**LESSON PLAN DATA SHEET**

**COURSE NAME:** AIR TRAFFIC BASICS  
**COURSE NUMBER:** 50043/50143  
**LESSON TITLE:** ATC SYSTEM AND NAS  
**DURATION:** 7+00 HOUR(S)  
**DATE REVISED**  
**VERSION:** V.1.08  
**REFERENCE(S):** FAA ORDERS JO 7110.65, AIR TRAFFIC CONTROL; JO 7210.3, FACILITY OPERATION AND ADMINISTRATION; AND 3120.4, AIR TRAFFIC TECHNICAL TRAINING; AERONAUTICAL INFORMATION MANUAL (AIM); ADMINISTRATOR’S FACT BOOK; AIR TRAFFIC RESTRUCTURING IMPLEMENTATION PLAN  
**HANDOUTS:** NONE  
**EXERCISE(S):** EXERCISE 1: PRIORITY AND PREFERENCE; EXERCISE 2: AFSS POSITIONS; EXERCISE 3: ATCT POSITIONS; EXERCISE 4: TRACON/ARTCC RADAR TEAM POSITIONS; EXERCISE 5: TMS  
**END-OF-LESSON TEST:** YES (NOT INCLUDED IN THIS DOCUMENT REFER TO ELT01-ATC NAS.PDF)  
**PERFORMANCE TEST:** NONE  
**MATERIALS:** NONE  
**OTHER PERTINENT INFORMATION:** VIDEOS: “SERVING AVIATION WITH PRIDE” (8 MINUTES), “THIS IS AIR TRAFFIC CONTROL,” (5 MINUTES) AND “MANAGING THE FLOW,” (6 MINUTES)  
**APPENDIX A:** FAA HISTORY  
**APPENDIX B:** ORGANIZATIONAL FLOWCHART  
**APPENDIX C:** GLOSSARY

**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.

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THE FEDERAL AVIATION ADMINISTRATION DISCLAIMS ANY/ALL RESPONSIBILITY FOR PROVIDING UNSOLICITED COURSEWARE UPDATES.
You are entering one of the most challenging career fields in aviation - Air Traffic Control (ATC). Your duties and responsibilities as an air traffic control specialist will be vital in ensuring the safety of aircraft both on the ground and in the air.

You need to understand the elements and functions of the National Airspace System (NAS) in order to effectively provide air traffic service. The NAS is the busiest and most complex airspace system in the world. The NAS includes every airport, runway, and taxiway in the United States. The system is woven together by airways and Navigational Aids (NAVAIDS) and broken into sections of airspace. It is governed by a set of rules, regulations and procedures designed to keep it safe.

The controller works with and is a part of the NAS. Knowledge of the elements of the NAS and an understanding of the role of Traffic Management helps the controller more effectively apply the rules and procedures that are necessary for maintaining a safe and orderly air traffic system.

This lesson describes the history of the FAA, the functions and roles of different FAA organizations and the responsibilities of different facility positions. It also describes the purpose of the ATC system, including the role of the Traffic Management System (TMS). The lesson ends with a description of the NAS.
INTRODUCTION (Continued)

Objectives

On an End-of-Lesson Test, you will identify:
1. Elements of the National Airspace System (NAS)
2. Role of the Traffic Management System (TMS) within the NAS
3. Purpose and responsibilities of the Air Traffic Control (ATC) System

You will meet these objectives in accordance with the following references:

- FAA Orders
  - JO 7110.65, Air Traffic Control
  - JO 7210.3, Facility Operation and Administration

NOTE: Briefly explain the manuals mentioned in the objectives. They will be taught later in the “Orders and Manuals” lesson.

On an End-of-Lesson Test, you will identify the primary functions and associated position responsibilities of:
1. Automated Flight Service Station (AFSS)
2. Tower team
3. Terminal radar/nonradar team
4. En route sector team

You will meet these objectives in accordance with the following references:

- FAA Orders
  - JO 7110.65, Air Traffic Control
  - 3120.4, Air Traffic Technical Training

- Aeronautical Information Manual (AIM)

On an End-of-Lesson Test, you will identify the duty priority, procedural preference, and operational priorities of the air traffic controller.

You will meet this objective in accordance with the following reference:

- FAA Order JO 7110.65, Air Traffic Control
NOTE: Click to show video, “Serving Aviation with Pride” (approximately 8 minutes).

You will now watch the video, “Serving Aviation with Pride.”

NOTE: This lesson is designed to provide introductory information. Topics will be discussed in greater detail in subsequent lessons.
The Federal Aviation Administration (FAA) was established in 1966 but has existed in some form since 1926. Here is a brief breakdown of important events related to the establishment of the FAA. For additional history related information turn to Appendix A.

- The Air Commerce Act of 1926 charged the Commerce Secretary with certain functions and responsibilities critical to aviation.
- In 1934, the Aeronautics Branch was renamed the Bureau of Air Commerce.
- The Civil Aeronautics Act was passed in 1938 and established an independent agency called the Civil Aeronautics Authority.
- In 1940, the Civil Aeronautics Authority was renamed the Civil Aeronautics Administration.
- The Federal Aviation Act of 1958 created the independent FAA wherein the FAA Administrator reported directly to the President.
- The Department of Transportation (DOT) Act of 1966 changed the name of the FAA from the Federal Aviation Agency to the Federal Aviation Administration, placed the FAA under the DOT, and began formal operation on April 1, 1967.

**NOTE:** This is the current configuration. The DOT manages all modes of transportation such as railways, highways, waterways, and airways. The FAA deals with aviation only.

**NOTE:** Time permitting, review Appendix A: FAA History.
The FAA is responsible for managing the NAS.

- The NAS is every person and thing required to successfully get a plane from one location to another.

To manage the NAS effectively, many different offices with different responsibilities are involved. In this section, we will discuss the FAA organization.

The DOT regulates all modes of transportation such as railroads, highways, waterways, and airways.
NOTE: If a question arises about the office of Region and Center Operations, inform students that the office is in charge of regional offices, the MMAC and the WJHTC, not ARTCCs.

The FAA Administrator’s office is located in Washington, D.C., and provides direction for:

- Headquarters
- Air Traffic Organization (ATO)
- Regions
  - Field facilities
- Mike Monroney Aeronautical Center
- William J. Hughes Technical Center

The FAA Administrator has delegated the responsibility and authority for FAA functions to eleven primary offices.

- Each primary office is divided into specific tasks/offices that manage the day-to-day operations of the NAS.
- Each primary office (except the ATO) is managed by an Associate Administrator.
  - The ATO is managed by a Chief Operating Officer (COO), (explained later).
FAA ORGANIZATION (Continued)

**NOTE:** Use the graphic above to show the regional boundaries. Click the button to return to the flowchart. Click again to move forward to the next slide.

FAA offices other than ATO facilities are under the jurisdiction of a regional office and operate independently using approved procedures.

- Regional offices provide facilities with direction as well as administrative and technical support.
Our area of concentration is the Air Traffic Organization (ATO).

The ATO was created on February 8, 2004.

The ATO mission is to:

- Ensure the safe, efficient operation, maintenance, and use of the air transportation system.
- Maximize utility of airspace resources.
- Increase system safety, capacity, and productivity.

The ATO is managed by a COO.

- The ATO’s COO issues and enforces rules, regulations, and minimum standards relating to:
  - Aircraft operations.
  - Licensing and rating of personnel.
  - Supervision and enforcement of medical standards.
  - Specifications for commercial air operations.
  - Surveillance of air operations.
  - Air navigation systems.
  - Provision of air traffic services.

Continued on next page
The ATO takes a performance-based (business-like) approach, focusing on:

- Essential programs.
- Clear benefits to the user community.

The ATO is accountable to:

- Customers (commercial and private aviation, other government agencies, Department of Defense).
- Owners (traveling public, taxpayers, Congress).
- Employees (federal employees, labor unions).

Each ATO office is managed by a vice president.
ATO ATC facilities are assigned to one of three service areas according to their geographic location.
The ATO ATC offices and functions are identified as follows:

- Office of En Route and Oceanic Service
  - Air Route Traffic Control Centers (ARTCCs) are established primarily to provide air traffic service to aircraft operating on Instrument Flight Rules (IFR) flight plans within controlled airspace, and principally during the en route phase of flight.

**NOTE:** IFR stands for Instrument Flight Rules and will be discussed later.

- Office of Terminal Service
  - Terminal Radar Approach Control (TRACONs) and Control Towers (ATCTs) have been established to provide for a safe, orderly, and expeditious flow of traffic on and in the vicinity of an airport.
  - TRACONs and ATCTs may also provide for the separation of IFR aircraft in the terminal areas.
Office of Flight Services

Automated Flight Service Stations (AFSSs) are air traffic facilities which provide a variety of services to pilots, such as:

- Processing flight plans.
- Pilot briefings.
- In-flight services.

They do **not**, however, engage in the control and separation of aircraft.

**NOTE:** Flight service station is the generic term for both Flight Service Station (FSS) and Automated Flight Service Station (AFSS). The two acronyms can be used interchangeably.
To ensure the sound administration and management of facilities:

- Clear lines of operating authority must be established from the FAA Administrator to you.

- However, communications is a two-way process, which flows from you to the FAA Administrator and vice-versa.

**NOTE:** A copy of the Organizational Flowchart can be found in Appendix B.
Review

Name the three ATO service areas.

**ANSWER:** Eastern, Western, Central

Each FAA primary office, except the ATO, is managed by a(n) ________.

A. Administrator  
B. Associate Administrator  **(CORRECT)**  
C. Director

The FAA ATO is managed by a(n) ________.

A. Administrator  
B. Vice President  
C. Chief Operating Officer  **(CORRECT)**
The primary purpose of the ATC system is to prevent a collision between aircraft operating in the system and to organize and expedite the flow of traffic in a manner which is:

- Safe.
- Orderly.
- Expeditious.

**NOTE:** Explain and give examples of each of the above.

ATC provides support for National Security and Homeland Defense.

ATC provides positive control among aircraft under its control.

- Positive control is the separation of all air traffic within designated airspace by ATC.
- Separation standards are established by the federal government, and designated in miles, altitudes (feet), and minutes.
AIR TRAFFIC CONTROL (ATC) SYSTEM  (Continued)

**Duty Priority**  
JO 7110.65,  
Chap. 2

- First priority is given to separating aircraft and issuing safety alerts. Second priority is to provide support to national security and homeland defense.
  - Good judgment shall be used in prioritizing all other duties based on the requirements of the situation at hand, or when encountering situations for which there is no written procedure.

**Procedural Preference**  
JO 7110.65,  
Chap. 2

- Automation procedures are used in preference to non-automation procedures when workload, communications, and equipment capabilities permit.

**NOTE:** Explain what an automated procedure is or give an example.

- Radar separation is used in preference to nonradar separation when it will be to an operational advantage, and workload, communications, and equipment permit.

- Nonradar separation is used in preference to radar separation when an operational advantage will be gained.

