Area of Operation **V** - Task **B**

Compliance with Departure, Enroute and Arrival Procedures

Key References:
- Instrument Flying Handbook
- Instrument Procedures Handbook
- AIM

Content

1. Introduction

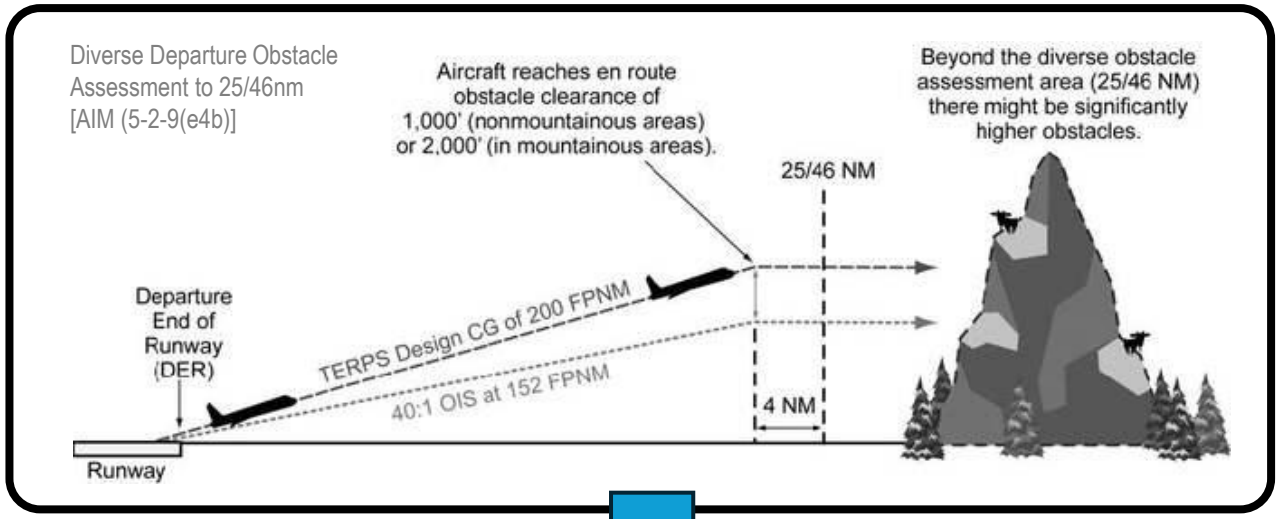
- **What**: Overview of the departure, enroute, and arrival procedures, as well as the pilot's responsibilities
- **Why**: Departures, STARs and Enroute procedures differ from VFR procedures, and knowledge of th
- **Definitions**:
  - Departure: Preplanned instrument procedures which provide obstruction clearance from the terminal area to the appropriate enroute structure ➔ *Details in* [AIM 5-2]
    - ✓ There are several types of Departure: SID, ODP, DVA, VCOA

  - Enroute: Segment of flight from the termination point of a departure procedure to the origination point of an arrival procedure ➔ *Details in* [AIM 5-3]

  - Arrival (STAR): Simplify clearance procedures and facilitate transition between enroute and Instrument Approach procedures ➔ Details in [AIM 5-4]

2. Departure Procedures | ODP & DVA

- **Diverse Airport Assessment**



- **Diverse Departure:**
  - Airport w/ IAP and no ODP: passed the Diverse Airport assessment, and aircraft can depart IFR w/ the standard profile: 35ft → 400ft → 200ft/nm
  - Diverse Vector Area (DVA): ATC provides vectors during climb while meeting the diverse departure criteria in substitution of an ODP/SID [AIM 5-2-9(b)]

- **ODP (Obstacle Departure Procedure)**
  - Published when airport doesn't meet the Diverse Departure criteria. Ensures obstacle clearance
  - May be flown without ATC clearance (unless if ATC specifies a different DP)
  - Printed textually, or graphically w/ the term "OBSTACLE" to differentiate from SID

- **Pilot's Responsibilities Prior to Departing IFR**

Standard Departure Profile [AIM 5-2-9(e)]

Unless specified otherwise, obstacle clearance for all departures req the pilot to:

- Cross the departure end of runway at or above 35ft AGL, climb to 400ft AGL before turning, and maintain climb of at least 200ft/nm to the min. IFR altitude
- **FPM = FPNM x (GS/60)**

Pilot's Responsibilities prior to departing IFR [AIM 5-2-9(h1)]

- Consider the type of terrain and other obstacles on or in the vicinity of the airport
- Determine whether an ODP is available
- Determine if can maintain obstacle avoidance visually or if needs to fly the ODP
- Consider the effect of degraded climb performance or engine loss
- Determine if DVA is published and whether the aircraft can meet climb gradient (advise ATC if not when requesting IFR clearance)
- Check for takeoff obstacle notes published in the TPP for the takeoff runway

2. Departure Procedures | ODP & DVA

Responsibilities & Recommendations

- **When flying an ODP:**
  - Does it exist? Can I fly it? Account for close obstacles
  - File in flight plan or inform ATC for a smooth coordination
  - ① If textual only, use foreflight to draw it during briefing
- **When flying DVA:**
  - ② Heading/instructions from ATC

Textual ODP and DVA

Found on section "L" of the TPP

L6

TAKEOFF MINIMUMS, (OBSTACLE) DEPARTURE PROCEDURES, AND DIVERSE VECTOR AREA (RADAR VECTORS)

24305

BELLINGHAM, WA
BELLINGHAM INTL (BLI)
TAKEOFF MINIMUMS AND (OBSTACLE) DEPARTURE PROCEDURES
AMDT 6 04FEB16 (23082) (FAA)

① DEPARTURE PROCEDURE:
Rwy 16, climb heading 164° to 600, then climbing right turn direct HUH VORTAC. Do not exceed 210K until established northbound.
Rwy 34, climb heading 344° to 600, then climbing left turn to intercept HUH R-145 to HUH VORTAC, continue climb in HUH holding pattern (northwest, right turn, 149° inbound) to MEA as appropriate for direction of flight.
TAKEOFF OBSTACLE NOTES:
Rwy 16, tree and windsock beginning abeam DER, 258' right of centerline, up to 15' AGL/187' MSL.
Trees beginning 180' from DER, 534' right of centerline, up to 30' AGL/199' MSL.
Trees beginning 747' from DER, 404' right of centerline, up to 40' AGL/213' MSL.
Trees beginning 1128' from DER, 56' left of centerline, up to 75' AGL/249' MSL.
Rwy 34, windsock 92' from DER, 516' right of centerline, 19' AGL/169' MSL.
Trees beginning 1372' from DER, 698' right of centerline, up to 60' AGL/208' MSL.
Trees beginning 2682' from DER, 966' right of centerline, up to 100' AGL/246' MSL.
Trees beginning 3079' from DER, 619' right of centerline, up to 85' AGL/246' MSL.

② DIVERSE VECTOR AREA (RADAR VECTORS)
ORIG 03MAR16 (16063) (FAA)
Rwy 16, heading as assigned by ATC; requires min. climb of 360' per NM to 2700.
Rwy 34, heading as assigned by ATC.

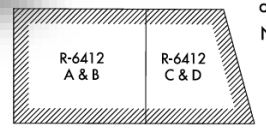
Graphical ODP

PROVO, UT
PROVO MUNI (PVU)
TAKEOFF MINIMUMS AND (OBSTACLE) DEPARTURE PRC
AMDT 6 30SEP04 (04274) (FAA)
DEPARTURE PROCEDURE:
Use PROVO DEPARTURE.

