Federal Aviation Administration

55054001 EN ROUTE RADAR ASSOCIATE CONTROLLER TRAINING PART A: BASIC CONCEPTS

Lesson 3: Vertical Separation

Version: V1.0 2022.08

INSTRUCTOR LESSON PLAN

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LESSON PLAN DATA SHEET

Course Name	En Route Radar Associate Controller Training Part A: Basic Concepts
Course Number	55054001
Lesson Title	Vertical Separation
Duration	1 hour, 15 minutes (Including lesson, ELT, and exercise)
Version	1.0 2022.08
Reference(s)	JO 7110.65, Air Traffic Control; JO 7610.4, Special Operations; JO 7210.3 Facility Operation and Administration; Aeronautical Information Manual
Prerequisites	NONE
Handout(s)	⊙ Exercise 1: Vertical Separation, *HO01_03 (Print prior to class)*
Exercise / Activity	Refer to handout for: ⊙ Exercise 1: Vertical Separation
Assessments	⊙ YES - Written *(Refer to ELT01_L03, print prior to class)*
Scenario	NONE
Materials and Equipment	⊙ Pencil and/or pen
Other Pertinent Information	⊙ **Ensure lesson materials are downloaded to the classroom computer** ⊙ This lesson is based on ERAM EAE410. ⊙ The lesson has been reviewed and reflects current orders and manuals as of April 2022.

As you prep for this lesson, recall and be prepared to talk about examples and personal experiences that illustrate or explain the teaching points in the lesson.

LESSON ICON LEGEND

	Description
	The Activity icon indicates an exercise, lab, or hands-on activity.
	The Discussion Question icon signals a discussion question to be asked to the students.
	The Handout icon indicates a handout is to be distributed to the students.
	The Instructor Note icon is in hidden text and indicates text that is for the instructor only.
	The Multimedia icon indicates a video or audio clip is in the presentation.
	The Phraseology icon indicates that phraseology is in the content.
	The WBT icon indicates a component of web-based training.
	The Click icon indicates a PPT slide with click-based functionality to present additional information.
	The Definition icon indicates a published definition.

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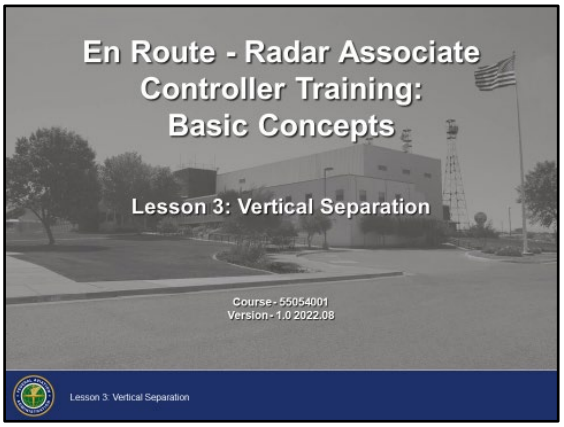
LESSON INTRODUCTION

Lesson Overview

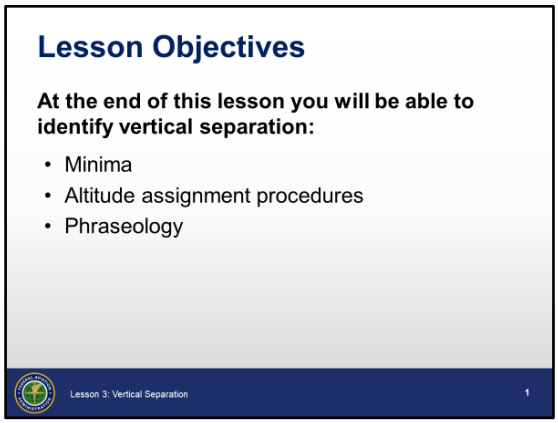


Overview

Understanding vertical separation and its application will help you separate and expedite traffic under your control. The better you understand each rule, the more efficient and effective you become as a controller.

LESSON INTRODUCTION *(CONT'D)*

Lesson Objectives



Objectives

- At the end of this lesson, you will be able to identify vertical separation:
  - Minima
  - Altitude assignment procedures
  - Phraseology

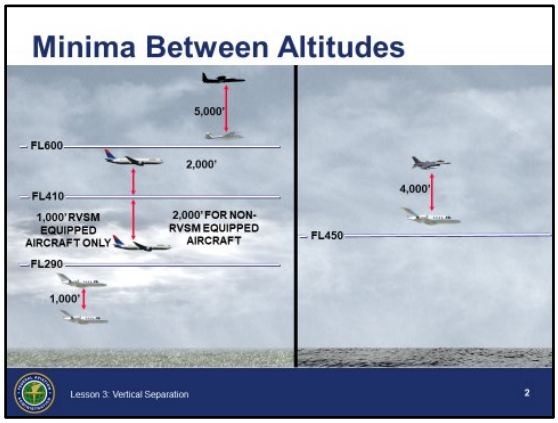
NOTE: There will be a graded end-of-lesson test upon completion of the lesson. The passing score is 70%. If you do not achieve a score of 70%, you will be provided study time and one retake of an alternate end-of-lesson test.

Review the lesson objectives.

SEPARATION MINIMA

Minima Between Altitudes

JO 7110.65, pars. 4-5-1, 4-5-4, Table 4-5-2



Minima Between Altitudes

- Separate IFR aircraft by assigning different altitudes using the following minima:
  - Up to and including FL410 - 1,000’ if Reduced Vertical Separation Minima (RVSM) capable
  - Above FL410 - 2,000’
  - At or above FL290 - Apply 2,000’ between non-RVSM aircraft and all other aircraft also at or above FL290
  - Military aircraft above FL600 - 5,000’
  - Above FL450 - 4,000’ in oceanic airspace, between a supersonic and any other aircraft

NOTE: Oceanic separation procedures are covered in JO 7110.65, chapter 8, sections 7 through 10.

