Federal Aviation Administration

EN ROUTE RADAR FLIGHT DATA CONTROLLER TRAINING

Lesson 1: *Air Traffic Service Routes and Airspace*

Version: 2019-12.1

FAA Course Number: 55053

INSTRUCTOR LESSON PLAN

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LESSON PLAN DATA SHEET

Course Name	Radar Flight Data Controller Training
Course Number	55053
Lesson Title	Air Traffic Service Routes and Airspace
Duration	1 hour 30 minutes **Performance Assessment 1 (Chart Completion) will take additional time, which will be determined locally.**
Version	2019-12.1
Reference(s)	AERONAUTICAL INFORMATION MANUAL (AIM); FAA ORDERS JO 7110.65, AIR TRAFFIC CONTROL, JO 7350.9, LOCATION IDENTIFIERS, JO 7400.2, PROCEDURES FOR HANDLING AIRSPACE MATTERS; AND 8260.3, UNITED STATES STANDARD FOR TERMINAL INSTRUMENT PROCEDURES (TERPS); FAR, PART 71, DESIGNATION OF CLASS A, B, C, D, AND E AIRSPACE AREAS, AIR TRAFFIC SERVICE ROUTES, AND REPORTING POINTS; IFR EN ROUTE LOW AND HIGH ALTITUDE CHARTS (FACILITY-PROVIDED); CENTER FEDERAL AIRWAYS AND JET ROUTES LIST (FACILITY-PROVIDED); AND LOCAL CONTROLLER CHARTS (FACILITY-PROVIDED). Advisory Circular AC 90-100
Prerequisite(s)	Course 57056 or current course, course number to be determined, is available as supplemental training for this lesson. It is recommended students complete this eLMS training prior to attending classroom training.
Handout(s)	Facilities will need to provide students the following: ⊙ Two copies of an unlabeled chart of their center area for use in completing the graded exercise ⊙ A facility-prepared center federal airways and jet routes list ⊙ A facility prepared Standard Terminal Arrivals (STARs) and Standard Instrument Departure (SIDs) List. ⊙ Facility-prepared local controller charts ⊙ IFR En Route low and high altitude chart
Exercise / Activity	None
Assessments	End-of-Lesson Test – ELT_V1_L01 **or** ELT_V2_L01 ⊙ There will be a graded end-of-lesson test upon completion of this lesson. The score required for passing will be in accordance with current FAA directives. Performance Assessment – PA_L01: Chart Completion ⊙ The instructor will verify mastery of the objective using locally developed answer keys and passing score requirements. Assessment and remediation strategies, if applicable, will be determined by the local facility and administered in accordance with National and Local Directives.
Materials and Equipment	Performance Assessment – Completion instructions, handouts, and any facility specific content will be developed by the instructor.
Other Pertinent Information	This lesson is based on ERAM EAE130. The lesson has been reviewed and reflects current orders and manuals as of December 2018.

NOTE: *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 PLAN ICONS

	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 QA icon indicates a question to be asked to the entire class by the instructor.
	Warning icon indicates a safety critical note.
	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.

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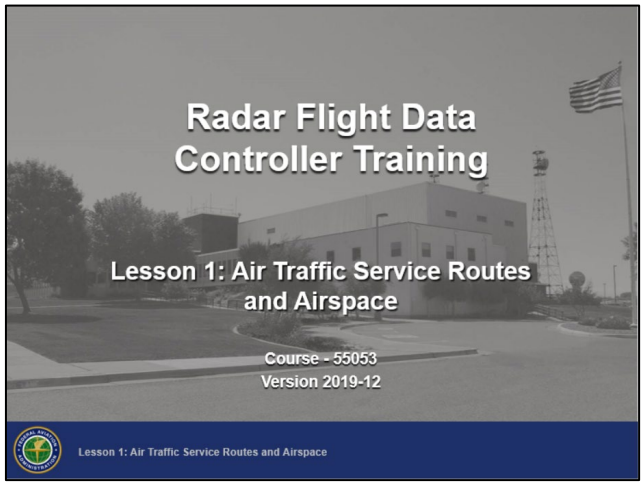
STAGE 2 COURSE INTRODUCTION

Radar Flight Data Controller Training Introduction



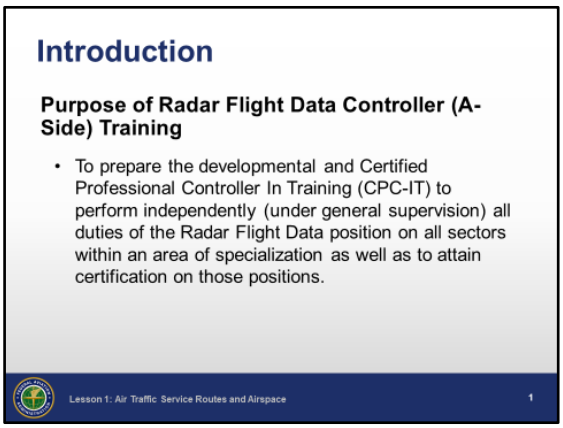
Welcome to the Radar Flight Data Controller training (Stage 2). This position is also known as the Assistant Controller or A-side position.

This is lesson 1 and will cover aspects of Air Traffic Service Routes and Airspace.

STAGE 2 COURSE INTRODUCTION *(Cont'd)*

Radar Flight Data Controller Training Introduction *(Cont'd)*

JO 3120.4, Appendix D, Sec. 3



JO 3120.4, Air Traffic Technical Training, outlines the purpose and framework for each Stage of controller training.

⊙ Purpose of Radar Flight Data Controller (A-Side) Training:

- To prepare the developmental and Certified Professional Controller In Training (CPC-IT) to perform independently (under general supervision) all duties of the Radar Flight Data position on all sectors within an area of specialization as well as to attain certification on those positions.

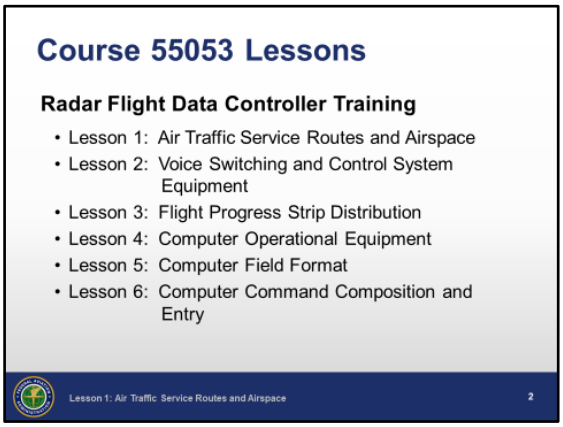
⊙ This stage of training is administered in two parts:

- Instructor-led training uses facility-prepared instructional materials to supplement the nationally prepared lessons.
- On-the-Job-Training (OJT) allows the participant to perform all duties of the assistance controller independently under general supervision.

STAGE 2 COURSE INTRODUCTION *(Cont'd)*

Stage 2 Lessons

JO 3120.4, Appendix D, Sec. 3



NOTE: *Briefly describe how each lesson will be instrumental in preparing the student to perform the duties of the Radar Flight Data Position.*

Shown here are the six nationally prepared lessons which will be supplemented with locally prepared materials.

NOTE: *The following exercises will be locally developed, with the exception of "Loading paper into a Flight Strip Printer."*

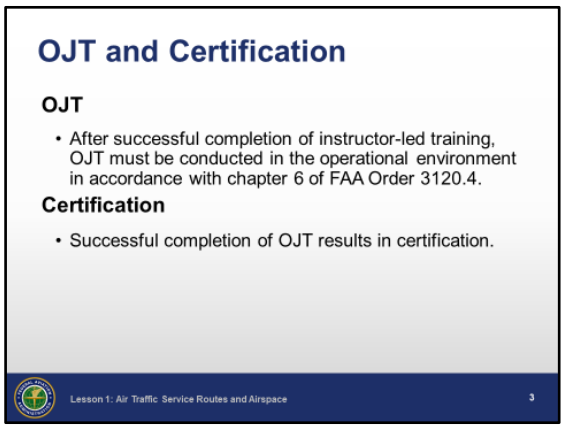
The lessons will include hands on exercises as follows:

- Completing an unlabeled chart of your center area from memory
- Completing a set of actions on Voice Switching and Control System (VSCS) Equipment
- Loading paper into a Flight Strip Printer
- Entering and amending flight plans in the training lab

STAGE 2 COURSE INTRODUCTION *(Cont'd)*

Stage 2 OJT and Certification

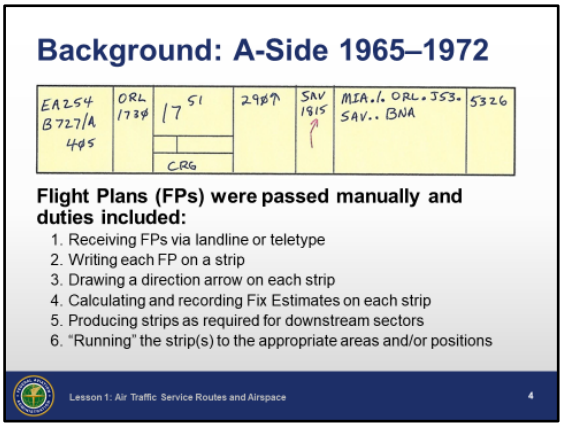
JO 3120.4, Appendix D, Sec. 3



NOTE: *Inform each student of the point at which OJT is planned for them.*

- After successful completion of instructor-led training, OJT must be conducted in the operational environment in accordance with chapter 6 of FAA Order JO 3120.4.
- Successful completion of OJT results in certification.

Background: A-side 1965–1972



1965–1972

In 1965 the FAA installed a computerized system that, for the first time, combined data from the flight plan with readings from the radar and transponder, producing alphanumeric radar screen readouts of data on the aircraft's position, speed and altitude. Controllers could at last "see" flights in three dimensions, and do so continually. With the new automation, controllers could also connect transponder signals with flight plans and detect and correct any variations.

Between 1965 and 1972 there were no call signs shown on radar screens. Controllers used grease pencils to write call signs and assigned altitudes on clear plastic "Shrimp Boats." These shrimp boats were kept beside their associated beacon slash, also known as a target, by pushing them along horizontal radar screens. With any update to assigned altitude, the previous assigned altitude was wiped away from the shrimp boat and the new one written on it.

Strips were written by hand. Flight plans were passed between facilities by landline communication (i.e., manually by voice) or in certain cases teletype.

