BASICS FOR AIR TRAFFIC CONTROL – APPROACHES

MODULE OVERVIEW

Purpose: The purpose of this module is to provide an overview of the Instrument Approach Procedures (IAPs) and identify the types of approaches available to pilots and the charts used to depict these approaches.

MODULE OUTLINE

Lesson: Instrument Approach Procedures (IAPs)

Purpose: The purpose of this lesson is to identify the segments of an instrument approach and to differentiate between the Instrument Approach Procedures (IAPs).

Objectives:

- Define Instrument Approach Procedures (IAPs)
- Describe types of IAPs

Topics:

- Instrument Approach Procedure (IAP)
- U.S. Terminal Procedures Publication
  - U. S. Criteria
  - U. S. Military Criteria
- Four Segments of an Instrument Approach
  - Initial Approach Segment
  - Intermediate Approach Segment
  - Final Approach Segment
  - Missed Approach Segment
- Knowledge Check
- Approach Categories and Types
- Precision Approaches
  - Instrument Landing System (ILS)
- Knowledge Check
  - Ground Based Augmentation System (GBAS) Landing System (GLS)
- Approaches with Vertical Guidance
- Nonprecision Approaches
- Knowledge Check
- Review/Summary

Question and Answer Session – *Parking Lot*

Video – ILS Approach (9:18 mins.)

Lesson: Instrument Approach Procedure Charts

Purpose: The purpose of this lesson is to describe how Instrument Approach Procedure (IAP) charts are used and to identify the sections and types of information displayed on these charts.

Objective:

- Identify Instrument Approach Procedure (IAP) charts

Topics:

- Instrument Approach Procedure Charts
  - Layout
- Knowledge Check
- Instrument Approach Chart
- Margin Information
- Knowledge Check
- Pilot Briefing Information
- Knowledge Check
- Planview
  - NAVAIDs
  - Information
  - Additional Information
  - Minimum Safe Altitude (MSA)
  - Terminal Arrival Area (TAA)
- Knowledge Check
- Airport Diagram
- Knowledge Check
- Missed Approach Icons
- Profile Views
  - Precision Approach
  - Non-precision Approach
- Knowledge Check
- Precision Minimums Section
- Knowledge Check
- Review/Summary

Question and Answer Session – *Parking Lot*

Lesson: Other Approaches

Purpose: The purpose of this lesson is to identify other types of approaches used by Air Traffic Control (ATC).

Objective:

- Identify alternate approach procedures

Topics:

- Other Approaches
  - Visual Approach
  - Visual Approach with Traffic
  - Contact Approach
  - Charted Visual Flight Procedures
- Knowledge Check
- Review/Summary

Question and Answer Session – *Parking Lot*

Activity – Instrument Approach Identification

Question and Answer Session – *Parking Lot*

End-of-Module (EOM) Test

INTRODUCTION

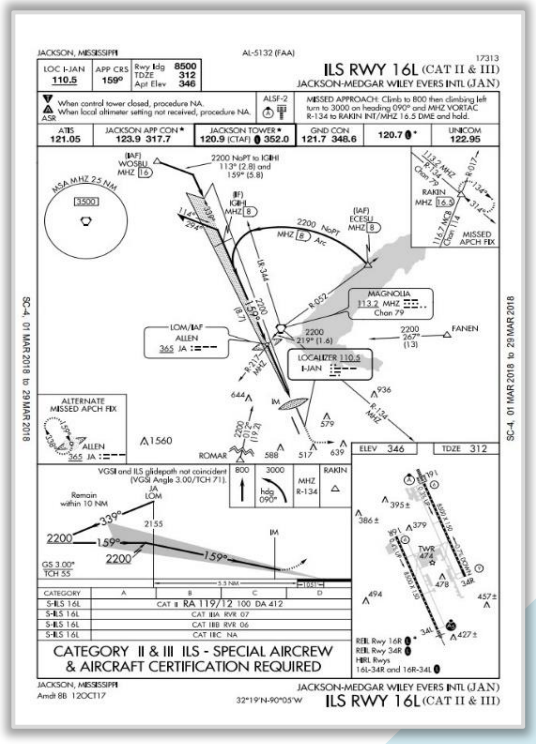
LESSONS	■ Instrument Approach Procedures (IAPs) ■ Instrument Approach Procedure Charts ■ Other Approaches
TOTAL ESTIMATED RUN TIME	3 hrs. 32 mins.
MODULE CONTENT	■ Module Overview ■ Lesson: Instrument Approach Procedures (IAPs) ■ Q&A Session – Parking Lot ■ Video – ILS Approach (9:18 mins.) ■ Lesson: Instrument Approach Procedure Charts ■ Q&A Session – Parking Lot ■ Lesson: Other Approaches ■ Q&A Session – Parking Lot ■ Activity – Instrument Approach Identification ■ Q&A Session – Parking Lot ■ End-of-Module Test

FACILITATOR INSTRUCTIONS	**DELIVERY METHOD**
■ Instruct students to select ***Approaches*** module link within Blackboard ■ Instruct students to read the module introduction and then wait quietly for additional instructions	Blackboard
	EST. RUN TIME
	2 mins.

The approach to an airport is often the most critical phase of the flight. The controller not only keeps the terminal area safe, but also provides the pilot with crucial information needed to execute the approach safely.

Traffic congestion alone heightens the importance of every clearance. Pilot requests become more frequent during the approach segment of flight.

This module will provide an overview of the Instrument Approach Procedures (IAPs), and identify the types of approaches available to pilots and the charts used to depict these approaches.



FACILITATOR INSTRUCTIONS	DELIVERY METHOD
■ **ENABLE *Instrument Approach Procedures (IAPs*)** lesson in Blackboard ■ Instruct students to navigate to the ***Instrument Approach Procedures (IAPs*)** lesson in Blackboard ■ Instruct students to work individually through the lesson content ■ Upon completion of the lesson, students should review previously introduced content or wait quietly until other students have completed	Blackboard **EST. RUN TIME** 20 mins.

INSTRUMENT APPROACH PROCEDURES (IAPs)

Purpose: The purpose of this lesson is to identify the segments of an instrument approach and to differentiate between the Instrument Approach Procedures (IAPs).

Objectives:

- Define Instrument Approach Procedures (IAPs)
- Describe types of IAPs

References for this lesson are as follows:

- FAA Order JO 7110.65, Air Traffic Control
- FAA-H-8083-15 Instrument Flying Handbook

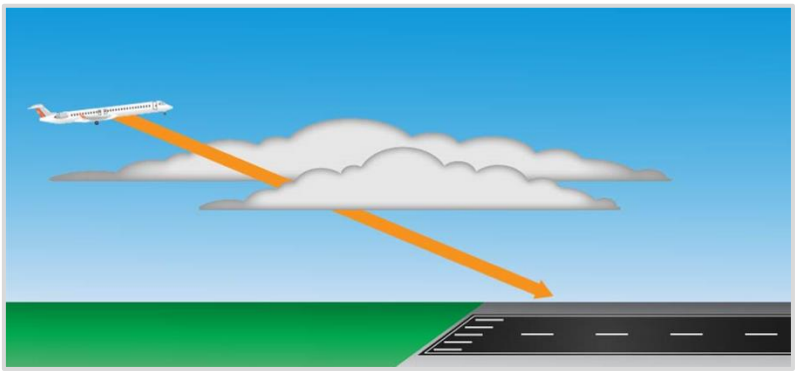
Instrument Approach Procedure (IAP)

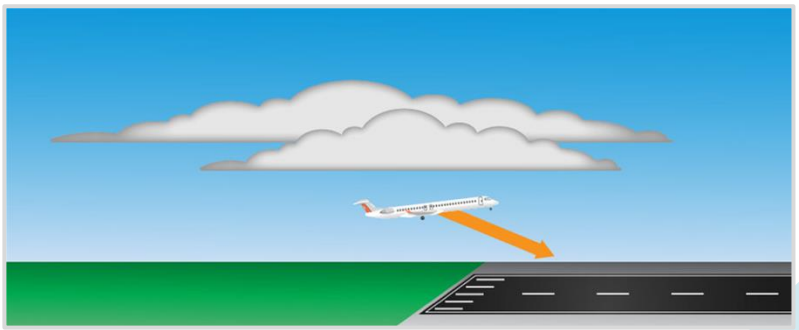
Instrument Approach Procedure (IAP) – A series of predetermined maneuvers for the orderly transfer of an aircraft under instrument flight conditions from the beginning of the initial approach to a landing or to a point from which a landing may be made visually. It is prescribed and approved for a specific airport by a competent authority.

IAPs are designed to:

- Provide an Instrument Flight Rules (IFR) descent from an en route environment to a point where a safe landing can be made
- Guide aircraft through IFR conditions to a point where the runway environment can be seen

Although IAPs are designed for use in IFR conditions, they may also be executed in Visual Flight Rules (VFR) conditions.

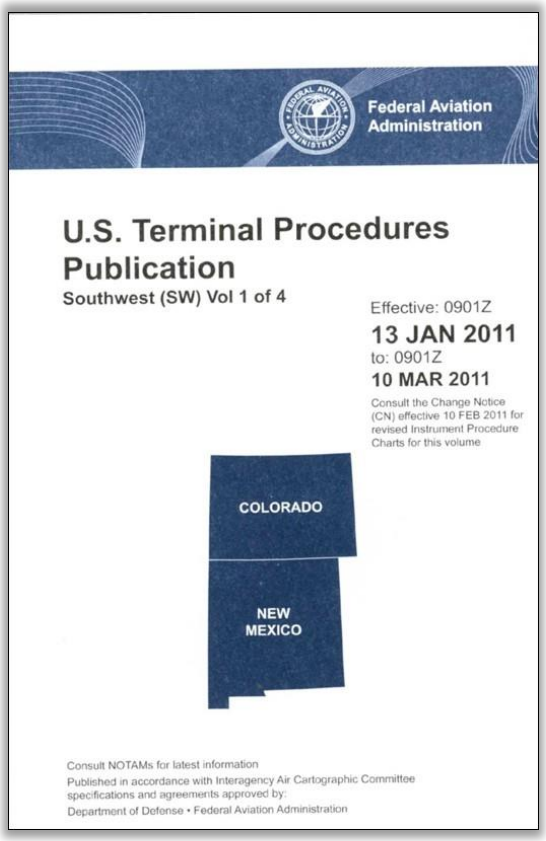




U.S. Terminal Procedures Publication

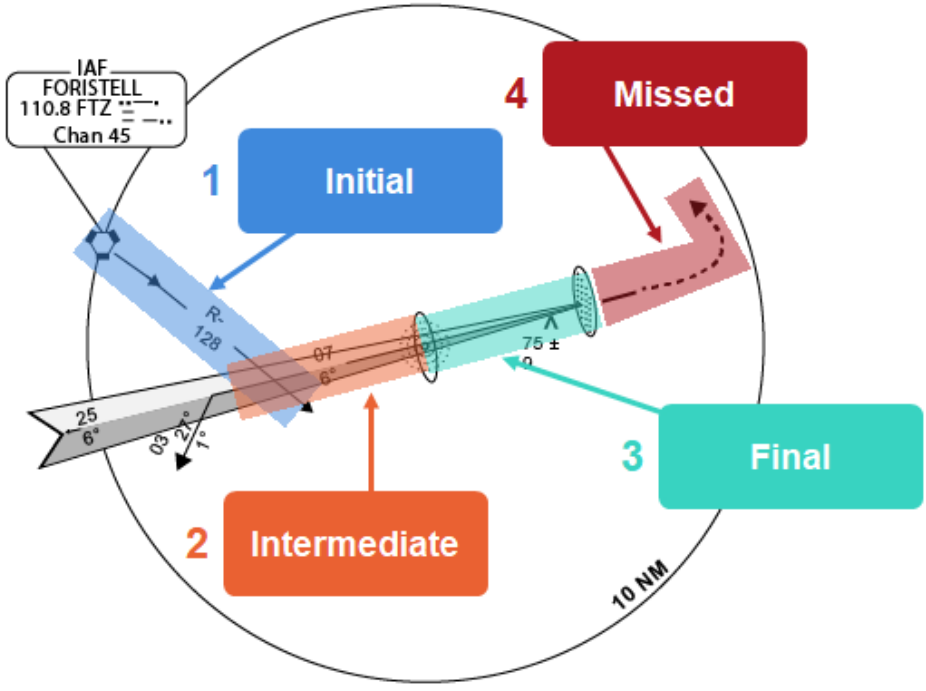
The IAP charts provide the method to descend and land safely in low visibility conditions. The FAA establishes an IAP after thorough analyses of obstructions, terrain features, and navigational facilities.

- **U.S. Criteria** – The approach charts reflect the criteria associated with the United States Standard for Terminal Instrument Approach Procedures (TERPs).
- **U.S. Military Criteria** – The U.S. Military IAPs are established and published by the Department of Defense and are available to the public upon request.



Four Segments of an Instrument Approach

The IAP charts provide the method to descend and land safely in low visibility conditions. The FAA establishes an IAP after thorough analyses of obstructions, terrain features, and navigational facilities.



Initial Approach Segment	The segment between the Initial Approach Fix (IAF) and the intermediate fix or the point where the aircraft is established on the intermediate course or final approach course. ■ IAPs must begin at an IAF or an intermediate fix (IF) if there is not an IAF ■ Can include radials, headings, radar vectors, procedure turns, or Distance Measuring Equipment (DME) arcs ■ Ends upon interception of the inbound approach course
Intermediate Approach Segment	The segment between the intermediate fix or point and the FAF. May consist of an extended portion of the final approach course prior to reaching the FAF.
Final Approach Segment	The segment between the FAF or point and the runway, airport, or missed approach point. ■ Begins at the FAF ■ Ends at a point from which a safe landing can be made or at the beginning of a missed approach procedure
Missed Approach Segment	The segment between the missed approach point or the point of arrival at Decision Altitude (DA) or Decision Height (DH) and the missed approach fix at the prescribed altitude. ■ Consists of a climb to a safe altitude and usually a turn or a heading to a point where the aircraft will enter holding ■ Established for every instrument approach ■ Positively identifies the exact point when the final approach must be abandoned and the missed approach procedure initiated

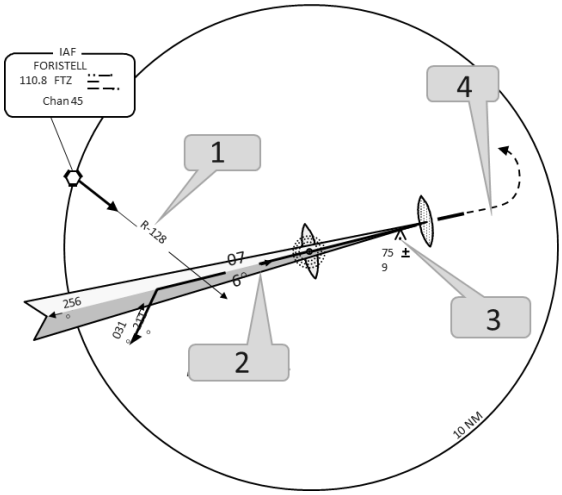
Knowledge Check A

REVIEW what you have learned so far about IAPs. ANSWER the questions listed below.

