Federal Aviation Administration

Initial En Route Qualification Training

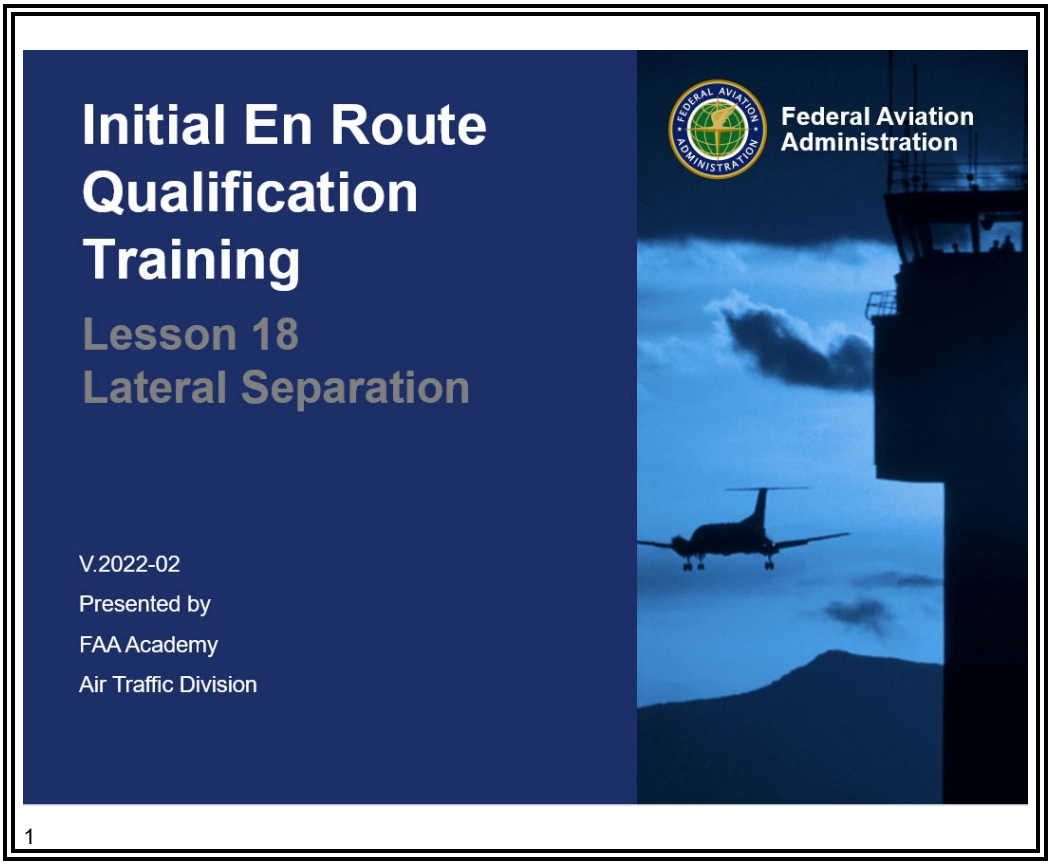
Lesson 18
Lateral Separation

Course 50148001

LESSON PLAN DATA SHEET

COURSE NAME:	INITIAL EN ROUTE QUALIFICATION TRAINING
COURSE NUMBER:	50148001
LESSON TITLE:	LATERAL SEPARATION
DURATION:	12+00 HOURS
DATE REVISED:	2022-02
VERSION:	V.2022-02
REFERENCE(S):	FAA ORDER JO 7110.65, AIR TRAFFIC CONTROL; AERO CENTER MAP; FAA ORDER 8260.3 UNITED STATES STANDARD FOR TERMINAL INSTRUMENT PROCEDURES (TERPS)
HANDOUT(S):	lat1.f2k, lat2.f2k, lat3.f2k, lat4.f2k, lat5.f2k, latptask.f2k - LATERAL SEPARATION PART-TASK STRIPS
EXERCISE(S)/ ACTIVITY(S):	EXERCISE 1: APPLYING LATERAL SEPARATION EXERCISE 2: DEMONSTRATING LATERAL SEPARATION BEST PRACTICES ACTIVITY: ENSURING SEPARATION
END-OF-LESSON TEST:	YES
PERFORMANCE TEST:	NONE
MATERIALS:	NONE
OTHER PERTINENT INFORMATION:	APPENDIX A: ZAE HOLDING PATTERNS

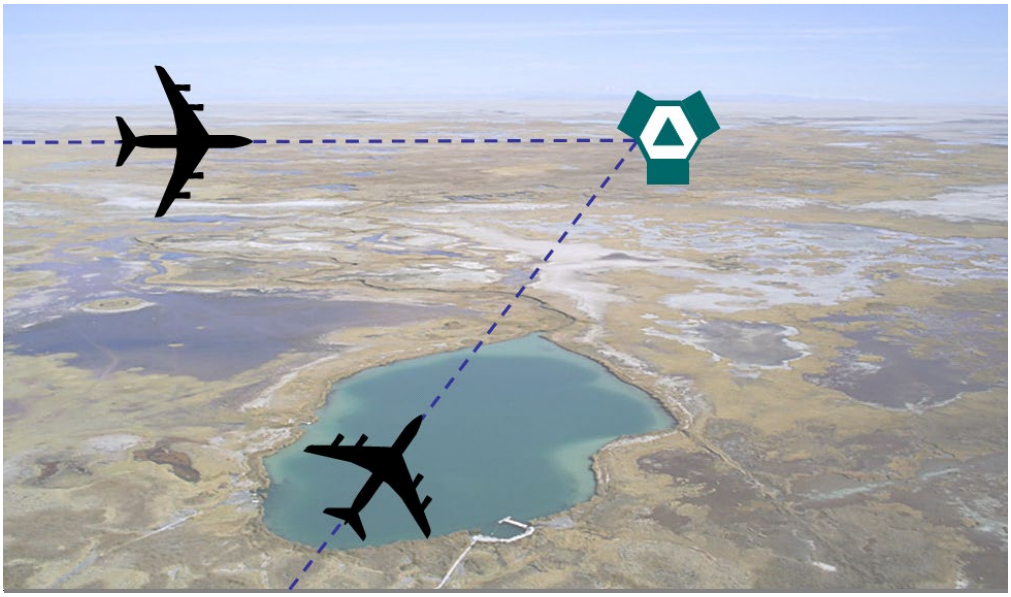
INTRODUCTION



In the previous lesson, you were introduced to longitudinal separation. However, you will **not** be able to apply vertical separation in all situations. Air Traffic Controllers generally use a combination of separation rules to achieve a safe operation. A combination of lateral and vertical separation will allow you to separate aircraft more efficiently.

INTRODUCTION *(Continued)*

LATERAL SEPARATION



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Your ability to apply lateral separation in conjunction with vertical separation will help resolve traffic situations as they become more complex throughout your training.

Purpose

This lesson will cover lateral separation and its application in air traffic control situations.

Lesson Objectives

LESSON OBJECTIVES

- On an End-of-Lesson Test, and in accordance with FAA Order JO 7110.65, you will identify:
  - Airspace to be protected along airways/routes, and holding patterns
  - Minima and procedures for applying lateral separation

