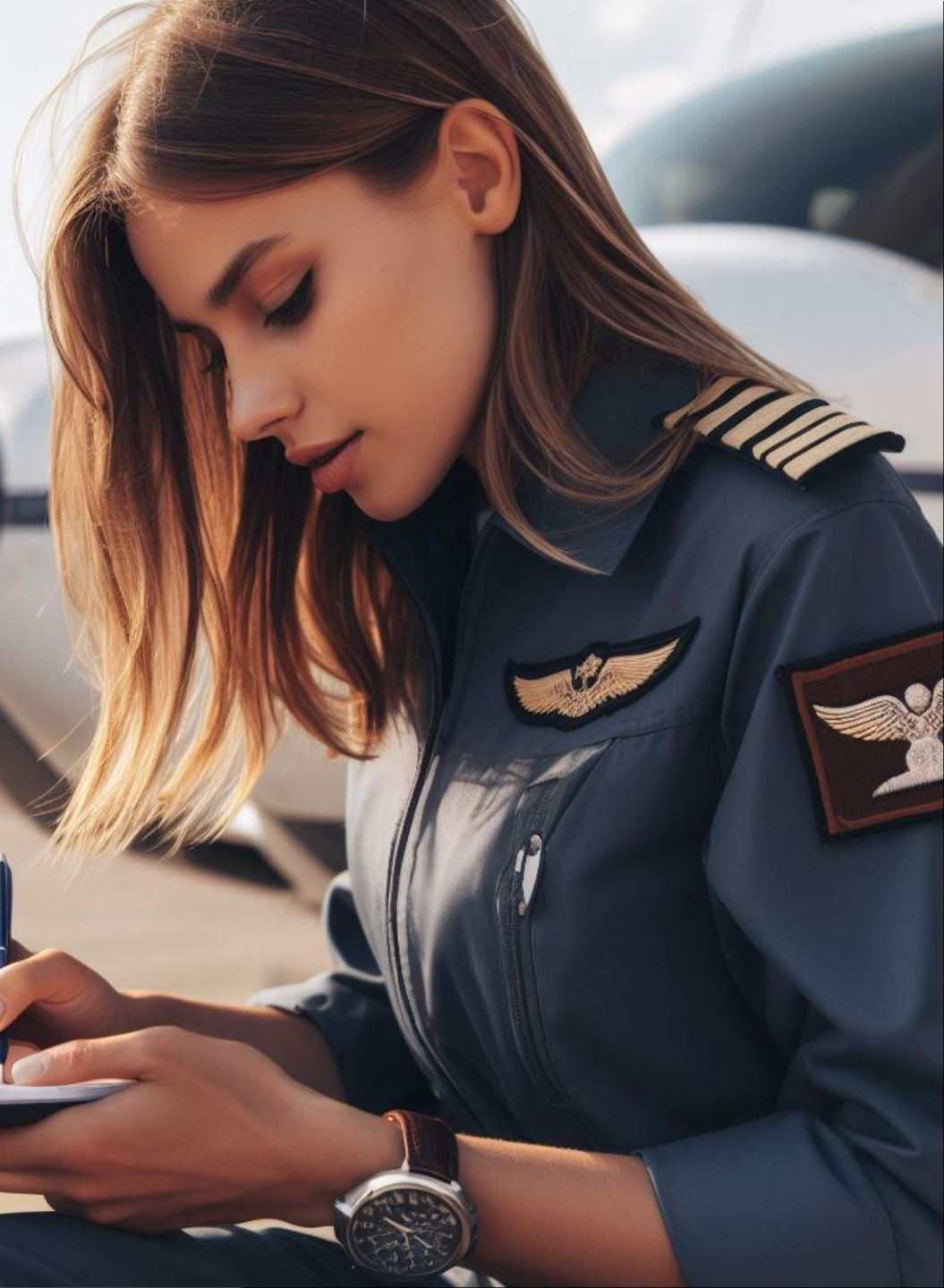


IFR Cross country

Flight Planning



Battle Plan

- Introduction
- Cross Country Flight Planning
- Q&A

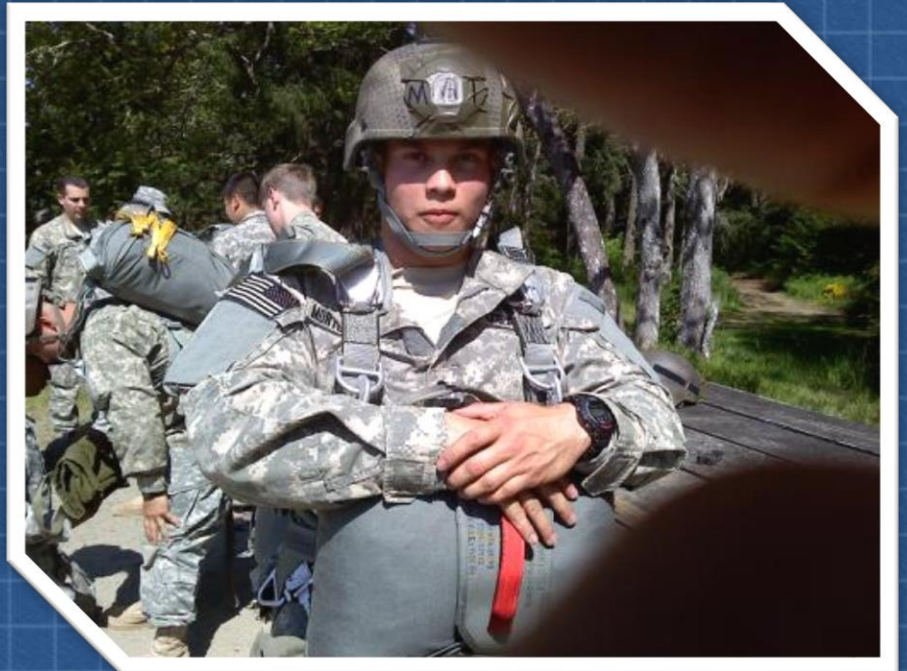
EMERALD SQUADRON AVIATION



EARN YOUR WINGS

LEARN TO FLY | GROUND SCHOOL
| FLIGHT SCHOOL

EMERALDSQUADRONAVIATION.COM



Cross Country Flight Planning

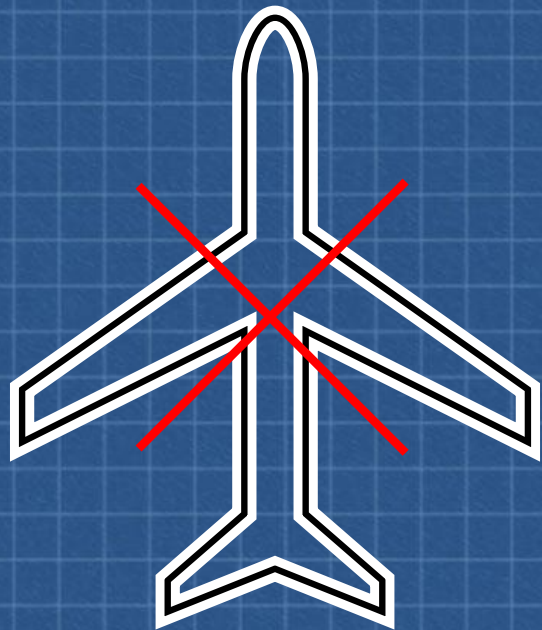
- Objective:
 - Develop knowledge of elements related to developing an IFR Cross Country Flight Plan
- Key Elements:
 - Applicable IFR Regulations
 - Choosing a course/altitude
 - Filing a Flight Plan

Elements

- IFR Regulatory requirements
- Estimated Time En Route and Fuel Requirements
- En Route Charts, DPS, STARs & Instrument Approach Charts
- NOTAM information
- IFR Flight Plan
- Control sequence
- GPS & RAIM
- VOR Minimum Operating Network
- Airframe Icing

Why do we care?

- You can't fly IFR without it!



