



Guidance Material for  
Operations Specifications

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## **All Weather Operations (AWO)**

First edition

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Military Aviation Authority

Royal Thai Air Force



## ISSUE APPROVAL

This Guidance Material (GM) contains the standards, policies, procedures, and guidelines concerning Royal Thai Air Force Regulation (AFR) – Operation of Aircraft and is published for use by the Military Aviation Authority (MAA) personnel delegated with the responsibility of certifying Air Operators shall comply with all provisions in this GM during the certification process.

In addition, this GM contains instruction in respect of certification to be eligible to conduct by Air Operator/Squadrons for guidance to reach the Royal Thai Air Force Flight Operations Standardization Regulations B.E.2564 ; Item 37.6.

Air Vice Marshal



(Jukkrawat Jongsuebsook)

Director of Military Aviation Authority

Royal Thai Air Force



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### RECORDS OF REVISION

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### REVISION HIGHLIGHTS

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## FOREWARD

ICAO Doc 9365 “Manual of all-weather operations” requires additional criteria to be met prior to granting authorization to conduct Category II and III operations.

The intention of this manual is to provide instructions in respect of Maintenance and Operation of the aircraft in Category II and Category III weather conditions and for the conduct of low visibility take offs.

In addition this manual contains instructions in respect of certification of Aerodromes to be eligible to conduct Category II and Category III operations.

This manual assumes that the Squadron is certified as a Category I operator prior to being evaluated as a Category II or Category III operator.

Therefore, this manual confine only to additional requirements of Category II and Category III operations.

All The Military Aviation Authority personnel delegated with the responsibility of certifying Squadrons for Category II and Category III operations shall comply with all provisions in this manual during the certification process.

Any interpretation regarding the contents of this manual by The Military Aviation Authority shall be considered final.



## DEFINITIONS

### Aircraft categories - All weather operations

#### Classification of aircrafts

The criteria taken into consideration for the classification of aircrafts by categories is the indicated airspeed at threshold (VAT) which is equal to the stalling speed (VSO) multiplied by 1.3 or stall speed VS1G multiplied by 1.23 in the landing configuration at the maximum certificated landing mass. If both VSO and VS1G are available, the higher resulting VAT shall be applied.

The aircraft categories corresponding to VAT values are in the Table below:

Aircraft Category	VAT
A	Less than 91 kt
B	From 91 to 120 kt
C	From 121 to 140 kt
D	From 141 to 165 kt
E	From 166 to 210 kt

The landing configuration which is to be taken into consideration shall be defined by the squadron or by the aircraft manufacturer.

Permanent change of category (maximum landing mass)

- a) The Squadrons may impose a permanent, lower, landing mass, and use this mass for determining the VAT if approved by the MAA.
- b) The category defined for a given aircraft shall be a permanent value and thus independent of the changing conditions of day to day operations.

#### Alert Height (AH)

A height above the runway threshold based on the characteristics of the aircraft and its failure operational landing system, above which a Category III operation would be continued and a missed approach initiated if a failure occurred in one of the redundant parts of the landing system, or in the relevant ground equipment.

#### Automatic flight control system (AFCS) with ILS coupled approach mode

Airborne system which provides automatic control of the flight path of the aircraft by reference to the ILS.

#### Automatic landing system

The airborne system which provides automatic control of the aircraft during the approach and landing.

#### Continuous descent final approach (CDFA)

A technique, consistent with stabilized approach procedures, for flying the final approach segment of a non-precision instrument approach procedure as a continuous descent, without





level-off, from an altitude/height at or above the final approach fix altitude/height to a point approximately 15 m (50 ft) above the landing runway threshold or the point where the flare maneuver should begin for the type of aircraft flown.

### **Decision altitude (DA) or decision height (DH)**

A specified altitude or height in the precision approach or approach with vertical guidance at which a missed approach must be initiated if the required visual reference to continue the approach has not been established.

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

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

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

### **Enhanced vision system (EVS)**

A system to display electronic real-time images of the external scene achieved through the use of image sensors.

### **Fail-operational automatic landing system**

An automatic landing system is fail-operational if, in the event of a failure, the approach, flare and landing can be completed by the remaining part of the automatic system.

### **Fail-passive automatic landing system**

An automatic landing system is fail-passive if, in the event of a failure, there is no significant deviation of aircraft trim, flight path or attitude but the landing will not be completed automatically.

### **Fail-operational hybrid landing system**

A system which consists of two or more independent landing systems and in the event of failure of one system, guidance or control is provided by the remaining system(s) to permit completion of the landing.

*Note. A fail-operational hybrid landing system may consist of a fail-passive automatic landing system with a monitored head-up display which provides guidance to enable the pilot to complete the landing manually after failure of the automatic landing system.*

### **Head-up display (HUD)**

A display system that presents flight information into the pilot's forward external field of view.



### Head-up display (HUD) approach and landing guidance system (HUDLS)

An airborne instrument system which presents sufficient information and guidance in a specific area of the aircraft windshield, superimposed for a conformal view with the external visual scene, which permits the pilot to maneuver the aircraft manually by reference to that information and guidance alone to a level of performance and reliability that is acceptable for the category of operation concerned.

### Hybrid Head Up Display Landing System (Hybrid HUDLS)

A system which consists of a primary fail-passive automatic landing system and a secondary independent HUD/HUDLS enabling the pilot to complete a landing manually after failure of the primary system.

*Note: Typically, the secondary independent HUD/HUDLS provides guidance which normally takes the form of command information, but it may alternatively be situation (or deviation) information.*

### ILS critical area

An area of defined dimensions about the localizer and glide path antennas where vehicles, including aircraft, are excluded during all ILS operations.

*Note. The critical area is protected because the presence of vehicles and/or aircraft inside the boundaries will cause unacceptable disturbance to the ILS signal-in-space.*

### ILS sensitive area

An area extending beyond the critical area where the parking and/or movement of vehicles, including aircraft, is controlled to prevent the possibility of unacceptable interference to the ILS signal during ILS operations.

*Note. The sensitive area is protected to protection against interference caused by large moving objects outside the critical area but still normally within the airfield boundary.*

### Instrument approach procedure

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

#### - Non-precision approach (NPA) procedure

An instrument approach procedure which utilizes lateral guidance but does not utilize vertical guidance.

#### - Approach procedure with vertical guidance (APV)

An instrument approach procedure which utilizes lateral and vertical guidance but does not meet the requirements established for precision approach and landing operations.



**- Precision approach (PA) procedure**

An instrument approach procedure using precision lateral and vertical guidance with minima as determined by the category of operation.

*Note.*— *Lateral and vertical guidance refers to the guidance provided either by:*

- a) ground-based navigation aid ;or
- b) computer-generated navigation data

**Categories of precision approach and landing operations (ICAO DOC9365)**

**Category I (CAT I) operation**

A precision instrument approach and landing with:

- a) a decision height not lower than 60 m (200 ft); and
- b) with either a visibility not less than 800 m or a runway visual range not less than 550 m.

**Category II (CAT II) operation**

A precision instrument approach and landing with:

- a) a decision height lower than 60 m (200 ft), but not lower than 30 m (100 ft);and
- b) a runway visual range not less than 300 m.

**Category IIIA (CAT IIIA) operation**

A precision instrument approach and landing with:

- a) a decision height lower than 30 m (100 ft) or no decision height; and
- b) a runway visual range not less than 175 m.

**Category IIIB (CAT IIIB) operation**

A precision instrument approach and landing with:

- a) a decision height lower than 15 m (50 ft), or no decision height; and
- b) a runway visual range less than 175 m but not less than 50 m.

**Category IIIC (CAT IIIC) operation**

A precision instrument approach and landing with no decision height and no runway visual range limitations.

**Low visibility procedures (LVP)**

Specific procedures applied at an aerodrome for the purpose of ensuring safe operations during Category II and III approaches and/or low visibility take-offs.

**Low visibility take-off (LTO)**

A term used by the European authorities in relation to flight operations referring to a take-off on a runway where the RVR is less than 400 m.



**Required visual reference**

The section of the visual aids or of the approach area which should have been in view for sufficient time for the pilot to have made an assessment of the aircraft position and rate of change of position, in relation to the desired flight path.

**Rollout control/guidance system**

A system which provides either automatic control or instrument guidance for manual control of lateral steering for rollout until manual control of the aircraft by visual reference is assured.

**Runway visual range (RVR)**

The range over which the pilot of an aircraft on the center line of a runway can see the runway surface markings or the lights delineating the runway or identifying its center line.

**State of the Aerodrome**

The State in whose territory the aerodrome is located.

**State of the Operator**

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

**State of the Registry**

The State on whose register the aircraft is entered.

**Stabilized approach**

An approach which is flown in a controlled and appropriate manner in terms of configuration, energy and control of the flight path from a pre-determined point or altitude/height down to a point 50 feet above the threshold or the point where the flare maneuver is initiated, if higher.

**Touchdown zone**

The portion of a runway, beyond the threshold, where it is intended landing aircrafts first contact the runway.

**Visual approach**

An approach by an IFR flight when either part or all of an instrument approach procedure is not completed and the approach is executed by visual reference to terrain.



