ATC System Structure

Chap 3 - Nolan
Airspace Classes

Class A  Class B  Class C  Class D  Class E  Class G

**Controlled Airspace**
- operating rules
- pilot requirements
- aircraft equipment requirements

**Uncontrolled Airspace**
- no rules
- no requirements
Airspace Classes
Class A Airspace

- **Region:**
  - 18,000 feet Mean Sea Level (MSL) up to 60,000 feet MSL
  - Within 12nm of coast of Continuous US (ConUS)
Class A Airspace

• Structure
  – Jet Airways (18,000’ to 45,000)
    • Use High altitude VORs
    • Jet airways labeled <J><Number> - (J-one-fifty-five)
    • VOR to VOR
      – Change Over Point (COP) = Fix between VORs at which pilot stops tracking radial of FROM VOR and starts tracking radial of TO VOR
  • Airway dimensions:
    – 4nm either side of airway centerline
    – 1000 ft vertically (using Mean Sea Level MSL)
Class A Airspace

• High Altitude Chart
Class A Airspace

• Aircraft operations in airspace:
  – IFR only
  – Receive clearance from ATC (altitude, route)
  – Require equipage (FAR 91.215)
  – Altimeters set at 29.92” Hg

• ATC Services:
  – Separation
  – Sequencing
  – Traffic Advisories
Class B - Airspace

• Region:
  – Around nations busiest airports
  – Surface to 10,000 feet MSL
  – Upside down “wedding cake”
Class B Airspace

3-D View – San Francisco (SFO)  Chart view – San Francisco (SFO)

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Class B Airspace

Chart view – San Francisco (SFO)
Class B Airspace

• Structure:
  – Fly published instrument procedures
  – Departure Procedures
    • Ensure aircraft avoids local obstacles and traffic patterns
  – Arrival Procedures
Class B Airspace – Departure Procedures
Class B Airspace – Departure Procedures

• DME Equipped Aircraft
  – If initially assigned heading 330 degrees to 60 degrees (clockwise)
    • Cross 5nm DME arc ORD at or above 3000’
    • Cross 8nm DME arc ORD at or above 4000’
    • [Climb and] maintain 5000’ (or ATCo assigned altitude)
  – If unable to comply, advise ATC as soon as possible prior to departure
Class B Airspace – Standard Arrival Procedures
Class B Airspace – Standard Arrival Procedures
Class B Airspace – Arrival Procedure

• Coming into Orlando from the direction of Pahokee
  • From PHK VORTAC fly radial 342 degrees to to BAIRN intersection
  • From BAIRN intersection to RWY 17 or 18
    – From BAIRN intersection fly ORL VORTAC radial 162 to SABOT intersection,
    – Depart SABOT at 360 degrees, then ATC will vector to final approach course
Class B - Airspace

• Aircraft Operations in airspace:
  – ATC clearance required
  – Fly published instrument procedures
  – IFR
    • File flightplan (includes departure and arrival procedures)
  – VFR
    • Request permission (IFR aircraft have priority over VFR)

• Equipage:
  • Two-way radio receivers
  • Transponders
  • Mode C Altitude Encoder (30 miles from airport)
  • VOR or TACAN Navigation

• ATC services:
  – IFR
    • Separation 3nm apart at same altitude
    • 1000’ vertical separation
  – VFR
    • Separation 1 ½ nm apart at same altitude
    • 500’ vertical separation
Class C - Airspace

• Region
  – Around medium to large airports
  – Surface to 4000’ above airport elevation (MSL)
  – Core - 5nm radius, from surface to 4000’
  – Shelf - 10 nm radius, from 1200’ to 4000’
  – Outer – 20 nm radius, from lower limits of radar coverage to ceiling of approach control airspace
Class C

Chart View – Fort Wayne International
Class C Airspace

• Aircraft operations in airspace:
  – IFR or VFR
  – Pilot must establish communications with air traffic control prior to entering
  – Pilot must comply with instructions issued by controller
  – Pilot must comply with VFR rules

• Equipage:
  • Two-way radio receivers
  • Mode C Transponder

• ATC Services:
  – Sequencing arrivals
  – IFR/IFR standard separation
  – IFR/VFR traffic advisories and conflict resolution
  – VFR/VFR traffic advisories
Class D Airspace

• Region:
  – Surface to 2500’ above airport (MSL)
  – Airspace individually tailored

• Structure:
  – May include instrument procedures (when published)

• Aircraft operations in airspace:
  – IFR – must file flightplan
  – VFR – VFR minima apply
  – Pilot must establish 2-way radio communication with air traffic controller (while tower is in operation)
  – Aircraft speed must remain less than 200 knots
Class D Airspace

3-D View - Jainesville

Chart View - Jainesville
Class D Airspace

• **Equipage:**
  - Two-way radio receivers

• **ATC Services:**
  - Sequencing arrivals
  - IFR/IFR standard separation
  - IFR/VFR traffic advisories and conflict resolution
  - VFR/VFR traffic advisories
Class E Airspace

• Region:
  – From 700’ or 1200’ AGL to Below 14,500 ft MSL (or up to controlled airspace)

OR

– Non-towered Airports with weather reporting sources and approved for Part 135 commuter/on-demand flight operations
Class E Airspace

• Operations:
  – Non-towered airports
    • IFR operations only when IMC conditions
  – Airspace
    • IFR or VFR