**Operational Priority**  
JO 7110.65,  
Chap. 2

- Air traffic control service to aircraft is provided on a “first come, first served” basis as circumstances permit, except the following:
  - Aircraft in distress
    - Have the right-of-way over all other traffic
  - Civilian air ambulance flights
    - Priority is also provided to military air evacuation flights and scheduled air carrier/air taxi flights, when verbally requested.
  - Search and Rescue (SAR) aircraft performing a SAR mission
  - Presidential aircraft
  - Flight Check aircraft
  - Special military and civilian operations
  - Diverted flights
    - Ensures that aircraft that have already had to divert to another airport due to weather or other phenomena do not incur an additional delay.
Additional services are to be provided to the extent possible.

- Additional services are advisory information provided by ATC which include, but are not limited to, the following:

  NOTE: Give a simple, brief example of each of these.

  - Traffic advisories
  - Radar vectors, when requested by the pilot, to assist aircraft receiving traffic advisories to avoid observed traffic
  - Altitude deviation information of 300 feet or more from an assigned altitude as observed on a verified (reading correctly) automatic altitude readout (Mode C)
  - Advisories that traffic is no longer a factor
  - Weather and chaff information
  - Weather assistance
  - Bird activity information
  - Holding pattern surveillance

Additional services are limited by many factors, such as:

- Volume of traffic
- Frequency congestion
- Quality of radar
- Controller workload
- Higher priority duties
- Pure physical inability to scan and detect those situations that fall in this category

Additional services are not optional for the controller; they are required when the work situation permits.
EXERCISE 1: PRIORITY AND PREFERENCE

Purpose

To review the purpose of the ATC System, including duty and operational priority and procedural preference.

Directions

Read each statement below and fill in the blanks.

The primary ___________ purpose ___________ of the ATC system is ___________ to prevent a collision ___________ between aircraft operating in the system, to ___________ organize ___________ and ___________ expedite ___________ the flow of traffic, and to provide support for national security and homeland defense.

First priority ___________ is given to ___________ separating traffic ___________ and ___________ issuing safety alerts ___________.

Second priority is to provide support to national security and homeland defense. For everything else, good judgment shall be used in prioritizing duties. Provide ___________ additional services ___________ to the extent possible.

ATC service to aircraft is provided on a ___________ “first come, first served” basis ___________, EXCEPT:

- Aircraft in distress have priority over all other aircraft
- Civilian air ambulances
- Military air evacuation flights (when requested by the pilot)
- Active Search and Rescue (SAR) missions
- Presidential aircraft
- Flight Check aircraft
- Special military and civilian operations
- Diverted flights

Automation procedures ___________ are used in preference to ___________ non-automation procedures ___________ when workload, communication and equipment capabilities permit.

Radar separation ___________ is used in preference to ___________ non-radar separation ___________ when it will be to an operational advantage, and workload, communications, and equipment permit.

Non-Radar separation ___________ is used in preference to ___________ radar separation ___________ when an operational advantage will be gained.
VISUAL FLIGHT RULES (VFR) AND INSTRUMENT FLIGHT RULES (IFR)

<table>
<thead>
<tr>
<th>Types of Flight Rules</th>
</tr>
</thead>
<tbody>
<tr>
<td>♦ Pilots must follow one set of rules when flying:</td>
</tr>
<tr>
<td>♦ Visual Flight Rules (VFR), or</td>
</tr>
<tr>
<td>♦ Instrument Flight Rules (IFR)</td>
</tr>
<tr>
<td>♦ VFR/IFR describe:</td>
</tr>
<tr>
<td>♦ Flight rules that pilots must follow.</td>
</tr>
<tr>
<td>♦ Flight plans that pilots must file.</td>
</tr>
<tr>
<td>♦ Weather conditions.</td>
</tr>
</tbody>
</table>

**NOTE:** Briefly describe a flight plan.
**VISUAL FLIGHT RULES (VFR) AND INSTRUMENT FLIGHT RULES (IFR)** *(Continued)*

**Visual Flight Rules (VFR)** are rules that govern the procedures for conducting flight under visual conditions. The term “VFR” is also used in the United States to indicate weather conditions that are equal to or greater than minimum VFR requirements. In addition, it is used by pilots and controllers to indicate a type of flight plan.

- **Under VFR,**
  - Pilots are responsible for maintaining separation from other aircraft.
  - Aircraft must remain clear of clouds to ensure good visibility.

**NOTE:** When flying VFR, pilots are operating the aircraft visually. That is, they are looking out of the cockpit to maintain separation from other aircraft, terrain, and manmade objects on the ground.
Instrument Flight Rules (IFR) are rules governing the procedures for conducting instrument flight. IFR is also a term used by pilots and controllers to indicate the type of flight plan.

- Under IFR, ATC maintains separation from other aircraft, terrain, and man-made objects on the ground.

- The term “IFR” is also used to indicate weather conditions that are less than minimum VFR requirements.

**NOTE:** During IFR flights, the pilots are flying the aircraft strictly by instruments and navigational equipment rather than relying on visual cues. IFR is required when weather conditions are below VFR minimums, or if an aircraft is flying into areas of airspace requiring it. Pilots flying under IFR must be IFR-certified, piloting an IFR-certified aircraft, and an IFR flight plan must be filed and approved by ATC.
The organizational structure of each air traffic facility varies depending upon its complexity.

- Complexity is determined by many factors, principally the number of aircraft operations a facility handles.

NOTE: Discuss aircraft operations and any other factors as necessary.
This is a basic facility organizational chart.

- It will vary by facility depending on their needs.

In any facility, when no supervisory personnel are available, one controller who is fully qualified shall be designated as Controller-in-Charge (CIC).

**NOTE:** If needed, further explain CIC as it applies to towers and larger facilities.

There are three types of ATC facilities:

- Automated Flight Service Station (AFSS)
- Terminal
  - Airport Traffic Control Tower (ATCT)
  - Terminal Radar Approach Control (TRACON)
- Air Route Traffic Control Center (ARTCC)
AFSSs are air traffic facilities which have no direct control authority over either IFR or VFR traffic.

They do not control traffic, however, they do have the primary responsibility for providing pilot briefings, and receiving and processing IFR and VFR flight plans.

They provide the following services to all air traffic:

**NOTE:** Click button to make 10 AFSS services appear, one at a time.

At select locations, AFSSs:

- Provide En Route Flight Advisory Service (EFAS) (Flight Watch).
  - EFAS is a service specifically designed to provide, upon pilot request, timely weather information pertinent to his or her type of flight, intended route of flight, and altitude.
- Take weather observations.
- Issue airport advisories.
- Advise Customs and Immigration of transborder flights.
There are five basic positions in an AFSS:

- Flight Data/NOTAM Coordinator
- Broadcast
- Preflight
- En Route Flight Advisory Service (EFAS)
- Inflight

**NOTE:** Click button to show positions one at a time.
Flight Data/NOTAM/Coordinator Position
3120.4, App. 3

Flight Data/NOTAM/Coordinator position duties are to:

- Compile, evaluate, record, and disseminate NOTAMs and flight movement data such as:
  - VFR and IFR, civil and military flight plans.
  - International flight plans.
  - Flight notification messages.
  - Customs notification.
  - Law enforcement messages.
- Initiate required search and rescue situations.

Broadcast Position
3120.4, App. 3

Broadcast position duties are to:

- Compile, evaluate, record, and disseminate weather and flight information through the following types of broadcasts:
  - Transcribed Weather Broadcast (TWEB) (Alaska only)
  - Telephone Information Briefing Service (TIBS)
  - Hazardous Inflight Weather Advisory Service (HIWAS)
AUTOMATED FLIGHT SERVICE STATIONS (AFSSs)
(Continued)

Preflight Position
3120.4, App. 3

 Preflight position duties are to:

- Brief and translate to pilots:
  
  - Current and forecast weather.
  
  - NOTAMs.
  
  - Flow control restrictions that the pilot might encounter along the route of flight.

- Apply VFR Not Recommended (VNR) procedures as prescribed

En Route Service Positions
3120.4, App. 3

 The following two Flight Service positions provide services to airborne pilots:

- En Route Flight Advisory Service (EFAS) position
- Inflight position

En Route Flight Advisory Service (EFAS) Position
3120.4, App. 3

 EFAS position duties are to:

- Provide en route aircraft with timely and pertinent weather data tailored to a specific altitude and route using the most current available sources of aviation meteorological information.

  - Radio call is “Flight Watch”

- Apply VNR procedures as prescribed.

- Alert NWS and the Center Weather Services Unit (CWSU) immediately when conditions are reported that differ from forecasts.
Inflight position duties provide services to aircraft inflight or operating on the airport surface.

Duties of the Inflight position are to:

- Monitor and restore NAVAIDs.
- Issue airport advisories.
- Relay ATC clearances, advisories, or requests.
- Issue military flight advisory messages.
- Receive and issue Notices to Airmen (NOTAMs).
- Assist in search and rescue communication searches.
- Activate and close flight plans.
- Make unscheduled broadcast(s).
- Solicit and issue Pilot Weather Reports (PIREPs).
- Present pilot weather briefings to airborne aircraft.
- Locate lost aircraft.
- Record aircraft contacts.
- Provide weather advisories and flight plan services.
- Provide hazardous area reporting services.
- Keep airmen and weather information current.
- Apply VNR procedures as prescribed.
AFSSs provide radar traffic advisories to VFR aircraft
A. True
B. False (CORRECT)

The AFSS position that initiates required search and rescue situations is the ______________ position.
A. Preflight Position
B. Inflight Position
C. Flight Data/NOTAM/Coordinator (CORRECT)

The AFSS position that provides airport advisories is the ______________ position.
A. Inflight (CORRECT)
B. Preflight
C. EFAS
**EXERCISE 2: AFSS POSITIONS**

**Purpose**
This exercise provides practice in identifying the duties of AFSS personnel.

**Directions**
Match each operating position in an AFSS with its associated function.

<table>
<thead>
<tr>
<th>Questions</th>
<th>C</th>
<th>1. Inflight</th>
<th>A. Briefs pilots on weather, NOTAMs, and restrictions along proposed route; applies VFR not recommended (VNR) procedures</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>D</td>
<td>2. Flight Data/ NOTAM/ Coordinator</td>
<td>B. Makes recordings of weather and flight information, such as Hazardous Inflight Weather Advisory Service (HIWAS)</td>
</tr>
<tr>
<td></td>
<td>B</td>
<td>3. Broadcast</td>
<td>C. Issues airport advisories, relays ATC clearances, advisories, or requests to pilots, monitors and restores NAVAIDs, activates and closes flight plans, assists pilots of lost aircraft</td>
</tr>
<tr>
<td></td>
<td>A</td>
<td>4. Preflight</td>
<td>D. Disseminates IFR and VFR flight plans, initiates search and rescue, disseminates NOTAMs, performs Customs notification</td>
</tr>
<tr>
<td></td>
<td>E</td>
<td>5. En Route Flight Advisory Service</td>
<td>E. Provides en route aircraft with timely and pertinent weather data; uses radio call sign “Flight Watch”</td>
</tr>
</tbody>
</table>
**TERMINAL FACILITIES**

- **AIRPORT TRAFFIC CONTROL TOWER (ATCT)**
  Provides ATC service to aircraft operating on or in the vicinity of the airport

- **TERMINAL RADAR APPROACH CONTROL (TRACON)**
  Provides radar service to arriving, departing, and some en route aircraft

**NOTE:** Advise students that there are still some nonradar approach controls. Some Tower/TRACONs are co-located. Provide examples, such as Honolulu Tower and Will Rogers Tower.

