPTER 4: Approach Procedures

Departure Procedures

1. The Approach Controller may control Aircraft departures iaw procedures published for the Aerodrome; identifying the Aircraft and handing them over to the next agency as appropriate.

Standard Instrument Departure (SID) / Military Instrument Departure (MID)

2. A SID is a designated IFR departure route, that is wholly contained within CAS, linking the Aerodrome or a specified Runway at the Aerodrome with a specified significant point[20], normally on a designated ATS route, at which the en route phase of flight commences. Where the departure route does not remain wholly within CAS it is known as a MID and may end at a 5 Letter Name Code (5LNC). Routings for both SIDs and MIDs are designed to ensure that major obstructions, prohibited airspace and restricted airspace are avoided.

3. SIDs / MIDs are applicable to all Aircraft. It is not mandatory to carry out a SID / MID although, if one is flown, the laid down procedure will be followed to ensure safe operation unless dispensation has been obtained from ATC. Aircraft Commanders unable to achieve the climb gradient specified for a particular SID / MID are required to ensure that meteorological conditions are adequate to allow obstacles to be seen and avoided up to the Altitude, Height or Flight Level stated on the departure chart. The climb gradient assumed will be 3.3% (200 ft / nm). Minimum climb gradient tables will be published when the required gradient exceeds 200 ft / nm. If the required climb gradient exceeds 200 ft / nm, a caution and explanation will be included on the departure chart and the controlling obstacle depicted thereon.

Area Navigation (RNAV) Departures

4. RNAV departures are pilot / Aircraft interpreted departures and are to be handled the same way as other instrument departures but they are designed to incorporate minimal vectoring and communications between pilots and ATC. Controllers are not to routinely intervene as there is an expectation that the Aircraft will follow the RNAV departure without ATC intervention, this becomes critical when Aircraft employ their flight management systems. Where intervention is required, consideration will be given to any subsequent actions that need to be taken to resume the planned departure route following such intervention. This may require the Controller to nominate the specific route that the Aircraft will follow, rather than simply state ‘resume own navigation’.

5. RNAV departure procedures are to be flown on the QNH and standard ATC procedures for sequencing and separating Aircraft will be applied at all times. Each RNAV Departure procedure is designed using significant points known as waypoints and they will either be allocated an alphanumeric designator or more commonly a 5LNC.

Military Aerodrome Traffic Zone (MATZ) Penetration

6. A MATZ crossing request will be co-ordinated between the relevant control positions and where possible the most expeditious, but safest route is to be

[20] Refer to CAP 1430 – UK Air Traffic Management Vocabulary for the definition of significant point.

given to the Aircraft when crossing the MATZ. The Height / Altitude at which Aircraft are permitted to cross the MATZ / Combined MATZ (CMATZ)[21] will be considered so as to cause minimum disruption. If it is considered unsafe for the Aircraft to cross the MATZ / CMATZ, the pilot will be informed and requested to re-route; civil pilots are only required to recognize and avoid the Aerodrome Traffic Zone (ATZ).

7. When crossing a MATZ / CMATZ it is the responsibility of the pilot to ensure that clearance is obtained to transit each individual embedded ATZ, although the pilot may ask the Controller to obtain these clearance(s) on their behalf. When issuing any Approval to cross a MATZ or CMATZ Controllers will specify clearly any clearance or otherwise to transit embedded ATZs.

8. Phraseology for the penetration of a MATZ / CMATZ and ATZ is detailed in CAP 413.

Handovers to Director

9. The Approach Controller will normally carry out the initial identification of Aircraft calling for random radar recoveries and Aircraft performing a missed approach or MACF procedure. The Approach Controller will ensure that these Aircraft are on a suitable heading and appropriate Flight Level / Height / Altitude for the Director to integrate them into the pattern.

Radar-Visual (R-Vis) Recoveries

10. For a R-Vis approach, the Radar Controller can give course guidance and descent down to the appropriate safe Height / Altitude as determined by the ATC SMAC or RVC for that Aerodrome. Aerodromes at which R-Vis approaches are used as a normal means of recovery will have a weather limit below which only authorized precision and non-precision Instrument Approaches are permitted. It is suggested that this limit be 1000 ft. In all cases, where such procedures are used the minimum required obstacle clearance will be 500 ft inside 10 nm from the Aerodrome[22] and 1000 ft outside 10 nm. Where the radar head is displaced from the Aerodrome, particular consideration will be given to the base of radar cover when descending Aircraft for R-Vis approaches.

11. Aircraft will be recovered in the most expeditious manner consistent with the prevailing weather and traffic conditions. If required by Local / Unit orders, the Radar Controller will inform the Aerodrome Controller of the approaching Aircraft when it is at a suitable distance from the Aerodrome, dependent on Aircraft speed and local conditions or as specified in local orders. When positioning Aircraft for this type of approach the Approach Controller may consider:

a. Reported cloud base, visibility and weather.

b. Approach lighting aids available.

c. Director’s pattern and conflicting traffic.