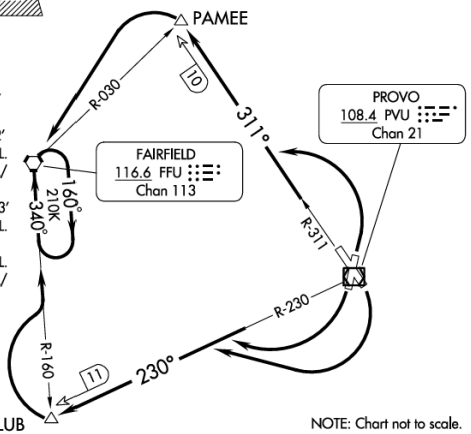
(PROVO4.FFU) 23334 AL-683 (FAA)
PROVO FOUR DEPARTURE (OBSTACLE) PROVO MUNI (PVU) PROVO, UTAH

ATIS 135.175 ★
CON

TAKEOFF MINIMUMS
Rwy 13: Standard with a minimum climb of 400' per NM to 9000, or 3100-3 for climb in visual conditions.
Rwy 18: Standard with a minimum climb of 350' per NM to 9000, or 3100-3 for climb in visual conditions.
Rwy 31: Standard with a minimum climb of 380' per NM to 9000, or 3100-3 for climb in visual conditions.
Rwy 36: Standard with a minimum climb of 365' per NM to 9000, or 3100-3 for climb in visual conditions.
NOTE: Climb in visual conditions NA at night.



TAKEOFF OBSTACLE NOTES
Rwy 18: Multiple trees beginning 429' from DER, 288' left of centerline, up to 57' AGL/4533' MSL. Multiple trees beginning 852' from DER, 202' right of centerline, up to 57' AGL/4533' MSL. Road 775' from DER, on centerline, 15' AGL/4518' MSL.
Rwy 31: Multiple trees beginning 1954' from DER, 743' right of centerline, up to 72' AGL/4561' MSL.
Rwy 36: Multiple trees beginning 978' from DER, 18' right of centerline, up to 46' AGL/4541' MSL. Road 210' from DER, on centerline, 15' AGL/4516' MSL.



DEPARTURE ROUTE DESCRIPTION

TAKEOFF RUNWAYS 13, 18: Climbing right turn to 9000 via PVU VOR/DME R-230 to CALUB INT/PVU 11 DME and a right turn via FFU VORTAC R-160 to FFU VORTAC and hold. Thence.... or climb in visual conditions to cross Provo Muni Airport southwest bound at or above 7400, climb to 9000 via PVU R-230 to CALUB INT/PVU 11 DME and right turn via FFU R-160 to FFU VORTAC and hold. Thence...

TAKEOFF RUNWAY 31: Climb to 9000 via PVU VOR/DME R-311 to PAMEE INT/PVU 10 DME and left turn direct FFU VORTAC and hold. Thence.... or climb in visual conditions to cross Provo Muni Airport northwest bound at or above 7400, climb to 9000 via PVU R-311 to PAMEE INT/PVU 10 DME and left turn direct FFU VORTAC and hold. Thence...

TAKEOFF RUNWAY 36: Climbing left turn to 9000 via PVU VOR/DME R-311 to PAMEE INT/PVU 10 DME and left turn direct FFU VORTAC and hold. Thence.... or climb in visual conditions to cross Provo Muni Airport northwest bound at or above 7400, climb to 9000 via PVU R-311 to PAMEE INT/PVU 10 DME, and left turn direct FFU VORTAC and hold. Thence...

....Expect clearance for filed route and altitude within 10 minutes after departure.

PROVO FOUR DEPARTURE (OBSTACLE) PROVO, UTAH PROVO MUNI (PVU)
(PROVO4.FFU) 27AUG09

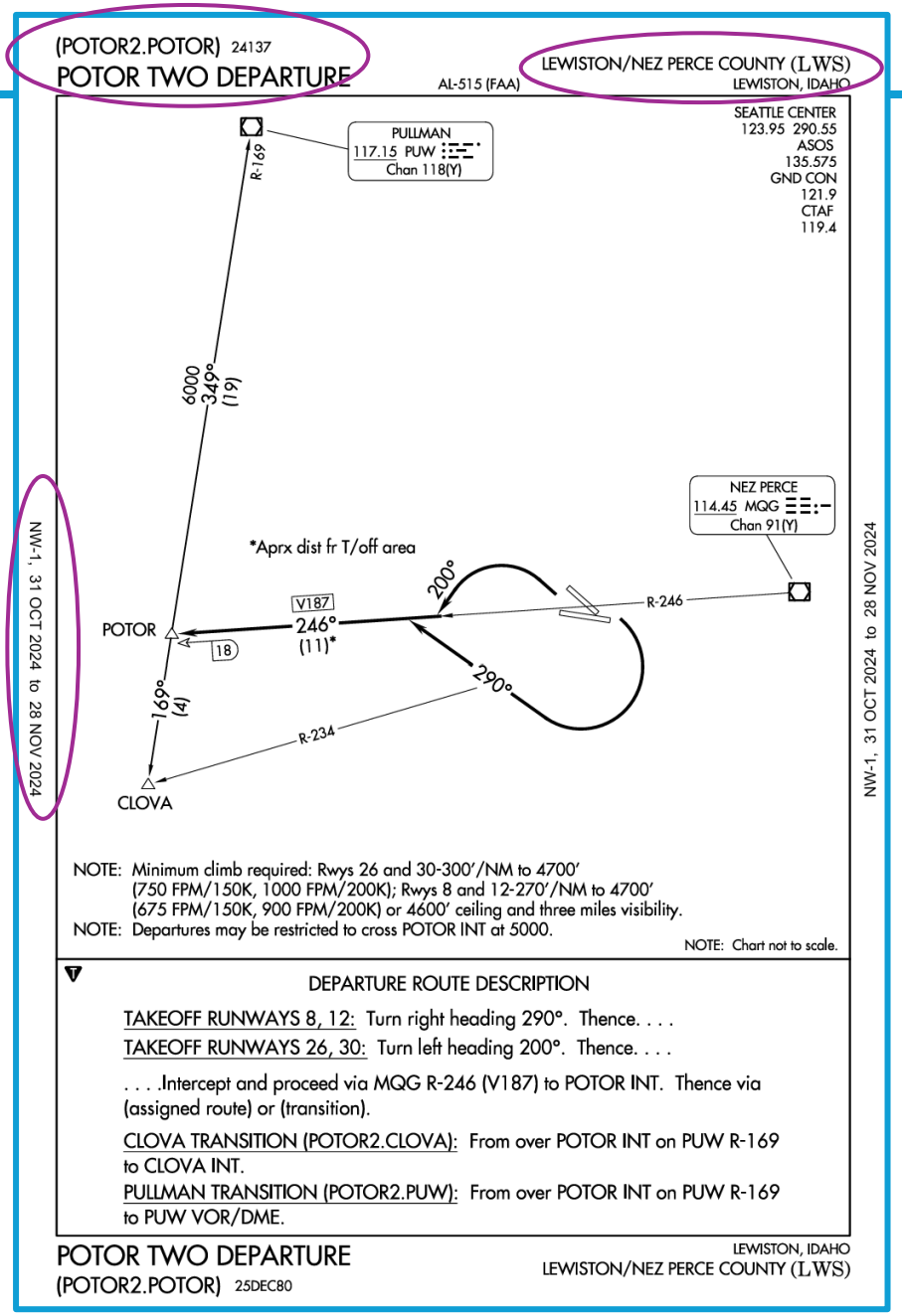
SW-4, 31 OCT 2024 to 28 NOV 2024

2. Departure Procedures | SID

- **SID (Standard Instrument Departures)** [AIM 5-2-9(a)]
  - Provides obstacle clearance and are designed for system enhancement (to reduce pilot/controller workload)
  - Always printed graphically
  - ATC clearance is required before flying a SID (ATC will provide)
    - ✓ ATC responsibility: they will provide clearance and ensure traffic separation
  - Types: RNAV, Non-RNAV, Radar (ATC needs to provide vectors)