- Types of terminal facilities include:
  - Airport Traffic Control Towers (ATCTs or Towers).
  - Terminal Radar Approach Controls (TRACONs).

- The **Airport Traffic Control Tower (ATCT)** is a terminal facility wherein controllers:
  - Use air/ground communications, visual signaling, and other devices to provide ATC services to aircraft operating in the vicinity of or on an airport.
  - Authorize aircraft to land or take off at the airport controlled by the tower or to transit tower-controlled airspace.
  - May also provide approach control services (radar or nonradar).
There are six positions in the tower:

- **Flight Data**
- **Clearance Delivery**
- **Local Control**
- **Ground Control**
- **Tower Coordinator**
- **Tower Associate**

- A particular tower may or may not use all positions.

There are no absolute divisions of responsibilities regarding position operations in the tower.

- The tasks to be completed remain the same no matter how many people are working positions within a tower cab.

- The team as a whole has responsibility for the safe and efficient operation of that tower cab.

- The intent of the team concept is not to hold the team accountable for the action of individual members in the event of an operational error/deviation.
AIRPORT TRAFFIC CONTROL TOWERS (ATCTs)
(Continued)

Flight Data
(FD) Position
JO 7110.65,
Chap. 2

- The Flight Data Controller assists the other air traffic controllers in the Tower and performs the clerical duties inherent in the operation of any facility.
  - Normally the first position assigned to a new air traffic controller at a facility.
  - Does not directly talk on the radio to pilots.

- Flight Data position duties are to:
  - Process and forward flight plan information.
  - Compile statistical data.
  - Observe and report weather information.

Clearance Delivery (CD)
Position
JO 7110.65,
Chap. 2

- The Clearance Delivery (CD) Controller is normally the first controller a pilot talks to when departing an airport.

- CD position duties are to:
  - Process and forward flight plan information.
  - Issue departure clearances and ensure accuracy of pilot readback.
  - Operate communications equipment.

**NOTE:** Briefly explain clearances.
AIRPORT TRAFFIC CONTROL TOWERS (ATCTs)
(Continued)

Tower Positions
(Local Control [LC] and
Ground Control [GC])
Positions
JO 7110.65,
Chap. 2 and 3

The Ground controller is responsible for ensuring that aircraft are
separated from other aircraft, ground vehicles and obstructions while
taxiing.

- Ground Control has responsibility for movement areas other than
  active runways, including control of vehicles as well as aircraft.

**NOTE:** Movements areas is taught in a later lesson.

The Local Controller is primarily responsible for separating and providing
safety alerts to aircraft in the airspace surrounding the airport and aircraft
on the active runways.

Local Control and Ground Control positions exchange information for the
safe and efficient use of runways and movements areas.

Only the Local Control and Ground Control have the distinction of being
called the Tower Positions, and their duties are to:

- Ensure separation.
- Initiate control instructions.
- Utilize tower radar display(s).
- Utilize alphanumerics.
- Assist the Tower Associate position with coordination.
- Scan tower cab environment.
- Ensure computer entries are completed for instructions or clearances
  issued or received.
- Ensure stripmarking is completed for instructions or clearances
  issued or received.
- Process and forward flight plan information.
- Perform any functions of the tower team which will assist in meeting
  situation objectives.
AIRPORT TRAFFIC CONTROL TOWERS (ATCTs)
(Continued)

Tower Coordinator (CC) Position
JO 7110.65, Chap. 2

- Tower Coordinator controller (also known as Cab Coordinator) works to ensure that the overall operation is at its greatest capacity while maintaining safety standards.

- CC position duties are to:
  - Perform interfacility/position coordination for traffic actions.
  - Advise the Tower and the Tower Associate position(s) of tower cab actions required to accomplish overall objectives.
  - Perform any of the functions of the tower team which will assist in meeting situation objectives.

**NOTE:** The Tower Coordinator position assumes responsibility for managing traffic flow and the Tower positions retain responsibility for aircraft separation when the Tower Coordinator position is staffed.

Tower Associate Position
JO 7110.65, Chap. 2

- Tower Associate position acts as an “assistant” to either or both of the “Tower Positions”, including monitoring the situation for anything Local or Ground may not be aware of. Associate position duties include:
  - Ensure separation
  - Maintain awareness of tower cab activities
  - Utilize tower radar display(s)
  - Assist the Tower positions by:
    - Accepting/initiating coordination for the continued smooth operation of the tower cab
    - Ensuring that the Tower positions are made immediately aware of any actions taken
  - Manage flight plan information, ensuring completion and accuracy
### EXERCISE 3: ATCT POSITIONS

**Purpose**
This exercise provides practice in identifying the duties of ATCT personnel.

**Directions**
Match the following ATCT operating positions with their associated functions.

<table>
<thead>
<tr>
<th>Question</th>
<th>Position</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>D</td>
<td>1. Flight Data</td>
<td>A. Performs interfacility/intrafacility coordination, advises the Tower Positions of actions required to accomplish objectives</td>
</tr>
<tr>
<td>F</td>
<td>2. Clearance Delivery</td>
<td>B. Initiates control instructions, has responsibility for control of active runways, ensures separation, one of the two “Tower Positions”</td>
</tr>
<tr>
<td>E</td>
<td>3. Ground Control</td>
<td>C. Assists the Tower Positions by performing coordination and helps to ensure separation by maintaining awareness of tower traffic</td>
</tr>
<tr>
<td>B</td>
<td>4. Local Control</td>
<td>D. Compiles statistical data, processes and forwards flight plan information, reports weather information</td>
</tr>
<tr>
<td>A</td>
<td>5. Tower Coordinator</td>
<td>E. Initiates control instructions, has responsibility control of aircraft and vehicles on taxiways and runways that are not active, ensures separation, one of the two “Tower Positions”</td>
</tr>
<tr>
<td>C</td>
<td>6. Tower Associate</td>
<td>F. Issues clearances and ensures accuracy of pilot readback.</td>
</tr>
</tbody>
</table>
TERMINAL RADAR APPROACH CONTROLS (TRACONs)

A Terminal Radar Approach Control (TRACON) facility is an ATC facility that uses radar and nonradar capabilities to provide control services to aircraft arriving, departing, and transiting airspace in a terminal area.

- Radar approach controls may be operated by FAA (TRACONs), USAF (RAPCONS), U.S. Army (ARAC), USN, USMC (RATCFs), or jointly by FAA and a military service.

**NOTE:** ARAC is Army Radar Approach Control Facility; RATCF is Radar ATC Facility.

- TRACONs may serve one or more airfields, and control is exercised primarily by direct pilot and controller communications.

- TRACONs are divided into sectors of airspace.

The TRACON location varies depending on the concentration of air traffic in the geographical location.

- In smaller metro areas, the TRACON may be located within or near the same structure as the Tower for the primary airport it serves (i.e. Oklahoma city TRACON is located near Oklahoma Will Rogers Tower).

- Others are located in an area remote from any airport, but serve several large metro areas. These are generally referred to as consolidated TRACONs or “Super-TRACONs.”
  - These TRACONs are found where there is a high density of air traffic, generally reflecting the population density of the metro areas they serve (i.e. Potomac TRACON is not located at any airport, but serves several large and small airports in the DC area).

- Where no TRACON exists (the traffic is not concentrated enough to warrant one) the ARTCC provides approach control services.
NOTE: Click button to display each member of the team as each position is covered.

There are four basic positions in the TRACON radar sector team:

- Radar Flight Data
- Radar Associate
- Radar Controller
- Radar Coordinator

- A particular sector may or may not use all positions.
There is no absolute division of responsibilities regarding position operations. 

- The tasks to be completed remain the same no matter how many people are working positions within a facility/sector.
- The team as a whole has responsibility for the safe and efficient operation of that facility/sector.

  - The intent of the team concept is not to hold the team accountable for the action of individual members in the event of an operational accident/incident.

The responsibilities of the Flight Data Controller in the TRACON are similar to the Flight Data Controller in the Tower.

- Responsibilities include:
  - Processing and forwarding flight plan information.
  - Compile statistical data

The Radar Associate controller provides assistance to the radar controller by relieving them of duties that are a distraction from the radar situation and communication with the pilots.

- The Radar associate controller works as a team with the radar controller and is particularly helpful during busy times.

Radar Associate position duties are to:

- Ensure separation.
- Initiate control instructions.
- Maintain awareness of facility/sector activities.
- Accept and initiate non-automated handoffs.
- Assist the Radar position.
- Coordinate.
- Manage flight information.

  - Scan flight strips to correlate with radar data.

- Ensure that:
  - Computer entries are completed.
  - Stripmarking is completed.
The Radar controller uses the radar display and air to ground frequencies to separate and sequence all aircraft in the sector’s airspace.

- Radar Controllers are usually identified according to the phase of flight they work (i.e., arrival, departure, final).

Radar Position duties are to:

- Ensure separation.
- Initiate control instructions.
- Accept and initiate automated handoffs.
- Assist the Radar Associate position with nonautomated handoffs.
- Assist the Radar Associate position with coordination.
- Scan the radar display.
  - Correlate with flight progress strip information
- Ensure that:
  - Computer entries are completed.
  - Stripmarking is completed.
- Adjust equipment at Radar position to be usable by all members of the team.

Radar Coordinator position duties are to:

- Perform interfacility/sector/position coordination of traffic actions.
- Advise the Radar position and the Radar Associate position of facility/sector actions required to accomplish the safe and efficient operation of the sector.
- Perform any of the functions of the radar team which will assist in meeting situation objectives.

**NOTE:** The Radar position has the responsibility of managing the overall sector operations, including aircraft separation and traffic flows. The Radar Coordinator position, when staffed, assumes responsibility for managing traffic flows and the Radar position retains responsibility for aircraft separation.
An Air Route Traffic Control Center (ARTCC) facility, commonly referred to as a “Center”, provides en route ATC service to IFR/VFR aircraft principally during the en route phase of flight.

- The en route phase of flight is the segment of flight between departure and destination terminal areas.

Every Center is divided into several Areas, which are created to distribute the workload.

- Areas are then divided into even smaller pieces of airspace (both vertically and horizontally) called Sectors.
  
  - A controller must be proficient in all of the sectors in his or her Area and can be called on to work any or all sectors of that area.
NOTE: Click button to display each member of the team as each position is covered.

There are four basic positions in the ARTCC:

- **Radar Flight Data**
- **Radar Associate**
- **Radar**
- **Radar Coordinator**

- A particular ARTCC may or may not use all positions.

There are no absolute divisions of responsibilities regarding position operations.

- The tasks to be completed remain the same whether one, two, or three people are working positions within a sector.

- A sector is an area of control jurisdiction within a center that has a given airspace.

- The team as a whole has responsibility for the safe and efficient operation of that sector.