• TAC Services:
  – Separation to IFR aircraft
  – Traffic advisories to VFR (workload permitting)
Class E Airspace - Low Altitude Airways
Class G Airspace

• Uncontrolled airspace
  – No ATC separation services provided to any aircraft (IFR or VFR)

• Region:
  – Below 1200’ AGL
  – Away from major airports
Class G Airspace

• Aircraft operations
  – IFR
    • Not required to file flightplan
    • Pilot must be properly rated
    • Pilot is solely responsible for navigating and avoiding other IFR or VFR aircraft
    • Pilot is responsible for operating safe distance above the ground
      – More than 1000 feet above ground
Class G Airspace

• Aircraft operations
  – VFR
    • Not required to file flightplan
    • Not required to contact ATC
    • Pilot must be properly rated
    • Pilot is solely responsible for navigating and avoiding other IFR or VFR aircraft
    • Pilot is responsible for operating safe distance above the ground
      – More than 1000 feet above ground
## Summary

<table>
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<th>Airspace Features</th>
<th>Class A</th>
<th>Class B</th>
<th>Class C</th>
<th>Class D</th>
<th>Class E</th>
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<tbody>
<tr>
<td>Operations permitted</td>
<td>IFR only</td>
<td>IFR and VFR</td>
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<tr>
<td>Airspace Entry Requirements</td>
<td>IFR Flightplan, ATC Clearance &amp; Mode C Transponder</td>
<td>VFR - ATC Clearance &amp; Mode C Transponder</td>
<td>ATC Clearance for IFR. VFR - radio contact &amp; Mode C Transponder</td>
<td>ATC Clearance for IFR. VFR - radio contact</td>
<td>ATC Clearance for IFR. VFR - All radio contact</td>
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<td>Radio communication Required</td>
<td>Two-way for IFR. Two-way for VFR.</td>
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<td>Min Visibility</td>
<td>IFR – N/A</td>
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<td>IFR – N/A VFR - 1 statute miles</td>
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<td>Min Distance from Clouds</td>
<td>IFR - N/A</td>
<td>IFR - N/A</td>
<td>IFR - N/A VFR - 3 statute miles</td>
<td>IFR - N/A VFR - 3 statute miles</td>
<td>IFR - N/A VFR - 3 statute miles</td>
<td>IFR - N/A VFR - Stay clear of clouds</td>
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<td>ATC role in Aircraft Separation</td>
<td>IFR and VFR aircraft</td>
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<td>IFR, SVFR, and runway operations</td>
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<td>ATC role in Conflict Resolution</td>
<td>N/A</td>
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<td>Between IFR and VFR</td>
<td>None</td>
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<td>ATC role in Traffic Advisories</td>
<td>N/A</td>
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<td>Yes</td>
<td>Workload permitting</td>
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<td>ATC role in Safety Advisories</td>
<td>Yes</td>
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<td>Yes</td>
<td>Yes</td>
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</table>

### Airspace Entry Requirements

- **Class A**: IFR only
- **Class B**: IFR and VFR
- **Class C**: IFR and VFR
- **Class D**: IFR and VFR
- **Class E**: IFR and VFR
- **Class G**: IFR and VFR

### Radio communication Required

- **Class A**: Two-way for IFR. Two-way for VFR.
- **Class B**: Two-way for IFR. Two-way for VFR.
- **Class C**: Two-way for IFR. Two-way for VFR.
- **Class D**: Two-way for IFR. Two-way for VFR.
- **Class E**: Two-way for IFR. None for VFR
- **Class G**: None

### Min Visibility

- **Class A**: IFR – N/A
- **Class B**: IFR – N/A
- **Class C**: IFR – N/A
- **Class D**: IFR – N/A
- **Class E**: IFR – N/A
- **Class G**: IFR – N/A VFR - 1 statute miles

### Min Distance from Clouds

- **Class A**: IFR - N/A
- **Class B**: IFR - N/A
- **Class C**: IFR - N/A
- **Class D**: IFR - N/A
- **Class E**: IFR - N/A
- **Class G**: IFR - N/A VFR - Stay clear of clouds

### ATC role in Aircraft Separation

- **Class A**: IFR and VFR aircraft
- **Class B**: IFR and VFR aircraft
- **Class C**: IFR, SVFR, and runway operations
- **Class D**: IFR, SVFR, and runway operations
- **Class E**: IFR, SVFR
- **Class G**: None

### ATC role in Conflict Resolution

- **Class A**: N/A
- **Class B**: N/A
- **Class C**: Between IFR and VFR
- **Class D**: None
- **Class E**: None
- **Class G**: None

### ATC role in Traffic Advisories

- **Class A**: Yes
- **Class B**: Yes
- **Class C**: Yes
- **Class D**: Workload permitting
- **Class E**: Workload permitting
- **Class G**: Workload permitting

### ATC role in Safety Advisories

- **Class A**: Yes
- **Class B**: Yes
- **Class C**: Yes
- **Class D**: Yes
- **Class E**: Yes
- **Class G**: Yes
Homework

1) Define the regions for each of the following airspaces A, B, C, D, E, G

2) What are the airspace entry requirements for each airspace A, B, C, D, E, G

3) Define the requirements for two-way radio communication for IFR and VFR operation in airspaces A, B, C, D, E, G

4) Define the minimum visibility requirements for IFR and VFR operation in airspaces A, B, C, D, E, G

5) What are the equipment requirements for entry into airspaces A, B, C, D, E, G