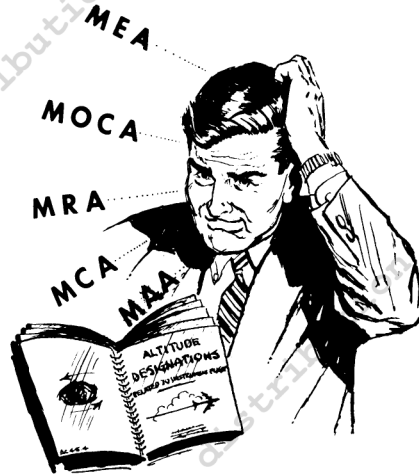


DEPARTMENT OF TRANSPORTATION  
Federal Aviation Administration  
IFR PILOT EXAM-O-GRAM\* NO. 8

IFR ALTITUDES



Applicants for the Instrument Rating Written Test should expect to be examined on various altitude designations related to instrument flight. Analyses of responses to current written examinations indicate that doubt exists as to the meaning of these designations and why they are specified.

GENERAL

IFR altitudes are established by the Federal Aviation Administration for instrument flight along Federal airways and off-airway routes in controlled airspace. They are established after consideration of:

1. obstruction clearance criteria;
2. navigation signal coverage for accurate navigation; and
3. two-way radio communications.

Obstruction clearance is normally at least 1,000 feet (2,000 feet in designated mountainous areas) above the highest terrain or obstruction 4 miles either side of the centerline of the airway or route.

For instrument flight along routes not in controlled airspace and for which no specific minimum IFR altitude has been established, it is the pilot's responsibility to select altitudes which comply with obstruction clearance requirements.

DEFINITIONS

1. MEA (Minimum Enroute Altitude) is the minimum altitude in effect between radio fixes which
  - a. meets obstruction clearance requirements;
  - b. assures acceptable navigational signal coverage for accurate navigation; and
  - c. assures two-way radio communication.

Remember that the MEA is often higher than that required for obstruction clearance only. This is to assure reception of navigation and communications signals and to provide additional airspace for VFR operations below the airway during periods of less than 3 miles forward visibility. Remember also that the MEA is sometimes different for opposite directions along an airway due to rising or lowering terrain.

2. MOCA (Minimum Obstruction Clearance Altitude) is the specified minimum altitude in effect between radio fixes which
  - a. meets obstruction clearance requirements; and
  - b. assures acceptable navigational signal coverage only within 22 nautical miles of the VOR.

A MOCA is shown (on National Ocean Survey IFR charts) directly below the MEA and is identified by an asterisk. The designation of a MOCA indicates that a higher MEA has been established for that particular airway or segment because of signal reception requirements. When no MOCA is shown on the chart, the MEA and MOCA are considered to be the same.

Remember that a flight altitude at the MOCA may be requested by a pilot, or assigned by ATC for traffic control purposes, for use within 22 nautical miles of the VOR. The MOCA may be assigned beyond 22 nautical miles provided certain special conditions exist. Beyond 22 nautical miles, the MOCA assures only obstruction clearance.

3. MRA (Minimum Reception Altitude) is the lowest altitude required to receive adequate signals to determine specific fixes. Reception of signals from a radio facility located off the airway being flown may be inadequate at the designated MEA, in which case, an MRA is designated for the fix. A DME fix arrow ( $\rightarrow$  or  $\curvearrowright$ ) at a fix where an MRA is given, indicates that the fix may also be identified with DME. If DME is used to identify the fix, the MRA does not apply since it is not necessary to receive the facility off the airway.
4. MCA (Minimum Crossing Altitude) is the minimum altitude at which certain radio facilities or intersections must be crossed in specified directions of flight. If a normal climb, commenced immediately after passing a fix beyond which a higher MEA applies, would not assure adequate obstruction clearance, an MCA is specified. The normal climb criteria used for establishing an MCA are:

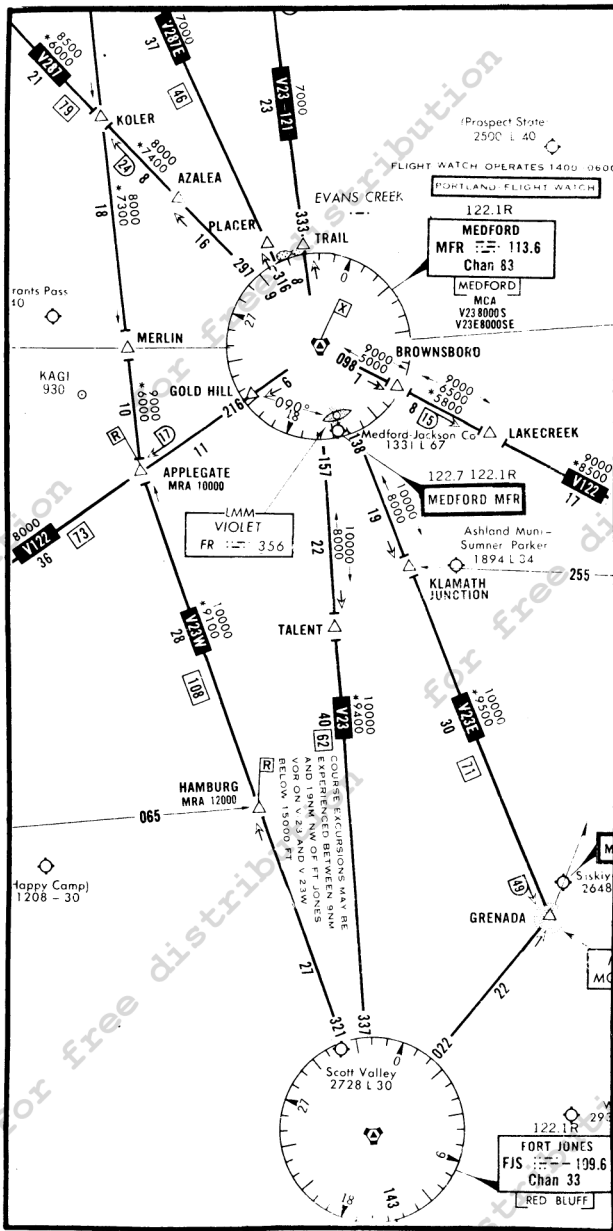
Sea level through 5,000 feet	- - - - -	150 feet per nautical mile
5,000 feet through 10,000 feet	- - - - -	120 feet per nautical mile
10,000 feet and over	- - - - -	100 feet per nautical mile