IFR Regulatory Requirements

- 91.103
 - NWKRAFT
- NOTAM
- Weather
- Known ATC Delays
- Runways
- Alternates – 91.169
 - 1, 2, 3 Rule
 - Precision vs non-precision, VFR
- Fuel – 91.167
 - Destination + Alternate + 45 min at Cruise
- Takeoff and Landing distance



IFR Regulatory Requirements

- IFR Departure – 91.173
 - You may not operate in controlled airspace under IFR unless you have:
 - Filed an IFR Flight plan
 - Received an appropriate ATC Clearance
 - Takeoff and landing under IFR
 - 0/0 Takeoffs are legal under part 91
 - Recommend you use published approach mins as a guideline
- IFR Enroute
 - Class A – 91.135 IFR Flight plan and clearance required
 - Class B – AIM 3-2-3(b)(5) VOR or TACAN Required



IFR Regulatory Requirements

- IFR Enroute
 - Mins – 91.177 (except takeoff and landing)
 - MEA/MOCA
 - Approach Procedures
 - Otherwise
 - Mountainous: 2,000' above the highest obstacle within 4nm
 - Non-mountainous: 1,000' above the highest obstacle within 4nm
 - You may fly below MEA but not below a MOCA within 22 NM of VOR
- IFR cruising altitudes – 91.179:
 - Magnetic course 0° – 179°: Any ODD thousand-foot MSL altitude
 - Magnetic course 180° – 359°: Any EVEN thousand-foot MSL altitude



IFR Regulatory Requirements



- Course to be flown – 91.181
 - You must:
 - Be on an ATS route along the centerline of the airway
 - On any other route, along the direct course between nav aids or fixes defining that route
 - Doesn't prohibit maneuvering to pass well clear of other aircraft/clearing flight path
- IFR Communications – 91.183
 - You must report:
 - Time/Altitude passing each designated reporting point, or any points specified by ATC
 - Except while under radar contact: report only those points specifically requested by ATC
 - Any un-forecasted weather
 - Anything related to the safety of the flight
- Restricted area
 - If not active, ATC will allow IFR traffic to operate without issuing a specific clearance to do so
 - If active, ATC will issue a clearance to avoid the airspace, unless ATC has permission to allow aircraft to enter the restricted airspace
- MOA – may be cleared through if IFR separation can be provided

Time En Route and Fuel Requirements

- Choose and record your route on an IFR Nav Log
 - Departure procedure
 - En Route Fixes
 - Preferred routing
 - STARS, IAPS, IAFs
 - List Defining nav fixes/waypoints for each leg
 - Record magnetic courses and distances (each leg and total)
- Choose operating altitude or flight level
 - Min IFR altitude
 - Airplane Performance
 - Weather – icing!
 - Duration of flight
 - Oxygen



