



**Federal Aviation
Administration**

Initial En Route Qualification Training

Lesson 40 Military Operations

Course 50148001

LESSON PLAN DATA SHEET

COURSE NAME: INITIAL EN ROUTE QUALIFICATION TRAINING
COURSE NUMBER: 50148001

LESSON TITLE: MILITARY OPERATIONS

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REFERENCE(S): FAA ORDER JO 7110.65, AIR TRAFFIC CONTROL; FAA ORDER JO 7110.311, PROCEDURAL GUIDANCE FOR FAA ORDER JO 7110.65 FOLLOWING EN ROUTE AUTOMATION MODERNIZATION (ERAM) IMPLEMENTATION; FAA ORDER JO 7610.4, SPECIAL OPERATIONS; FAA ORDER JO 7400.2, PROCEDURES FOR HANDLING AIRSPACE MATTERS; FAR, PART 73, SPECIAL USE AIRSPACE; FAR PART 91.185, IFR OPERATIONS: TWO-WAY RADIO COMMUNICATIONS FAILURE

HANDOUT(S): NONE

**EXERCISE(S)/
ACTIVITY(S):** IDENTIFYING TERMS USED IN MILITARY OPERATIONS
EXERCISE

**END-OF-LESSON
TEST:** YES

**PERFORMANCE
TEST:** NONE

MATERIALS: NONE

**OTHER PERTINENT
INFORMATION:** NONE

DISCLAIMER

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INTRODUCTION

Initial En Route Qualification Training

Lesson 40 Military Operations

V.2025-02
Presented by
FAA Academy
Air Traffic Division



Federal Aviation
Administration



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In previous lessons, you have learned procedures for working aircraft in your sector. These procedures apply to civilian as well as military aircraft.

INTRODUCTION *(Continued)*

Opening Scenario



Military operations add a great deal of complexity to the workload of an air traffic controller. It is important for you, as an Air Traffic Controller, to have a solid understanding of military operations and to be aware of the potential impact such operations have to air traffic.

Purpose

This lesson serves as a brief introduction to military operations which are extensively covered in later stages of training.

INTRODUCTION *(Continued)*

Lesson Objectives

LESSON OBJECTIVES

On an End-of-Lesson Test and in accordance with FAA Orders JO 7110.65 and JO 7610.4, you will identify:

- Terms for selected military operations
- Procedures and minima for Special Use/ATC Assigned Airspace and formation flights
- Procedures for forwarding information from military flights

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ALTITUDE RESERVATION (ALTRV)

Altitude Reservation (ALTRV) Definition

JO 7110.65,
Pilot/Controller
Glossary;
JO 7610.4,
par. 3-1-2



Altitude Reservation (ALTRV) is airspace utilization under prescribed conditions, normally employed for the mass movement of aircraft under special user requirements that **cannot** otherwise be accomplished. ALTRVs are approved by the appropriate ATC facility.

- ⦿ ALTRVs **shall** receive special handling from FAA facilities.

NOTE: Rules regarding special handling will be covered at your facility.

Inflight Separation

JO 7610.4,
par. 3-6-3;
JO 7110.65,
Pilot/Controller
Glossary



Military Authority Assumes Responsibility for Separation of Aircraft (MARSA) is a condition whereby the military services involved assume responsibility for separation between participating military aircraft in the ATC system. It is used **only** for required IFR operations that are specified in Letters of Agreement or other appropriate FAA or military documents.

NOTE: MARSA may be used in numerous military operations, such as aerial refueling and formation flights. MARSA continues until MARSA aircraft advise they are separated and ATC advises MARSA is terminated.