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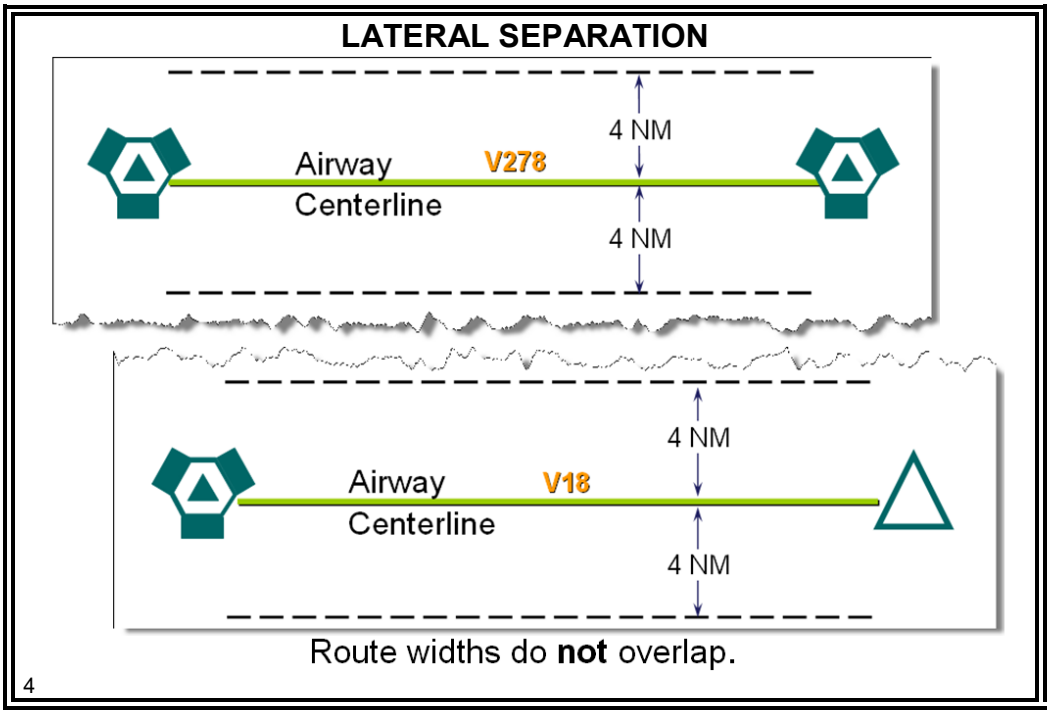
LATERAL SEPARATION METHODS

Methods
JO 7110.65,
par. 6-5-1



⊙ Clear aircraft on different airways or routes whose widths or protected airspace **must not** overlap.

NOTE: Protected airspace can touch, but it **cannot** overlap.

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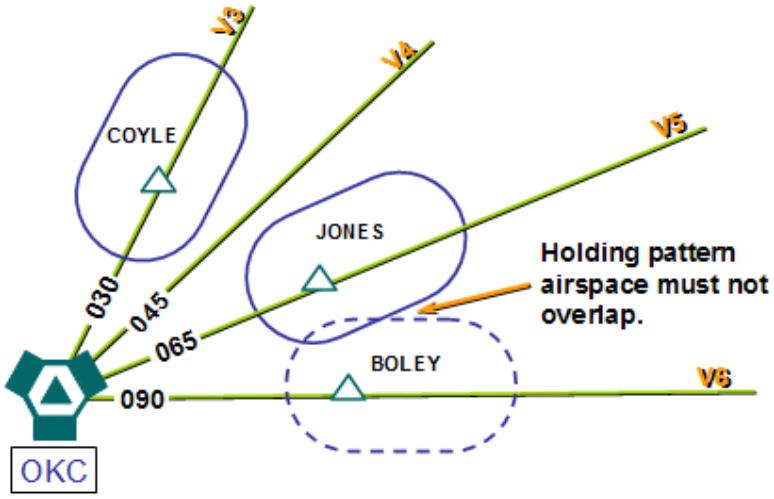
LATERAL SEPARATION METHODS *(Continued)*

Methods (Cont'd)
JO 7110.65, par. 6-5-1

SEPARATION IN HOLDING PATTERNS



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Clear aircraft to hold over different fixes whose holding patterns **must not** overlap.

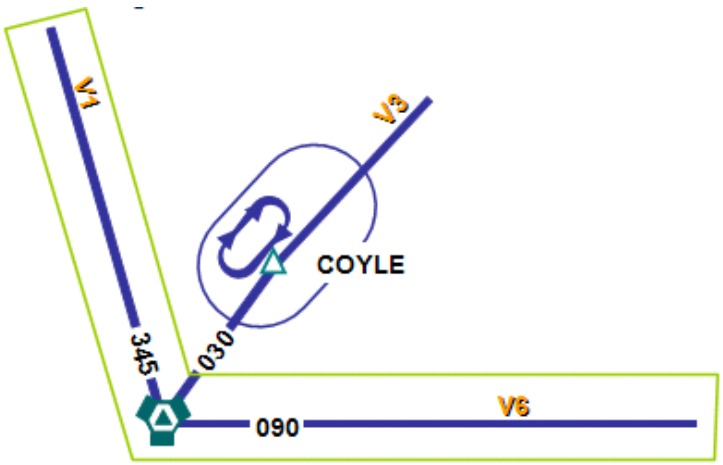
- If holding patterns overlap, do **not** hold aircraft at the same altitude

Continued on next page

LATERAL SEPARATION METHODS *(Continued)*

Methods (Cont'd)
JO 7110.65, par. 6-5-1

SEPARATION BETWEEN HOLDING PATTERNS AND AIRWAYS/ROUTES



Protected airspaces may **not** overlap.

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- Clear aircraft to hold over different fixes whose holding patterns **must not** overlap other protected airspace.

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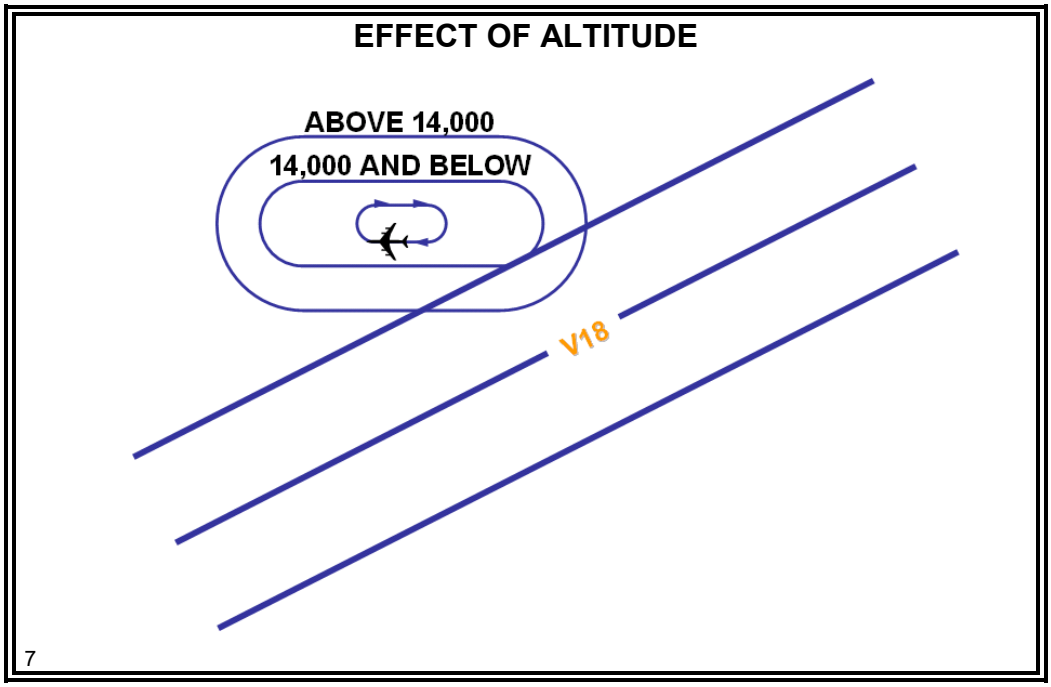
LATERAL SEPARATION METHODS *(Continued)*

Methods (Cont'd)
JO 7110.65, par. 6-5-1



- Holding pattern protected airspace area increases with an increase in an aircraft's altitude and/or speed.

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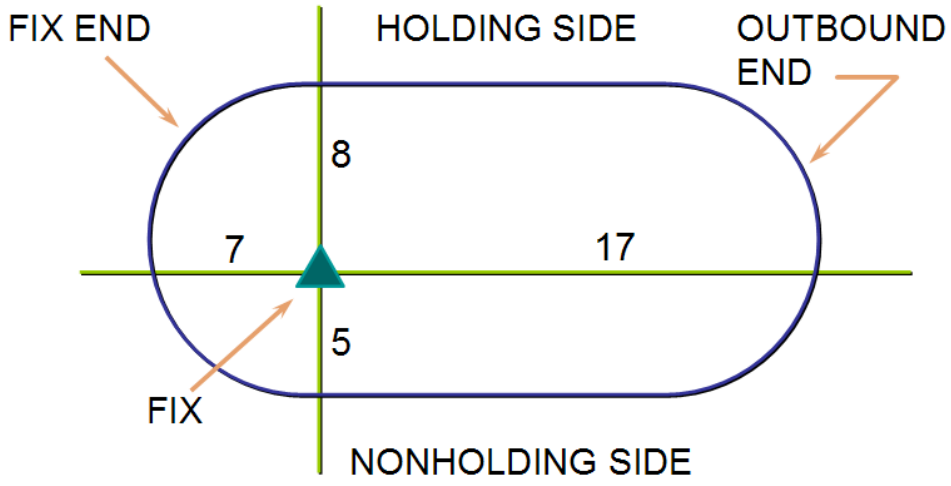
LATERAL SEPARATION METHODS *(Continued)*

Methods (Cont'd)
JO 7110.65, par. 6-5-1

AERO CENTER HOLDING PATTERN



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- The above holding pattern was used in Aero Center to determine the protected airspace used in nonradar maps, scenarios, and procedures

NOTE: Other templates are available for other altitudes and types of aircraft.

