



Agenda Item 4: Report on activities and deliverables for the GESEA and Subgroups

IMPLEMENTATION OF THE CLIMBING VECTORING AREA (AVS)

(Prepared by Brazil)

SUMMARY

This working paper presents the initiative of the Department of Airspace Control (DECEA), through an Ad-hoc group of the Airspace Planning Study Group (GEPEA), to implement the Climbing Vectoring Area (AVS). This innovation allows aircraft to be vectored under the Minimum vectoring altitudes charts while executing the Standard Instrument Departure (SID) chart and the Instrument Approach Procedure (IAP) chart. Some operational benefits of AVS include increased operational efficiency, operational flexibility for departure sequences between aircraft with different performances and the possibility to act before operational conflicts and incidents such as AIRPROX.

References:

- GEPEA Meetings, Brazil
- FAA Order 8260.3G – TERPS
- Doc 8168 Vol. II PANS-OPS, 20th ed.
- CIRCEA 100-120, DECEA
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1. Background

1.1 Several Regional Service of the Brazilian ATM system, especially the Presidente Juscelino Kubitschek Airport (SBBR), have identified the urgent need for a tactical tool that allows aircraft being vectored below the Minimum vectoring altitudes charts, during the Standard Instrument Departure (SID), the missed approach and Instrument Approach Procedure (IAP) in CTR or TMA type controlled airspaces.

The lack of this capability has generated multiple operational restrictions and vulnerabilities:

- a) Lack of a specific ATC tool to enable tactical vectoring at lower altitudes and thus avoid AIRPROX-type incidents, particularly conflicts between aircraft during simultaneous takeoffs;
- b) Necessity to implement traffic flow management, especially at high-demand aerodromes such as Brasília (SBBR), where there is a need for smoother departures and approaches.
- c) Operational errors resulting from incorrect departure selection or misinterpretation of initial curves, which could be mitigated with the use of early vectoring;

NOTE 1: In 2024, Brasília (SBBR) ranked third with a total of 147,957 movements, illustration 1.