Military Authority Assumes Responsibility for Separation of Aircraft (MARSA)

JO 7110.65,
par. 2-1-11,
Pilot/Controller
Glossary

- ⦿ The application of MARSA is a military command prerogative covered by:
 - Letter of Agreement (LOA)
 - Appropriate FAA/military document
 - ⦿ MARSA will **not** be indiscriminately invoked by individual:
 - Units
 - Pilots
 - ⦿ ATC facilities do **not** invoke or deny MARSA.
 - ⦿ The Department of Defense (DOD) is responsible for coordination with using agencies for Special Use Airspace (SUA) and ATC Assigned Airspace (ATCAA) involving MARSA procedures.
 - ⦿ ATC is **not** responsible for determining which military aircraft are authorized to enter Special Use Airspace/ATCAA.
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SPECIAL USE AND ATC ASSIGNED AIRSPACE

Special Use Airspace

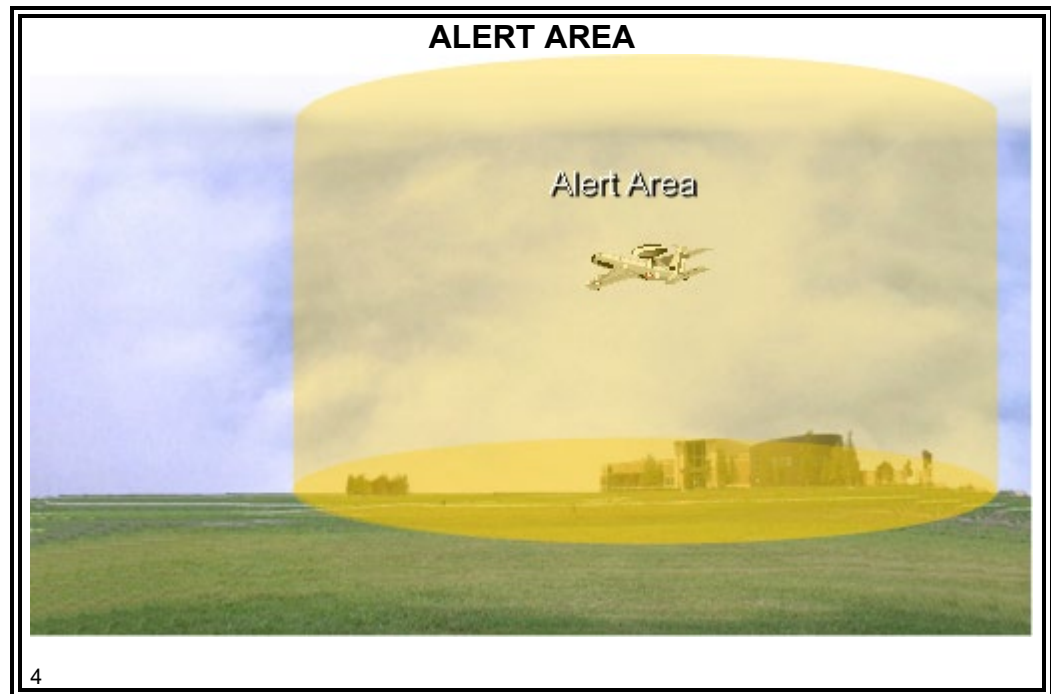
JO 7110.65,
Pilot/Controller
Glossary



Special Use Airspace (SUA) is 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.

Types of Special Use Airspace

JO 7110.65,
Pilot/Controller
Glossary



An **Alert Area** is airspace that may contain a 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.