1. Under which conditions may an aircraft execute an Instrument Approach Procedure? *(Select the correct answer.)*
   - ❑ Instrument
   - ❑ Visual
   - ❑ **Either instrument or visual**

2. Identify the four segments of an instrument approach by filling in the appropriate blank. *(Fill in the blanks with the correct answers.)*

   1. **Initial**
   2. **Intermediate**
   3. **Final**
   4. **Missed**



Approach Categories and Types

There are three primary categories of IAPs: Precision Approaches (PAs), Approaches with Vertical Guidance (APVs), and Nonprecision Approaches (NPAs).

Precision	With Vertical Guidance	Nonprecision
		
PAs provide both lateral and vertical guidance with a ground-based support infrastructure. PAs include: ■ Instrument Landing System (ILS) ■ Precision Approach Radar (PAR) ■ Ground Based Augmentation System (GBAS) Landing System (GLS)	APVs provide both lateral and vertical guidance without the requirement for a ground-based support infrastructure. Approaches with vertical guidance include: ■ Area Navigation (RNAV [GPS]) ■ Area Navigation (RNAV Required Navigation Performance [RNP])	NPAs provide lateral course information only. NPAs include: ■ Localizer (LOC) ■ Omni-directional Range (VOR) ■ Very High Frequency Omni-directional Range/Distance Measuring Equipment (VOR/DME) ■ Tactical Air Navigation (TACAN) ■ Global Positioning System (GPS) ■ Non-Directional Radio Beacon (NDB) ■ Airport Surveillance Radar (ASR)

***Note**: Each approach (except PAR and GPS) will be discussed in more detail in the next section.*

Precision Approaches

Instrument Landing System (ILS)

The ILS provides precision navigation guidance for exact alignment and descent of aircraft on approach to a runway.

- Primary Components
  - **Localizer** – Provides horizontal (left/right) guidance along the extended centerline of the runway
  - **Glideslope (GS)** – Provides vertical (up/down) guidance toward the runway touchdown point, usually at a 3° slope
  - **Marker Beacons** – Provide range information along the approach path
- Supplementary Components
  - **Approach Lights** – Assist in the transition from instrument to visual flight
  - **Compass Locators** – An NDB on the final approach course that tells the pilot where they are on the ILS
  - **DME** – Is generally collocated with the localizer when used as a component of the ILS; however, other locations may be used if they provide improved coverage or operational benefits

If the GS component of an ILS approach is inoperative, the remainder of the procedure is classified as a localizer approach. An ILS approach is not usable if the localizer is out of service.

Knowledge Check B

REVIEW what you have learned so far about IAPs. ANSWER the questions listed below.

1. The ILS is designed to provide _____. *(Select the correct answer.)*
   - ❑ **An approach path with lateral and vertical guidance**
   - ❑ 360 useable magnetic radials
   - ❑ Accurate long range navigation

2. Which of the following components of an ILS is designed to provide the pilot with course guidance to the runway centerline? *(Select the correct answer.)*
   - ❑ Markers
   - ❑ Glidepath
   - ❑ **Localizer**

Ground Based Augmentation System (GBAS) Landing System (GLS)

The GLS provides precision navigation guidance for exact alignment and descent of aircraft on approach to a runway. It provides differential augmentation to the Global Navigation Satellite System (GNSS).

- GBAS was developed as an “ILS look−alike” system, from the pilot perspective, to provide GLS precision approaches at select airports
- GLS provides guidance similar to ILS approaches for the final approach segment; portions of the GLS approach prior to and after the final approach segment will be based on RNAV

Approaches with Vertical Guidance

RNAV (GPS) Approach	RNAV (RNP) Approach
Uses GPS signals, often augmented by Wide Area Augmentation System (WAAS) and/or an approach certified Barometric Vertical Navigation (Baro-VNAV) system, for guidance.	Based on GPS signals and WAAS/Baro-VNAV. Requires on-board navigation performance monitoring and alerting capability to ensure that the aircraft stays within a specific containment area.
Baro-VNAV uses barometric altitude information from the aircraft's pitot-static system and air data computer to compute vertical guidance for the pilot.	Some RNP approaches have a curved path, also called a radius−to−a−fix (RF) leg. Since not all aircraft have the capability to fly these arcs, pilots are responsible for knowing if they can conduct a specific RNP approach. Aircraft speeds, winds and bank angles have been taken into consideration in the development of the procedures.

Nonprecision Approaches

- **VOR/DME Approach** – More accurate than VOR approach because of the range/distance guidance provided by the DME.
- **LOC Approach** – An approach that uses only the localizer component of an ILS system.
- **VOR Approach** – Provides a radial to be intercepted and tracked, which leads to the airport. The approach may be to a specified runway or simply to the airport with a circling approach to a runway.
- **TACAN Approach** – Used only by the military; provides azimuth and distance, similar to VOR/DME approach.
- **NDB Approach** – Provides a non-directional bearing that a pilot uses to fly a course to an airport. This approach is the least accurate of the instrument approaches.
- **ASR Approach** – An approach conducted with surveillance radar that provides azimuth and range only. The approach is conducted with Air Traffic Control (ATC) personnel communicating with the pilot via radio.

Knowledge Check C

REVIEW what you have learned so far about IAPs. ANSWER the questions listed below.

1. An approach is termed "nonprecision" because it _____. *(Select the correct answer.)*
   - ❑ Requires a ground-based NAVAID
   - ❑ Provides lateral and vertical guidance
   - ❑ **Provides only lateral course guidance**

2. _____ approaches utilize WAAS and GPS signals. *(Select the correct answer.)*
   - ❑ TACAN
   - ❑ **RNAV**
   - ❑ NDB

Instrument Approach Procedures (IAPs) Summary

Landing an aircraft is one of the most complicated phases of flight a pilot has to learn. Therefore, directing instrument approaches may be one of the most intricate processes you will be performing among your duties as an air traffic controller. This duty will require your expertise and your undivided concentration for the safety of all involved.

FACILITATOR INSTRUCTIONS	DELIVERY METHOD
■ Review content presented in ***Instrument Approach Procedures (IAPs)*** lesson ■ Navigate to the ***Parking Lot*** link within Blackboard and review any student questions ■ Address ***Parking Lot*** questions and facilitate a brief discussion of the lesson content	Facilitated Discussion **EST. RUN TIME** 25 mins.

FACILITATOR INSTRUCTIONS	DELIVERY METHOD
■ **ENABLE *ILS Approach*** video and ***Instrument Approach Procedure Charts*** lesson in Blackboard ■ ***Note:*** Movie controls in BB are limited to “Play” and “Pause” while not in full screen ■ Instruct students to select the link to begin viewing the video in the Exercises and Activities folder ■ Upon completion of the video, instruct students to proceed to ***Instrument Approach Procedure Charts*** lesson in Blackboard and begin the lesson without a break	Video **EST. RUN TIME** 10 mins.

FACILITATOR INSTRUCTIONS	DELIVERY METHOD
■ ***Note: Instrument Approach Procedure Charts*** should have already been enabled in Blackboard, if not ensure it is enabled ■ Instruct students to navigate to the ***Instrument Approach Procedure Charts*** lesson in Blackboard ■ Instruct students to work individually through the lesson content ■ Upon completion of the lesson, students should review previously introduced content or wait quietly until other students have completed	Blackboard **EST. RUN TIME** 30 mins.

INSTRUMENT APPROACH PROCEDURE CHARTS

Purpose: The purpose of this lesson is to describe how Instrument Approach Procedure (IAP) charts are used and to identify the sections and types of information displayed on these charts.

Objective:

- Identify Instrument Approach Procedure (IAP) charts

References for this lesson are as follows:

- FAA Order JO 7110.65, Air Traffic Control
- FAA-H-8083-15, Instrument Flying Handbook
- FAA Order 8260.3, United States Standard for Terminal Instrument Procedures (TERPS)
- Aeronautical Information Manual (AIM)

Instrument Approach Procedure (IAP) Charts

The purpose of an IAP chart is to portray the aeronautical data that is required to execute IAPs to airports. IAP charts are commonly referred to as “approach plates.”

Layout

All IAPs except the Precision Approach Radar (PAR) and Airport Surveillance Radar (ASR) approaches are depicted using the same general format.

- Symbols used on the IAP can be found with accompanying explanations in the legend
- Like Standard Instrument Departures (SIDs) and Standard Terminal Arrival Routes (STARs), IAPs are listed alphabetically in the U.S. Terminal Procedures Volumes, first under “city,” then under “airport”

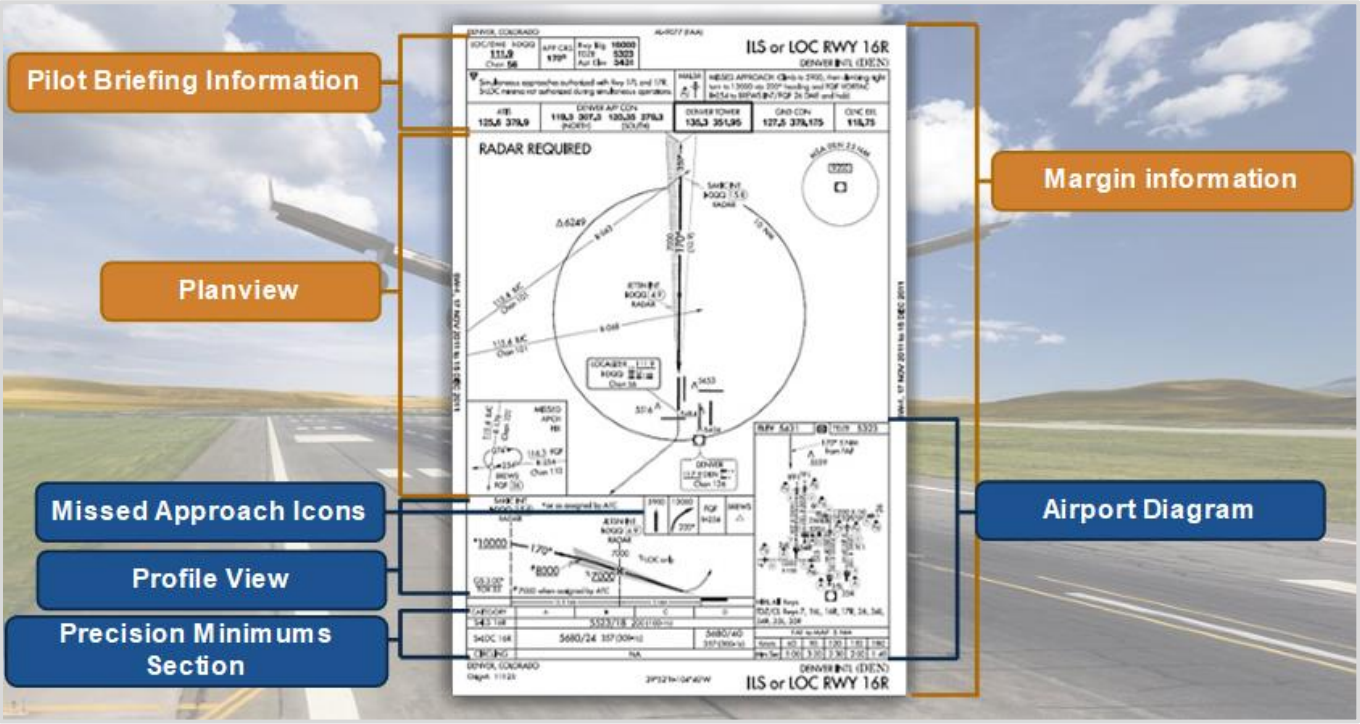
Knowledge Check D

REVIEW what you have learned so far about IAP charts. ANSWER the questions listed below.

1. IAP charts are commonly referred to as _____. *(Select the correct answer.)*
   - ❑ **Approach plates**
   - ❑ Arrival plates
   - ❑ Approach briefings

Instrument Approach Chart

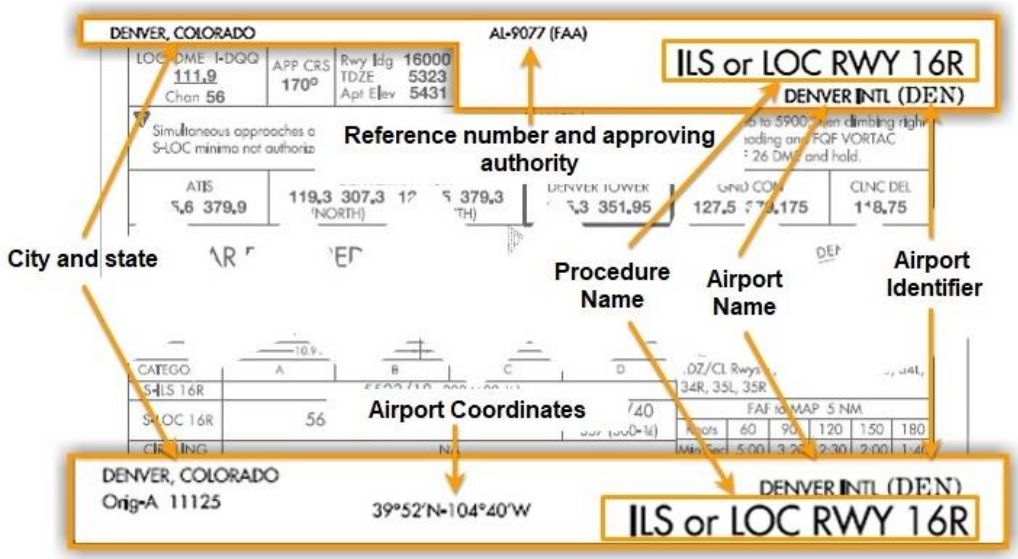
Each section of the IAP chart has information needed for the approach.



Margin Information

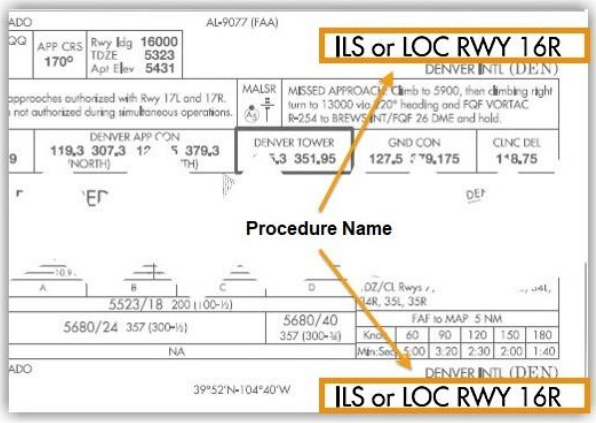
The margin information at the top and bottom of the chart depicts the airport location and procedure identification.

