CIVIL AVIATION AUTHORITY
OF THE PHILIPPINES

ADVISORY CIRCULAR
AC 08-011

APPLICATION & PROCESS:
ENHANCED VISION SYSTEMS

SECTION 1 POLICY & GENERAL INFORMATION

1.1 PURPOSE

The purpose of this advisory circular (AC) is to provide guidance to aircraft operators regarding the application and approval for the use of Enhanced Vision Systems (EVS) by Philippine operators.

- This advisory circular is intended to announce the CAAP intent to exercise approval authority for the use of EVS systems.
- It is expected that this circular will be amended as the international standards for use of EVS are expanded.

1.2 STATUS OF THIS AC

This AC is an original issuance.

1.3 BACKGROUND

A. The information in this advisory circular provides guidance for EVS intended for installation and operational use in aircraft engaged in international air navigation.

B. EVS may be installed and operated to enhance situational awareness or to obtain an operational credit such as lower minima for approach and landing operations.

A EVS and HUD system may be installed separately or together as part of a hybrid system

C. Any use of these systems and any operational credit gained from their use requires approval from the CAAP.

Operational credit can only be granted within the limits of the design approval

1.4 APPLICABILITY

The requirement for CAAP approval for the use of EVS before use in instrument or night operations to operators of Philippine-registered aircraft involved in general aviation, aerial work and commercial air transport.

1.5 RELATED REGULATIONS

- PCAR Part 7 includes requirements for approval of EVS before use in all-weather operations
- PCAR Part 8 includes the requirements for all-weather operations..
- PCAR Part 9 includes the requirements for CAAP approval of all-weather operations for AOC holders.

- Advisory Circulars are intended to provide advice and guidance to illustrate a means, but not necessarily the only means, of complying with the regulations, or to explain certain regulatory requirements by providing informative, interpretative and explanatory material.
- Where a regulation contains the words “prescribed by the Authority,” the AC may be considered to “prescribe” a viable method of compliance, but status of that “prescription” is always “guidance” (never regulation).

1.6 RELATED PUBLICATIONS

The following publications provide information that is used in this advisory circular—

1) Civil Aviation Authority of the Philippines (CAAP)

   - AC 00-004, Generic CAAP Certification Process.
   - AC 08-010; Application & Process: Heads-Up Display Systems

   Copies may be obtained from CAAP Flight Standards Inspectorate Service.

2) International Civil Aviation Organization (ICAO)

   - Annex 6, Part 1, International Commercial Air Transport – Aeroplanes
   - Annex 6, Part 3, International Operations – Helicopters

   Copies may be obtained from Document Sales Unit, ICAO, 999 University Street, Montreal, Quebec, Canada H3C 5H7.

1.7 DEFINITIONS & ACRONYMS

1.7.1 DEFINITIONS

The following definitions apply to this advisory circular—

1.7.2 ACRONYMS & ABBREVIATIONS

The following acronyms apply to this advisory circular—

1) **AC** – Advisory Circular
2) **AOC –** Air Operator Certificate
3) **CAAP** – Civil Aviation Authority of the Philippines
4) **EASA** – European Aviation Safety Agency
5) **ECAC** – European Civil Aviation Conference
6) **EVS** – Enhanced Vision System
7) **EUROCAE** – European Organization for Civil Aviation Equipment
8) E**UROCONTROL** – European Organisation for the Safety of Air Navigation
9) **FAA** – Federal Aviation Administration
10) **HUD –** Heads-Up Display
11) **MEL** – Minimum Equipment List
12) **MNPS** – Minimum Navigation Performance Specification
13) **NSE** – Navigation System Error
14) **OEM** – Original Equipment Manufacturer
15) **PCAR –** Philippine Civil Aviation Regulations

SECTION 2 OPERATIONAL APPROVAL PROCESS

2.1 GENERAL INTERNATIONAL REQUIREMENTS

2.1.1 COMPLETE CERTIFICATION REQUIREMENTS

Prior to operating a civil aircraft of Philippine registry in airspace for which EVS will be used must first—

1) Satisfactorily complete the process for granting of the proper authorizations;
2) Obtain CAAP-approval document for the specific aircraft or fleet.