- The intent of the team concept is not to hold the team accountable for the action of individual members in the event of an operational accident or incident.
AIR ROUTE TRAFFIC CONTROL CENTERS (ARTCCs)  
(Continued)

**Radar Flight Data Position**  
JO 7110.65, Chap. 2

- Radar Flight Data position duties are to:
  - Assist Radar Associate position in managing flight progress strips.
  - Receive, process, and distribute flight progress strips.
  - Request, receive, and disseminate weather, NOTAM, NAS status, traffic management, and Special Use Airspace status messages.
  - Manually prepare flight progress strips when automation systems are not available.
  - Enter flight data into computer.
  - Forward flight data via computer.
  - Assist facility/sector in meeting situation objectives.

**Radar Associate Position**  
JO 7110.65, Chap. 2

- Radar Associate position (often called “D side”) duties are to:
  - Ensure separation.
  - Initiate control instructions.
  - Accept and initiate handoffs via landline communications and to ensure the Radar position is made aware of the actions.
  - Assist Radar position by accepting or initiating automated handoff(s), and to ensure that the Radar position is made immediately aware of any action taken.
  - Coordinate, including point outs.
  - Scan User Request Evaluation Tool (URET) display. (URET is an automated flight data management tool, commonly referred to as “electronic strips”.)

**NOTE:** Explain the term “point out” as necessary.

- Scan and manage flight progress strips.
  - Correlates URET/Flight progress strips with radar data

Continued on next page
AIR ROUTE TRAFFIC CONTROL CENTERS (ARTCCs)
(Continued)

Radar Associate Position (Cont’d)
JO 7110.65, Chap. 2

- Ensure that:
  - Computer entries are completed.
  - Manage URET display information.
  - Stripmarking is completed.
  - Instructions issued or received by the Radar position are entered when aware of those instructions.

Radar Position
JO 7110.65, Chap. 2

- Radar (R) controller position (often called the “R side”) communicates directly with the aircraft and uses radar information as the primary means of separation.

Radar position duties are to:

- Ensure separation.
- Initiate control instructions, utilizing radar information.
- Maintain direct communication with aircraft.
- Accept and initiate handoffs/automated.
- Assist the radar associate position.
- Assist the radar associate position in coordination when needed.
- Scan radar display.

  - Correlate with URET and flight progress strip information

- Ensure computer entries are completed.
- Ensure stripmarking is completed.
Radar Coordinator position duties are to:

- Perform interfacility/intrafacility/sector/position coordination of traffic actions.
- Advise the Radar and Radar Associate positions of sector actions required to accomplish the safe and efficient operation of the sector.
- Perform any functions of the en route sector team which will assist in meeting situation objectives, including accepting and initiating handoffs.

**NOTE:** The Radar position has responsibility for managing overall sector operations, including aircraft separation and traffic flows. The Radar Coordinator position (when staffed) assumes responsibility for managing traffic flows, and the Radar position retains responsibility for aircraft separation.
EXERCISE 4: TRACON/ARTCC RADAR TEAM POSITIONS

Purpose
This exercise provides practice in identifying the duties of TRACON/ARTCC radar teams.

Directions
The following questions are multiple choice. Circle the correct answer.

Questions
1. The position that is in direct communication with aircraft is _______.
   A. Radar Associate Position
   B. Radar Flight Data Position
   C. Radar Position  **CORRECT**
   D. Radar Coordinator Position

2. The position responsible for compiling statistical data and forwarding flight plan data is _______.
   A. Radar Associate Position
   B. Radar Flight Data Position  **CORRECT**
   C. Radar Position
   D. Radar Coordinator Position

3. The position responsible for ensuring separation, initiating control instructions, managing flight strip information, and assisting the Radar Position with coordination is the _______.
   A. Radar Associate Position  **CORRECT**
   B. Radar Flight Data Position
   C. Radar Position
   D. Radar Coordinator Position

Continued on next page
Questions (Cont’d)

4. The Radar Coordinator position is responsible for _______.
   A. interfacility/intrafacility coordination  CORRECT
   B. direct communication with aircraft
   C. Compiling statistical data
   D. Issuing control instructions to aircraft
**NOTE:** Click the pointer on the indicated area to show video “This is Air Traffic Control” (approximately 5 minutes).

- You will now watch the video “This is Air Traffic Control.”
<table>
<thead>
<tr>
<th>Review</th>
</tr>
</thead>
<tbody>
<tr>
<td>From what facility would you receive a landing clearance?</td>
</tr>
<tr>
<td>A. TRCON</td>
</tr>
<tr>
<td>Name the two types of facilities that are referred to as &quot;Terminal&quot;</td>
</tr>
<tr>
<td><strong>ANSWER:</strong> ATCTs and TRACONs</td>
</tr>
<tr>
<td>The first level of supervision for any ARTCC ATC specialist is known as:</td>
</tr>
<tr>
<td><strong>ANSWER:</strong> Front Line Manager</td>
</tr>
<tr>
<td>Generally, the first contact made to an ATCT by a departing IFR aircraft is the ______ position.</td>
</tr>
<tr>
<td>A. Flight Data</td>
</tr>
</tbody>
</table>
The mission of the Traffic Management System (TMS) is to balance air traffic demand with the system’s capacity to ensure that the maximum efficient utilization of the NAS is maintained.
NOTE: Click pointer on the indicated area to show video, “Managing the Flow of Air Traffic” (6 minutes).

You will now watch the video, “Managing the Flow of Air Traffic."

- The Air Traffic Control System Command Center (ATCSCC) directs the operation of the TMS.
  - Located in Herndon, VA (near Washington, DC)
  - Office of primary interest on a national level

- Traffic Management Units (TMUs) are located in:
  - All ARTCCs.
  - Busier terminal facilities.

  - The primary function of the Traffic Management Unit (TMU) is to monitor and balance traffic flows within their area of responsibility in accordance with traffic management directives.
NOTE: Click button to display each Traffic Management System Program as the program is covered in the lesson. Elaborate on each and provide examples as appropriate. Explain that these programs can be used by the ATCSCC or the local TMU. To show realtime airport acceptance rates, you may access the website: www.fly.faa.gov, select the “Products” tab, the third option in the menu is “Airport Arrival and Demand Chart. Most TMIIs are implemented based on this data.

Traffic management programs are one of several processes administered by the ATCSCC to achieve optimum use of the NAS and minimize delays without increasing controller workload. They include:

- Departure Sequencing Program (DSP) assigns a departure time to achieve a constant flow of aircraft departing several airports that will fly over a common point.
TRAFFIC MANAGEMENT SYSTEM (TMS) *(Continued)*

Traffic Management Programs *(Cont’d)*

- En Route Sequencing Program (ESP) assigns departure times that will facilitate integration into the en route traffic stream.

- Arrival Sequencing Program (ASP) is an automated program designed to assist in sequencing aircraft destined for the same airport by assigning times for aircraft to cross the arrival metering fixes.

- Ground Delay Program (GDP) is a traffic management process administered by ATCSCC whereby aircraft are held on the ground until a specified time.
  - The purpose is to limit airborne holding.

- Reroutes are ATC routings other than the filed flight plan.
  - Designed to ensure aircraft operate with the flow of traffic.
  - Keeps aircraft clear of special use airspace.
  - Keeps aircraft away from congested airspace.
  - Avoids area of known weather where aircraft are deviating or refusing to fly.

- Ground Stops (GS) are the most restrictive method of traffic management, and override all other traffic management programs.
  - Implemented with little or no warning.
  - Keeps aircraft on the ground based on specific criteria, such as departure or destination airport, airspace restrictions, or aircraft type.
  - Aircraft may not be released without the approval of the originator of the ground stop.

Traffic management initiatives (TMI) and programs do not have priority over maintaining:

- Separation of aircraft.
- Procedural integrity of the sector.
EXERCISE 5: TRAFFIC MANAGEMENT SYSTEM (TMS)

Purpose
This exercise provides practice in identifying the purpose and elements of the TMS.

Directions
Questions 1, 2, and 3 are fill in the blank. Complete each statement by writing the correct word(s) or acronym in the spaces provided. Questions 4 through 9 are matching. In the space provided, write the letter of the definition that describes each of the TMS programs listed.

Questions
1. The mission of the TMS is to balance air traffic demand with system capacity.
2. The operation of the TMS is the responsibility of the ATC System Command Center.
3. Monitoring and balancing air traffic flows within their area of responsibility is the primary function of the TMU.

D 4. Departure Sequencing Program (DSP)
---
A. Assigns times for aircraft inbound to the same airport to cross an arrival fix for that airport

F 5. En Route Sequencing Program (ESP)
---
B. Routings other than the filed flight plan; designed to keep aircraft clear of special use airspace, congested airspace, or weather areas

A 6. Arrival Sequencing Program (ASP)
---
C. Overrides all other TMS programs. Aircraft remain on the ground indefinitely

E 7. Ground Delay Program (GDP)
---
D. Assigns departure times to achieve a constant flow of aircraft departing from several airports and flying over the same point

B 8. Reroutes
---
E. Aircraft are held on the ground until a specified time

C 9. Ground Stop (GS)
---
F. Assigns departure times that will facilitate integration into the en route traffic stream
NATIONAL AIRSPACE SYSTEM (NAS)

NAS Overview
JO 7110.65, Pilot/Controller Glossary

- As mentioned earlier in the lesson, the NAS includes every person and thing required to successfully get a plane from one location to another.

- The NAS is predominately owned, operated, and maintained by the FAA with DOT involvement.

- The NAS cannot be described in terms of an end-state system; it is always changing.

- The NAS Plan provides a basis for the FAA’s investment decisions and provides the “roadmap” that shows the where, how, and when of NAS evolution.

  - Evolutionary improvements permit greater flexibility.

- The current NAS modernization program is known as NextGen.

  - NextGen is an umbrella term for the ongoing, wide-ranging transformation of the United States’ NAS.

  - At its most basic level, NextGen represents an evolution from a ground-based system of air traffic control to a satellite-based system of air traffic management, including surveillance, communications, navigation and decision making tools.

NAS Components
JO 7110.65, Pilot/Controller Glossary

- The NAS is a common network of U.S.:
  
  - Airspace and ATS Routes.
  - Navigational Aids (NAVAIDs).
  - Airports or landing areas.
  - Aeronautical Charts.
  - Rules, regulations, and procedures.
  - Personnel and equipment.

- In this section, we will discuss some of the components of the NAS.

NOTE: Each component of the NAS discussed in this lesson will be further discussed in another lesson.
The nation’s airspace is divided into several different classes.

- Each class has unique dimensions and operating rules for pilots and controllers.
  - For example,
    - Class A airspace is reserved for high altitude IFR travel en route from airport to airport.
    - Class B airspace surrounds the nation’s busiest airports.
- Certain other airspace areas are designated for military use and national security, and are referred to as Special Use Airspace.

**NOTE:** Give a brief description of airspace. Dimensions and operations within each of the airspace classifications will be taught in another lesson.
"ATS routes" is a generic term used to identify the various types of routes and airways used by pilots for navigation.