The civil approach plates are organized by city, then airport name and state. Military approaches are organized by airport name first. At the bottom center, the airport's latitude and longitude coordinates are provided.



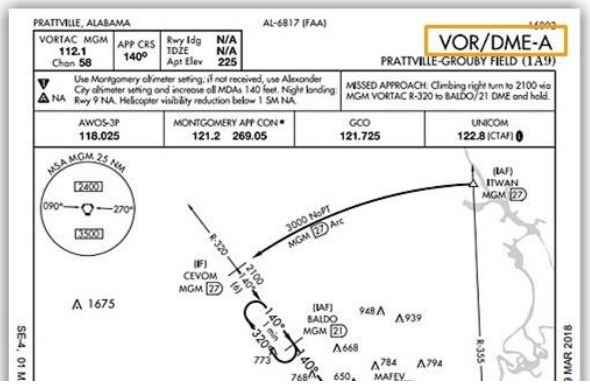
The name of the approach as published is used to identify the approach, even though a component of the approach is inoperative.

Example: *"*Cleared ILS Runway 9, glideslope unusable."



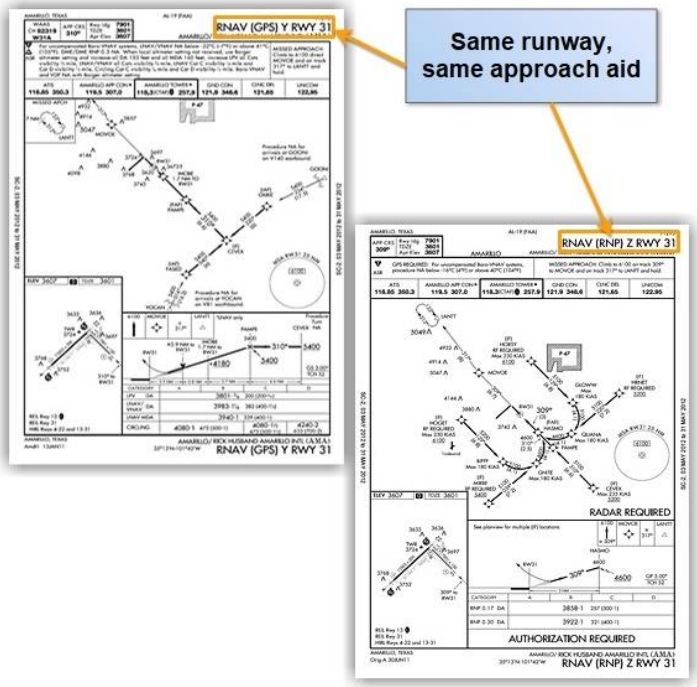
Letters from the beginning of the alphabet that are used as a suffix to the approach name denote procedures that do not meet the criteria for a straight-in approach (for example, if the final approach course is not aligned within 30 degrees of runway heading or the required descent gradient is greater than 400 feet per nautical mile [FPNM] from the FAF to the Threshold Crossing Height [TCH]).

Examples: VOR-A, GPS-B



Letters from the end of the alphabet appearing in the approach name denote approaches to the same runway using the same approach aid.

Examples: RNAV (GPS) Y Runway 31 or RNAV (RNP) Z Runway 31



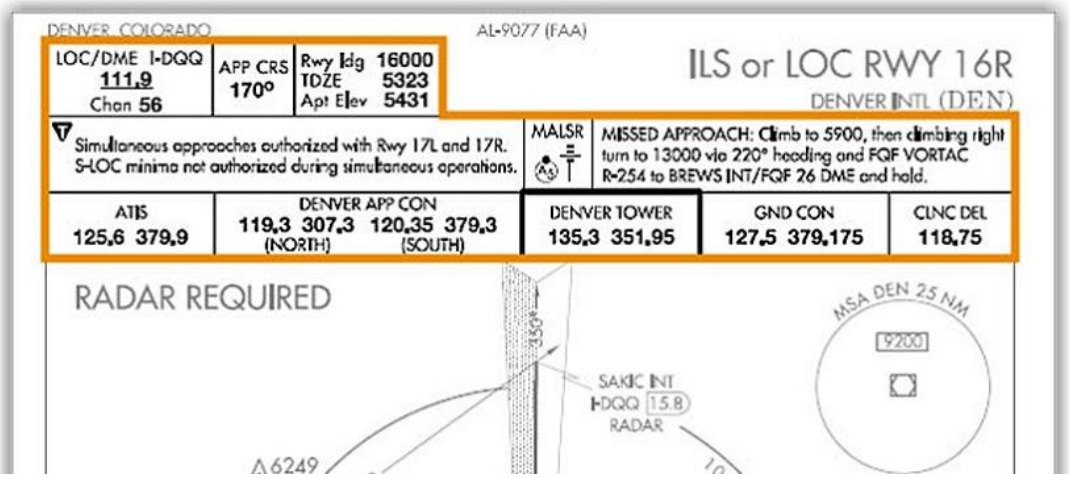
Knowledge Check E

REVIEW what you have learned so far about IAP charts. ANSWER the question listed below.

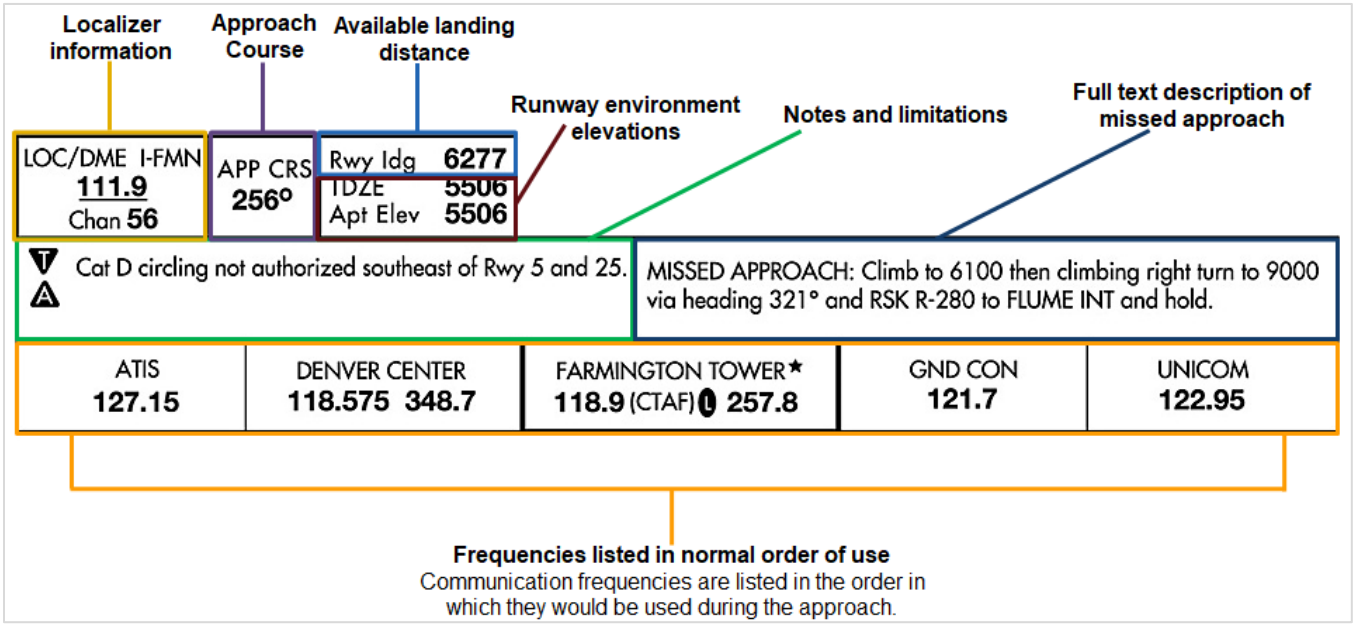
1. How are civil approach plates organized? *(Select the correct answer.)*
   - ❑ Airport name/ city/ state
   - ❑ **City/ airport name**
   - ❑ State/ city/ airport name

Pilot Briefing Information

The pilot briefing is located at the top of the chart and provides the pilot with information required to execute the published approach procedure.

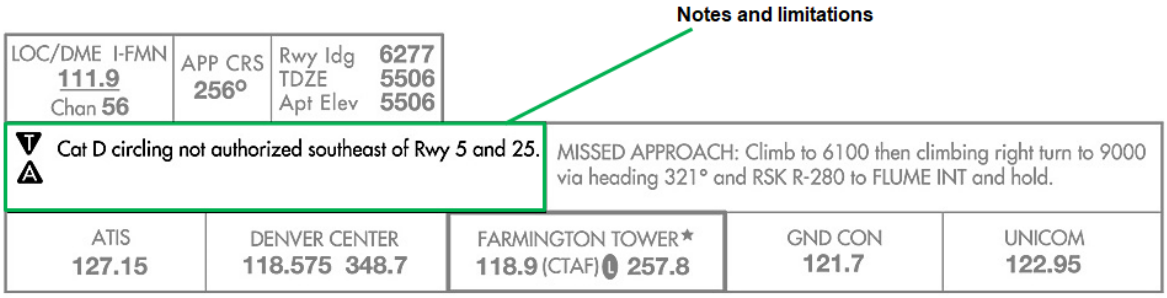


The information labeled here can be found within the pilot briefing section of an approach plate. Included in the upper left-hand four boxes are the NAVAID providing approach guidance, its frequency, the final approach course, and runway information.



A notes section contains additional procedural information. Information such as restrictions for circling maneuvers, local altimeter setting requirements, and RADAR requirements may be noted in this section.

- When a T symbol appears in the notes section, it signifies the airport has nonstandard IFR takeoff minimums
- When a A symbol appears in the notes section, it signifies the airport has nonstandard IFR alternate minimums



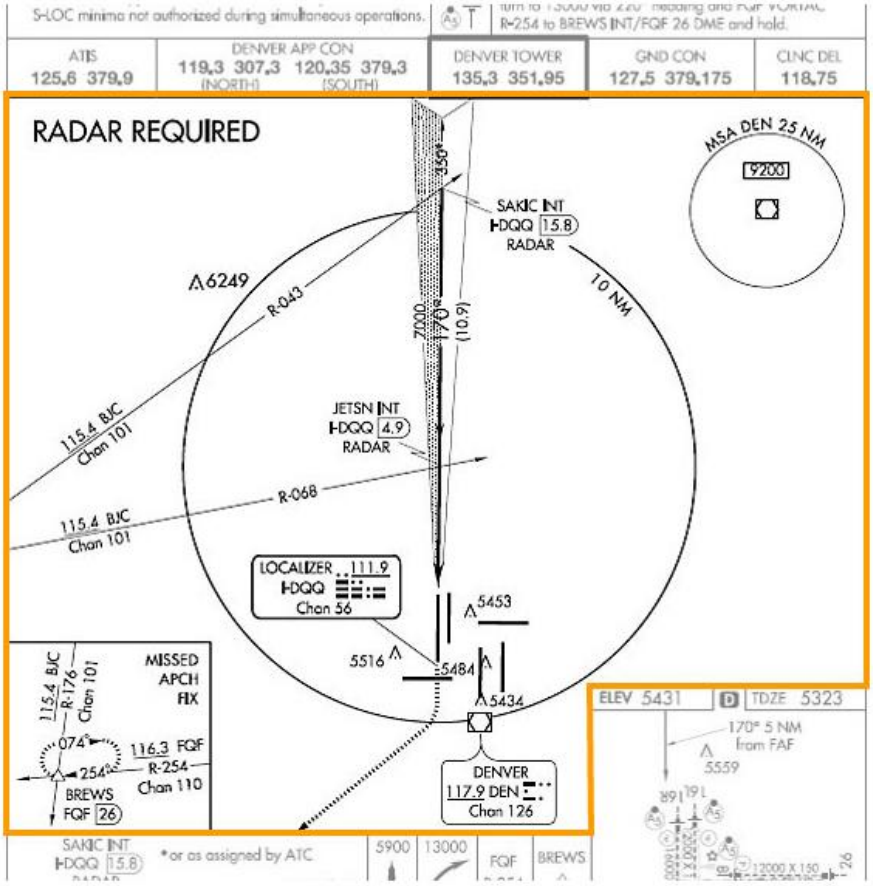
Knowledge Check F

REVIEW what you have learned so far about IAP charts. ANSWER the questions listed below.