[21] CMATZs are occasionally established as the means of integrating and coordinating traffic patterns and specified control services. Where 2 or more MATZs are grouped together, one Aerodrome is designated the Controlling Aerodrome.
[22] Note: The Final Approach Vectoring Area (FAVA) on a ATC SMAC is already designed to only provide 500 ft obstacle clearance.

d. Other Aerodromes' traffic patterns.

e. Airspace restrictions.

f. Terrain clearance.

g. Clearance criteria.

Visual Approaches

12. At some stage during an Instrument Approach a pilot has to decide whether they can continue their approach using external cues[23] as the primary reference for flying. This decision may be made at any stage during the Instrument Approach but, once it is made, the approach converts from an instrument to a visual approach[2].

[23] Unless they are performing a fully automated landing.

CHAPTER 5: Aircraft Emergencies

General Principles

1. The requirements for handling an Aircraft emergency are detailed in RA 3311[24] with the main principle being to ensure that the maximum possible assistance is provided to the Aircraft concerned. This chapter provides further guidance on interacting with the Distress and Diversion (D&D) Cell, readiness states for Aerodrome Emergency Services, responsibilities, and specific emergency procedures for military Aircraft types.

D&D Cell

2. The UK D&D Cell is part of 78 Squadron RAF, and fulfils the following primary functions:

   a. Provide surveillance-based ATS to Aircraft that have declared an emergency on 243.00 MHz or 121.50 MHz, and to Aircraft that are practising emergencies on 245.1 MHz.

   b. Provide an emergency fixing service to enable the identification of the position of an Aircraft in emergency.

   c. Coordinate and facilitate the exchange of information between agencies involved in the handling of emergency Aircraft: these may include other ATS units, the emergency services and the Joint Rescue Coordination Centre (JRCC).

3. The D&D Cell has a detailed knowledge of minor Aerodrome availability within the UK FIR, as well as a comprehensive database that enables rapid communication with Aerodromes, Aircraft operators, ATSUs, and the Search and Rescue (SAR) organisation including Police Air Support Units and the regional emergency services. The D&D cell also provide facilities for practising emergency procedures to both civil and military pilots.

4. Both the D&D Cell and ATSUs will provide an alerting service iaw RA 3311, this Manual and applicable local orders. At all times, the responsibility for the operation and Safety of the Aircraft rests with the pilot.

5. Where the D&D Cell are providing an ATS to an emergency Aircraft, they will consult with the pilot and relevant ATSUs to identify the most suitable Aerodrome for landing, iaw RA 3311. For RPAS, ditching points will need to be considered.

6. Once agreement has been reached that the selected Aerodrome can accept the Aircraft, the D&D Cell may opt to continue to provide a service to the Aircraft or to complete a handover of the Aircraft to an alternative ATSU that they believe is better placed to provide assistance to the pilot.

7. The responsibility for providing a service to the emergency Aircraft will only be transferred between the D&D Cell controller and the receiving ATSU controller once both parties are satisfied that they have all the necessary information to enable them to provide the best possible assistance to the pilot.

[24] Refer to RA 3311 – Aircraft Emergency and Crash Procedures.

8. Controllers will consider the following points when interacting with D&D:

a. **Surveillance Cover**. The D&D cell can provide an ATS using NATS area ATS surveillance systems, which include a facility to automatically detect emergency SSR codes. However, surveillance coverage at lower levels is poor; therefore, the D&D controller may seek an early handover to the Aerodrome ATSU to avoid the need to stop the descent of an emergency Aircraft.

b. **Auto-triangulation**. The D&D Cell can provide an instant VHF / UHF auto-triangulation fixing service. In the London FIR, this service is expected to be available to Aircraft operating over land to the east of Wales and south of Manchester at and above 3,000 ft amsl and at and above 2,000 ft amsl within 40 nm of Heathrow. In the Scottish FIR, this service is expected to be available at and above 8,500 ft amsl, reducing to 2,000 – 5,000 ft amsl over the sea, lowland areas and around the Scottish TMA. Outside these parameters, the service can be unreliable.

c. **RTF Coverage**. D&D's low-level radio coverage (below 3,000 ft amsl) is poor and so an early handover to the diversion Aerodrome may be sought by the D&D controller. In certain circumstances, (eg a UHF-only equipped Aircraft diverting to a VHF-only equipped Aerodrome ATSU), it may be impossible to transfer RTF communications with the Aircraft to its destination Aerodrome. In these circumstances, the D&D controller may request that the responsibility for the provision of the service to the emergency Aircraft be transferred to the Aerodrome ATSU, with the Aerodrome ATSU issuing information, clearances and instructions on the landline telephone to the D&D controller, for relay to the pilot. In these circumstances, it is imperative that the Controllers involved agree explicitly as to who is responsible for the provision of the service to the Aircraft. Additionally, the D&D controller may opt to keep the Aircraft high for as long as practicable to facilitate the passing of information, clearances and instructions before a loss of RTF occurs.

