



**Federal Aviation
Administration**

***55054001
EN ROUTE
RADAR ASSOCIATE
CONTROLLER TRAINING PART A:
BASIC CONCEPTS***

**Lesson 12: VFR and VFR-On-Top
Procedures**










Version: 1.0 2022.08

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LESSON PLAN DATA SHEET

Course Name	En Route Radar Associate Controller Training Part A: Basic Concepts
Course Number	55054001
Lesson Title	VFR and VFR-On-Top Procedures
Duration	1 Hour (Includes lesson and ELT)
Version	1.0 2022.08
Reference(s)	JO 7110.65, Air Traffic Control; Aeronautical Information Manual (AIM); 14 CFR Part 91; JO 7400.10, Special Use Airspace
Prerequisites	NONE
Handout(s)	NONE
Exercise / Activity	NONE
Assessments	☉ YES - Written
Scenario	NONE
Materials and Equipment	☉ Pencil and/or pen
Other Pertinent Information	<ul style="list-style-type: none">☉ Ensure lesson materials are downloaded to the classroom computer☉ Course 57847, VFR and VFR-ON-TOP PROCEDURES, or current course, is available as supplemental training for this lesson☉ This lesson is based on ERAM EAE410☉ The lesson has been reviewed and reflects current orders and manuals as of April 2022

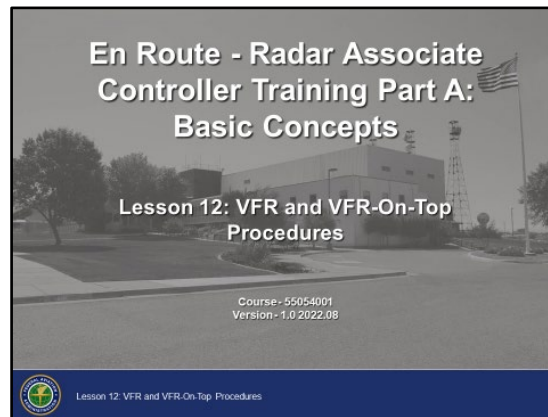
LESSON ICON LEGEND

	Description
	The Activity icon indicates an exercise, lab, or hands-on activity.
	The Discussion Question icon signals a discussion question to be asked to the students.
	The Handout icon indicates a handout is to be distributed to the students.
	The Instructor Note icon is in hidden text and indicates text that is for the instructor only.
	The Multimedia icon indicates a video or audio clip is in the presentation.
	The Phraseology icon indicates that phraseology is in the content.
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LESSON INTRODUCTION

Overview



Overview

This lesson covers authorizing IFR aircraft to operate in VFR conditions on an ATC clearance. Also included are issuing alternative clearances in conjunction with VFR and VFR-on-top clearances, VFR altitudes for direction of flight, VFR traffic advisories, and VFR-on-top operations in relation to ATC Assigned Airspace (ATCAA).


LESSON INTRODUCTION (CONT'D)

Lesson Objectives

Lesson Objectives

At the end of this lesson, you will be able to identify:

- VFR and VFR-on-top requirements
- VFR and VFR-on-top procedures
- Attributes of visual separation

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Objectives

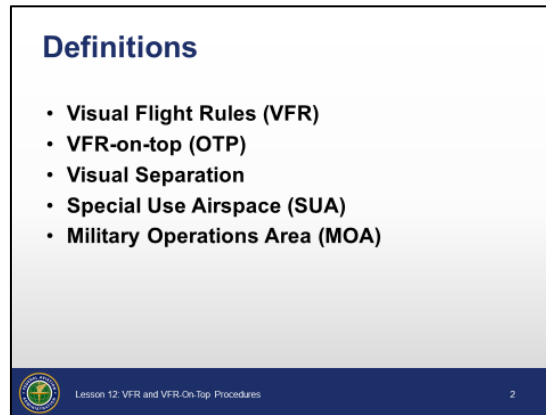
- ⦿ At the end of this lesson, you will be able to identify:
 - VFR and VFR-on-top requirements
 - VFR and VFR-on-top procedures
 - Attributes of visual separation

NOTE: There will be a graded end-of-lesson test upon completion of the lesson. The passing score is 70%. If you do not achieve a score of 70%, you will be provided study time and one retake of an alternate end-of-lesson test.