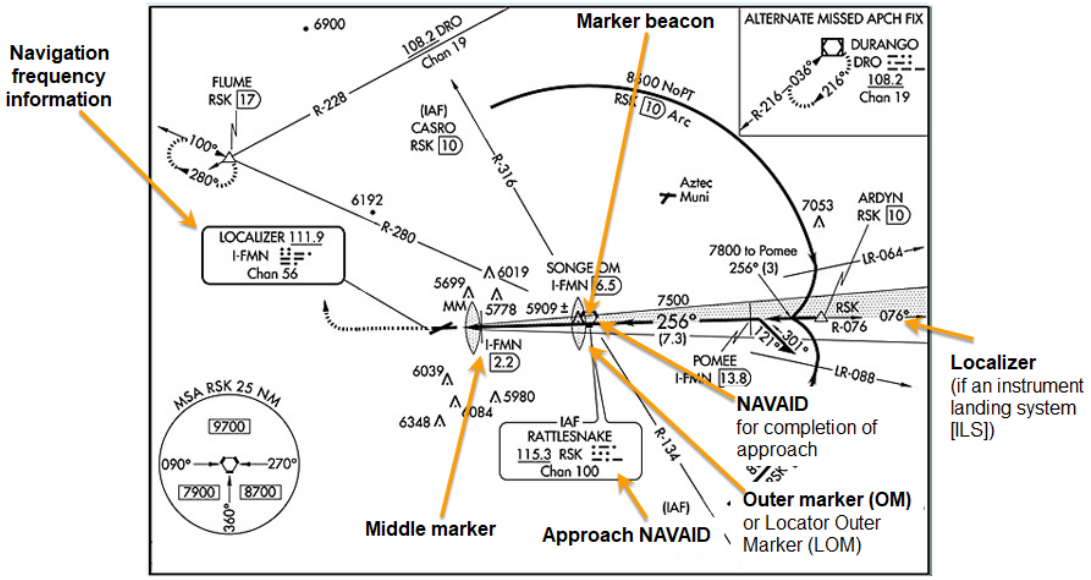
1. What are some types of information that can be found in the pilot's briefing section of an IAP? *(Select all correct answers that apply.)*
   - ❑ **Landing distance**
   - ❑ Missed approach icons
   - ❑ **Localizer information**
   - ❑ **Frequencies**
   - ❑ Minimums

Planview

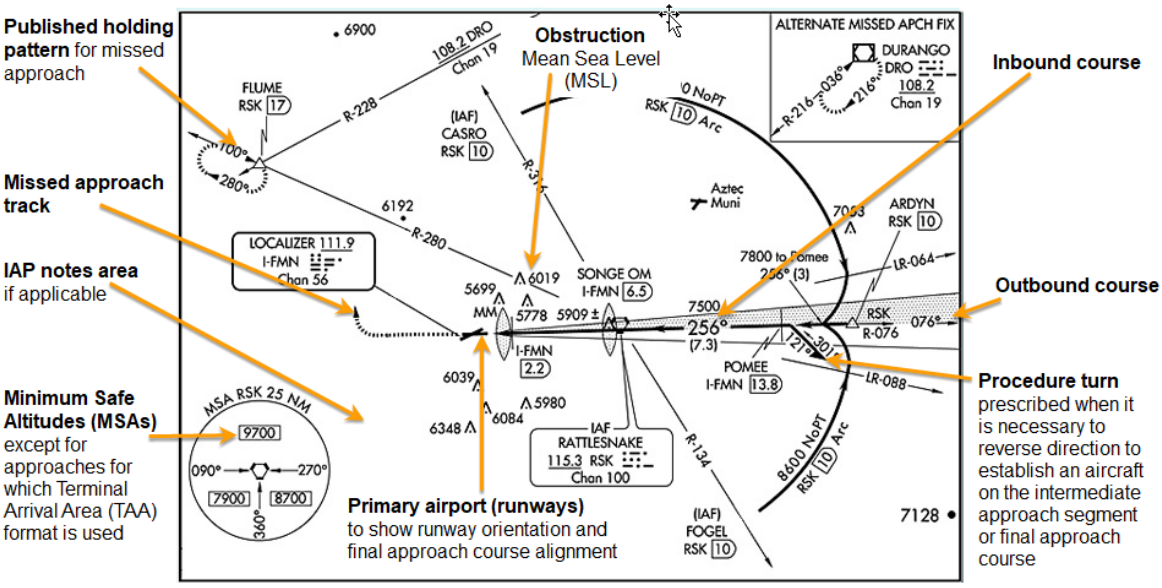
The planview provides a graphical overhead view of the procedure.



NAVAIDs



Information

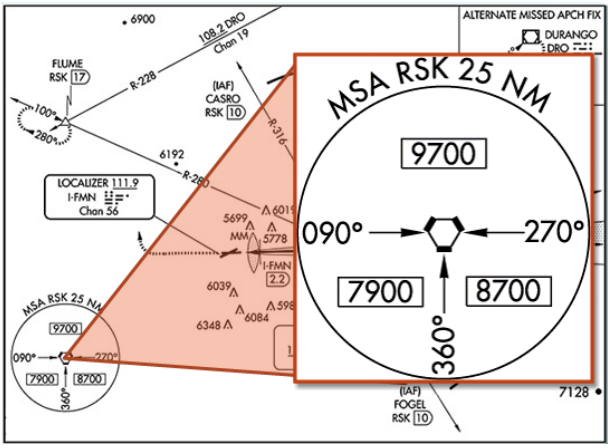


Additional Information

Additional information provided may include:

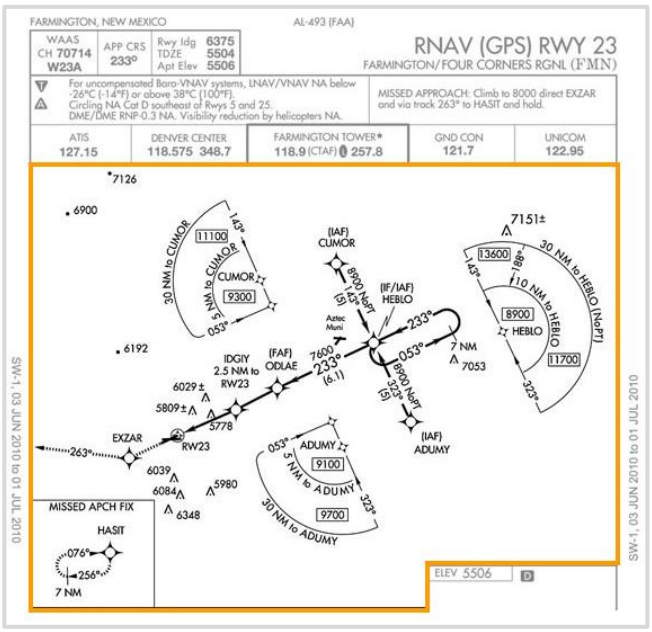
- Transition routes (may include a DME arc)
  - Altitude
  - Mileage information
- Geographical landmarks (such as rivers and lakes)
- Alternate missed approach fix

Minimum Safe Altitude (MSA)
Minimum Safe Altitude (MSA) is an emergency altitude to be used within 25 nautical miles (NM) of the NAVAID upon which the approach is predicated. In this example, the MSA is a 25 NM radius of the Rattlesnake VORTAC. This ensures 1,000 feet of obstruction clearance but does not ensure NAVAID frequency reception.

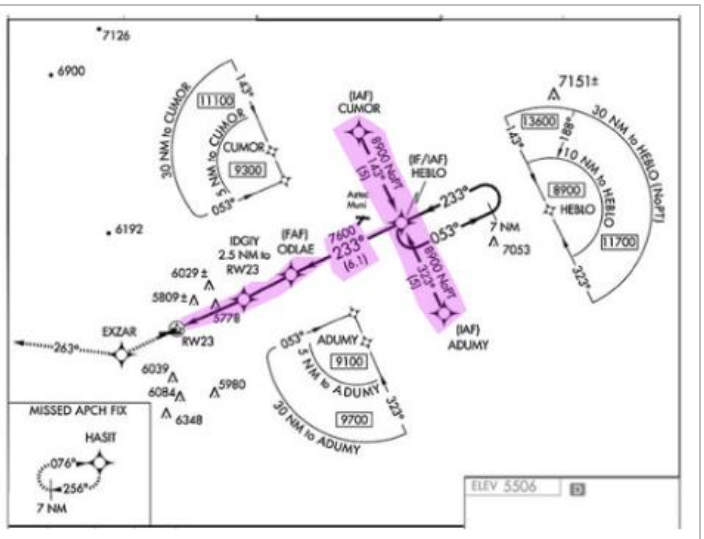


Terminal Arrival Area (TAA)

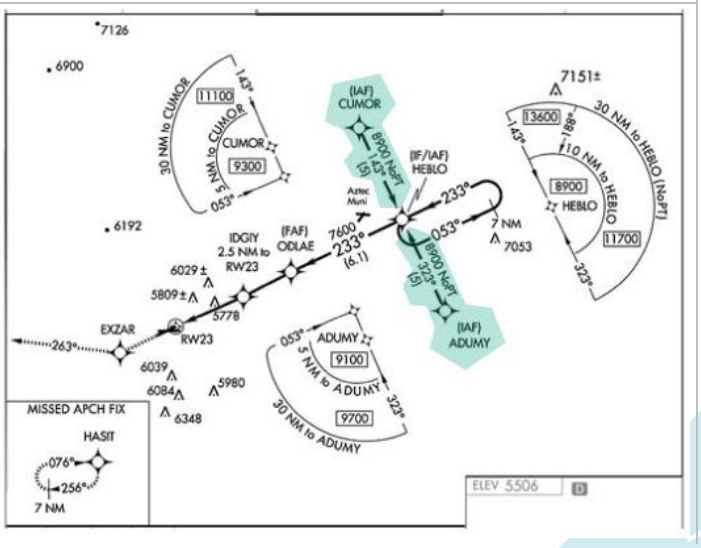
- Found on some RNAV approach charts
- Replaces the MSA and provides minimum altitudes with standard obstacle clearance depending upon the direction from which the aircraft is arriving
- Based on a 30-mile radius of the IAF
- Arc boundaries of the three areas of the TAA are published portions of the approach and allow aircraft to transition from the en route structure direct to the nearest IAF
- Eliminates or reduces feeder routes, departure extensions, and procedure turns or course reversal

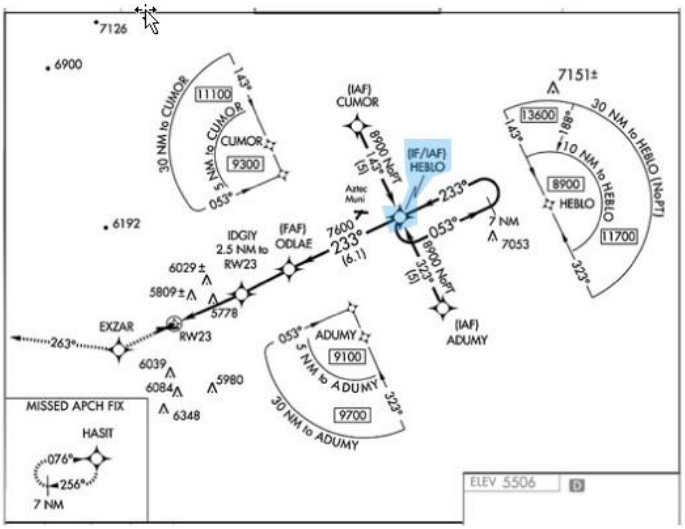
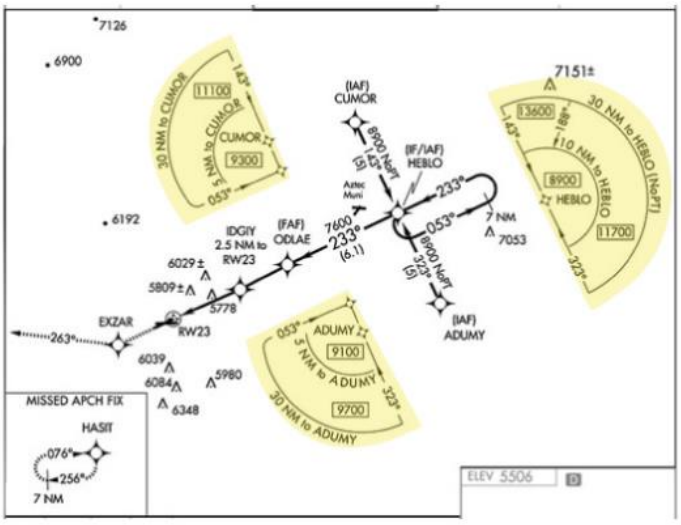


The Basic T design ideally aligns the procedure with the runway centerline to include the Missed Approach Point (MAP) located at the threshold, the FAF 5 NM from the threshold, and the Intermediate Fix (IF) 5 NM from the FAF.



The Basic T usually incorporates 2 IAFs located 3 to 6 NM on either side of the final IF/IAF and approximately 90° to the final approach course. The leg length or angle of the turn to the intermediate segment may be modified when required by obstructions or airspace.



Normally, the IF is also designated an IAF for straight-in (No Procedure Turn [NoPT]) procedures. If a straight-in procedure cannot be used due to terrain or airspace considerations, the IF will not be designated an IAF. If circumstances require a course reversal, a holding pattern is established at the IF/IAF.	
TAAs do not specify routes of flight, but rather describe a volume of airspace within which an aircraft proceeds inbound from the 30-NM arc boundary toward an appropriate IAF.	

Knowledge Check G

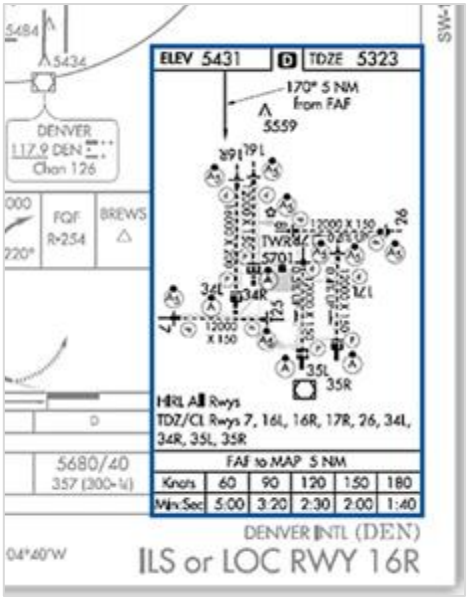
REVIEW what you have learned so far about IAP charts. ANSWER the questions listed below.

1. What are some types of information that can be found in the planview section of an IAP? *(Select all correct answers that apply.)*
   - ❑ **Middle marker**
   - ❑ **Procedure turn**
   - ❑ **Transition routes**
   - ❑ En route NAVAIDs
   - ❑ **Inbound course**

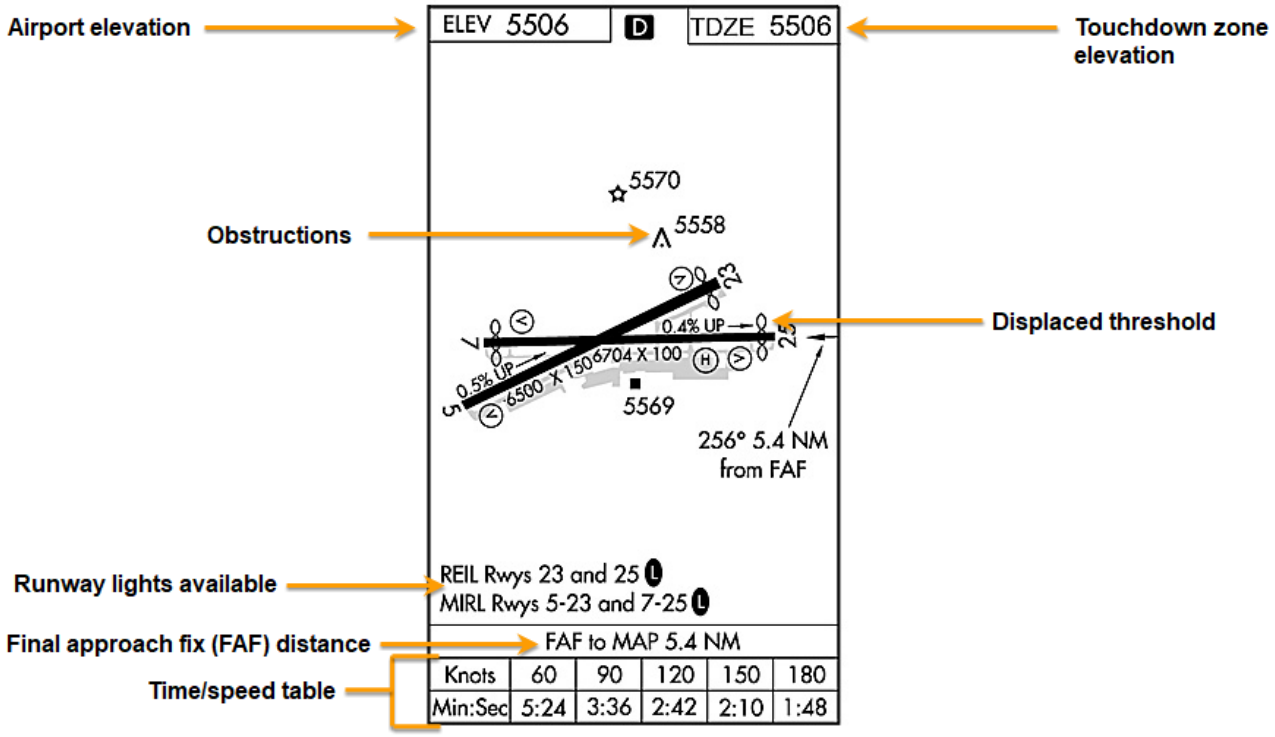
2. TAA is based on a _____ mile radius of the IAF. *(Select the correct answer.)*
   - ❑ 25
   - ❑ **30**
   - ❑ 40
   - ❑ 5

Airport Diagram

The airport diagram gives detailed information about the layout of the airport. This information helps pilots identify the MAP on certain nonprecision approaches (for example, those lacking DME).