## ACRONYMS/ABBREVIATIONS

AC 120-28D	(FAA advisory circular) Criteria for approval of category III weather minima for takeoff, landing, and rollout
AC 120-29A	(FAA advisory circular) Criteria for approval of category I and category II weather minima for approach
AH	Alert Height
AFCS	Automatic Flight Control System
ALS	Automatic landing system
Cat I	Category I precision instrument approach
Cat II	Category II precision instrument approach
Cat III	Category III precision instrument approach
CDFA	Continuous Descent Final Approach
CS-AWO	EASA document on certification specifications, including airworthiness codes and acceptable means of compliance, for all weather operations (« CS-AWO »)
DA/H	Decision Altitude/Height
EASA	European Aviation Safety Agency
ECAC	European Civil Aviation Conference
EVS	Enhanced Vision System
FGS	Flight Control/Guidance System
Ft	Feet
HUD	Head Up Display
HUDLS	Head Up Guidance Landing System
ILS	Instrument Landing System
LVP	Low Visibility Procedures
LVTO	Low Visibility Take Off
M	Meters
MAA	Military Aviation Authority
RVR	Runway Visual Range
SAP	Stabilized Approach
SMGCS	Surface Movement and Guidance and Control System
SVR	Slant Visual Range



## 1. INTRODUCTION AND CERTIFICATION

### 1.1 LOW VISIBILITY OPERATIONS

1.1.1 In this manual, Low visibility operations means all procedures applied for the purpose of ensuring safe aircraft operations during Category II, III approaches and low visibility take-offs.

1.1.2 Certification of aerodromes, aircraft systems and crews for low visibility operations by The Military Aviation Authority shall be as per criteria contained in this manual.

1.1.3 All certifying staff of the Military Aviation Authority shall comply with provisions in this manual when certifying Squadrons to conduct “Low visibility operations”.

1.1.4 Any questions not covered herein, or any point of apparent conflict requiring resolution, should be referred to The Military Aviation Authority.

### 1.2 LOW VISIBILITY OPERATIONS - GENERAL OPERATING RULES

1.2.1 The Squadrons shall not conduct Category II or Category III operations unless:

- a) Each aircraft concerned is certificated by a regulatory authority of a contracting state for operations with decision heights below 200 ft, or no decision height, and accepted by the Military Aviation Authority for such operations as per paragraph 2.1.1 of this manual.
- b) A suitable system for recording approach and/or automatic landing success and failure is established and maintained to monitor the overall safety of the operation; The operations are approved by the Military Aviation Authority.
- c) The flight crew consists of at least two pilots.
- d) Decision height is determined by means of a radio altimeter.
- e) Only RVR values are used for low visibility operations.

1.2.2 The Squadrons shall not conduct low visibility take-offs in RVR less than 150 m unless approved by the Military Aviation Authority.

### 1.3 APPLICATION FOR LOW VISIBILITY OPERATIONS.

1.3.1 These instructions are intended for application to the Royal Thai Air Force transporter aircraft.

1.3.2 In no case, Category II/III certification shall be given in the case of a single pilot operation.

1.3.3 Conformity with these instructions will be prerequisite for the Squadrons intending to include Category II/III operations in Operations Specifications.

### 1.4 APPROVAL CRITERIA

Requests for landing operations in the CAT II/III range of weather minima will be considered if the following criteria are met:

- a) The aircraft has suitable flight characteristics, an approved list of equipment and acceptable continuing maintenance program.



- b) The aircraft is operated by a qualified crew in conformity with laid down procedures; and
- c) The aerodrome is suitably equipped and maintained.

## 1.5 LOW VISIBILITY OPERATIONS - INITIAL CERTIFICATION PROCEDURE

### 1.5.1 General.

The following procedures shall apply to the initial introduction and approval of low visibility operations by Royal Thai Air Force transporter aircraft.

### 1.5.2 Operational demonstration.

The purpose of the operational demonstration is to determine or validate the squadron's use and effectiveness of the applicable aircraft flight guidance systems, including HUDLS if appropriate, training, flight crew procedures, maintenance program, and manuals applicable to the Category II/III program being approved.

- a) At least 30 approaches and landings must be accomplished by the squadron in line operations using the Category II/III systems installed in each aircraft type if the requested DH is 50 ft or higher. If the DH is less than 50 ft, at least 100 approaches and landings will need to be accomplished unless otherwise approved by the Military Aviation Authority. All approaches for the purpose of these demonstrations shall be conducted in Category I or better weather conditions.
- b) If the squadron has different variants of the same type of aircraft utilizing the same basic flight control and display systems, or different basic flight control and display systems on the same type of aircraft, the squadron must show that the various variants have satisfactory performance, but the squadron need not conduct a full operational demonstration for each variant.
- c) If the number of unsuccessful approaches exceeds 5% of the total (e.g. unsatisfactory landings, system disconnects) the evaluation program must be extended in steps of at least 10 approaches and landings until the overall failure rate does not exceed 5 %.

### 1.5.3 Data collection for operational demonstrations.

Each applicant must develop a data collection method (e.g., a form to be used by the flight crew) to record approach and landing performance. The resulting data and a summary of the demonstration data shall be made available to the Authority for evaluation.

### 1.5.4 Data analysis.

Unsatisfactory approaches and/or automatic landings and all equipment failures shall be documented and analyzed.



## 1.6 TRANSITIONAL PERIODS

- a) The squadron with no previous Category II experience
  - i. The squadron without previous CAT II operational experience, applying for a CAT II operational approval, should demonstrate to the competent authority that it has gained a minimum experience of 6 months of CAT I operations on the aircraft type.
  - ii. The squadron applying for a CAT III operational approval should demonstrate to MAA that it has already completed 6 months of CAT II operations on the aircraft type.
- b) The squadron with previous CAT II or CAT III experience, applying for a CAT II or CAT III operational approval with reduced transition periods as set out in (a), should demonstrate to the competent authority that it has maintained the experience previously gained on the aircraft type.

1.6.1 The squadron authorized for Category II or III operations using auto-coupled approach procedures, with or without auto-land, and subsequently introducing manually flown Category II or III operations using a HUDLS shall be considered to be a “New Category II/III operator” for the purposes of the demonstration period provisions.

## 1.7 ELIGIBLE AERODROMES AND RUNWAYS

1.7.1 Each aircraft type/runway combination must be verified by the successful completion of at least one approach and landing in Category II or better conditions, prior to commencing Category III operations.

1.7.2 For runways with irregular pre-threshold terrain or other foreseeable or known deficiencies, each aircraft type/runway combination must be verified by operations in Category I or better conditions, prior to commencing Category II, or Category III operations.

1.7.3 If the squadron has different variants of the same type of aircraft in accordance with sub paragraph 1.7.4 below, utilizing the same basic flight control and display systems, or different basic flight control and display systems on the same type of aircraft in accordance with sub paragraph 1.7.4 below, the squadron must show that the variants have satisfactory operational performance, but the squadron need not conduct a full operational demonstration for each variant/runway combination.

1.7.4 For the purpose of paragraph 1.7, an aircraft type or variant of an aircraft type is deemed to be the same type/variant of aircraft if that type/variant has the same or similar:

- a) Level of technology, including the:
  - i) FGS and associated displays and controls.
  - ii) The FMS and level of integration with the FGS.
  - iii) Use of HUDLS.





- b) Operational procedures, including:
  - i) Alert height.
  - ii) Manual landing/automatic landing.
  - iii) No decision height operations.
  - iv) Use of HUD/HUDLS in hybrid operations.
- c) Handling characteristics, including:
  - i) Manual landing from automatic or HUDLS guided approach.
  - ii) Manual go-around from automatic approach.
  - iii) Automatic/manual roll out.

1.7.5 The squadrons using the same aircraft type/class or variant of a type in accordance with paragraph 1.7.4 above may take credit from each other's experience and records in complying with this paragraph 1.7.

## 1.8 LOW VISIBILITY OPERATIONS - CERTIFICATION STANDARDS

Following are the certification standards for.

- i. Precision approach - Category II
- ii. Precision approach - Category III
- iii. Low visibility takes off (LVTO)

## 1.9 PRECISION APPROACH - CATEGORY II OPERATIONS

1.9.1 A Category II operation is a precision instrument approach and landing using ILS or MLS with:

- i. A decision height below 200 ft but not lower than 100 ft; and
- ii. A runway visual range of not less than 300 m.

1.9.2 Decision height.

The squadron must ensure that the decision height for a Category II operation is not lower than:

- i. The minimum decision height specified in the AFM, if stated.
- ii. The minimum height to which the precision approach aid can be used without the required visual reference.
- iii. The OCH for the category of aircraft.
- iv. The decision height to which the flight crew is authorized to operate; or
- v. 100 ft.

1.9.3 Visual reference.

A pilot may not continue an approach below the Category II decision height determined in accordance with sub paragraph 1.9.2 above unless visual reference containing a segment of at least three consecutive lights that depict the center line of the approach lights or touchdown zone lights or runway center line lights or runway edge lights or a



combination of these is attained and can be maintained. This visual reference should include a lateral element of the ground pattern, i.e., an approach lighting crossbar or the landing threshold or a barrette of the touchdown zone lighting, unless the operation is conducted utilizing an approved HUDLS to touchdown.