VFR AND VFR-ON-TOP REQUIREMENTS

Definitions

JO 7110.65,
PCG



Definitions



VISUAL FLIGHT RULES (VFR) - 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 type of flight plan.



VFR-ON-TOP - ATC authorization for an IFR aircraft to operate in VFR conditions at any appropriate VFR altitude.



VISUAL SEPARATION - A means employed by ATC to separate aircraft in terminal areas and en route airspace.



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




MILITARY OPERATIONS AREA (MOA) - Permanent and temporary MOAs are 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. Permanent MOAs are depicted on Sectional Aeronautical, VFR Terminal Area, and applicable En Route Low Altitude Charts.

VFR AND VFR-ON-TOP REQUIREMENTS (CONT'D)

Definitions (Cont'd)

Definitions (Cont'd)

- **ATC Assigned Airspace (ATCAA)**
- **Altitude Reservation (ALTRV)**
- **Military Training Route (MTR)**

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ATC ASSIGNED AIRSPACE (ATCAA) - 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.



ALTITUDE RESERVATION (ALTRV) - Airspace utilization under prescribed conditions normally employed for the mass movement of aircraft or other special user requirements which cannot otherwise be accomplished. ALTRVs are approved by the appropriate FAA facility.



MILITARY TRAINING ROUTE (MTR) - Airspace of defined vertical and lateral dimensions established for the conduct of military flight training at airspeeds in excess of 250 knots IAS.

VFR AND VFR-ON-TOP REQUIREMENTS (CONT'D)

VFR Climb or Descent

JO 7110.65,
pars. 7-1-1
through 7-1-2

VFR Climb or Descent

- Clear aircraft to maintain VFR conditions if the pilot of an aircraft on an IFR flight plan requests a VFR climb or descent
- If flight in VFR conditions becomes impractical, issue an alternative clearance
- In Class A airspace, do not apply visual separation or issue VFR or VFR-on-top clearances



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VFR Climb or Descent

- ⦿ Clear aircraft to maintain VFR conditions if the pilot of an aircraft on an IFR flight plan requests a VFR climb or descent
- ⦿ When, in your judgement, there is reason to believe that flight in VFR conditions may become impractical, issue an alternative clearance which will ensure separation from all other aircraft for which you have separation responsibility



IF UNABLE, (alternative procedure), AND ADVISE

Example: "IF UNABLE, MAINTAIN SIX THOUSAND AND ADVISE"

- ⦿ In Class A airspace, do not apply visual separation or issue VFR or VFR-on-top clearances


VFR AND VFR-ON-TOP REQUIREMENTS (CONT'D)

Visual Phraseology

JO 7110.65, par.
7-1-2

Visual Phraseology

- MAINTAIN VFR CONDITIONS
- MAINTAIN VFR CONDITIONS UNTIL (time or fix)
- MAINTAIN VFR CONDITIONS ABOVE/BELOW (altitude)
- CLIMB/DESCEND VFR and if required, BETWEEN (altitude) AND (altitude)

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Visual Phraseology

- ⦿ Instruct an aircraft to maintain VFR with no other instructions or restrictions:



MAINTAIN V-F-R



MAINTAIN V-F-R CONDITIONS

- ⦿ VFR clearance with restrictions:



MAINTAIN V-F-R CONDITIONS UNTIL (time or fix)



MAINTAIN V-F-R CONDITIONS ABOVE/BELOW (altitude)

- ⦿ VFR climb or descent:

- A pilot may request a VFR climb/descent so as to get a requested altitude sooner than an IFR climb/descent would allow



CLIMB/DESCEND V-F-R

and if required,



BETWEEN (altitude) AND (altitude)

Example: "CLIMB V-F-R BETWEEN SIX THOUSAND AND EIGHT THOUSAND"

or



ABOVE/BELOW (altitude)

Example: "MAINTAIN V-F-R AT OR ABOVE SIX THOUSAND FIVE HUNDRED"



VFR AND VFR-ON-TOP REQUIREMENTS (CONT'D)

Knowledge Check

Knowledge Check

When would alternative instructions to a pilot requesting a VFR climb be issued?