- There are two primary types of ATS routes used by pilots.
  - VOR airways, also called “Victor” airways, and RNAV “Tango” routes, which are used for navigation below 18,000 feet MSL
  - Jet routes, and RNAV “Q” routes, which are used for navigation between FL180 and FL450
NAVAIIds are a vital part of the NAS. They are used to:

- Navigate from point to point.
- Provide approach aids for landing.

NAVAIIds can be ground-based or satellite-based.

VORs and VORTACs are the primary NAVAIDs for the nation’s airways.

Global Positioning System (GPS) is the latest navigation system approved for use by ATC.
An airport or a landing area is an area on land or water used or intended to be used for the landing and takeoff of aircraft.

- Airports and their facilities are probably the most familiar element of the NAS.
- Over 19,000 airports are included in the NAS, and each has unique characteristics.
- Every part of the airport is designed to give controllers and pilots the information and tools they need to navigate safely, such as different colored lights that pinpoint where runways and taxiways are at night, and directional signs and pavement markings.
Aeronautical charts are also part of the NAS.

- Aeronautical charts outline airways, mark boundaries of classes of airspace, provide airport information, show NAVAIDs, obstacles and landmarks on the ground.

There are several different types of charts, each designed to present information required for VFR and IFR flight.
Documents containing rules, regulations, and procedures are also part of the NAS.

- Having rules and regulations to establish and maintain positive control among aircraft helps to prevent accidents.
- Used by controllers and the aviation community to:
  - Promote the safe, orderly, and expeditious flow of air traffic.
  - Provide a common language for controllers and pilots.
The NAS also includes all personnel and equipment that are in any way involved in the movement of aircraft from one location to another.
Phraseology is a series of standard words and phrases to ensure that miscommunication is kept to a minimum between the pilots and controllers.

Certain letters and numbers may sound similar to each other when spoken over low-fidelity radio or telephone equipment.

- To alleviate this problem, the FAA adopted a standard for pronunciation of letters and numbers for both controllers and pilots.
- English is the universal air traffic language.

**NOTE:** Introduce the following terms, phrases, and phonetics as briefly as possible. Stress that we will speak as air traffic controllers in the classroom whenever possible, and that students should master the phonetic alphabet and number pronunciation as soon as practicable.

**NOTE:** You should familiarize yourself with the following terms, phrases and pronunciations. Familiarization will help you grasp the concepts that will be discussed in more detail throughout this course. A more thorough glossary of items is provided in Appendix C.
### TERMS, PHRASES AND PRONUNCIATIONS (Continued)

**Terms**

<table>
<thead>
<tr>
<th>TERMS</th>
<th>ACRONYM</th>
<th>DEFINITIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Above Ground Level Altitude</td>
<td>AGL</td>
<td>Altitude expressed in feet measured above ground level.</td>
</tr>
<tr>
<td>Air Traffic Control</td>
<td>ATC</td>
<td>A service operated by appropriate authority to promote the safe, orderly and expeditious flow of air traffic.</td>
</tr>
<tr>
<td>Air Traffic Control Specialist</td>
<td>ATCS</td>
<td>A person authorized to provide air traffic control service.</td>
</tr>
<tr>
<td>Altitude</td>
<td>ALT</td>
<td>The height of a level, point or object measured in feet Above Ground Level (AGL) or from Mean Sea Level (MSL).</td>
</tr>
<tr>
<td>Coordinated Universal Time</td>
<td>UTC</td>
<td>Time is given in Coordinated Universal Time, the local standard time at the Prime Meridian at Greenwich, England. Local Standard Time is based on each 15° of longitude.</td>
</tr>
<tr>
<td>Distance Measuring Equipment</td>
<td>DME</td>
<td>Equipment (airborne and ground) used to measure, in nautical miles, the slant range distance of an aircraft from the DME navigational aid.</td>
</tr>
<tr>
<td>Flight Level</td>
<td>FL</td>
<td>A level of constant atmospheric pressure related to a reference datum of 29.92 inches of mercury. Each is stated in three digits that represent hundreds of feet. For example, flight level (FL) 250 represents a barometric altimeter indication of 25,000 feet; FL255, an indication of 25,500 feet.</td>
</tr>
<tr>
<td>Navigational Aid</td>
<td>NAVAID</td>
<td>Any visual or electronic device airborne or on the surface which provides point-to-point guidance information or position data to aircraft in flight.</td>
</tr>
<tr>
<td>Mean Sea Level</td>
<td>MSL</td>
<td>Altitude expressed in feet measured from mean sea level.</td>
</tr>
<tr>
<td>Global Positioning System</td>
<td>GPS</td>
<td>A space-based radio positioning, navigation, and time-transfer system. The system provides highly accurate position and velocity information, and precise time, on a continuous global basis, to an unlimited number of properly equipped users. The system is unaffected by weather, and provides a worldwide common grid reference system.</td>
</tr>
<tr>
<td>Non-directional Beacon</td>
<td>NDB</td>
<td>An L/MF or UHF radio beacon transmitting nondirectional signals whereby the pilot of an aircraft equipped with direction finding equipment can determine his bearing to or from the radio beacon and “home” on or track to or from the station.</td>
</tr>
</tbody>
</table>

*Continued on next page*
## Terms (Cont’d)

<table>
<thead>
<tr>
<th>TERMS</th>
<th>ACRONYM</th>
<th>DEFINITIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tactical Air Navigation</td>
<td>TACAN</td>
<td>An ultra-high frequency electronic rho-theta air navigation aid which provides suitably equipped aircraft a continuous indication of bearing and distance to the TACAN station.</td>
</tr>
<tr>
<td>Very High Frequency Omni Directional Range Navigational Aid</td>
<td>VOR</td>
<td>A ground-based electronic navigation aid transmitting very high frequency navigation signals, 360 degrees in azimuth, oriented from magnetic north. Used at 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 FSS for transmitting instructions/information to pilots.</td>
</tr>
<tr>
<td>Very High Frequency Omni Directional Range/ Tactical Air Navigation Navigational Aid</td>
<td>VORTAC</td>
<td>A navigation aid providing VOR azimuth, TACAN azimuth, and TACAN distance measuring equipment (DME) at one site.</td>
</tr>
</tbody>
</table>

*Continued on next page*
<table>
<thead>
<tr>
<th>Word/Phrase</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACKNOWLEDGE</td>
<td>Let me know that you have received and understood my message.</td>
</tr>
<tr>
<td>AFFIRMATIVE</td>
<td>Yes.</td>
</tr>
<tr>
<td>CORRECTION</td>
<td>An error has been made in the transmission and the correct version follows.</td>
</tr>
<tr>
<td>EXPEDITE</td>
<td>Used by ATC when prompt compliance is required to avoid the development of an imminent situation.</td>
</tr>
<tr>
<td>GO AHEAD</td>
<td>Proceed with your message. Not to be used for any other purpose.</td>
</tr>
<tr>
<td>HOW DO YOU HEAR ME?</td>
<td>A question relating to the quality of the transmission or to determine how well the transmission is being received.</td>
</tr>
<tr>
<td>IMMEDIATELY</td>
<td>Used by ATC when compliance with an action is required to avoid an imminent situation.</td>
</tr>
<tr>
<td>I SAY AGAIN</td>
<td>The message will be repeated.</td>
</tr>
<tr>
<td>NEGATIVE</td>
<td>“No” or “Permission not granted” or “That is not correct.”</td>
</tr>
<tr>
<td>OVER</td>
<td>My transmission is ended; I expect a response.</td>
</tr>
<tr>
<td>READ BACK</td>
<td>Repeat my message back to me.</td>
</tr>
<tr>
<td>ROGER</td>
<td>I have received all of your last transmission. It should not be used to answer a question requiring a “yes” or “no” answer.</td>
</tr>
<tr>
<td>SAY AGAIN</td>
<td>Used to request a repeat of the last transmission. Usually specifies transmission or portion thereof not understood or received, e.g., “Say again all after ABRAM VOR.”</td>
</tr>
<tr>
<td>STAND BY</td>
<td>Means the controller or pilot must pause for a few seconds, usually to attend to other duties of higher priority. Also means to “wait” as in “stand by for clearance.” If a delay is lengthy, the caller should re-establish contact.</td>
</tr>
<tr>
<td>UNABLE</td>
<td>Indicates inability to comply with a specific instruction, request, or clearance.</td>
</tr>
<tr>
<td>WILCO</td>
<td>I have received your message, understand it, and will comply with it.</td>
</tr>
<tr>
<td>WORDS TWICE</td>
<td>1. As a request: “Communication is difficult. Please say every phrase twice.”</td>
</tr>
<tr>
<td></td>
<td>2. As information: “Since communications are difficult every phrase in this message will be spoken twice.”</td>
</tr>
</tbody>
</table>
## Terms, Phrases and Pronunciations (Continued)

### Pronunciation

<table>
<thead>
<tr>
<th>Character</th>
<th>Word</th>
<th>Pronunciation</th>
<th>Character</th>
<th>Word</th>
<th>Pronunciation</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Alfa</td>
<td>AL-FAH</td>
<td>N</td>
<td>November</td>
<td>NO-VEM-BER</td>
</tr>
<tr>
<td>B</td>
<td>Bravo</td>
<td>BRAH-VOH</td>
<td>O</td>
<td>Oscar</td>
<td>OSS-CAH</td>
</tr>
<tr>
<td>C</td>
<td>Charlie</td>
<td>CHAR-LEE</td>
<td>P</td>
<td>Papa</td>
<td>PAH-PAH</td>
</tr>
<tr>
<td>D</td>
<td>Delta</td>
<td>DELL-TAH</td>
<td>Q</td>
<td>Quebec</td>
<td>KEH-BECK</td>
</tr>
<tr>
<td>E</td>
<td>Echo</td>
<td>ECK-OH</td>
<td>R</td>
<td>Romeo</td>
<td>ROW-ME-OH</td>
</tr>
<tr>
<td>F</td>
<td>Foxtrot</td>
<td>FOKS-TROT</td>
<td>S</td>
<td>Sierra</td>
<td>SEE-AIR-AH</td>
</tr>
<tr>
<td>G</td>
<td>Golf</td>
<td>GOLF</td>
<td>T</td>
<td>Tango</td>
<td>TANG-GO</td>
</tr>
<tr>
<td>H</td>
<td>Hotel</td>
<td>HOH-TELL</td>
<td>U</td>
<td>Uniform</td>
<td>YOU-NEE-FORM</td>
</tr>
<tr>
<td>I</td>
<td>India</td>
<td>IN-DEE-AH</td>
<td>V</td>
<td>Victor</td>
<td>VIK-TAH</td>
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<td>J</td>
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<td>JEW-LEE ETT</td>
<td>W</td>
<td>Whiskey</td>
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<td>K</td>
<td>Kilo</td>
<td>KEY LOH</td>
<td>X</td>
<td>X-ray</td>
<td>ECK-SRAY</td>
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<td>L</td>
<td>Lima</td>
<td>LEE-MAH</td>
<td>Y</td>
<td>Yankee</td>
<td>YAN-GKEY</td>
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<tr>
<td>M</td>
<td>Mike</td>
<td>MIKE</td>
<td>Z</td>
<td>Zulu</td>
<td>ZOO-LOO</td>
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### Numbers