***NOTE:** Discuss the following:*

- *All flight plan data was written on strips*
- *Manual passing of flight plans*
- *Manual passing of updates to flight plan elements, such as fix estimate changes of more than 3 minutes, altitude, route, etc.*
- *Diligence necessary to keep flight plan data and target identity accurate*

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STAGE 2 COURSE INTRODUCTION *(Cont'd)*

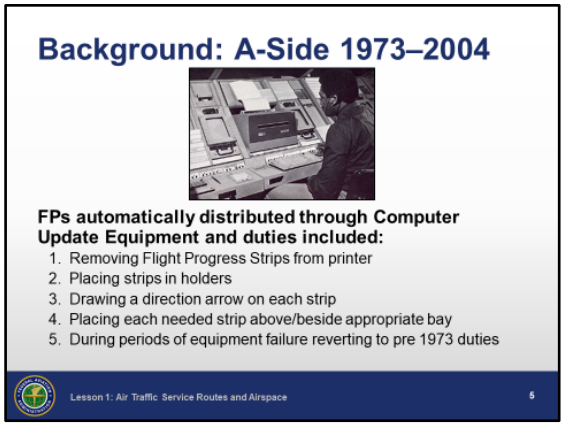
Background: A-side 1965–1972 *(Cont'd)*

The A-side duties included:

1. Receiving FPs via landline or teletype
2. Writing each FP on a strip
3. Drawing a direction arrow on each strip
4. Calculating and recording Fix Estimates on each strip
5. Producing strips as required for downstream sectors
6. "Running" the strip(s) to the appropriate areas and/or position

STAGE 2 COURSE INTRODUCTION *(Cont'd)*

Background: A-side 1972–2004



NOTE: *Discuss the following:*

- *The large amount of strips printed, due to changes to routes of flight*
- *Computer outages and reverting to manual flight plan processing*

1973–2004

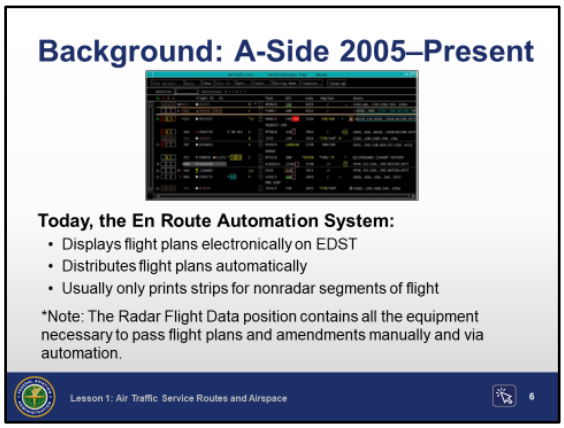
The advent of computer technology offered a way to transform the capabilities of air traffic control. In 1967, IBM delivered a prototype computer to ARTCCs as part of the NAS En Route Stage A project. The first phase undertook automatic distribution of flight-plan data through the Computer Update Equipment (CUE). By February 1973, all the En Route centers in the contiguous United States had this capability.

A-Side duties included:

1. Removing Flight Progress Strips from printer
2. Placing strips in holders
3. Drawing a direction arrow on each strip
4. Placing each needed strip above/beside appropriate bay
5. During periods of equipment failure reverting to pre 1973 duties

Background: A-Side 2005–Present

JO 7110.65, par. 2-10-1.c.2



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***NOTE:** Discuss the following:*

- *The Radar Flight Data position is not staffed at most facilities, however, the position can be utilized when needed to assist the radar team.*
- *Discuss the capabilities of the Radar Flight Data position equipment.*

2005–Present

Today, the En Route Automation System:

- ⊙ Displays flight plans electronically on EDST
- ⊙ Distributes flight plans automatically
- ⊙ Usually only prints strips for nonradar segments of flight

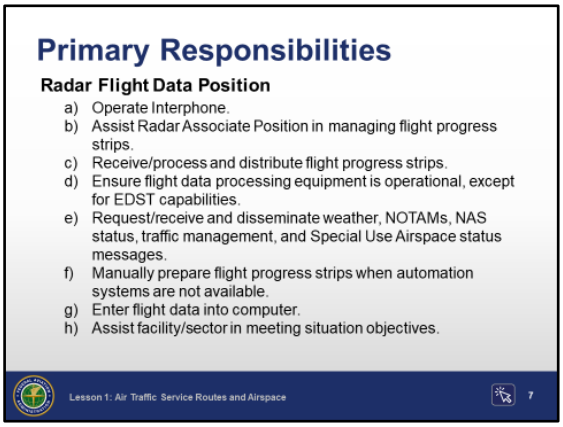
Controllers must revert to appropriate pre-2005 processing of flight plans, when automation systems are not available.*

NOTE: You must be able to utilize the Radar Flight Data position to accurately make appropriate flight plan data entries. You must also be prepared to manually process flight plans in the event automation systems are not available.

NOTE: The Radar Flight Data position contains all the equipment necessary to pass flight plans and amendments manually and via automation.

Primary Responsi-bilities

JO 7110.65, par. 2-10-1.c.2



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Click to reveal all responsibilities.

- Primary Responsibilities: Radar Flight Data Position
  a. Operate Interphone.
  b. Assist Radar Associate Position in managing flight progress strips.
  c. Receive/process and distribute flight progress strips.
  d. Ensure flight data processing equipment is operational, except for En Route Decision Support Tool (EDST) capabilities.
  e. Request/receive and disseminate weather, NOTAMs, NAS status, traffic management, and Special Use Airspace status messages.
  f. Manually prepare flight progress strips when automation systems are not available.
  g. Enter flight data into computer.
  h. Assist facility/sector in meeting situation objectives.

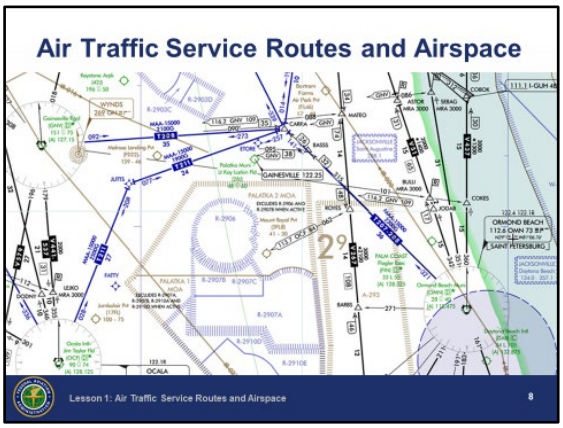
***NOTE:** Discuss how this position is utilized in your local facility*

This course, Radar Flight Data Controller Training, will teach you how to do the following:

- Make and receive calls on Voice Switching and Control System (VSCS).
- Manually process flight plan information when automation systems are not available.
- Operate the Flight Strip Printer.
- Make flight plan data entries into the En Route Automation System

LESSON INTRODUCTION

Lesson Introduction



To function as an assistant controller, it is essential for you to have complete knowledge of Air Traffic Service Routes and Special Use Airspace (SUA) in your center area. This knowledge will not only allow you to do your job, but will also be beneficial to you during your controller training.

Most of a controller's duties require instant recall of one or several items at a time. Learning and memorizing your map will make the job much easier.

Overview

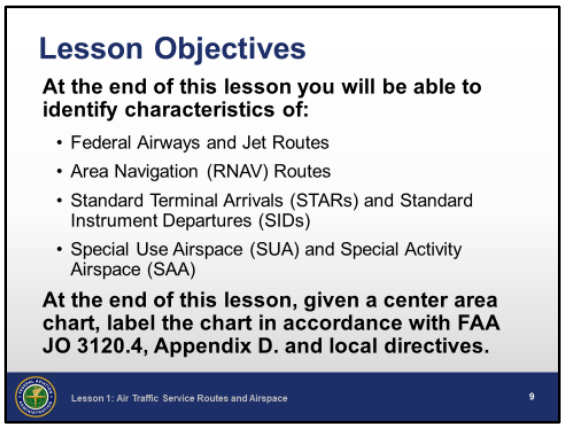
This lesson covers the low and high altitude boundaries, NAVAIDs, federal airways, Area Navigation (RNAV) routes (e.g., Q routes, T routes, Direct Navigation Routes), STARs, SIDs, Special Use Airspace, and jet route structure/components within your area.

At the end of this lesson you will complete a graded end-of-lesson test. The score required for passing the end-of-lesson test will be in accordance with current FAA directives.

There will be a graded exercise in which you will draw and/or label Air Traffic Service Routes, Special Use Airspace, sector boundaries, and Navigational Aids (NAVAIDs) for your center area as specified by your local facility.

LESSON INTRODUCTION *(Cont'd)*

Objectives



NOTE: *Review the objectives on the slide.*

- At the end of this lesson you will be able to identify characteristics of:
  - Federal airways and jet routes
  - Area Navigation (RNAV) Routes
  - Standard Terminal Arrivals (STARs) and Standard Instrument Departures (SIDs)
  - Special Use Airspace (SUA) and Special Activity Airspace (SAA)
- At the end of this lesson, given a center area chart, label the chart in accordance with FAA JO 3120.4, Appendix D. and local directives.

NOTE: There will be graded end-of-lesson tests upon completion of this lesson. The scores required for passing the end-of-lesson tests will be in accordance with current FAA directives.

BOUNDARIES AND NAVAIDS

High and Low Altitude Boundaries

Local Controller Charts

Local Controller Charts

NOTE: *Ensure all charts (facility-provided) have been handed out. Point out the locations and identifications of areas, sectors, and adjacent center boundaries on the charts and in the facility.*

- Areas of specialization of the ARTCC
- Sector boundaries
- Center boundaries

High and Low Altitude NAVAIDs

Local Controller Charts

Identification

NOTE: *Point out the location and identification of:*

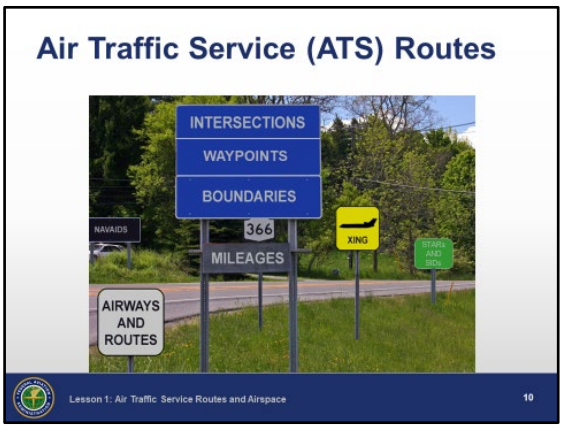
- Local center NAVAIDs
- Adjacent center's NAVAID (first one outside center area)

NOTE: Three letter identifiers are used to define NAVAIDs.

AIR TRAFFIC SERVICE ROUTES

Air Traffic Service Routes

JO 7110.65, Pilot/Controller Glossary



NOTE: *Discuss these items that make up the United States route structure.*

AIR TRAFFIC SERVICE (ATS) ROUTES – The term “ATS Route” is a generic term that includes “VOR Federal airways,” “colored Federal airways,” “jet routes,” and “RNAV routes.” The term “ATS route” does not replace these more familiar route names, but serves only as an overall title when listing the types of routes that comprise the United States route structure.

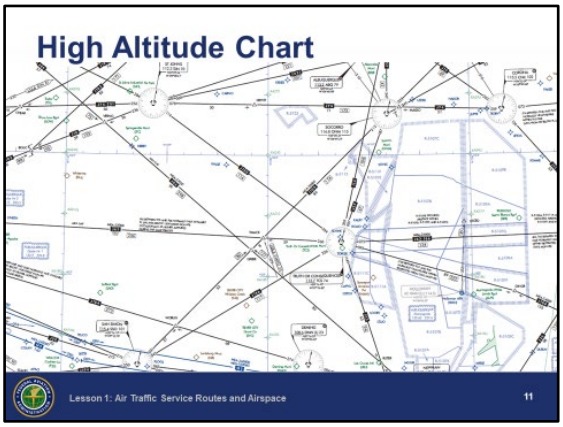
⊙ Examples of ATS Routes:

- VOR Federal airways
  - V1 (“Victor One”)
  - V629 (“Victor Six Twenty Nine”)
- Colored Federal airways
  - G4 (“Green Four”)
  - A17 (“Amber Seventeen”)
  - R50 (“Red Fifty”)
  - B7 (“Blue Seven”)
- Jet Routes
  - J22 (“J Twenty Two”)
- RNAV Routes
  - T214 (“Tango Two Fourteen”)
  - TK502 (“TK Five Zero Two”)
  - Q100 (“Q One Hundred”)

AIR TRAFFIC SERVICE ROUTES *(Cont'd)*

High Altitude Charts

IFR En Route High Altitude Charts

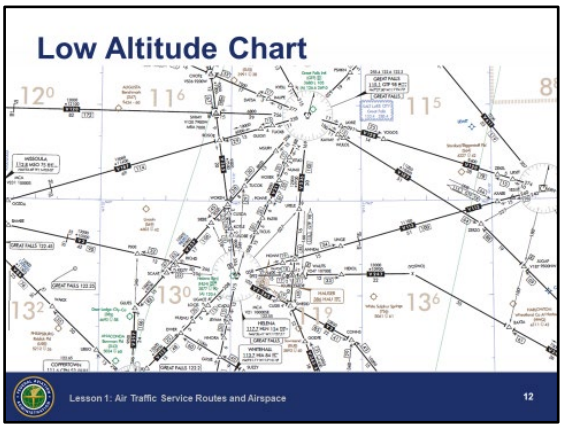


NOTE: The illustration provided is an example of a high altitude chart. Refer to your local instrument flight rules (IFR) En Route High Altitude Chart (facility-provided) as well.