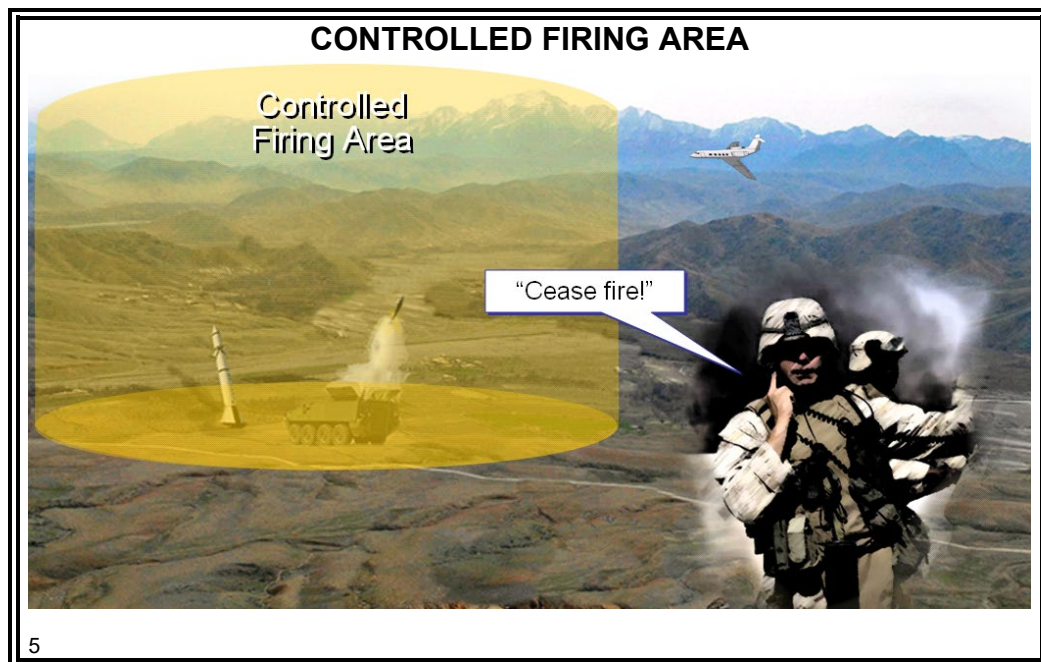
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SPECIAL USE AND ATC ASSIGNED AIRSPACE

(Continued)

Types of Special Use Airspace (Cont'd)

JO 7110.65,
Pilot/Controller
Glossary



A **Controlled Firing Area** is 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.

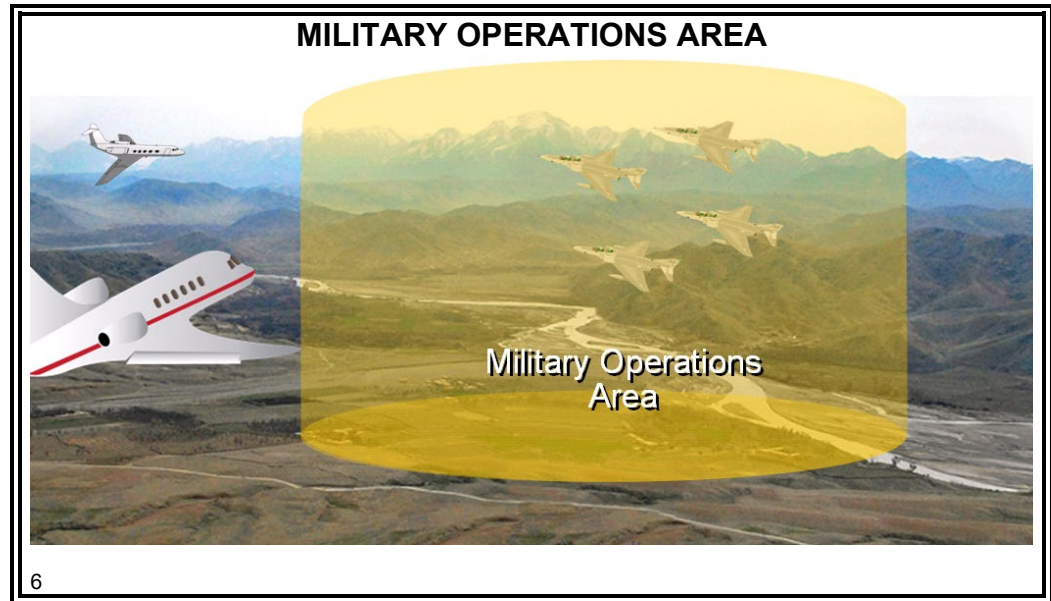
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SPECIAL USE AND ATC ASSIGNED AIRSPACE

(Continued)

Types of Special Use Airspace (Cont'd)

JO 7110.65,
Pilot/Controller
Glossary



A **Military Operations Area (MOA)** is airspace established outside of a Class A airspace area to separate or segregate certain nonhazardous military activities from IFR traffic and to identify for VFR traffic where these activities are conducted.