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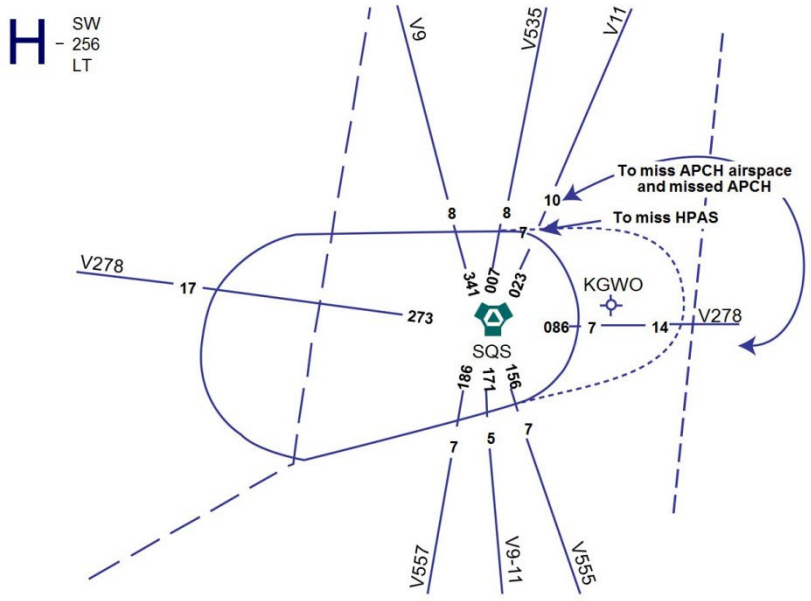
LATERAL SEPARATION METHODS *(Continued)*

Methods (Cont'd)
JO 7110.65, par. 6-5-1

SQS HOLDING PATTERN



NOTE: SQS holding pattern overlaps Sector 67 airspace and requires coordination before and after use. The dotted line at the airport end depicts additional protected airspace for the actual approach to the airport including the missed approach. Other Aero Center holding patterns are in Appendix A of this lesson.

NOTE: KGWO departures which require a crossing restriction or report on V11, V278 or V535 of 10 miles NE SQS or less must include "ON/established on" an airway.
Example: "Cross one zero miles NE SQS VORTAC ON/Established ON V11 at or below 6000"….

LATERAL SEPARATION METHODS *(Continued)*

Knowledge Check

KNOWLEDGE CHECK

QUESTION: The protected airspace of a holding pattern must **not** _____ of an airway.

A. overlap the protected airspace

B. overlap the centerline

C. touch the protected airspace

10

KNOWLEDGE CHECK

QUESTION: The size of the protected airspace of a holding pattern varies according to _____ and _____.

A. speed; direction of holding

B. altitude; wind speed

C. speed; altitude

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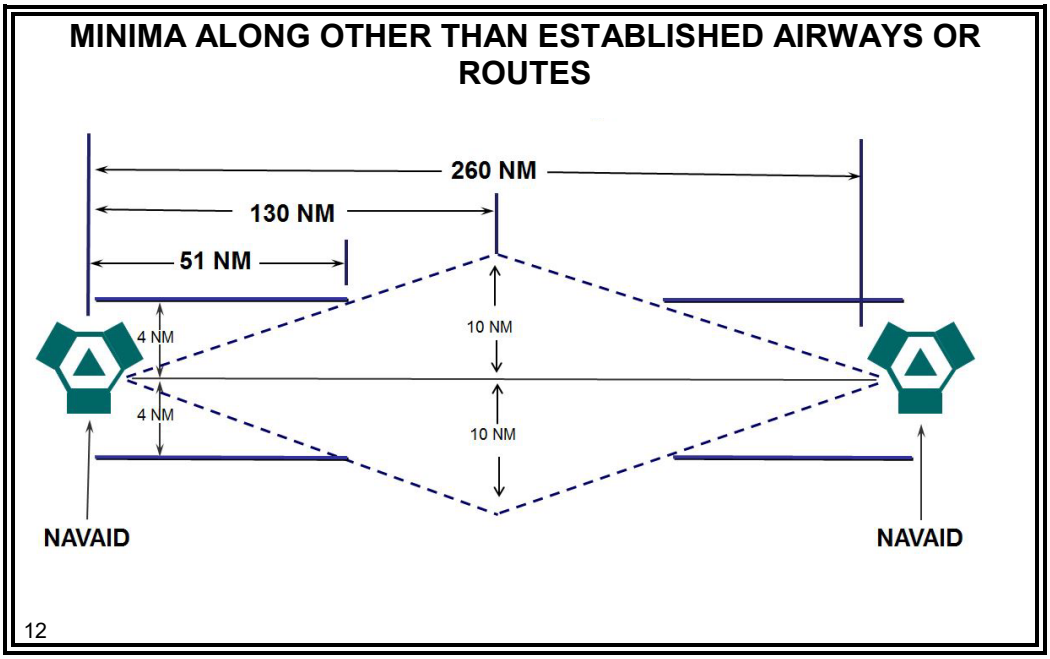
PROTECTED AIRSPACE

Minima Along Other Than Established Airways/ Routes
JO 7110.65, par. 6-5-4



Protect airspace along other than established airways or routes as follows:

⊙ Direct courses and course changes of 15 degrees or less:

- Via NAVAIDs or radials FL 600 and below− 4 miles on each side of the route to a point 51 miles from the NAVAID, then increasing in width on a 4 1/2 degree angle to a width of 10 miles on each side of the route at a distance of 130 miles from the NAVAID.

PROTECTED AIRSPACE *(Continued)*

Protected Airspace

PROTECTED AIRSPACE

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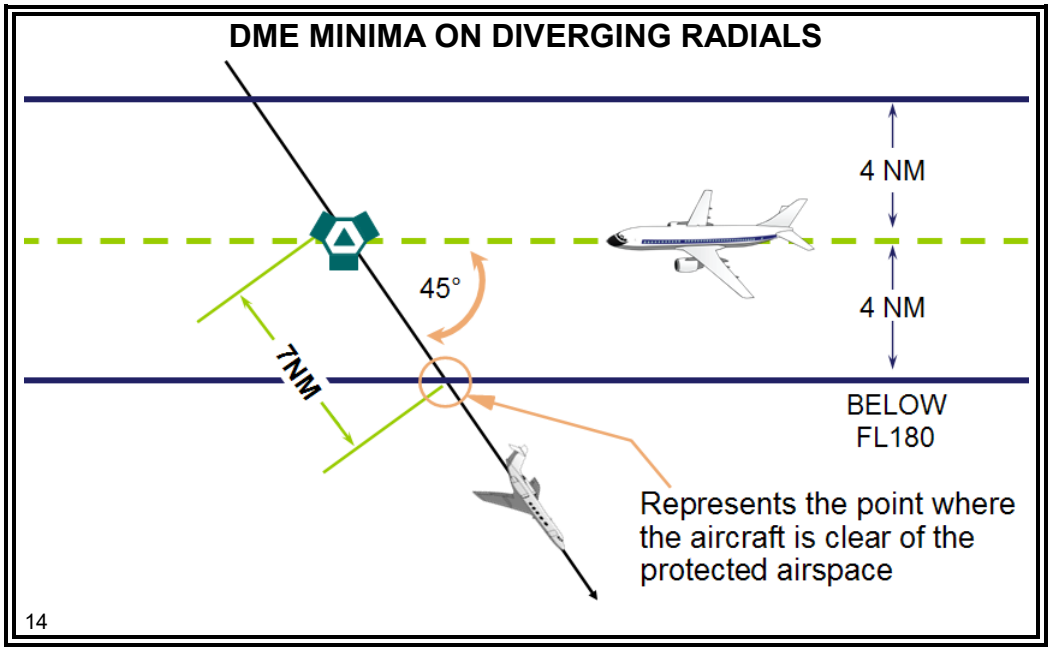
NOTE: This animation is intended to illustrate the concept of lateral and longitudinal protected airspace.