AIR TRAFFIC SERVICE ROUTES *(Cont'd)*

Low Altitude Chart

IFR En Route Low Altitude Charts



NOTE: The illustration provided is an example of a low altitude chart. Refer to your local IFR En Route Low Altitude Chart (facility-provided) as well.

AIR TRAFFIC SERVICE ROUTES *(Cont'd)*

Facility Controller Charts

- Facility Controller Charts are refined charts that add needed information to En Route High and Low Altitude Charts.
- Charts:
  - Are placed in the console chart holders above sector positions.
  - Include local facility control information
  - Are updated every 56 days

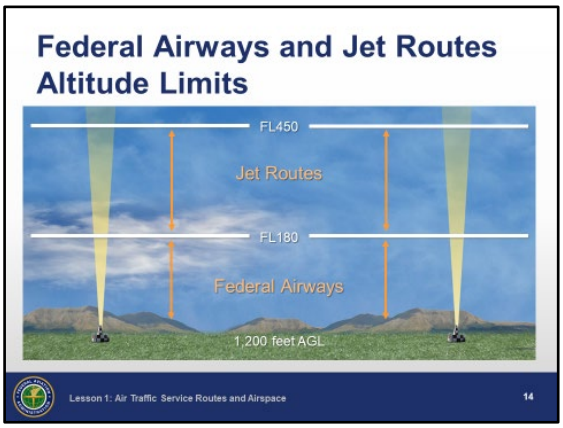
Note: Discuss your local chart updating process.

FEDERAL AIRWAYS AND JET ROUTES

Federal Airways and Jet Routes:

Vertical Limits

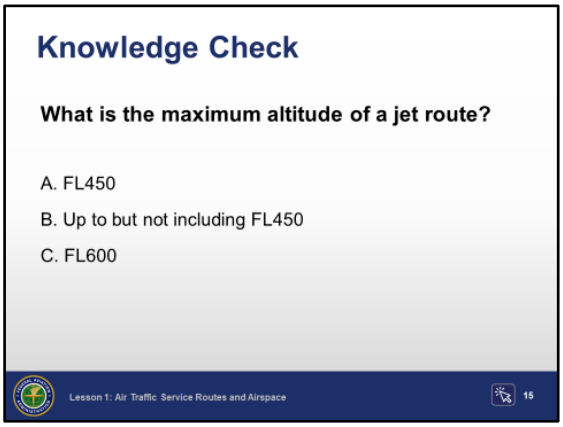
JO 7110.65, Pilot/Controller Glossary; FAR, Part 71



- Federal airway and jet route centerlines are defined by radio navigational aids.
- Federal airway altitude limits are from 1,200 feet AGL up to but not including 18,000 feet Mean Sea Level (FL180 MSL).
  - All federal airways have Minimum En Route Altitudes (MEAs).
- Jet route altitude limits are from 18,000 feet MSL (FL180) to 45,000 feet MSL (FL450) inclusive.
  - Some jet routes have MEAs.
- Air Traffic Service Routes do NOT include airspace of prohibited areas.

KNOWLEDGE CHECK

Knowledge Check

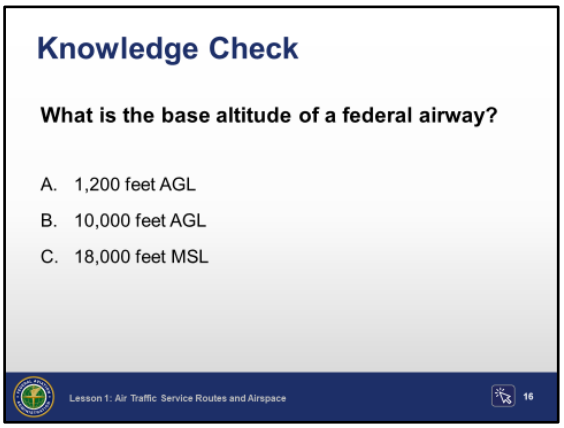


Q&A **Question:** What is the maximum altitude of a jet route?

***Answer**: A. FL450*

KNOWLEDGE CHECK

Knowledge Check

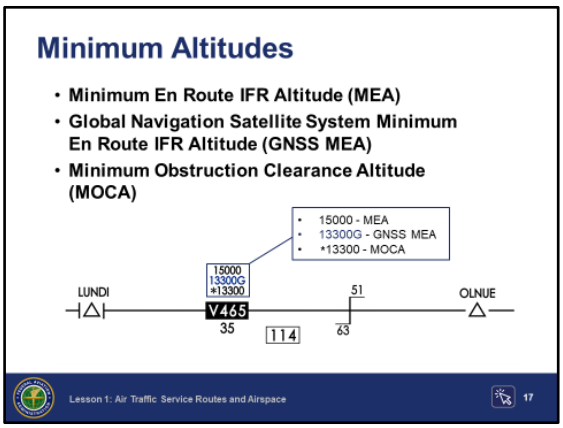


Q&A ***Question:*** *What is the base altitude of a federal airway?*

Answer: *A. 1,200 feet AGL*

Minimum Altitudes

IFR En Route Low Altitude Charts; 14 CFR Parts 91 and 95; AIM; JO 7110.65, Pilot/Controller Glossary; FAA Aeronautical Chart User's Guide



This slide is animated, 1 click.

Click to reveal each chart altitude depiction as an MEA, GNSS MEA, or MOCA.

- MINIMUM EN ROUTE IFR ALTITUDE (MEA) - The lowest published altitude between radio fixes which assures acceptable navigational signal coverage and meets obstacle clearance requirements between those fixes. The MEA prescribed for a Federal airway or segment thereof, area navigation low or high route, or other direct route applies to the entire width of the airway, segment, or route between the radio fixes defining the airway, segment, or route.
- GLOBAL NAVIGATION SATELLITE SYSTEM MINIMUM EN ROUTE IFR ALTITUDE (GNSS MEA) - The minimum en route IFR altitude on a published ATS route or route segment which assures acceptable Global Navigation Satellite System reception and meets obstacle clearance requirements.
- MINIMUM OBSTRUCTION CLEARANCE ALTITUDE (MOCA) - The lowest published altitude in effect between radio fixes on VOR airways, off-airway routes, or route segments which meets obstacle clearance requirements for the entire route segment and which assures acceptable navigational signal coverage only within 25 statute (22 nautical) miles of a VOR.

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FEDERAL AIRWAYS AND JET ROUTES *(Cont'd)*

Minimum Altitudes ***(Cont'd)***

NOTE:

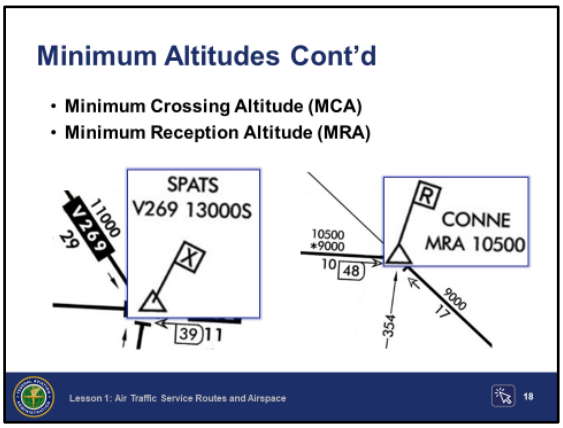
- Unless stated otherwise, "Altitude" MSL, flight level (FL), or both.
- MEAs are shown on IFR High Altitude Charts when MEA is other than 18,000'.
- In addition to federal airways and jet routes, published minimum altitudes may also be present for other ATS Routes.

NOTE: *Minimum and maximum En Route altitudes are published in Title 14 Code of Federal Regulations (CFR) Part 95, Subpart C - En Route IFR Altitudes Over Particular Routes and Intersections.*

FEDERAL AIRWAYS AND JET ROUTES *(Cont'd)*

Minimum Altitudes (***Cont'd)***

JO 7110.65, Pilot/Controller Glossary; FAA Aeronautical Chart User's Guide



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- MINIMUM CROSSING ALTITUDE (MCA) - The lowest altitude at certain fixes at which an aircraft must cross when proceeding in the direction of a higher minimum en route IFR altitude (MEA).
- MINIMUM RECEPTION ALTITUDE (MRA) - The lowest altitude at which an intersection can be determined.

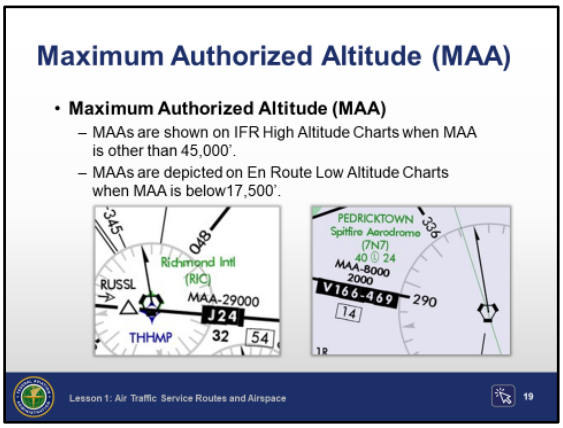
Click to show the MCA graphic expanded.

Click to show a charted MRA.

Click to show the MRA graphic expanded.

Maximum Authorized Altitude

JO 7110.65, Pilot/Controller Glossary; FAA Aeronautical Chart User's Guide; 14 CFR Part 95



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⊙ MAXIMUM AUTHORIZED ALTITUDE - A published altitude representing the maximum usable altitude or flight level for an airspace structure or route segment. It is the highest altitude on a Federal airway, jet route, area navigation low or high route, or other direct route for which an MEA is designated in 14 CFR Part 95 at which adequate reception of navigation aid signals is assured.

- MAAs are shown on IFR High Altitude Charts when MAA is other than 45,000'.

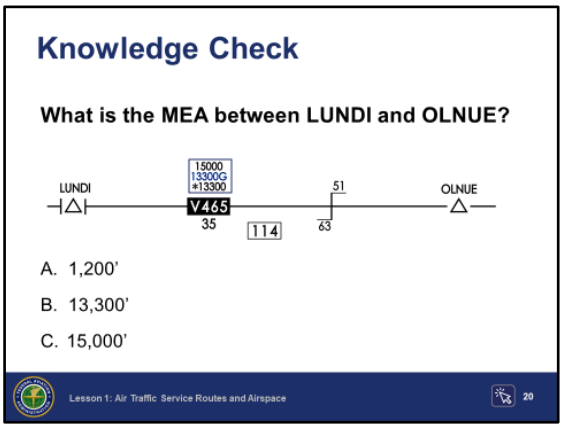
Click to show an En Route Low Altitude charted MAA.