2.1.2 CERTIFICATION EVALUATION REQUIRED

In making this certification evaluation, CAAP shall take into account the—

1) Type(s) of operations proposed;
2) Suitability of the aircraft, instruments and equipment for those operations;
3) Procedures for conformance with international standards; and
4) Qualification of operator personnel for such operations

2.1.3 CRITERIA FOR GRANTING THE APPROVAL DOCUMENT

CAAP shall be satisfied that the—

1) The aircraft, instruments and equipment were designed and airworthiness-tested for the EVS operations proposed by the operator;

- The criteria specified in this paragraph will be applied after certification to all inspections involving EVS operations.
- Consistent satisfactory performance is absolutely necessary for continued EVS approval.

2) Operator has instituted appropriate procedures and training in respect to maintenance programmes and practices necessary to ensure the continued airworthiness of the aircraft, instruments and equipment involved in the proposed EVS operations.
3) Operator has instituted adequate and appropriate operational procedures to ensure the safe accomplishment of the EVS operations;
4) Operator has ensured that all flight crew and flight dispatcher participants in the proposed EVS operations are trained and qualified; and
5) The operator has demonstrated that its personnel can conduct the EVS operations(s) consistently and safely

2.2 GENERAL PHILIPPINE REQUIREMENTS

2.2.1 CERTIFICATION PROCESS

A. While all certification proceeds through the same 5-phase process, whether is a single document or a completely new airline, the lines between the phases blur in a simple certification.

B. Granting of EVS approval is a simple process. The applicant will provide the required formal application as prescribed by CAAP.

C. The certification team will then accomplish the document conformance.

D. Document conformance is considered complete when all submitted documents have been—

1) Evaluated;

2) Found to be acceptable for use in aviation; and

3) Issued a formal instrument of approval or acceptance.

2.2.2 INSPECTION & DEMONSTRATION

A. The specific aircraft to be used will be inspected for EVS equipment capability and reliability.

B. If there is any doubt that the operator's personnel and equipment may not be capable of meeting the required international standards, the applicant will be issued an LOA to conduct EVS operations under the close supervision of CAAP inspector personnel.

Past performance of the operator's personnel with the EVS will be a key factor in the type of demonstration required.

C. The demonstrated operational performance will be considered before granting the EVS approval(s).

2.2.3 FINAL CERTIFICATION ACTIONS

A. This is the period of time that CAAP completes the necessary documentation to formalize the approval of the applicant for EVS approvals for specific operations and, if necessary, for aircraft type(s).

B. That approval will be in the form of—

1) For general aviation operators; an LOA valid for a period of 12 months; and

2) For AOC holders, a revision to the—

(a) Master (formal) operations specifications; and

(b) Aircraft Display operations specification (for each type of aircraft).

SECTION 3 CONTENTS OF FORMAL APPLICATION PACKAGE

3.1 GENERAL REQUIREMENTS

The following documents will be considered individually—

1) A letter of intent detailing the type of operation, equipment and relevent certification documents;

2) Operations Manual (or revisions) that include EVS policies and procedures appropriate the desired operational applications;

3) Operations Manual - D (or revisions) that include training programs appropriate to the use of the EVS;

4) Maintenance Control Manual (or revisions) that include general maintenance procedures related to EVS airworthiness and current status;

5) Summary of relevant operator or personnel past operating history (where available);

3.2 FOR AIRCRAFT TYPE

The following documents must be submitted for each aircraft type—

1) Description of aircraft or equipment airworthiness data;

2) Operations Manual - B (or revisions) that include EVS procedures and limitations appropriate;

3) Proposed Minimum Equipment List (MEL) revisions for EVS, if applicable; and

4) Current Master Minimum Equipment List (MMEL);

3.3 FOR EVS EQUIPMENT

The following documents related to the specific HUP equipment required should be submitted with the application—

1) Manufacturer's certification documentation; and

2) Proposed maintenance program revisions;

3.4 AVAILABLE FOR CONSULTATION

The following documents (for each type of aircraft and equipment necessary for the EVS operations) must be available at the applicant's facilities for consultation—

- CAAP inspectors shall have unobstructed ability to refer to these documents.
- If this criteria is not met, copies of these manuals will be required to be submitted to the CAAP offices as a part of the application.

1) Maintenance manuals;

2) Standard practices manuals; and

3) Illustrated parts catalogues.