MINIMA ON DIVERGING RADIALS

Separation Criteria
JO 7110.65, par. 6-5-2, table 6-5-2



- Consider separation to exist between aircraft:
  - Established on diverging radials of the same NAVAID
    - At least 15 degrees divergence when either aircraft is clear of the airspace to be protected for the other aircraft

MINIMA ON DIVERGING RADIALS *(Continued)*

DME Divergence Distance Minima
JO 7110.65, par. 6-5-2, table 6-5-2

DME DIVERGENCE DISTANCE MINIMA

Divergence (Degrees)	Distance (NM) (below FL180)
15	17
20	13
25	11
30	9
35	8
45	7
55	6
90	5

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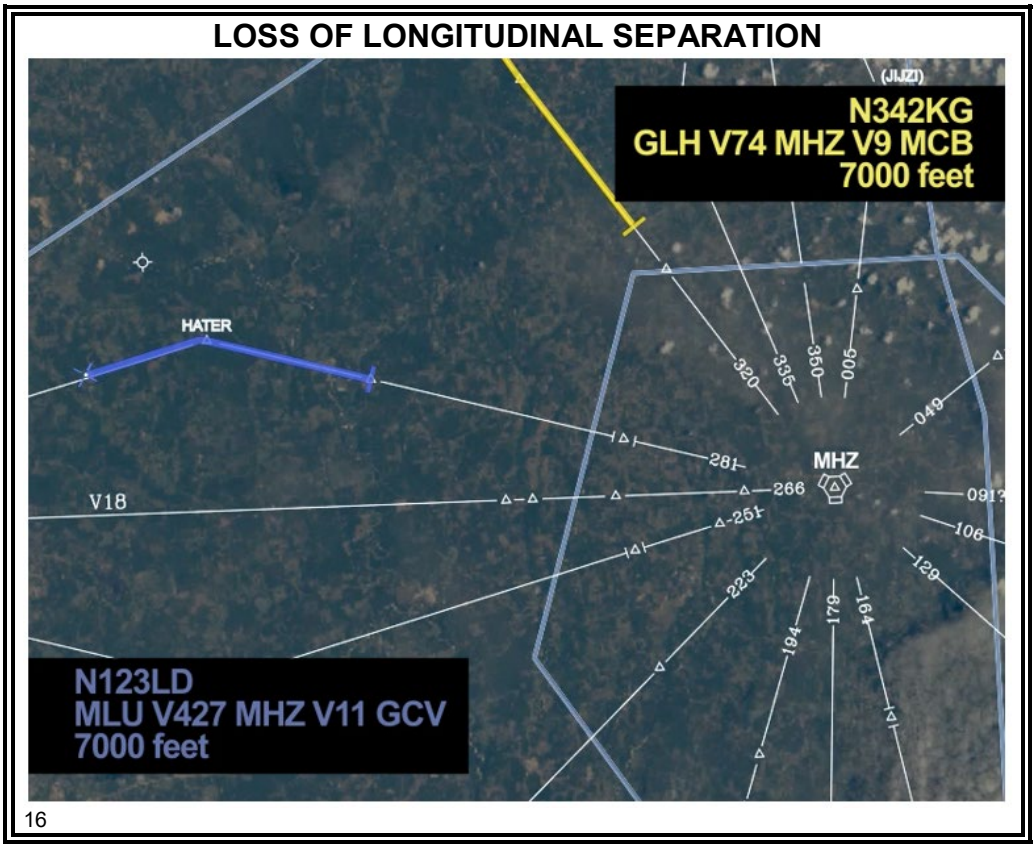
⊙ DME Application Table

- Used to determine the distance required for angles of divergence to clear protected airspace
  - If the divergence falls between two values, use the greater distance minima
- Compensates for DME slant-range error
  - Slant-range is the line-of-sight distance between the aircraft and NAVAID

NOTE: Students must memorize DME Divergence Table. It will **not** be available during tests.

MINIMA ON DIVERGING RADIALS *(Continued)*

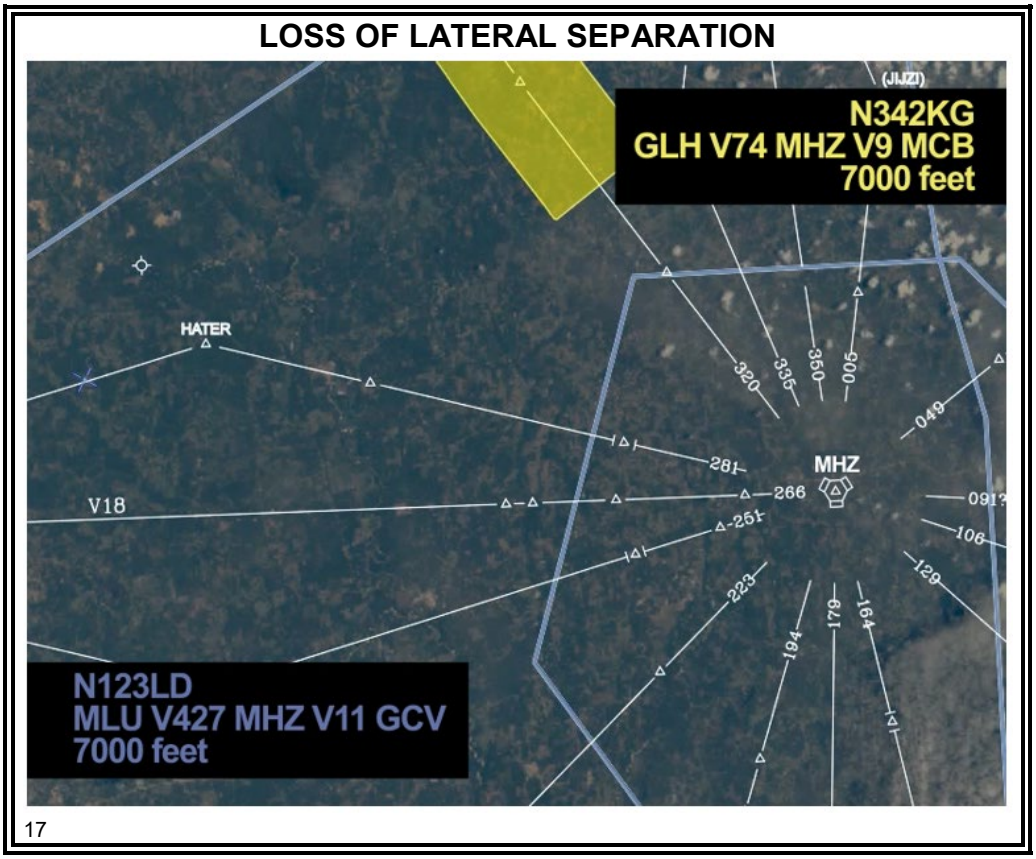
Loss of Longitudinal Separation



NOTE: This animation is intended to illustrate loss of longitudinal separation and the requirement to issue a clearance establishing some other form of separation prior to loss of longitudinal.

