



# **CIVIL AVIATION PUBLICATION**

## **CAP 05**

### **ALL WEATHER OPERATIONS**

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## ALL WEATHER OPERATIONS

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## 1. INTRODUCTION

### 1.1 General

All Weather Operations (AWO or AWOPS) applies to an operator who requires approach minima with a decision height lower than 200 feet or an RVR of less than 550 m or take-off RVR of less than 400 metres. [Appropriate Low Visibility Procedures must be in force at an aerodrome, according to information received from Air Traffic Services, before commencing a Low Visibility Take-off, Other than Standard Category II or a Category II or III approach.]

*Note: Please also refer to CAP 07 for additional operational approval requirements for the use of Head-up Display and Enhanced Visual Systems (HUD/EVS).*

This CAP provides information on the application, required equipment, the approval process, as well as guidance on operational procedures and training. All San Marino registered aircraft planning to conduct AWO operations shall be required to obtain an approval from the CAA before the commencement of operations.

### 1.2 Applicability

This guidance material is intended for all operators of San Marino registered aircraft planning to conduct All Weather Operations. [This CAP applies to the initial issue of AWO for LVTO, Other than Standard CAT II, and CAT II/III ILS. AWO approval will be granted only to operators of aircraft with the appropriate equipment and applying additional training, procedures and maintenance.]

### 1.3 References

The following references should be used when applying for All Weather Operations;

- (a) CAR OPS 1, Subpart E (primary reference for all operators and must be reviewed before application. It can be downloaded from CAA website)
- (b) FAA Advisory Circular 120-29A.

### 1.4 Terminology

**Category II** - Landing following a precision approach using an Instrument Landing System or Microwave System with a decision height of below 200 feet but not less than 100 feet. Runway visual range: not less than 300 metres.

**Category IIIA** - Landing following a precision approach using an Instrument Landing System with a decision height lower than 30 m (100 ft) or no decision height and a runway visual range not less than 200 m;

**Category IIIB** - Landing following a precision approach using an Instrument Landing System or Microwave System with a decision height lower than 50 ft, or no decision height and a runway visual range less than 200 m but not less than 75 m;

**Category IIIC** - Landing following a precision approach using an Instrument Landing System or Microwave System with no decision height and no runway visual range limitations.



[ ]

**Low Visibility Procedures (LVP).** Procedures applied at an aerodrome for the purpose of ensuring safe operations during Category II approaches and Low Visibility Take-offs below 400 metres RVR (EASA) or 550 metres RVR (ICAO).

*Note: Some States refer to LVP (as applied at an aerodrome) as All Weather Operations (AWO).*

**Low Visibility Take-Off (LVTO).** A take-off where the Runway Visual Range (RVR) is less than 400 metres.

**Other than Standard Category II Operation** - A Category II Instrument Approach and Landing Operation to a runway where some or all of the elements of the ICAO Annex 14 Precision Approach Category II lighting system are not available (Refer to Appendix 1 to CAR OPS 1.430 (f)(4) Table 7b. for minimum RVR)

*Note: Only available to operators approved for CAT II operations.*

## 2. APPROACH INSTRUMENTS AND EQUIPMENT

### 2.1 General

Except for LVTO down to 125m RVR the AFM (or supplement) should indicate that the aircraft is certified for the appropriate AWO. The required instruments and equipment must be installed in each aircraft and;

- (a) all instruments and items of equipment required must be capable of performing as necessary for AWO operations; and
- (b) the MEL must reflect AWO procedures.

Approval is also required after each subsequent alteration to these instruments and items of equipment. The CAA requires the aircraft to be equipped in accordance with EASA CS-AWO or an equivalent standard accepted by the Authority.

### 2.2 Required Instruments and Equipment

- (a) Two localiser and glide slope receiving systems. Each system must provide a basic ILS display and each side of the instrument panel must have a basic ILS display. However, a single localiser antenna and a single glide slope antenna may be used.
- (b) A communications system that does not affect the operation of at least one of the ILS systems.
- (c) A marker beacon receiver that provides distinctive aural and visual indications of the outer and the middle markers.
- (d) Two gyroscopic pitch and bank indicating systems.
- (e) Two gyroscopic direction indicating systems.