- **Pilot Responsibilities related to a SID**
  - Determine if a SID is applicable
  - Verify NOTAMs
  - File/plan applicable SID
  - Ensure you have ATC clearance
  - Fly the SID as charted
  - "NO SID" Remark in FP if can't take it
  - Immediately comply with radar vectors
  - Notify ATC if unable to meet their instructions

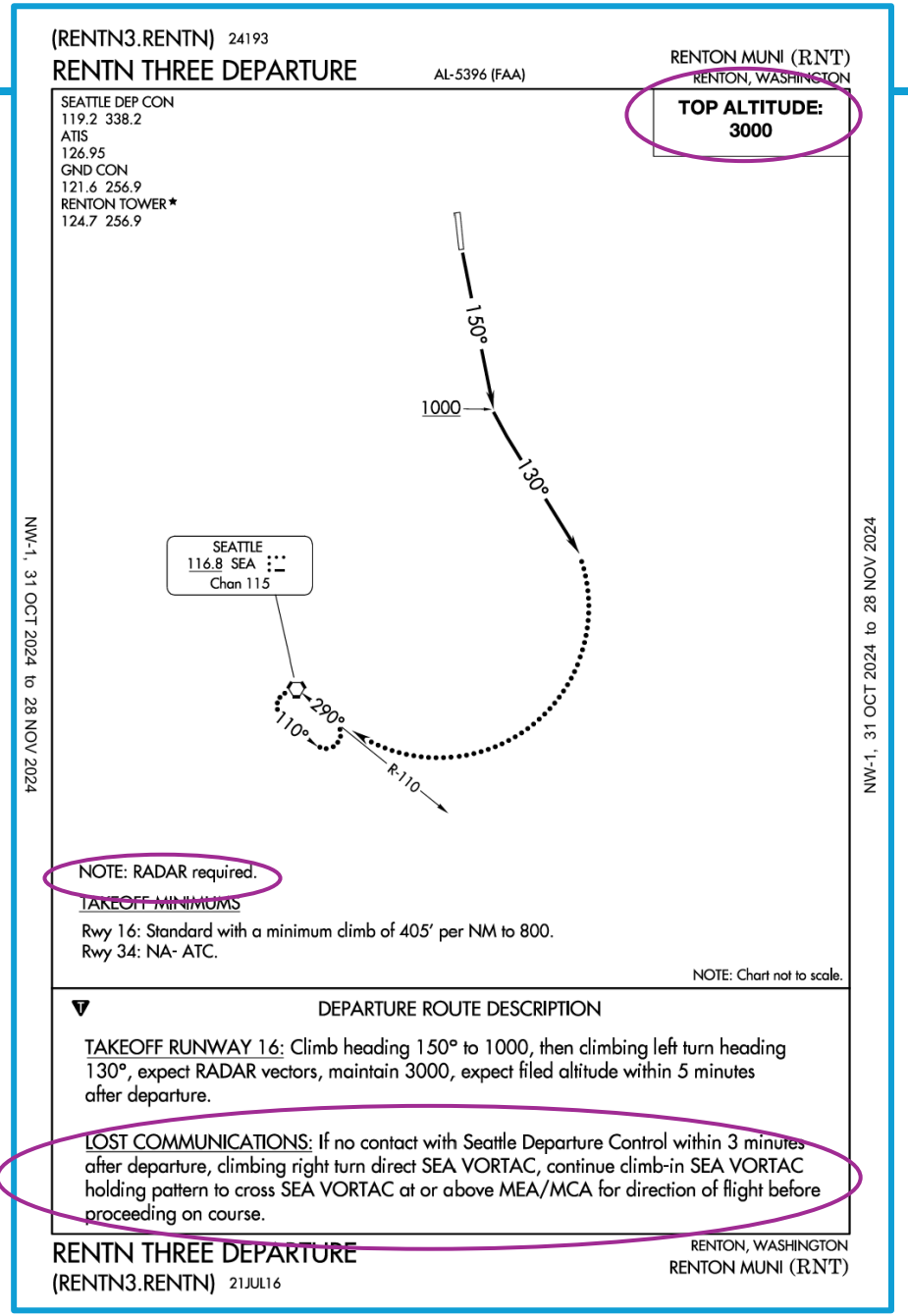
Always confirm departure name, airport and currency



2. Departure Procedures | SID

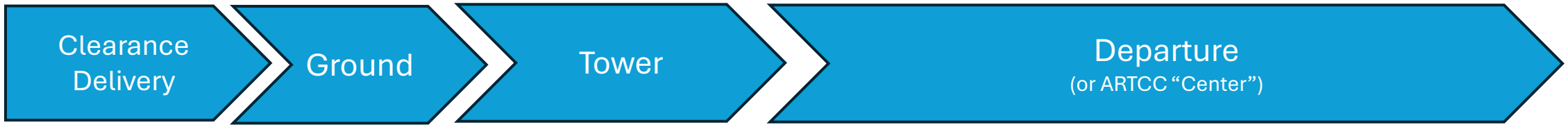
Flying a SID

- **“Maintain”**
  - Clearance that does not contain published crossing restrictions, and/or has a Radar Vector segment. Example: “Maintain 3000”
- **“Climb via”**
  - An abbreviated clearance that requires compliance w/ the lateral path, and speed/altitude restrictions along the departure procedure
  - Authorizes the pilot to:
    - ✓ Join the procedure after departure
    - ✓ Navigate laterally
    - ✓ Meet all published or assigned altitude and speed restrictions
- **“Climb Via” Followed by “Maintain (altitude)”**
  - All intermediary altitude restrictions are removed



2. Departure Procedures | Communications

- **Communications with ATC will follow the flow:**



- IFR Clearance
- Taxi Clearance
- Takeoff Clearance
- Hand over to Approach
- Manages traffic between the airport and higher altitudes
- Some airports don't have a departure control – straight to Center
- Frequency received during IFR clearance ("F" in CRAFT)
- As you transition through airspace, ATC will provide new frequencies

- **Lost Communications**
  - Radar SID charts often include non-standard lost communication procedures
  - Otherwise, follow standard lost communication procedures

Lost Communications under IFR [§91.185]
- Route (fly on this order): Assigned → Vectored → Expected → Filed
- Altitude (fly the highest of M.E.A.): **M**inimum, **E**xpected, **A**ssigned altitude
- Leaving the clearance limit:
  - If that's a point where approach begin → start descent/approach as close as possible to the EFC (Expect Further Clearance time) or ETA (if no EFC)
  - Otherwise → proceed to the fix where the approach begins at the EFC (or ETA if no EFC) and start the descent/approach
- *NOTE: If VFR conditions → continue under VFR and land as soon as practical*

2. Departure Procedures | Other Considerations

- Verify obstacles, terrain and aircraft capability before selecting a departure procedure
- Brief the Departure with proper attention and time
  - ✓ *Know what to expect*
  - ✓ *Have your frequencies, GPS and bugs set/ready*
- Maintain Situational Awareness throughout the departure
  - ✓ *Stay ahead of the aircraft → altitude, airspeed, next turn*
- Be prepared: Assume something will go wrong and plan ahead
- Execute checklists
- Keep transmissions brief and to the point
- Use moving maps for improved situational awareness (with terrain and/or traffic overlays)