- ⦿ The upper vertical limit of a MOA can be up to, but not including, FL180.
- ⦿ A MOA can be established in any type of airspace **except** Class A airspace.

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SPECIAL USE AND ATC ASSIGNED AIRSPACE

(Continued)

Types of Special Use Airspace (Cont'd)

JO 7110.65,
Pilot/Controller
Glossary



A **Prohibited Area** is airspace designated under FAR, Part 73 within which no person may operate an aircraft without the permission of the using agency.

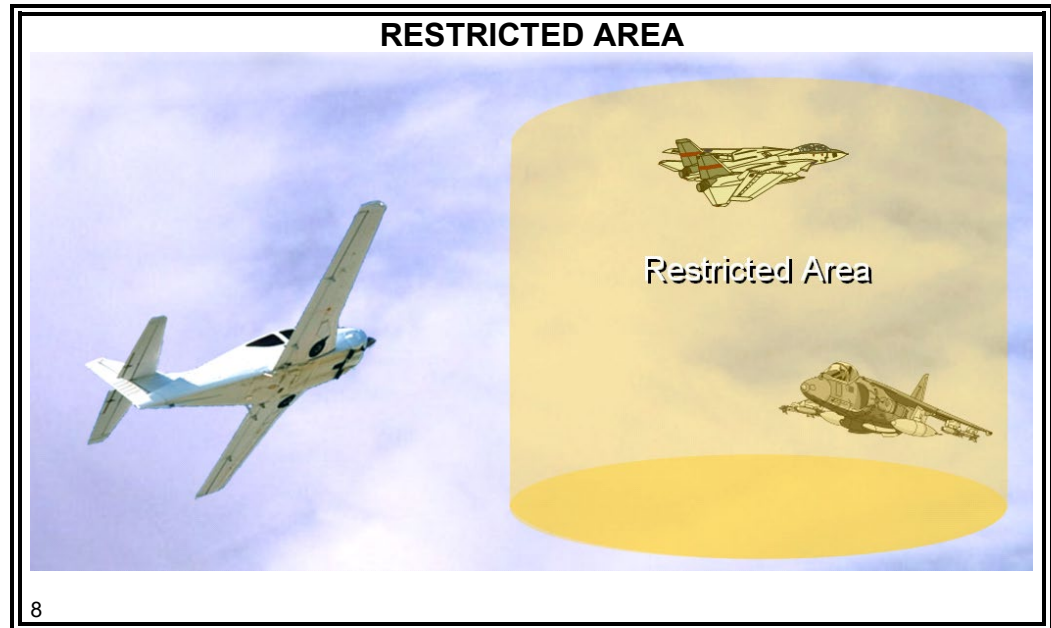
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SPECIAL USE AND ATC ASSIGNED AIRSPACE

(Continued)

Types of Special Use Airspace (Cont'd)

JO 7110.65,
Pilot/Controller
Glossary



A **Restricted Area** is 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.