SECTION 4 EVS SYSTEMS CHARACTERISTICS

4.1 GENERAL

A. EVS present a real-time electronic image of the external scene through the use of image sensors.

This information should be displayed on a head-up or head-down display.

B. When enhanced vision imagery is displayed on a HUD, it should be presented to the pilots' forward external field of view without significantly restricting that external view.

- A variety of image sensors may be used individually or in combination to present a real-time electronic image of the external scene.
- Image sensors may include sensors using low-level light intensification, thermal emissions, radar or other electronic emissions.

4.2 OPERATIONAL APPLICATIONS

A. Flight operations with enhanced vision image sensors allow the pilot to view an image of the external scene obscured by darkness or other visibility restrictions.

- When the external scene is partially obscured, enhanced vision imaging may allow the pilot to acquire an image of the external scene earlier than with natural or unaided vision.
- The improved acquisition of an image of the external scene may improve situational awareness.

B. This enhanced imagery may also allow pilots to detect terrain or obstructions on the runway or taxiways.

An enhanced image can also provide visual cues to enable earlier runway alignment and a more stabilized approach.

C. The enhanced vision images may also be used to obtain approval to use reduced visibility minima when the images are presented into the pilot's external field of view on a HUD without significantly restricting that view.

- The approval also requires specific aircraft performance parameters and navigation guidance to be presented on the HUD.

D. The combined display of aircraft performance, guidance and imagery may allow the pilot to maintain a more stabilized approach and smoothly transition from enhanced visual references to standard visual references.

4.3 EVS APPROVAL

A. Approval requirements differ based on whether the intended function of the system is to increase situational awareness or to obtain operational credit.

B. When enhanced vision imagery is used to improve situational awareness, operational approval requirements may be limited.

- An example of this type of operation may include an EVS on a head-down display that is only used for situational awareness of the surrounding area of the aircraft during ground operations where the display is not in the pilot's primary field of view.

C. For enhanced situational awareness, the installation and operational procedures need to ensure that EVS operations do not interfere with normal procedures or the operation or use of other aircraft systems.

> In these cases, modifications to normal procedures for other systems or equipment may be necessary to ensure compatibility.

D. When enhanced vision imagery is used for operational credit, operational approvals may require that the imagery be combined with flight guidance and presented on a HUD.

- Operational approvals may also require that this information be presented on a head-down display.
- A pilot could use this system to continue an instrument approach below published minimum altitudes using the enhanced visual imagery combined with flight guidance on the HUD.

E. When EVS is used for operational credit, operational approval standards should ensure the credit for the individual image sensor or combination of sensors is appropriate.

> Operational credit may be applied for any flight operation, but credit for instrument approach and landing operations is most common.

SECTION 5 EVS TRAINING

A. Training requirements should be established, monitored and approved by the CAAP.

- These training requirements should include recency of experience requirements if the CAAP determines those requirements are significantly different than current requirements for the use of HUD without enhanced vision imagery or conventional head-down instrumentation.

B. EVS training should address all flight operations for which the enhanced vision display is approved.

- This training should include contingency procedures required in the event of system degradation or failure.
- Training for EVS used for situational awareness should not interfere with other required operations.
- Training for EVS used for operational credit should also require training for the applicable HUD used to present the enhanced visual imagery.

C. EVS training should include the following elements as applicable:

1) An understanding of the system characteristics and operational constraints. Normal procedures, controls, modes, and system adjustments;

2) EVS limitations;

3) EVS airworthiness requirements;

4) Enhanced vision display during low visibility operations, including

   (a) Taxi,

   (b) Take-off; and/or

   (c) Instrument approach and landing.

The EVS use will be evaluated for instrument approach procedures in both day and night conditions;

5) Failure modes of the EVS and the impact of the failure modes or limitations upon crew performance, in particular, for two-pilot operations;

6) Crew coordination and monitoring procedures and pilot call-out responsibilities;

7) Transition from enhanced imagery to visual conditions during the runway visual acquisition;

8) Rejected landing: loss of visual cues of the landing area, touchdown zone, or rollout area; and

- LED runway lighting may not be visible to crews using HUD/E VS due to the fact that LEDs are non-incandescent lights.
- The effect of LED runway lighting on HUD/EVS is being evaluated, and the results will be included in a subsequent revision to this advisory circular.

9) Any effects that weather, such as low ceilings and visibilities, may have on the performance of an EVS.

End of Advisory Circular

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