- MAAs are depicted on En Route Low Altitude Charts when MAA is below 17,500'.

Note: In addition to federal airways and jet routes, MAAs may also be present for other ATS Routes.

KNOWLEDGE CHECK

Knowledge Check

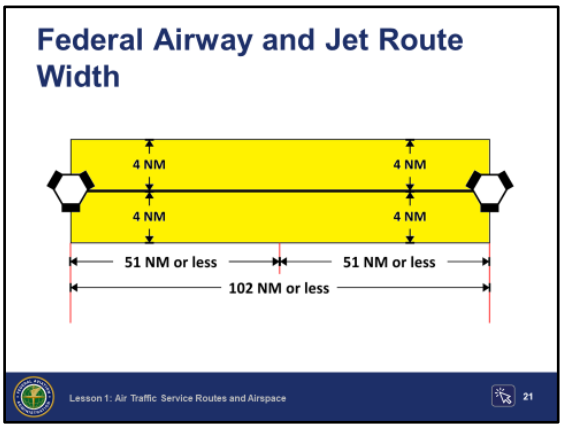


Q&A ***Question:*** *What is the MEA between LUNDI and OLNUE?*

Answer: *C. 15,000'*

Federal Airway and Jet Route Width

JO 7110.65, par. 2-1-2, 6-5-4; FAR, Part 71

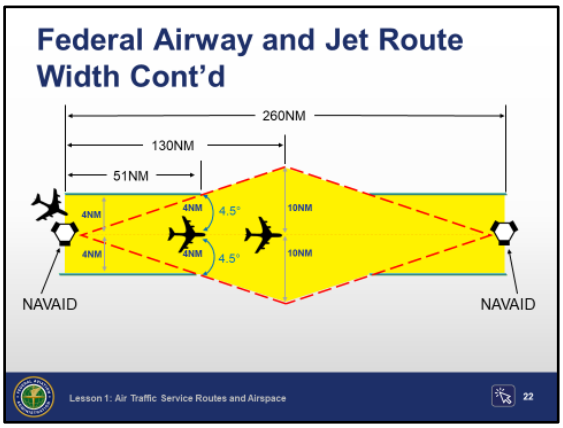


- When separation is involved:
  - Revert to minima for protected airspace established for a federal airway or jet route.
- Each federal airway or jet route is based on a centerline that extends from one NAVAID or intersection to another NAVAID (or through several NAVAIDs or intersections) specified for that airway.
  - Where an airway changes direction, it includes that airspace enclosed by extending the boundary lines of the airway segments until they meet.
- Federal regulations specify federal airway and jet route widths. These ATS routes have protected lateral airspace to prevent overlapping with other routes or special use airspace.
  - From the NAVAID to 51 miles from the NAVAID, the federal airway and jet route width is 4 miles on each side of the centerline. Therefore, if a jet route with a midpoint changeover is 102 miles or less, the jet route width is 4 miles on either side of the centerline for the entire airway.

NOTE: In JO 7110.65 "miles" means nautical miles unless otherwise specified, and means statute miles in conjunction with visibility.

Federal Airway and Jet Route Width (*Cont'd)*

JO 7110.65, par. 6-5-4; FAR, Part 71



This slide is animated, 2 clicks.

Unless otherwise specified:

- Where the changeover point for an airway segment is more than 51 miles from either of the NAVAIDs defining that segment and the changeover point is midway between the NAVAIDs:
  - Route width is 4 miles each side of centerline, which includes airspace that, beginning at 51 miles from the NAVAID, increases in width on a 4.5° angle until they intersect abeam the changeover point.

Move the aircraft to 51 miles from NAVAID.

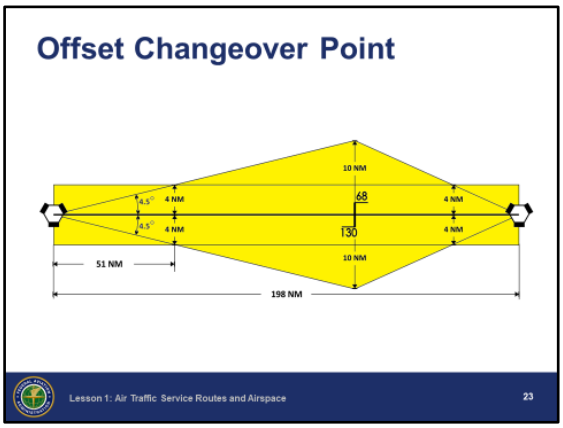
  - At 130 miles from the NAVAID route width is 10 miles each side of centerline.

Move the aircraft to 130 miles from NAVAID.

NOTE: *ABEAM* - An aircraft is "abeam" a fix, point, or object when that fix, point, or object is approximately 90 degrees to the right or left of the aircraft track.

Federal Airway and Jet Route Width (***Cont'd)***

JO 7110.65, par. 2-1-2, 6-5-4, Pilot/Controller Glossary; FAR, Part 71; JO 8260.3, par. 15-1-7

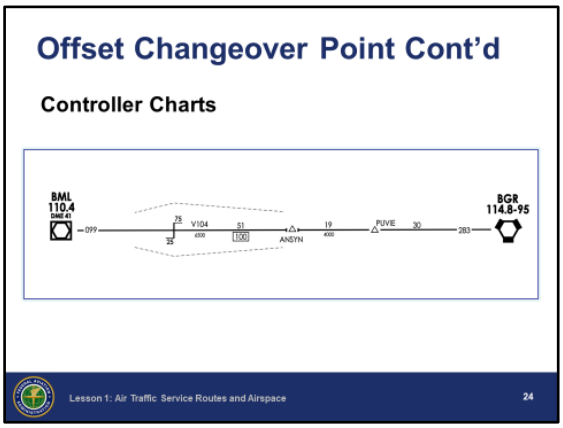


Offset changeover point:

- Is not located midway between NAVAIDs
- May be due to navigation facility (NAVAID) performance problems
- Route width for the segment from the farthest facility to the changeover point is:
  - From the NAVAID to 51 miles from the NAVAID, 4 miles on each side of the centerline
  - Beginning at 51 miles from the NAVAID increases in width on a 4.5° angle until abeam the changeover point
- Route width for the segment from the closest facility to the changeover point is:
  - 4 miles on each side of the centerline
  - Increases in width where lines drawn directly from the NAVAID join the lines drawn at a 4.5° angle from the other NAVAID abeam the changeover point create an area greater than four miles
    - The lines drawn from the nearer facility have no specific angle

Note: A changeover point symbol is only depicted where the changeover point is not midway between the NAVAIDs. Mileages from each NAVAID to the changeover point are charted with the symbol.

Federal Airway and Jet Route Width (***Cont'd)***



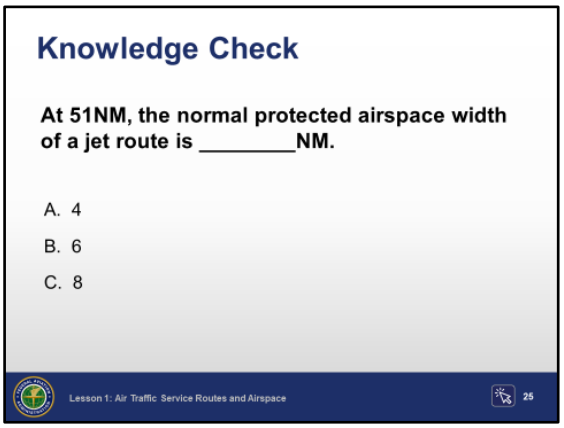
Controller charts, among other things, depict:

- ⊙ Offset changeover points
  - Route width greater than 4 miles from centerline is depicted with a dashed line.

Note: Controller charts, which are locally developed, are located in the chart holders above sector positions. Protected airspace greater than 4 miles from centerline is depicted by dashed lines

KNOWLEDGE CHECK

Knowledge Check

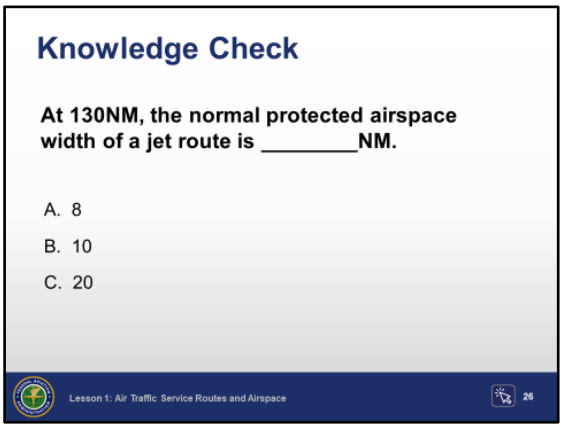


Q&A ***Question:*** *At 51 NM, the normal protected airspace width of a jet route is _____NM.*

Answer*: C. 8*

KNOWLEDGE CHECK

Knowledge Check

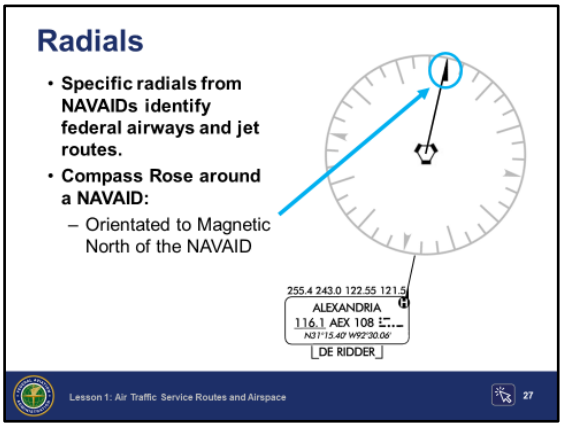


Q&A ***Question:*** *At 130NM, the normal protected airspace width of a jet route is _____NM.*

Answer: *C. 20*

Radials

AIM, par. 5-3-4; Center Federal Airways and Jet Routes List; JO 7110.65 Pilot\Controller Glossary; Aeronautical Chart User's Guide



This slide is animated, 1 click.

***NOTE:** Distribute the following handout to the participants:*

Center Federal Airways and Jet Routes List (facility-developed)

⊙ Specific radials from NAVAIDs identify federal airways and jet routes.

- VORs/VORTACs/TACANs are the most common NAVAIDs.
  - VHF Omnidirectional Range (VOR) is a VHF navigational aid (omnidirectional course information).
  - VORTAC is a VHF Omnidirectional Range/Tactical Air Navigation aid.
  - TACAN is a UHF navigational aid (omnidirectional course and distance information).
- L/MF Radio Beacons (RBNs) are less common.
- Radials in degrees are magnetic from the NAVAID.

COMPASS ROSE - A circle, graduated in degrees, printed on some charts or marked on the ground at an airport. It is used as a reference to either true or magnetic direction.