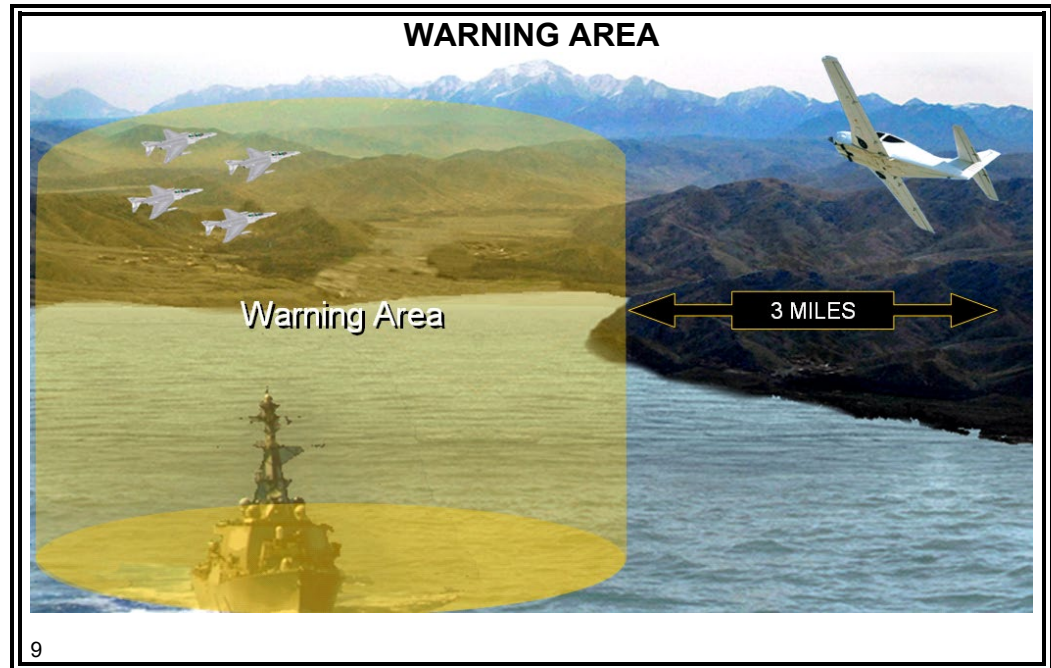
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SPECIAL USE AND ATC ASSIGNED AIRSPACE

(Continued)

Types of Special Use Airspace (Cont'd)

JO 7110.65,
Pilot/Controller
Glossary



A **Warning Area** is airspace of defined dimensions, extending from 3 nautical miles outward from the coast of the United States, that contains activity that may be hazardous to nonparticipating aircraft. The purpose of such a warning area is to warn nonparticipating pilots of the potential danger. A warning area may be located over domestic or international waters or both.

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SPECIAL USE AND ATC ASSIGNED AIRSPACE

(Continued)

Types of Special Use Airspace (Cont'd)

JO 7110.65,
Pilot/Controller
Glossary



ATC Assigned Airspace (ATCAA) is airspace of defined vertical/lateral limits assigned by ATC for the purpose of providing air traffic segregation between the specified activities being conducted within the assigned airspace and other IFR air traffic.

- ⦿ An ATCAA normally overlies other published special use airspace, such as a MOA, and contains altitudes at or above FL180 within Class A airspace. This allows air traffic control facilities to protect all other aircraft on IFR flight plans from the activities within an ATCAA.

SPECIAL USE AND ATC ASSIGNED AIRSPACE

(Continued)

Purpose

JO 7110.65,
Pilot/Controller
Glossary;
JO 7610.4,
par. 9-1-2

- ⊙ The military has a continuing need to conduct training activities as free from nonparticipating aircraft as possible. Special Use Airspace (SUA) and ATC Assigned Airspace (ATCAA) have been established for this purpose.

Application

JO 7110.65,
par. 9-3-1

- ⊙ Apply the appropriate separation minima between nonparticipating aircraft and SUA or ATCAA, unless:
 - The pilot informs you that permission has been obtained from the using agency to operate in the airspace
 - The using agency informs you they have given permission for the aircraft to operate in the airspace
 - The SUA or ATCAA has been released to the controlling agency
 - The aircraft is on an approved ALTRV, unless the airspace is an ATCAA
 - Mission Project Officer is responsible for obtaining approval for ALTRV operations within prohibited/restricted/warning areas and MOAs

NOTE: These procedures do **not** apply to Alert Areas or Controlled Firing Areas.