d. **Minimum Sector Altitudes**. D&D Controllers can operate down to the Area Safety Altitudes prior to handover. Controllers do not have a detailed knowledge of the local airspace, terrain or obstacles surrounding Aerodromes. Therefore, the D&D controller may require guidance from relevant ATSUs on local minimum sector Altitudes and local datum pressure in order to provide the fullest possible service to actual emergencies.

9. With exception to the following circumstances, ATSUs will not transmit on 121.5 MHz or 243.00 MHz without authorization from the D&D cell:

a. A pilot in distress calls a specific ATSU that is local to the pilot concerned; or,

b. It is apparent that the D&D cell is not responding to an emergency transmission.

10. The control of an Aircraft, or the provision of a non-control ATS, may be transferred between the D&D Cell and an ATSU as described above. Whilst the D&D Cell will continue to provide assistance and management of response agencies, the responsibility for the Aircraft remains with the pilot at all times,

and responsibility for the provision of an ATS remains with the agency providing the ATS.

11. The terms ‘Executive Control’ and ‘Operational Control’, previously used to differentiate between the types of emergency control that Distress and Diversion (D&D) and an ATSU provide when assisting an Aircraft in an emergency, are no longer required and are not to be used.

Search and Rescue Operations (SAROPS) Messages

12. The following message may be issued by a D&D Controller or by another Controller on behalf of D&D:

a. **SAROPS ON FULL RESTRICTIONS.** 243.00 MHz and / or 121.5 MHz are being used for homing; practice emergencies cannot be accepted on these frequencies.

b. **SAROPS ON NO RESTRICTIONS.** Although SAROPs are in progress, practice emergencies can be accepted.

Actions to be taken by a Pilot in an Emergency

13. Squawk 7700 and pass the emergency message as per CAP 413. If applicable, the pilot is to advise ATC of any change to their intentions.

Actions to be taken by Controllers handling an Emergency Aircraft

14. Controllers will carry out immediate actions iaw RA 3311.

15. Where an emergency Aircraft is recovering to the ATSU Aerodrome, Aerodrome Emergency Services are to be brought to the appropriate level of readiness, as detailed below. The control of those assets thereafter will depend on the situation and assistance required. Other internal and external agencies are to be alerted as required in local orders.

Aerodrome Emergency Services[25] States of Readiness for Aircraft Emergencies

16. Aerodrome Emergency Services will be brought to a response level appropriate to the situation, as follows:

a. **State 1 – Aircraft Accident.** A crash has occurred on the Aerodrome or can be seen from the Aerodrome. Aerodrome Emergency Services are deployed immediately to the crash location.

b. **State 2 – Full Emergency.** An incident on the Aerodrome where doubt exists about the Safety of the Aircraft or its occupants, or to anticipate a State 1. Aerodrome Emergency Services are deployed to the incident or to pre-arranged positions on the Aerodrome.

c. **State 3 – Local Standby.** A precautionary measure to cater for a possible incident on the Aerodrome, or when an Aircraft has crashed off the Aerodrome, but the position is unknown. Aerodrome Emergency Services are crewed with engines running at their normal locations.

17. Readiness State 3 is to be taken by Aerodrome Emergency Services for:

[25] Aerodrome Emergency Services comprises ARFF and medical services. It may contain other elements as directed in local orders.

a. Aircraft carrying Dangerous Goods (DG).

b. Aircraft involved in practice and actual display flying at the Aerodrome.

c. Aero-med Flights.

d. Royal Flights

e. Any additional local unit requirements for Readiness State 3 are to be annotated in local orders and take into account the following:

(1) Type of Aircraft / movement.

(2) Normal composition of the Aerodrome Emergency Services.

(3) Nature of cargo / status of passengers.

Standard Format for Alerting Aerodrome Emergency Services[26]

18. For State 1 and State 2, Aerodrome Emergency Services will be brought to readiness by use of the Crash Alarm Bells / Telephone iaw RA 3261. This will initiate the required immediate actions within the Fire Section and Medical Centre, whilst the emergency message is passed. For State 3, use of the direct line to the required sections is normally sufficient.