- A. To prevent the pilot from climbing VFR through the altitude of an IFR aircraft
- B. To prevent the pilot from climbing through meteorological obscurations
- C. To ensure separation if VFR climb becomes impractical

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Question: When would alternative instructions to a pilot requesting a VFR climb be issued?

VFR AND VFR-ON-TOP REQUIREMENTS (CONT'D)


VFR-on-top Clearances

JO 7110.65, par. 7-3-1

AIM, par. 4-4-8

VFR-on-top Clearances

- Clear aircraft to maintain VFR-on-top if the aircraft is on an IFR flight plan and requested by the pilot
- Pilot responsibilities:
 - Fly at appropriate VFR altitude
 - Comply with VFR visibility requirements
 - See and avoid other aircraft
 - Comply with instrument flight rules that are applicable to this flight



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VFR-on-top Clearances

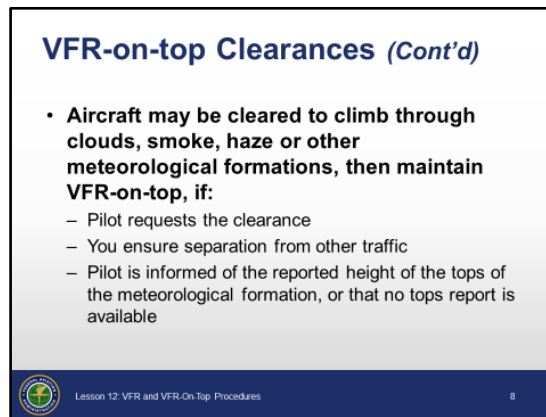
- ⦿ Clear aircraft to maintain VFR-on-top if the aircraft is on an IFR flight plan and requested by the pilot
- ⦿ Pilot responsibilities
 - Fly at appropriate VFR altitude
 - Comply with VFR visibility requirements; pilots may fly:
 - Above clouds
 - Between clouds
 - Below clouds
 - See and avoid other aircraft
 - Comply with instrument flight rules that are applicable to this flight
 - Minimum IFR altitudes
 - Position reporting
 - Radio communications
 - Course to be flown
 - Adherence to ATC clearance, etc.

NOTE: Although IFR separation is not applied, controllers must continue to provide traffic advisories and safety alerts, and apply merging target procedures to aircraft operating VFR-on-top.

VFR AND VFR-ON-TOP REQUIREMENTS (CONT'D)

VFR-on-top Clearances (Cont'd)

JO 7110.65, par.
7-3-1



- ⦿ Aircraft may be cleared to climb through clouds, smoke, haze or other meteorological formations, then maintain VFR-on-top, if:
 - Pilot requests the clearance
 - You ensure separation from other traffic for which you have separation responsibility by issuing an alternative clearance
 - Pilot is informed of reported height of the tops of the meteorological formation, or that no top report is available
- ⦿ When an aircraft is climbing to and reports reaching VFR-on-top, reclear the aircraft to maintain VFR-on-top

NOTE: A clearance to climb/descend to and report reaching VFR-on-top authorizes climb/descent until reaching on top conditions, unless alternative instructions are issued.


VFR AND VFR-ON-TOP REQUIREMENTS (CONT'D)

VFR-on-top Phraseology

JO 7110.65, par.
7-3-1

VFR-on-top Phraseology

- CLIMB TO AND REPORT REACHING V-F-R-ON-TOP
and,
- TOPS REPORTED (altitude)
or,
- NO TOPS REPORTS
Alternative instructions,
- IF NOT ON TOP AT (altitude), MAINTAIN (altitude), AND ADVISE

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VFR-on-top Phraseology

- ⦿ IFR aircraft requesting VFR-on-top clearance



CLIMB TO AND REPORT REACHING V-F-R-ON-TOP

and,

TOPS REPORTED (altitude)

or,

NO TOPS REPORTS

Alternative instructions if needed,



IF NOT ON TOP AT (altitude), MAINTAIN (altitude), AND ADVISE

Example: "CLIMB TO AND REPORT REACHING V-F-R-ON-TOP, TOPS REPORTED SIX THOUSAND. IF NOT ON TOP AT SEVEN THOUSAND, MAINTAIN SEVEN THOUSAND AND ADVISE."