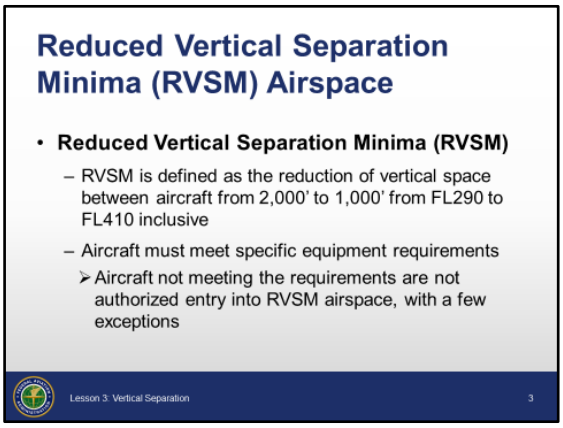
- Lowest usable flight level
  - If a change in atmospheric pressure affects a usable flight level in your area of jurisdiction, use JO 7110.65 Table 4-5-2 to determine the lowest usable flight level

Altimeter Setting	Lowest Usable FL
29.92" or higher	180
29.91" to 28.92"	190
28.91" to 27.92"	200

RVSM Airspace

JO 7110.65, par. 2-1-29

JO 7210.3, par. 6-9-1



RVSM Airspace

⊙ Reduced Vertical Separation Minima (RVSM)

- RVSM is defined as the reduction of vertical space between aircraft from 2,000' to 1,000' from FL290 to FL410 inclusive
- Aircraft must meet specific equipment requirements
  - Aircraft not meeting the requirements are not authorized entry into RVSM airspace, with a few exceptions

RVSM Exceptions

JO 7110.65, par. 2-1-29

JO 7210.3, par. 6-9-1

RVSM Exceptions

- Ensure non-RVSM aircraft are not permitted in RVSM airspace unless they meet the criteria of excepted aircraft and are previously approved by the supervisor/CIC. Exceptions:
  - Department of Defense (DOD) - U.S. military and all NASA DOD certified aircraft
  - MEDEVAC - Civilian airborne ambulance
  - Foreign State aircraft - Aircraft used for transporting a head of state, and those military aircraft associated with international agreements, such as "Open Skies" flights
  - Manufacturer development or certification flights - New production aircraft in the certification and/or development phase that have not received RVSM approval status
- Ensure sector-to-sector coordination for all non-RVSM aircraft operations within RVSM airspace
- Inform the supervisor/CIC when a non-RVSM exception flight is denied clearance into RVSM airspace or is removed from RVSM airspace

SEPARATION MINIMA *(CONT'D)*

Non-RVSM Aircraft Above FL290

JO 7110.65, par. 2-1-29

JO 7210.3, par. 6-9-1

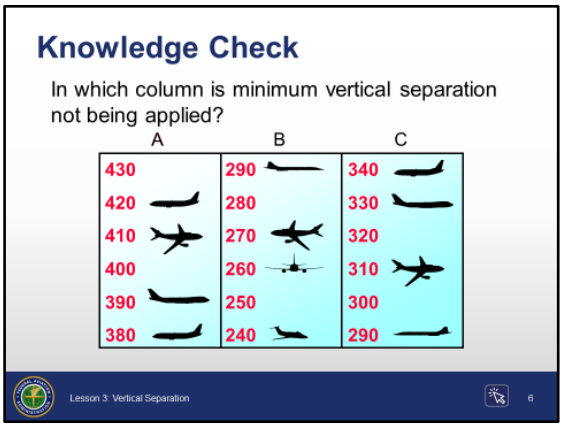
Non-RVSM Aircraft Above FL290

- Apply 2,000' vertical separation between non-RVSM aircraft and all other aircraft in RVSM airspace
- Coordination with affected sectors must be accomplished prior to handoff
  - Non-RVSM aircraft at the base or ceiling of your airspace must be coordinated with any affected sectors
- Apply appropriate separation standards and remove any aircraft from RVSM airspace that advises it is unable to maintain RVSM due to equipment outages while en route
- In the event of a change to an aircraft's RVSM eligibility, amend the RVSM qualifier in the ICAO equipment string in order to properly identify non-RVSM aircraft on the controller display

NOTE: Changing the equipment suffix may change the filed navigation equipment and assigned routes.

SEPARATION MINIMA *(CONT'D)*

Knowledge Check



Question: In which column is minimum vertical separation not being applied?

Answer: *A. The first column*

Non-RVSM Aircraft Transitioning RVSM Airspace

JO 7110.65, par. 2-1-29

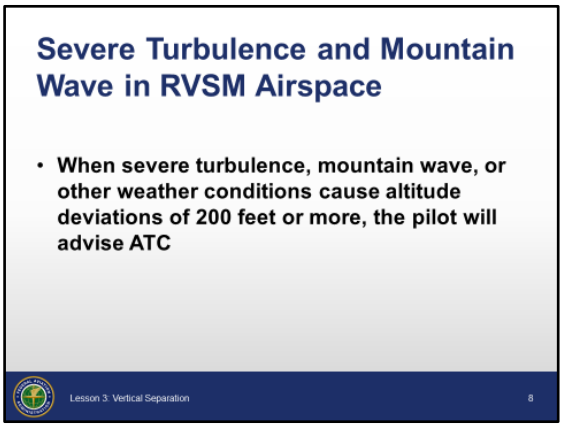
JO 7210.3, par. 6-9-1

Aircraft Transitioning RVSM Airspace

- Non-RVSM aircraft may transition through RVSM airspace to operate above or below it
  - Aircraft transitioning through RVSM airspace may not level off in RVSM airspace unless required by the controller for separation
- Notify the supervisor/CIC of transitioning aircraft
- Transitioning aircraft require approval before handing off to another sector

Severe Turbulence and Mountain Wave in RVSM Airspace

JO 7110.65, par. 5-1-4



Severe Turbulence and Mountain Wave in RVSM Airspace

⊙ When severe turbulence, mountain wave, or other weather conditions cause altitude deviations of 200' or more, the pilot will advise ATC

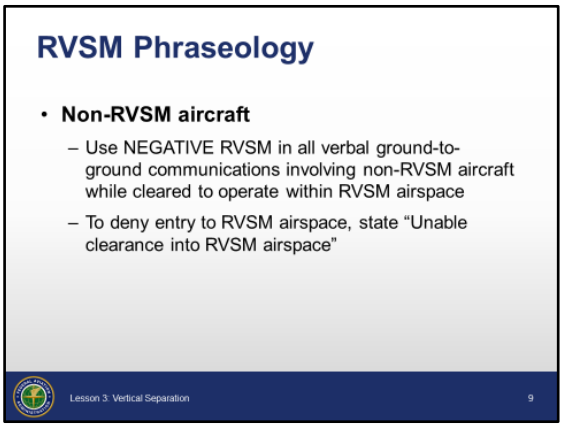
- If unable to vector the aircraft due to turbulence or mountain wave, advise the pilot:

  UNABLE R-V-S-M DUE TO TURBULENCE (OR MOUNTAIN WAVE)

- Discontinue RVSM separation and utilize appropriate separation standards for that aircraft