1.9.4 Required RVR.

The lowest minima to be used by the squadron for Category II operations are:

**RVR for Category II approach vs. Decision Height**

Category II minima		
Decision Height (DH)	Auto coupled to below DH (Note 1a)	
	RVR/Aircraft category A,B and C	RVR/Aircraft category D
100 ft - 120 ft	300 m	300 m / 350 m (Note 2a)
121 ft - 140 ft	400 m	400 m
141 ft - 199 ft	450 m	450 m

Note 1a: The reference to “Auto-Coupled to below DH” in this table means continued use of the automatic flight control system down to a height which is not greater than 80 percent of the applicable DH. Thus, airworthiness requirements may, through minimum engagement height for the automatic flight control system, affect the DH to be applied.

Note 2a: For a CAT D aircraft conducting an Autoland, 300 m may be used.

**1.10 PRECISION APPROACH - CATEGORY III OPERATIONS**

1.10.1 Category III operations are subdivided as follows.

- a) Category III A operations.
- b) Category III B operations.

1.10.2 Category III A operations.

A precision instrument approach and landing using ILS or MLS with:

- a) a DH lower than 30 m(100 ft) or no DH; and
- b) an RVR not less than 175 m. (600 ft).

1.10.3 Category III B operations.

A precision instrument approach and landing using ILS or MLS with:

- a) a DH lower than 15 m (50 ft) or no DH; and
- b) an RVR lower than 175 m (600 ft) but not less than 50 m. (200ft).



*Note: Where decision height (DH) and runway visual range (RVR) fall into different categories of operation, the instrument approach and landing operation would be conducted in accordance with the requirements of the most demanding category (e.g. an operation with a DH in the range of CAT IIIA but with an RVR in the range of CAT IIIB would be considered a CAT IIIB operation or an operation with a DH in the range of CAT II but with an RVR in the range of CAT I would be considered a CAT II operation).*

#### 1.10.4 Decision height

For operations in which a DH is used, the squadron shall ensure that the decision height is not lower than:

- a) the minimum DH specified in the AFM, if stated.
- b) the minimum height to which the precision approach aid can be used without the required visual reference; and
- c) the DH to which the flight crew is authorized to operate.

#### 1.10.5 No decision height

For operations with no DH, the squadron should ensure that the operation is conducted only if:

- a) the operation with no DH is authorized in the AFM.
- b) the approach aid and the aerodrome facilities can support operations with no DH;
- c) the squadron has an approval for CAT III operations with no DH.

*Note: In the case of a CAT III runway, it may be assumed that operations with no DH can be supported unless specifically restricted as published in the AIP or NOTAM.*

#### 1.10.6 Visual reference

- a) For Category IIIA operations, and for Category IIIB operations conducted either with fail-passive flight control systems, or with the use of an approved HUDLS, a pilot may not continue an approach below the DH (determined in accordance with subparagraph 1.10.4, above) unless a visual reference containing a segment of at least three consecutive lights that depict the centerline of the approach lights or touchdown zone lights or runway center line lights or runway end lights or a combination of these is attained and can be maintained.
- b) For Category IIIB operations conducted either with fail-operational flight control systems or with a fail operational hybrid landing system (comprising, for example, an HUDLS), using a DH a pilot may not continue an approach below the DH (determined in accordance with subparagraph 1.10.4, above) unless a visual reference containing at least one centerline light is attained and can be maintained.



1.10.7 Required RVR

The lowest minima to be used by the squadron for Category III operations are:

**RVR for Cat III operations vs. DH and roll-out control/guidance system.**

Category III minima			
Category	Decision height m (feet) (Note 2)	Roll out control / Guidance system	RVR (m)
IIIA	Less than 30 m (100 ft)	Not required	175m
IIIB	Less than 30 m (100 ft)	Fail passive	150m (Note 1)
IIIB	Less than 15 m (50 ft)	Fail passive	125m
IIIB	Less than 15 m (50 ft) or No decision height	Fail operational (note 3)	75m

Note 1: For aircrafts certificated in accordance with CS-AWO 321(b)(3) or equivalent FAA requirement.

Note 2: Flight control system redundancy is determined under CS-AWO or equivalent FAA requirement by the minimum certificated decision height.

Note 3: The fail operational system referred to may consist of a fail-operational hybrid system

**1.11 CERTIFICATION FOR LOW VISIBILITY OPERATIONS**

1.11.1 An authorization for Category II/III operations will not be included in Operations Specifications, until the applicant has.

- a) Demonstrated that his flight crew have carried out an approved program of training of this manual.
- b) Laid down detailed procedures and instructions for crew in the operations manual for the operation of the aircraft in low visibility operations of this manual.
- c) Laid down detailed procedures and instructions for Pilot in Command and flight operations officers (if required as per the squadron Operations Specifications) in respect of flight dispatch in low visibility operations of this manual.
- d) Demonstrated that his aircraft and its equipment, maintenance program including qualifications of maintenance staff meet requirements of this manual.
- e) The squadron and his personal has completed satisfactorily all evaluations as required in this manual.



### 1.12 INTERIM CATEGORY II MINIMA

1.12.1 When the above requirements have been met, pilots of the applying carrier who have successfully undergone an evaluation will be initially authorized for interim Category II minima.

1.12.2 Interim Category II minima will be a value between Category I minima and the lowest limit of Category II operations as per this manual.

1.12.3 Approval for the lowest limit of Category II minima will be subject to.

- a) Accumulation of adequate operational experience by the squadron in operating as per Interim Category II procedures as determined by the MAA.
- b) Analysis of pilot reports of ground and airborne system performance with satisfactory results.
- c) Accumulation of adequate operational experience by flight crew in operating as per Interim Category II minima as determined by the Authority.
- d) Accumulation of adequate operational experience by maintenance staff as per Interim Category II procedures as determined by the MAA.

### 1.13 INTERIM CATEGORY III MINIMA

1.13.1 Authorization for Category III operations must precede adequate experience as a Category II squadron. The adequate experience level will be determined by the MAA on a case by case basis.

1.13.2 Initially approval will be for Interim Category III operations and the lowest limit of Category III limits will be authorized with accumulation of adequate operational experience.

1.13.3 Category IIIB authorization shall precede adequate experience as a Category IIIA squadron.



## 2. THE AIRCRAFT AND ITS EQUIPMENT

### 2.1 ACCEPTANCE OF CERTIFICATION CONDUCTED BY A CONTRACTING STATE

2.1.1 Authorization granted by a contracting state (state of manufacture only) for an aircraft to conduct Category II and Category III operations shall be accepted by the Military Aviation Authority

2.1.2 Certification as required in paragraph 2.1.1. above should comply with.

- a) EASA document on certification specifications, including airworthiness codes and acceptable means of compliance, for all weather operations (CS-AWO), or
- b) FAA AC120-28D, Criteria for Approval of Category III Landing Weather Minima, or AC120-29A, Criteria for Approving Category I and Category II Landing Minima

2.1.3 All procedures as required by the contracting state (refer to paragraph 2.1.1) for the conduct of Category II and Category III flight operations and maintenance shall be adopted without any deviation by the Military Aviation Authority.

2.1.4 Category II and Category III approval shall be made by an appropriate document included in the aircraft flight manual. This document shall include any additional requirements of the Military Aviation Authority.

### 2.2 CERTIFICATION BY THE MILITARY AVIATION AUTHORITY FOR LOW VISIBILITY OPERATIONS

2.2.1 Any request for the initial certification of an aircraft to conduct Category II and Category III operations shall be considered by the Military Aviation Authority on a case-by-case basis.

2.2.2 For all initial Certification of Category II and Category III operations the Military Aviation Authority shall publish requirements in conformity to ICAO Doc 9365-Manual of All weather operations for compliance.

### 2.3 MAINTENANCE OF CATEGORY II, CATEGORY III AND LVTO EQUIPMENT.

2.3.1 Maintenance instructions for the on-board guidance systems must be established by the squadron, in liaison with the manufacturer, and included in the squadron's aircraft maintenance program which must be approved by the MAA.

2.3.2 The maintenance program must ensure that the airborne equipment necessary for low visibility operations continues to operate in service to the required performance level and should cover following areas and any other requirement specified by the Military Aviation Authority.

- a) Maintenance procedures.
- b) Maintenance and calibration of test equipment.



- c) Initial and recurrent training of maintenance staff.
- d) Recording and analysis of airborne equipment failures.

## 2.4 CONTINUOUS MONITORING

2.4.1 After obtaining the initial approval, the operations must be continuously monitored by the squadron to detect any undesirable trends before they become hazardous. Flight crew reports may be used to achieve this.

2.4.2 The following information must be retained for a period of 12 months.

- a) The total number of approaches, by aircraft type, where the airborne Category II or III equipment was utilized to make satisfactory, actual or practice, approaches to the applicable Category II or III minima: and
- b) Reports of unsatisfactory approaches and/or automatic landings, by aerodrome and aircraft registration, in the following categories:
  - i) Airborne equipment faults.
  - ii) Ground facility difficulties.
  - iii) Missed approaches because of ATC instructions; or
  - iv) Other reasons.
- c) The squadron must establish a procedure to monitor the performance of the automatic landing system or HUDLS to touchdown performance, as appropriate, of each aircraft.

2.4.3 All applicable system component failures shall be recoded and analyzed.

2.4.4 For Category III operations, monitoring system should use data from the flight data recorder for analysis for unsuccessful approaches.



