



NAVIGATION INSTRUMENTATION - MARKER

1. Introduction

A marker beacon is a VFR radio transmitter which radiates vertically a distinctive pattern for providing position information to aircraft.

From the 1930s until the 1950s, markers were used extensively along airways to provide to aircraft an indication of its position.

They are now gradually being deactivated as RNAV navigation and GPS instrument have made marker beacons obsolete.

Nowadays, marker beacons are still used in some airfield in conjunction with an instrument landing system (ILS), to give pilots a means to verify its position.

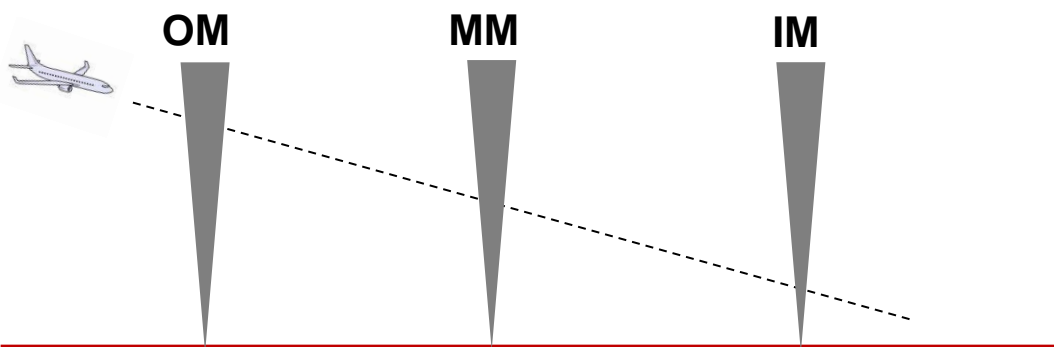
2. Ground equipment

2.1. Marker type

There are three types of marker beacons:

- Outer Marker (OM)
- Middle Marker (MM)
- Inner Marker (IM)

In the final approach path, the marker are overflown with the same order.



Note: when marker beacons are available on the airfield, the presence of all marker beacons is not guaranteed. Some airfield can have only one or two marker beacons.

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2.2. Technical review

Each marker beacon station on ground transmit a amplitude modulated (AM) signal on VHF 75MHz frequency using low power (about 1 to 5W only).

All marker beacon use a sinusoid signal in a certain frequency in order to make distinction between them:

- 400Hz sinusoid for Outer Marker
- 1300Hz sinusoid for Middle Marker
- 3000Hz sinusoid for Inner Marker

The Outer Marker is situated on the same course/track as the localizer and the runway centreline before the runway threshold. It is typically located about 1 NM inside the point where the glideslope intercepts the intermediate altitude.

The Middle Marker works on the same principle as an outer marker. It is normally positioned 0.5 to 0.8NM before the runway threshold.

The Inner Marker works on the same principle as an outer and middle marker. It is normally positioned 75m to 450m from the threshold of the runway on some ILS approach systems.



Ground marker beacon station

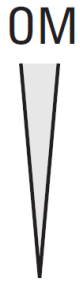
Marker antenna is highly directional, and is pointed straight up.

The valid signal area is a 730m x 1,280m ellipse. When the aircraft passes over the outer marker antenna, its marker beacon receiver detects the signal

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3. Charts Representation

Marker representation on chart can be one of these examples showed below:



Marke Vertical Representation



Marker Horizontal Representation



Elliptical Pattern

Bone Pattern

Fan Marker and NDB

Carte Jeppesen
Marker Vertical Representation



Carte Jeppesen
Marker Horizontal Representation

4. On-Board equipment

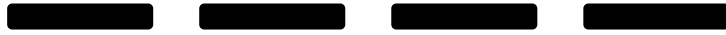
The on board maker equipment is located on cockpit and should show the 3 coloured letters “OMI” or 3 coloured lamps (blue, amber, white):



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4.1. Outer marker

When the aircraft passes over the outer marker antenna, its marker beacon receiver detects the signal. The system gives the pilot a visual - blinking blue outer marker light - and aural -continuous series of 400Hz audio tone Morse code-like 'dashes' sequence.



In the United States, the outer marker can be combined with a non-directional beacon (NDB) to make a Locator Outer Marker (LOM). An LOM is a navigation aid used as part of an instrument landing system (ILS) instrument approach for aircraft. Aircraft can navigate directly to the location using the NDB as well as be alerted when they fly over it by the beacon.

LOMs are identified by two-letter Morse code modulated at 1020 Hz. LOMs use the first two letters of the parent ILS's identification.

4.2. Middle Marker

When the aircraft passes over the middle marker antenna, its marker beacon receiver detects the signal. The system gives the pilot a visual - blinking amber middle marker light - and aural - continuous series of 1300Hz audio tone Morse code-like a repetitive one 'dot' and one 'dash' sequence.



4.3. Inner Marker

When the aircraft passes over the inner marker antenna, its marker beacon receiver detects the signal. The system gives the pilot a visual - blinking white inner marker light - and aural -continuous series of 3000Hz audio tone Morse code-like 'dot' sequence.



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