Airspace Description

JO 7400.2,
sec. 2

- ⊙ The areas for military operations are described in terms of vertical and horizontal limits.
 - Vertical limits
 - Expressed as flight levels or feet above Mean Sea Level (MSL)
 - When necessary to provide terrain clearance, floors may be expressed as feet Above Ground Level (AGL)

NOTE: “Floor” refers to the lower vertical limit of the airspace.

Continued on next page

SPECIAL USE AND ATC ASSIGNED AIRSPACE

(Continued)

Airspace Description (Cont'd)

JO 7400.2,
sec. 2

- Unless otherwise specified, “to” an altitude or flight level means “to and including” that altitude or flight level
- If vertical limits do **not** include that altitude/flight level, the ceiling **shall** be specified as “to, but not including”
- Horizontal limits
 - Defined by geographical coordinates or other appropriate reference that clearly describe their boundary

Separation Minima

JO 7110.65,
par. 9-3-2

- ⊙ Separate nonparticipating aircraft from active Special Use Airspace and ATCAA by the following minima:
 - Altitude above/below the upper/lower limit
 - FL290 and below
 - 500 feet
 - Above FL290
 - 1,000 feet

NOTE: “Nonparticipating aircraft” refers to those aircraft for which you have separation responsibility and which have **not** been authorized by the using agency to operate in/through the Special Use Airspace or ATCAA in question.

- Radar lateral
 - FL600 and above – 6 miles
 - Below FL600 – 3 miles
 - Clear aircraft on routes/airways whose widths/protected airspace do **not** overlap the peripheral boundary

NOTE: The above minima are **not** required for prohibited/restricted/warning areas that have been identified by facility management for security reasons or to contain hazardous activities **not** involving aircraft operations. When these minima are **not** required, vector aircraft to avoid the airspace.

Continued on next page

SPECIAL USE AND ATC ASSIGNED AIRSPACE

(Continued)

Separation Minima

(Cont'd)

JO 7110.65,
par. 9-3-2

NOTE: If the pilot of the nonparticipating aircraft exercises his/her discretion to deviate from a clearance, and the track of the aircraft will not maintain the required minima from the SUA, controllers must ascertain if the pilot is exercising emergency authority as outlined in the Radar Separation and Safety Alerts lesson, Minima: Aircraft from SUA/ATCAA section.

Knowledge Check

KNOWLEDGE CHECK

❖ **QUESTION:** The appropriate lateral separation between nonparticipating aircraft and SUA or ATCAA is _____ below FL600.

- A. 500 feet
- B. 3 miles
- C. 5 miles

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KNOWLEDGE CHECK

❖ **QUESTION:** What does the word “to” mean when referring to an altitude or flight level?

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AERIAL REFUELING

Aerial Refueling Terms

JO 7110.65,
Pilot/Controller
Glossary;
JO 7610.4,
par. 1-3-2



Aerial refueling is a procedure used by the military to transfer fuel from one aircraft to another during flight.

MILITARY TRAINING ROUTES (MTRs)

Terms

JO 7110.65,
Pilot/Controller
Glossary



A **Military Training Route (MTR)** is airspace of defined vertical and lateral dimensions established for the conduct of military flight training at airspeeds in excess of 250 knots IAS.

☉ There are two types of MTRs:



IFR Military Training Route (IR) is a route used by the Department of Defense and associated Reserve and Air Guard units for the purpose of conducting low-altitude navigation and tactical training in both IFR and VFR conditions below 10,000 feet MSL at airspeeds in excess of 250 knots IAS.



VFR Military Training Route (VR) is a route used by the Department of Defense and associated Reserve and Air Guard units for the purpose of conducting low-altitude navigation and tactical training under VFR conditions below 10,000 feet MSL at airspeeds in excess of 250 knots IAS.