The information labeled here can be found on the airport diagram section of an approach plate.



Knowledge Check H

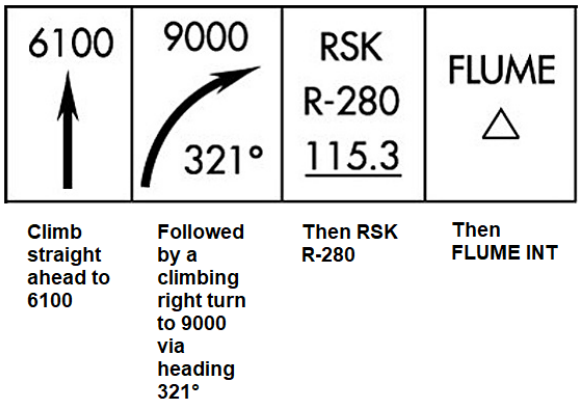
REVIEW what you have learned so far about IAP charts. ANSWER the questions listed below.

1. Which of the following items is included in an airport diagram? *(Select the correct answer.)*
   - ❑ DA
   - ❑ FAF
   - ❑ **Airport elevation**

Missed Approach Icons

The missed approach icons are part of the profile view and provide a visual depiction of the instructions for conducting the MAP.

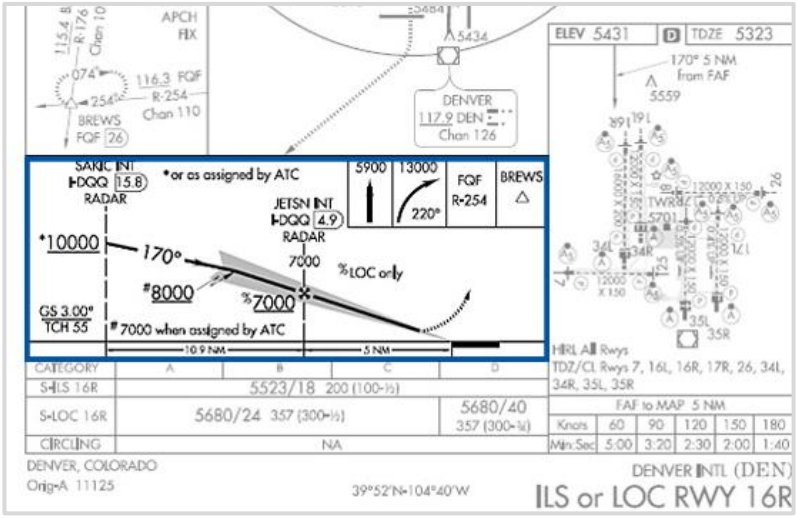
Shown here is the information that can be found in the missed approach icons section of an approach plate.



Profile View

The profile view includes the missed approach icons and shows a side view of the IAP.

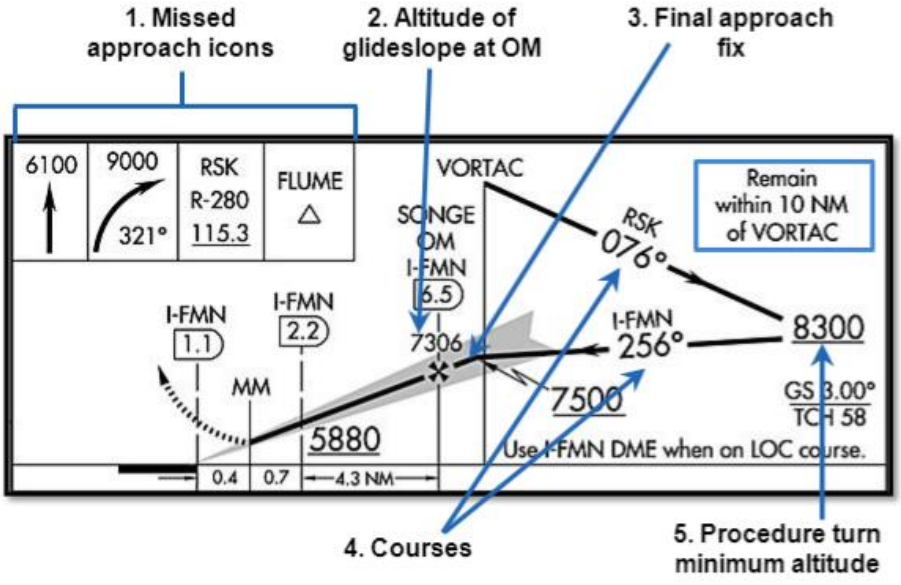
The information is different for precision approaches, approaches with vertical guidance, and nonprecision approaches.



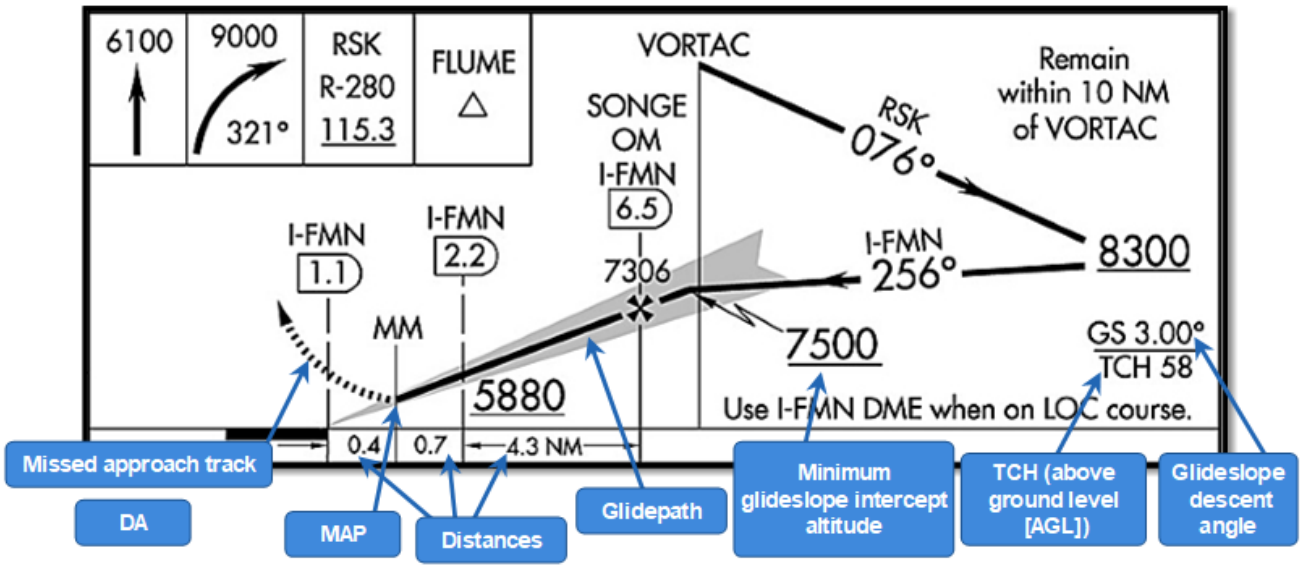
Precision Approach

The profile view of a precision approach contains the following items:

1. Missed approach icons
2. Altitude of the glideslope at the Locator Outer Marker (LOM)
3. FAF
   - Depicted by a lightning bolt ( ) when flown as a full ILS approach with glideslope
   - Depicted by a Maltese cross (✠) when flown as a localizer approach (when the glideslope is inoperative)
4. Courses of the IAP to be flown
5. Minimum procedure turn altitude



Precision Approach



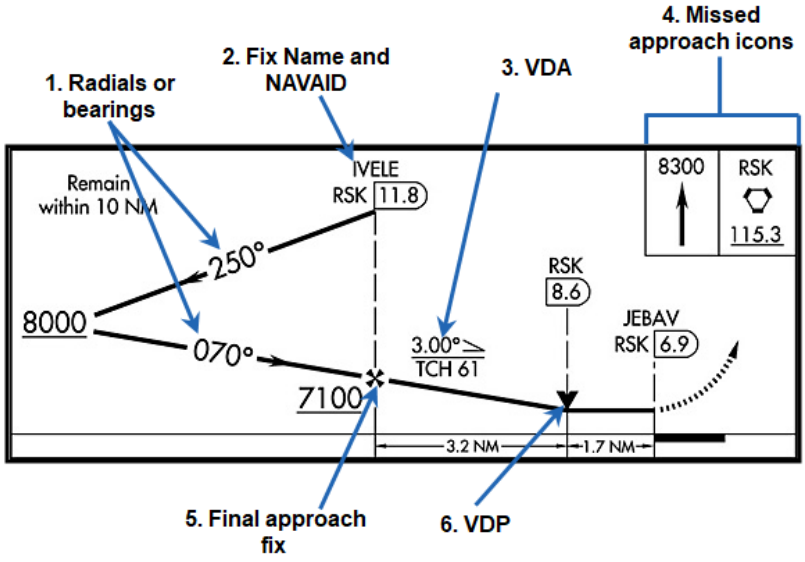
A precision approach also contains:

- The **Decision Altitude (DA)** is a specified altitude (MSL) on an instrument approach procedure (ILS, GLS, vertically guided RNAV) at which the pilot must decide whether to continue the approach or initiate an immediate missed approach if the pilot does not see the required visual references.
- Missed Approach Point (MAP)
  - For an ILS approach, is at the Decision Altitude (DA)
  - For a localizer approach, is determined by the pilot by timing from the FAF or by waypoints defined by global positioning system (GPS) or distance measuring equipment (DME)
- Missed approach track shown as a dashed line
- Distances
  - From runway threshold to the middle marker
  - From middle marker to locator outer marker
  - Maximum distance of procedure turn
- Glidepath
- Minimum glideslope intercept altitude
- Threshold Crossing Height (TCH) in feet AGL
- Glideslope descent angle in degrees

Nonprecision Approach

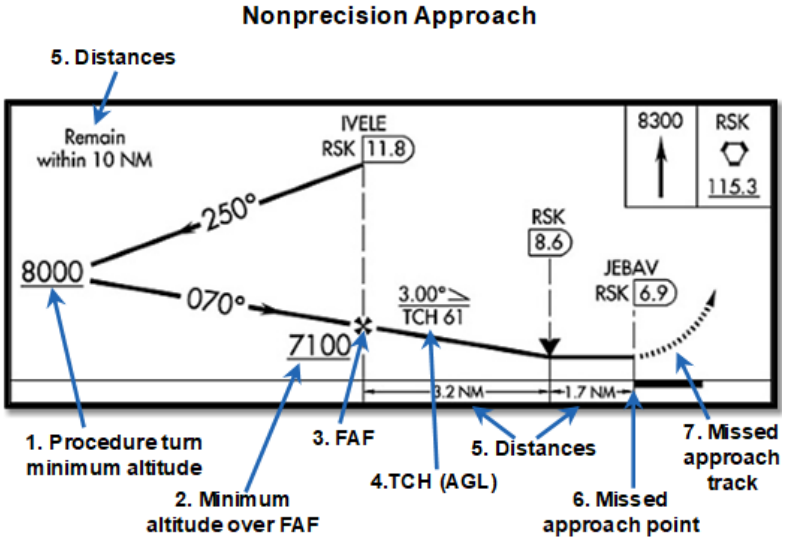
The profile view of a **nonprecision approach** contains the following items:

1. Radials or bearings of the IAP to be flown
2. Fix name and navigational aid (NAVAID) used to conduct the approach
3. Vertical Descent Angle (VDA), which is information required to establish a stabilized approach descent from the FAF to the TCH
4. Missed approach icons
5. FAF depicted by a Maltese cross (✠)
6. Visual Descent Point (VDP), where normal descent from the MDA to the runway touchdown point may be commenced



A nonprecision approach also contains:

1. Procedure turn altitude
2. Minimum altitude over FAF
3. Final approach fix
4. Threshold crossing height (TCH) in feet AGL
5. Distances
   - Maximum distance of procedure turn from the NAVAID
   - Distance between fixes
   - Distance between runway threshold and fix/FA
6. Missed Approach Point (MAP)
7. Missed approach track shown as a dashed line



Note: *The profile view of an approach with Vertical Guidance is very similar to that of a Nonprecision Approach. There are some differences between the two, for example, there is a GP angle instead of VDA and the FAF is depicted by a lightning bolt (* ↯ *).*

Knowledge Check I

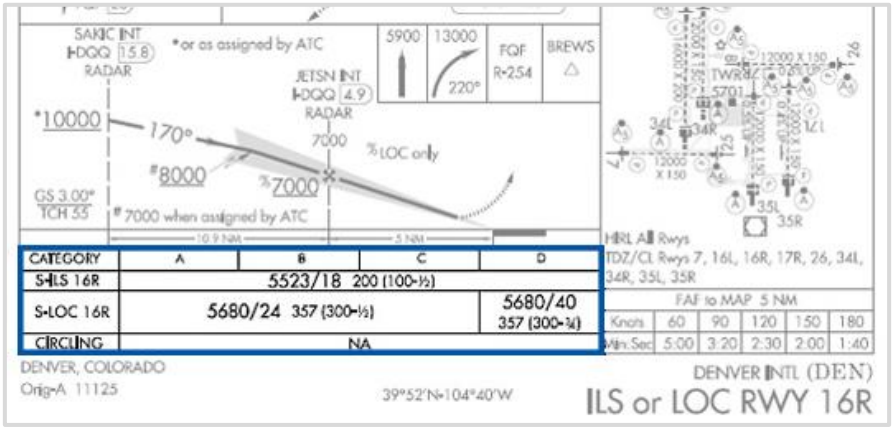
REVIEW what you have learned so far about IAP charts. ANSWER the questions listed below.