### 3. OPERATION OF THE AIRCRAFT

#### 3.1 LOW VISIBILITY OPERATIONS - OPERATING PROCEDURES

##### 3.1.1 General

##### 3.1.2 Low visibility operations include:

- a) Manual take-off (with or without electronic guidance systems or HUD/HUDLS/Hybrid HUDLS).
- b) Auto-coupled approach to below DH, with manual flare, landing and roll-out.
- c) Approach flown with the use of a HUD/HUDLS/Hybrid HUDLS and/or EVS.
- d) Auto-coupled approach followed by auto-flare, auto landing and manual roll-out; and
- e) Auto-coupled approach followed by auto-flare, auto landing and auto-roll-out, when the applicable RVR is less than 400 m.

*Note1: A hybrid system may be used with any of these modes of operations.*

*Note2: Other forms of guidance systems or displays may be certificated and approved.*

#### 3.2 PROCEDURES AND OPERATING INSTRUCTIONS

3.2.1 The squadron must establish standard operating procedures and instructions to be used for low visibility take-off, approaches utilizing enhanced vision system (EVS), Category II and III operations. These procedures must be included in the Operations Manual and contain the duties of flight crew members during taxiing, take-off, approach, flare, landing, roll-out and missed approach as appropriate.

3.2.2 The precise nature and scope of procedures and instructions given depend upon the airborne equipment used and the flight deck procedures followed. The squadron must clearly define flight crew member duties during take-off, approach, flare, roll-out and missed approach in the Operations Manual. Particular emphasis must be placed on flight crew responsibilities during transition from non-visual conditions to visual conditions, and on the procedures to be used in deteriorating visibility or when failures occur. Special attention must be paid to the distribution of flight deck duties so as to ensure that the workload of the pilot making the decision to land or execute a missed approach enables him to devote himself to supervision and the decision-making process.

3.2.3 The squadron must specify the detailed operating procedures and instructions in the Operations Manual. The instructions must be compatible with the limitations and mandatory procedures contained in the Aircraft Flight Manual and cover the following items in particular:





- a) Checks for the satisfactory functioning of the aircraft equipment, both before departure and in flight.
- b) Effect on minima caused by changes in the status of the ground installations and airborne equipment.
- c) Procedures for the take-off, approach, flare, landing, roll-out and missed approach.
- d) Procedures to be followed in the event of failures, such as engines, electrical system, hydraulics, and flight control system.
- e) Pilot assessment of aircraft position and monitoring of the automatic flight control system, the effects of the failures of any required portion of the flight control system or instrument used with the system, and action to be taken in the event of inadequate performance or failure of any portion of either the system or the associated instruments warnings (to include HUD/HUDLS/Hybrid HUDLS/EVS and other non-normal situations);
- f) The minimum visual reference required.
- g) The importance of correct seating and eye position.
- h) Action which may be necessary arising from a deterioration of the visual reference.
- i) Allocation of crew duties in the carrying out of the procedures according to sub paragraphs (a) to (e) and (g) above, to allow the pilot in command/Commander to devote himself mainly to supervision and decision making.
- j) The requirement for all height calls below (200 ft) to be based on the radio altimeter and for one pilot to continue to monitor the aircraft instruments until the landing is completed.
- k) The requirement for the Localizer Sensitive Area to be protected.
- l) The use of information relating to wind velocity, wind shear, turbulence, runway contamination and use of multiple RVR assessments.
- m) Standard Operating Procedures to be used for:
  - i. Category II and III approaches
  - ii. Approaches utilizing EVS; and
  - iii. Practice approaches and landing on runways at which the full Category II or Category III aerodrome procedures are not in force.
- n) Operating limitations resulting from airworthiness certification; and
- o) Information on the maximum deviation allowed from the ILS glidepath and/or localizer.

3.2.4 The operations manual shall specify conditions to be satisfied prior to conducting a LVTO, Category II/III approach, and suitable addition to the pre takeoff/approach briefing.



3.2.5 The operations manual shall also specify the situations when a missed approach should be initiated during operations in Category II/III weather conditions.

3.2.6 The operations manual must also specify actions to be taken in the event of engine failure. These instructions will, under such circumstances, forbid the commencement or continuation of an approach to Category II/III limits, unless the squadron demonstrates to the Military Aviation Authority that exceptions to this general rule are justified for specific situations and aircraft types. If exceptions are approved, the operations manual will clearly describe the agreed situations under which a Category II/III approach may be conducted with one engine inoperative.

### 3.3 RESPONSIBILITIES OF PILOT IN COMMAND

3.3.1 The commander shall satisfy himself that:

- a) The status of the visual and non-visual facilities is sufficient prior to commencing a low visibility take-off, an approach utilizing EVS or a Category II or III approach.
- b) Appropriate LVPs are in force according to information received from Air Traffic Services, before commencing a low visibility take-off or a Category II or III approach; and
- c) The flight crew members are properly qualified prior to commencing a low visibility take-off in an RVR of less than 150 m(200 m for Category D aircrafts), an approach utilizing EVS or a Category II or III approach.
- d) The squadron has appropriate authorization from the state of registry and the state of aerodrome to carry out a low visibility take-off or a Category II or III approach to the aerodrome intended.
- e) The aircraft is properly certified and all required equipment are serviceable for the intended low visibility take-off or a Category II or III approach (refer to paragraph 3.4)

### 3.4 LOW VISIBILITY OPERATIONS - MINIMUM EQUIPMENT

3.4.1 The squadron shall include in the Operations Manual the minimum equipment that has to be serviceable at the commencement of a low visibility take-off, an approach utilizing EVS, or a Category II or III approach in accordance with the AFM or other approved document.

3.4.2 The squadron shall have procedures to indicate to the flight crew/Flight operations officer the status of the aircraft when the aircraft is upgraded/Degraded due to any unserviceability as per paragraph 3.4.1 or any other reason.



3.4.3 The commander shall satisfy himself the status of the aircraft and of the relevant airborne systems is appropriate for the specific operation to be conducted prior to departure.

### 3.5 PILOT QUALIFICATIONS

3.5.1 The squadron must ensure that each flight crew member completes training and a Check as required by this manual before being authorized to conduct Category II or III operations.

3.5.2 The flight crew qualifications as per above paragraph 3.5.1 are specific to the squadron and the type of aircraft in which the qualification obtained.

### 3.6 TYPE AND COMMAND EXPERIENCE.

3.6.1 Before commencing CAT II operations, the following additional provisions should be applicable to pilots-in-command/commanders, or pilots to whom conduct of the flight may be delegated, who are new to the aircraft type or class:

- a) 50 hours or 20 sectors on the type, including line flying under supervision; and
- b) 100 meters should be added to the applicable Category II RVR minima when the operation requires a Category II manual landing or use of HUDLS to touchdown until:
  - i. a total of 100 hours or 40 sectors, including line flying under supervision, has been achieved on the type: or
  - ii. a total of 50 hours or 20 sectors, including line flying under supervision, has been achieved on the type where the flight crew member has been previously qualified for CAT II manual landing operations with an operator acceptable to the Authority.
- c) For HUDLS operations the sector requirements in paragraph 3.6.1 and 3.6.2 shall always be applicable, the hours on type/class does not fulfill the requirement.

3.6.2 Before commencing Category III operations, the following additional requirements are applicable to pilots-in-command/commanders, or pilots to whom conduct of the flight may be delegated, who are new to the aircraft type:

- a) 50 hours or 20 sectors on the type, including line flying under supervision; and
- b) 100 m should be added to the applicable CAT II or CAT III RVR minima unless he has previously qualified for CAT II or III operations with the squadron acceptable to The MAA, until a total of 100 hours or 40 sectors, including line flying under supervision, has been achieved on the type.



3.6.3 The MAA may approve a reduction in the above command experience requirements for flight crew members who have Category II or Category III pilot in command experience if such experiences are acceptable to the MAA.

3.6.4 There are no additional requirements for first officer other than the requirement prescribed in paragraph 3.5.1, before commencing Category II/III operations.

### **3.7 LOW VISIBILITY OPERATIONS - CREW TRAINING**

3.7.1 The squadron shall ensure that, prior to conducting Category II and III operations or approaches utilizing EVS:

- a) Each flight crew member completes the training and checking requirements prescribed in this manual including Flight simulator training in operating to the limiting values of RVR and Decision Height appropriate to the squadron's approval.
- b) The training and checking is conducted in accordance with a detailed syllabus approved by the MAA and included in the Operations Manual. This training is in addition to the training requirement for type qualifications.

3.7.2 The squadron must ensure that flight crew member training programs for low visibility operations include structured courses of ground and flight simulator training.

### **3.8 CREW TRAINING - FLIGHT CREW MEMBERS WITH NO PREVIOUS CATEGORY II OR CATEGORY III EXPERIENCE**

3.8.1 Flight crew members with no previous Category II or Category III experience must complete at least the following training program.

3.8.2 Ground training.

3.8.3 The squadron must ensure that the initial ground training course for low visibility operations covers at least:

- a) The characteristics and limitations of the ILS ,including the effect on aircraft systems performance of interference to the ILS signal caused by other landing, takeoff or overflying aircrafts and the effect of the infringement of ILS critical and sensitive areas by aircrafts or vehicles in the maneuvering area.
- b) The characteristics of the visual aids (e.g., approach lighting, touchdown zone lighting, center line lighting)and the limitations ontheir use as visual cues in reduced RVRs with various glide path angles and cockpit cut of angles and the heights at which various cues may be expected to become visible in actual operations.