<table>
<thead>
<tr>
<th>Number</th>
<th>Word</th>
<th>Pronunciation</th>
<th>Number</th>
<th>Word</th>
<th>Pronunciation</th>
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<tbody>
<tr>
<td>0</td>
<td>Zero</td>
<td>ZE-RO</td>
<td>5</td>
<td>Five</td>
<td>FIFE</td>
</tr>
<tr>
<td>1</td>
<td>One</td>
<td>WUN</td>
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<tr>
<td>2</td>
<td>Two</td>
<td>TOO</td>
<td>7</td>
<td>Seven</td>
<td>SEV-EN</td>
</tr>
<tr>
<td>3</td>
<td>Three</td>
<td>TREE</td>
<td>8</td>
<td>Eight</td>
<td>AIT</td>
</tr>
<tr>
<td>4</td>
<td>Four</td>
<td>FOW-ER</td>
<td>9</td>
<td>Nine</td>
<td>NIN-ER</td>
</tr>
</tbody>
</table>
Lesson Summary

Lesson Review

NOTE: Review and elaborate briefly on the following:

- FAA History
- FAA Organization
- Air Traffic Control (ATC) System
- Visual Flight Rules (VFR) and Instrument Flight Rules (IFR)
- Air Traffic Facilities
- Automated Flight Service Stations (AFSSs)
- Airport Traffic Control Towers (ATCTs)
- Terminal Radar Approach Controls (TRACONs)
- Air Route Traffic Control Centers (ARTCCs)
- Air Traffic Control
- Traffic Management System (TMS)
- National Airspace System (NAS)
- Terms, Phrases and Pronunciations

NOTE: Hand out and administer the End-of-Lesson Test. The ELT serves as a review for students. Provide feedback on missed items, including explanations about why particular answers are correct, as well as why some responses are incorrect.

Re-emphasize the importance of students getting familiar with the terms, phrases and pronunciations provided in the lesson and the appendix.
APPENDIX A: FAA HISTORY

* The Air Commerce Act of 1926 charged the Commerce Secretary with certain functions and responsibilities critical to aviation.
  
  - The Commerce Secretary created an Aeronautics Branch within the Commerce Department to:
    
    - Promote air commerce.
    - Issue and enforce air traffic rules.
    - License pilots.
    - Designate and establish airways.
    - Certify aircraft airworthiness.
    - Operate and maintain NAVAIDs.

* In 1930, local airport operators began to establish regulations and issue radio advisories to aircraft in the vicinity of airports in an attempt to prevent collisions. This action by airport operators was one of the first steps toward providing air traffic control.

* In 1934, the Aeronautics Branch was renamed the Bureau of Air Commerce.

* The Civil Aeronautics Act was passed in 1938 and established an independent agency called the Civil Aeronautics Authority which consisted of the following:
  
  - Administrator of the Civil Aeronautics Authority
    
    - Responsible for executing the authority’s orders
  
  - Board for Economic Regulations and Safety Rules
    
    - Five members who regulated airline fares and determined the routes that air carriers would serve
  
  - Air Safety Board
    
    - Three members who investigated aircraft accidents and recommended safety improvements
APPENDIX A: FAA HISTORY  (Continued)

In 1939, the Civil Aeronautics Authority was reorganized.

- The Air Safety Board was abolished and its duties were transferred to the Board for Economic Regulation and Safety Rulemaking.
- Board for Economic Regulation and Safety Rulemaking was renamed the Civil Aeronautics Board (CAB).
  - Transferred CAB and administrator to the Commerce Department
    → The CAA administrator reported directly to the Secretary of Commerce.
    → The CAB remained independent (except for administrative support).
- The collective functions of the Administrator were designated to the Civil Aeronautics Administration (CAA).

In 1941, the airport advisories being provided by local operators became the responsibility of the CAA. This service was given to the CAA to standardize airport traffic control procedures and expand air traffic service to additional airports.

NOTE: The Bureau of Air Commerce was the forerunner of the CAA, and the CAA was the forerunner of the FAA.

The Federal Aviation Act of 1958

- Several factors led to the passage of the Federal Aviation Act of 1958. The most important factor was the growing need for a single air navigation and Air Traffic Control system equipped with modern facilities to serve the vastly increasing demands of both civil and military aviation.
- This act:
  - Created an independent Federal Aviation Agency (FAA).
  - Transferred the CAB’s safety/rulemaking functions to the FAA.
  - Provided for the FAA Administrator to report directly to the President.

The Department of Transportation Act of 1966

- Placed the FAA under the DOT.
- Changed the name of the FAA from the Federal Aviation Agency to the Federal Aviation Administration.
- Created a single department rather than separate, competing systems.
APPENDIX B: ORGANIZATIONAL FLOWCHART

Secretary of Transportation

- Railroads
- Pipelines and Hazardous Materials
- Human Resource Management
- Financial Services
- Airports
- Commercial Space Transport
- Information Services
- Acquisition and Business
- Strategy and Performance

FAA Administrator

- Highways
- Marine Navigation
- Security and Hazardous Materials
- International Aviation
- Aviation Safety
- Region and Center Operations
- Communications
- NexGen and Ops Planning
- Finance

ATO COO

- EnRoute
- Terminal
- Flight Service

Operations
The following is a list of commonly used words, phrases, and acronyms. For a more comprehensive list, refer to the Pilot/Controller Glossary in FAA Order JO 7110.65.

<table>
<thead>
<tr>
<th>TERMS</th>
<th>ACRONYM</th>
<th>DEFINITIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Above Ground Level Altitude</td>
<td>AGL</td>
<td>Altitude expressed in feet measured above ground level.</td>
</tr>
<tr>
<td>Airport Elevation (Field Elevation)</td>
<td></td>
<td>The highest point of an airport’s usable runways measured in feet from mean sea level.</td>
</tr>
<tr>
<td>Airport Surveillance Radar</td>
<td>ASR</td>
<td>Approach control radar used to detect and display an aircraft’s position in the terminal area. ASR provides range and azimuth information but does not provide elevation data. Coverage of the ASR can extend up to 60 miles.</td>
</tr>
<tr>
<td>Airspeed</td>
<td></td>
<td>The speed of an aircraft relative to its surrounding air mass. The unqualified term “airspeed” means one of the following:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>a. Indicated Airspeed (IAS) - The speed shown on the aircraft airspeed indicator. This is the speed used in pilot/controller communications under the general term “airspeed.”</td>
</tr>
<tr>
<td></td>
<td></td>
<td>b. True Airspeed (TAS) - The airspeed of an aircraft relative to undisturbed air. Used primarily in flight planning and en route portion of flight. When used in pilot/controller communications, it is referred to as “true airspeed” and not shortened to “airspeed.”</td>
</tr>
<tr>
<td>Air Traffic</td>
<td>AT</td>
<td>Aircraft operating in the air or on an airport surface, exclusive of loading ramps and parking areas.</td>
</tr>
<tr>
<td>Air Traffic Clearance</td>
<td></td>
<td>An authorization by air traffic control for the purpose of preventing collision between known aircraft, for an aircraft to proceed under specified traffic conditions within controlled airspace. The pilot-in-command of an aircraft may not deviate from the provisions of a Visual Flight Rules (VFR) or Instrument Flight Rules (IFR) air traffic clearance except in an emergency or unless an amended clearance has been obtained.</td>
</tr>
<tr>
<td>Air Traffic Control</td>
<td>ATC</td>
<td>A service operated by appropriate authority to promote the safe, orderly and expeditious flow of air traffic.</td>
</tr>
<tr>
<td>Air Traffic Control Specialist</td>
<td>ATCS</td>
<td>A person authorized to provide air traffic control service.</td>
</tr>
</tbody>
</table>

Continued on next page
### APPENDIX C: GLOSSARY

(Continued)