MINIMA ON DIVERGING RADIALS *(Continued)*

Loss of Lateral Separation

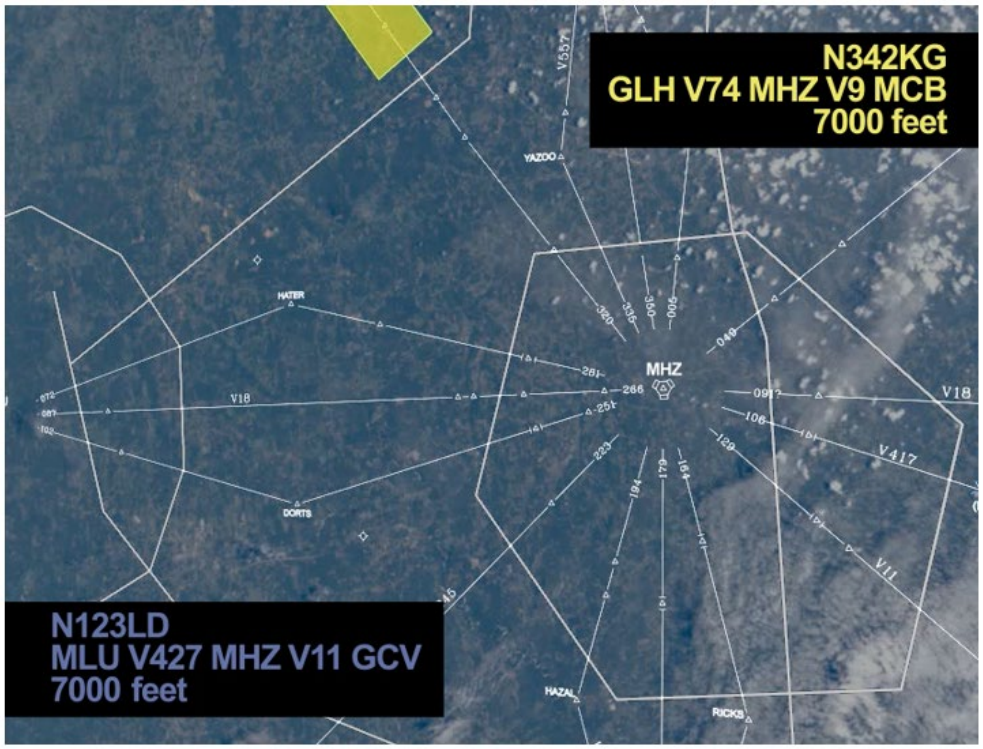


NOTE: This animation is intended to illustrate loss of lateral separation.

MINIMA ON DIVERGING RADIALS *(Continued)*

Establishing Vertical Separation

ESTABLISHING VERTICAL SEPARATION WITH A CROSSING RESTRICTION



"N123LD cross 8 miles northwest Magnolia VORTAC at or above eight thousand. Climb and maintain niner thousand."

18

NOTE: This animation is intended to illustrate the establishment of vertical separation at the same point where lateral separation is lost.

MINIMA ON DIVERGING RADIALS *(Continued)*

Knowledge Check

KNOWLEDGE CHECK

QUESTION: To determine a distance for lateral separation when the degrees divergence falls between two values listed in the divergence table, _____.

A. take the average of the two distances

B. use the greater distance

C. use the lesser distance

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KNOWLEDGE CHECK

QUESTION: The width of V18, 40 miles east of MLU VORTAC, is _____ miles.

A. 4

B. 8

C. 10

20

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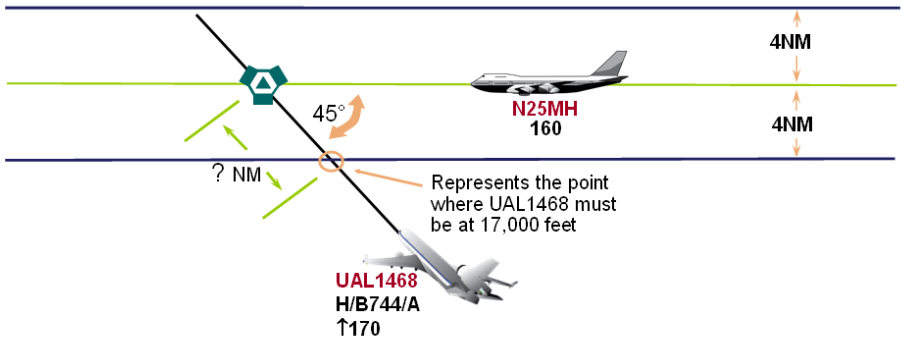
MINIMA ON DIVERGING RADIALS *(Continued)*

Knowledge Check (Cont'd)

KNOWLEDGE CHECK



QUESTION: How many miles southeast of the VORTAC must UAL1468 (DME aircraft) be at 17,000 feet to provide minimum lateral separation from N25MH?

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EXERCISE 1: APPLYING LATERAL SEPARATION

Exercise 1

APPLYING LATERAL SEPARATION EXERCISE

Purpose: to practice applying lateral separation rules

Directions: use lateral separation rules and provided aides to answer questions

22

Directions Use your Aero Center Map to answer questions 1 through 10 in this exercise.

Questions

QUESTION 1: What is the required mileage for the following diverging angles? (Use the DME Application Table on p. 13)

DIVERGING ANGLES	BELOW FL180
15 degrees	
45 degrees	

QUESTION 2: AAL42 is 40 miles west of Magnolia VORTAC on V427 at one six thousand. At this position, what airspace **must** be protected on either side of the route?

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Continued on next page

EXERCISE 1: APPLYING LATERAL SEPARATION
(Continued)

Questions (Cont'd)

QUESTION 3: Under what condition may aircraft be cleared to hold over different fixes at the same altitude?

QUESTION 4: When are aircraft established on radials of the same NAVAID that diverge by at least 15 degrees considered to be laterally separated?

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Use the following flight progress strip on DAL660 to answer questions 5 through 10.

Question 5 Progress Strips

DAL660 H/B763/I T490 66 03	GLH 1255	59 12 SQS	130	IGB	KTXK V278 IGB LGC LGC1 KATL	
N401L LJ25/A T460 66 01		T→SW- SQS KGWO P1250	↑150 X____ ↡____	MHZ	KGWO SQS V555 KMCB/0025	D-A

25

QUESTION 5: TIME: 1250 RUNWAY: 23

To provide separation from DAL660, N401L **must** have a crossing restriction of _____ miles southeast of SQS VORTAC at or below _____ feet.

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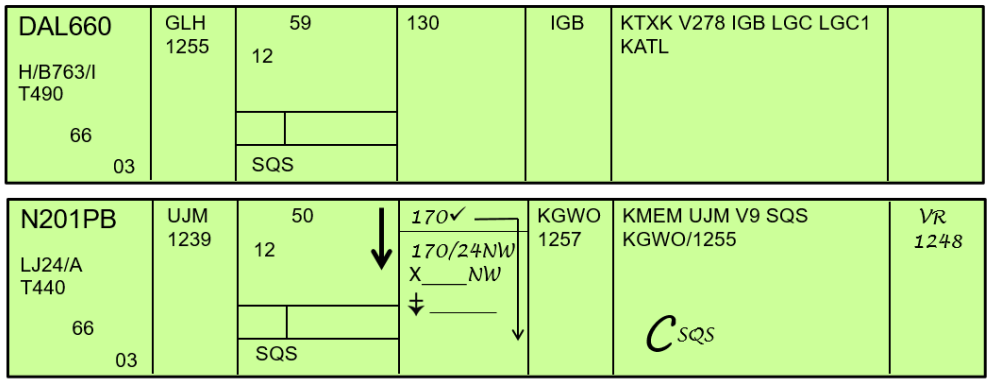
EXERCISE 1: APPLYING LATERAL SEPARATION

(Continued)

Questions (Cont'd)

Question 6 Progress Strips



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QUESTION 6: TIME: 1248

To provide separation from below DAL660, N201PB **must** have a crossing restriction of _____ miles northwest of SQS VORTAC at or below _____ feet.

Continued on next page

EXERCISE 1: APPLYING LATERAL SEPARATION
(Continued)

Questions (Cont'd)

Question 7 Progress Strips

DAL660 H/B763/I T490 66 03	GLH 1255	59 12 SQS	130	IGB	KTXK V278 IGB LGC LGC1 KATL	
N401L LJ25/A T460 66 01		T→SW- SQS KGWO P1250	↑150 X____ ↡____	MHZ	KGWO SQS V555 KMCB/0025	D-A

27

QUESTION 7: To provide lateral separation from DAL660, N401L **must** have a crossing restriction of _____ miles southeast of SQS VORTAC at or below _____ feet.

Question 8 Progress Strips

DAL660 H/B763/I T490 66 03	GLH 1255	59 12 SQS	130	IGB	KTXK V278 IGB LGC LGC1 KATL	
N751L LJ55/A T465 66 02	MHZ 1249	57 12 SQS	130✓	HLI	KMCB V555 SQS V11 HLI M41/1312	

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QUESTION 8: When will separation cease to exist between N751L and DAL660?

Continued on next page

EXERCISE 1: APPLYING LATERAL SEPARATION
(Continued)

Questions (Cont'd)

Question 9 Progress Strips

DAL660 H/B763/I T490 66 03	GLH 1255	59 12 SQS	130	IGB	KTXK V278 IGB LGC LGC1 KATL	
N50JC GLF3/A T450 66 02	MHZ 1249	57 12 SQS	↑160 X____ ‡ ____	UJM	KJAN MHZ V9 UJM KMEM/1312	

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QUESTION 9: TIME: 1255 RUNWAY: 18

To provide lateral separation from DAL660, N50JC **must** have a crossing restriction of _____ miles southeast of SQS VORTAC at or above _____ feet.