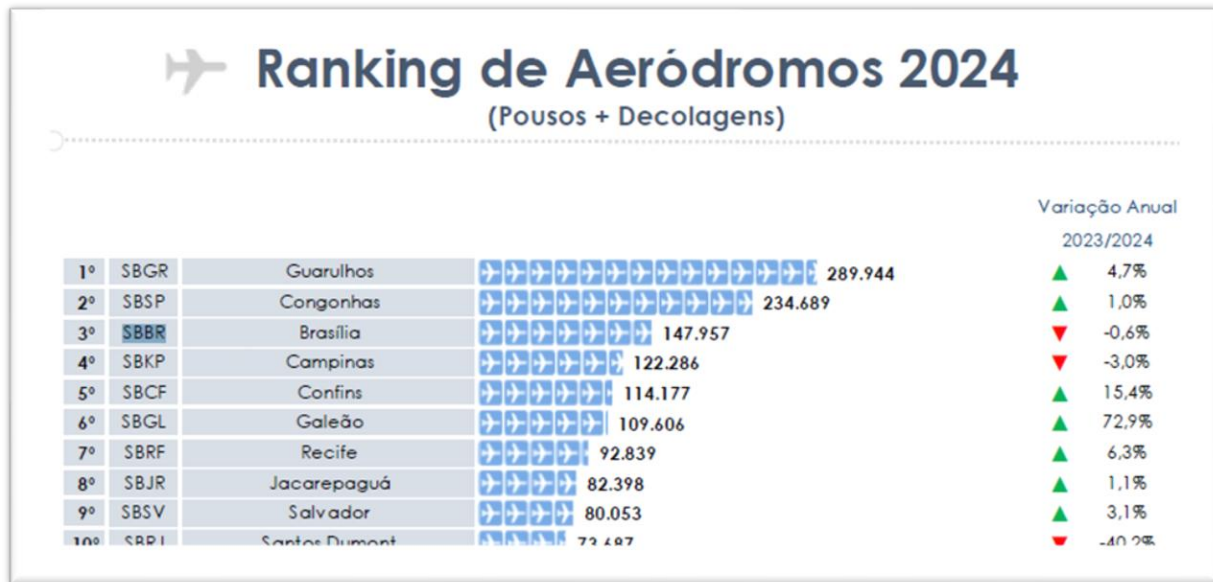


illustration 1- SBBR - flights



Illustration 2 – Brasília Airport - simultaneous and independent operations

2. Analysis

2.1 SCENARIO AND SCOPE ANALYSIS

Based on the identified needs, especially the operational requirements expressed by Brasília Airport (SBBR) and the Regional Services responsible for Airspace Management, the lack of a standardized tool that allows aircraft being vectored below the Minimum Vectoring Altitude Chart. This reduces the efficiency of air traffic management and limits the response capacity of air traffic control (ATC) in high-density environments.

Before this reality and considering that there is currently no national standard governing this issue, the scope of the project was defined as the creation of a product and regulations that would enable, regulate, and standardize the tactical application of Vectoring at lower levels. The product was called AVS (Climbing Vectoring Area) and had the following scope:

- a) Allow aircraft being Vectored below the Minimum Altitude Chart in controlled airspace, ensuring separation and safety;
- b) Simultaneously serve aircraft in takeoff (SID) and missed approach follow-on procedures of an Instrument Approach Procedure (IAP);
- c) Serve as a reference solution for eventual implementation at other airports;
- d) The development of the AVS product included the development of national regulations (CIRCEA) that defined technical and operational criteria, as well as the requirements for its design, publication, and application by ATS services (TWR/APP), in addition to the standardization of phraseology, responsibilities, and limits for tactical vectoring.

2.2 IDEATE (HOW TO CREATE A SOLUTION)

The ideation phase is the time to generate creative, viable solutions focused on the real needs of users, based on the problem clearly defined in the previous stage. In this case, the challenge was to establish a solution that allows for the safe vectoring of aircraft below the Minimum Altitude Chart for vector guidance, both during takeoffs and missed approaches, as shown in Figure 3.

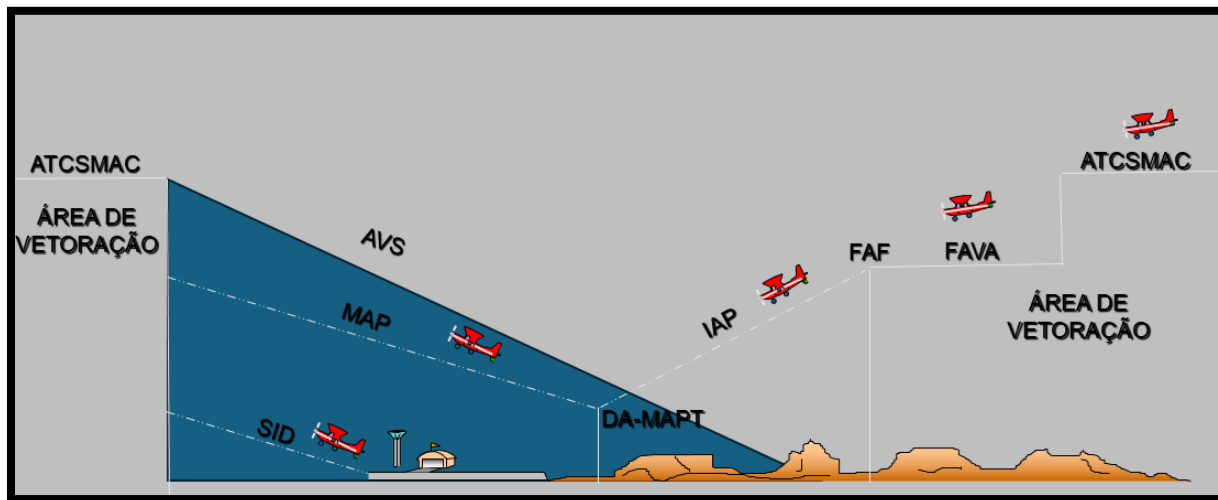


Figure 3 - AVS

During the ideation process, all stakeholders - including Air Traffic Controllers, Designer procedure, pilots, and ATM specialists to discuss and develop a technical and operational solution. From these discussions, the following key elements of the solution emerged.

