

(Non-radar) Separation: En-route and Terminal

Nolan, Chap 7

1

(Non-radar) Separation Procedures

- Four methods of separation
 1. Vertical Separation
 2. Lateral Separation
 - Holding Patterns
 3. Longitudinal Separation
 4. Visual Separation
- Methods 1/2/3 block airspace that cannot be entered by another aircraft
- Separation exists when one of the 4 methods holds

2

Vertical Separation

- Aircraft operating on same route/airway separate by vertical
 - Preferred in Center airspace
- **Basic Vertical Separation**
 - Aircraft reserved space 500 ft above/below
 - Aircraft separation differ by:
 - 1000 ft below FL290
 - 2000 ft above FL290
 - Pilots report passing through or leveling off at the assigned altitude
 - “Southwest 5-2-1, descend and maintain six-thousand, report leaving ten-thousand and report reaching six thousand”
 - Airspace between 10,000 and 6,000 blocked out
 - No other aircraft can be cleared into this block until, Southwest 5-2-1 reports reaching 6000.

3

Vertical Separation

- **Flight Progress Strip Marking:**
 - New altitude assigned is written on flight strip
 - Report Leaving 10,000 (RL100)
 - Report Reaching 6,000 (RR 06)
 - Terminal Flight Progress Strip – field 9
 - Center Flight Progress Strip – field 20
- **Figure 7-5, 7-6**

4

Lateral Separation

- Aircraft at same altitude on different routes with reserved airspace that does not overlap
- Basic Lateral Separation Rule
 - Two aircraft operating on airways/routes whose airspace does not overlap
 - Airways are 8nm wide (4nm each side of centerline)
 - Aircraft are within 51 nm of navigation aid defining airway
 - Aircraft are holding at navigation fixes whose holding pattern airspace does not overlap

5

Lateral Separation

- Holding Patterns
 - “park” airplane in blocked out airspace until airways is free of traffic
 - Size of Holding pattern determined by:
 - Aircraft speed on 1 minute legs
 - Wind magnitude and direction

6

Longitudinal Separation

- Aircraft flying same route/airway separate by longitudinal
 - Preferred in Terminal airspace
 - Aircraft flying at same airspeed (or lead aircraft faster)
 - Aircraft separation 10 minutes (20nm):
 - Depart airport/navigational fix at specified time
 - Depart airport/navigational fix after preceding aircraft has traveled a specified distance
 - Arrive/cross navigational fix at specified time (RX)

7

Longitudinal Separation Rules

- Aircraft operating in the same direction:
 - Lead aircraft 44 knots faster than follow
 - 3 minute (or 5 miles)
 - Lead aircraft 22 knots faster than follow
 - 5 minute (or 10 miles)
 - Either aircraft climbing or descending through altitude of other aircraft
 - 5 minutes (or 10 miles)
 - None of the above
 - 10 minute (or 20 miles)

8

Initial Longitudinal Separation

- Used to separate aircraft beginning or ending at airport
- Separation intervals temporarily reduced
 - Initial Separation Arriving/Departing Aircraft
 - Departing aircraft with divergent courses (45 degrees) from arriving aircraft
 - 3 minutes (4miles)

9

Initial Longitudinal Separation

- Initial Separation Departing Aircraft
 - Departing aircraft with divergent courses (45 degrees)
 1. Same runway (or parallel runways < 3500')
 - Two aircraft with diverging courses after takeoff
 - » 1 minute interval continuous operation
 - Two aircraft with diverging courses 5 minutes after takeoff
 - » 2 minute interval continuous operation
 - Two aircraft with diverging courses within 13 miles of takeoff
 - » 3 mile interval continuous operation
 2. Different runways (parallel > 3500')
 3. Intersecting runways
 - Runways diverge by more than 30 degrees, preceding aircraft has passed the intersection, courses after takeoff diverge by more than 45 degrees
 - Runways diverge by more than 15 degrees and less than 30 degrees, preceding aircraft has crossed the intersection and commenced turn on course, courses after takeoff diverge by more than 45 degree

10

Visual Separation

- Most flexible, used by Terminal Controllers
- Either pilot sees the other aircraft
 - Or controller can observe both aircraft
- Requires radio contact
- Two ways:
 - Controller accepts responsibility for visual separation
 - Pilot can identify other aircraft and accepts responsibility for separation (and pilot of other aircraft informed visual separation has been applied)

11

Homework Chap 7

- What are the 4 methods of non-radar separation?
- When non-radar separation is in operation, how does the controller know where each aircraft is?
- Who can be responsible for visual separation?
- What are the dimensions of the airspace
 - Vertical
 - Lateral

12