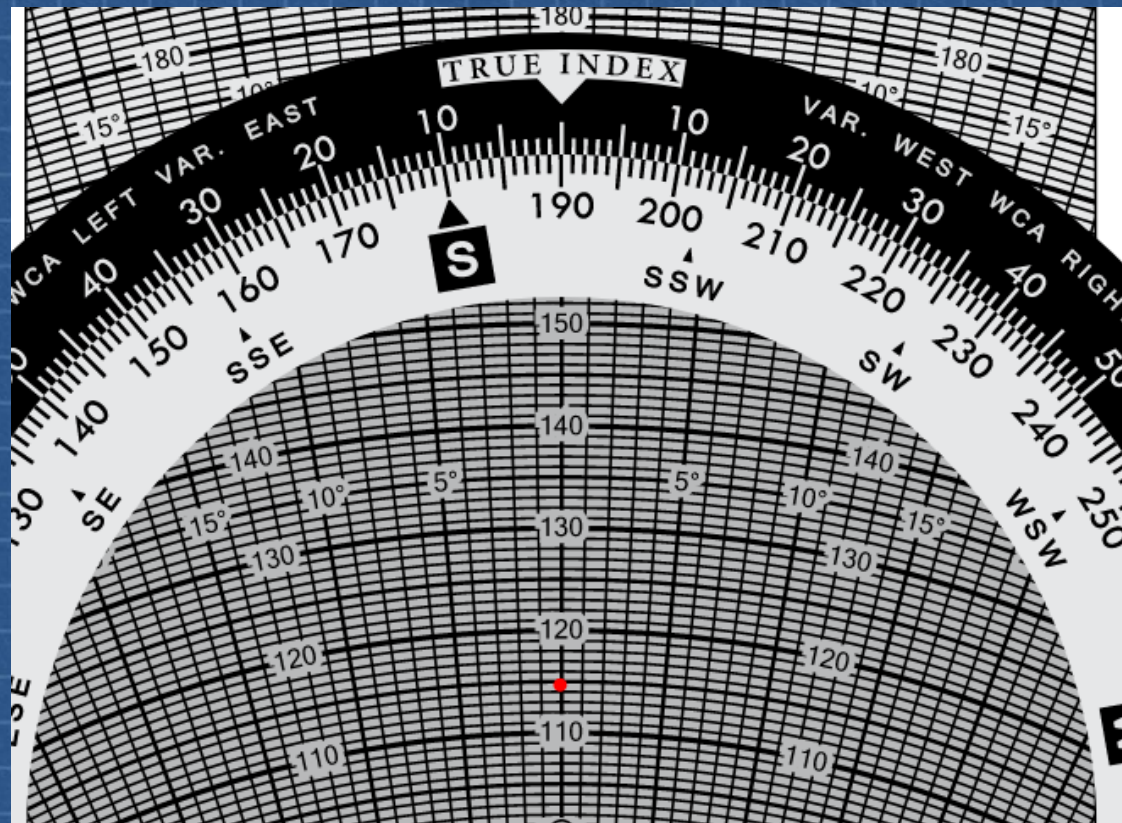
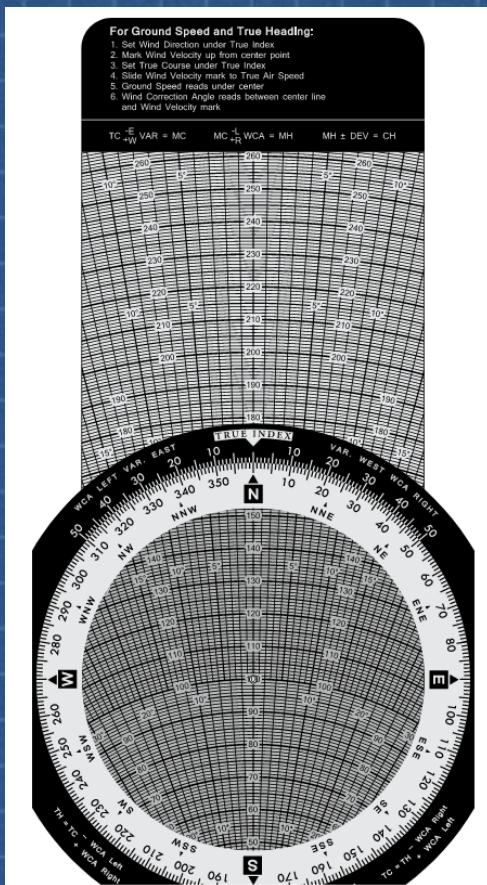
Time En Route and Fuel Requirements

- Choose power setting
- Use TAS/wind data to determine GS, ETE
 - Time, fuel, distance to climb, fuel for engine start, taxi, takeoff
 - Cruise
 - Alternate
 - Legal mins
- Enroute Charts, DPS, STARs, and Instrument approach charts
 - Current
 - NOTAMS
 - FAA Chart user's guide



Time En Route and Fuel Requirements

- E6B Wind Calculation



NOTAM

- Notices to Air Missions
 - NOTAM D
 - Nav facilities and public use aerodromes
 - FDC NOTAM
 - Regulatory information
 - IAP changes, laser, TFRS
 - Center area NOTAM
 - Security NOTAM
 - International NOTAMS
 - ICAO format
 - Not included in weather brief unless specifically requested
 - Military
 - Domestic
 - GPS NOTAMS



IFR Flight plan

- Must file and receive clearance before entering controlled airspace under IFR

FlightService Home Dashboard Map Wx Charts Plan & Brief Airports Account Features Links Help Logout

Welcome MONTES DE OCA Wed Oct 18 08:36:56 PDT | 15:36:56 Z

Draft ICAO Domestic

Recent Flight Plans Favorite Flight Plans Save as Favorite

Notice: Per FAA Guidance, all civilian flight plans must be filed as ICAO flight plans.