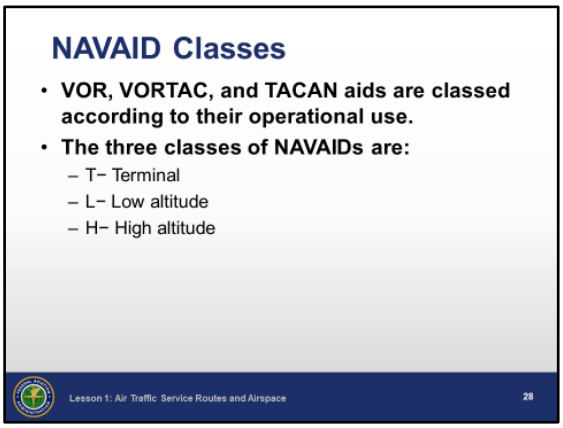
Click to reveal the following:

⊙ Compass Rose around a NAVAID:

- Orientated to Magnetic North of the NAVAID

NAVAID Classes

JO 7110.65, Pilot/Controller Glossary



NAVAID CLASSES

- VOR, VORTAC, and TACAN aids are classified according to their operational use.
- The three classes of NAVAIDs are:
  - T - Terminal
  - L - Low altitude
  - H - High altitude

NAVAID Limitations

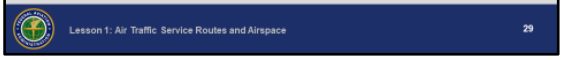
JO 7110.65, par. 4-1-1

VOR/VORTAC/TACAN NAVAIDs
Normal Usable Altitudes and Radius Distances

CLASS	ALTITUDE (FEET)	DISTANCE (NM)
T	1,000 to 12,000 AGL	25
L	1,000 to 18,000 AGL	40
H	1,000 to 14,500 AGL	40
H	14,500 to 17,999 AGL	100
H	18,000 to 45,000 AGL	130
H	Above 45,000 AGL	100

L/MF RADIO BEACON
Usable Radius Distances for All Altitudes

CLASS	POWER (WATTS)	DISTANCE (NM)
Compass Locator	Under 25	15
MH	Under 50	25
H	50-1,999	50
HH	2,000 or more	75



NOTE: *Use the graphic shown to explain the different types of NAVAIDs*

⊙ NAVAID Service Range

- The normal service range for T, L, and H NAVAIDs is found in the AIM.
- Certain operational requirements make it necessary to use some of these aids at greater service ranges than specified.
- Extended range is made possible through flight inspection determinations.
- Some aids also have lesser service range due to location, terrain, frequency protection, etc.
  - Restrictions to service range are listed in Chart Supplement U.S.

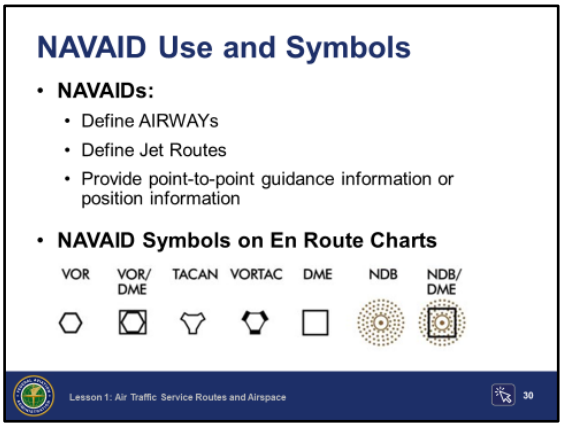
Cont'd on next page

NAVAID Limitations *(Cont'd)*

- **L/MF Radio Beacon**: A low or medium frequency radio beacon transmits nondirectional signals whereby the pilot of an aircraft properly equipped can determine bearings and "home" on the station.
  - All radio beacons except the compass locator transmit a continuous three-letter identification in Morse Code except during voice transmissions.
  - Voice transmissions are made on radio beacons unless the letter "W" (without voice) is included in the class designator (e.g., HW).
  - Radio beacons are subject to disturbances that may result in erroneous bearing information. These disturbances may result from:
    - Lightning
    - Precipitation
    - Interference from distant stations at night

NAVAID Use and Symbols

Aeronautical Chart User's Guide



This slide is animated, 1 click.

- NAVAIDs:
  - Define Airways - Class E airspace areas established in the form of corridors, the centerlines of which are defined by radio navigational aids.
  - Define Jet Routes - Based on VOR or VORTAC NAVAIDs, and are depicted in black. In Alaska, Russia and Canada some segments of jet routes are based on L/MF NAVAIDs, and are depicted in brown.
  - Provide for point-to-point guidance or position information

Click to reveal NAVAID symbols on en route charts.

Very High Frequency (VHF) and Ultra High Frequency (UHF) NAVAIDs

- VOR - A ground-based electronic navigation aid transmitting very high frequency navigation signals, 360 degrees in azimuth, oriented from magnetic north. Used as the basis for navigation in the National Airspace System. The VOR periodically identifies itself by Morse Code and may have an additional voice identification feature. Voice features may be used by ATC or Flight Service Station (FSS) for transmitting instructions/information to pilots.
- DISTANCE MEASURING EQUIPMENT (DME) - Equipment (airborne and ground) used to measure, in nautical miles, the slant range distance of an aircraft from the DME navigational aid.
- TACTICAL AIR NAVIGATION (TACAN) - An ultra-high frequency electronic air navigation aid which provides suitably equipped aircraft a continuous indication of bearing and distance to the TACAN station.
- VORTAC - A navigation aid providing VOR azimuth, TACAN azimuth, and TACAN DME at one site.

Cont'd on next page

FEDERAL AIRWAYS AND JET ROUTES *(Cont'd)*

NAVAID Use and Symbols *(Cont'd)*

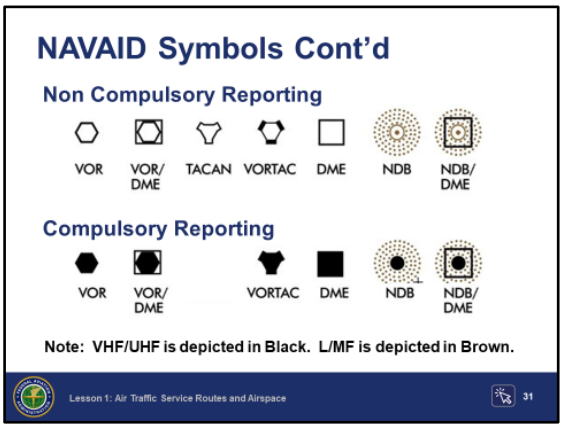
Aeronautical Chart User's Guide

Low Frequency (LF) and High Frequency (HF) NAVAIDs

- Nondirectional Beacon (NDB) - An L/MF or UHF radio beacon transmitting nondirectional signals, whereby the pilot of an aircraft equipped with direction finding equipment can determine his/her bearing to or from the radio beacon. The pilot may also track to ("home") or from the station. When the radio beacon is installed in conjunction with the Instrument Landing System marker, it is normally called a Compass Locator.

NAVAID Symbols *(Cont'd)*

Aeronautical Chart User's Guide



NOTE: *Use the graphic shown to explain the different types of NAVAIDs. This slide is animated, 2 clicks.*

- NON COMPULSORY REPORTING POINTS – Do not require pilot reports.

Click to reveal NAVAID coloring on En Route Low and High charts.

NOTE: VHF/UHF NAVAIDs are depicted in Black. L/MF NAVAIDS are depicted in Brown.

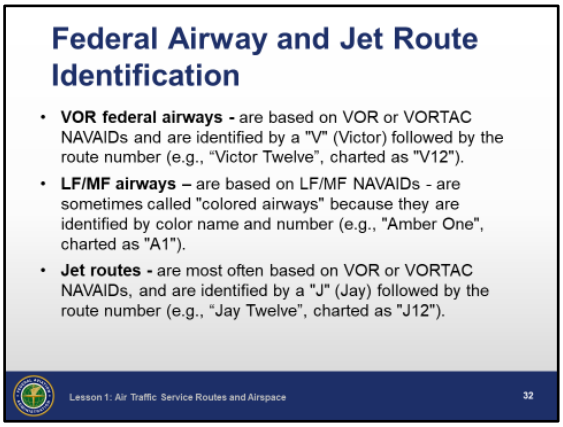
Click to reveal Compulsory Reporting NAVAIDs.

- COMPULSORY REPORTING POINTS - Reporting points which must be reported to ATC. These points are geographical locations which are defined by navigation aids/fixes. Pilots should discontinue position reporting over compulsory reporting points when informed by ATC that their aircraft is in "radar contact."

NOTE: There are very few compulsory reporting points in the 48 contiguous states.

Federal Airway and Jet Route Identification

JO 7110.65, Pilot/Controller Glossary; IFR En Route High and Low Altitude Charts; Center Federal Airways and Jet Routes List



NOTE: *Use local examples from the IFR En Route High and Low Altitude Charts and the Center Federal Airways and Jet Routes List.*

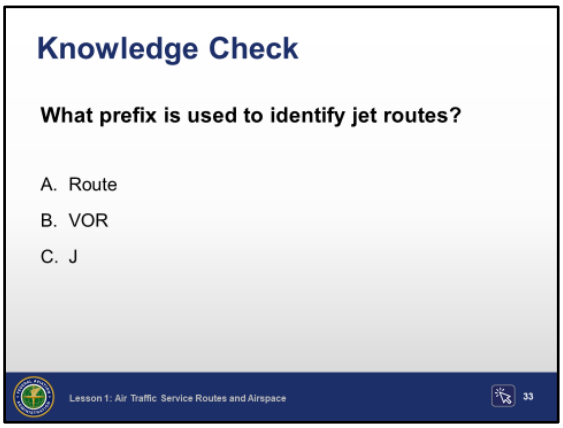
Specific radials from NAVAIDs identify federal airways and jet routes. These airways and routes are identified as follows:

- VOR federal airways - airways based on VOR or VORTAC NAVAIDs and are identified by a "V" (Victor) followed by the route number (e.g., "Victor Twelve", charted as "V12").
- LF/MF airways - airways based on LF/MF NAVAIDs - are sometimes called "colored airways" because they are identified by color name and number (e.g., "Amber One", charted as "A1").
- Jet routes are based on VOR or VORTAC NAVAIDs, and are identified by a "J" (Jay) followed by the route number (e.g., "Jay Twelve", charted as "J12").
  - In Alaska, Russia and Canada some segments of jet routes are based on LF/MF NAVAIDs.

NOTE: Overlapping routes are indicated by the letter "V" or "J" followed by more than one set of numbers.

KNOWLEDGE CHECK

Knowledge Check

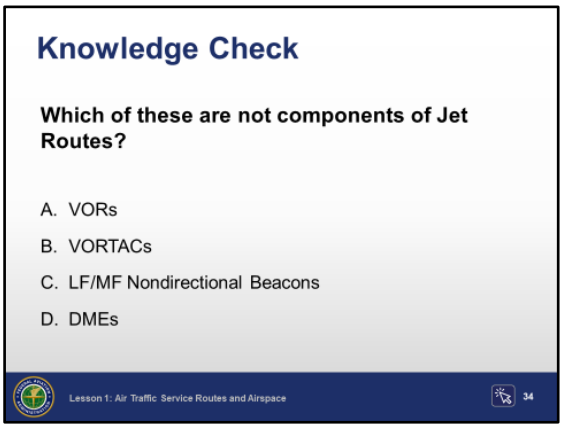


Q&A ***Question:*** *What prefix is used to identify jet routes?*

Answer: *C. J*

KNOWLEDGE CHECK

Knowledge Check

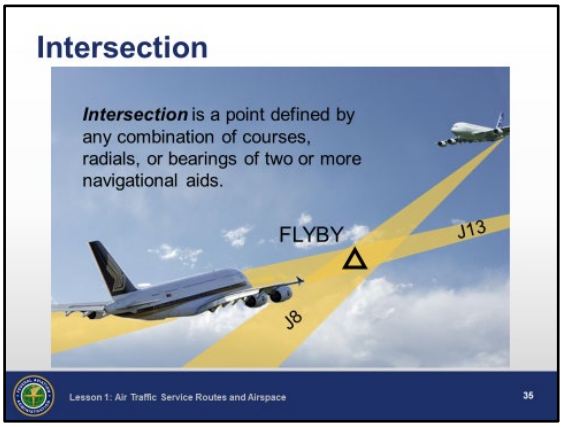


Q&A ***Question:*** *Which of these are not components of Jet Routes?*

Answer: *D. DMEs*

Intersection

JO 7350.9;
JO 7400.2, par. 3-3-4;
Local Controller Charts;
IFR En Route High and Low Altitude Charts



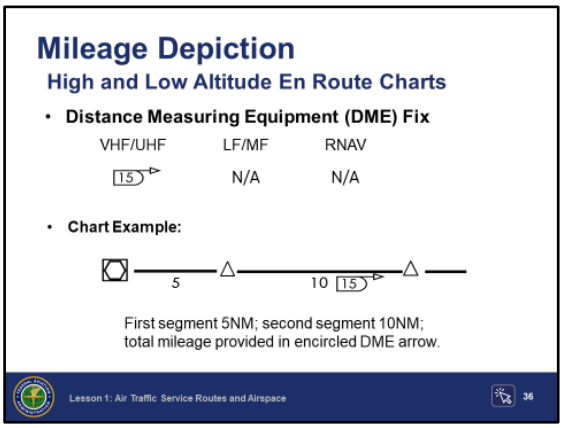
NOTE: *Point out location of intersections on Local Controller Charts.*

An **Intersection** is a point defined by any combination of courses, radials, or bearings of two or more navigational aids.