- (f) Two airspeed indicators.
- (g) Two sensitive altimeters adjustable for barometric pressure, having markings at 20 foot intervals and each having a placarded correction for altimeter scale error and for the wheel height of the aircraft.
- (h) Two vertical speed indicators.
- (i) A flight control guidance system that consists of either an automatic approach coupler or a flight director system. A flight director system must display computed information as steering command in relation to an ILS localiser and, on the same instrument, either computed information as pitch command in relation to an ILS glide slope or basic ILS glide slope information. An automatic approach coupler must provide at least automatic steering in relation to an ILS localiser. The flight control guidance system may be operated from one of the receiving systems required by subparagraph (a) of this paragraph.
- (j) For Category II operations with decision heights below 150 feet either a marker beacon receiver providing aural and visual indications of the inner marker or a radio altimeter.
- (k) Warning systems for immediate detection by the pilot of system faults in items (a), (d), (e), and (i).
- (l) Dual controls.
- (m) An externally vented static pressure system with an alternate static pressure source.
- (n) A windshield wiper or equivalent means of providing adequate cockpit visibility for a safe visual transition by either pilot to touchdown and rollout.
- (o) A heat source for each airspeed system pitot tube installed or an equivalent means of preventing malfunctioning due to icing of the pitot system.
- (p) A radio altimeter must meet the performance criteria of this paragraph for original approval and after each subsequent alteration.
  - (1) It must display to the flight crew clearly and positively the wheel height of the main landing gear above the terrain.
  - (2) It must display wheel height above the terrain to an accuracy of  $\pm 5$  feet or 5 percent, whichever is greater, under the following conditions:
    - (i) Pitch angles of zero to  $\pm 5^\circ$  about the mean approach attitude.
    - (ii) Roll angles of zero to  $20^\circ$  in either direction.
    - (iii) Forward velocities from minimum approach speed up to 200 knots.
    - (iv) Sink rates from zero to 15 feet per second at altitudes from 100 to 200 feet.



- (3) Over level ground, it must track the actual altitude of the aircraft without significant lag or oscillation.
- (4) With the aircraft at an altitude of 200 feet or less, any abrupt change in terrain representing no more than 10 percent of the aircraft's altitude must not cause the altimeter to unlock, and indicator response to such changes must not exceed 0.1 seconds and, in addition, if the system unlocks for greater changes, it must reacquire the signal in less than 1 second.
- (5) Systems that contain a push to test feature must test the entire system (with or without an antenna) at a simulated altitude of less than 500 feet.
- (6) The system must provide to the flight crew a positive failure warning display any time there is a loss of power or an absence of ground return signals within the designed range of operating altitudes.

### **3. LOW VISIBILITY TAKE-OFF (LVTO) REQUIREMENTS**

#### **3.1 General**

Low visibility take-offs require specific approval by the CAA and also require LVP to be established at the airport. With certified lateral guidance equipment the lowest RVR is 75 metres RVR whilst 125 metres RVR, or higher for Category A, B and C aeroplanes (150 metres RVR for Category D), is available to aircraft without lateral guidance equipment.

#### **3.2 LVTO of 125 Metres RVR or Higher**

Operators of Category A, B and C aeroplanes may be authorised for a LVTO with a minimum of 125 metres RVR (Category D – 150 metres RVR) provided;

- (a) Low Visibility Procedures are in force;
- (b) High intensity runway centreline lights spaced 15 m or less and high intensity edge lights spaced 60 m or less are in operation;
- (c) Flight crew members have satisfactorily completed training in a Flight Simulator;
- (d) A 90 metre visual segment is available from the cockpit at the start of the take-off run; and
- (e) The required RVR value has been achieved for all of the relevant RVR reporting points.

#### **3.3 LVTO of less than 125 Metres RVR**

Operators of aeroplanes may be authorised for a LVTO with a RVR less than 125 metres, but not less than 75 metres, provided either a certified lateral guidance system, for example para-visual displays or HUD; is used and

- (a) Low Visibility Procedures are in force;





- (b) the relevant section of the AFM (or supplement) or documentation on modifications, STC etc. for the aircraft serial number, specifically states the criteria;
- (c) runway protection and facilities equivalent to Category III landing operations are available.
- (d) the minimum required RVR should be achieved for all reporting points representative of the parts of the runway from the point at which the aircraft commences the take-off until the greater of the calculated take-off distance or accelerate-stop distance from that point.

*Note: The reported RVR value representative of the initial part of the take-off run can be replaced by pilot assessment.*

## **4. APPROVAL PROCESS**

### **4.1 Application**

An application for Air Weather Operations approval must be submitted to the CAA for their initial review using the Form SM 05 for General Aviation operators and Form SM 05A for Commercial Air Transport operators. Any required operational supporting documentation must be included in the application as an attachment.