5. MAA (Maximum Authorized Altitude) is the highest altitude authorized for instrument flight for a particular segment of an airway or route for which an MEA has been designated in FAR Part 95. For example, a segment of a Jet Route on a High Altitude Enroute Chart might have an MAA designated due to interference from VOR navigation signals on the same frequency at altitudes above the MAA. MAAs are designated on some Low Altitude Enroute Charts due to military requirements above that altitude.

TRY THIS TEST. Correct answers are shown on the back page.

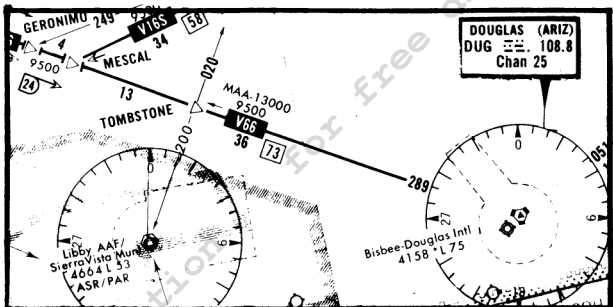
1. The MEA assures acceptable navigational signals for accurate navigation, \_\_\_\_\_.
2. If the MOCA does not assure reliable navigation signal coverage between fixes, a higher altitude is designated as the \_\_\_\_\_.
3. MRAs are designated at certain intersections where aircraft position cannot be determined accurately at the \_\_\_\_\_.
4. The lowest altitude for crossing a radio fix beyond which a higher minimum applies (if no minimum crossing altitude is specified) is the \_\_\_\_\_.
5. Different MEAs for opposite directions of flight along an airway segment are sometimes specified due to \_\_\_\_\_.
6. Acceptable navigational signal coverage at the MOCA is assured for a distance from the VOR of only \_\_\_\_\_.
7. ATC may assign the MOCA when certain special conditions exist and when within \_\_\_\_\_.
8. Why would ATC assign the MOCA? \_\_\_\_\_, \_\_\_\_\_.

9. For flight outside controlled airspace, the responsibility for determining the minimum IFR altitude rests with the \_\_\_\_\_.
10. The minimum IFR altitude for "VFR Conditions On Top" operation, except in an emergency, is the \_\_\_\_\_.



USE REPRODUCED PORTION OF ENROUTE LOW ALTITUDE CHART L-1, TO THE LEFT, FOR ANSWERING QUESTIONS 11 THROUGH 19.

11. A southbound flight on V23 must cross Medford VORTAC at or above \_\_\_\_\_.
12. The MEA between BROWNSBORO and LAKECREEK (southeast of Medford) is \_\_\_\_\_ and \_\_\_\_\_.
13. The minimum altitude for a flight from LAKECREEK to BROWNSBORO on V122 with assurance of acceptable navigational signals is \_\_\_\_\_.
14. A flight on V122 may not be able to determine APPLEGATE (southwest of Medford) at an altitude below \_\_\_\_\_ if not equipped with DME.
15. The MOCA from Fort Jones VORTAC to HAMBURG on V23W is \_\_\_\_\_.
16. A northwest flight from Fort Jones on V23W may not be able to determine HAMBURG at an altitude below \_\_\_\_\_.
17. What equipment is required to identify TALENT when flying north from Fort Jones on V23? \_\_\_\_\_
18. What radio instrument indications may exist when flying north from Fort Jones on V23 or V23W at an altitude less than 15,000 feet? \_\_\_\_\_



19. What is the MEA from GRENADA to Fort Jones VORTAC? \_\_\_\_\_

USE PORTION OF CHART TO THE LEFT FOR ANSWERING QUESTION 20.

20. What is the maximum altitude for a flight on V66 between Douglas VORTAC and Mescal? \_\_\_\_\_

ANSWERS TO QUESTIONS:

1. obstruction clearance requirements, and two-way radio communication.
2. MEA .
3. MEA .
4. MEA at which the fix is approached.
5. rising or lowering terrain.
6. 22 NM .
7. 22 NM of a VOR.
8. For traffic control purposes, or at pilot's request.
9. pilot.
10. MEA, or published MOCA within 22 NM of a VOR.
11. 8,000 feet.
12. 6,500 feet northwest-bound and 9,000 feet southeast-bound.
13. 5,800 feet.
14. 10,000 feet.
15. 9,100 feet.
16. 10,000 feet (can use DME).
17. DME.
18. Course excursions may be experienced between 9NM and 19 NM northwest from Fort Jones.
19. 10,000 feet.
20. 13,000 feet.

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