



# MINIMUM SECTOR ALTITUDE

## 1. Introduction

The Minimum Sector Altitude (MSA) is the lowest altitude which may be used which will provide a minimum clearance of 300 m (1 000 ft) above all objects located in the area contained within a sector of a circle of 46 km (25 NM) radius centered on a radio navigation aid .

Sometimes the MSA can be taken as Minimum Safe Altitude. Minimum Safe Altitude is a generic expression, used in various cases to denote an altitude below which it is unsafe to fly owing to presence of terrain or obstacles. An ICAO definition of a term "minimum safe altitude" as such does not exist.

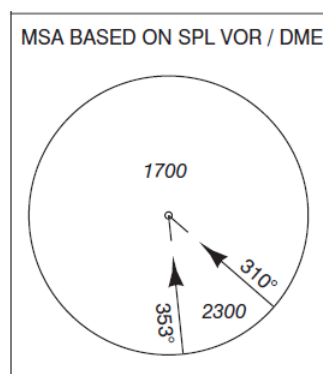
The Minimum Sector Altitude (MSA) is found on the plan view of:

- Instrument Approach Procedure (IAP),
- Standard Instrument Departure (SID)
- Standard Terminal Arrival Route (STAR) charts.

## 2. Construction

The MSA element can contain:

- The reference point (VOR, NDB, DME...)
- One or several sectors
- A graphical depiction of the altitude (expressed in mean sea level MSL) that allows adequate vertical clearance from nearby terrain and man-made obstacles, allowing proper navigational functions.



Example of MSA extracted from charts

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### 3. Application

As a pilot, when flying IFR in a terminal area, except when following vectoring instructions from the air traffic controller or when following the altitude constraints of the published route followed, you must use this MSA value that ensures you will fly away from any obstacles.

If you are an air traffic controller, when handling an aircraft outside a published route in a terminal area, you must take the MSA altitude restrictions into account, except if some MRVA (minimum radar vectoring altitude) are published.

An aircraft can be below MSA altitude only if it follows altitude constraints published on charts for the route used or, if a lower altitude is given from an active air traffic controller compatible with published MRVA charts for the flied sector.

### 4. Diagram explanation

Here is the construction of the MSA:

- Minimum sector altitude is depicted as a circle.
- The center of the circle is a radio navigation aid: this is the reference for the pilot.
- The MSA applicable zone is 25 NM around this reference.
- In each sector, the altitude (expressed in mean sea level MSL) value is written.
- The sectors are created using magnetic inbound track to the beacon.

As some airfields are complex, the MSA is not constant in every direction and many sectors can be created in order to not set a very high altitude in all directions.

#### 4.1. Example n°1

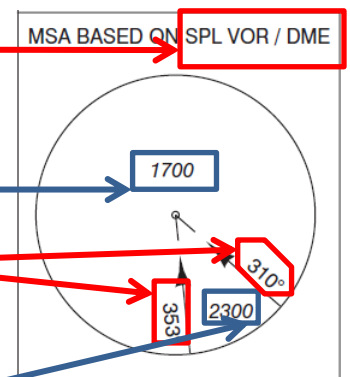
The radio navigation aid is **SPL** and its type is **VOR/DME**

The minimum sector altitude is **1700ft.**

There is one sector with different altitude (other than 1700ft, the previous one).

This sector is between the **track 310° to 353°** inbound the navigation aid.

In this sector, the minimum sector altitude is different and it is **2300ft.**



The applicable distance of these minimum sector altitudes is **25NM** (definition).

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## 4.2. Example n°2 – Sub-sector

In some airfields, there are sub-sectors depending of the distance.

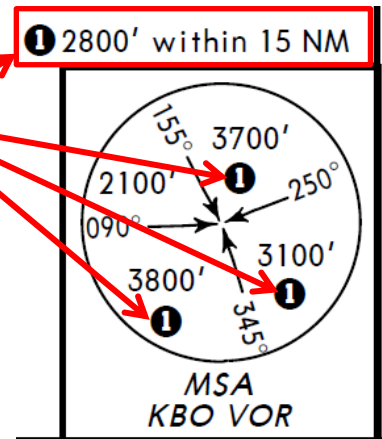
In the example on the right, in 3 sectors, there is a special mark ①.

Reading the ① legend, it is defined that the minimum sector altitude is lowered to 2800ft within 15NM from the radio navigation aid KBO.

Between 15NM and 25NM, the altitude written on the sector is the minimum sector altitude to take into account.

Be careful, that ① restriction applies only to 3 of the 4 sectors.

Be aware that this sub-sector is not applicable to the 2100 ft sector between 090° and 155°.



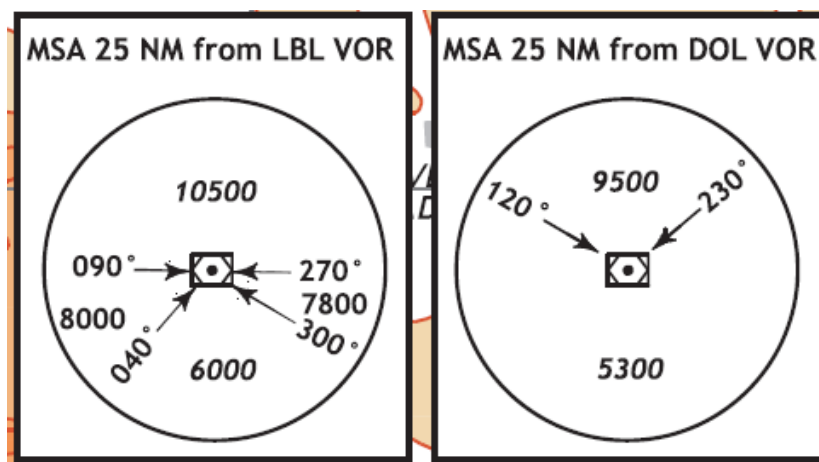
The applicable distance of these minimum sector altitudes is **25NM** (definition).

## 4.3. Example n°3 – Dual MSA constraints

Some airfields have several radio navigation aids in different sectors.

Due to mountainous area, there are some airports which have 2 MSA constraints published for them, one with each radio navigation aid.

In function of your flight sector and/or the radio navigation aid taken, you must select the right MSA diagram.



Example of 2 MSA diagrams for LJJL airfield.

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