### **4.2 Supporting Documentation**

An applicant from a General Aviation operator to operate on AWO must provide evidence of aircraft system capability and declare in a Declaration of Compliance (refer Form SM 05) that the aircraft has certified equipment (is eligible), the pilot is suitably qualified and current with respect to the equipment and adequate procedures and checklists are in place.

*Note: The CAA may request a review of the GA Operations Manual section on AWO procedures.*

An applicant from a Commercial Air Transport operator to operate on AWO must submit all supporting documentation below for approval. Training at paragraph (e) below should be observed.

The supporting documentation must be sufficient for the CAA to be able to make a determination. The relevant section of the AFM (or supplement) and documentation on modifications, STC etc. for the aircraft serial number must be included as well as proposed amendments to;

- (a) MMEL/MEL addressing AWO (requires CAA approval).
- (b) Maintenance Programme. Maintenance instructions for the on-board guidance systems must be established by the operator, in liaison with the manufacturer, and included in the operator's aeroplane maintenance programme, which must be acceptable to the Authority.



*Note: The operator must include procedures for the maintenance of AWO equipment such as adherence to manufacturer's instructions, modification procedures, repair procedures, system calibration policy etc. Additional engineering procedures should include action for downgrading and upgrading such as technical log entries, corrective action, placarding, release to service procedures, monitoring reliability of AWO critical components and reporting to CAA etc.*

- (c) MME if applicable
- (d) Operations Manual

All operators must ensure the following procedures and requirements are addressed. A General Aviation operator must make a declaration that the Operations Manual complies whereas a Commercial Air Transport operator must submit the Operations Manual (or amendment) to the CAA for approval. SOPs must cover applicable operator requirements such as;

- Definitions.
- Crew qualifications for AWO
- Equipment required for AWO
- MEL handling.
- Data collection
- Crew briefing
- Low Visibility Take-Off:
  - Taxiing in low visibility conditions.
  - Take-off minima and lighting.
  - Crew visual visibility assessment.
  - Crew responsibilities/handling.
  - Visual references required.
  - Approved lateral guidance system.
  - ATC calls.
  - Contingency procedures including: engine failure between  $V_1$  and  $V_R$ ; and rejected take-off.
- Approach and landing:
  - Modes of operation.
  - Statement that autopilot/flight director must be used whenever possible.
  - AWO fuel considerations.
  - Minimum visual references for landing.
  - Approach Ban and RVR.
  - Cross-wind limits.
  - Effect of irregular pre-threshold terrain.
  - Stabilised approach criteria.
  - Correct seating and eye position.
  - Designation of PF and PNF and their duties.
  - Use of automatic flight control system.
  - Checklist handling.
  - Approach briefing.
  - Radio communications handling.
  - Monitoring and cross-checking of instruments and radio aids.
  - Cockpit call outs.



- Contingency procedures including:
  - use of equipment downgrade list;
  - failures above and below decision height;
  - ILS deviation warnings;
  - autopilot disconnect;
  - auto-throttle disconnect;
  - electrical failures;
  - engine failure;
  - failures and loss of visual references at or below decision height; and pilot incapacitation.

(e) Training

Appropriate formal AWO training at an ATO approved for the purpose, using a simulator for the type of aircraft applied for, in respect to the following (as appropriate);

- Initial training
- Recurrent training/qualification
- Upgrade training
- Recency of experience
- Differences training
- Simultaneous training and qualification for AWO
- Ground training curriculum segment
- Surface movement control training
- Flight training curriculum segment
- Initial qualification
- Low visibility take-off qualification
- Multiple aircraft type or variant qualification (as applicable)
- Line checks
- Crew records and notification system

- (f) safety assessments must be carried out and performance indicators established to monitor the level of safety.

### 4.3 Operations Evaluation Programme for Commercial Air Transport Operators (only)

#### 4.3.1 General

The CAA must evaluate, and approve where necessary, the following before operational approval;

- (a) ATO & FSTD capability;
- (b) Training programme;
- (c) Aircraft systems;
- (d) Operating instructions (Operations Manual and MEL);
- (e) Operational procedures (FSTD and in-flight);



### 4.3.2 Demonstrations

Unless otherwise authorised by the CAA, the evaluation programme for each aircraft requires the demonstrations as specified in Appendix 1 to CAR OPS 1.440, as follows.