- Single five-letter pronounceable name
  - Listed in FAA Order JO 7350.9, Location Identifiers
- Intersections are labeled on Local Controller Charts, IFR En Route Low and High Altitude Charts, and Instrument Approach Procedure Charts.

Mileage Depiction

Aeronautical Chart User's Guide;
JO 7110.65, Pilot/Controller Glossary



This slide is animated, 1 click.

- **DISTANCE MEASURING EQUIPMENT (DME) –** Equipment (airborne and ground) used to measure, in nautical miles, the slant range distance of an aircraft from the DME navigational aid.

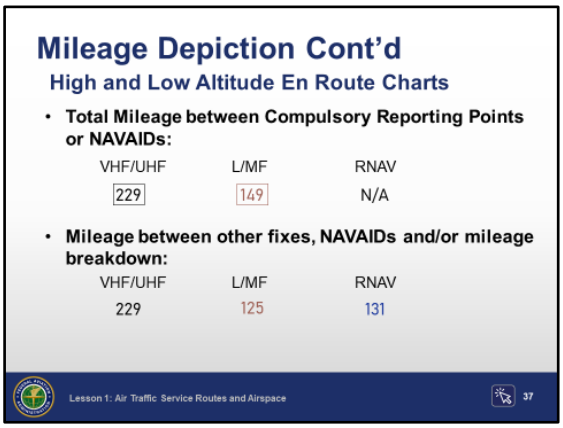
Click to reveal the chart example and then discuss the slant range error below.

  - Slant Range Error Example:
    - A DME equipped aircraft directly over the DME NAVAID at FL310 would still indicate 5 miles away (31,000 ft ÷ 6,076 ft/nm = 5.1 nm).

- A **DME fix** is a geographical position determined by reference to a navigational aid that provides distance and azimuth information.

Mileage Depiction *(Cont'd)*

Aeronautical Chart User's Guide



This slide is animated, 1 click.

Discuss the slide depiction of total mileage between Compulsory Reporting Points or NAVAIDs.

Mileage Depiction:

- Distance is measured in nautical miles on all aviation charts.
- Types
  - Total Mileage between Compulsory Reporting Points or NAVAIDs
  - Mileage between other fixes, NAVAIDs, and/or mileage breakdown
- Mileages are between:
  - Intersections and NAVAIDs
  - NAVAIDs and other NAVAIDs
  - Intersections and DME fixes

Click to reveal mileage between other fixes, NAVAIDs and/or mileage breakdown.

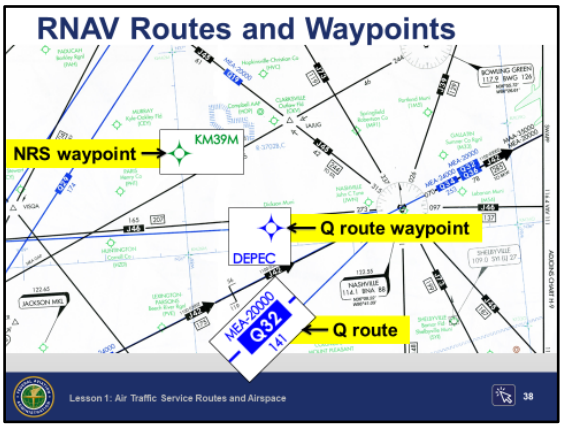
***NOTE:** Refer to local controller charts and ask the students to name some NAVAIDs in your center's airspace.*

***NOTE:** On Local Controller Charts, point out distances between intersections and NAVAIDs, NAVAIDs and other NAVAIDs, and intersections and DME fixes.*

AREA NAVIGATION (RNAV) ROUTES

Area Navigation (RNAV) Routes and Waypoints

JO 7110.65, Pilot/Controller Glossary



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Area Navigation (RNAV) A method of navigation which permits aircraft operation on any desired flight path within the coverage of ground or space-based navigation aids or within the limits of the capability of self-contained aids, or a combination of these.

Note: Area navigation includes performance-based navigation as well as other operations that do not meet the definition of performance-based navigation.

Types

JO 7110.65, Pilot Controller Glossary

- RNAV routes are classified into two types:
  - Random (Impromptu)
  - Published

Protected Airspace

JO 7400.2, par. 20-5-4

- The basic width of an RNAV route is 8 NM (4 NM on each side of the route centerline).
- Additional lateral airspace to be protected for course changes along RNAV routes at and above FL180 must be in accordance with FAA Order 7130.2, Airspace to be Protected for Course Changes at and Above FL180. In effect, this means that the lateral dimensions of reduced route widths do not constitute fully protected airspace for aircraft during such course changes.

AREA NAVIGATION (RNAV) ROUTES *(Cont'd)*

Random (Impromptu) RNAV Routes

JO 7110.65, par. 2-5-2

- Random RNAV routes are routes consisting of fixes that may be NAVAIDs, degree-distance fixes, intersections, and waypoints including Navigation Reference System (NRS) waypoints.
- The **Navigation Reference System (NRS)** is a system of waypoints developed for use within the United States for flight planning and navigation without reference to ground-based navigational aids. The NRS waypoints are located in a grid pattern along defined latitude and longitude lines. The NRS waypoints are intended for use by aircraft capable of point-to-point navigation.

Click to enlarge NRS waypoint.

- NRS waypoints are identified sequentially by:
  - The single letter corresponding to the ICAO (International Civil Aviation Organization) Flight Information Region (FIR) identifier ("K" for the contiguous U.S.).
  - The letter corresponding to the FIR subset (ARTCC area for the contiguous U.S.).
  - The latitude increment in single digit or group form.
  - The longitude increment.

  Example of NRS Waypoint: "KILO DELTA THREE FOUR UNIFORM (KD34U)"

NOTE: NRS waypoints are depicted on IFR En Route High Altitude Charts.

Cont'd on next page

AREA NAVIGATION (RNAV) ROUTES *(Cont'd)*

Published RNAV Routes

JO 7110.65, Pilot/Controller Glossary

Published RNAV routes are either high or low altitude routes.

Click to enlarge Q route identification.

- Q routes – High altitude published routes within the continental U.S. (depicted on IFR En Route High Altitude Charts)
  - Identify Q routes by stating the letter "Q" followed by the route number in group form.

    Example: "Q ONE FORTY-FIVE (Q145)"

Click to enlarge Q route waypoint.

  - Q route waypoints are labeled with 5-letter identifiers.

    Example: "DEPEC" as shown in the graphic

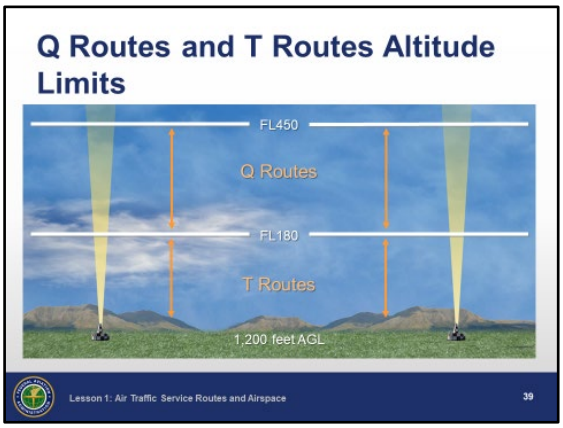
- T and TK routes – Low altitude published routes within the continental U.S.
  - Identify T routes by stating the letter of the route phonetically followed by the number of the route in group form.

    Example: "TANGO TWO TEN (T210)"

  - TK routes are low altitude RNAV helicopter only routes.
- Typically RNAV 2 is used for En Route operations unless otherwise specified. T routes and Q routes are examples of this RNAV specification. Aircraft must maintain a total system error of not more than 2 NM for 95 percent of the total flight time.
- Published RNAV routes are RNAV 2 except when specifically charted as RNAV 1.

Q Routes and T Routes Altitude Limits

FAR, Part 71;
JO 7400.11

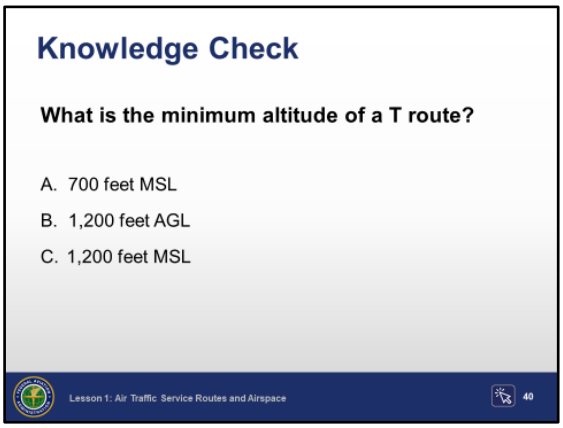


Q Routes and T Routes Altitude Limits

- Q Route altitude limits are from 18,000 feet MSL (FL180) to 45,000 feet MSL (FL450) inclusive.
  - Some Q Routes have Minimum En Route Altitudes (MEAs).
  - The MEA for a Q-Route is FL 180 if no altitude is charted.
- T Route altitude limits are from 1,200 feet AGL up to but not including 18,000 feet MSL (FL180).
  - All T Routes have MEAs.
- Air Traffic Service Routes do NOT include airspace of prohibited areas.