19. When passing an emergency message to Aerodrome Emergency Services, the standard format is as follows:

a. Readiness state required:

(1) “STATE 1, STATE 1, STATE 1” or,

(2) “EMERGENCY STATE 2” or,

(3) “EMERGENCY STATE 3”.

b. Type of Aircraft.

c. Nature of emergency.

d. Location.

e. Persons on board and whether any have ejected or baled out.

f. Any complications (eg crashed into buildings or vehicles).

g. Whether the Aircraft is armed and / or carrying DG.

h. Any additional information of use to the emergency services.

20. A checklist is to be used to ensure the details above are maintained correctly and passed in the standard format. It is vital that the message is passed accurately, calmly, and clearly and that the receiving agencies confirm they have received it.

21. Once the required elements of Aerodrome Emergency Services establish two-way contact with ATC via RTF, the emergency message will be passed again, and acknowledgement gained.

[26] Refer to NATO STANAG 7048 – Crash Fire-Fighting and Rescue Response Readiness.

22. The Stn broadcast system (commonly known as the ‘tannoy’) will be used to broadcast the emergency message.

23. Other Stn sections or external agencies will be contacted as required in local orders.

Actions to be taken by ATC Supervisors / ATCO IC when handling an Emergency Aircraft

24. The ATC Supervisor or ATCO IC will use their experience and judgement in determining how best to support an emergency. This will often require a balance between assisting the ATC staff concerned and liaising with other agencies. However ATC Supervisors and ATCO IC’s choose to manage an Aircraft emergency, it is vital that they maintain overall situation awareness.

25. The ATC Supervisor or ATCO IC will ensure that:

a. The ATC team is not distracted by non-essential enquiries or observers.

b. Liaison with other agencies is prioritised, or delayed, according to the situation.

c. All necessary recording action is completed accurately and fully.

d. Once the emergency has concluded, ATC staff are relieved as soon as practicable to enable timely capture of vital information.

e. ATC staff are provided a sufficient break, and support as necessary, prior to recommencing duties.

26. Following a State 2 or State 3 emergency, in most circumstances the ATC Supervisor or ATCO IC will determine when the Movement Area is available for use.

27. Following a State 1 emergency, restoration of the Aerodrome to normal operations will be governed by the corresponding Post Crash Management procedures detailed in local orders.

Actions to be taken by Controllers on Suspecting Hypoxia in Aircrew

28. If a Controller suspects that the pilot of an Aircraft is suffering the effects of hypoxia, they are to attempt to make the pilot aware of their condition by transmitting, with appropriate urgency:

“Oxygen! Oxygen! Oxygen! Descend below 10,000 ft”.

29. As the pilot may not recognise the symptoms themselves, the transmission is to be repeated as often as necessary until the Aircraft is observed descending below 10,000 ft, or the required Altitude iaw AP 3458[27], if different.

30. Once the Aircraft is below 10,000 ft, or the required Altitude iaw AP 3458[27] if different, and the symptoms of hypoxia have subsided the pilot is to be instructed to level off at an appropriate level and advised to make a precautionary Return To Base (RTB). Irrespective of the pilot’s decision regarding an immediate RTB, the recovery Aerodrome is to be informed of the

[27] Refer to AP 3458 – Aircraft Emergency Reference Cards. F-35B is required to be descended below 9000 ft and Atlas / C-17 Aircraft require to be descended below 8000 ft.

hypoxia event as soon as possible to ensure that appropriate medical procedures are put in place.

Single Frequency Approach Procedure

31. This procedure, applicable to radio frequencies, is aimed at reducing, as much as possible, pilot actions that might cause spatial disorientation during the let-down / approach phases of flight. Whenever practicable, this principle will also be applied to Identification Friend or Foe / SSR code changes.

32. **Definitions**. Definitions are as follows:

a. **Single Frequency Approach.** This is an ATC approach procedure whereby pilots will not normally be required to change radio frequency from the beginning of the Instrument Approach to touchdown, except that pilots conducting an en-route descent may be required to change frequency when control is transferred from the ATCRU to the terminal facility.

b. **Single-piloted Aircraft.** This is an Aircraft possessing one set of flight controls, tandem cockpits, or 2 sets of controls but operated by one pilot.

33. **Procedures.** When the pilot of a single-piloted Aircraft requests a single frequency approach they will, whenever possible, be allocated a single radio frequency to be used from the beginning of the Instrument Approach to touchdown. Exceptions are as follows:

a. During daylight hours, when a non-surveillance approach is made, Aircraft may be instructed to change to the tower frequency after the pilot reports being able to proceed by visual reference to the ground.

b. At night, when in level flight prior to joining the circuit for a visual circuit and landing.