- (a) *General.* The following procedures apply to the introduction and approval of low visibility operations.
- (b) *Operational Demonstration and Safety Assessment*

The intention of the safety assessment is to validate the use and effectiveness of the applicable aircraft flight control and guidance systems, procedures, flight crew training and aircraft maintenance programme. The intention is not to repeat the statistical analysis required for certification of equipment, but rather to demonstrate that the various elements of the 'total system' for LVOs work together for a particular operator.

#### (1) Approaches

The purpose of the operational demonstration is to determine or validate the use and effectiveness of the applicable aircraft flight guidance systems, training, flight crew procedures, maintenance programme, and manuals applicable to the Category II/III programme being approved.

- (i) At least 30 approaches and landings must be accomplished in 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 Authority.
- (ii) If an operator has different variants of the same type of aircraft utilising the same basic flight control and display systems, or different basic flight control and display systems on the same type of aircraft, the operator must show that the various variants have satisfactory performance, but the operator need not conduct a full operational demonstration for each variant. The Authority may also accept a reduction of the number of approach and landings based on credit given for the experience gained by another operator using the same aeroplane type or variant and procedures.
- (iii) If the number of unsuccessful approaches exceeds 5 % of the total (e.g. unsatisfactory landings, system disconnects) the evaluation programme must be extended in steps of at least 10 approaches and landings until the overall failure rate does not exceed 5 %.

#### (2) LVTO

If the procedures used for LVTO are not significantly different from those used for standard take-off, it may be sufficient for operators to conduct only a small number of take-offs using the procedures established for LVTO for the purpose of data gathering. The following could be considered as minimum:



- (i) For LVTO in an RVR of 125 m or more: 2 x take-offs;
- (ii) For LVTO in an RVR of less than 125 m: 10 x take-offs;

An operator holding approval for LVTO on one aircraft type and applying for LVTO on another type or variant may use data from LVTO conducted on the first type if the following are similar:

- (i) level of technology, including flight deck displays, HUD or an equivalent guidance system;
  - (ii) operational procedures; and
  - (iii) handling characteristics.
- (c) *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.
- (d) *Data Analysis.* Unsatisfactory approaches and/or automatic landings shall be documented and analysed.
- (e) *Continuous Monitoring*
- (1) After obtaining the initial authorisation, the operations must be continuously monitored by the operator to detect any undesirable trends before they become hazardous. Flight crew reports may be used to achieve this.
  - (2) The following information must be retained for a period of 12 months:
    - (i) The total number of approaches, by aeroplane type, where the airborne Category II or III equipment was utilised to make satisfactory, actual or practice, approaches to the applicable Category II or III minima; and
    - (ii) Reports of unsatisfactory approaches and/or automatic landings, by aerodrome and aeroplane registration, in the following categories:
      - (A) Airborne equipment faults;
      - (B) Ground facility difficulties;
      - (C) Missed approaches because of ATC instructions; or
      - (D) Other reasons.
  - (3) An operator must establish a procedure to monitor the performance of the automatic landing system of each aeroplane.



(f) *Transitional periods*

(1) *Operators with no previous Category II or III experience*

- (i) An operator without previous Category II or III operational experience may be approved for Category II or IIIA operations, having gained a minimum experience of 6 months of Category I operations on the aeroplane type in private or CAT operations.
- (ii) After completing another 6 months of Category II or IIIA operations on the aeroplane type in private or CAT operations, the operator may be approved for Category IIIB/C operations. When granting such an approval, the Authority may impose higher minima than the lowest applicable for an additional period. The increase in minima will normally only refer to RVR and/or a restriction against operations with no decision height and must be selected such that they will not require any change of the operational procedures.

(2) *Operators with previous Category II or III experience.*

An operator with previous Category II or IIIA/B/C experience may be granted a reduction in the transition period provided satisfactory evidence is submitted of that experience as supporting documentation with the application. Appendix 1 to CAR OPS 1.450 should be referred to when making application.

That evidence should include the differences between the previous operator and the San Marino operator's AWO procedures/limitations as well as the following information for the pilots to be used on the stated aircraft type;

- (i) Evidence of initial training;
- (ii) Evidence of recurrent training;
- (iii) Number of CAT II approaches;
- (iv) Number of CAT IIIA/B/C approaches; and
- (v) Length of service with the previous operator on this aircraft type.