RVSM Phraseology

JO 7110.65, par. 2-1-29



RVSM Phraseology

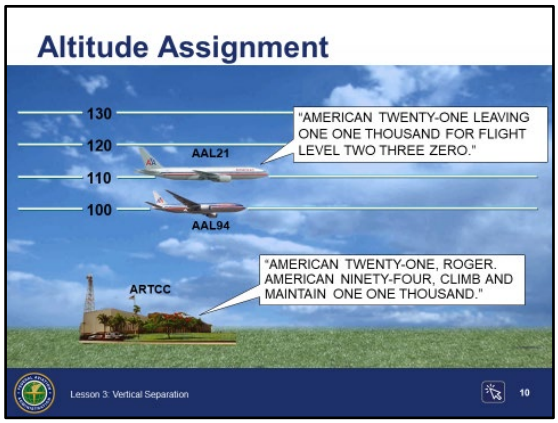
- Use NEGATIVE RVSM in all verbal ground-to-ground communications involving non-RVSM aircraft while cleared to operate within RVSM airspace
- To deny clearance into RVSM airspace:

  UNABLE CLEARANCE INTO R-V-S-M AIRSPACE
- To request a pilot to report when able to resume RVSM:

  REPORT ABLE TO RESUME R-V-S-M

Altitude Assignment

JO 7110.65, pars. 4-5-7, 5-5-5, 6-6-1



Altitude Assignment

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- Aircraft not laterally separated, may be vertically separated by one of the following methods:
  - Assign altitudes to aircraft, provided valid Mode C altitude information is monitored and the applicable separation minima is maintained at all times
  - Assign an altitude to an aircraft after the aircraft previously at that altitude has been issued a climb or descent clearance and is observed (valid Mode C), or reports leaving the altitude

Click to show the clearance to the vacated altitude.

- When applying vertical separation minima, consider:
  - Known aircraft performance characteristics *and/or*
  - Mode C detected information which indicate that climb or descent will not be consistent with the rates recommended in the Aeronautical Information Manual (AIM)

Continued on next page

ALTITUDE ASSIGNMENT PROCEDURES *(CONT'D)*

Altitude Assignment (Cont'd)

JO 7110.65, pars. 4-5-7, 5-5-5, 6-6-1

- Altitude assignment phraseology

MAINTAIN/CRUISE (altitude)

CLIMB AND MAINTAIN (altitude)

DESCEND AND MAINTAIN (altitude)

INTERCEPT (route) AT OR ABOVE (altitude)

CROSS (fix) AT OR ABOVE/BELOW (altitude)

CROSS (number of miles) MILES (direction) OF (name of fix/waypoint) AT OR ABOVE/BELOW (altitude)

CLIMB/DESCEND TO REACH (altitude) AT (time/fix/waypoint)

NOTE: If the restriction is a time, issue a time check.

MAINTAIN BLOCK (altitude) THROUGH (altitude)

- Phraseology for requesting altitude reports

REPORT LEAVING/REACHING (altitude/flight level)

REPORT LEAVING ODD/EVEN ALTITUDES/FLIGHT LEVELS

Examples: "REPORT LEAVING EIGHT THOUSAND"

"REPORT REACHING ONE ZERO THOUSAND"

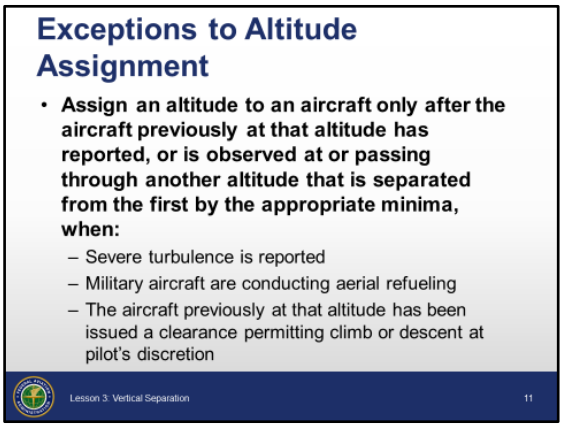
"REPORT LEAVING ODD ALTITUDES"

NOTE: A report leaving an altitude may be used to assign vacated altitudes to other aircraft.

ALTITUDE ASSIGNMENT PROCEDURES *(CONT'D)*

Exceptions to Altitude Assignment

JO 7110.65, pars. 4-5-7, 5-5-6, 6-6-2

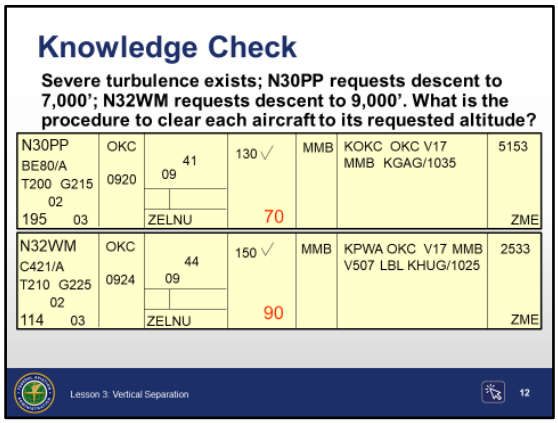


Exceptions to Altitude Assignment

- Assign an altitude to an aircraft only after the aircraft previously at that altitude has been reported or observed at or passing through another altitude separated from the first by the appropriate minima, when:
  - Severe turbulence is reported
  - Military aircraft are conducting aerial refueling
  - The aircraft previously at that altitude has been issued a clearance permitting climb or descent at pilot's discretion
- Do not use Mode C to effect separation with an aircraft on a cruise clearance or on a contact approach
- Mode C information in the data block must not be used for separation when:
  - The position symbol associated with the data block falls more than one history behind the actual aircraft target, or
  - There is no target symbol displayed

ALTITUDE ASSIGNMENT PROCEDURES *(CONT'D)*

Knowledge Check

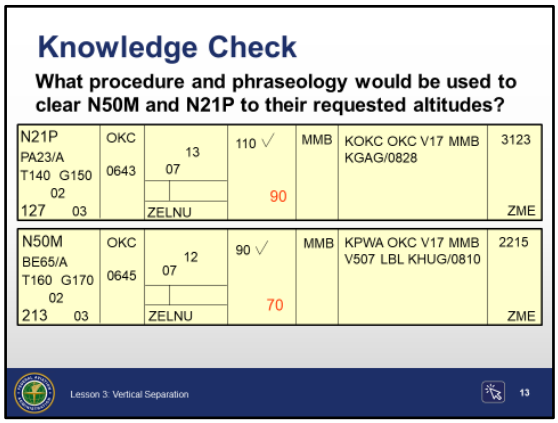


Question: Severe turbulence exists; N30PP requests descent to 7,000'; N32WM requests descent to 9,000'. What is the procedure to clear each aircraft to its requested altitude?