- ⦿ If an IFR aircraft reports VFR-on-top and requests an on top clearance, reclear the aircraft to maintain VFR-on-top

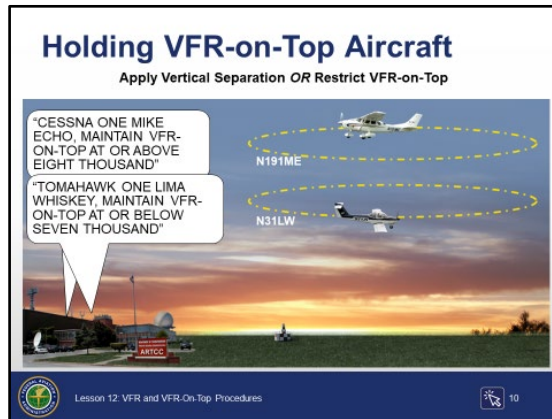


MAINTAIN V-F-R-ON-TOP

VFR AND VFR-ON-TOP REQUIREMENTS (CONT'D)

Holding VFR-on-Top Aircraft

JO 7110.65, par. 7-3-1



Holding VFR-on-Top Aircraft

- ⦿ Do not clear an aircraft to maintain “VFR-on-top” between sunset and sunrise to separate holding aircraft from each other, or from en route aircraft unless restrictions are applied to ensure appropriate IFR vertical separation
 - Do not restrict a VFR-on-top aircraft to one altitude due to cloud clearance and visibility requirements, instead issue holding:
 - At or above an altitude
 - At or below an altitude
 - Between altitudes



MAINTAIN V-F-R-ON-TOP AT OR ABOVE/BELOW/BETWEEN (altitudes)

“CESSNA ONE MIKE ECHO, MAINTAIN VFR-ON-TOP AT OR ABOVE EIGHT THOUSAND”

“TOMAHAWK ONE LIMA WHISKEY, MAINTAIN VFR-ON-TOP AT OR BELOW SEVEN THOUSAND”



VFR AND VFR-ON-TOP REQUIREMENTS (CONT'D)

Knowledge Check

Knowledge Check

What is the phraseology to clear N126Y to VFR-on-top, with no traffic, or tops reported?

- A. "NOVEMBER TWO SIX YANKEE MAINTAIN V-F-R-ON-TOP NO TOPS REPORTS"
- B. "NOVEMBER TWO SIX YANKEE CLIMB TO AND REPORT REACHING V-F-R-ON-TOP NO TOPS REPORTS"
- C. "NOVEMBER TWO SIX YANKEE CLIMB IN V-F-R CONDITIONS MAINTAIN V-F-R-ON-TOP"

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Question: What is the phraseology to clear N126Y to VFR-on-top with no traffic or tops reported?

VFR AND VFR-ON-TOP PROCEDURES


VFR Altitudes

JO 7110.65, par.
7-3-2

14 CFR Part
91.159

VFR Altitudes

- **VFR and VFR-on-top altitudes for direction of flight:**
 - Zero degrees through 179 degrees magnetic:
 - Any odd cardinal altitude plus 500'
 - 180 degrees through 359 degrees magnetic:
 - Any even cardinal altitude plus 500'

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VFR Altitudes

⦿ VFR and VFR-on-top procedures may be conducted

- Below FL180
- Above FL600

⦿ Direction of flight

- Zero degrees through 179 degrees magnetic:
 - Any odd cardinal altitude plus 500'
- 180 degrees through 359 degrees magnetic:
 - Any even cardinal altitude plus 500'

Example: 3,500', 5,500', 7,500'

Example: 4,500', 6,500', 8,500'

NOTE: Aircraft operating less than three thousand feet above the surface may cruise at any altitude for any direction of flight.