Question 10 Progress Strips

A25817 BE55/B T230 66 02	STUEE 0040	57 12 58 MHZ	90↓60	KJAN	KMLU V18 MHZ KJAN	H NW
N256B BE65/A T160 66 01		 KJAN P0100	↑90 X____ ‡ ____	KHEZ	KJAN MHZ V245 KHEZ/0030	

30

QUESTION 10: TIME: 0050

To provide separation from A25817's holding pattern at MHZ, N256B **must** be restricted to cross _____ miles southwest of MHZ VORTAC at or below _____ feet.

LATERAL SEPARATION FROM SPECIAL USE AIRSPACE

Conflict with MOA

CONFLICT WITH MOA

"N342KG Cleared to Texarkana airport via direct Sidon Victor 278. Climb and maintain one zero thousand.
B-G."

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NOTE: This animation is intended to illustrate loss of separation between GWO departure and the CBM MOA.

LATERAL SEPARATION FROM SPECIAL USE AIRSPACE *(Continued)*

Crossing Restriction to Miss MOA

CROSSING RESTRICTION TO MISS MOA

"N342KG cleared to Texarkana Airport via direct Sidon Victor 278. Cross eight miles northeast Sidon VORTAC at or below seven thousand. Climb and maintain one zero thousand. B-G."

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NOTE: This animation is intended to illustrate the crossing restriction required to separate a GWO departure from the CBM MOA.

EXERCISE 2: DEMONSTRATING LATERAL SEPARATION BEST PRACTICES

Exercise 2

DEMONSTRATING LATERAL SEPARATION BEST PRACTICES EXERCISE

Purpose: to practice applying lateral separation rules

Directions: complete the flight strips based on the information provided by your instructor

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Directions

In this exercise, you will practice stripmarking and phraseology to ensure lateral separation.

Your instructor will provide five separate sets of flight progress strips and lead the class through a discussion to determine the correct solution, phraseology, and stripmarking for each scenario.

EXERCISE 2: DEMONSTRATING LATERAL SEPARATION BEST PRACTICES SCENARIOS 1-5

34-43

VKS

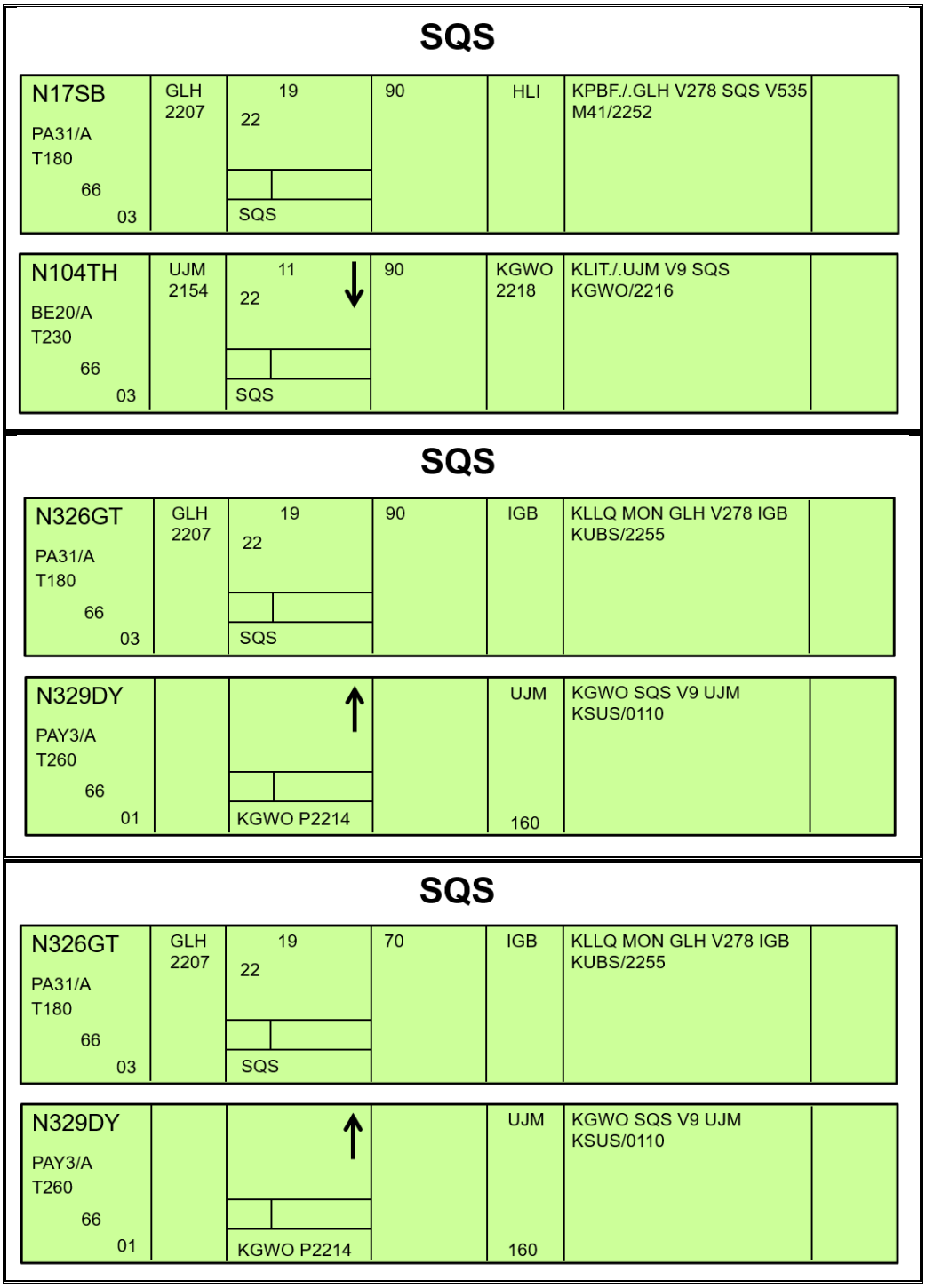
N811SD BE35/A T200 66 01	MLU 1622	28 16 STUEE	90	MHZ	KRSN MLU V18 MHZ V9 KMCB/1720	
N252EW C441/A T250 66 01		↑ KVKS P1610		MLU 120	KVKS MLU V94 EMG KGGG/0050	ZFW

SQS

N17SB PA31/A T180 66 03	GLH 2207	19 22 SQS	90	IGB	KPBF./.GLH V278 IGB KMGM/2307	
N104TH BE20/A T230 66 03	UJM 2154	11 22 ↓ SQS	90	KGWO 2218	KLIT./.UJM V9 SQS KGWO/2216	

SQS

N17SB PA31/A T180 66 03	GLH 2207	19 22 SQS	70	IGB	KPBF./.GLH V278 IGB KUBS/2250	
N104TH BE20/A T230 66 03	UJM 2154	11 22 ↓ SQS	90	KGWO 2218	KLIT./.UJM V9 SQS KGWO/2216	


SQS
N17SB
PA31/A
T180
66
03
GLH
2207
19
22
SQS
90
HLI
KPBF./.GLH V278 SQS V535
M41/2252
N104TH
BE20/A
T230
66
03
UJM
2154
11
22
SQS
90
KGWO
2218
KLIT./.UJM V9 SQS
KGWO/2216
SQS
N326GT
PA31/A
T180
66
03
GLH
2207
19
22
SQS
90
IGB
KLLQ MON GLH V278 IGB
KUBS/2255
N329DY
PAY3/A
T260
66
01
KGWO P2214
UJM
160
KGWO SQS V9 UJM
KSUS/0110
SQS
N326GT
PA31/A
T180
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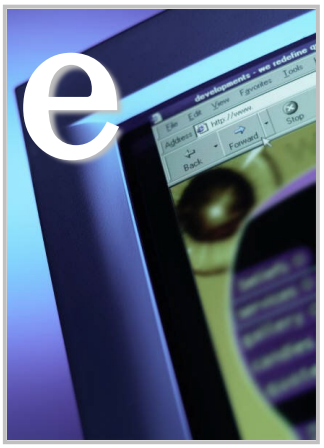
KSUS/0110

ACTIVITY: ENSURING SEPARATION

Activity

ENSURING SEPARATION ACTIVITY



Purpose: to identify and resolve conflictions by applying lateral separation rules

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Description In this activity, you will review flight scenarios with conflictions and then select the appropriate solutions to ensure lateral separation.