- c) The operation, capabilities and limitations of the airborne systems(e.g.; the automatic flight control systems, monitoring and warning devices, flight instruments – including altimetry system, the means the pilot has to assess the position of the aircraft during the approach, touchdown and roll out), and to include HUD symbology and EVS characteristics if appropriate;
- d) Approach, including missed approach procedures and techniques including description of the factors affecting height loss during missed approach in normal and abnormal aircraft configurations.
- e) The use and limitation of RVR, including the applicability of RVR readings from different positions of the runway, the different methods of measuring and assessing RVR, and the limitations associated with each method.
- f) The basic understanding of obstacle limitation and the obstacle free zone, including missed approach design criteria and of obstacle clearance for Category II and III operations.
- g) The effects of precipitation, ice accretion, low level wind shear ,turbulence and characteristic of fog;
- h) The pilot task at decision height, procedures, and techniques for transition from instrument to visual flight in low RVR conditions, including the geometry of eye, wheel, and antenna positions with reference to ILS reference datum height.
- i) Action to be taken if the visual reference becomes inadequate when the aircraft is below the decision height and the technique to be adopted for transition from visual to instrument flight should a go around become necessary at these low heights.
- j) Action to be taken in the event of failure of approach and landing equipment above and below decision height.
- k) Recognition of and action to be taken in the event of failure of ground equipment.
- l) Significant factors in the determination of decision height, the effect of terrain profile in the approach area on radio altimeter readings and on the automatic approach/landing systems.
- m) The importance and significance of alert height if applicable and the action in the event of any failure above and below the alert height.



- n) Effect of specific aircraft malfunctions (e.g., engine failure) on auto throttle, auto pilot performance etc.;
- o) Procedures and precautions to be followed while taxiing during low visibility operations.
- p) Additional procedures required for take-off in conditions of RVR less than 150 m. (200 m. for Category D aircrafts);
- q) The importance of correct seating and eye position.
- r) The qualification requirements for pilots to obtain and retain approval to conduct low visibility take-offs and Category II or III operations.
- s) Knowledge of squadron Operations specifications and contents of the Military Aviation Authority approved manual for low visibility operations.

3.8.4 The training must ensure that all flight crew members understand their duties and responsibilities, those of the other flight crew members and the need for close crew coordination.

3.8.5 Flight simulator training the squadron must ensure that flight simulator training for low visibility operations includes:

- a) Checks of satisfactory functioning of equipment required for low visibility operations, both on the ground and in flight.
- b) Effect on minima caused by changes in the status of ground installations.
- c) Monitoring of:
  - i. Automatic flight control systems and auto land status annunciators with emphasis on the action to be taken in the event of failures of such systems; and
  - ii. HUD/HUDLS/EVS guidance status and annunciators as appropriate, to include head down displays.
- d) Actions to be taken in the event of failures such as engines, electrical systems, hydraulics, or flight control systems.
- e) The effect of known unserviceability and use of minimum equipment lists.
- f) Operating limitations resulting from airworthiness certification.
- g) Guidance on the visual cues required at decision height together with information on maximum deviation allowed from glide path or localizer; and
- h) The importance and significance of alert height if applicable, and the action in the event of any failure above and below the alert height.



3.8.6 The squadron must ensure that each flight crew member is trained to carry out his duties and instructed on the coordination required with other crew members. Maximum use should be made of flight simulators.

3.8.7 Flight simulator training must be divided into phases covering.

- a) Normal operation with no aircraft or equipment failures but including all weather conditions which may be encountered.
- b) Detailed scenarios of aircraft and equipment failures, which could affect Category II or III operations.
- c) If the aircraft system involves the use of hybrid or other special systems (such as HUD/HUDLS or enhanced vision equipment) then flight crew members must practice the use of these systems in normal and abnormal modes during the flight simulator phase of training.

3.8.8 Incapacitation procedures appropriate to low visibility take-offs and Category II and III operations shall be practiced.

3.8.9 Initial Category II and III training shall include at least the following exercises:

- a) Approach using the appropriate flight guidance, autopilots and control systems installed in the aircraft, to the appropriate decision height and to include transition to visual flight and landing.
- b) Approach with all engines operating using the appropriate flight guidance systems, autopilots, HUDLS and/or EVS and control systems installed in the aircraft down to the appropriate decision height followed by missed approach; all without external visual reference.
- c) Where appropriate, approaches utilizing automatic flight systems to provide automatic flare, landing and rollout.
- d) Normal operation of the applicable system both with and without acquisition of visual cues at decision height.

3.8.10 Emergency/Abnormal phases of simulator training must include at least:

- a) Approaches with engine failure at various stages on the approach.
- b) Approaches with critical equipment failures (e.g., electrical systems, auto flight systems, ground and/or airborne ILS/MLS systems and status monitors);
- c) Approaches where failures of auto flight equipment and/or HUD/HUDLS/Hybrid HUDLS/EVS at low level require either.
- d) Reversion to manual flight or a downgraded automatic mode to control missed approaches from, below decision height including those which may result in a



touchdown on the runway, such as to simulate failures or a loss of visual reference prior to touch down.

- e) Failures of the systems which will result in excessive localizer and/or glide slope deviation, both above and below decision height, in the minimum visual conditions authorized for the operation. In addition, a continuation to a manual landing must be practiced if a head-up display forms a downgraded mode of the automatic system or the head-up display forms the only flare mode; and
- f) Failures and procedures specific to aircraft type or variant.

3.8.11 The training program must provide practice in handling faults which require a reversion to higher minima.

3.8.12 The training program must include the handling of the aircraft when, during a fail passive Category III approach, the fault causes the autopilot to disconnect at or below decision height when the last reported RVR is 300 m or less.

3.8.13 Where take-offs are conducted in RVRs of 400 m and below, training must be established to cover systems failures and engine failures resulting in continued as well as rejected take-offs.

3.8.14 The training program must include, where appropriate, approaches where failures of the HUD/HUDLS/Hybrid HUDLS and/or EVS equipment at low level require either:

- a) Reversion to head down displays to control missed approach; or
- b) Reversion to flight with no, or downgraded, HUDLS Guidance to control missed approaches from decision height or below, including those which may result in a touchdown on the runway.

3.8.15 The squadron shall ensure that when undertaking low visibility take-off and Category II and III Operations utilizing a HUD/HUDLS or hybrid HUD/HUDLS or an EVS, that training program includes, where appropriate, the use of the HUD/HUDLS in normal operations during all phases of flight.

### **3.9 CREW TRAINING - FLIGHT CREW MEMBERS WITH PREVIOUS CATEGORY II OR CATEGORY III EXPERIENCE**

3.9.1 Flight crew members with previous Category II or Category III experience with a similar type of operation (auto coupled /auto-land, HUDLS/Hybrid HUDLS or EVS) or Category II with manual land if appropriate with another squadron acceptable to the MAA may undertake an abbreviated ground / flight training program.





3.9.2 The squadron shall propose a suitable abbreviated training program (based on paragraph 3.8) for the approval of the MAA.

### **3.10 CREW TRAINING - LOW VISIBILITY TAKE-OFF (LVTO) WITH RVR LESS THAN 150 M.**

3.10.1 The squadron must ensure that prior to authorization to conduct take-offs in RVRs less than 150 m. the following training is carried out:

- a) Normal take-off in minimum authorized RVR conditions.
- b) Take-off in minimum authorized RVR conditions with an engine failure between V1 and V2, or as soon as safety considerations permit; and
- c) Take-off in minimum authorized RVR conditions with an engine failure before V1 resulting in a rejected take-off.

3.10.2 LVTO training/recurrent training program shall have the approval of the MAA and included in the operations manual.

3.10.3 The squadron must ensure that the training required by paragraph 3.10.2 above is carried out in a flight simulator.

3.10.4 This training must include the use of any special procedures and equipment.

### **3.11 CREW TRAINING - FLIGHT CREW MEMBERS CONVERSION TRAINING**

3.11.1 Conversion training requirements to conduct low visibility take-off, Category II/III operations by the squadron's crew members on another type /class or variant aircraft may be an abbreviated program based on paragraph 3.8.

3.11.2 The squadron shall propose a suitable abbreviated training program (based on paragraph 3.8) for the approval of the MAA.

### **3.12 RECURRENT TRAINING - LOW VISIBILITY OPERATIONS**

3.12.1 The squadron shall ensure that all crew authorized for low visibility operations undergo an annual recurrent ground school training program which shall be an abbreviated training program covering requirements in paragraph 3.8.3.

3.12.2 The squadron shall ensure that all crew authorized for low visibility operations undergo a recurrent simulator training program in the simulator prior to the certification requirement as per paragraph 3.13.

3.12.3 Training programs as required in paragraphs 3.12.1 and 3.12.2 shall have the approval of the MAA and included in the operations manual.

### **3.13 CREW CERTIFICATION FOR CATEGORY II / CATEGORY III OPERATIONS**

3.13.1 The squadron shall ensure that, prior to conducting Category II and III operations or approaches utilizing EVS and conducting low visibility take off, each flight crew member completes the checking requirements prescribed in this manual.



3.13.2 Flight crew training, prior to conducting initial or recurrent Category II or Category III Checks, The Flight Operation Inspector / Designed Check Pilot must ensure that all crew (Pilot-in-Command and First officer) has completed the applicable approved Category II/III training program successfully.