⦿ Inform an aircraft maintaining VFR or VFR-on-top when they are not complying with appropriate altitude for direction of flight



V-F-R/V-F-R-ON-TOP CRUISING LEVELS FOR YOUR DIRECTION OF FLIGHT ARE ODD/EVEN ALTITUDES PLUS FIVE HUNDRED FEET


VFR AND VFR-ON-TOP PROCEDURES (CONT'D)

Traffic Advisories

JO 7110.65, par.
2-1-21

Traffic Advisories

- **Issue traffic advisories to all aircraft, IFR or VFR, when:**
 - Proximity may diminish to less than the applicable separation minima
- **Where no separation minima exist:**
 - Issue traffic advisories to those aircraft when, in your judgement, their proximity warrants it

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Traffic Advisories

- ⦿ Issue traffic advisories to all aircraft, IFR or VFR, when:
 - Proximity may diminish to less than the applicable separation minima
- ⦿ Where no separation minima exist, such as VFR aircraft outside of Class B or Class C airspace:
 - Issue traffic advisories to those aircraft when, in your judgement, their proximity warrants it
- ⦿ To aircraft that are not radar identified, issue:
 - Distance and direction from fix
 - Direction in which traffic is proceeding
 - If known, type of aircraft and altitude
 - ETA over the fix the aircraft is approaching if appropriate



TRAFFIC, (number) MILES/MINUTES (direction) OF (airport or fix),
(direction) BOUND,

and if known,

ESTIMATED (fix) (time),

or



TRAFFIC, NUMEROUS AIRCRAFT VICINITY (location)

If altitude is unknown,

ALTITUDE UNKNOWN

VFR AND VFR-ON-TOP PROCEDURES (CONT'D)


Special Use Airspace SUA/ATCAA Separation Minima

JO 7110.65,
pars. 9-3-2, 9-3-3;

JO 7400.10,
Part I, Subparts
B, C; Part II

SUA/ATCAA Separation Minima

- **VFR Aircraft:**
 - May not enter prohibited or active restricted areas
 - May enter an active MOA, alert area, warning area, MTR, or ALTRV, however, advisories should be issued
- **VFR-on-top Aircraft:**
 - May not enter prohibited or active restricted areas
 - May not enter an active MOA, MTR, or ALTRV
 - Must maintain at least 500' vertical separation above or below SUA

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SUA/ATCAA Separation Minima

- ⦿ VFR aircraft:
 - May not enter prohibited or active restricted areas
 - May enter an active MOA, alert area, warning area, MTR, or ALTRV; however, advisories should be issued
- ⦿ VFR-on-top aircraft:
 - May not enter prohibited or active restricted areas
 - May not enter an active MOA, MTR, warning area, or ALTRV
 - Must maintain at least 500' of vertical separation above the upper limit or below the lower limit of an active SUA
 - If unable to comply, clear the aircraft via a routing that provides approved separation



MAINTAIN V-F-R-ON-TOP AT LEAST 500 FEET ABOVE/BELOW (upper/lower limit of airspace) ACROSS (name or number of airspace) BETWEEN (fix) AND (fix)

and if the airspace is an ATCAA:

(name of ATCAA) IS ATC ASSIGNED AIRSPACE

Example: “NOVEMBER TWO SIX LIMA WHISKEY, MAINTAIN V-F-R-ON-TOP AT LEAST FIVE HUNDRED FEET ABOVE THE MAXWELL ONE M-O-A”



VFR AND VFR-ON-TOP PROCEDURES (CONT'D)

Knowledge Check

Knowledge Check

What is the required minimum vertical separation for a VFR-on-top aircraft above or below an active SUA?

- A. 500'
- B. 1000'
- C. 2000'

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Question: What is the required minimum vertical separation for a VFR-on-top aircraft above or below an active SUA?