* Click field names for help

Aircraft ID N3538V	Flight Rule IFR	Flight Type G	No. of Aircraft 1	Aircraft Type C150	Wake Turbulence L
Aircraft Equipment SD	Departure KPAE Sunrise: 0733 PDT Sunset: 1815 PDT	Airport Info Area Brief	Departure Date & Time 10/18/2023 0900 PDT 1-120 Apply Minutes From Now		Evaluate Cruising Speed N0100
Level A090	Optimize	Surveillance Equipment SB2	Route of Flight VAMPS V2 BEEZR Map Plan		
Other Information (Optional)			Destination KELN Sunrise: 0724 PDT Sunset: 1809 PDT	Airport Info Area Brief	Est Elapsed Time 0043 Calculate
Alternate 1 (Optional) KBFI			Airport Info Area Brief		
Alternate 2 (Optional)	Airport Info Area Brief	Fuel Endurance 0500	Persons on Board 1	Aircraft Color & Markings (Optional) W	
Survival Equipment <input type="checkbox"/> Polar <input type="checkbox"/> Desert <input type="checkbox"/> Maritime <input type="checkbox"/> Jungle		Jackets <input type="checkbox"/> Light <input type="checkbox"/> Fluorescent <input type="checkbox"/> UHF <input type="checkbox"/> VHF	Dinghies (Optional) Number Capacity Color Covered		Pilot Contact Information MONTY, (504)867-5309
Supplemental Remarks (Optional)			Pilot in Command (Optional)		Emergency Radios <input type="checkbox"/> UHF <input type="checkbox"/> VHF <input type="checkbox"/> ELBA

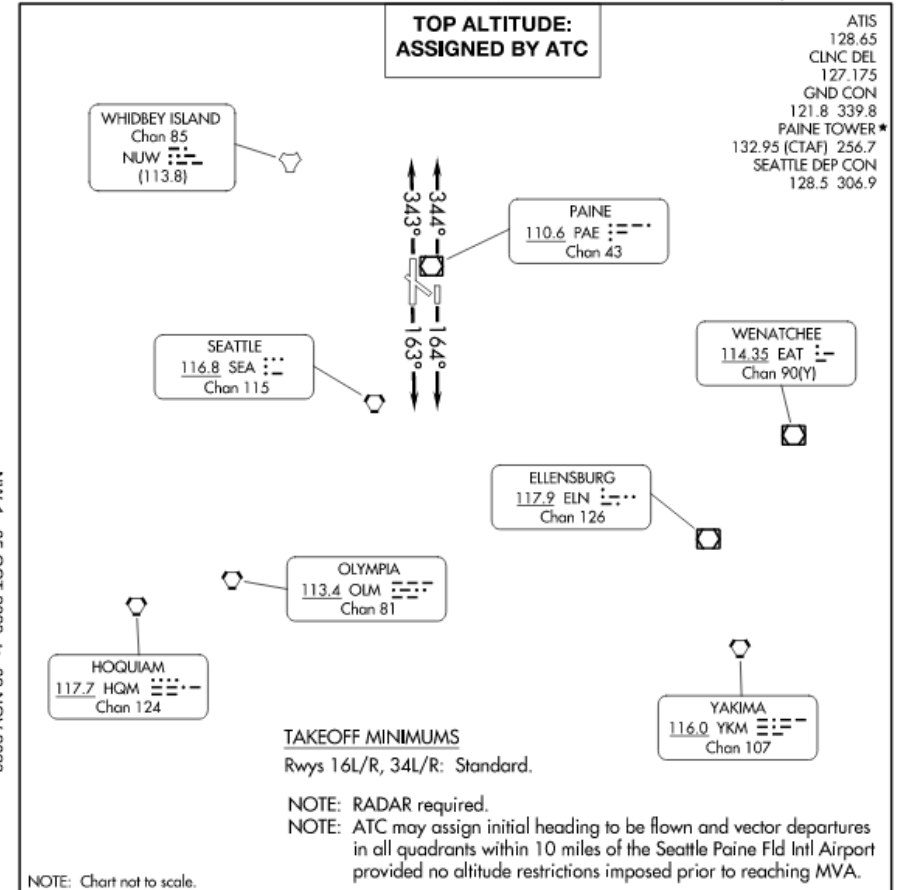
Route Brief File NavLog Return Flight Plan Next Leg Clear

Control Sequence

- Who we talk to in order:
- FSS
 - Wx brief and file
- ATIS
- Clearance Delivery
- Ground
- Tower
- Departure
- ARTCC – Air route traffic control center
- ATIS
- Approach
- Tower