### 3.14 FLIGHT CREW CERTIFICATION

3.14.1 For the purpose of a Category II or Category III Check a successful approach is defined as one in which, at the DH:

- a) The aircraft is in trim for continuation of a normal approach and landing.
- b) The aircraft is positioned so that the flight deck is within, and tracking to remain within, the lateral confines of the runway extended.
- c) Deviation from the glide path does not exceed  $\pm 75$  micro-amperes (equivalent to one dot)\* as displayed on the ILS indicator; no unusual roughness or excessive attitude changes have occurred after leaving the middle marker.
- d) This relationship may not be true for older instruments. In such cases, the allowable indicators deflection is that which is equivalent to  $\pm 75$  microamperes.

3.14.2 When preparatory requirements have been met, arrangements will be made between the squadron and the Military Aviation Authority, for crew evaluation. Details of the evaluation procedure will be determined by the Flight Operation Inspector/ Designed Check Pilot, and the following general criteria will apply.

- a) An evaluation of flight crews and operating procedures for certification for Category II or III will be demonstrated using applicable type simulators certified for Category II or III by the Military Aviation Authority.
- b) Non-visual simulators may be used to demonstrate crew coordination and proficiency in the handling of emergency procedures during an approach and overshoot. All other Checks, whether initial or recurrent, must be done in a visual type of simulator.
- c) The crew will consist of a Pilot-in-Command, a first officer, and a third crewman as appropriate to type. The squadron Training Pilot will not form part of the flight crew (unless for his qualification ride);
- d) The Flight Operation Inspector/Designed Check Pilot should try to introduce a fault prior to the Categories II or III Approach to permit observation of the crew's ability to assess the approach capability of the aircraft.

3.14.3 The captain's initial or recurrent Category II or III Proficiency Check will at least comprise of:



- a) One Category II or III ILS approach, during which a practical emergency (e.g. engine fire) is introduced, aimed at assessing crew co-ordination.
- b) One Category II or III ILS approach to a landing in Category II or III weather minima. (An automatic landing or manual landing from an approved manual system).
- c) A missed approach starting from a very low altitude which may result in touchdown during the go-around maneuvers.
- d) For those Category II or III operations predicated on the use of a fail- passive rollout control system, a manual rollout using visual reference or a combination of visual and instrument references.

3.14.4 Other flight crew members will be Checked concurrently in the performance of their assigned duties in support of the above initial/recurrent Proficiency Check items.

3.14.5 The recording of the evaluation will be made on the Pilot Proficiency Check report. The authorized DH/ RVR shall be annotated in the appropriate box in the form.

3.14.6 The period of certification will be for six months or up to the validity period of the PPC. Renewal Check may be combined with Pilot Proficiency Check or during an approved LOFT program.

3.14.7 If HUDLS and / or EVS is utilized to touchdown the required approaches during evaluation shall be four (refer to paragraph 3.14.3).

### **3.15 CERTIFICATION OF LOW VISIBILITY TAKE OFF (LVTO)**

3.15.1 The squadron must ensure that a flight crew member has completed a check before conducting low visibility takeoffs in RVR of less than 150 m.

3.15.2 The check shall comply with the requirements in paragraph 3.10.1 and may be combined with crew certification for Category II or III operations.

3.15.3 The recording of the evaluation will be made on the Pilot Proficiency Check report. The authorized RVR shall be annotated in the appropriate box in the form.

3.15.4 The period of certification will be for six months or up to the validity period of the PPC. Renewal Check may be combined with Pilot Proficiency Check or during an approved LOFT program.

### **3.16 FLIGHT CREW/AIRCRAFT RECENCY REQUIREMENTS**

3.16.1 To maintain Category II/III qualification current ,each crew member is required to have completed one Category II and/or Category III approach and landings as appropriate in the aircraft in a six-month period.

*Note: This recency requirement is in no way a substitute for recurrent training.*

3.16.2 Above requirement in paragraph 3.16.1 may be satisfied by conducting practice Category II/III approaches and/or Auto landings in good weather conditions.



3.16.3 Each individual aircraft must complete a simulated/actual Category II/III approach and landing every 28-day period to be eligible to perform an actual Category II/III approach in line operations.

### 3.17 FLIGHT CREW RECORDS

3.17.1 The squadron shall maintain records in respect of all flight crew authorized to conduct low visibility operations.

3.17.2 The records as required as per paragraph 3.17.1 shall.

- a) Indicate initial and continued eligibility of the flight crew member to conduct LVTO, Category II/III operations.
- b) Minima authorized and Category of operations.
- c) Recency as required in paragraph 3.16.

3.17.3 Each flight crew member is required to be in possession of the crew records required in paragraph 3.17.1 when exercising the privileges authorized in this manual.

### 3.18 PERFORMANCE RELIABILITY SYSTEM

3.18.1 Following certification to conduct low visibility operations, the squadron should use the airborne system to approved minima as frequently as feasible to ensure continued performance and reliability of the system and to build up pilot experience in approaches to authorized limits.

3.18.2 Each Category II/III approach, real or simulated, is to be recorded on a form developed by the squadron, including the following information as a minimum:

- a) Date, type of aircraft, name of pilot-in-command, aerodrome, and runway of landing, and reported ceiling and visibility.
- b) Whether approach was auto coupled or flown manually.
- c) If auto-coupled, indicate, when applicable:
  - i) If flight director agreed with autopilot,
  - ii) The height at which coupler was disengaged,
  - iii) If auto landing was successful.
- d) Whether the approach was successful, as defined in para. 3.14.1, or unsuccessful.
- e) If the approach was unsuccessful, specify the unsatisfactory element of the Category II/III system (e.g. airborne equipment, ground installation, crew performance, traffic condition);
- f) The difference, if any, between computed airspeed and actual airspeed at the DH.



- g) An assessment of the overall quality of the Category II/III systems as Good, Acceptable, Poor or unacceptable.

3.18.3 A consolidated report containing the required information in paragraph 3.18 is to be sent to the Military Aviation Authority monthly. These reports will be used as one basis for determining when the squadron may be considered for upgrading to operational Category II/III minima.

### **3.19 LOW VISIBILITY OPERATIONS AERODROME CONSIDERATIONS**

3.19.1 The squadron shall not use an aerodrome for Category II or III operations unless the aerodrome is approved for such operations by the State in which the aerodrome is located.

3.19.2 The squadron shall verify that low visibility procedures (LVP) have been established, and will be enforced, at those aerodromes where low visibility operations are to be conducted.

### **3.20 LOW VISIBILITY OPERATIONS - PRACTICE APPROCHES**

The squadrons who wish to perform automatic landings in Category I or better weather conditions for training purposes, or record data for operational demonstrations shall have appropriate procedures for the guidance of flight crew included in the operations manual.

### **3.21 LOW VISIBILITY OPERATIONS - FLIGHT DISPATCH PROCEDURE**

3.21.1 The squadron shall ensure requirements for low visibility operations shall be included in the flight dispatch procedures.

3.21.2 The squadron shall have a system to inform the flight dispatch office regarding the status of the aircraft in respect low visibility operations including the requirement in paragraph 3.16.3.

3.21.3 Procedures as required in paragraph 3.21.1 shall be included in the operations manual.

### **3.22 LOW VISIBILITY OPERATIONS - FLIGHT OPERATIONS OFFICERS**

3.22.1 If the system of flight dispatch of the squadron requires the employment of a Flight Operations Officer (FOO), the squadron shall ensure that the FOO receive initial and annual recurrent training in respect of flight dispatch in connection with low visibility operations.

3.22.2 The initial and recurrent training programs as required by paragraph 3.22.1 shall have the approval the Military Aviation Authority and be included in the operations manual.



## 4. THE AERODROME

### 4.1 CERTIFICATION

4.1.1 Certification and granting approval for an aerodrome to conduct Category II and Category III operations is the responsibility of Authority.

4.1.2 Official recording of such approval will be by a suitable annotation in the Aerodrome certificate.

4.1.3 This annotation will stipulate that Category II/III approaches may be accepted at that aerodrome when the following elements have met or exceeded the specifications described in this Chapter.

- a) Runways and taxiways
- b) Obstacle Limitation requirements.
- c) Pre threshold terrain
- d) Visual Aids.
- e) Non visual aids
- f) Secondary power supply
- g) Aerodrome services (Aerodrome safety assessment/Ground control movement of aircrafts and vehicles/Security and surveillance/Air traffic services/Meteorological services/Aeronautical information service)
- h) Instrument approach procedures

4.1.4 The references given in this manual are to ICAO documents. However, whenever there is an approved Aerodrome Manual reference may be made to the Aerodrome Manual in addition to ICAO documents.

### 4.2 THE AERODROME OPERATOR

4.2.1 Aerodrome Operator shall publish appropriate procedures, instructions for the guidance and compliance of all applicable aerodrome staff during the period the aerodrome is conducting Category II and III operations which shall have the approval. It is the responsibility of the Aerodrome Operator to immediately cease Category II and III operations when any of the certifying criteria given in paragraph 4.1.3 are not met.

4.2.2 Certifying criteria given in paragraph 4.1.3 in this manual are in addition to requirements as given in Chapter 3 of the Manual of All Weather Operations (ICAO Doc 9365).

4.2.3 Hence when all requirements as tabulated in Chapter 3 of the Manual of All Weather Operations (ICAO Doc 9365) are not met the Aerodrome Operator shall cease Category II and III Operations.