Directions Access the IET eLearning menu. Select **Lesson 18 – Lateral Separation**. Click on the title to launch the **Ensuring Separation** activity.

Time Allotted 45 minutes

IN CONCLUSION

Lesson Review

LESSON REVIEW

The following topics were covered in this lesson:

- Lateral separation methods
- Protected airspace
- Minima on diverging radials

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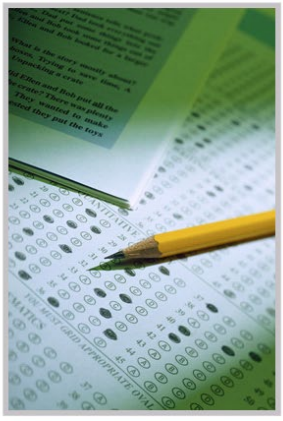
End-of-Lesson Test

END-OF-LESSON TEST

Lateral Separation



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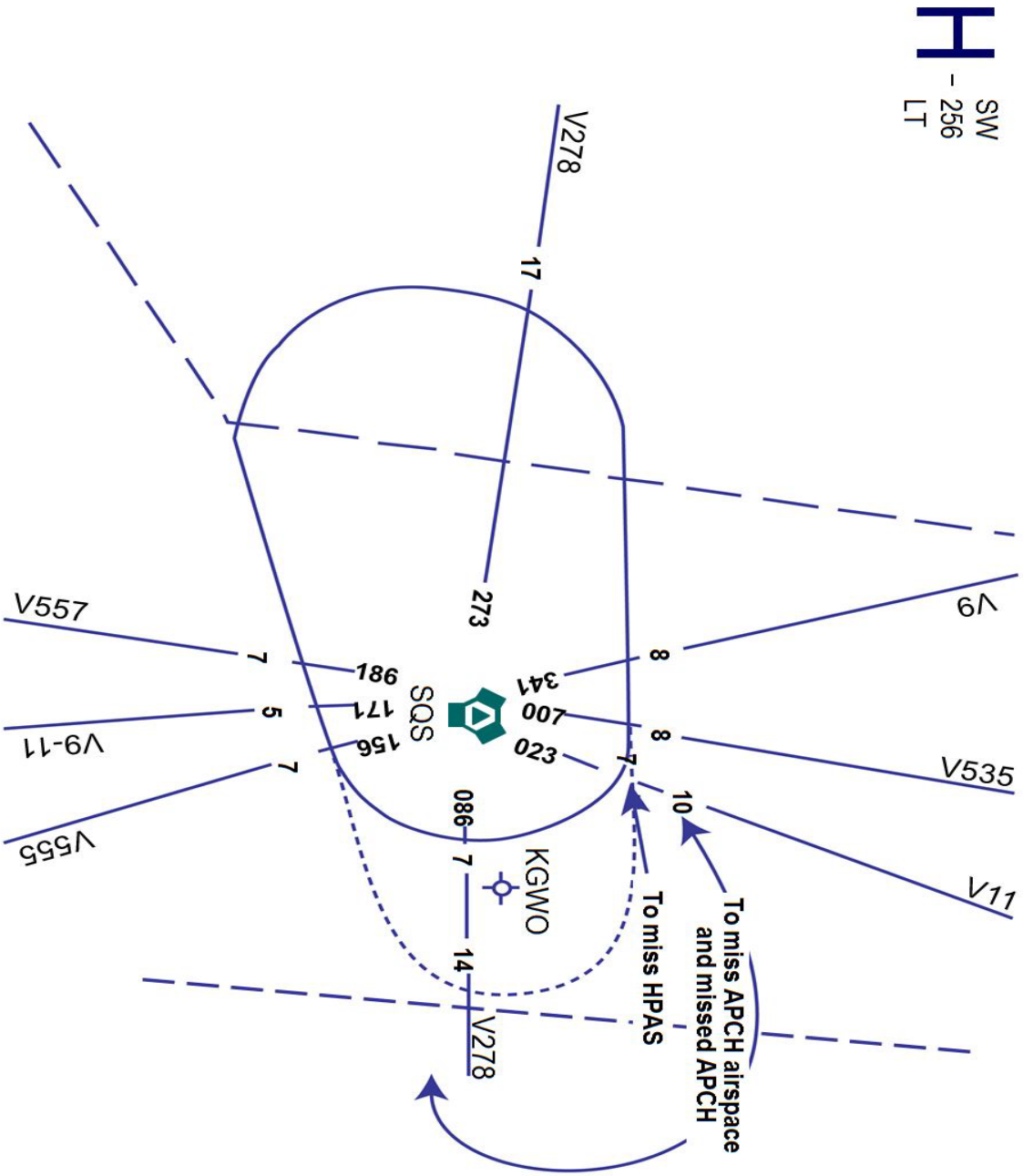
Part-Task Lab

You will now complete the Lateral Separation part-task lab using LATPtask strips.

APPENDIX A: ZAE HOLDING PATTERNS



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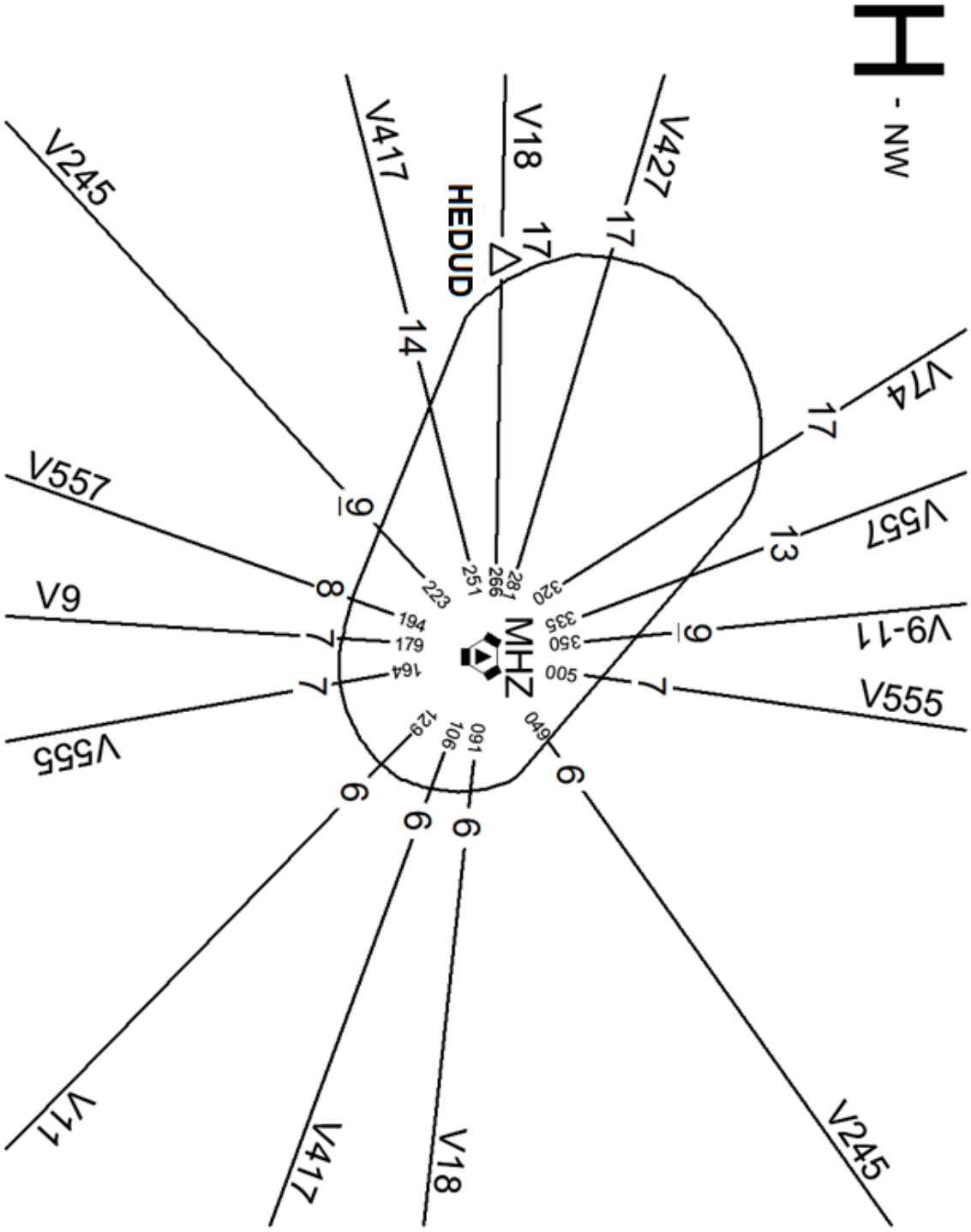
APPENDIX A: ZAE HOLDING PATTERNS *(Continued)*