Answer: *When N30PP reports leaving 8,000', N32WM can be assigned 9,000. The aircraft could also be stepped down in altitude.*

ALTITUDE ASSIGNMENT PROCEDURES *(CONT'D)*

Knowledge Check



Question: What procedure and phraseology would be used to clear N50M and N21P to their requested altitudes?

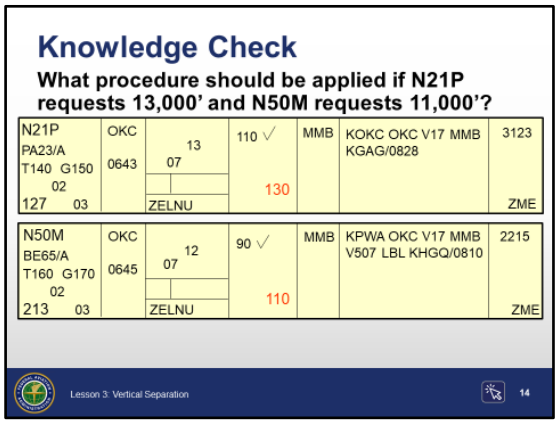
Answer: *"QUEEN AIR FIVE ZERO MIKE, DESCEND AND MAINTAIN SEVEN THOUSAND. REPORT LEAVING NINER THOUSAND"*

When N50M reports leaving niner thousand…

"APACHE TWO ONE PAPA, DESCEND AND MAINTAIN NINER THOUSAND"

ALTITUDE ASSIGNMENT PROCEDURES *(CONT'D)*

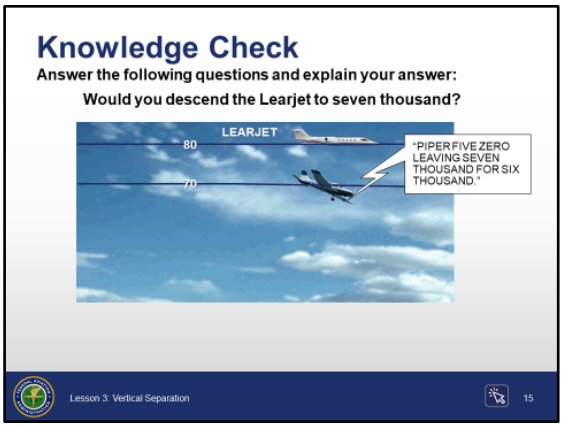
Knowledge Check



Question: What procedure should be applied if N21P requests 13,000' and N50M requests 11,000'?

Answer: *When N21P reports leaving 11,000', N50M may be assigned 11,000'.*

Knowledge Check

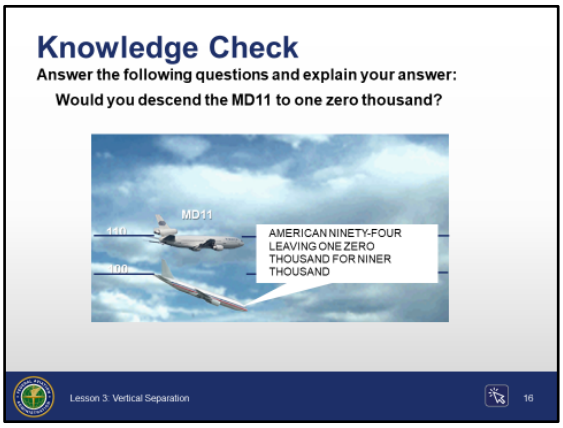


Answer the following question and explain your answer.

Question: Would you descend the Learjet to seven thousand?

Answer: No. The vast difference in aircraft performance characteristics in this situation make this altitude change dangerous.

Knowledge Check



Answer the following question and explain your answer.

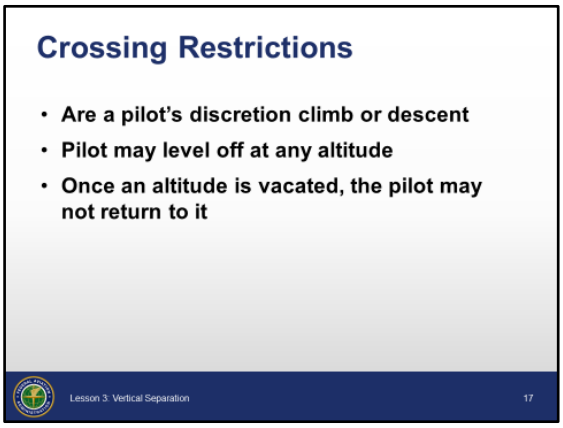
Question: Would you descend the MD11 to ten thousand?

Answer: Yes. The aircraft characteristics in this situation are compatible.

ALTITUDE ASSIGNMENT PROCEDURES *(CONT'D)*

Crossing Restrictions

JO 7110.65, par. 4-5-7



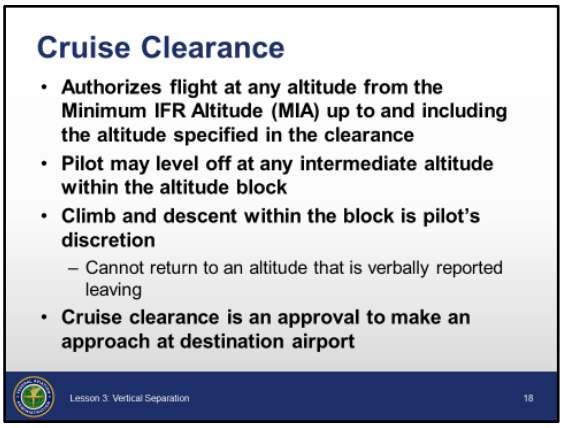
Crossing Restrictions

- Crossing restrictions are pilot's discretion climb or descent
- Pilot may level off at any altitude
- Once an altitude is vacated, the pilot may not return to it