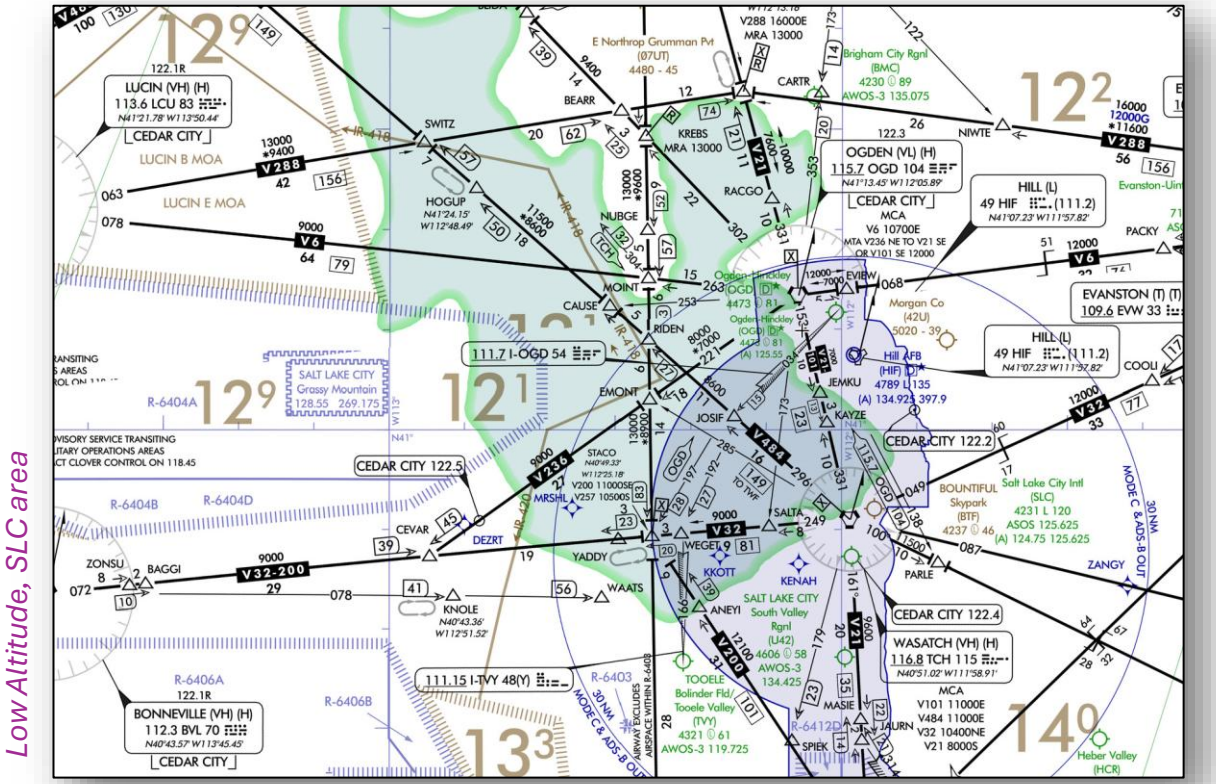
3. Enroute Procedures | Charts

- **Depict Navaids, Airways, Airports, VORs, Altitudes, etc**
  - Green (has IAP), Blue (approved DOD IAP), Brown (don't have IAP)

- **Low Altitude (<18,000ft MSL):**
  - Victor Airways (VOR/VORTAC) – Black Line
  - T-Routes (GPS) – Blue Line
  - Airports with IAP or min 3000ft runway
  - OROCA, special use areas, military training routes

- **High Altitude (≥18,000ft MSL):**
  - Jet Routes (VOR/VORTAC) – Black Line
  - Q-Routes (GPS) – Blue Line
  - Selected Airports (Green/Blue)

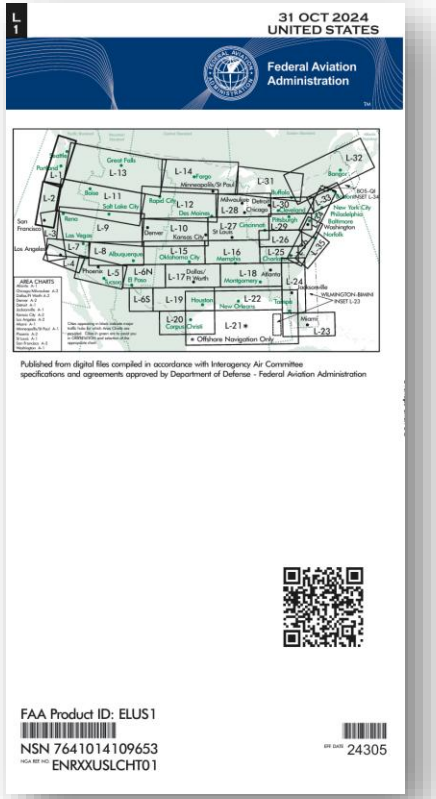
IFR Enroute Altitudes [FAA Glossary]
- MOCA: Minimum Obstruction Clearance Altitude *(nav reception within min 22nm)*
- MEA: Minimum Enroute Altitude *(nav reception assured)*
- MAA: Maximum Authorized Altitude *(denoted as "MAA-" followed by altitude in ft)*
- MCA: Minimum Crossing Altitude *(to cross an intersection; flag with a "X")*
- MRA: Minimum Reception Altitude *(to identify intersections; flag w/ a "R")*
- MTA: Minimum Turning Altitude *(in intersections; denoted as a flag with a "X")*
- MVA: Minimum Vectoring Altitude *(lowest altitude that allows vectors from ATC)*
- OROCA: Off Route Obstruction Clearance Altitude *(ensure 1000ft, or 2000ft if mountainous area, clearance from obstruction)*