1. Which types of information would a precision approach contain? *(Select all correct answers that apply.)*
   - ❑ **Displaced threshold**
   - ❑ **Courses of the IAP to be flown**
   - ❑ **Missed approach icons**
   - ❑ **Navigation frequency**
   - ❑ **Minimum procedure turn altitude**

2. Which types of information would a nonprecision approach contain? *(Select all correct answers that apply.)*
   - ❑ **Radials or bearings of the IAP**
   - ❑ **Approach NAVAID**
   - ❑ **Airport coordinates**
   - ❑ **Vertical descent angle**
   - ❑ Decision altitude
   - ❑ **Missed approach icons**

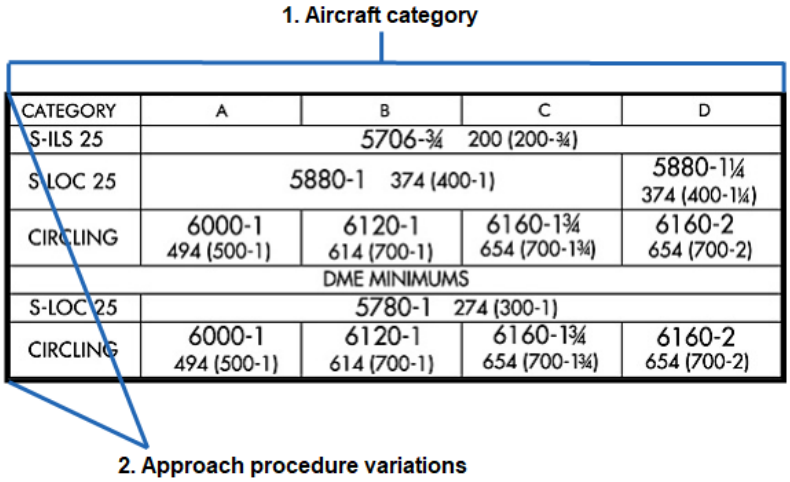
Precision Minimums Section

Precision minimums section contents consist of minimum parameters on certain aspects when landing, like ceiling height, distances, and weather. Numbers often differ according to aircraft category.



The primary data types of the minimums section are:

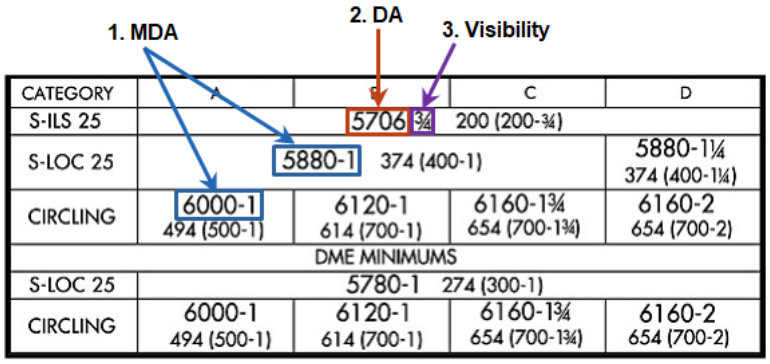
1. Aircraft approach categories
   - Determined according to landing speed at maximum certified gross landing weight
2. Variations of the approach procedure:
   - **Straight-in** to the aligned runway
   - **Localizer** when the glideslope component is inoperative (nonprecision approach)
   - **Circling** when aircraft must circle to another runway because of wind direction and/or velocity or runway restrictions



Altitudes and Visibility

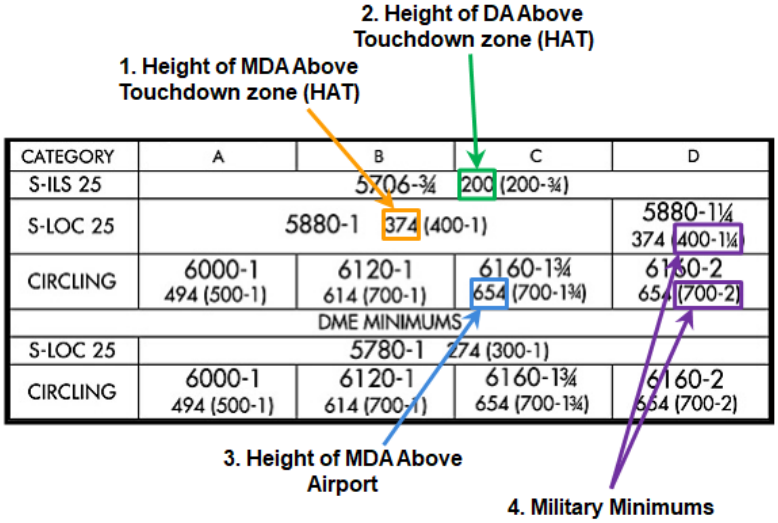
1. Decision Altitude (DA) (MSL)
2. Visibility in statute miles or Runway Visual Range (RVR)
3. Minimum Descent Altitude (MDA) (mean sea level [MSL])
    - Used for nonprecision approach

The **MDA** is the lowest altitude, expressed in feet above MSL, to which descent is authorized on final approach or during circle-to-land maneuvering in execution of an IAP where no electronic glideslope is provided.



Heights

1. Height of MDA above Touchdown zone (HAT)
    - Used for localizer approach because runway is known
2. Height of DA above Touchdown zone (HAT)
    - Used for straight-in approach only because the landing runway is known
3. Height of MDA above airport (HAA)
    - Used for circling version because runway is not known
    - MDA for the circling version of the approach is the highest of all the minimum altitudes
4. Military minimums shown in parentheses



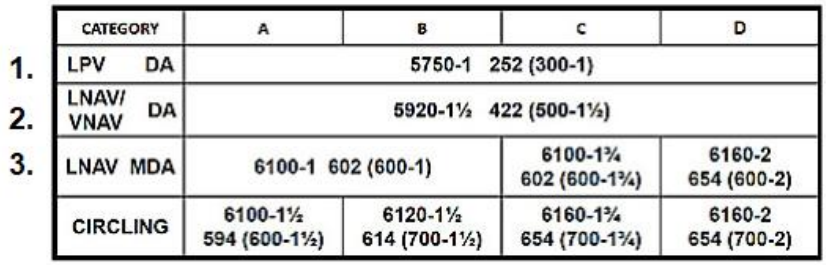
- **HAT** – The height of the Decision Height or MDA above the highest runway elevation in the touchdown zone (first 3,000 feet of the runway). HAT is published on instrument approach charts in conjunction with all straight-in minimums.

- **HAA –** The height of the MDA above the published airport elevation. This is published in conjunction with circling minimums.

Approaches with Vertical Guidance Minimums Section Contents

RNAV (GPS) Minimums – Approach Procedure Variations:

1. LPV: Localizer Performance with Vertical Guidance uses Wide Area Augmentation System (WAAS) to attain higher accuracy lateral and vertical guidance
    - Requires specific avionics
2. LNAV/VNAV: Lateral navigation/Vertical navigation
    - Uses either WAAS or Baro-VNAV to provide vertical guidance
3. LNAV: Lateral navigation:
    - No vertical guidance provided; does not require WAAS



Knowledge Check J

REVIEW what you have learned so far about IAP charts. ANSWER the questions listed below.

1. What types of approach variations are listed in the minimums section of an IAP? *(Select all correct answers that apply.)*
   - ❑ **Straight-in**
   - ❑ **Circling**
   - ❑ Vertical
   - ❑ **Localizer**

2. For a pilot conducting a nonprecision approach, what is the lowest altitude to which descent is authorized on final approach? *(Select the correct answer.)*
   - ❑ Height above airport
   - ❑ Decision Altitude
   - ❑ **Minimum Descent Altitude**

Instrument Approach Procedure Charts Summary

Not just any plane can land on any runway. There are different rules and parameters depending on the equipment the aircraft has, the equipment each runway possesses, and the current weather. Be sure to study the approach plates for your airport with great care so you can provide the best guidance possible to get everyone safely on the ground.

FACILITATOR INSTRUCTIONS	DELIVERY METHOD
■ Review content presented in ***Instrument Approach Procedures Charts*** lesson and ***ILS Approach*** video ■ Navigate to the ***Parking Lot*** link within Blackboard and review any student questions ■ Address ***Parking Lot*** questions and facilitate a brief discussion of the lesson content	Facilitated Discussion **EST. RUN TIME** 20 mins.

FACILITATOR INSTRUCTIONS	DELIVERY METHOD
■ **ENABLE *Other Approaches*** lesson in Blackboard ■ Instruct students to navigate to the ***Other Approaches*** lesson in Blackboard ■ Instruct students to work individually through the lesson content ■ Upon completion of the lesson, students should review previously introduced content or wait quietly until other students have completed	Blackboard **EST. RUN TIME** 15 mins.

OTHER APPROACHES

Purpose: The purpose of this lesson is to identify other types of approaches used by Air Traffic Control (ATC).

Objective:

- Identify alternate approach procedures

References for this lesson are as follows:

- FAA Order JO 7110.65, Air Traffic Control
- FAA Order JO 7110.79, Charted Visual Flight Procedures

Other Approaches

To expedite traffic, ATC may clear Instrument Flight Rules (IFR) aircraft for other approaches, in lieu of other than standard approaches. These approaches allow the flight to continue as an IFR flight, while increasing the efficiency of the arrival.

Visual Approach

A visual approach authorizes a pilot to proceed visually and cleared of clouds to the airport while operating on an IFR flight plan.

Required Conditions

Pilot	Approach	Weather
The pilot must, at all times, have in sight either the: • Airport • Preceding aircraft	The approach must be: • Authorized • Under the control of the appropriate ATC facility	Reported weather at the airport of intended landing, must be: • Ceiling at or above 1,000 feet • Visibility of 3 miles or greater

Visual Approach with Traffic

In order to conduct a visual approach with traffic in the vicinity, the following conditions must exist for each approach.

Radar Environment	Vectored for the Approach	Following an Aircraft
In a radar environment, to vector an aircraft for a visual approach, the: • Ceiling at the airport of intended landing must be 500 feet above the minimum vectoring altitude • Visibility must be 3 miles or greater	When an aircraft is being vectored for an instrument approach and reports the airport in sight: • Controller may initiate visual approach • Pilot may request visual approach	An aircraft following another arriving aircraft may be cleared for visual approach, if: • Pilot reports the traffic in sight • Pilot is instructed to follow it

Note: *Once the pilot reports the preceding aircraft in sight and cleared, they assume responsibility for their own separation as well as wake turbulence avoidance.*

Contact Approach

A **contact approach** is an approach wherein an aircraft on an IFR flight plan, may deviate from the instrument approach procedure, and proceed to the destination airport by visual reference to the surface, providing they:

- Have an ATC authorization
- Operate clear of clouds with at least 1 statute mile (SM) flight visibility
- Have a reasonable expectation of continuing to the destination airport in those conditions

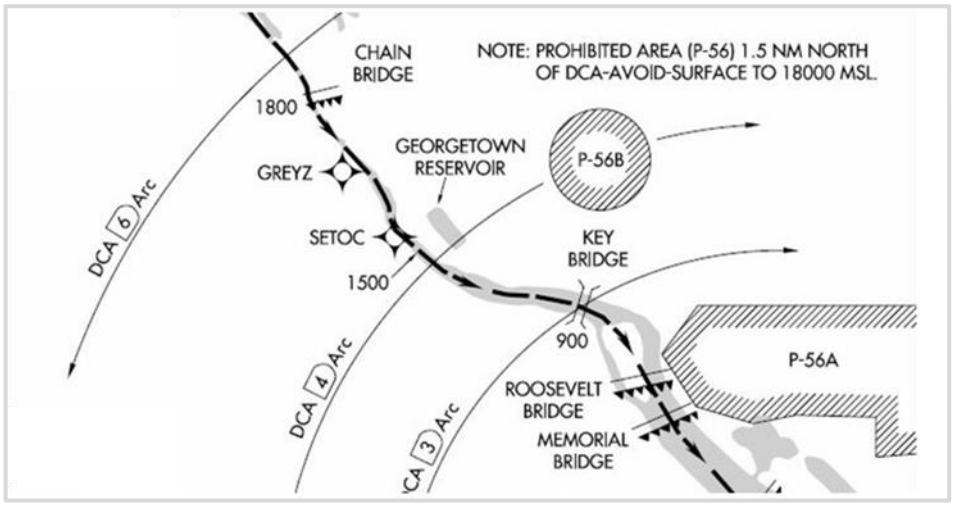
Required Conditions

Approach Authorized	Approach Procedure
This approach will only be authorized when: ■ Requested by the pilot ■ Reported ground visibility at the destination airport, is at least 1 SM	A standard or special instrument approach procedure: ■ Has been published ■ Is functioning for the airport of intended landing
Approved Separation	**Alternative Clearance**
Approved separation is applied between: ■ Aircraft so cleared and ■ Other IFR or Special Visual Flight Rules (SVFR) aircraft	An alternative clearance is issued when weather conditions are such that a contact approach may be impracticable.

Charted Visual Flight Procedures

Charted Visual Flight Procedures (CVFPs) are established for environmental/noise considerations, and/or when necessary for the safety, and efficiency of air traffic operations.

- Designed primarily for turbojet aircraft
- Depict prominent landmarks, courses, and recommended altitudes to specific runways



Required Conditions

■ Procedures used only at airports with an operating control tower	■ Most approach charts depict some Navigational Aid (NAVAID) information for supplemental guidance
■ Usually begins within 20 nautical miles (NM) from the airport	■ Not an instrument approach, and do not have missed approach segments
Unless indicating a Class B airspace floor, all depicted altitudes are for noise abatement purposes and are recommended only. ■ Pilots are not prohibited from flying other than recommended altitudes if operational requirements dictate ■ ATC may assign additional restrictions	

Knowledge Check K

REVIEW what you have learned so far about alternate approaches. ANSWER the questions listed below.