ALTITUDE ASSIGNMENT PROCEDURES *(CONT'D)*

Cruise Clearance

JO 7110.65, par. 4-5-7, PCG



Cruise Clearance

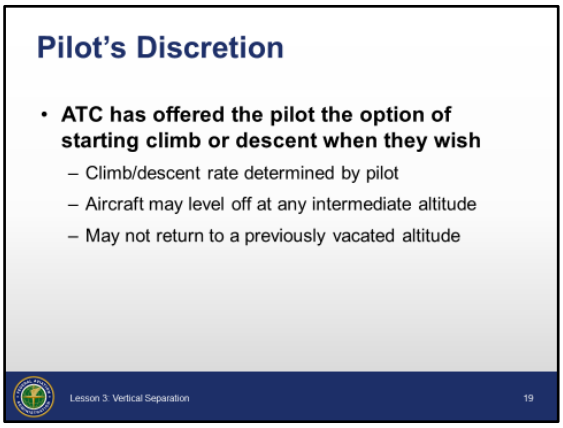
- Authorizes a pilot to conduct flight at any altitude from the minimum IFR altitude up to and including the altitude specified in the clearance
- The pilot may level off at any intermediate altitude within this block of airspace
- Climb or descent within the block is to be made at the discretion of the pilot
  - Once the pilot starts descent and verbally reports leaving an altitude in the block, they may not return to that altitude without additional ATC clearance
- Cruise clearance is approval for the pilot to proceed to and make an approach at destination airport and can be used in conjunction with:
  - An airport clearance limit at locations with a standard/special instrument approach procedure. The Code of Federal Regulations (CFR) require that if an instrument letdown to an airport is necessary, the pilot shall make the letdown in accordance with a standard/special instrument approach procedure for that airport, *or*
  - An airport clearance limit at locations that are within/below/outside controlled airspace and without a standard/special instrument approach procedure
    - Cruise clearance is NOT AUTHORIZATION for the pilot to descend under IFR conditions below the applicable minimum IFR altitude nor does it imply that ATC is exercising control over aircraft in Class G airspace
  - At airports where no instrument approach procedure is published, issue a cruise clearance with no crossing restriction

Example: "CRUISE SIX THOUSAND"

ALTITUDE ASSIGNMENT PROCEDURES *(CONT'D)*

Pilot's Discretion

JO 7110.65, pars. 4-5-7, 6-6-2



Pilot's Discretion

- When used in conjunction with altitude assignments, means that ATC has offered the pilot the option of starting climb or descent when they wish
  - Climb or descent rate determined by pilot
  - Aircraft may level off at any intermediate altitude
  - May not return to a previously vacated altitude
- Advantages
  - Pilot may determine when to start climb or descent
  - Pilot may level off at an intermediate altitude, but after vacating an altitude may not return to a vacated altitude
  - Discretionary clearance may conserve fuel
- Disadvantages
  - Controller must protect more altitudes
  - Procedure may interfere with sequencing and separation of traffic
- ATC may issue a specified altitude over a specified fix for that portion of a descent clearance, where descent at pilot's discretion is permissible. At any other time it is practicable, authorize climb or descent at pilot's discretion.

CLIMB/DESCEND AT PILOT'S DISCRETION

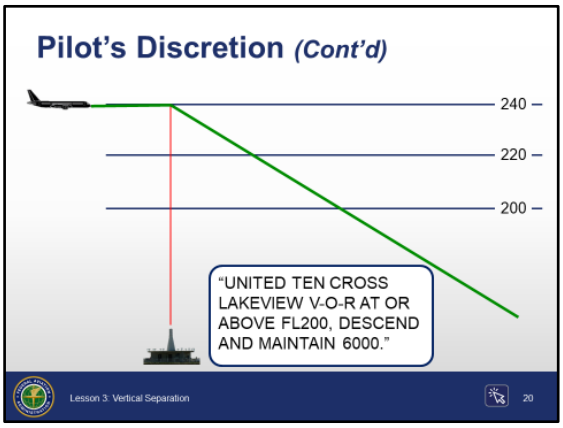
Example: "UAL417 DESCEND AT PILOT'S DISCRETION MAINTAIN FL230"

ALTITUDE ASSIGNMENT PROCEDURES *(CONT'D)*

Pilots Discretion (Cont'd)

JO 7110.65, pars. 4-5-7, 6-6-2

AIM, par. 4-4-10



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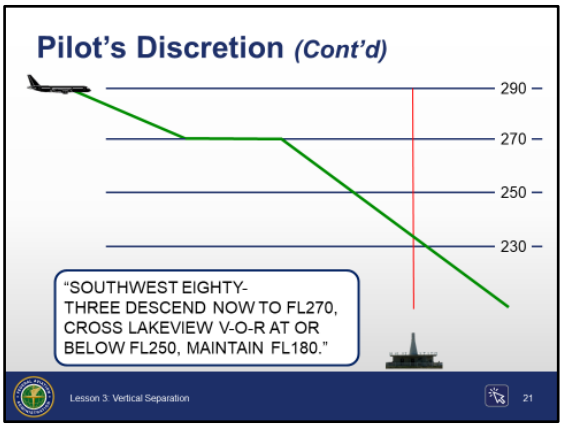
Example: "UAL10 CROSS LAKEVIEW V-O-R AT OR ABOVE FLIGHT LEVEL TWO ZERO ZERO, DESCEND AND MAINTAIN SIX THOUSAND"

Click to show the descent profile for the above example

NOTE: The pilot is authorized to conduct descent "at pilot's discretion" until reaching Lakeview VOR. The pilot must comply with the clearance provision to cross the Lakeview VOR at or above FL200, and after passing Lakeview VOR, the pilot is expected to descend at the rates specified in the Aeronautical Information Manual (AIM) until reaching the assigned altitude of 6,000'.

Pilot's Discretion (Cont'd)

JO 7110.65, pars. 4-5-7, 6-6-2



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Example: "SWA83 DESCEND NOW TO FLIGHT LEVEL TWO SEVEN ZERO, CROSS LAKEVIEW V-O-R AT OR BELOW FLIGHT LEVEL TWO FIVE ZERO DESCEND AND MAINTAIN FLIGHT LEVEL ONE EIGHT ZERO"

Click to show the descent profile for the above example

NOTE: The pilot is expected to promptly execute and complete descent to FL270 upon receipt of the clearance. After reaching FL270, the pilot is authorized to descend "at pilot's discretion" until reaching Lakeview VOR. The pilot must comply with the clearance provision to cross Lakeview VOR at or below FL250. After Lakeview VOR, the pilot is expected to descend at the rates specified in the AIM until reaching Flight Level one eight zero.

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ALTITUDE ASSIGNMENT PROCEDURES *(CONT'D)*

Pilot's Discretion (Cont'd)

JO 7110.65, pars. 4-5-7, 6-6-2

⊙ A descent clearance which specifies a crossing altitude authorizes descent at pilot's discretion for that portion of the flight to which the crossing altitude restriction applies

- Any other time that authorization to descend at pilot's discretion is intended, it must be specifically stated by the controller
- The pilot may need to know of any future restrictions that might affect the descent, including those that may be issued in another sector, in order to properly plan a descent at pilot's discretion

NOTE: Be aware that the descent rates in the AIM are only suggested and aircraft will not always descend at those rates.