- a) Initial directions defined for RWY 11: AVS limit headings 045 degrees for each side of the threshold (THR);
- b) Initial directions defined for RWY 28: AVS limit headings 045 degrees for each side of the threshold (THR);
- c) Application of AVS during the Takeoff and Missed Approach phases;
- d) Legal and Regulatory Support;

- e) Procedure design gradient - 3.3%;
- f) Missed approach design slope - 2.5%;
- g) If necessary, define aircraft heading limits due to obstacles;
- h) Define communication failure; and
- i) Necessity for ATS surveillance for AVS use.

2.3 **PROTOTYPE AND BENEFITS**

PROTOTYPE: The prototype creation phase represents the moment in which ideas are transformed into tangible solutions, with a focus on the practical experimentation of the concepts generated during the ideation stage. In the context of developing an AVS according to CIRCEA 100-120, the prototype takes the form of a model according to the following essential parameters:

- a) Minimum climb gradient;
- b) Critical obstacles and obstacle assessment surface;
- c) Initial headings defined in accordance with airspace safety and efficiency;
- d) Separation requirements with adjacent control areas;
- e) Integration with the ATC flow and already published SID procedures.

The designed prototype can be verified in illustration 4, and also illustration 5 which represents an AVS with course limitation due to obstacles.

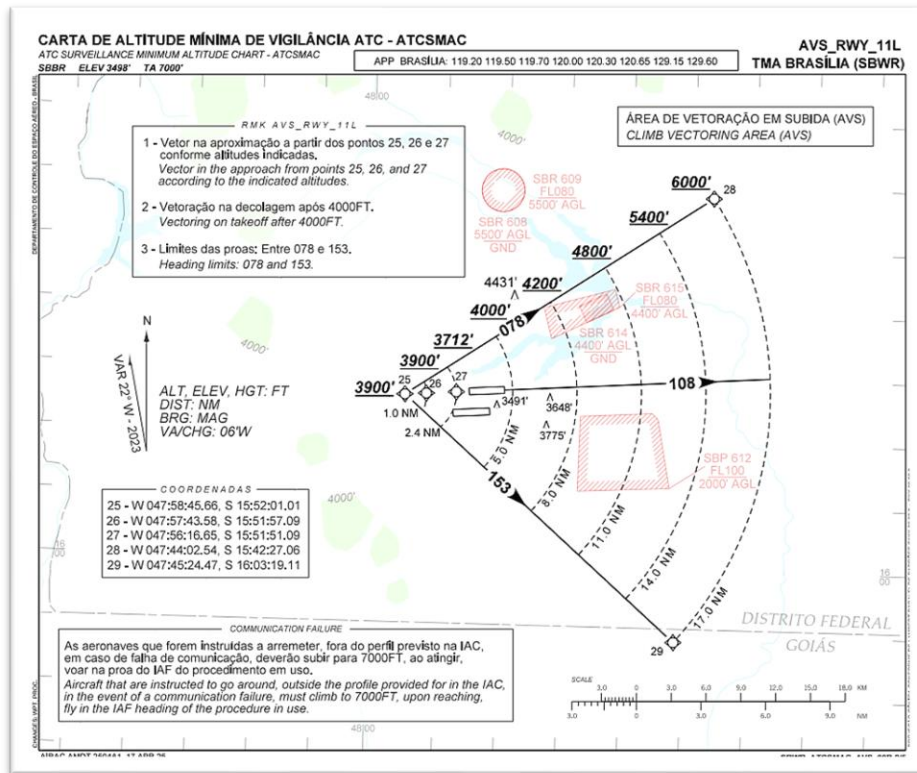


Figure 1 - AVS

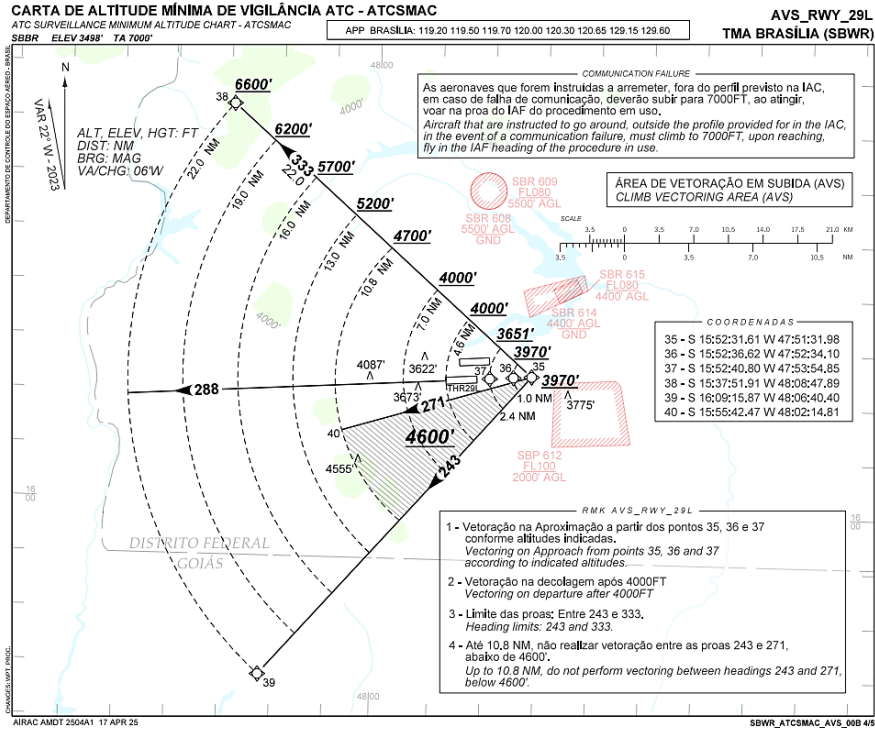


Figure 2 - AVS with heading limitation due to obstacles

BENEFITS:

The AVS incorporates insights from users, in special, Air Traffic Controllers and pilots - ensuring that the solution is safe, efficient, and tailored to operational reality. By combining regulatory criteria from CIRCEA 100-120 / Order TERPS 8260.3G with creative and iterative approaches to innovation. we are moving toward a more modern, user-centric, and safety-based air navigation system that offers numerous benefits, including:

- a) Allows aircraft to be vectored below the Minimum Altitude Charts for vector guidance;
- b) Improves Air Traffic Flow Management; and
- c) Strengthens operational safety.

2.4 FLIGHT INSPECTION

The AVS was developed and published by a specialized technical team, based on updated topographic data and current aeronautical procedures, in accordance with the parameters established in CIRCEA 100-120. In addition, the Special Flight Inspection Group (GEIV, Figure 6) conducted the corresponding inspection flight, validating the safety and functionality of the defined space.



Figure 3 - GEIV

2.5 IMPLEMENTATION

We inform you that, as of April 22, 2025, AVS (Climbing Vectoring Area) was officially implemented in the airspace under the jurisdiction of Brasília International Airport - Presidente Juscelino Kubitschek.

The AVS was established to improve the transition between takeoff procedures and radar vectoring, providing greater operational safety, smoother air traffic flow, and compliance with the criteria established in CIRCEA 100-120.

The implementation of the AVS represents an important advance in the structuring of national airspace and will significantly contribute to the efficiency of operations in the Brasília TMA.

3. Suggested actions

3.1 The Meeting is invited to:

- a) Take note and review the information of this Working Paper;
- b) review any questions about the AVS Project; and
- c) discuss and analyze whether implementation of the AVS is necessary in each state.

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