(PAINE6.PAINE) 23278
PAINE SIX DEPARTURE

AL-142 (FAA) SEATTLE PAINE FLD INTL (PAE)
EVERETT, WASHINGTON



NW-1, 05 OCT 2023 to 02 NOV 2023

NW-1, 05 OCT 2023 to 02 NOV 2023

DEPARTURE ROUTE DESCRIPTION

TAKEOFF RUNWAY 16L: Climb heading 164° . . .
 TAKEOFF RUNWAY 16R: Climb heading 163° . . .
 TAKEOFF RUNWAY 34L: Climb heading 343° . . .
 TAKEOFF RUNWAY 34R: Climb heading 344° . . .

. . . or as assigned for RADAR vectors to join assigned route. Maintain assigned altitude: expect filed altitude flight level five minutes after departure.

LOST COMMUNICATIONS: If not in contact with Seattle approach upon reaching 2000, continue climb to assigned altitude and proceed direct to PAE VOR/DME. Thence via assigned route.

PAINE SIX DEPARTURE
(PAINE6.PAINE) 08NOV18

EVERETT, WASHINGTON
SEATTLE PAINE FLD INTL (PAE)

GPS & RAIM

- RAIM
 - Receiver autonomous integrity monitoring
 - Without it, you cannot trust the signal
 - 5 satellites to detect error, or 4 plus a barometric altimeter input (baro-aiding)
 - Some systems can isolate and remove a bad signal with a 6th satellite
 - Must have other forms of navigation if GPS signal is lost.
 - Active monitoring is not required if GPS receiver uses RAIM