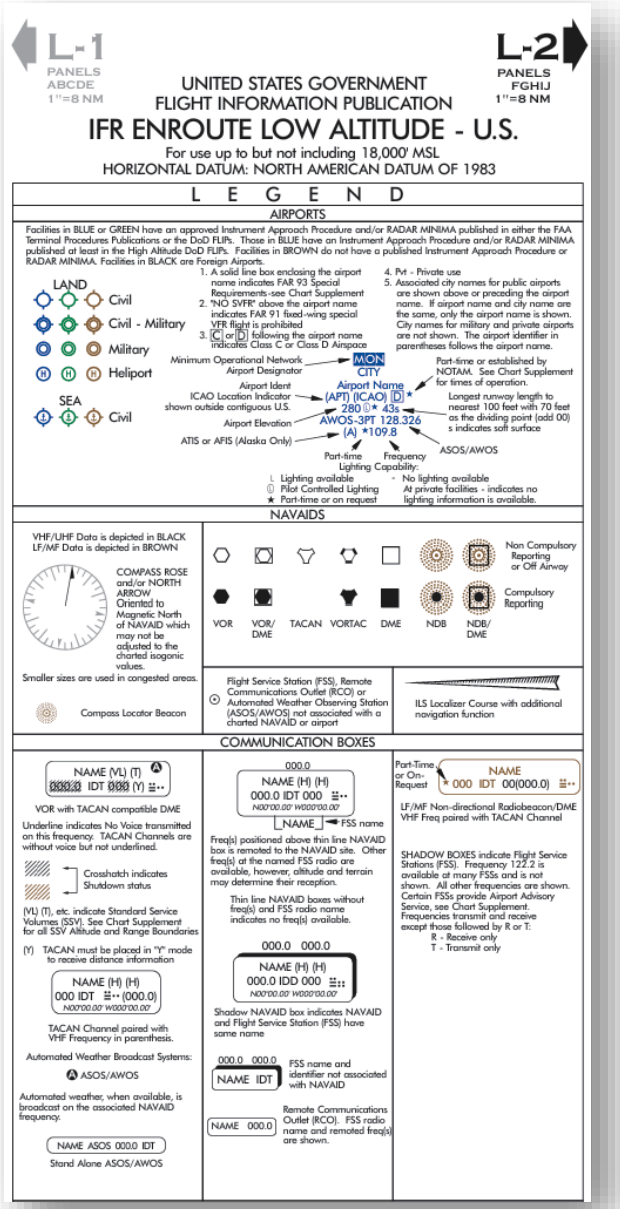


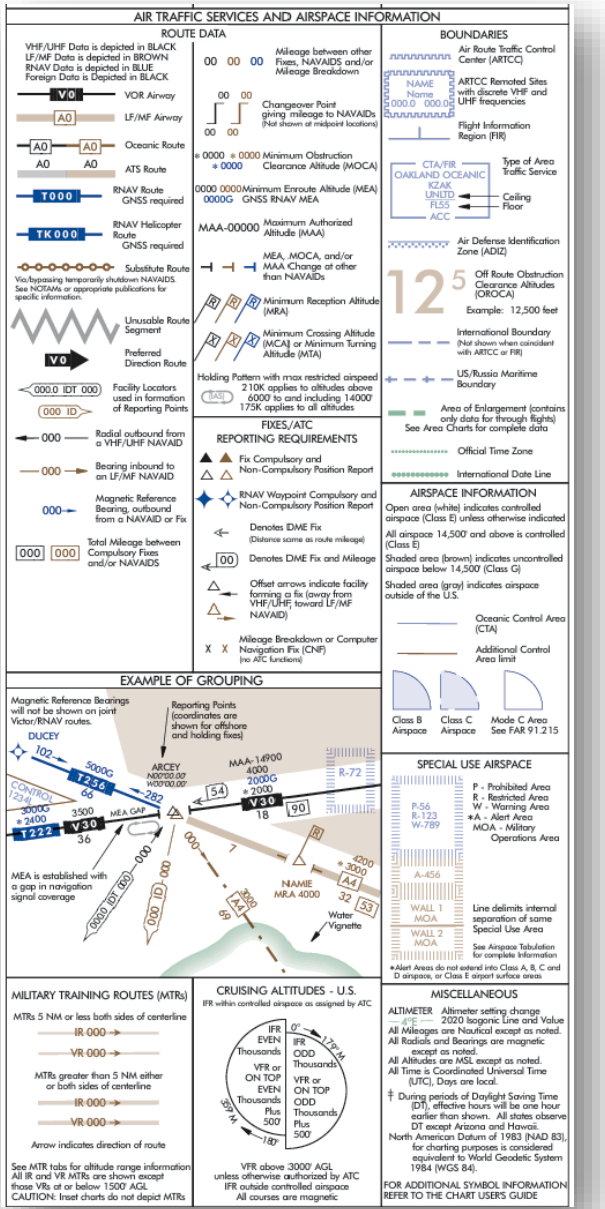
Low Altitude, SLC area

3. Enroute Procedures | Charts

- **Reading the Charts**
  - Aeronautical Chart User's Guide: Pgs. 59-89
  - Chart Legend also available w/ each chart plate →







3. Enroute Procedures | Pilot Responsibilities

- **Plan and File route, using current and applicable charts**
- **Acknowledge and Prompt comply w/ clearances*, query ATC if unclear, Notify if unable** [AIM 5-5-2]
- **Instructions while being Vectored** [AIM 5-5-6]
  - Promptly complies with headings and altitudes assigned to you by the controller
  - Questions any assigned heading or altitude believed to be incorrect,
  - Advise ATC if a vector would cause a CFR violation
- **See and Avoid** [AIM 5-5-6] ➔ If VMC, responsible to see-and-avoid other aircraft, traffic and terrain
- **Fly on the centerline of an ATS route** [91.181] **and adhere to airways being flow** [AIM 5-3-5]
- **Speed**
  - Report change of 5% or 10 knots (whichever is greater) from filed speed [AIM 5-5-9]
  - Max 250 kts below 10,000ft MSL (comply with [91.117(a)]
- **Altitude**
  - Follow proper cruising altitudes by [91.179]
  - If on VFR-on-Top, comply with VFR cruising altitudes per [91.159]

IFR Cruising Altitudes [§91.179]

- In controlled airspace: maintain the altitude or flight level assigned by ATC
- In uncontrolled airspace, except while in holding of 2min or less, or turning:

0^0 ➔ 179^0 [N/E]:	180^0 ➔ 359^0 [S/W]:
Odd *(5000ft, 7000ft, FL190, FL210)*	Even *(4000ft, 6000ft, FL180, FL200)*

If FL290 or above an RSVM (Reduced Vertical Separation Minimum), then separation remains 2000ft interval. If Non-RSVM, separation of 4000ft intervals

NOTE: All courses magnetic

*except on Emergencies per 91.3

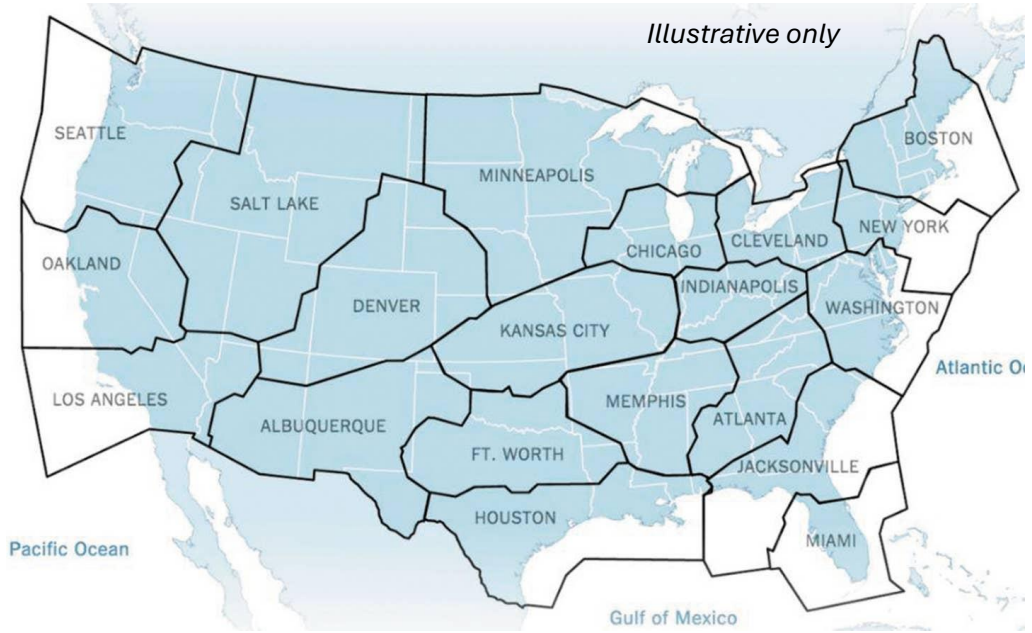
3. Enroute Procedures | Controller Responsibilities

- **Issue appropriate clearances and ensure readback is correct** [AIM 5-5-2]
  - Assign altitudes at or above minimum IFR altitudes
- **Vectors** [AIM 5-5-6]
  - Vectors aircraft when requested by the pilot
  - Vectors at/above minimum vectoring altitudes
- **Ensure enroute Traffic Separation** [AIM 5-5-1]
- **Provide traffic advisories** [AIM 5-5-10]
- **Issue Safety Alerts** [AIM 5-5-7]
  - Terrain/Obstruction Alert
  - Aircraft Conflict Alert

3. Enroute Procedures | Communications

- **Communications with ATC will follow the flow:**

Departure → ARTCC ("Center") → Approach



- **Departure/Approach vs Center**
  - Departure/Approach operate manage traffic near large airports, while Centers operate across multiple states
  - Both are divided into different sectors/frequencies
- **ATC will transition you over multiple frequencies**
  - ATC will provide new frequencies
  - When calling the next controller say Callsign and Current Altitude
- **Lost Communications**
  - Follow standard lost communication procedures →

Lost Communications under IFR [§91.185]
- Route (fly on this order): Assigned → Vectored → Expected → Filed
- Altitude (fly the highest of M.E.A.): **M**inimum, **E**xpected, **A**ssigned altitude
- Leaving the clearance limit:
  - If that's a point where approach begin → start descent/approach as close as possible to the EFC (Expect Further Clearance time) or ETA (if no EFC)
  - Otherwise → proceed to the fix where the approach begins at the EFC (or ETA if no EFC) and start the descent/approach
- *NOTE: If VFR conditions → continue under VFR and land as soon as practical*

