TERMS OF REFERENCE
Special Committee (SC) 213
Enhanced Flight Vision Systems/Synthetic Vision Systems
(Revision 18)

REQUESTOR:

Organization	Person
Federal Aviation Administration, Aviation Safety (FAA/AVS)	**Mr. Nicholas Sabatini, Associate Administrator for Aviation Safety**

SC LEADERSHIP:

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BACKGROUND:

An aircraft's ability to conduct flight operations depends upon various factors. As weather and visibility conditions deteriorate, reduced visibility makes it increasingly difficult to conduct flight operations in the same manner and rate as in visual meteorological conditions. While current technology provides solutions to many of the problems caused by low visibility, the potential now exists to enhance visual references for the flight crew or provide them with artificial graphical depictions of visual references. Enhanced Flight Vision Systems (EFVS) help mitigate reduced visibility as a limiting factor in flight operations. Synthetic Vision Systems (SVS) can provide an aid for runway location or other objects, make visual search for specific features more efficient, and facilitate future action planning in dynamic environments.

Synthetic vision is a computer-generated image of the external scene topography from the perspective of the flight deck, derived from aircraft attitude, high-precision navigation solution,

and database of terrain, obstacles and relevant cultural features. A synthetic vision system is an electronic means to display a synthetic vision image of the external scene topography to the flight crew. SVS does not include flight guidance cues but is typically integrated with such cues as well as other strategic information typically found on a navigation display. SVS can provide an enhanced intuitive view of the flight environment along with a depiction of hazardous terrain and obstacles, with ortho-image draping and airport features and precision navigation guidance. The intuitive view is derived primarily from geo-spatial databases with additional superimposed or integrated information. Required system redundancy and reliability of the SVS depends on the intended function and the criticality of the flight operations being supported. Cross-checking may be needed to ensure the integrity of flight critical information. Database integrity is a major parameter to enable SVS operations.

Alternatively, EVS technologies do not use geo-spatial databases, but use sensors to "see" the environment in front of and along the flight path. EVS technologies have been certified on many platforms with varying levels of complexity. For example, EFVS requires a conformal Head-Up Display (HUD), or an equivalent display, along with specific aircraft flight symbology, EFVS sensor imagery, attitude symbology, and guidance appropriate for the approach to be flown for operational credit in accordance with §91.176 (l) and (m). Alternatively, head-down displays (HDD) of EVS are used in some light aircraft and helicopters for general hazard awareness and are not allowed operational credit.

Combined Vision Systems (CVS) combine elements of SVS and EVS/EFVS in one system. Depending on the operational context, the images may be combined on one display, selectable on one display, or presented on separate displays. Operational credit is based on which image source provides that credit. The image source used for credit may need to be distinguished from other sources. Some operational concepts use one source to provide some operational credit and use another source to provide operational credit from the new, lower height. Images may also be used to provide context for the image used for operational credit and to make the entire system more robust and easier to use.

In November 2020, the leadership of the committee determined that the work which had been done as part of the new EVS/EFVS MASPS to gain industry and regulatory agreement on how to test for Quantified Visual Advantage would be useful as a published stand-alone DO-XXX/ED-YYY document. The work has been developed as part of the joint work of EUROCAE WG-79 and RTCA SC-213. This content was intended to be an appendix in the joint EVS/EFVS MASPS and will be referenced in the final MASPS already in the deliverables table.

DELIVERABLES:

Product	Description	FRAC Completion Due Date*	Changed From
MASPS DO-XXX	Minimum Aviation System Performance Standards (MASPS) for SVS/SVGS/CVS Joint with EUROCAE WG79	December 2023	
MASPS DO-XXX	Minimum Aviation System Performance Standards (MASPS) for EVS/CVS/EFVS Joint with EUROCAE WG79	December 2023	
MASPS DO-XXX	Minimum Aviation System Performance Standard (MASPS) for a Combined Vision System for Helicopter Operations for Low Visibility Operational Credit Joint with EUROCAE WG79	December 2024	

*Note: Final Review and Comment (FRAC) Completion Due Date refers to the date that the committee plenary approves the document after completing the FRAC Process. SCs should submit the final document at least 45 days before the PMC meeting where it will be considered for approval.