<table>
<thead>
<tr>
<th>TERMS</th>
<th>ACRONYM</th>
<th>DEFINITIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Air Traffic Service Routes</td>
<td>ATS</td>
<td>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.</td>
</tr>
<tr>
<td>Airway</td>
<td></td>
<td>A Class E airspace area established in the form of a corridor, the centerline of which is defined by radio navigational aids.</td>
</tr>
<tr>
<td>Alert Area</td>
<td></td>
<td>A type of Special Use Airspace which may contain high volume of pilot training activities or an unusual type of aerial activity, neither of which is hazardous to aircraft. Alert Areas are depicted on aeronautical charts for the information of nonparticipating pilots. All activities within an Alert Area are conducted in accordance with Federal Aviation Regulations, and pilots of participating aircraft as well as pilots transiting the area are equally responsible for collision avoidance.</td>
</tr>
<tr>
<td>Altimeter Setting</td>
<td>ALSTG</td>
<td>The barometric pressure reading used to adjust a pressure altimeter for variations in existing atmospheric pressure or to the standard altimeter setting (29.92).</td>
</tr>
<tr>
<td>Altitude</td>
<td></td>
<td>The height of a level, point or object measured in feet Above Ground Level (AGL) or from Mean Sea Level (MSL).</td>
</tr>
<tr>
<td>Controlled Firing Area</td>
<td>CFA</td>
<td>A type of Special Use Airspace wherein activities are conducted under conditions so controlled as to eliminate hazards to nonparticipating aircraft and to ensure the safety of persons and property on the ground.</td>
</tr>
<tr>
<td>Coordinated Universal Time</td>
<td>UTC</td>
<td>Time is given in Coordinated Universal Time, the local standard time at the Prime Meridian at Greenwich, England. Local Standard Time is based on each 15° of longitude.</td>
</tr>
<tr>
<td>Data Block (Alphanumeric Display)</td>
<td></td>
<td>Letters and numerals used to show identification, altitude, beacon code, and other information concerning a target on a radar display.</td>
</tr>
<tr>
<td>Distance Measuring Equipment</td>
<td>DME</td>
<td>Equipment (airborne and ground) used to measure, in nautical miles, the slant range distance of an aircraft from the DME navigational aid.</td>
</tr>
<tr>
<td>Fix</td>
<td></td>
<td>A geographical position determined by visual reference to the surface, by reference to one or more radio NAVAIDs, by celestial plotting, or by another navigational device.</td>
</tr>
<tr>
<td>Flight Check</td>
<td>FLC</td>
<td>A call sign prefix used by FAA aircraft engaged in flight inspection/certification of navigational aids and flight procedures. The word “recorded” may be added as a suffix; e.g., “Flight Check 320 recorded” to indicate that an automated flight inspection is in progress in terminal areas.</td>
</tr>
<tr>
<td>TERMS</td>
<td>ACRONYM</td>
<td>DEFINITIONS</td>
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<tr>
<td>Flight Level</td>
<td>FL</td>
<td>A level of constant atmospheric pressure related to a reference datum of 29.92 inches of mercury. Each is stated in three digits that represent hundreds of feet. For example, flight level (FL) 250 represents a barometric altimeter indication of 25,000 feet; FL255, an indication of 25,500 feet.</td>
</tr>
<tr>
<td>Flight Plan</td>
<td>FP</td>
<td>Specified information relating to the intended flight of an aircraft that is filed orally or in writing with an FSS or an ATC facility.</td>
</tr>
<tr>
<td>Flow Control</td>
<td></td>
<td>Measures designed to adjust the flow of traffic into a given airspace, along a given route, or bound for a given aerodrome (airport) so as to ensure the most effective utilization of the airspace.</td>
</tr>
<tr>
<td>General Aviation</td>
<td>GA</td>
<td>That portion of civil aviation which encompasses all facets of aviation except air carriers holding a certificate of public convenience and necessity from the Civil Aeronautics Board and large aircraft commercial operators.</td>
</tr>
<tr>
<td>Global Positioning</td>
<td>GPS</td>
<td>A space-based radio positioning, navigation, and time-transfer system. The system provides highly accurate position and velocity information, and precise time, on a continuous global basis, to an unlimited number of properly equipped users. The system is unaffected by weather, and provides a worldwide common grid reference system.</td>
</tr>
<tr>
<td>Handoff</td>
<td></td>
<td>An action taken to transfer the radar identification of an aircraft from one controller to another if the aircraft will enter the receiving controller’s airspace and radio communications with the aircraft will be transferred.</td>
</tr>
<tr>
<td>Hold Procedure</td>
<td></td>
<td>A predetermined maneuver which keeps aircraft within a specified airspace while awaiting further clearance from air traffic control. Also used during ground operations to keep aircraft within a specified area or at a specified point while awaiting further clearance from air traffic control.</td>
</tr>
<tr>
<td>IFR Conditions</td>
<td></td>
<td>Weather conditions below the minimum for flight under visual flight rules. Generally, IFR weather conditions exist when the ceiling is below 1,000 feet AGL or the visibility is below 3 statute miles.</td>
</tr>
<tr>
<td>IFR/VFR Aircraft</td>
<td></td>
<td>The pilot using Instrument Flight Rules (IFR) relies on instruments for navigation during poor weather conditions and is provided ATC separation. The Visual Flight Rules (VFR) pilot relies on his/her own vision for separation and may or may not use instruments for navigation.</td>
</tr>
<tr>
<td>Initial Approach Fix</td>
<td>IAF</td>
<td>The fixes depicted on instrument approach procedure charts that identify the beginning of the initial approach segment(s).</td>
</tr>
<tr>
<td>TERMS</td>
<td>ACRONYM</td>
<td>DEFINITIONS</td>
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<tr>
<td>Instrument Departure Procedure</td>
<td>DP</td>
<td>A preplanned instrument flight rule (IFR) air traffic control departure procedure printed for pilot use in graphic and/or textual form. DP’s provide transition from the terminal to the appropriate en route structure.</td>
</tr>
<tr>
<td>Instrument Flight Rules</td>
<td>IFR</td>
<td>Rules governing the procedures for conducting instrument flight. Also a term used by pilots and controllers to indicate type of flight plan.</td>
</tr>
<tr>
<td>Instrument Landing System</td>
<td>ILS</td>
<td>A precision instrument approach system which normally consists of the following electronic components and visual aids:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>a. Localizer.</td>
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<td></td>
<td></td>
<td>b. Glideslope.</td>
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<tr>
<td></td>
<td></td>
<td>c. Outer Marker.</td>
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<tr>
<td></td>
<td></td>
<td>d. Middle Marker.</td>
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<tr>
<td></td>
<td></td>
<td>e. Approach Lights.</td>
</tr>
<tr>
<td>Jet Route</td>
<td></td>
<td>A route designed to serve aircraft operations from 18,000 feet MSL up to and including flight level 450. The routes are referred to as “J” routes with numbering to identify the designated route; e.g., J105.</td>
</tr>
<tr>
<td>Lateral Separation</td>
<td></td>
<td>The lateral spacing of aircraft at the same altitude by requiring operation on different routes or in different geographical locations.</td>
</tr>
<tr>
<td>Longitudinal Separation</td>
<td></td>
<td>The longitudinal spacing of aircraft at the same altitude by a minimum distance expressed in units of time or miles.</td>
</tr>
<tr>
<td>Mach Number</td>
<td></td>
<td>The ratio of true airspeed to the speed of sound; e.g., MACH .82, MACH 1.6.</td>
</tr>
<tr>
<td>Mayday</td>
<td></td>
<td>The international radiotelephony distress signal. When repeated three times, it indicates imminent and grave danger and that immediate assistance is requested.</td>
</tr>
<tr>
<td>Mean Sea Level Altitude</td>
<td>MSL</td>
<td>Altitude expressed in feet measured from mean sea level.</td>
</tr>
<tr>
<td>Military Operations Area</td>
<td>MOA</td>
<td>An airspace assignment of defined vertical and lateral dimensions established outside Class A airspace to separate/segregate certain military activities from IFR traffic and to identify for VFR traffic where these activities are conducted.</td>
</tr>
<tr>
<td>Movement Area</td>
<td></td>
<td>The runways, taxiways, and other areas of an airport/heliport which are utilized for taxiing/hover taxiing, air taxiing, takeoff, and landing of aircraft, exclusive of loading ramps and parking areas. At those airports/heliports with a tower, specific approval for entry onto the movement area must be obtained from ATC.</td>
</tr>
</tbody>
</table>
### APPENDIX C: GLOSSARY (Continued)

<table>
<thead>
<tr>
<th>TERMS</th>
<th>ACRONYM</th>
<th>DEFINITIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>National Airspace System</td>
<td>NAS</td>
<td>The common network of U.S. airspace; air navigation facilities, equipment and services, airports or landing area; aeronautical charts, information and services; rules, regulations and procedures, technical information, and manpower and material. Included are system components shared jointly with the military.</td>
</tr>
<tr>
<td>Navigational Aid</td>
<td>NAVAID</td>
<td>Any visual or electronic device airborne or on the surface which provides point-to-point guidance information or position data to aircraft in flight.</td>
</tr>
<tr>
<td>Non-directional Beacon</td>
<td>NDB</td>
<td>An L/MF or UHF radio beacon transmitting nondirectional signals whereby the pilot of an aircraft equipped with direction finding equipment can determine his bearing to or from the radio beacon and “home” on or track to or from the station.</td>
</tr>
<tr>
<td>Non-movement Area</td>
<td></td>
<td>Taxiways and apron (ramp) areas not under the control of air traffic.</td>
</tr>
<tr>
<td>Nonradar</td>
<td></td>
<td>Generally means without the use of radar, such as:</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Nonradar Approach.</strong> Used to describe instrument approaches for which course guidance on final approach may or may not be provided by ATC.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Nonradar Approach Control.</strong> An ATC facility providing approach control service without the use of radar.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Nonradar Arrival.</strong> An aircraft arriving at an airport without radar service or at an airport served by a radar facility and radar contact has not been established or has been terminated due to a lack of radar service to the airport.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Nonradar Route.</strong> A flight path or route over which the pilot is performing his/her own navigation. Pilot may be receiving radar separation, radar monitoring, or other ATC services while on a nonradar route.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Nonradar Separation.</strong> The spacing of aircraft in accordance with established minima without the use of radar, e.g., vertical, lateral, or longitudinal separation.</td>
</tr>
<tr>
<td>Positive Control</td>
<td></td>
<td>The separation of all air traffic within designated airspace by air traffic control.</td>
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</tbody>
</table>

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### APPENDIX C: GLOSSARY  *(Continued)*

<table>
<thead>
<tr>
<th>TERMS</th>
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<th>DEFINITIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Precision Approach Radar</td>
<td>PAR</td>
<td>Radar equipment in some ATC facilities operated by the FAA and/or the military services at joint-use civil/military locations and separate military installations to detect and display azimuth, elevation, and range of aircraft on the final approach course to a runway. This equipment may be used to monitor certain nonradar approaches, but is primarily used to conduct a precision instrument approach wherein the controller issues guidance instructions to the pilot based on the aircraft’s position in relation to the final approach course (azimuth), the glidepath (elevation), and the distance (range) from the touchdown point on the runway as displayed on the radar scope.</td>
</tr>
<tr>
<td>Prohibited Area</td>
<td></td>
<td>Designated airspace within which the flight of aircraft is prohibited.</td>
</tr>
<tr>
<td>Radar</td>
<td></td>
<td>A device which, by measuring the time interval between transmission and reception of radio pulses and correlating the angular orientation of the radiated antenna beam or beams in azimuth and/or elevation, provides information on range, azimuth, and/or elevation of objects in the path of the transmitted pulses.</td>
</tr>
<tr>
<td>Radar Point Out</td>
<td></td>
<td>An action taken by a controller to transfer the radar identification of an aircraft to another controller if the aircraft will or may enter the airspace or protected airspace of another controller and radio communications will not be transferred.</td>
</tr>
<tr>
<td>Radar Vectors</td>
<td></td>
<td>Specific headings, issued to the pilot by a controller, to provide navigational guidance, based on the use of radar.</td>
</tr>
</tbody>
</table>

*Continued on next page*
# APPENDIX C: GLOSSARY (Continued)

<table>
<thead>
<tr>
<th>TERMS</th>
<th>ACRONYM</th>
<th>DEFINITIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Restricted Area</td>
<td></td>
<td>A type of Special Use Airspace designated under FAR Part 73, within which the flight of aircraft, while not wholly prohibited, is subject to restriction. Most restricted areas are designated joint use and IFR/VFR operations in the area may be authorized by the controlling ATC facility when it is not being utilized by the using agency. Restricted areas are depicted on en route charts. Where joint use is authorized, the name of the ATC controlling facility is also shown.</td>
</tr>
<tr>
<td>Runway</td>
<td>RWY. RY</td>
<td>A defined rectangular area on a land airport prepared for the landing and takeoff run of aircraft along its length. Runways are normally numbered in relation to their magnetic direction rounded off to the nearest 10 degrees; e.g., Runway 01, Runway 25.</td>
</tr>
<tr>
<td>Safety Alert</td>
<td></td>
<td>A safety alert issued by ATC to aircraft under their control if ATC is aware the aircraft is at an altitude which, in the controller’s judgment, places the aircraft in unsafe proximity to terrain, obstructions, or other aircraft. The controller may discontinue the issuance of further alerts if the pilot advises he is taking action to correct the situation or has the other aircraft in sight.</td>
</tr>
<tr>
<td>Special Use Airspace</td>
<td>SUA</td>
<td>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.</td>
</tr>
<tr>
<td>Squawk</td>
<td></td>
<td>Activate specific codes on the aircraft transponder; e.g., “Squawk one zero two zero.”</td>
</tr>
<tr>
<td>Stabilizer</td>
<td></td>
<td>Stabilizers are located in the tail section of the aircraft. The Vertical Stabilizer is in the upright position, while the Horizontal Stabilizer is in a horizontal position. These are manipulated by the pilot in order to control the aircraft.</td>
</tr>
<tr>
<td>Tactical Air Navigation</td>
<td>TACAN</td>
<td>An ultra-high frequency electronic rho-theta air navigation aid which provides suitably equipped aircraft a continuous indication of bearing and distance to the TACAN station.</td>
</tr>
</tbody>
</table>
### APPENDIX C: GLOSSARY