VISUAL SEPARATION

Visual Separation

AIM, par. 4-4-14

JO 7110.65,
PCG



Visual Separation

- ⦿ Visual separation is a means employed by ATC to separate aircraft in terminal areas and en route airspace in the NAS
 - ⦿ There are two methods to employ visual separation:
 - The tower controller sees the aircraft involved and issues instructions, as necessary, to ensure that the aircraft avoid each other
 - A pilot sees the other aircraft involved and upon instructions from the controller, provides separation by maneuvering the aircraft to avoid it
 - When pilots accept responsibility to maintain visual separation, they must maintain constant visual surveillance and not pass the other aircraft until it is no longer a factor
-

VISUAL SEPARATION (CONT'D)

Application Considerations

JO 7110.65, par. 7-2-1

Application Considerations

- Visual separation may be applied when other approved separation is assured before and after application of visual separation
- To ensure that other separation will exist consider:
 - Aircraft performance
 - Wake turbulence
 - Closure rate
 - Routes of flight
 - Known weather conditions
 - Aircraft position



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Application Considerations

- ⦿ Visual separation may be applied when other approved separation is assured before and after the application of visual separation
- ⦿ To ensure that other separation will exist consider:
 - Aircraft performance
 - Wake turbulence
 - Closure rate
 - Routes of flight
 - Known weather conditions
 - Weather conditions must allow the aircraft to remain within sight until other separation exists
 - Aircraft position

VISUAL SEPARATION (CONT'D)


Application

JO 7110.65,
pars. 7-2-1, 2-1-
20

Application

- **Visual Separation may be used:**
 - Between successive departures when routes and/or aircraft performance assure maintaining separation
 - In conjunction with visual approach procedures
 - Up to but not including FL180 with constraints

NOTE: Visual separation is not authorized when the lead aircraft is a super.

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Application

Visual separation may be used:

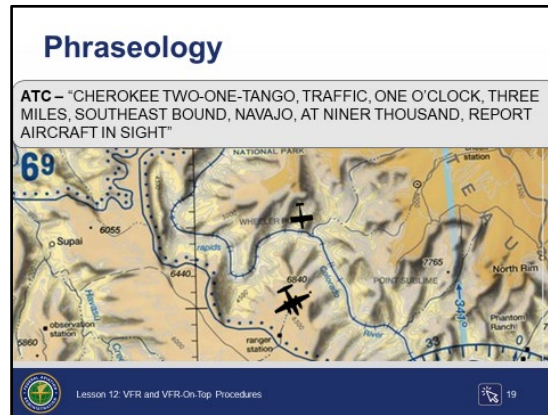
- ⦿ Between successive departures when routes and/or aircraft performance assure maintaining separation
- ⦿ In conjunction with visual approach procedures
- ⦿ Up to but not including FL180 with these constraints:
 - Direct communication is maintained with one aircraft involved and the ability to communicate with other aircraft exists
 - Pilot sees another aircraft and is instructed to maintain visual separation from it as follows:
 - Tell pilot about other aircraft including position, direction, and type. If it is not obvious, include other aircraft's intentions.
 - Obtain acknowledgment from pilot that other aircraft is in sight
 - Instruct pilot to maintain visual separation from that aircraft
 - Advise pilot if radar targets appear likely to converge
 - If aircraft are on converging courses issue traffic information and inform other pilot that visual separation is being applied
 - Advise pilots if either aircraft is heavy
 - Issue wake turbulence cautionary advisories
- ⦿ If the pilot reports the traffic in sight and will maintain visual separation from it (the pilot must state both), the controller may "approve" the operation instead of restating the instructions

NOTE: Visual separation is not authorized when the lead aircraft is a super.

VISUAL SEPARATION (CONT'D)

Phraseology

JO 7110.65, par.
7-2-1



Phraseology



(ACID), TRAFFIC, (clock position and distance), (direction) BOUND,
(type of aircraft), (intentions and other relevant information)

If required,

(ACID), REPORT TRAFFIC IN SIGHT

or

DO YOU HAVE IT IN SIGHT?