NOTE: All routes are one-way **only**, and are designated by the appropriate prefix (IR or VR) followed by the route number (IR177, VR265).

SPECIAL MILITARY FLIGHTS AND OPERATIONS

Celestial Navigation (CELNAV) Definition JO 7610.4



Celestial Navigation (CELNAV) is the art and science of finding one's geographic position by means of astronomical observations, particularly by measuring altitudes of celestial objects—sun, moon, planets, or stars. During CELNAV training, the pilot will advise ATC before initiating any heading changes which exceed 20 degrees.

FORMATION FLIGHTS

Formation Flight

Definition

JO 7610.4,
par. 12-12-3



A **formation flight** consists of more than one aircraft which, by prior arrangement between pilots, operate as a single aircraft with regard to navigation and position reporting.

Types of Formation Flights

JO 7610.4,
par. 12-12-3

- ⦿ Standard formation
 - Each wingman will maintain a position no more than 1 mile laterally or longitudinally and within 100 feet vertically from the flight leader.
- ⦿ A nonstandard formation is a formation in which:
 - The flight leader has requested, and ATC has approved formation dimensions other than standard, or
 - The formation is operating on an approved ALTRV or under the provisions of a Letter of Agreement, or
 - The formation is operating in airspace specifically designated for special activity.

FORMATION FLIGHTS *(Continued)*

ATC Responsibilities

JO 7110.65,
pars. 2-1-13, 5-5-8

- ⦿ Control formation flights as a single aircraft.
 - ⦿ For additional separation between:
 - Standard formation and other radar-identified aircraft
 - Add 1 mile to radar separation minima
 - Two standard formation flights
 - Add 2 miles to appropriate radar separation minima
 - Nonstandard formation flight and other radar-identified aircraft
 - Apply appropriate separation minima to perimeters of nonstandard formation
 - Assign an appropriate beacon code to each aircraft in formation, or first and last aircraft in formation
-

FORWARDING INFORMATION ON AIRBORNE MILITARY FLIGHTS

Information Received

JO 7110.65,
par. 2-2-12



Phraseology Example

INFORMATION RECEIVED

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◎ Forward to Flight Service the following information from airborne military flights:

- IFR flight plans
- Changes from VFR to IFR flight plans
- Changes to IFR flight plans, such as:
 - A change in destination (include the following in order)
 - Aircraft identification and type
 - Departure point
 - Original destination
 - Position and time
 - New destination
 - ETA
 - Remarks, including change in fuel exhaustion time
 - Revised ETA (if appropriate)
 - Or a change in fuel exhaustion time

NOTE: This makes current information available to FSS for relay to military bases concerned and for use by centers in the event of two-way radio communications failure.

EXERCISE: IDENTIFYING TERMS USED IN MILITARY OPERATIONS

Exercise

IDENTIFYING TERMS EXERCISE



Purpose: to become familiar with terms used in military operations

Directions: match the terms to their definitions

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Directions

Match the term to its definition by answering the following questions using the list of terms provided.

Terms

CELNAV	Controlled Firing Area	Alert Area
MOA	MARSA	VR
Aerial refueling	MTR	Restricted Area
Prohibited Area	ALTRV	ATCAA
SUA	Warning Area	IR
Formation flight		

Questions

1. What is the airspace utilization under prescribed conditions, normally employed for the mass movement of aircraft under special user requirements that cannot otherwise be accomplished?

ANSWER:

2. It is the condition whereby the military services involved assume responsibility for separation between participating military aircraft in the ATC system.

ANSWER:

Continued on next page

EXERCISE: IDENTIFYING TERMS USED IN MILITARY OPERATIONS *(Continued)*

Questions (Cont'd)

3. Extending from 3NM outward from the coast of the U.S., this area contains activity that may be hazardous to nonparticipating aircraft.