⊙ When a portion of a climb or descent may be authorized at the pilot's discretion, specify the altitude the aircraft must climb or descend to, followed by the altitude to maintain at the pilot's discretion

CLIMB/DESCEND NOW TO (altitude), THEN CLIMB/DESCEND AT PILOT'S DISCRETION MAINTAIN (altitude)

Example: "UAL310 DESCEND NOW TO FLIGHT LEVEL TWO EIGHT ZERO, THEN DESCEND AT PILOT'S DISCRETION MAINTAIN FLIGHT LEVEL TWO FOUR ZERO."

NOTE: The pilot is expected to commence descent upon the receipt of the clearance to FL280; at that point, the pilot is authorized to continue descent to FL240 within context of the term "at pilot's discretion" as described in the AIM.

⊙ Removal of pilot's discretion

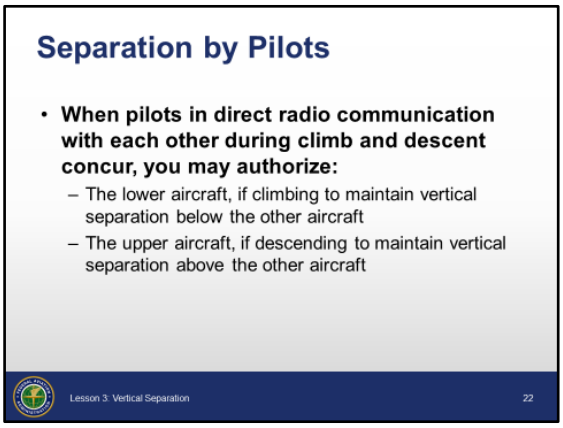
- When the pilot's discretion portion of a climb or descent clearance is being canceled by assigning a new altitude, inform the pilot that the new altitude is an amended altitude

AMEND ALTITUDE

Example: "AAL830 AMEND ALTITUDE, DESCEND AND MAINTAIN FL180"

Separation by Pilots

JO 7110.65, par. 6-6-3



Separation by Pilots

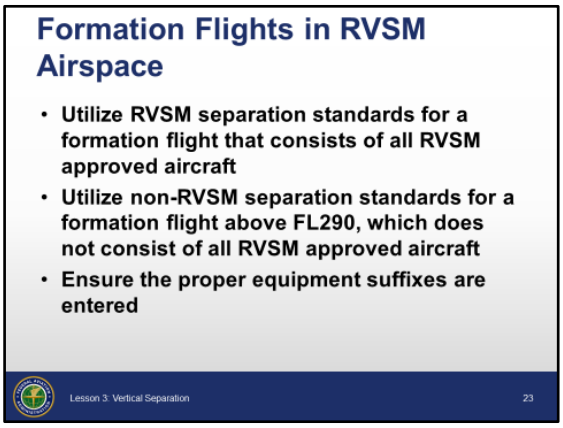
⊙ When pilots in direct radio communication with each other during climb and descent concur, you may authorize:

- The lower aircraft, if climbing, to maintain vertical separation below the other aircraft, or
- The upper aircraft, if descending, to maintain vertical separation above the other aircraft

MAINTAIN AT LEAST (ONE/TWO) THOUSAND FEET (ABOVE/BELOW) (identification)

Formation Flights in RVSM Airspace

JO 7110.65, par. 2-1-13



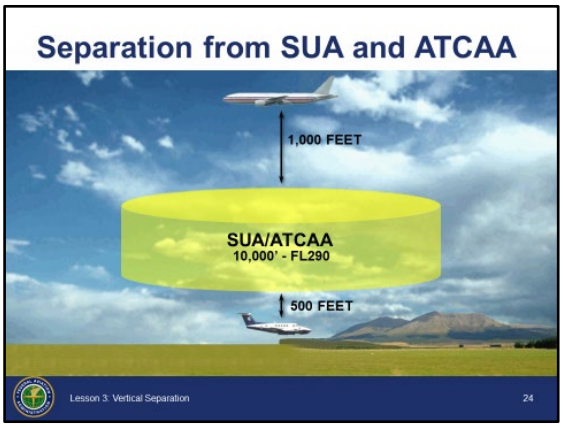
Formation Flights in RVSM Airspace

- Utilize RVSM separation standards for a formation flight that consists of all RVSM approved aircraft
- Utilize non-RVSM separation standards for a formation flight above FL290, which does not consist of all RVSM approved aircraft
- Ensure the proper equipment suffixes are entered
  - If aircraft are requesting to form a formation flight to FL290 or above, the controller who issues the clearance creating the formation flight is responsible for ensuring the proper equipment suffix is entered for the lead aircraft
  - Flights that depart as a formation and are requesting FL290 or above, the first center sector to communicate with the aircraft must ensure the proper equipment suffix is entered
  - If a formation flight is below FL290 and later requests FL290 or above, the controller receiving the RVSM request must ensure the proper equipment suffix is entered
  - Upon break-up of the formation flight, the controller initiating the break-up must ensure that all aircraft or flights are assigned the proper equipment suffix

ALTITUDE ASSIGNMENT PROCEDURES *(CONT'D)*

Separation from Special Use Airspace

JO 7110.65, par. 9-3-2



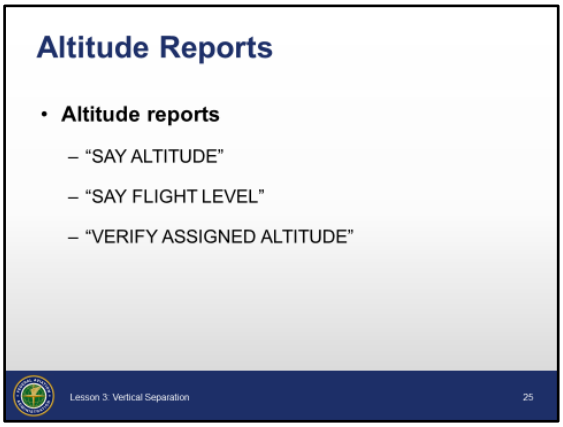
Separation from Special Use Airspace

- Separate nonparticipating aircraft from Special Use Airspace (SUA), ATC Assigned Airspace (ATCAA) and stationary ALTRVs by the following minima:
  - Vertical
    - FL290 and below - At least 500' above/below the altitude limits of airspace
    - Above FL290 - At least 1,000' above/below the altitude limits of airspace
  - Exception
    - Some prohibited/restricted/warning areas are established for security reasons or to contain hazardous activities not involving aircraft operations
    - Unless clearance of nonparticipating aircraft in/through/adjacent to a prohibited/restricted/warning area/MOA/ATCAA/stationary ALTRV is provided for in a letter of agreement (LOA) or letter of procedure (LOP)