Flame-Out Procedures

34. Although the term ‘flame-out’ is used to describe the complete loss of engine thrust in jet Aircraft, this procedure may be used by non-jet Aircraft, and for partial power in either jet or non-jet Aircraft. Flame-out procedures are not suitable for all Aircraft. For this reason, ADHs / AM(MF) and Aircraft Commanders are authorized to produce, as necessary, patterns and techniques to suit their own requirement and lay down weather minima for the recovery procedure. The purpose of the procedure is to bring an Aircraft into visual contact with the Aerodrome at a suitable Height / Altitude for landing to be attempted. Appropriate RT phraseology is in CAP 413.

35. Whenever an actual flame-out is notified to ATC, it will be considered and handled as an emergency condition. In all cases, the Aircraft position will be confirmed by the quickest available means so that the wisest choice of diversion Aerodrome may be made.

36. It is the Responsibility of the Aircraft Commander to determine if a flame-out recovery will be attempted after consideration of data provided by the Controller, the particular situation that exists, and procedures established by their ADH / AM(MF) concerning flame-outs in the type of Aircraft being flown. Because of the many possible variables involved in a flame-out attempt (type of

Aircraft, relative location of recovery Aerodrome, weather and winds, pilot experience, etc) it is not practicable to establish ATC procedures to be used for specific application.

F-35 Flameout Procedures

37. The F-35 Flameout (FO) / Practice FO (PFO) procedure has two forms. Depending on the energy state of the Aircraft, either of the profiles described below may be intercepted at an appropriate point.

a. **Straight-in FO / PFO**. The straight in profile starts 7 - 10 nm from the Aerodrome and 7,000 - 10,000 ft AGL. On approach, the Aircraft may appear to be flying a steeper approach, and / or weave, in order to manage the energy state of the Aircraft.

b. **Overhead FO / PFO.** The overhead profile is a spiral descent flown from the overhead at approximately 10,000 ft AGL, to a low-key position abeam the threshold at 5,000 - 6,000 ft AGL. The gear will normally be lowered at low key, abeam the threshold, but this may be delayed until no later than halfway around final. Once the landing gear is down and locked, the pilot will call gear down.

38. Unless an emergency is declared, a request for a PFO will be treated as a practice approach. An actual emergency will be notified in the usual manner. The information required by the pilot does not differ between a practice or actual FO, however they may request a single-frequency approach, dependant on the Aircraft system failure.

Ejection

39. If ejection is elected and time permits, the pilot will pass to the Controller, immediately prior to the ejection, Aircraft heading and Altitude. The Controller will record this information iaw RA 3204[28], and pass it immediately to the D&D cell.

Radar Actual Forced Landing (AFL) / Practice Forced Landing (PFL)

40. The following radar AFL / PFL procedure permits recovery from above a cloud layer or in conditions of poor visibility following an actual or simulated power loss. Relevant RT phraseology is in CAP 413. The procedure is as follows:

a. Following the initial request for an AFL / PFL, the pilot is given a steer for the Aerodrome corrected as necessary, to permit a homing to the overhead.

b. The pilot may have lost some instruments, including navigation displays, and therefore may not be able to give an accurate position report. Identification should be as expeditious as possible by whatever means are available. The pilot may be able to squawk SSR Mode A 7700 in an actual emergency.

c. Once identified, the pilot is given ranges from the overhead at 1 nm intervals. While gliding towards the overhead, the pilot compares their range with their Height / Altitude in thousands of feet and positions to achieve the desired glideslope. If the Aircraft is positioned particularly high

[28] Refer to RA 3204 – Air Traffic Management Records.

in relation to the distance to run, the Aircraft Commander may elect to arc or circle in order to achieve the required range / Height / Altitude relationship.

d. Once the Aircraft has established in the glide or the pilot has reported ‘accelerating’, range information is required at ½ nm intervals.

e. On becoming visual with the Aerodrome, (lowest Height / Altitude is the circling minimum) the pilot positions for the most suitable Runway at Low Key point, as they would do for a visual AFL / PFL.

41. **Terminology.** The following terms apply:

a. **High Key Point.** This varies in position and Height according to the Aircraft type but generally is high ‘dead-side’ of the landing Runway.

b. **Low Key Point.** Downwind, opposite the landing threshold.

Hawk T2 / Mk.167 and Hunter Straight-in Forced Landing (SIFL)

42. The Hawk T2 / Mk.167 and Hunter SIFL procedure is used to recover an Aircraft that has had an engine failure or when imminent failure is suspected. The pilot will attempt to fly the Aircraft to intercept the Runway centreline before turning inbound, configuring and conducting a steep final approach. It is an internal aids approach usually requiring minimal ATC input.

43. After an engine failure the Aircraft may suffer severely degraded navigation capability until a back up generator comes online; therefore, an initial vector and range to the Aerodrome may be required. Once the back up generator is online (or if it was already online), the pilot will have full navigation capabilities and will require freedom of manoeuvre to achieve the centreline, usually without further assistance.