3. Enroute Procedures | Other Considerations

- Pilot is responsible for identifying fixes, navaids, COP, tracking and intercepting courses
- Fuel Awareness
  - ✓ *Monitor time and fuel remaining*
  - ✓ *Compare actual vs planned fuel burn*
- Ensure aircraft is capable to fly the selected route
- Consider possible diversion airports along the route
- Keep transmissions brief and to the point
- A non-emergency problem in VFR can be an Emergency in IFR
- **Weather**
  - Monitor weather development along the route
  - Be specially aware (and looking for) icing
  - Ask ATC for altitude or heading changes to deviate from weather

Common ATC Instructions when climbing, descending or cruising

Climb/Descend and maintain

➢ Climb/descend at optimum rate to 1,000' below, then 500-1,500 fpm

Immediately

➢ Expeditious compliance is expected and necessary

Pilot's discretion

➢ Start the climb/descend when you wish, at any rate
➢ May temporary level off
➢ May not return to an altitude once it's vacated

Expedite

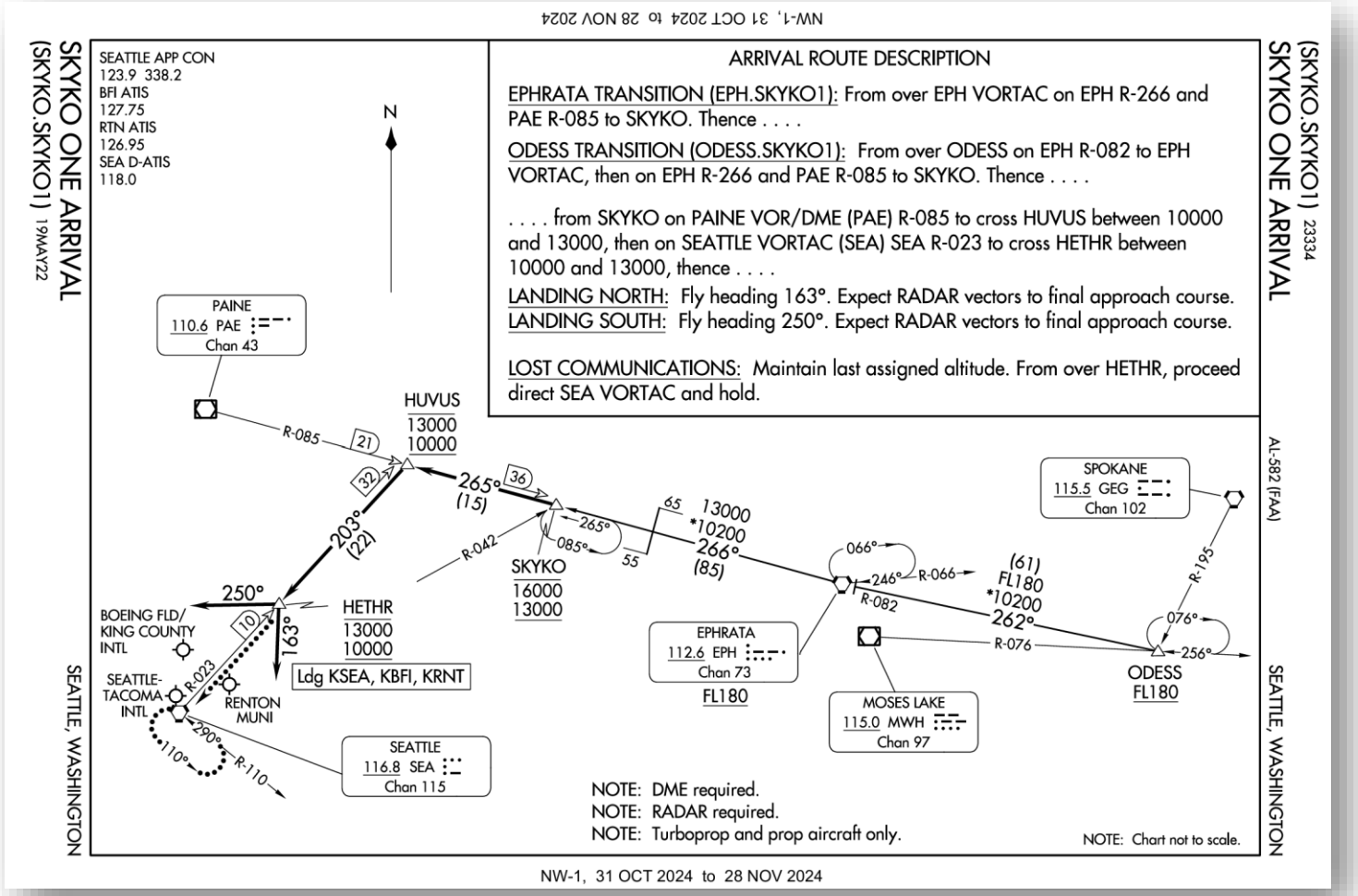
➢ Use best rate of climb/descent, safety permitting

Cruise

➢ Block from min IFR altitude up to the altitude in the clearance

4. Arrival Procedures | STAR

- **Standard Terminal Arrival Route** ➔ IFR routing to transition from enroute to the terminal area
  - Provides route, and in some cases, altitudes and airspeeds
  - Ends at a fix or navaid that connects to, or allows for vectors to, an approach
  - Increase capacity, organize traffic and reduce environmental impact
  - Found on Section Z of the TPP
- **Transition Routes**
  - Start: Funnel traffic onto the STAR
  - End: Funnel traffic to airports/runways
- **When Planning**
  - Ensure compatibility (RNAV/Non-RNAV)
  - Plan & file the STAR (“NO STAR” remark)



4. Arrival Procedures | STAR

Pilot Responsibilities

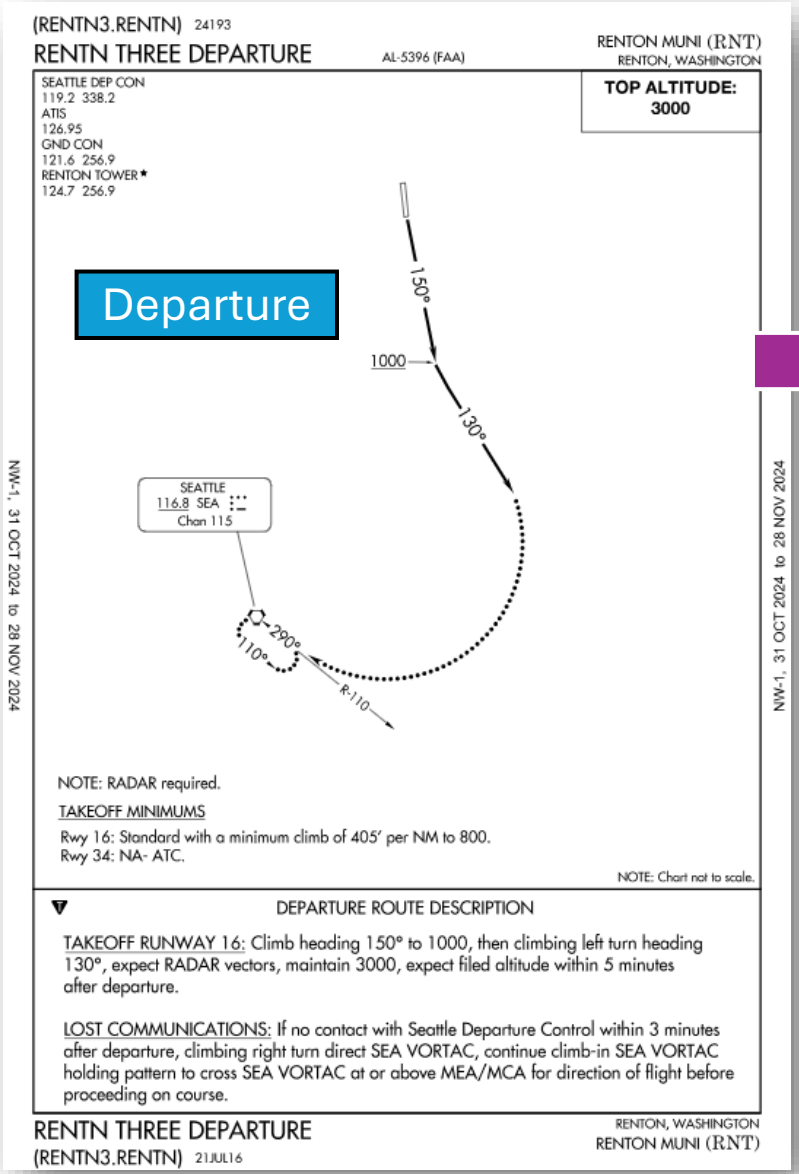
- Accept or refuse STAR (notify ATC if unable to comply with the STAR)
- Must have approved chart
- "NO STAR" remark
- Types of Clearance:
  - Cleared for the arrival: Lateral route only (**cannot descend**)
  - Descend Via: Comply with STAR lateral, vertical, & speed requirements