1. What reported weather must be present at the intended airport for an IFR flight to conduct a visual approach? *(Select all correct answers that apply.)*
   - ❑ **Visibility of 3 miles or greater**
   - ❑ Ground visibility of at least 1SM
   - ❑ Visibility one mile or greater
   - ❑ **Ceiling at or above 1,000 feet**

2. When is an aircraft following another arriving aircraft cleared for visual approach? *(Select the correct answer.)*
   - ❑ If the pilot reports traffic in sight, and the visibility is 3 miles or greater
   - ❑ After ATC issues authorization
   - ❑ **If the pilot reports traffic in sight, and instructed by ATC to follow**
   - ❑ After ATC verifies reported visibility, and instructed by ATC to follow

3. What must happen before a contact approach will be authorized? *(Select the correct answer.)*
   - ❑ **Pilot must request**
   - ❑ The pilot must have the airport in sight
   - ❑ **Approach procedures must be published**
   - ❑ Alternative clearance is issued

4. Select the items that accurately describe a CVFP. *(Select all correct answers that apply.)*
   - ❑ **Usually begin within 20 NM of the airport**
   - ❑ **CVFPs depict prominent landmarks**
   - ❑ Used at airports without an operating control tower
   - ❑ CVFPs have missed approach segments

Other Approaches Summary

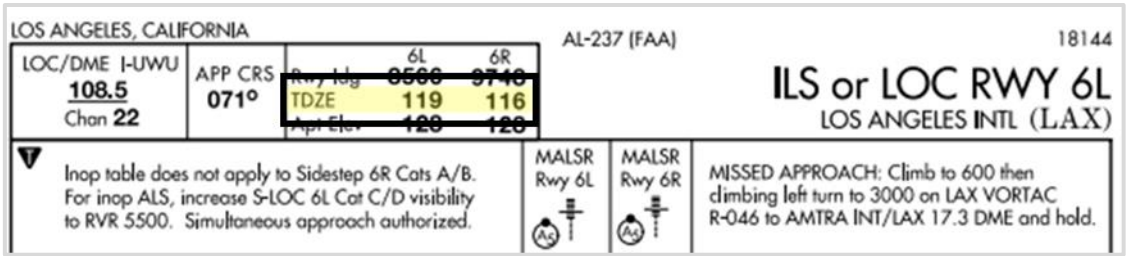
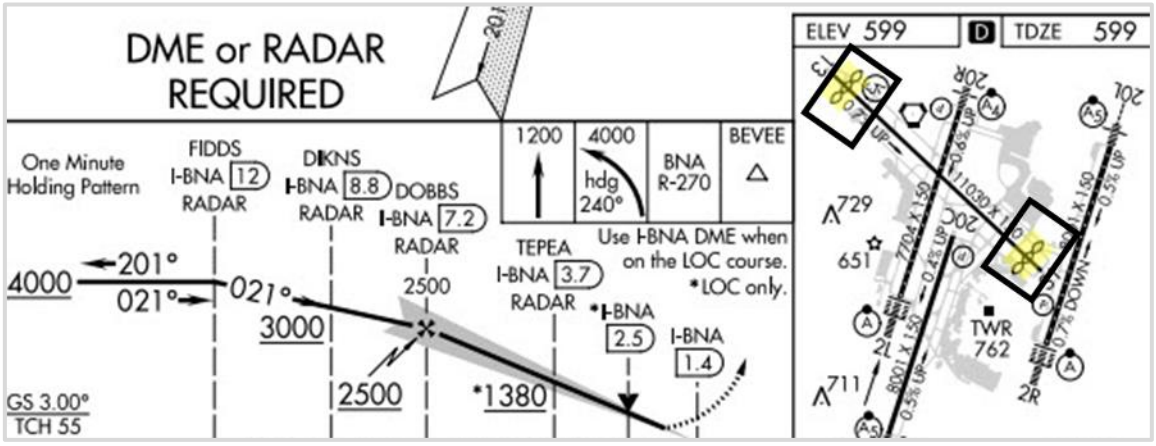
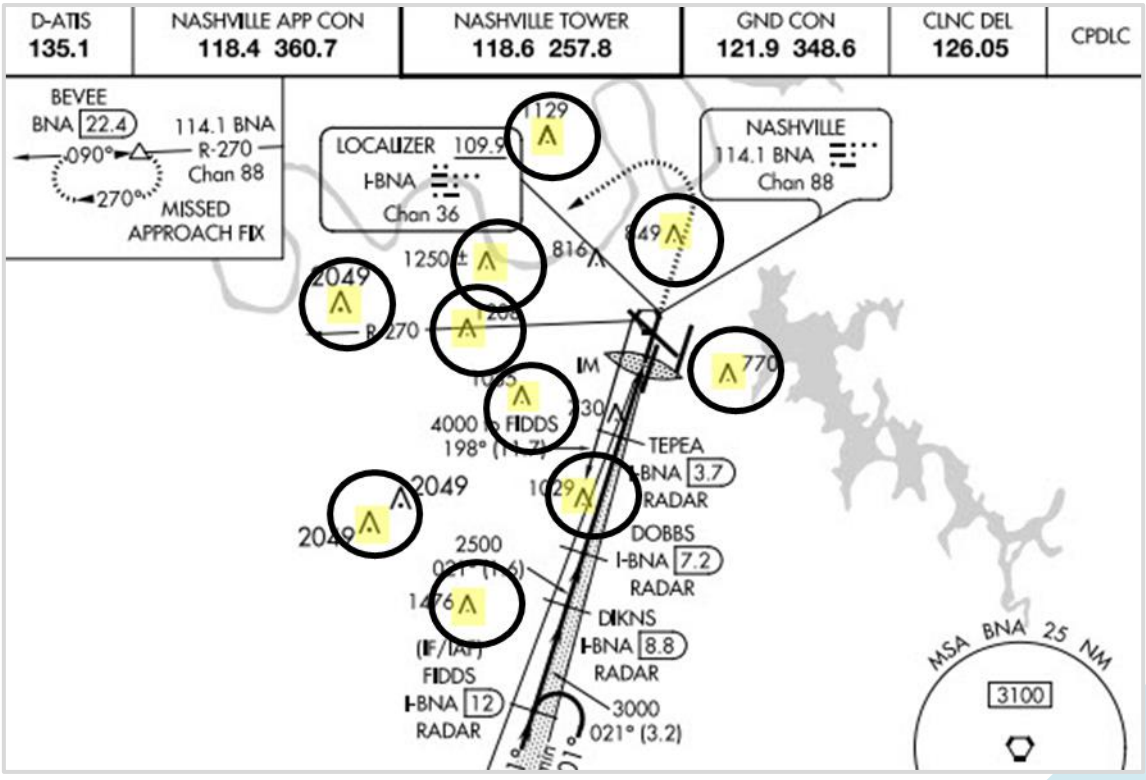
Air traffic control often clears IFR aircraft for other approaches to help expedite traffic and increase efficiency during arrival. Before a controller authorizes or issues a clearance for these approaches, they must be able to determine the necessary procedures to conduct each approach.

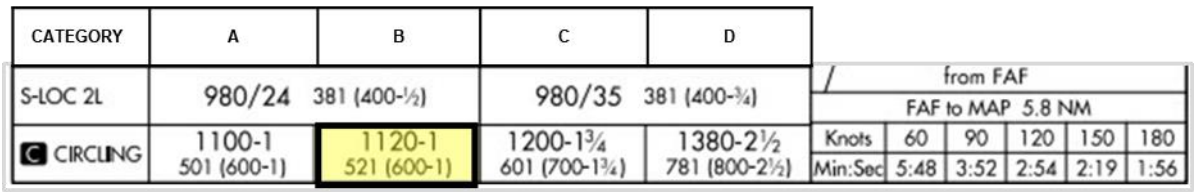
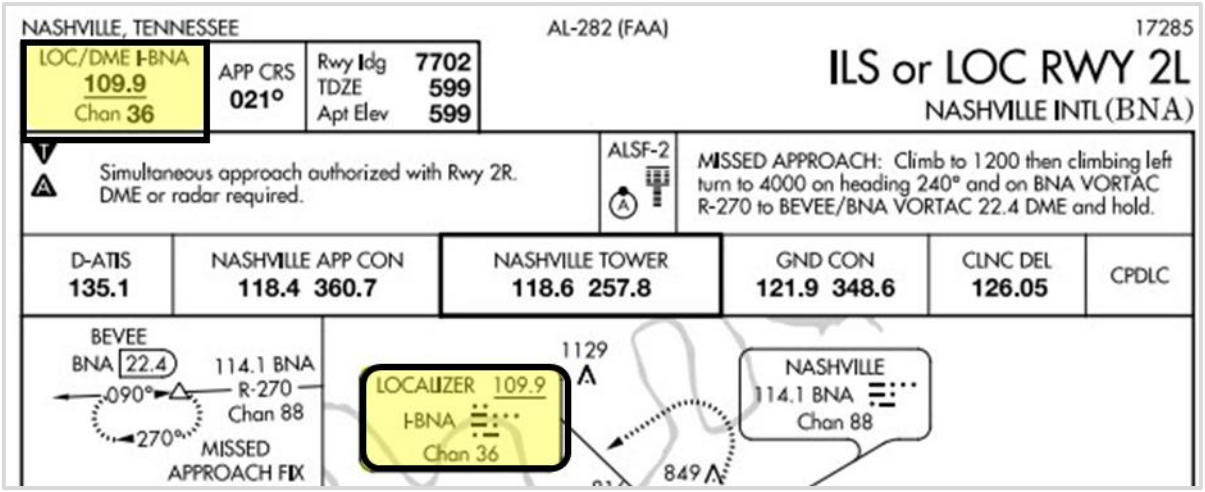
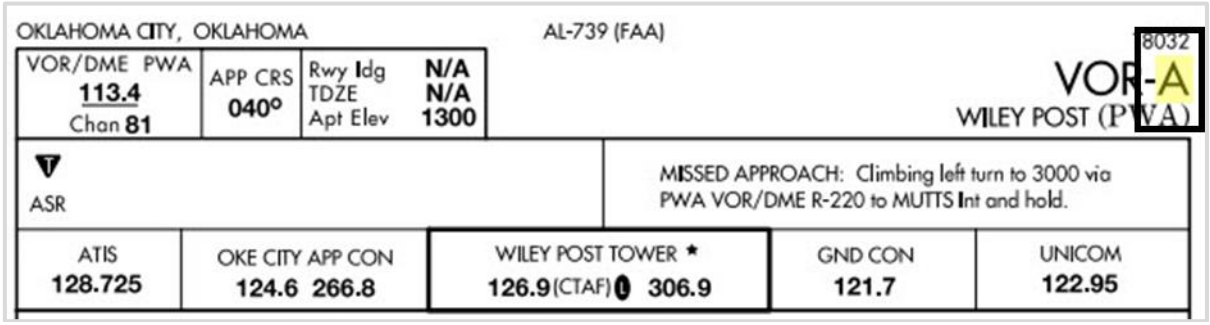
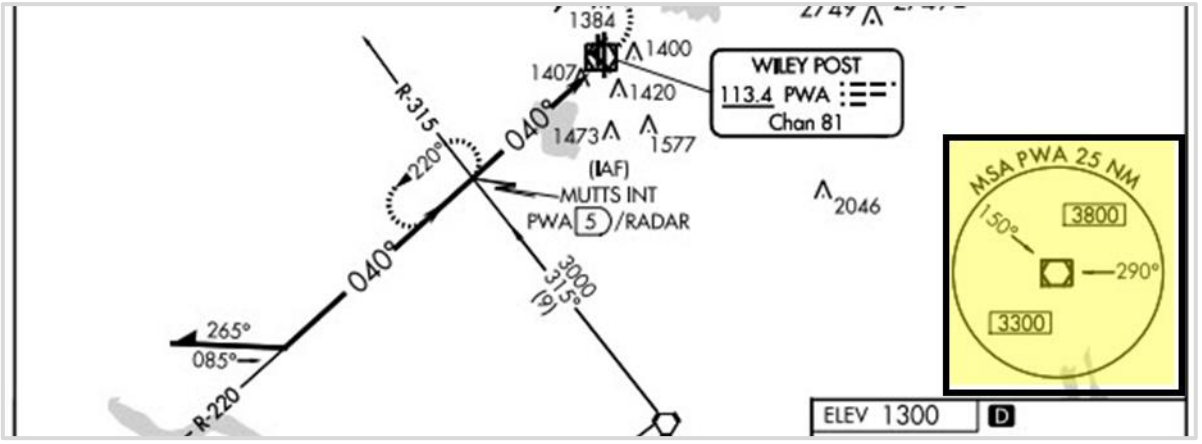
FACILITATOR INSTRUCTIONS	DELIVERY METHOD
■ Review content presented in ***Other Approaches*** lesson ■ Navigate to the ***Parking Lot*** link within Blackboard and review any student questions ■ Address ***Parking Lot*** questions and facilitate a brief discussion of the lesson content	Facilitated Discussion **EST. RUN TIME** 20 mins.