VERTICAL SEPARATION PHRASEOLOGY

Altitude Reports

JO 7110.65, pars. 4-5-9, 6-6-1



Altitude Reports

- When an aircraft is known to be operating below the lowest usable flight level:

SAY ALTITUDE

- When an aircraft is known to be above the lowest usable flight level:

SAY FLIGHT LEVEL

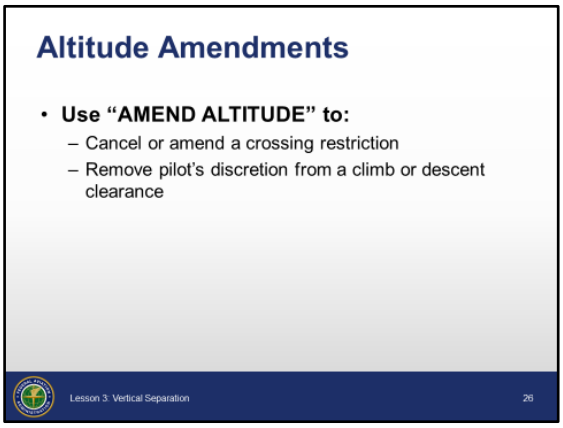
- For an aircraft that is climbing or descending, to verify the altitude assigned to the aircraft:

VERIFY ASSIGNED ALTITUDE

VERTICAL SEPARATION PHRASEOLOGY *(CONT'D)*

Altitude Amendments

JO 7110.65, par. 4-2-5



Altitude Amendments

⊙ Use "Amend Altitude" to:

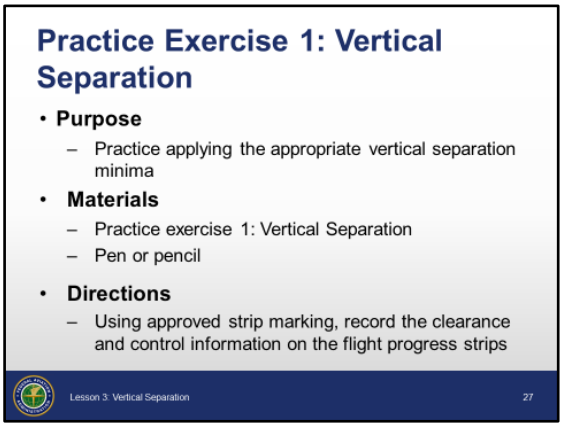
- Cancel or amend a crossing restriction
- Remove pilot's discretion from a climb or descent clearance

AMEND ALTITUDE

NOTE: It is a good technique to say AMEND ALTITUDE when issuing a new altitude to an aircraft that is already climbing or descending.

PRACTICE EXERCISE 1: VERTICAL SEPARATION

Practice Exercise 1



Purpose

Practice applying the appropriate vertical separation minima.

Materials

Handout: *HO01_L03*

- Practice exercise 1 from lesson 3 handout: Vertical Separation
- Pen or Pencil

Directions

This exercise takes approximately 15 minutes to complete. Using approved strip marking, record the clearance and control information on the flight progress strips. Describe the process you would use to apply vertical separation. Write your answers in the spaces provided. There may be more than one solution to each problem.

Discuss other ways to solve the problems. Slides 28 through 31 depict the answers to discuss with the students.

PRACTICE EXERCISE 1: VERTICAL SEPARATION

Exercise 1 - Question 1

TIME: 1235 - How would you clear each aircraft to its requested altitude?

N5PX BE30/G T310 G300 02 176 01	GRIME 1228	56 12 RBL	120 140	OED	KSAC SAC RBL V23 OED KMFR	5136
N67L BE20/G T310 G300 02 213 01	GRIME 1227	55 12 RBL	100 120	OED	KSAC SAC RBL V23 OED KMFR	2607

Exercise 1 - Question 2

TIME: 1144 - How would you clear each aircraft to its requested altitude?

N341LW C650/L T450 G465 02 340 02	SGD 1138	47 11 47 NAKPT	170 ✓ 130	MLC	KOAK SGD T263 DIBLE KRDD	3442
VV72771 P8/L T460 G495 02 321 02	SGD 1138	46 11 46 NAKPT	160 ✓ 120	MLC	KNUQ OAK SGD T263 HOMEG KPDX	2121
N892FX G4/G T420 G435 02 315 02	SGD 1135	45 11 45 NAKPT	150 ✓ 110	FSM	KHWD OAK SGD T263 ELWHA CYVR	2354

Exercise 1 - Question 3

TIME: 0738 - How would you clear each aircraft to its requested altitude?

N674S C310/A T170 02 413 01		↑ 0731/0732 KSTS P0730	50 ✓ 70	ENI 50	KSTS STS V494 ENI KUKI/~~0053~~	2315 D-A ZME
N42P PA23/A T160 02 425 01		↑ 0730/0730 KSTS P0730	70 ✓ 90	ENI 70	KSTS STS V494 ENI KUKI/~~0056~~	1503 D-A ZME

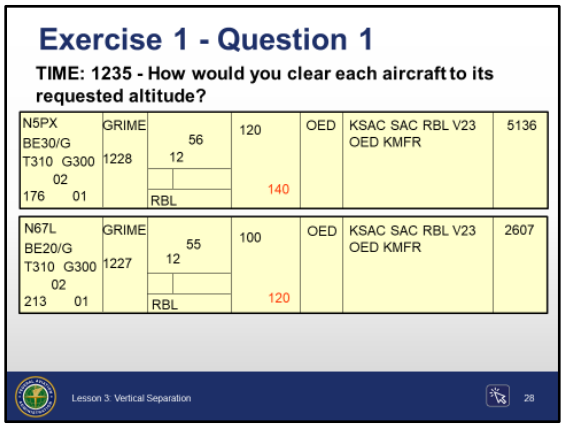
Exercise 1 - Question 4

TIME: 0720 - How would you clear each aircraft to its requested altitude?