44. Certain emergency situations may prevent the back up generator from running; it is therefore possible that ATC may be required to continue to provide vectors and ranges to the Aerodrome if the pilot requests it.

45. The Aircraft will initially glide 2 nm per thousand feet. The pilot will ideally intercept the extended centreline for the in-use Runway at a point where the range in nm is equal to Height in thousands of feet (eg 9 nm at 9000 ft). This may involve arcing around the Aerodrome or flying through the overhead before turning inbound; the exact position achieved depends on many variables and the pilot may even need to position for an out-of-use Runway.

46. The procedure can be flown in Instrument Meteorological Conditions (IMC) or VMC, but is always conducted under IFR; it is therefore radar monitored for both the requirements of the pilot and for safe integration with other instrument traffic.

47. Once the extended centreline is achieved, the Aircraft will maintain a speed of 160 - 190 kts, configure for landing and increase its ROD. In the final approach, the Aircraft will be configured with gear and full flap in a steep descent (~14º nose down). Approximately 200 ft from landing, the pilot will raise the nose, reducing the ROD. With around 40 ft to go, the pilot will raise the nose a second time to adopt the landing attitude. These landings may be considerably inset from the threshold and will usually involve a brake chute deployment.

48. While some training bases have SIFL details in their local orders, the procedures below provide brief guidance on Hawk T2 / Mk.167 and Hunter SIFLs to other Aerodromes.

49. When the pilot states intentions to perform a SIFL, the Approach Controller will:

a. Instruct the pilot to squawk emergency, identify the Aircraft and provide the requested ATS.

b. Inform the pilot of the circuit state – Controllers will endeavour to clear the circuit as this is an emergency procedure and the emergency Aircraft will be unable to deconflict from any other traffic.

c. Pass Aerodrome details and instruct the pilot to set the QFE / QNH. Own navigation can then be given and "taking own terrain clearance, descent approved" subject to the pilot **not** being in receipt of a Deconfliction Service.

d. Inform the Aerodrome Controller that a SIFL is inbound.

e. Ensure safe integration with other instrument traffic – this may mean breaking off other traffic to allow the emergency Aircraft priority.

f. At 5 nm from touchdown, request a joining clearance from the Aerodrome Controller.

g. Instruct the emergency Aircraft to continue with the Aerodrome Controller. This will be no earlier than the join clearance and no later than 2 nm from touchdown.

50. The Aerodrome Controller will:

a. Ensure that the circuit traffic is positioned appropriately to allow the emergency Aircraft to make a landing; ideally, the circuit will be cleared.

b. Ensure a QFE / QNH and gear check are obtained.

c. Issue a clearance to land.

Hawk T2 / Mk.167 and Hunter Straight-in Practice Forced Landing (SIPFL) and Academic SIPFL

51. The Hawk T2 / Mk 167 and Hunter Aircraft may practice emergency procedures by requesting a SIPFL. Generally this will only be conducted to an empty circuit as the Aircraft’s flightpath will prevent it from integrating with visual circuit traffic, though local orders may contain deconfliction instructions in the case of an occupied circuit.

52. If requested from outside the ATZ, the profile will follow that outlined for the SIFL, with the exception of squawking emergency. If it is not possible to safely deconflict from other traffic, the SIPFL is to be terminated.

53. If requested from inside the ATZ, an Academic SIPFL setup is flown and it can be flown Visual Flight Rules (VFR) or IFR. The pilot will depart the circuit at approximately 7000 ft and contact the Approach Controller to self-position on the extended centreline at approximately 6 nm before turning inbound. Once inbound and established on the centreline, the Aircraft will adopt the latter

stages of a SIPFL profile, requiring a clearance to join for the Runway in use before contacting the Aerodrome Controller.

54. Once the pilot has contacted the Aerodrome Controller and completed a QFE / QNH and gear check, a clearance can be issued. The SIPFL is usually flown to a low approach not below XXX ft or a touch and go, iaw local orders.

Brake Chute Operations[29]

55. The Aerodrome Controller is to be informed of any planned brake chute deployment as soon as possible (ie if informed on radar this is to be passed to the Aerodrome Controller at the earliest opportunity). The deployment of a brake parachute introduces a potential Foreign Object Debris Risk due to the rubber bands that are ejected from the parachute pack on deployment. Additionally, the recovery of the brake parachute carries potential Health and Safety and equipment contamination Risks. Local orders based on specialist advice are to cover the procedures to be taken where a brake parachute equipped Aircraft has the potential to land at the Airfield.

56. Aerodrome Controllers are to ensure that if the Aircraft in question joins the visual circuit, their intentions are confirmed to ensure that all elements of the visual circuit are aware of the chute deployment.

57. In the event of an Aircraft deploying its brake chute, other Aircraft are not to land behind the Aircraft until the Runway has been confirmed clear of the chute, unless otherwise specified in local orders.