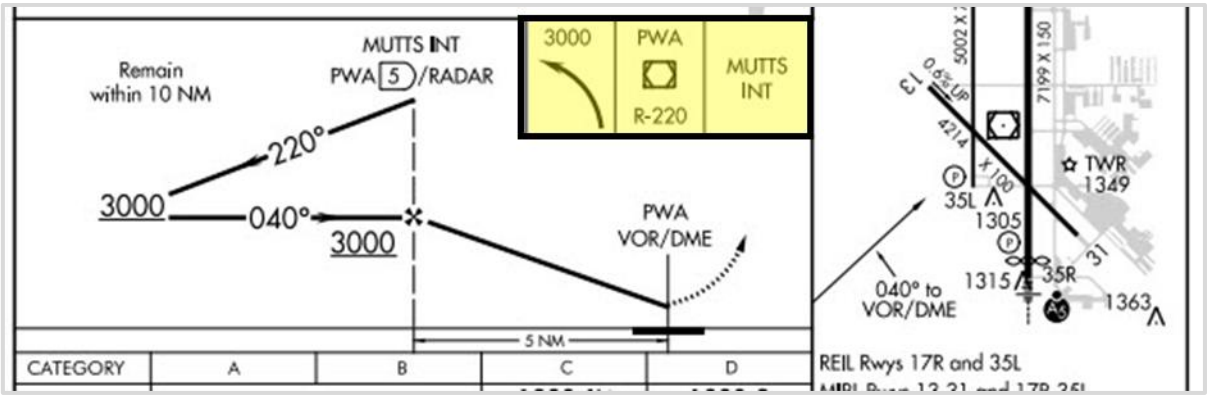
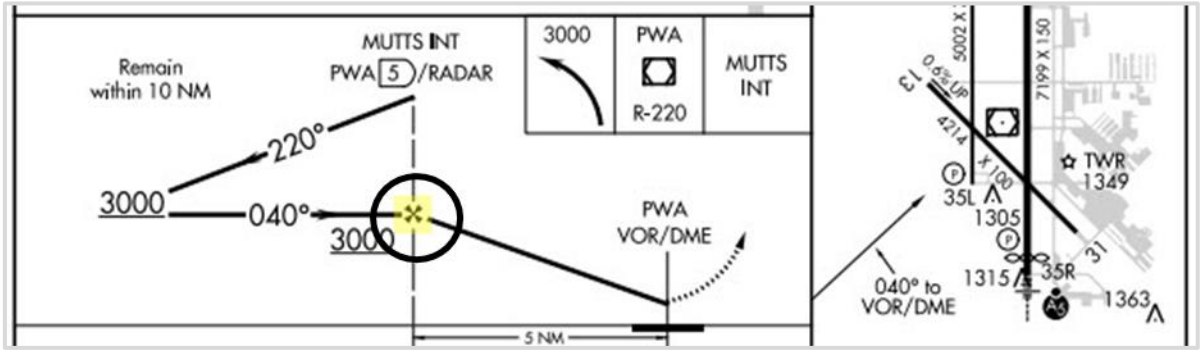
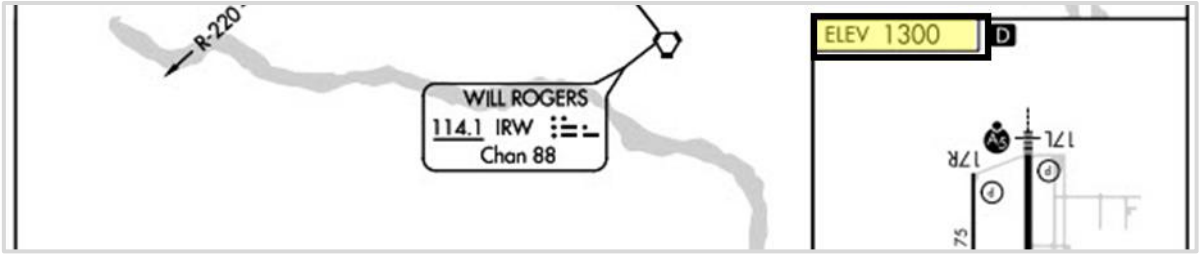
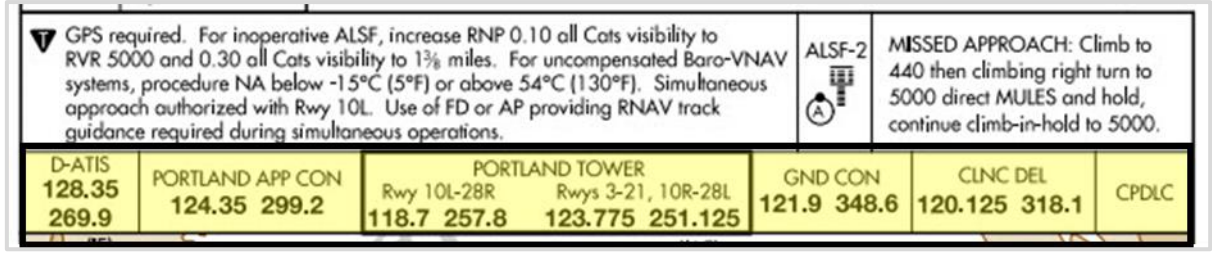
FACILITATOR INSTRUCTIONS	DELIVERY METHOD
■ **ENABLE *Instrument Approach Identification*** activity in ***Exercises and Activities*** folder in Blackboard ■ Instruct students to navigate to the ***Exercises and Activities*** folder in Blackboard ■ Instruct students to locate student activity ***Instrument Approach Identification*** ■ The activity may be performed individually ■ Instruct students to answer each question ■ At the end of the exercise, the activity will evaluate the students' performance ■ Suggest allowing opportunities to repeat the activity during periods of down time	Activity **EST. RUN TIME** 20 mins.

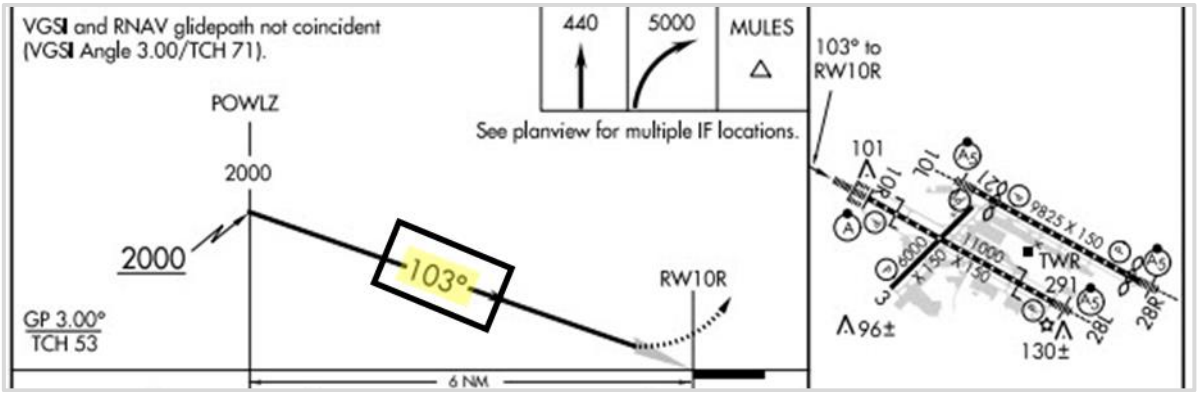
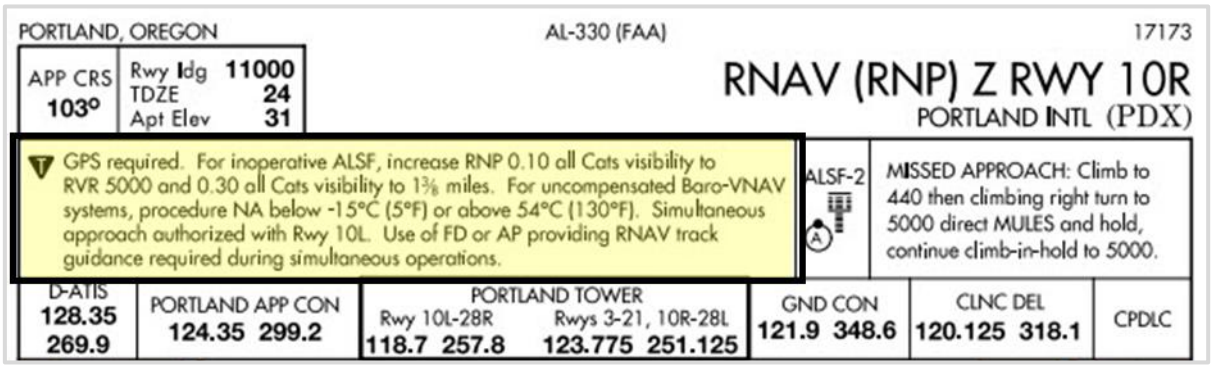
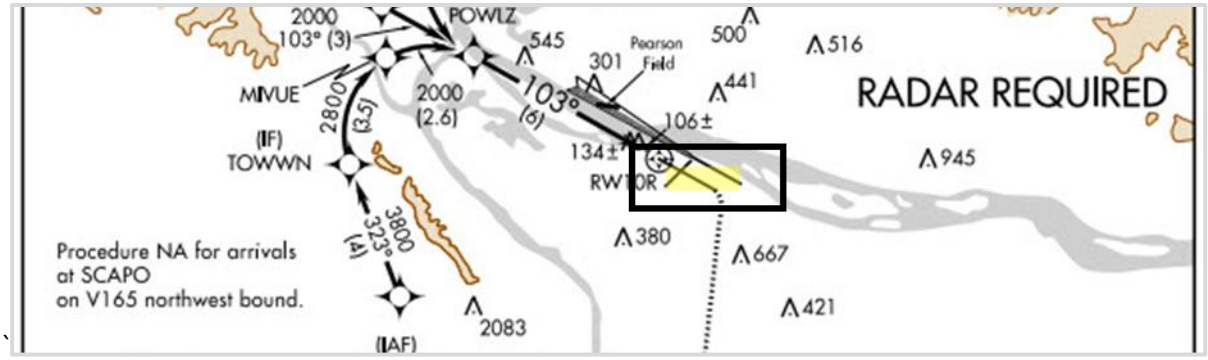
ACTIVITY: INSTRUMENT APPROACH IDENTIFICATION (ANSWER KEY)

Note: *The questions in the key and their distractors may appear in a different order than displayed here due to activity question randomization.*

Question	Answer (highlighted in yellow and black outlines)
Select the Touchdown Zone Elevation (TDZE).	
Select the displaced threshold.	
Can you find an obstruction?	

Select the approach minimums of a circling class B aircraft.	
Where do you find the localizer frequency?	
What part of this approach name indicates that it is to an airport and not a runway?	
Where would you look to find the minimum safe altitudes that should be used within 25 nautical miles of the approach NAVAID?	

Can you find the missed approach icons?	
Where is the FAF?	
Where can you find the airport elevation?	
Where can you find the airport identifier?	
Where are the ATC frequencies listed in order of use?	

Where is the radial (or course)?	
Where would you look to find whether this airport has nonstandard IFR takeoff minimums?	
Can you find the runway?	

Note: *During this portion of the activity, the students will define the acronyms found on approach plates by typing them into the fields provided.*

Acronym		Answer
1.	MM	**Middle marker**
2.	LOM	**Locator outer marker**
3.	MSA	**Minimum safe altitude**
4.	TAA	**Terminal Arrival Area**
5.	MSL	**Mean sea level**
6.	DME	**Distance measuring equipment**
7.	FMS	**Flight Management System**
8.	MAP	**Missed approach point**
9.	IF	**Intermediate fix**
10.	NoPT	**No procedure turn**
11.	RVR	**Runway visual range**
12.	HAT	**Height above touchdown**
13.	HAA	**Height above airport**
14.	IAP	**Instrument Approach Procedure**
15.	LOC	**Localizer**
16.	ILS	**Instrument Landing System**
17.	RNAV	**Area Navigation**
18.	DA	**Decision altitude**
19.	MDA	**Minimum descent altitude**
20.	NM	**Nautical Miles**
21.	FAF	**Final approach fix**
22.	LNAV	**Lateral navigation**
23.	TCH	**Threshold crossing height**
24.	IAF	**Initial approach fix**
25.	GPS	**Global positioning system**
26.	OM	**Outer marker**
27.	GLS	**GBAS Landing System**
28.	LPV	**Localizer Performance with Vertical Guidance**
29.	GBAS	**Ground Based Augmentation System**
30.	WAAS	**Wide Area Augmentation System**
31.	LNAV/VNAV	**Lateral navigation / Vertical navigation**

SUMMARY

The purpose of this module was to provide an overview of the Instrument Approach Procedures (IAPs) and identify the types of approaches available to pilots and the charts used to depict these approaches.

In accordance with FAA Order JO 7110.65, Air Traffic Control; FAA-H-8083-15 Instrument Flying Handbook; FAA Order JO 7110.79, Charted Visual Flight Procedures; and the Aeronautical Information Manual (AIM); you should now be able to:

- Define Instrument Approach Procedures (IAPs)
- Describe types of IAPs
- Identify an Instrument Approach Procedure (IAP) chart
- Identify alternate approach procedures

FACILITATOR INSTRUCTIONS	DELIVERY METHOD
■ Navigate to the ***Parking Lot*** link within Blackboard and review any student questions ■ Address ***Parking Lot*** questions and facilitate a brief discussion of the lesson content ■ Instruct students to prepare for the End-of-Module test by putting away their Student Guides	Facilitated Discussion **EST. RUN TIME** 15 mins.

FACILITATOR INSTRUCTIONS	DELIVERY METHOD
■ **ENABLE *Approaches End-of-Module Test*** link in Blackboard ■ Instruct students: ○ Clear desks ○ Do not write anything during or after the test ○ Navigate to the ***Approaches End-of-Module Test*** link in Blackboard ○ Once they are satisfied with their responses, click “Save and Submit;” do not click “OK” to review results until directed to do so ○ Choose “Cancel” if they receive a warning message that the test has unanswered questions; choosing OK will submit the test and not allow them to go back and answer the questions ○ Leave the room after submitting the test and return at the “Be Back” time ■ ***Note:*** *This test is scored but not graded* ■ During test, monitor students to ensure a secure testing environment ■ Identify the most commonly missed questions by reviewing student statistics in Blackboard ■ Instruct students to click “View Results” when ready to review commonly missed questions ■ Review commonly missed questions with students	Blackboard Assessment **EST. RUN TIME** 15 mins.

END-OF-MODULE TEST (ANSWER KEY)

Note: *Test questions in Blackboard are presented to the students in random order. Please be aware the test key question order will not match the student version.*

1. What are IAPs designed to provide? *(Select the correct answer.)*
   - ❑ **IFR descent from an en route environment to a point where a safe landing can be made**
   - ❑ Expedited arrival procedures at airports
   - ❑ Aeronautical data required to ensure safe descent
   - ❑ Authorization to proceed visually and clear of clouds to the airport

   Reference(s): JO 7110.65, Pilot/Controller Glossary

2. Which of these is a supplementary component of an ILS? *(Select the correct answer.)*
   - ❑ **Compass locators**
   - ❑ Localizer
   - ❑ Glideslope
   - ❑ Marker beacons

   Reference(s): JO 7110.65, Pilot/Controller Glossary

3. Which of the following items is **NOT** found on the planview section of the IAP chart? *(Select the correct answer.)*
   - ❑ **Airport coordinates**
   - ❑ Missed approach track
   - ❑ Transition routes
   - ❑ Obstructions

   Reference(s): FAA-H-8083-15, Chap. 1

4. Which statement is true regarding MSAs? *(Select the correct answer.)*
   - ❑ **MSAs provide 1,000 feet obstacle clearance**
   - ❑ MSAs provide obstacle clearance within 22 NM of the primary approach NAVAID
   - ❑ NAVAID frequency reception is ensured at the MSA
   - ❑ Individual MSAs are depicted along each segment of the approach procedure

   Reference(s): FAA-H-8083-15, Chap. 1

5. What additional condition must a pilot provide during a contact approach after obtaining ATC authorization to operate clear of clouds with at least 1 SM of flight visibility? *(Select the correct answer.)*
   - ❑ **Reasonable expectation of continuing to the destination airport in those conditions**
   - ❑ Assume responsibility for their own wake turbulence avoidance
   - ❑ Have the airport or preceding aircraft in sight
   - ❑ Begin arrival procedures within 20 NM from the airport

   Reference(s): JO 7110.65, Chap. 7

FACILITATOR INSTRUCTIONS	DELIVERY METHOD
■ **ENABLE *End-of-Block 3 Test*** link in Blackboard ■ Instruct students: ○ Clear desks ○ Do not write anything during or after the test ○ Navigate to the ***End-of-Block 3 Test*** link in Blackboard ○ Once they are satisfied with their responses, click “Save and Submit;” do not click “OK” to review results until directed to do so ○ Choose “Cancel” if they receive a warning message that the test has unanswered questions; choosing OK will submit the test and not allow them to go back and answer the questions ○ The test will auto-submit when the time limit is reached ○ Leave the room after submitting the test and return at the “Be Back” time ■ ***Note:*** *This test is scored but not graded* ■ During test, monitor students to ensure a secure testing environment ■ Instruct students to click “View Results” when ready to review results; do not review commonly missed questions	Blackboard Assessment **EST. RUN TIME** 60 mins.