N216T MU30/L T440 G440 02 231 01	DURHA 0701	21 ↓ 07 21 | 20/ KRDD	160 ✓ 80		KPVF HNW V332 RBL KRDD	APCH 2413 H - S 180 0740
N73SP GLF4/L T450 G440 02 272 01	DURHA 0701	21 ↓ 07 22 | 20/ KRDD	140 ✓ 70		KPVF HNW V332 RBL KRDD	APCH 1526 H - S 180 0730
N6241T LJ24/G T420 G410 02 195 01	DURHA 0656	17 ↓ 07 17 | 17/ KRDD	120 ✓ 60		KPVF HNW V332 RBL KRDD	APCH 1127 H - S 180 0720

PRACTICE EXERCISE 1 *(CONT'D)*

Practice Exercise 1 (Cont'd)



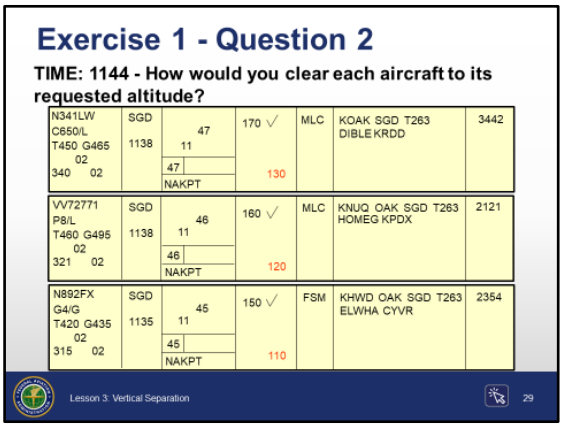
Question: The time is 1235. How would you clear each aircraft to its requested altitude?

Requests: N5PX 14,000', N67L 12,000'

Answer: *Have N5PX climb and maintain 14,000' and report leaving 12,000'. After receiving the report leaving 12,000', have N67L climb and maintain 12,000'.*

PRACTICE EXERCISE 1 *(CONT'D)*

Practice Exercise 1 (Cont'd)



Question: The time is 1144. How would you clear each aircraft to its requested altitude?

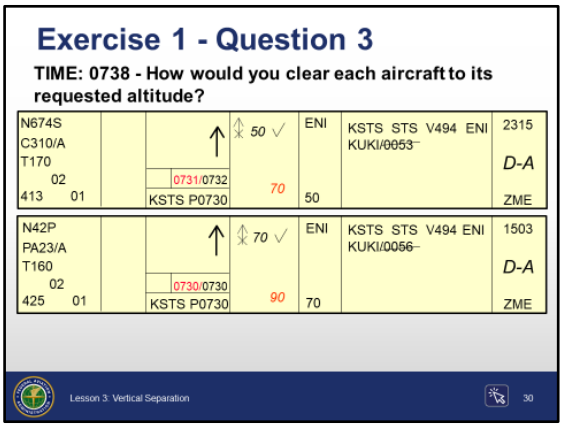
Requests: N341LW 13,000', VV72771 12,000', N892FX 11,000'

Answer: *Have N892FX descend and maintain 11,000' and report leaving even altitudes. As you receive the even altitude reports, descend VV72771 to those altitudes and request VV72771 to report leaving odd altitudes. As VV72771 reports leaving odd altitudes, descend N341LW to those altitudes.*

Discuss other possible solutions

PRACTICE EXERCISE 1 *(CONT'D)*

Practice Exercise 1 (Cont'd)



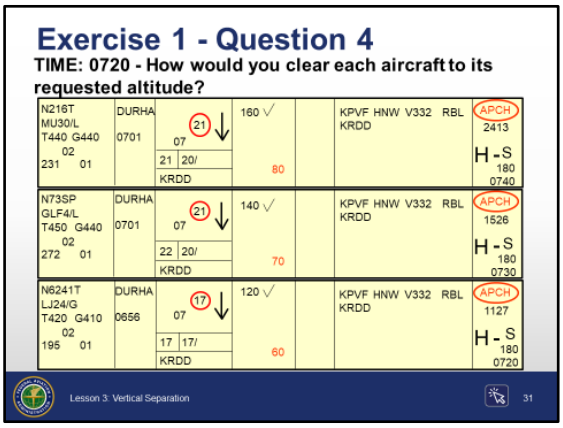
Question: The time is 0738. How would you clear each aircraft to its requested altitude?

Requests: N42P 9,000', N674S 7,000'

Answer: *Have N42P climb and maintain 9,000' and report leaving 7,000'. When N42P reports leaving 7,000', assign 7,000' to N674S.*

PRACTICE EXERCISE 1 *(CONT'D)*

Practice Exercise 1 (Cont'd)



Question: The time is 0720. How would you clear each aircraft to its requested altitude?

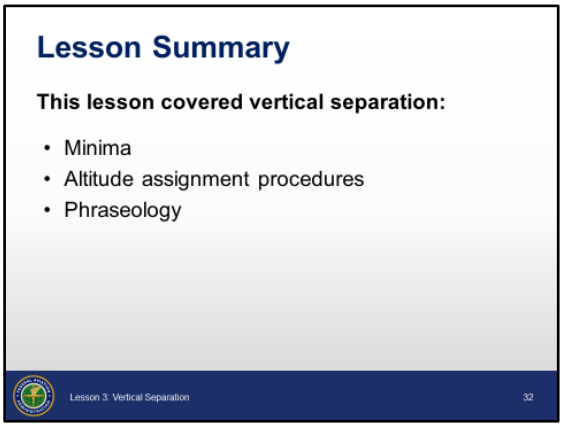
Requests: N6241T 6,000', N73SP 7,000', N216T 8,000'

Answer: *Have N6241T descend and maintain 6,000' and report leaving odd altitudes. As you receive those reports, descend N73SP to those altitudes and request N73SP to report leaving even altitudes. As you receive those reports from N73SP, assign N216T those altitudes.*

Discuss other possible methods.

CONCLUSION

Lesson Summary



Review and elaborate briefly on the following topics. Ask students if they have questions about any of the concepts covered in the lesson.

Summary

- Minima
  - Minima between altitudes
  - RVSM airspace
  - RVSM exceptions
  - Non-RVSM aircraft above FL290
- Altitude assignment procedures
  - Non-RVSM aircraft transitioning RVSM airspace
  - Severe turbulence and mountain wave with RVSM
  - Assign an altitude after an aircraft vacates that altitude
  - Aircraft performance
  - Mode C different than standard aircraft performance
  - Exceptions to altitude assignment
    - Severe turbulence
    - Aerial refueling
    - Pilot's discretion
    - Cruise clearance

Continued on next page

CONCLUSION *(CONT'D)*

Lesson Summary (Cont'd)

- Crossing restrictions
- Separation by pilots
- Formation flights in RVSM airspace
- Separation from SUA and ATCAA

⊙ Phraseology

- RVSM
- Altitude assignment
- Altitude reports
- Altitude amendments

 *Hand out and administer the end of lesson test. Provide feedback on missed items, including why particular answers are correct, as well as why some responses are incorrect.*