KNOWLEDGE CHECK

Knowledge Check

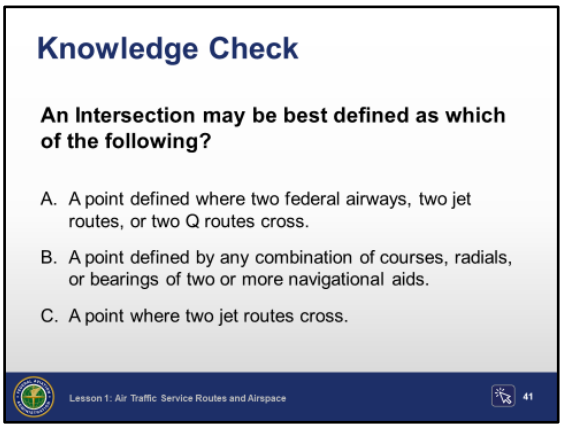


Q&A ***Question:*** *What is the minimum altitude of a T route?*

Answer: *B. 1,200 feet AGL*

KNOWLEDGE CHECK

Knowledge Check



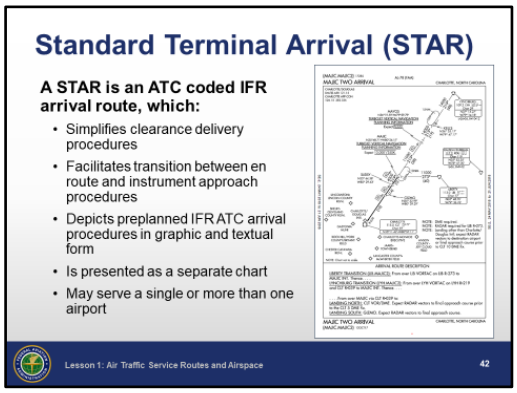
Q&A ***Question:*** *An intersection may be best defined as which of the following?*

Answer: *B. A point defined by any combination of courses, radials, or bearings of two or more navigational aids.*

STANDARD TERMINAL ARRIVAL (STAR)

STANDARD TERMINAL ARRIVAL (STAR)

JO 7110.65, Pilot\Controller Glossary; 8260.3D 1-1-5,e; AIM, par. 5-4-1



STANDARD TERMINAL ARRIVAL - A preplanned instrument flight rule (IFR) air traffic control arrival procedure published for pilot use in graphic and/or textual form. STARs provide transition from the En Route structure to an outer fix or an instrument approach fix/arrival waypoint in the terminal area.

NOTE: *The above definition may be expressed simply as a procedure that provides obstacle clearance and routing from the En Route structure to a fix in the terminal area.*

- Simplifies clearance delivery procedures
  - Controllers issue the STAR without needing to define the route of flight in detail
- Facilitates transition between En Route and instrument approach procedures
  - Reduces the need to vector to the final approach course
- Depicts preplanned IFR ATC arrival procedures in graphic and textual form
  - Some STARs depict altitude and/or speed restrictions further easing workload while allowing pilots to plan for these future published maneuvers
- Is presented as a separate chart
  - Discrete charting reduces clutter and is more legible
  - May serve a single or more than one airport
  - Some STARs have transitions to multiple airports in the terminal area

Cont'd on next page

STANDARD TERMINAL ARRIVAL (STAR) *(Cont'd)*

Standard Terminal Arrival (STAR) (*Cont'd)*

JO 7110.65, Pilot/Controller Glossary; 8260.3D 1-1-5,e; FAA-H-8083-16A, p. 3-10

STAR Characteristics:

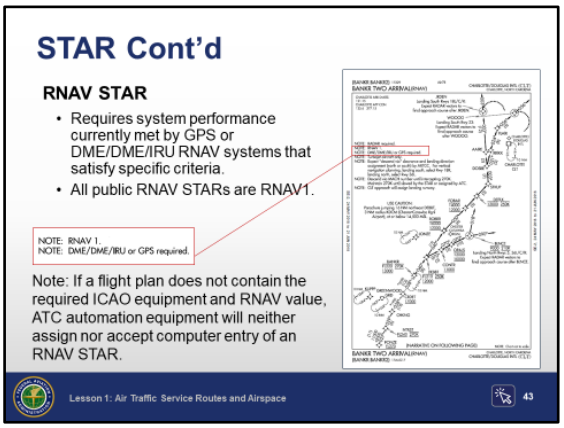
- A STAR is an ATC-coded IFR route established for arriving IFR aircraft destined for certain airports.
- The STAR provides a critical form of communication between pilots and ATC.
  - Once a flight crew has accepted a clearance for a STAR, they have communicated with the controller what route, and in some cases what altitude and airspeed they fly during the arrival.
- STARs provide a common method for pilots to leave the En Route structure and navigate to their destination.
- The STAR is published in graphic and textual form that simplifies clearance delivery procedures.

STARs come in two types:

- Conventional STARs
  - The STAR connects to one or more En Route airway/jet routes.
- RNAV STARs
  - The STAR connects to common route or point.

RNAV STAR

AIM, pars. 1.2.1, 5.4.1;



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- STARs designated RNAV serve the same purpose as conventional STARs, but are only used by aircraft equipped with Flight Management System (FMS) or GPS.
- Requires system performance currently met by GPS or DME/DME/IRU RNAV systems that satisfy specific criteria.
- All public RNAV STARs are RNAV 1.
- Some RNAV STARs provide Vertical Navigation (VNAV).
  - **Vertical Navigation (VNAV) –** A function of area navigation (RNAV) equipment which calculates, displays, and provides vertical guidance to a profile or path.

Click to call-out the STAR RNAV and equipment requirements.

NOTE: If a flight plan does not contain the required ICAO equipment and RNAV value, ATC automation equipment will neither assign nor accept computer entry of an RNAV STAR. This will be covered in detail later in Radar Associate Position training.

Cont'd on next page

STANDARD TERMINAL ARRIVAL *(Cont'd)*

Navigation Systems

JO 7110.65, Pilot/Controller Glossary; AIM, par. 5-4-1; AC 91-77

Required navigation systems are specified in a note on the chart.

- **DME/DME/IRU –** Refers to navigation using DME ranging from at least two DME facilities to determine position along with use of an inertial reference unit (IRU) to provide sufficient position information during limited DME gaps.
- **Global Navigation Satellite System (GNSS) –** A worldwide position and time determination system, which includes one or more satellite constellations, aircraft receivers, and system integrity monitoring. GNSS is augmented as necessary to support the required navigation performance for the actual phase of operation.
- **Global Positioning System (GPS) –** The U.S. GNSS core satellite constellation providing space-based positioning, velocity, and time. GPS is composed of space, control, and user elements.

NOTE: Aircraft operating on RNAV 1 must maintain a total system error of not more than 1 NM for 95 percent of the total flight time.

Pilot Compliance

AIM, par. 5-4-1

- If an aircrew does not want to use a STAR, they will specify "No STAR" in the remarks section of the flight plan.
- Pilots may also refuse the STAR when it is given to them verbally by ATC, but the system works better if the aircrew advises ATC ahead of time.

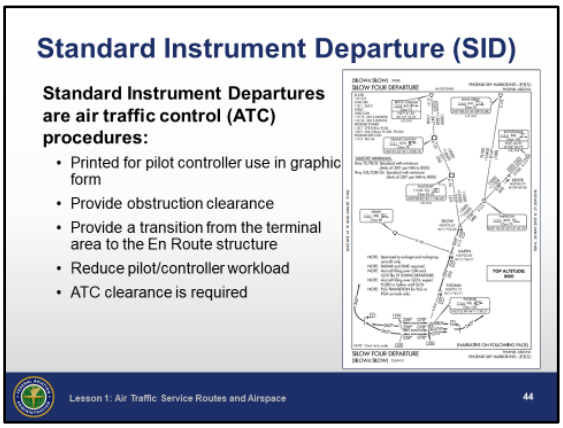
NOTE: *Distribute the following handout:*

Center STARs and SIDs List (facility-developed).

STANDARD INSTRUMENT DEPARTURE (SID)

STANDARD INSTRUMENT DEPARTURE (SID)

JO 7110.65, Pilot\Controller Glossary; AIM, pars. 5-2-8, 5-4-1



STANDARD INSTRUMENT DEPARTURE (SID) – A preplanned IFR ATC departure procedure printed for pilot/controller use in graphic form to provide obstacle clearance and a transition from the terminal area to the appropriate En Route structure. SIDs are primarily designed for system enhancement to expedite traffic flow and to reduce pilot/controller workload. ATC clearance must always be received prior to flying a SID.

- ⊙ Printed for pilot/controller use in graphic form
  - The SID may be one or two pages in length, depending on the size of the graphic and the amount of space required for the departure description.
- ⊙ Provide obstruction clearance
- ⊙ Provide a transition from the terminal area to the en route structure
- ⊙ Reduce pilot/controller workload
  - Primary goal is to reduce workload while providing seamless transitions to the En Route structure.
  - Obstacle protection is always ensured in SID routing.
  - ATC clearance is required.

Cont'd on next page

STANDARD INSTRUMENT DEPARTURE *(Cont'd)*

Standard Instrument Departure (SID) (Cont'd)

JO 7110.65, Pilot\Controller Glossary;

AIM, par. 5-2-8;

FAA-H-8083-16A

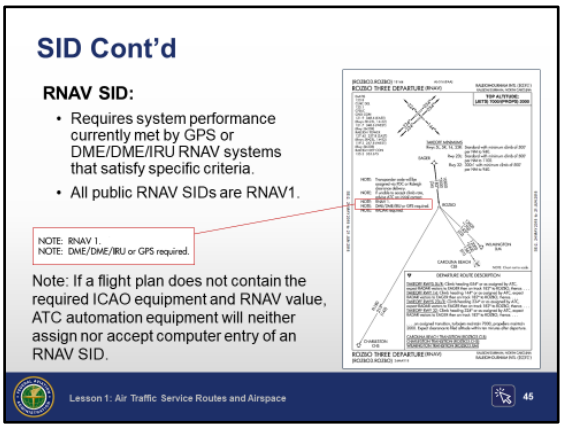
SID Characteristics

- A SID is an ATC-requested and developed departure route, typically used in busy terminal areas.
  - Designed in order to increase capacity of terminal airspace, effectively control the flow of traffic with minimal communication, and reduce environmental impact through noise abatement procedures.
- While obstacle protection is always ensured in SID routing, the primary goal is to reduce ATC/pilot workload while providing seamless transitions to the En Route structure.
- SIDs also provide additional benefits to both the airspace capacity and the airspace users by reducing radio congestion, allowing more efficient airspace use, and simplifying departure clearances.

STANDARD INSTRUMENT DEPARTURE *(Cont'd)*

RNAV SID

FAA-H-8083-16A



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- Some RNAV SIDs provide Vertical Navigation (VNAV).

NOTE: *Aircraft operating on RNAV 1 must maintain a total system error of not more than 1 NM for 95 percent of the total flight time. This is the same requirement as for RNAV STARs.*

- RNAV is a method of navigation that permits aircraft operation on any desired flight path within the coverage of ground or spaced-based NAVAIDs, or within the limits of the capability of self-contained aids, or a combination of these.

Click to call-out the SID RNAV and equipment requirements.

NOTE: If a flight plan does not contain the required ICAO equipment and RNAV value, ATC automation equipment will neither assign nor accept computer entry of an RNAV SID. This will be covered in detail later in Radar Associate Controller training

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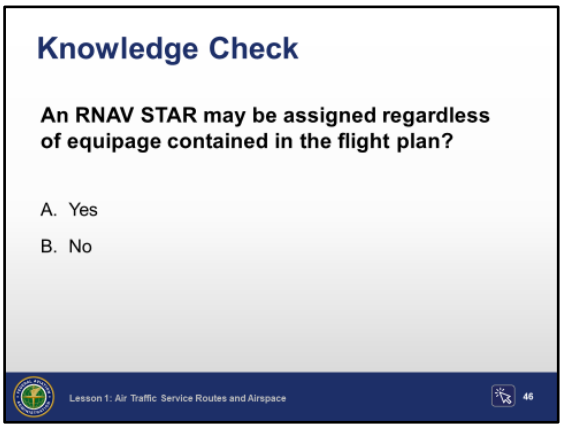
KNOWLEDGE CHECK

Knowledge Check



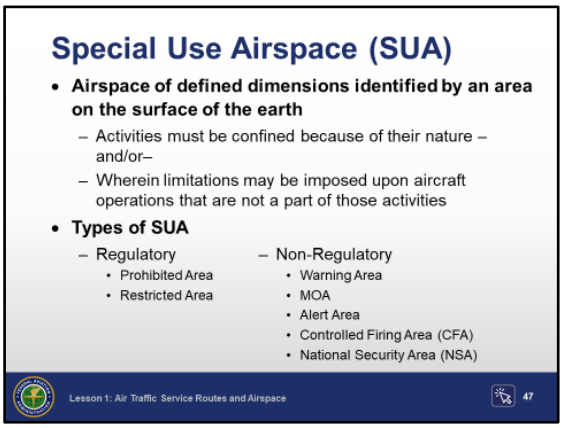
Q&A ***Question:*** *An RNAV STAR may be assigned regardless of equipage contained in the flight plan?*

Answer: *B. No*

SPECIAL USE AIRSPACE (SUA)

SPECIAL USE AIRSPACE (SUA)

Aeronautical Information Publication (AIP) ENR 5.1;
JO 7110.65, Pilot\Controller Glossary;
JO 7400.10



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SPECIAL USE AIRSPACE (SUA) - Airspace of defined dimensions identified by an area on the surface of the earth wherein activities must be confined because of their nature and/or wherein limitations may be imposed upon aircraft operations that are not a part of those activities.

