

IFR EN ROUTE

MINIMUM IFR ALTITUDES

1. Minimum reception altitude (**MRA**) is the lowest altitude at which an intersection can be determined.
2. Minimum obstruction clearance altitude (**MOCA**) assures acceptable navigational signal coverage only within 22 NM (25 SM) of a VOR.
 - a. ATC may assign the MOCA as an assigned altitude when certain special conditions exist and when the airplane is within 22 NM of a VOR.
3. Minimum en route altitude (**MEA**) is the lowest published altitude between radio fixes which assures acceptable navigational signal coverage and meets obstacle clearance requirements between those fixes.
 - a. It is the minimum altitude to cross a fix beyond which a higher minimum applies.
4. MOCA and all other minimum IFR altitudes guarantee obstruction clearance in nonmountainous areas by providing at least 1,000 ft. of vertical distance from the highest obstruction 4 NM either side of the center of the airway to be flown.
 - a. In mountainous areas, 2,000 ft. of vertical distance is provided.
5. Routes designed to serve aircraft operating from 18,000 ft. MSL up to and including FL 450 are referred to as jet routes or "J" routes.

VFR-ON-TOP

1. VFR-on-top operations can be conducted only after a pilot has received a VFR-on-top clearance to operate in VFR conditions.

NOTE: The pilot must request a VFR-on-top clearance.
2. VFR-on-top must comply with the appropriate VFR cruising altitudes as prescribed in FAR 91.159, which is based upon magnetic courses.
 - a. 000° through 179° -- odd 1,000 ft. plus 500 ft.
 - b. 180° through 359° -- even 1,000 ft. plus 500 ft.
3. VFR-on-top must be conducted at an altitude above the minimum IFR altitude.
4. VFR-on-top is conducted such that both VFR and IFR rules apply.
5. A clearance "to VFR-on-top" is authorization to fly through cloud layers to VFR conditions on top.
6. VFR-on-top operations are specifically prohibited in Class A airspace.
7. In VFR-on-top clearances, you must provide the same reports to ATC that are required for any other IFR flight.

IFR EN ROUTE CHART INTERPRETATION

1. The FAA knowledge test questions in this module are wide ranging. They are best prepared for by studying the legends for En Route Low-Altitude Charts.
 - a. Legend 24 is presented below.
 - b. Legends 22 and 23 are presented in color on pages 428 and 429.
 - c. Some questions require application of previously covered topics such as interpretation of VOR indicators.

MILITARY TRAINING ROUTES (MTRs)

MTRs 5 NM or less both sides of centerline

IR-000 →

VR-000 →

MTRs greater than 5 NM either
or both sides of centerline

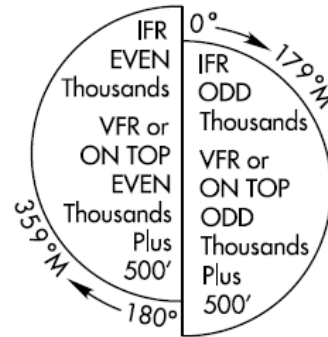
IR-000 →

VR-000 →

Arrow indicates direction of route

See MTR tabs for altitude range information
All IR and VR MTRs are shown except
those VRs at or below 1500' AGL
CAUTION: Inset charts do not depict MTRs

CRUISING ALTITUDES - U.S. IFR within controlled airspace as assigned by ATC



VFR above 3000' AGL
unless otherwise authorized by ATC
IFR outside controlled airspace
All courses are magnetic