ANSWER:

4. The area 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.

ANSWER:

5. A route used by the Department of Defense and associated Reserve and Air Guard units for the purpose of conducting low-altitude navigation and tactical training in both IFR and VFR conditions below 10,000 feet MSL at airspeeds in excess of 250 knots IAS.

ANSWER:

6. 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.

ANSWER:

7. Consists of more than one aircraft which, by prior arrangement between pilots, operate as a single aircraft with regard to navigation and position reporting.

ANSWER:

8. The airspace of defined vertical and lateral dimensions established for the conduct of military flight training at airspeeds in excess of 250 knots IAS.

ANSWER:

9. The airspace established outside of a Class A airspace area to separate or segregate certain nonhazardous military activities from IFR traffic and to identify for VFR traffic where these activities are conducted.

ANSWER:

Continued on next page

EXERCISE: IDENTIFYING TERMS USED IN MILITARY OPERATIONS *(Continued)*

Questions (Cont'd)

10. This airspace is designated under FAR, Part 73 within which the flight of aircraft, while not wholly prohibited, is subject to restriction. Most 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. They are depicted on en route charts.

ANSWER:

11. This airspace may contain a high volume of pilot training activities or an unusual type of aerial activity, neither of which is hazardous to aircraft. It is depicted on aeronautical charts for the information of nonparticipating pilots.

ANSWER:

12. Aircraft navigation using sun, moon, planets, or stars. During this type of training, the pilot will advise ATC before initiating any heading changes which exceed 20 degrees.

ANSWER:

13. The route used by the Department of Defense and associated Reserve and Air Guard units for the purpose of conducting low-altitude navigation and tactical training under VFR conditions below 10,000 feet MSL at airspeeds in excess of 250 knots IAS.

ANSWER:

14. The area of airspace designated under FAR, Part 73 within which no person may operate an aircraft without the permission of the using agency.

ANSWER:

15. The airspace of defined vertical/lateral limits assigned by ATC for the purpose of providing air traffic segregation between the specified activities being conducted within the assigned airspace and other IFR air traffic.

ANSWER:

16. The procedure used by the military to transfer fuel from one aircraft to another during flight.

ANSWER:

IN CONCLUSION

Lesson Review

LESSON REVIEW

The following topics were covered in this lesson:

- Altitude Reservation (ALTRV)
- Special Use and ATC Assigned Airspace
- Aerial refueling
- Military Training Routes (MTRs)
- Special military flights and operations
- Formation flights
- Forwarding information on airborne military flights

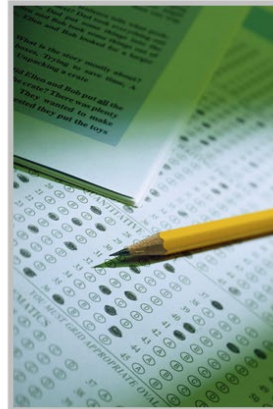


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End-of-Lesson Test

END-OF-LESSON TEST

Military Operations



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APPENDIX A: SPECIAL USE AIRSPACE

Special Use Airspace

JO 7110.65,
Pilot/Controller
Glossary

TYPE	DESCRIPTION
Alert Area	Airspace which may contain a 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.
Controlled Firing Area	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.
Military Operations Area (MOA)	A MOA is airspace established outside of Class A airspace area to separate or segregate certain nonhazardous military activities from IFR traffic and to identify for VFR traffic where these activities are conducted.
ATC Assigned Airspace (ATCAA)	Airspace established within Class A airspace to separate or segregate military activities from IFR traffic.
Restricted Area	Airspace designated under 14 CFR 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.
Warning Area	A warning area is airspace of defined dimensions extending from 3 nautical miles outward from the coast of the United States, that contains activity that may be hazardous to nonparticipating aircraft. The purpose of such warning area is to warn nonparticipating pilots of the potential danger. A warning area may be located over domestic or international waters or both.
Prohibited Area	Airspace designated under 14 CFR Part 73 within which no person may operate an aircraft without the permission of the using agency.