Click to reveal the types of SUA.

Types of Special Use Airspace (SUA)

- Regulatory
  - Prohibited Areas
  - Restricted Areas

  NOTE: Code of Federal Regulations is applicable for participating aircraft.

  Example: The FAA may enforce the 250 knot speed limit on participating aircraft within a Restricted Area.
- Non-Regulatory
  - Warning Areas
  - MOAs
  - Alert Areas
  - Controlled Firing Areas (CFA)
  - National Security Areas (NSA)

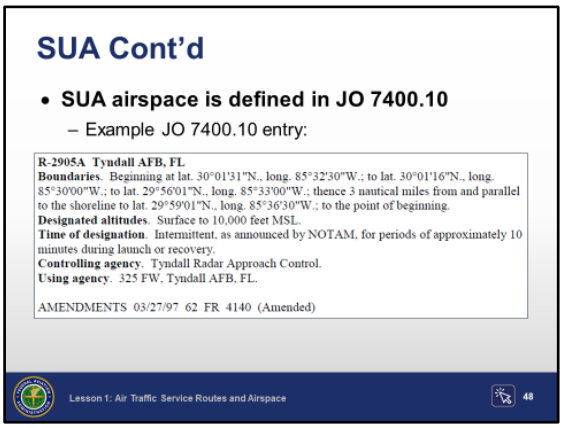
  NOTE: Code of Federal Regulations is not applicable for participating aircraft.

  Example: The FAA cannot enforce the 250 knot speed limit on participating aircraft within a Warning Area.

SPECIAL USE AIRSPACE *(Cont'd)*

Special Use Airspace *(Cont'd)*

AIM, par. 3-4-1



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- Actions establishing, amending, or revoking regulatory and non-regulatory designations of special use airspace areas, in the United States and its territories, are issued by the FAA throughout the year.
- JO 7400.10
  - Special use airspace descriptions (except CFAs) are contained in FAA Order JO 7400.10, Special Use Airspace. It is a compilation of all regulatory and non-regulatory special use airspace areas in effect and pending on a specified date.

Click to reveal an example of JO 7400.10 SUA. Discuss how R-2905A is defined.

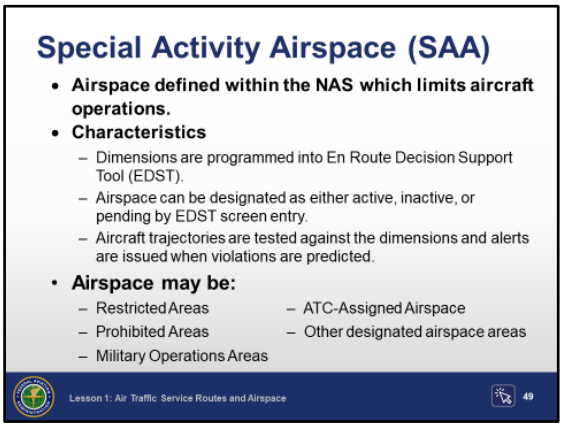
- Permanent SUA (except CFAs) is charted on Sectional Aeronautical, VFR Terminal Area, and applicable En Route charts, and include the hours of operation, altitudes, and the controlling agency.

NOTE: For temporary restricted areas and temporary MOAs, pilots should review the Notices to Airmen Publication (NTAP), the FAA SUA website, and/or contact the appropriate overlying ATC facility to determine the effect of non-depicted SUA areas along their routes of flight.

SPECIAL ACTIVITY AIRSPACE (SAA)

Special Activity Airspace (SAA)

JO 7110.65, Pilot\Controller Glossary



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SPECIAL ACTIVITY AIRSPACE (SAA) - Any airspace with defined dimensions within the National Airspace System wherein limitations may be imposed upon aircraft operations. This airspace may be restricted areas, prohibited areas, military operations areas, air ATC assigned airspace, and any other designated airspace areas. The dimensions of this airspace are programmed into EDST and can be designated as either active or inactive by screen entry. Aircraft trajectories are constantly tested against the dimensions of active areas and alerts issued to the applicable sectors when violations are predicted.

Click to reveal:

⊙ **SAA Characteristics**

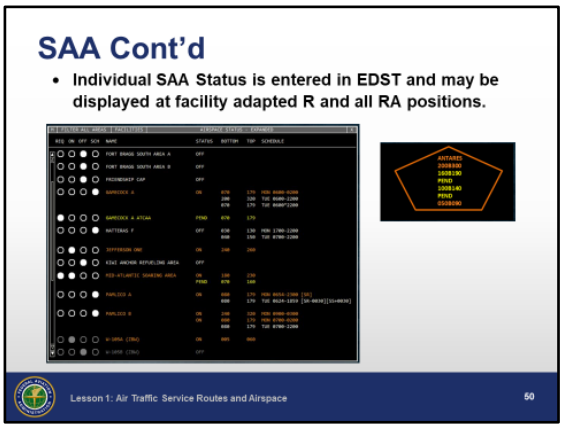
- SAA Dimensions are programmed into En Route Decision Support Tool (EDST).
  - Airspace can be designated as either active, inactive, or pending by EDST screen entry.
  - Aircraft trajectories are tested against the dimensions and alerts are issued when violations are predicted.

⊙ SAA airspace may be restricted area, prohibited area, military operations area, ATC-assigned airspace, or other designated airspace area.

SPECIAL ACTIVITY AIRSPACE *(Cont'd)*

Special Activity Airspace (SAA) (*Cont'd*)

JO 7110.65, pars. 2.10.1 and 13.1.17



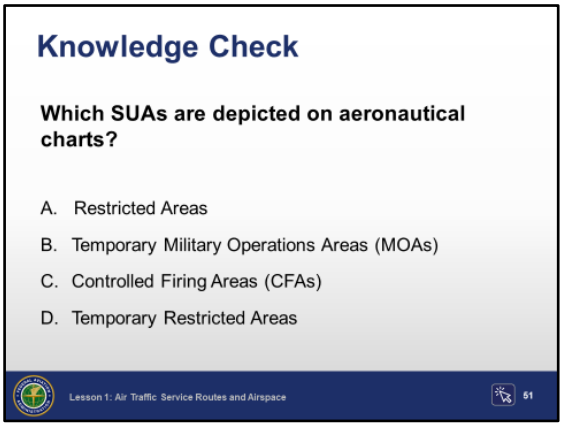
- Individual SAA Status is entered in EDST and may be displayed at facility adapted R and all RA positions.

NOTE: *Discuss the responsibility of the Radar Flight Data Position to disseminate SUA status messages, if received.*

- A responsibility of the Radar Flight Data Position is to "Request/receive and disseminate weather, NOTAMs, NAS status, traffic management, and Special Use Airspace status messages."
- Where assigned as a sector responsibility by facility directive, the sector team shall update Special Activity Airspace to reflect current status.

KNOWLEDGE CHECK

Knowledge Check

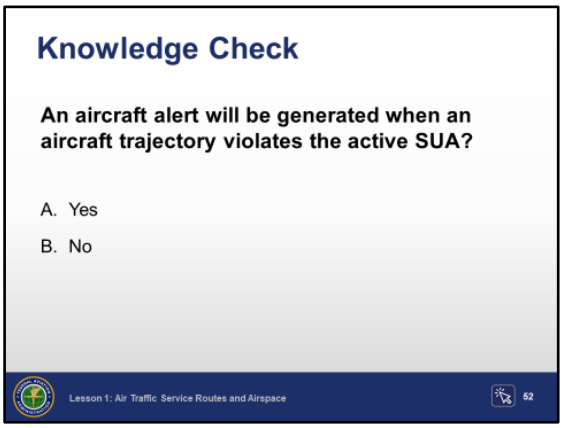


Q&A ***Question:*** *Which SUAs are depicted on aeronautical charts?*

Answer: *A. Restricted Areas*

KNOWLEDGE CHECK

Knowledge Check

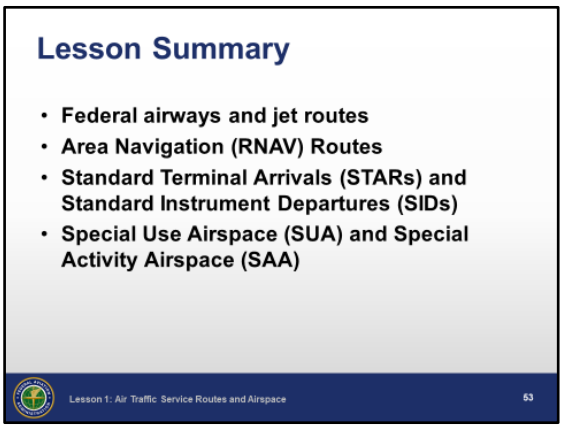


Q&A ***Question:*** *Will an aircraft alert be generated when an aircraft trajectory violates the active SUA?*

Answer: *B. No*

KNOWLEDGE CHECK

Lesson Summary



NOTE: *Review and elaborate briefly on the following:*

- Federal airways and jet routes
- Area Navigation (RNAV) Routes
- Standard Terminal Arrivals (STARs) and Standard Instrument Departures (SIDs)
- Special Use Airspace (SUA) and Special Activity Airspace (SAA)

NOTE: *Ask students if there are any questions.*

- *Administer end of lesson test (ELT01_L01), explain test passing score requirements, time allowed for completing the test, and other procedures for administering test.*

  NOTE: The score required for passing the end-of-lesson test will be in accordance with current FAA directives.

- *Provide feedback on missed questions, including a discussion to explain why particular answers are correct or incorrect.*

- *This lesson is the prerequisite for the completion of Performance Assessment 1: Chart Completion (ELT02_L01). This locally developed and graded assessment must be in accordance with JO 3120.4, Appendix D. Time for study and completion of the exercise is also determined locally.*

PERFORMANCE ASSESSMENT 1

Performance Assessment 1 Purpose

You will demonstrate knowledge of Air Traffic Service Routes and Airspace in and adjacent to your center area by labeling a center area chart.

Materials

You will need the following materials for this exercise:

- An unlabeled chart of your center area that shows center boundaries and symbols representing high altitude NAVAIDS.

Directions

NOTE: *Provide the student with ample study time and a list of items to be included in the chart (e.g., facility determined list of STARs).*

NOTE: *This is a locally developed graded performance assessment. It will be administered in accordance with national and local FAA training directives.*

Graded Performance Assessment

Given a center area chart, label the chart in accordance with FAA JO 3120.4, Appendix D. and local directives.

Completion instructions, handouts, etc., will be provided by the instructor.

The instructor will verify mastery of the objective using locally developed answer keys and passing score requirements. Assessment and remediation strategies, if applicable, will be determined by the local facility and administered in accordance with national and local directives.