(Continued)

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<tr>
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</tr>
</thead>
<tbody>
<tr>
<td>Target</td>
<td></td>
<td>The indication shown on a radar display resulting from a primary radar return or a radar beacon reply.</td>
</tr>
<tr>
<td>Traffic Alert and Collision</td>
<td>TCAS</td>
<td>An airborne collision avoidance system based on radar beacon signals which operates independent of ground-based equipment.</td>
</tr>
<tr>
<td>Avoidance System</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Transponder</td>
<td></td>
<td>The airborne radar beacon receiver/transmitter portion of the Air Traffic Control Radar Beacon System (ATCRBS) which automatically receives radio signals from interrogators on the ground, and selectively replies with a specific reply pulse or pulse group only to those interrogations being received on the mode to which it is set to respond.</td>
</tr>
<tr>
<td>Vertical Separation</td>
<td></td>
<td>Separation established by assignment of different altitudes or flight levels.</td>
</tr>
<tr>
<td>Visual Flight Rules</td>
<td>VFR</td>
<td>Rules that govern the procedures for conducting flight under visual conditions. The term “VFR” is also used in the United States too. In addition, it is used by pilots and controllers to indicate type of flight plan.</td>
</tr>
<tr>
<td>VFR Aircraft</td>
<td></td>
<td>An aircraft conducting flight in accordance with visual flight rules.</td>
</tr>
<tr>
<td>VFR Conditions</td>
<td></td>
<td>Weather conditions that are equal to or greater than minimum VFR requirements. Generally, VFR weather conditions exist when the ceiling is at or above 1,000 feet AGL and the visibility is at least 3 statute miles.</td>
</tr>
<tr>
<td>Video Map</td>
<td></td>
<td>An electronically displayed map on the radar display that may depict data such as airports, heliports, runway centerline extensions, hospital emergency landing areas, NAVAIDs and fixes, reporting points, airway/route centerlines, boundaries, handoff points, special use tracks, obstructions, prominent geographic features, map alignment indicators, range accuracy marks, minimum vectoring altitudes.</td>
</tr>
<tr>
<td>Visibility</td>
<td>VIS</td>
<td>The ability, as determined by atmospheric conditions and expressed in units of distance, to see and identify prominent unlighted objects by day and prominent lighted objects by night. Visibility is reported as statute miles, hundreds of feet or meters.</td>
</tr>
<tr>
<td>Visual Separation</td>
<td></td>
<td>A means employed by ATC to separate aircraft in terminal areas.</td>
</tr>
<tr>
<td>Voice Switching and Control</td>
<td>VSCS</td>
<td>A computer controlled switching system that provides air traffic controllers with all voice circuits (air to ground and ground to ground) necessary for air traffic control.</td>
</tr>
<tr>
<td>System</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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<table>
<thead>
<tr>
<th>TERMS</th>
<th>ACRONYM</th>
<th>DEFINITIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Very High Frequency Omni Directional Range Navigational Aid</td>
<td>VOR</td>
<td>A ground-based electronic navigation aid transmitting very high frequency navigation signals, 360 degrees in azimuth, oriented from magnetic north. Used at 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 FSS for transmitting instructions/information to pilots.</td>
</tr>
<tr>
<td>Very High Frequency Omni Directional Range/Tactical Air Navigation Navigational Aid</td>
<td>VORTAC</td>
<td>A navigation aid providing VOR azimuth, TACAN azimuth, and TACAN distance measuring equipment (DME) at one site.</td>
</tr>
<tr>
<td>Wake Turbulence</td>
<td></td>
<td>Phenomena resulting from the passage of an aircraft through the atmosphere. The term includes vortices, thrust stream turbulence, jet blast, jet wash, propeller wash, and rotor wash both on the ground and in the air.</td>
</tr>
<tr>
<td>Warning Area</td>
<td></td>
<td>A type of Special Use Airspace which may contain hazards to nonparticipating aircraft in international airspace.</td>
</tr>
<tr>
<td>Word/Phrase</td>
<td>Meaning</td>
<td></td>
</tr>
<tr>
<td>------------------</td>
<td>------------------------------------------------------------------------</td>
<td></td>
</tr>
<tr>
<td>ACKNOWLEDGE</td>
<td>Let me know that you have received and understood my message.</td>
<td></td>
</tr>
<tr>
<td>ADVISE INTENTIONS</td>
<td>Tell me what you plan to do.</td>
<td></td>
</tr>
<tr>
<td>AFFIRMATIVE</td>
<td>Yes.</td>
<td></td>
</tr>
<tr>
<td>ATC ADVISES</td>
<td>Used to prefix a message of noncontrol information when it is</td>
<td></td>
</tr>
<tr>
<td></td>
<td>relayed to an aircraft by other than an air traffic controller.</td>
<td></td>
</tr>
<tr>
<td>ATC CLEARS</td>
<td>Used to prefix an ATC clearance when it is relayed to an aircraft by</td>
<td></td>
</tr>
<tr>
<td></td>
<td>other than an air traffic controller.</td>
<td></td>
</tr>
<tr>
<td>ATC REQUESTS</td>
<td>Used to prefix an ATC request when it is relayed to an aircraft by</td>
<td></td>
</tr>
<tr>
<td></td>
<td>other than an air traffic controller.</td>
<td></td>
</tr>
<tr>
<td>CLEARED FOR</td>
<td>ATC authorization for an aircraft to depart. It is predicated on known</td>
<td></td>
</tr>
<tr>
<td>TAKEOFF</td>
<td>traffic and known physical airport conditions.</td>
<td></td>
</tr>
<tr>
<td>CLEARED TO LAND</td>
<td>ATC authorization for an aircraft to land. It is predicated on known</td>
<td></td>
</tr>
<tr>
<td></td>
<td>traffic and known physical airport conditions.</td>
<td></td>
</tr>
<tr>
<td>CORRECTION</td>
<td>An error has been made in the transmission and the correct version</td>
<td></td>
</tr>
<tr>
<td></td>
<td>follows.</td>
<td></td>
</tr>
<tr>
<td>EXPEDITE</td>
<td>Used by ATC when prompt compliance is required to avoid the</td>
<td></td>
</tr>
<tr>
<td></td>
<td>development of an imminent situation, usually in conjunction with a</td>
<td></td>
</tr>
<tr>
<td></td>
<td>request for best rate of climb/descent, without requiring an</td>
<td></td>
</tr>
<tr>
<td></td>
<td>exceptional change in aircraft handling characteristics.</td>
<td></td>
</tr>
<tr>
<td>GO AHEAD</td>
<td>Proceed with your message. Not to be used for any other purpose.</td>
<td></td>
</tr>
<tr>
<td>HOW DO YOU HEAR</td>
<td>A question relating to the quality of the transmission or to determine</td>
<td></td>
</tr>
<tr>
<td>ME?</td>
<td>how well the transmission is being received.</td>
<td></td>
</tr>
<tr>
<td>IMMEDIATELY</td>
<td>Used by ATC when compliance with an action is required to avoid an</td>
<td></td>
</tr>
<tr>
<td></td>
<td>imminent situation.</td>
<td></td>
</tr>
<tr>
<td>I SAY AGAIN</td>
<td>The message will be repeated.</td>
<td></td>
</tr>
<tr>
<td>NEGATIVE</td>
<td>“No” or “Permission not granted” or “That is not correct.”</td>
<td></td>
</tr>
<tr>
<td>OUT</td>
<td>The conversation is ended and no response is expected.</td>
<td></td>
</tr>
<tr>
<td>OVER</td>
<td>My transmission is ended; I expect a response.</td>
<td></td>
</tr>
<tr>
<td>RADAR CONTACT</td>
<td>Used by ATC to inform an aircraft that it is identified on the radar</td>
<td></td>
</tr>
<tr>
<td></td>
<td>display and radar flight following will be provided until radar</td>
<td></td>
</tr>
<tr>
<td></td>
<td>identification is terminated. Radar service may also be provided</td>
<td></td>
</tr>
<tr>
<td></td>
<td>within the limits of necessity and capability. When a pilot is informed</td>
<td></td>
</tr>
<tr>
<td></td>
<td>of “radar contact,” he automatically discontinues reporting over</td>
<td></td>
</tr>
<tr>
<td></td>
<td>compulsory reporting points.</td>
<td></td>
</tr>
<tr>
<td>RADAR CONTACT</td>
<td>Used by ATC to inform a pilot that radar data used to determine the</td>
<td></td>
</tr>
<tr>
<td>LOST</td>
<td>aircraft’s position is no longer being received, or is no longer</td>
<td></td>
</tr>
<tr>
<td></td>
<td>reliable and radar service is no longer being provided.</td>
<td></td>
</tr>
<tr>
<td>READ BACK</td>
<td>Repeat my message back to me.</td>
<td></td>
</tr>
<tr>
<td>ROGER</td>
<td>I have received all of your last transmission. It should not be used</td>
<td></td>
</tr>
<tr>
<td></td>
<td>to answer a question requiring a “yes” or “no” answer.</td>
<td></td>
</tr>
<tr>
<td>SAY AGAIN</td>
<td>Used to request a repeat of the last transmission. Usually specifies</td>
<td></td>
</tr>
<tr>
<td></td>
<td>transmission or portion thereof not understood or received, e.g.,</td>
<td></td>
</tr>
<tr>
<td></td>
<td>“Say again all after ABRAM VOR.”</td>
<td></td>
</tr>
</tbody>
</table>

Continued on next page
### APPENDIX C: GLOSSARY (Continued)

<table>
<thead>
<tr>
<th>Word/Phrase</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>SAY ALTITUDE</strong></td>
<td>Used by ATC to ascertain an aircraft’s specific altitude/flight level. When the aircraft is climbing or descending, the pilot should state the indicated altitude rounded to the nearest 100 feet.</td>
</tr>
<tr>
<td><strong>SPEAK SLOWER</strong></td>
<td>Used in verbal communications as a request to reduce speech rate.</td>
</tr>
<tr>
<td><strong>SQUAWK</strong></td>
<td>Activate specific codes on the aircraft transponder; e.g., “Squawk one zero two zero.”</td>
</tr>
<tr>
<td><strong>UNABLE</strong></td>
<td>Indicates inability to comply with a specific instruction, request, or clearance.</td>
</tr>
<tr>
<td><strong>STAND BY</strong></td>
<td>Means the controller or pilot must pause for a few seconds, usually to attend to other duties of higher priority. Also means to “wait” as in “stand by for clearance.” If a delay is lengthy, the caller should re-establish contact.</td>
</tr>
<tr>
<td><strong>THAT IS CORRECT</strong></td>
<td>The understanding you have is right.</td>
</tr>
<tr>
<td><strong>VERIFY</strong></td>
<td>Request confirmation of information; e.g., “Verify assigned altitude.”</td>
</tr>
<tr>
<td><strong>WILCO</strong></td>
<td>I have received your message, understand it, and will comply with it.</td>
</tr>
</tbody>
</table>
| **WORDS TWICE**  | 1. As a request: “Communication is difficult. Please say every phrase twice.”  
2. As information: “Since communications are difficult every phrase in this message will be spoken twice.” |