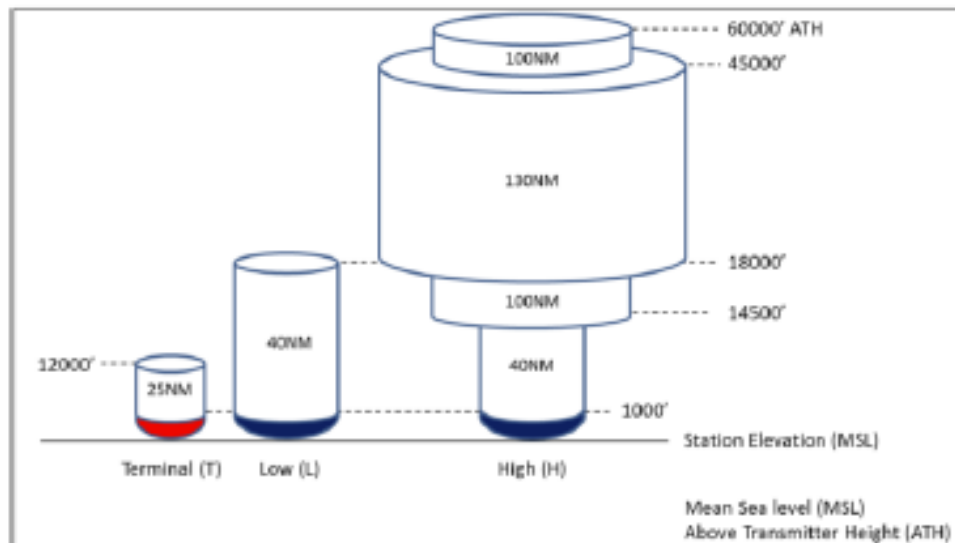


VOR Minimum Operating Network

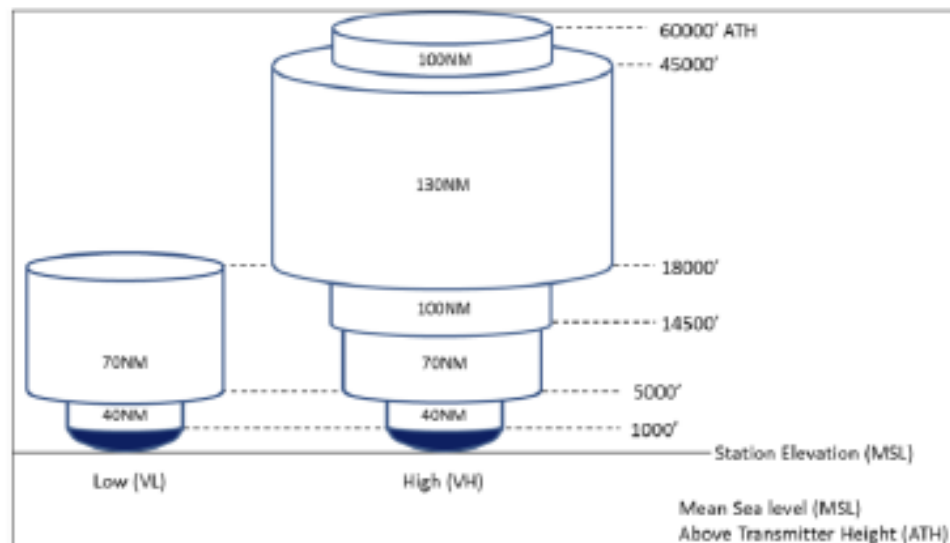
- NAS transitioning to performance based navigation
 - 896 VOR stations to 590 by 2030
 - 2 new larger service volumes will still enable near continuous nav above 5000
 - Coverage will exist lower but may not be guaranteed
- Non-GPS navigation
 - Pilots can use VOR to reach a MON airport and fly a conventional approach
 - ILS, LOC, VOR
 - MON airport assured within 100NM
 - A key concept of the MON is to ensure that an aircraft will always be within 100 NM of an airport with an instrument approach that is not dependent on GPS.
- New VOR service volumes
 - Low: 70nm from 500 to 18000
 - High: 70nm from 5000 to 14,500



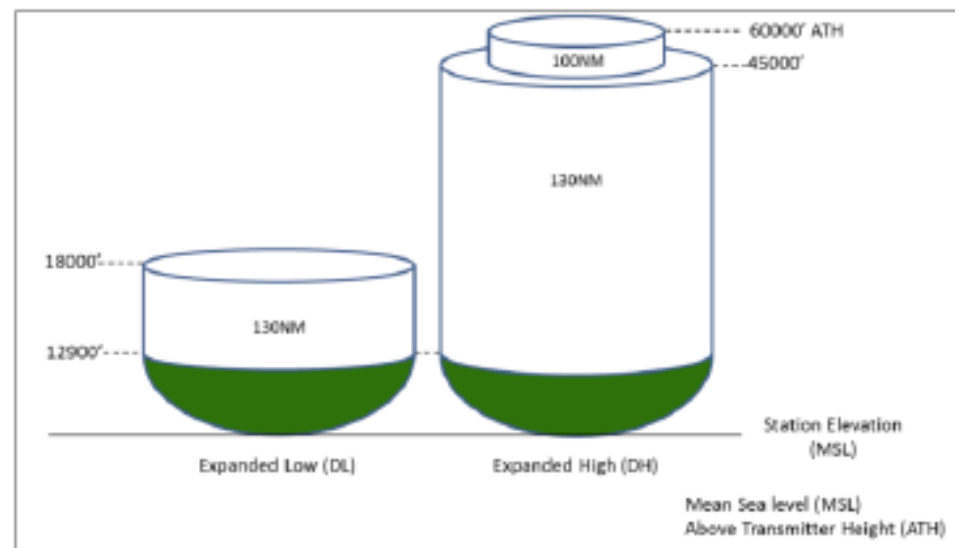
LEGACY SERVICE VOLUMES



NEW MON SERVICE VOLUMES



D. New DME Service Volumes



Airframe Icing

- Recognize
 - Early detection is critical
 - Visible moisture and near freezing temperature (-10° to $+2^{\circ}$)
 - Windscreen
 - Wings
- Why?
 - Adverse effects!
 - Reduced thrust and lift
 - Increased drag and weight
 - Increased stall speed
 - $\frac{1}{2}$ inch of ice can reduce lift by 50% and increase drag by 50%
- What to do?
 - Activate deice or anti ice equipment (manufacture's guidelines)
 - Leave the area
 - Get out of precipitation
 - Seek warmer altitude
 - Land at nearest suitable airport



Conclusion

- You must be on an IFR Flight plan to operate in controlled airspace
- Safe and smart to plan appropriately
- VORs are cool
- Ice is bad

Q&A