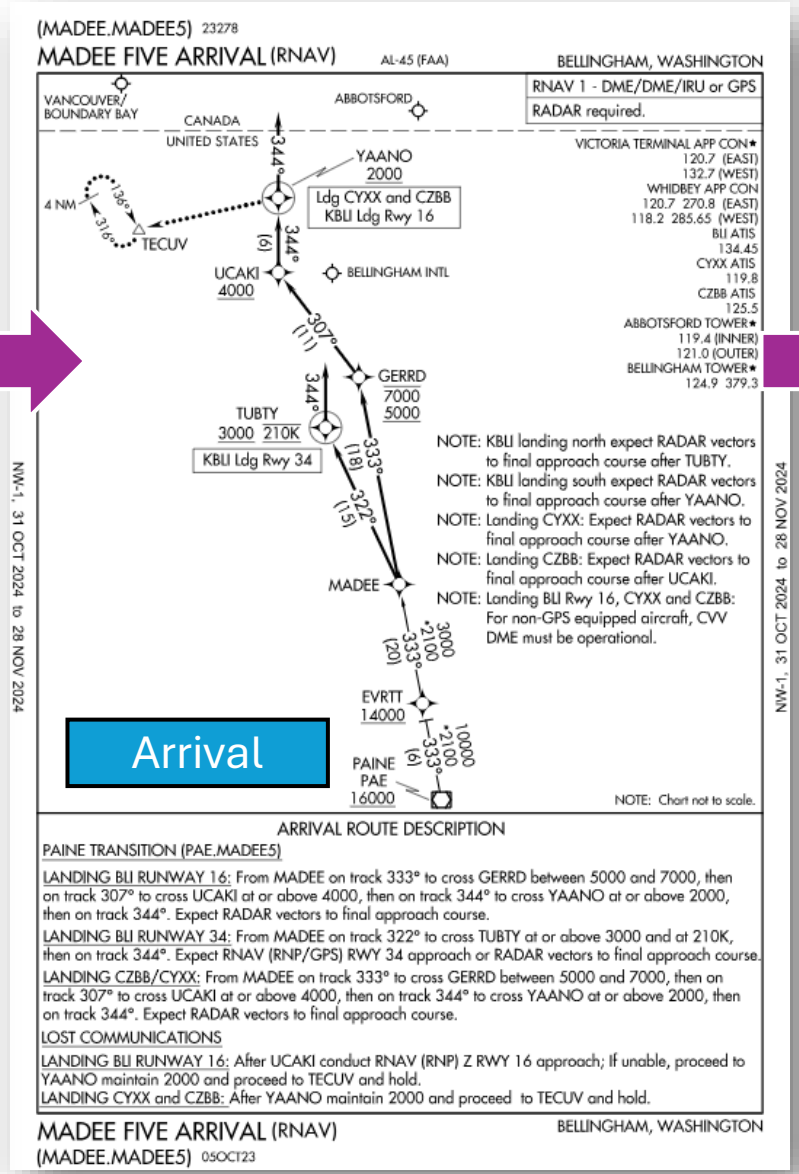
- STARs can begin with ARTCC or Approach
- STARs can have specific instructions for loss of comms

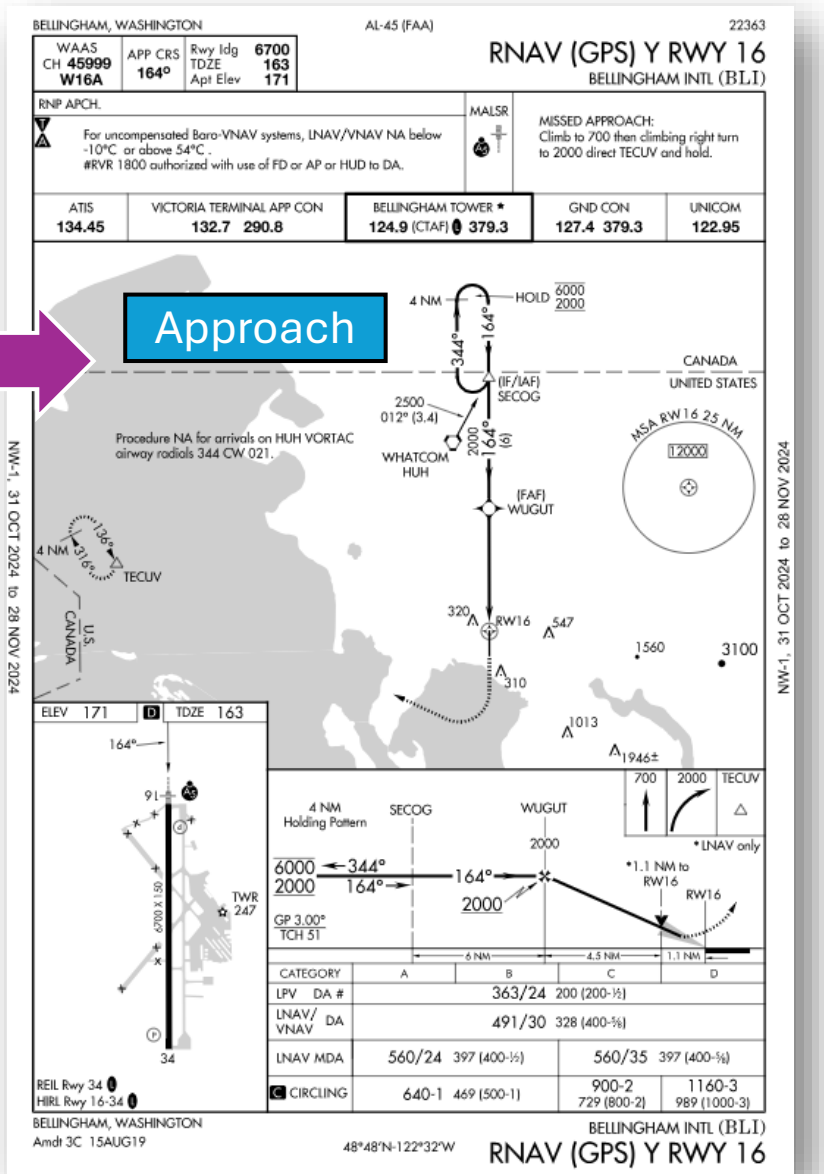
Controller Responsibilities

- Clear the pilot for the STAR procedure
  - ✓ *Route, altitude, airspeeds, and/or deletions*
- Ensure pilot acknowledgement of clearance and instructions
- Ensure pilot readback is correct and make corrections as required
- Enroute traffic separation & traffic advisories