“CHEROKEE TWO ONE TANGO, TRAFFIC IN SIGHT”

If the pilot reports traffic in sight, or the answer is in the affirmative,

“CHEROKEE TWO ONE TANGO, MAINTAIN VISUAL SEPARATION,
DESCEND AND MAINTAIN NINER THOUSAND”

“CHEROKEE TWO ONE TANGO, MAINTAINING VISUAL
SEPARATION, DESCENDING TO NINER THOUSAND”



(ACID), MAINTAIN VISUAL SEPARATION

If aircraft are on converging courses, advise the other aircraft:

(ACID) TRAFFIC, (clock position and distance), (direction)-BOUND,
(type of aircraft), ON CONVERGING COURSE, HAS YOU IN SIGHT
AND WILL MAINTAIN VISUAL SEPARATION

VISUAL SEPARATION (CONT'D)

Nonapproach Control Towers

JO 7110.65, par.
7-2-1



Nonapproach Control Towers (i.e., VFR towers)

- ⦿ May be authorized to provide visual separation between aircraft within surface areas or designated areas when approved separation is provided before and after the application of visual separation



VISUAL SEPARATION APPROVED BETWEEN (ACID) AND (ACID)

and for departing aircraft,

(departing/succeeding aircraft) (ACID), RELEASED

Example: “VISUAL SEPARATION APPROVED BETWEEN BONANZA NINER-NINER-DELTA AND COMANCHE SIX-TWO-UNIFORM, BONANZA NINER-NINER-DELTA RELEASED”

- ⦿ If the nonapproach control tower controller states to the radar controller that they will provide visual separation between arrivals, departures/arrivals and/or successive departures, and states the call signs of all aircraft involved, the radar controller can approve the application of visual separation as requested



VISUAL SEPARATION APPROVED

and for departing/succeeding aircraft,

(ACIDs) RELEASED



VISUAL SEPARATION (CONT'D)

Knowledge Check

Knowledge Check

N316K is on approach. N13Y requests clearance to depart. What phraseology would the center controller use to authorize the tower to provide visual separation?

- A. "VISUAL SEPARATION APPROVED BETWEEN N13Y AND N316K. N13Y RELEASED."
- B. "RELEASE N13Y YOUR DISCRETION WHEN N316K IS IN SIGHT."
- C. "APPLY VFR BETWEEN N13Y AND N316K."

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Question: N316K is on approach. N13Y requests clearance to depart. What phraseology would the center controller use to authorize the tower to provide visual separation?

VISUAL SEPARATION (CONT'D)

Knowledge Check

Knowledge Check

Visual separation may be used _____ when direct communication is maintained with one of the aircraft involved and there is an ability to communicate with the other.

- A. Up to but not including FL190
- B. Up to and including FL180
- C. Up to but not including FL180



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Question: Visual separation may be used _____ when direct communication is maintained with one of the aircraft involved and there is an ability to communicate with the other.


CONCLUSION

Lesson Summary

Lesson Summary

This lesson covered:

- VFR and VFR-on-top requirements
- VFR and VFR-on-top procedures
- Attributes of visual separation



Lesson 12: VFR and VFR-On-Top Procedures

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Summary

- ⦿ VFR/VFR-on-top requirements
 - Visual restrictions
 - VFR conditions
 - Visual phraseology
 - VFR-on-top
 - VFR-on-top clearances
 - VFR-on-top phraseology
 - Holding VFR-on-top aircraft
- ⦿ VFR/VFR-on-top procedures
 - Altitude for direction of flight
 - Traffic advisories
 - SUA operations

Continued on next page

CONCLUSION (CONT'D)

Lesson Summary (Cont'd)

- ⊙ Attributes of visual separation
 - Application considerations
 - Separation before and after the application of visual separation
 - Other factors
 - Aircraft performance
 - Wake turbulence
 - Closure rate
 - Routes of flight
 - Known weather conditions
 - Aircraft position
 - Application
 - Phraseology
 - Nonapproach control towers (VFR Towers)
-