4.2.4 When Category II and III operations are curtailed as per paragraph 4.2.2 and 4.2.4, such information shall be published in NOTAM.



### 4.3 RUNWAYS AND TAXIWAYS

4.3.1 Physical characteristics of runways and taxiways shall comply with specifications and guidance material contained in ICAO Annex 14, Volume 1 and the Aerodrome Design manual (Doc 9157), Part 1 and 2.

4.3.2 In general, the requirements for Category II/III operations are no more demanding than for those for Category I operations. However, the separation distance between a holding bay or runway holding position and the center line of the runway may be significantly greater for Category II/III operations. Also, the dimensions for the critical and sensitive areas may be greater for Category II/III operations.

### 4.4 OBSTACLE LIMITATION REQUIREMENTS

4.4.1 Obstacle Limitation Requirements for aerodromes situated in Thailand shall comply with ICAO Annex 14, volume 1.

4.4.2 In addition, Thailand will abide by the “Obstacle Limitation Surfaces” for CAT II/III runways as specified in Airport services manual (Doc 9137).

4.4.3 The limitation of obstacles in, and the dimension of, an obstacle free zone are to comply with Annex 14, volume 1.

4.4.4 For Category II/III operations the obstacle free zone, extended when appropriate to the appropriate Category II obstacle clearance height, must not be penetrated by any obstacle except those specially permitted in Annex 14, volume 1.

4.4.5 The Military Aviation Authority will be responsible for determining the governing obstacle clearance limit which will determine the minimum CAT II/III DH.

### 4.5 VISUAL AIDS

4.5.1 Runway lights, for Category II and III aerodromes shall be appropriate to the category of operation for which the runway is intended.

4.5.2 Approach, threshold, touchdown zone, runway edge, center line, runway end and other aerodrome lights shall comply with requirements as given in ICAO Annex 14, Volume 1.

4.5.3 It is appreciated that some runway lights in a particular system may fail, but if such failures are distributed in a manner which does not confuse the lighting pattern, the system may be regarded as serviceable.

4.5.4 It is difficult and expensive to provide monitoring of individual lights, except by regular visual inspection of all sections of the lighting system, and consideration may therefore be given to monitoring only the lighting circuits. To help safeguard recognizable patterns in the event of failure of a single circuit, circuits should be interleaved so that the failure of adjacent lights or cluster of lights will be avoided.

4.5.5 The design, maintenance and monitoring of lighting circuits shall be as contained in ICAO Annex 14, Volume 1 and the Aerodrome design manual (Doc 9157), Part 4.



4.5.6 When the lighting system does not comply with the requirements of ICAO Annex 14, Volume 1 (due to unserviceability etc.) the runway shall be downgraded from Category II/III status.

4.5.7 When the runway is downgraded as per requirement of paragraph 4.6.7 above, the Aerodrome Operator shall disseminate such information to all concerned immediately by appropriate means.

#### 4.6 RUNWAY MARKINGS

4.6.1 Runway markings shall be in accordance with Annex 14 and Aerodrome Design Manual (Doc 9157) for runways intended to conduct Category II and III Operations.

4.6.2 The conspicuity of runway markings and taxiway markings deteriorate rapidly, particularly at aerodromes having high movement rates. The Aerodrome Operator is required to have a program to inspect all runway markings at regular intervals and maintain marking to a standard suitable for Category II and III operations.

#### 4.7 NON-VISUAL AIDS (ILS INSTALLATION)

4.7.1 The ILS ground equipment must meet with the facility performance requirement specified for Category II/III ILS contained in ICAO Annex 10, Volume I, Part 1.

4.7.2 The required components of a Category II/III ILS are:

- a) Localizer (dual channel);
- b) Glide path (dual Channel);
- c) Middle marker (dual channel);
- d) Outer marker or compass locator beacon (if not applicable DME collocated with the glide path antenna may be used as an acceptable alternate to part or all of the ILS marker beacon system or the compass locator beacon).

*NOTE: All ILS installations in Thailand will include items (a) through (d); however, the non-serviceability of the outer marker or applicable alternative outer marker system will not necessitate a downgrading of the Category II/III system.*

4.7.3 Flight inspections and ground checks of the ILS facilities shall be conducted as per ICAO Doc 8071 (Manual of testing of radio navigational aids) and respective manuals provided by the installation manufactures.

4.7.4 Aerodrome operators shall have a program to monitor the ILS ground equipment. Such program shall be in compliance with the guidance material contained in Attachment C to Part 1 of Annex 10 Volume 1.

4.7.5 To ensure that the integrity of the guidance signal radiated by the ILS is maintained during Category II/III approaches the aerodrome operator shall have procedures established to ensure that all vehicles and aircraft on the ground remain outside the ILS critical and sensitive area in conformity to Annex 10, Volume 1, Attachment C to Part 1.





4.7.6 ATS unit shall ensure that, the longitudinal separation between successive landing airplanes in Category II/III approaches are such that there is no deterioration to the integrity of the ILS signal.

4.7.7 Diffraction and/or reflection may also be caused by large aircrafts in the vicinity of the runway which may effect both the glide path and the localizer signals. This additional area ,outside the critical area is called the sensitive area. The extent of the sensitive area will vary with the characteristics of the ILS and the category of operations. It is essential to establish the level of interference caused by aircraft and vehicles at various positions on the aerodrome so that the boundaries of the sensitive areas can be determined.

4.7.8 Prior to granting approval to conduct Category II and III operations the Military Aviation Authority shall ensure the size and shape of the sensitive area for a particular category of operation is determined by the aerodrome operator to the satisfaction of the MAA.

4.7.9 The reliability of the ILS ground equipment is a measure of the frequency of unscheduled outages which may be experienced. Reliability will be increased by providing on line standby equipment and by duplication or triplication of key functions, including power supplies. The lowest value of operating minima can only be achieved with ILS that have high standard of reliability. The specification in Annex 10, Volume 1, Part 1, indicate the total maximum periods of time allowed outside the specified performance limits for each ILS facility performance requirements.

4.7.10 Aerodrome operators shall publish guidelines for maximum snow accumulations at the glide path antenna site, and the minimum area around the localizer and glide path antennas that must be protected from ground interference (if applicable).

4.7.11 Category II/III ILS installation will be downgraded to non-categorized status under the following conditions:

- a) If the annual or routine flight inspection is delayed more than a period prescribed.
- b) If there has been a significant change in ground conditions since the last flight inspection.
- c) The definition of “significant change” must be left to individual aerodrome electronic maintenance staffs since this could vary from eight inches of dry snow to one inch of wet snow (if applicable) or less than an inch of rain where the water table is near the surface. Where uncertainty exists, a flight inspection should be carried out.



- d) If, during a snowfall, a number of successive pilot reports are received advising that the glide path angle is too high or too low (if applicable); or
- e) Where the standby localizer, glide path, or middle marker transmitter are not available.

4.7.12 Under all the conditions described in paragraph 4.7.11, an appropriate Class I NOTAM will be issued.

#### **4.8 SECONDARY POWER SUPPLIES**

4.8.1 Requirements for the provision of secondary power supplies for the visual and non visual aids are specified in Annex 14, Volume 1 and Annex 10, Volume 1, Part 1 respectively. Prior to being authorized to conduct Category II and III approaches provisioning of secondary power supplies will conform to these requirements.

4.8.2 Change over times of secondary power supply will conform to guidance material in Aerodrome design manual (Doc 9157), Part 4 and in Annex 10, Volume 1, attachment C to part 1.

4.8.3 Secondary power supply is also required for essential communications and for other associated facilities, such as visibility measuring systems. Change over times for these facilities will be commensurate with the operations conducted.

4.8.4 When a runway is placed on Category II/III status, the standby on-site diesel power system becomes the primary source, and commercial power will revert to the standby source. In this way the backup power source (commercial electric) is available without interruption if the diesel generator system should fail.

4.8.5 One of the controller's actions when placing a runway on Category II/III status is the selection of diesel power as the primary source. He shall do so by the switching arrangement that is installed in the control tower enabling the controller to select diesel or commercial power. If such an arrangement is not available, he shall request the appropriate authority to select diesel power as the primary source.

4.8.6 The Aerodrome Controller must be aware of the limitations of this system, particularly with regard to the number of starts that can be made over a given time period, the length of continuous running time of diesel generators, and minimum loading of the system.

4.8.7 If a failure occurs in the secondary power supply, the runway shall be declared unavailable for Category II/III approaches. However, if an aircraft is on final approach when the failure occurs, the pilot may complete the approach, and the ban then applied to subsequent approaches until secondary power is restored.



#### 4.9 AERODROME SAFETY ASSESSMENT

4.9.1 In some conditions of limited visibility, air traffic controllers may no longer be able to see the whole movement area of the aerodrome, but the pilots will still have the capability to see other traffic in their vicinity and to avoid if necessary. In worse conditions it may well be that nor the controller nor the pilot will be able to see the other traffic, and it may then become essential to have a system which effectively ensures the separation of aircraft from aircraft or aircraft from vehicles.

4.9.2 Aerodrome operator shall have a system to ensure the separation of airplanes from airplanes/vehicles which shall comply with guidance material contained in the ICAO manual of surface movement guidance and control system (SMGCS–Doc 9476).