4. Arrival Procedures | STAR



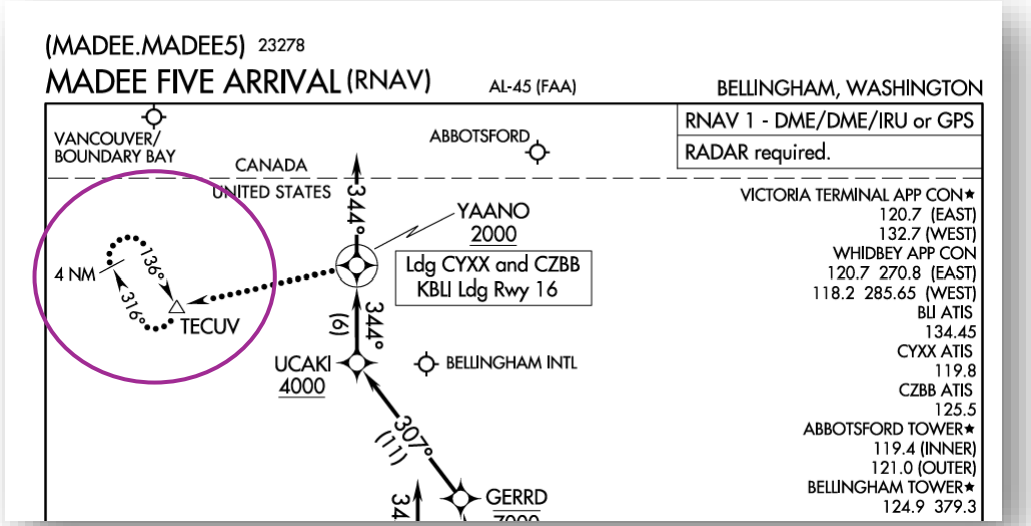




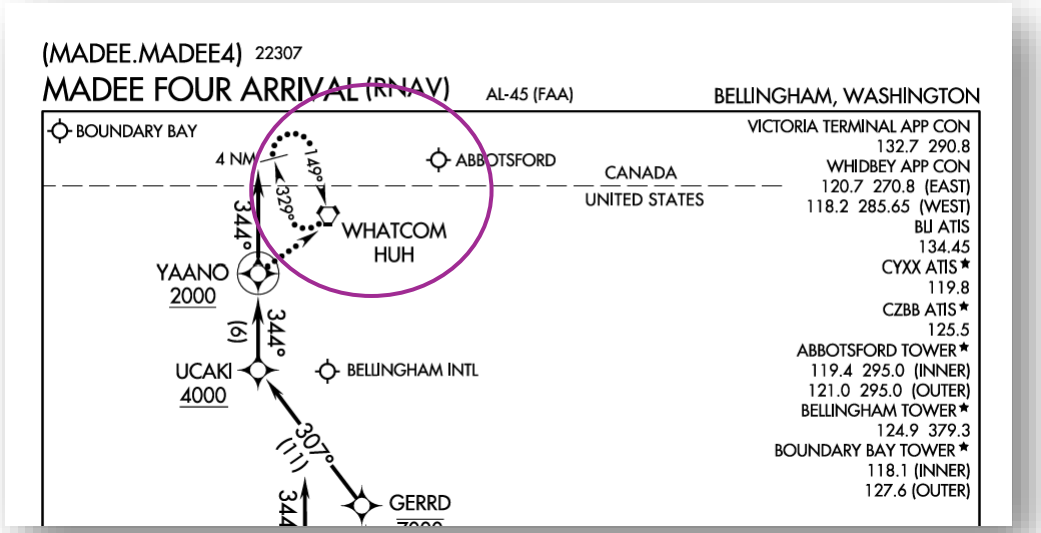
4. Arrival Procedures | Other Considerations

- **NAVAIDS**: Record frequencies and waypoints for reference on the navlog. If RNAV, have it all loaded on the GPS
- Ensure the aircraft can meet the required speeds and altitudes
- Verify navigational capabilities
- Ensure you are comfortable with the procedure
- Use “NO STAR” remark, if necessary
- Bring all required publications and verify currency
  - Procedures DO change from time to time
- Stay ahead of the aircraft

New



Old



5. Reporting Points

- **Reporting Points**
  - Compulsory:
  - On Request (Non-Compulsory):

> **§ 91.183 IFR communications.**
>
> Unless otherwise authorized by ATC, the pilot in command of each aircraft operated under IFR in controlled airspace must ensure that a continuous watch is maintained on the appropriate frequency and must report the following as soon as possible—
>
> (a) The time and altitude of passing each designated reporting point, or the reporting points specified by ATC, except that while the aircraft is under radar control, only the passing of those reporting points specifically requested by ATC need be reported;
>
> (b) Any unforecast weather conditions encountered; and
>
> (c) Any other information relating to the safety of flight.

- **Reporting Requirements** [AIM 5-3-2(c)]
  - Airways/Routes: Over each compulsory reporting point
  - Direct Route: Over each reporting point along the route
  - Radar Environment: Discontinue reports when advised “Radar Contact”
  - Oceanic : Report each point defining the route (compulsory & on request)

- **What to report, when required** [AIM 5-3-2(c)]
  - Identification ➔ Position ➔ Time ➔ Altitude
  - Type of Flight Plan (not required for reports to ARTCC/Approach)
  - ETA and Name of the Next Reporting Point
  - Name of the Next Succeeding Reporting Point
  - Pertinent Remarks

5. Reporting Points

Additional Reporting

To be given at ALL TIMES, except the ones marked with a ★, which are only required if non-radar contact

Mandatory IFR Reporting Points [AIM 5-3-3]

MARVELOUS VFR C500

- **M** – Missed approach
- **A** – Airspeed change of 10kts or 5% of filed TAS (whichever is greater)
- **R** – Reaching a holding fix (report time and altitude)
- **V** – VFR on top when changing altitudes
- **E** – ETA changed by more than 2min (or 3min in North Atlantic) ★
- **L** – Leaving a holding fix
- **O** – Outer marker or fix (precision approach) ★
- **U** – Unforecasted weather [§91.183]
- **S** – Safety related [§91.183]
- **V** – Vacating an altitude or flight level
- **F** – Final approach fix (non-precision approach) ★
- **R** – Radio/Nav equipment failure [§91.187]
- **C** – Compulsory points (▲) [§91.183] or any fix if not in airways [AIM 5-3-2(c2)] ★
- **500** – Unable to descent/climb at least 500fpm
- *NOTE: In non-radar environment, pilot must report Call Sign → Position → Time → Altitude → Name + ETA of next reporting fix → Name of the fix after that*

Non-radar only

6. Minimum Fuel

- **Minimum Fuel** [AIM 5-5-15]
  - Cannot accept any undue delay
  - NOT an emergency
  - No traffic priority
  - On initial contact, state “minimum fuel” after your call sign

- **Emergency Fuel** [Feb 2012 DOT/FAA Air Traffic Bulletin]
  - Not defined in the AIM or FAA regulations
  - Point at which, in the judgement of the PIC, it is necessary to proceed directly to the airport of intended landing due to low fuel
  - Explicit statement that priority handling by ATC is required and expected

7. MFD Situational Awareness

- **Aircraft position in relation to course**
- **Airports and Navaids**
- **Topography**
- **Overlays**
  - Terrain
  - Traffic
  - Weather
- **Additional Information**
  - Time/Distance
  - Airports/Runways/Frequencies
  - Trends (when to arrive certain altitude, hdg, etc)
  - Vertical Navigation (some units)

Questions?