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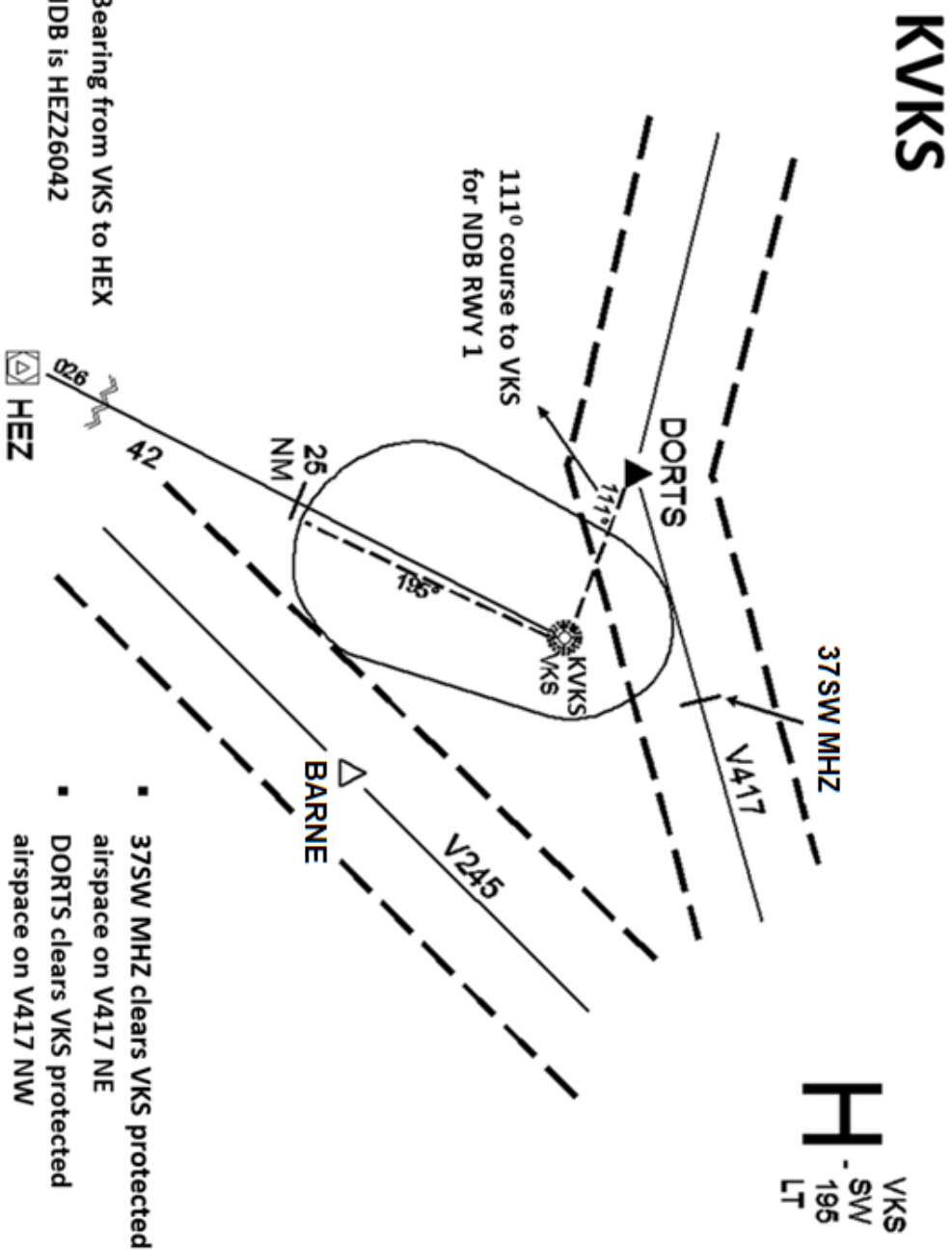
APPENDIX A: ZAE HOLDING PATTERNS *(Continued)*



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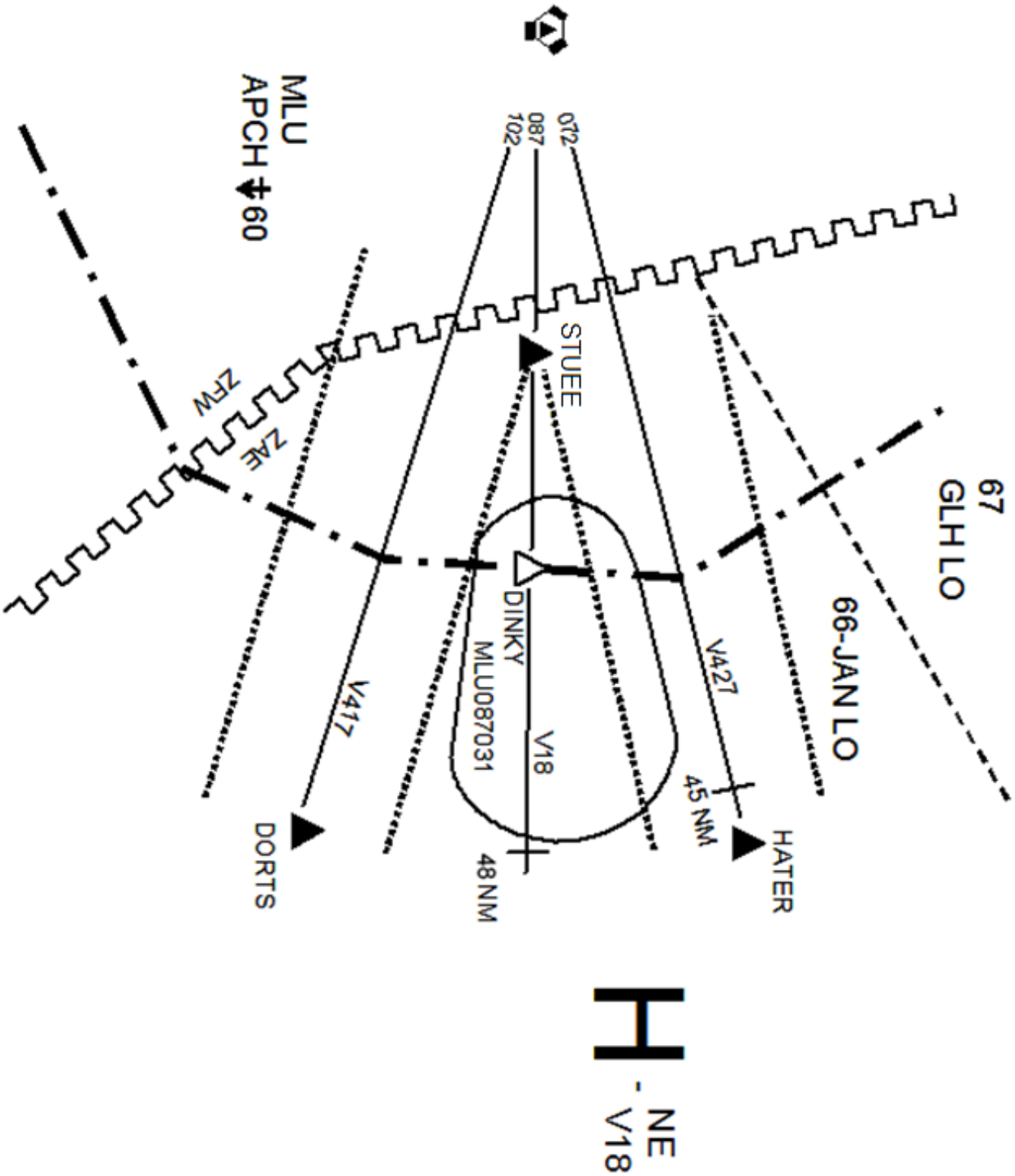
APPENDIX A: ZAE HOLDING PATTERNS *(Continued)*



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