4.9.3 In formulation of a system to ensure safe separation of aircrafts and vehicles the Aerodrome operator shall conduct a comprehensive safety assessment of the aerodrome which requires examination of all relevant factors such as the layout of the movement area, aircrafts and vehicle routings, relevant existing instructions and rules, meteorological records, movement statistics, records or runway intrusions, existing security procedures etc.

4.9.4 On completion of the safety assessment an action plan will be formulated which will dependent upon the characteristics of the movement area and the type of operation and will need consideration of the following.

- a) Training of ground personnel.
- b) Maintenance of records by ATS of persons and vehicles on the maneuvering area.
- c) Non essential personnel and vehicles to be withdrawn from movement areas when limited visibility weather conditions prevail or are impending.
- d) Essential vehicles permitted to enter the movement area in limited visibility conditions to have R/T communications with ATS.
- e) Patrols where necessary in area of intensive vehicle movement where there is no traffic control point between those area and the runway.
- f) Unguarded aerodrome entrances to be locked and inspected at frequent intervals.
- g) Procedures to warn airlines and other organizations with the movement area access of the commencement of the more restricted measures.
- h) Development of appropriate emergency procedures.



#### 4.10 GROUND MOVEMENT CONTROL OF AIRCRAFTS AND VEHICLES

4.10.1 Aerodrome Operator shall have ground movement control procedures adequate to ensure that runway incursions are prevented during any period when the runway is required for takeoff or landing operations.

4.10.2 Ground movement control procedures should constitute an appropriate combination of visual aids, non visual aids, radiotelephony communications, procedures, control and information facilities adequate to meet the guidance and control of all relevant traffic in the aerodrome in limited visibility conditions.

4.10.3 Aerodrome Operator should consider the use of aids specially designed for the control of ground movement of aerodrome traffic. Control, surveillance, and safety will be enhanced by the use of supplementary facilities, such as aerodrome surface movement radar, controllable taxiway lights, stop bars, signs and local detectors such as induction loops, intrusion alarm devices etc; specially at aerodromes anticipating heavy traffic during low visibility conditions.

4.10.4 Ground movement control procedures adopted by Aerodrome Operator shall comply with provisions in ICAO Manual of surface movement guidance and control system (SMGCS–Doc 9476).

#### 4.11 SECURITY AND SURVEILLANCE

4.11.1 When no special surveillance equipment is employed and control over traffic on the movement area is maintained by procedures and visual aids, unauthorized traffic must be restricted by local security measures.

4.11.2 Normally, it may be expected that routine measures for restricting unauthorized traffic on an aerodrome will be adequate for low visibility operations.

4.11.3 When the local situation is such that routine measures may not be adequate, Aerodrome operators are required to adopt special measures to provide surveillance and control, particularly for the ILS critical and sensitive areas and active runways.

#### 4.12 AIR TRAFFIC SERVICES

4.12.1 The provision of an Air Traffic control service is essential at aerodromes planned for Category II and III operations. The essential information to be provided to pilots is specified in Annex 11 and in Chapter 7 of PANS-ATM (Doc 4444). Guidance on the responsibilities of the ATS is given in the manual of Surface movement guidance and control system (SMGCS–Doc 9476).

4.12.2 Information on the status of relevant ground systems should be promptly passed to flight crews conducting instrument approaches. This is particularly critical for Category



II and III operations. Although the general recommendation which encourages ATS to minimize transmission of extraneous communication to flight crews during critical phases of the flight is valid, care must be taken to not filter information which may seem unimportant to ATC, but which in fact may be operationally relevant. Accordingly, the following principle should be applied to radio communications between ATC and Category II/III arrivals or for aircraft departing in low visibility.

- a) As a minimum, information should be provided in accordance with the PANS – ATM (Doc 4444), Chapter 7.
- b) ATC, Operators, and the Authority should reach prior agreement on deficiencies, failures or anomalies that may occur which could affect Category II and III operations or low visibility take offs, particularly if they are site specific or unique.
- c) Commonly agreed terminology should be devised to be applied by ATC for transmission to flight crews when the above occurrences take place.
- d) Understanding should be reached on any situations which may occur for which ATC does not, or will not, advise landing aircraft.
- e) As a general rule, if doubt exists regarding the operational relevance of the information, ATC will pass that information to flight crew who will decide its operational application and significance.

4.12.3 The Aerodrome Controller is the focal point on the aerodrome in so far as Category II/III operations are concerned. The Aerodrome Controller must, therefore, be immediately aware if any essential aerodrome element, as listed below, becomes unserviceable or is not operating to prescribed standards and tolerances.

- a) Approach, threshold, touchdown zone, center line, edge and end lights.
- b) ILS localizer, glide path, or middle marker;
- c) RVR reporting system.
- d) Commercial (electrical) and standby (diesel) power.

4.12.4 The status of those items listed in paragraph 4.12.3 (b), (c) and (d) will be available continuously by status indicators in the control tower. The lighting elements listed in paragraph 4.12.3 (a) will be checked daily, and unless advised to the contrary, the Aerodrome Controller will assume all lighting is within acceptable limits.

4.12.5 When any lighting element is found to be unserviceable, or below acceptable tolerances, the Aerodrome Controller will be so advised; he must also know when the element is restored to an acceptable status. Accordingly, the aerodrome management will have necessary procedures in place and arrange a reliable communication link between aerodrome maintenance and ATC unit to ensure this information is passed.



4.12.6 The Aerodrome Controller will, when Category II/III weather exists or is forecast, advise the appropriate authority whenever an essential aerodrome element is unserviceable. In this event, the Automatic Terminal Information Service (ATIS) broadcast will include the fact that Category II/III approaches are not authorized. Where ATIS is not available, incoming aircraft will be given this information as early as feasible.

4.12.7 When the ceiling is 200 ft. and/or the visibility is 550 meters, or when worse conditions exist or are considered imminent (within a time span of less than one hour), and providing inbound aircraft are scheduled, the Aerodrome Controller will switch airfield systems to standby power (refer to paragraphs 4.8.4 to 4.8.7). Standby power to remote communication transceiver sites is not provided at some locations. At such locations a serviceable DC-powered transceiver shall be immediately available in the control tower.

4.12.8 When Category II/III approaches are made, special care is to be taken in the control of taxiing aircraft. Holding position marking have been established at all aerodromes authorized for Category II and III operations on the basis of potential interference with ILS signals. It is mandatory that any taxiing aircraft or ground vehicles are not allowed to enter ILS critical areas when Category II/III approaches are in progress.

4.12.9 Terminal Controllers shall assume that pilots using Category II/III facilities prefer an automatic coupled approach. Accordingly, terminal controllers shall vector the aircraft to intercept and be stabilized inbound on the localizer at least five miles prior to crossing the outer marker (or a similar distance prior to interception of the glide path where no outer marker is installed). The aircraft shall be at minimum vectoring altitude before interception of the glide path.

4.12.10 An aircraft overflying the localizer at close range may cause interference which could jeopardize a Category II/III approach by a following aircraft. To minimize this risk, departing aircraft should have started their takeoff run before the approaching aircraft is within 4 NM of the threshold. In the case of consecutive approaches, enough separation should be allowed to ensure the preceding aircraft cannot adversely affect the localizer signal for the following aircraft: the minimum separation in such cases is 5 NM.

4.12.11 It is necessary to provide information as much as possible and as early as possible to pilots in respect of any unserviceability resulting the downgrading of the runway during Category II and III operations. This information will be helpful to Pilot in command to make decisions in respect of a diversion or to continue to the destination.

4.12.12 Loss of following CAT II/III elements can result in a wide variation of landing limits, depending on remaining aids available and individual company operations specifications.



By providing information to the pilot-in-command he will be able to determine his appropriate action, either to divert to his alternate aerodrome or continue the approach down to CAT I limits.

- a) Category II/III approach and runway lighting;
- b) RVR system;
- c) Standby power;
- d) ILS outside Category II/III tolerances.

4.12.13 In addition to information normally transmitted by approach control, the following information must be passed by the appropriate controller to the pilot of every arriving aircraft.

- a) The current RVR readings for the landing runway (or the reported metrological visibility if the RVR system is unserviceable).
- b) Unserviceability of any component parts of the Category II/III facilities not previously broadcast on the arrival ATIS.

#### 4.13 METEOROLOGICAL SERVICES

4.13.1 Aerodrome Operators shall ensure that meteorological information provided in support of Category II and III operations shall be as specified in Annex 3 and amplified in the manual of Aeronautical Meteorological Practice (Doc 8896).

4.13.2 Aerodrome Operators shall ensure that RVR assessment and reporting shall comply with requirements in Manual of Runway visual range observing and reporting Practices (Doc 9328).

4.13.3 In addition to the normal meteorological information in routine hourly and special reports, RVR values must be known at the touchdown and mid-point prior to commencement of a CAT II/III approach. Accordingly, two transmissometers are required for each CAT II/III runway, one at the touchdown point, designated the “A” system, and one at the mid-point, normally half-way down the runway, designated the “B” system. Readouts from both systems are to be continuously available in the Aerodrome Controller position. For CAT III operations an additional rollout RVR is required.

4.13.4 Information on turbulence, wind shear and slant visual range could be invaluable during CAT II/III approaches. Pilots who have just completed approaches are the only reliable source of such information, and therefore should be encouraged to report any significant values in these areas so that the information can be passed to succeeding aircraft.