58. For unplanned chute deployments any Aircraft already in receipt of a clearance to use the Runway are to be warned that the Aircraft on the Runway has streamed its chute. The decision as to whether a safe go-around can be executed rests with the pilot. Any clearance to use the Runway behind the Aircraft streaming its chute is to be iaw local orders.

59. A formation planning to stream the brake chute will conduct a normal formation approach and landing. The subsequent element(s) of the formation will ensure nose tail separation, using wheel-brakes if necessary, even if this is above Normal Max Braking Speed (NMBS) as use of the chute will automatically result in a much higher NMBS. The formation leader will select the brake chute after subsequent element(s) of the formation have done so.

60. To avoid damage or contamination of the brake chute, the collection and recovery must be carried out by a suitably qualified and experienced person. Depending on weather conditions, it may be possible for the chute to be retained until the Aircraft has taxied well clear of the Runway.

No Compass No Gyro Procedures

61. If both compass and gyro are unserviceable the pilot is instructed to make all turns standard rate one and the Controller times all turns (3º per second). A standard controlled descent through cloud is then carried out with the Controller timing all turns. Standard procedures are used where possible and the specific RT phraseology in CAP 413, will be used.

[29] For example, Hawk T2 and Typhoon Aircraft.

Missed Approach and Communications Failure (MACF) Procedures

62. MACF procedures are published as follows:

a. **Missed Approach (MA) Procedure.** The missed approach procedure for an Aerodrome is published in the appropriate TAP chart. In the case of ground interpreted aids not covered by that means, the missed approach procedure will be published in TAP charts under 'Special Procedures'.

(1) The missed approach begins at the MAPt but separate instructions may be issued by the Controller if the pilot is unable to complete the approach to that point.

b. **Communication Failure (CF) Procedure.** The UK AIP[30] contains the details for what a pilot is to do if they experience a communications failure during an approach in VMC / IMC but, where an Aerodrome requires to detail a specific CF procedure, it will be included on the applicable TAP charts iaw the arrangements given for MA procedures.

(1) The phrase "If radio contact is lost and you are unable to continue your approach" will precede any CF procedure message transmitted by the Controller.

63. Pilots are expected to be familiar with the MACF procedures, or, if not, are required to request details from the Controller before the first approach. The MA or CF procedure will be transmitted separately and passed by the Controller in the following circumstances:

a. To visiting Aircraft in an emergency, where appropriate (see Note), including practice emergency exercises.

b. When requested by the pilot.

c. When the procedure is temporarily changed from that published.

d. When directed by unit / local orders.

Note:

During certain emergencies, eg Flame-Out / Fuel Shortage, the giving of such procedures would be counterproductive and will be omitted.

64. Where a Controller requires confirmation that a pilot is familiar with the MACF procedures, the phrase "confirm you are familiar with the Missed Approach and Communication Failure procedures" will be used.

Aircraft with Communications or Total Electrics Failure in the Visual Circuit

65. The presence of an Aircraft with radio or total electrics failure in the visual circuit will be acknowledged by the use of a green pyrotechnic or light signal as the Aircraft proceeds downwind accompanied by an RT transmission "Radio / total electrics failure turning downwind".

66. Landing instructions will be given to such Aircraft on finals using a pyrotechnic or light signal.

[30] Refer to UK AIP Part 2 – ENR 1.1 Para 3.4.2 Radio Failure Procedures for Pilots.

67. When an Aircraft with total electrics failure requires an undercarriage status check prior to landing, the ATC procedure will be as follows:

a. A port to starboard sequence of signals for indicating undercarriage status.

b. Green pyrotechnic or light signal to indicate undercarriage down, red to indicate position other than locked down.

c. Hook fitted Aircraft only receive a green fourth pyrotechnic or light signal if the hook is down.

d. Pyrotechnic or light signal indications will be given when the Aircraft is downwind other than at those Aerodromes with special requirements.

Loss of Communications

68. **General.** If radio contact is lost with an Aircraft receiving a radar service the following steps will be taken to establish which elements of the air and / or ground equipment are unserviceable:

a. Call other Aircraft on the frequency in use.

b. Instruct the pilot to carry out one of the following:

(1) Make a SSR code change.

(2) Operate the IDENT feature.

(3) Effect a turn of at least 30°.

c. Carry out a ground check of the frequency in use.

d. Call the pilot on 243.00 MHz or 121.5 MHz having obtained Approval from D&D.

Air Equipment Unserviceable

69. Equipment unserviceabilities are dealt with as follows:

Total Radio Failure

a. If an Aircraft has total radio failure, a Controller will:

(1) Continue to trace the Aircraft to its destination or handover point or to the limits of radar cover.