SCOPE:

Emerging enhanced and synthetic vision technology continues to result in more sophisticated systems. This RTCA Special Committee will develop MASPS-level guidance which includes Synthetic Vision Systems (SVS), Enhanced Flight Vision Systems (EFVS), Enhanced Vision Systems (EVS), and Combined Vision System (CVS) technologies (which includes synthetic and enhanced vision). The MASPS shall not contradict nor conflict with existing FAA certification criteria established and applied to existing SVS and EVS product approvals. However, advanced applications of the technologies for which certification criteria do not yet exist may be addressed in subsequent editions as identified in Deliverables.

ENVISIONED USE OF DELIVERABLE(S)

The envisioned use of the two new MASPS (MASPS for SVS/SVGS/CVS and MASPS for

EVS/CVS/EFVS) is to address alignment with the FAA Advisory Circulars AC 20-167 and AC 20-185. Currently there are multiple MASPS documents that point to these ACs. The DO-315, 341, 359, 371 and 374 would be obsoleted for new certifications and replaced by these two new MASPS. Additionally, there are some circular references that will be clarified and removed.

The envisioned use on the MASPS for a Combined Vision System for Helicopter Operations for Low Visibility Operational Credit is alignment with WG-79 and potential future FAA Advisory Circulars.

The envisioned use of the Test Procedures for Quantified Visual Advantage is by applicants for regulatory approval.

SPECIFIC GUIDANCE:

This special committee shall work collaboratively to satisfy the following work program:

A. The existing MASPS for EVS, SVS, SVGS, CVS, and EFVS will remain unchanged. The existing MASPS will remain in effect for existing certifications.

B. When developing documents for different uses for SVS and EVS, separate documents were created to allow specific requirements to be created without need to determine if they applied to concepts of operations that already existed. Now that a number of concepts have been explored and guidance has been created for multiple operation, there is greater commonality than originally thought. The documents each reference each other as well as the different guidance material. Two new MASPS will be created, one for SVS and one for EVS so systems can more easily get credit for multiple operations.

C. The following are areas the committee will explore while consolidating MASPS. When the committee has a firm scope associated with the areas of exploration, a new TOR update can be addressed.

The MASPS for Enhanced Flight Vision System approach, landing, and rollout (lower than 1000 ft. but greater than 300 ft. RVR) is due at a date TBD. When combining and reconciling requirements of 1000 ft. RVR and 300 ft. RVR, the committee will investigate if system requirements may be defined for intermediate visibilities. In the initial work for 300 ft. RVR the committee chose fail-operational like requirements but did not include fail-passive with sensors other than FLIR.

The MASPS for Vision Systems for Taxi (300 ft. RVR) is due at a date TBD. Due to the complexity of airport involvement in surface operations, this work will require additional committee expertise from government and industry.

For each application/architecture or class of architectures, the committee shall identify system and sub-system requirements such as database quality (including integrity), sensor performance, time criticality, availability, navigation performance, redundancy, and other pertinent requirements, for the use of this technology. Also, identify any requirements for non-aircraft elements (e.g.,

Enhanced Vision Runway Visual Range, precision survey requirements). (For SC-213, this includes both 14 CFR part 23 and part 25 aircraft and part 27 and part 29 helicopters.)

D. Address the integration of any additional guidance, control, and flight information displays that collectively provide more complete and contemporaneous information to the pilot / flight crew. The MASPS does not replace criteria from approved flight guidance systems.

Coordination should include:

- *ICC Coordination* – SC-213 will coordinate with SC-217 with respect to survey requirements used for synthetic vision system technology.

- SC-213 will coordinate with SC-159 on GNSS requirements for SVGS.

- *EUROCAE Coordination* - RTCA SC-213 / EUROCAE WG-79 is a joint committee and will conduct joint meetings. The goal is to publish joint documents.

- *Initial Documentation* none required.

TERMINATION: When the scope of this Terms of Reference is complete, the committee will recommend to the PMC that the committee Sunset, go into Active Monitoring Mode, or spend a period of time in Hiatus. Any change/extension in the committee's work program requires prior PMC approval.