(g) *Maintenance of Category II, Category III and LVTO equipment.* Maintenance instructions for the on-board guidance systems must be established by the operator, in liaison with the manufacturer, and included in the operator's aeroplane maintenance programme which must be approved by the Authority.

(h) *Eligible Aerodromes and Runways*

- (1) Each aeroplane type/on-board equipment/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.



- (2) For runways with irregular pre-threshold terrain or other foreseeable or known deficiencies, each aeroplane type/on-board equipment/runway combination must be verified by operations in Category I or better conditions, prior to commencing Category II or III operations.
- (3) If an operator has different variants of the same type of aircraft utilising the same basic flight control and display systems, or different basic flight control and display systems on the same type of aircraft, the operator must show that the various variants have satisfactory performance, but the operator need not conduct a full operational demonstration for each variant/runway combination.
- (4) Operators using the same aeroplane type/variant and on-board equipment combination and procedures may take credit from each other's experience and records in complying with this paragraph.

### 4.3.3 Records

During the evaluation programme the following information must be maintained by the applicant for the aircraft with respect to each approach and made available to the CAA upon request;

- (a) Each deficiency in airborne instruments and equipment that prevented the initiation of an approach.
- (b) The reasons for discontinuing an approach, including the altitude above the runway at which it was discontinued.
- (c) Speed control at the 100 foot decision height if auto throttles are used.
- (d) Trim condition of the aircraft upon disconnecting the auto coupler with respect to continuation to flare and landing.
- (e) Position of the aircraft at the middle marker and at the decision height indicated both on a diagram of the basic ILS display and a diagram of the runway extended to the middle marker. Estimated touchdown point must be indicated on the runway diagram.
- (f) Compatibility of flight director with the auto coupler, if applicable.
- (g) Quality of overall system performance.

## 5. CERTIFICATION

### 5.1 Approval

The AWO approval will be issued on Specific Approval Certificate for General Aviation operators, a copy of which must be carried in the aircraft for all flights where AWO may be expected to be conducted.

The AWO approval will be granted by inclusion in the Operations Specifications of the AOC holder.



*Note: The limits to be included in the Operations Specifications or Specific Approval Certificate are derived from the relevant tables of CAR OPS 1, Subpart E for the aeroplane category.*

## 5.2 Certificate of Competency

Once approved and upon request, the CAA will also prepare a Certificate of Competency for the operator to send to foreign states with CAT II/III airports for their approval. No person may conduct a Category II/III approach in a foreign country without the authorisation from the National Aviation Authority of that country and only then in accordance with that Authority.

## 6. OPERATING PROCEDURES

The commander must satisfy himself that:

- (a) [The status of the visual and non-visual facilities is sufficient prior to commencing a Low Visibility Take-Off, Other than Standard Category II or a Category II/III approach;
- (b) Appropriate LVPs are in force according to information received from Air Traffic Services, before commencing a Low Visibility Take-off below 400 metres RVR, Other than Standard Category II or a Category II/III; and
- (c) The flight crew members are properly qualified prior to commencing a Low Visibility Take-off, Other than Standard Category II, or a Category II/III approach.]
- (d) The commander shall satisfy himself that the status of the aeroplane and of the relevant airborne systems is appropriate for the specific operation to be conducted.

## 7. APPROVAL

The operational approval is issued as an Approval Certificate/Operations Specifications, which must be carried on all flights in the aircraft. The minimums normally included in the approval are;

- (a) LVTO
  - not below 75 m RVR with approved lateral guidance or HUD/EVS systems fitted
  - not below 125 m RVR (Category A, B & C)
  - not below 150 m RVR (Category D)
- (b) CAT II
  - DH 100 ft (all Categories)
  - RVR 300 m (Category A, B & C)
  - RVR 350m\* (Category D)

*Note\*: Category D aeroplanes may be granted RVR 300m if conducting autoland only.*

- (c) Other than Standard Cat II
  - DH 100 ft
  - RVR 350 m (Category A, B & C)
  - RVR 400 m (Category D)

*Note: RVR Minimums stated are for Full Approach Lighting System.*





- (d) CAT IIIA
  - DH < 100ft (all Categories)
  - RVR 200m (all Categories)
  
- (e) CAT IIIB
  - DH < 100ft or no decision height (all Categories)
  - RVR 75 - 200m (all Categories)
  
- (f) CAT IIIC
  - not available



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