(2) Ensure, if possible, other traffic is vectored clear of the Aircraft with radio failure.

(3) Pass details of the situation to the ATC Supervisor, requesting that they co-ordinate with civil units where necessary.

(4) Inform D&D of the action taken.

(5) Arrange any subsequent handover of control.

Transmitter Failure

b. If an Aircraft has transmitter failure, the Controller will:

(1) Obtain information from the pilot by instructing them to squawk 'IDENT'.

(2) Try other frequencies including VHF if practicable. However, the Controller will ensure that the pilot continues to listen out on the frequency being used so that complete contact is not lost.

(3) Inform the ATC Supervisor.

(4) Advise the next unit to which the Aircraft is likely to be transferred.

(5) Advise D&D of the situation and, if possible, provide a service on 243.00 MHz or 121.5 MHz.

Receiver Failure

c. If a Controller suspects an Aircraft receiver has failed, they will:

(1) Advise D&D of the situation and, if possible, provide a service on 243.00 MHz or 121.5 MHz.

(2) Take actions as per total radio failure.

Microphone Failure

d. The speechless procedure is used primarily in Terminal ATC and the phraseology to be used is detailed in CAP 413. In the Area Radar environment the identity and destination of an Aircraft will usually be known and the speechless procedure will be adapted to fit an incident. While it is impracticable to detail the actions to be taken in all circumstances, whenever possible, Area Radar Controllers will include the following questions during the incident:

(1) 'Do you require recovery to (station name)? (if the destination is not known, endeavour to ascertain).'

(2) 'Do you have any further emergency?'

Airborne Reporting of Communicable Diseases

70. Pilots have a responsibility to inform the ATC agency providing the ATS if they become aware that they have someone on board who is suffering from a suspected communicable disease[31]. The pilot is to report this over the radio to the Controller from whom they are receiving a service. The message is to include the following:

a. Callsign.

b. Departure Aerodrome

c. Destination Aerodrome.

d. ETA at destination.

e. Number of people affected.

f. Persons on board.

g. The words 'communicable disease'.

[31] Refer to CAP 493 – Manual of Air Traffic Services (MATS) Part 1, Section 5, Chapter 1.

71. A Controller receiving such a message is to pass it to the Supervisor / ATCO I/C at the destination Aerodrome. For Tac C2 Agency[14], the Tac C2 Controller is to pass the message to the 78 Sqn Supervisor for onward transmission to the destination Aerodrome. Further communication on the suspected communicable disease is not to take place over the radio.

Fuel Jettison

72. The flying Regulations for fuel jettison are contained in RA 2309 – Flight Procedures: General[32]. The decision to jettison fuel will rest solely with the pilot.

73. It is recommended that fuel jettison takes place at 10,000 ft above ground or sea level. If this is not possible, then fuel may be jettisoned at lower Altitudes, but as high as possible whilst maintaining Safety.

74. Vertical separation of at least 1,000 ft is required against an Aircraft jettisoning fuel.

75. The fuel jettison area will ideally be clear of populated areas (preferably over water) and areas where thunderstorms have been reported or forecast. Controllers will liaise with the pilot to identify the most suitable area for the jettison to take place. The environmental impact will be minimised to the greatest extent possible whilst ensuring the Safety of the Aircraft commensurate with the urgency of the situation.

76. Further guidance may be found in CAP 493[33].

[32] Refer to RA 2309(11): Fuel Jettison.
[33] Refer to CAP 493 – Manual of Air Traffic Services – Part 1, Section 5, Chapter 1: Aircraft Emergencies, paragraph 13.

CHAPTER 6 Establishment, Disestablishment or Changes to Airspace

1. Proposals for the establishment, disestablishment or changes to the dimensions of airspace will be submitted through the relevant Front Line Command (FLC) and / or Defence Infrastructure Organisation (DIO), where appropriate, to Defence Airspace and Air Traffic Management (DAATM). DAATM will subsequently provide guidance on how to follow the relevant CAA Airspace Policy Statement[34] and / or CAP 1616 airspace change process. An airspace change sponsor will be required to undertake the work involved, including engagement with impacted stakeholders and submission of an Airspace Change Proposal to the CAA for consideration. Airspace is solely regulated by the CAA.

Aerodrome Approach, Holding and Departing Patterns and Procedures

2. Proposals for new Aerodrome approach, holding or departure patterns and procedures, or alteration to existing patterns and procedures, will be submitted to the SO3 Aeronautical Information Manager, responsible for the contract with the Approved Procedure Design Organisation (APDO), at No 1 AIDU for coordination. No 1 AIDU is responsible for seeking FLC ATM HQ advice to resolve possible conflictions between adjacent Aerodromes or other published procedures.

[34] Refer to CAA List of Airspace Policy Statements (www.caa.co.uk).

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