NAVAL AVIATION SCHOOLS COMMAND

NAS PENSACOLA, FLORIDA **NAVAVSCOLSCOM-SG-200**

PREFLIGHT COURSE (API) MODULE/UNIT 7:

FLIGHT RULES AND REGULATIONS

TRAINEE GUIDE

APRIL 2017

OUTLINE SHEET 7-1-1

FEDERAL AVIATION ORGANIZATION

A. INTRODUCTION

This lesson provides an introduction to the Federal Aviation Regulations (FAR) Part 91 and CNAF M-3710.7 as they relate to Federal aviation organizations, aviation publications, terminology, air traffic control organization, policy guidance concerning flight operations, flight planning, flight safety, and survival.

B. ENABLING OBJECTIVES

2.345 IDENTIFY the organization responsible for the publication of the Federal Aviation Regulations (FAR) and the Aeronautical Information Manual (AIM), in a classroom, in accordance with Naval Aviation Fundamentals, NAVAVSCOLSCOM-SG-200

2.346 DESCRIBE the relationship between FAR Part 91, CNAF M-3710.7, and the AIM, in a classroom, in accordance with Naval Aviation Fundamentals, NAVAVSCOLSCOM-SG-200

2.347 LIST the regulatory priority of applicable Department of the Navy (DON), Department of Defense (DOD), and Federal Aviation Administration (FAA) publications, in a classroom, in accordance with Naval Aviation Fundamentals, NAVAVSCOLSCOM-SG-200

2.348 IDENTIFY "shall", "should", "may", and "will" as per CNAF M-3710.7, in a classroom, in accordance with Naval Aviation Fundamentals, NAVAVSCOLSCOM-SG-200

2.349 IDENTIFY the responsibilities of Air Traffic Control (ATC), Flight Service Station (FSS), Control Tower, Approach Control (APC), and the Air Route Traffic Control Center (ARTCC), in a classroom, in accordance with Naval Aviation Fundamentals, NAVAVSCOLSCOM-SG-200

2.350 IDENTIFY the responsibilities of the Pilot in Command, in a classroom, in accordance with Naval Aviation Fundamentals, NAVAVSCOLSCOM-SG-200

2.351 IDENTIFY the CNAF M-3710.7 requirements for preflight planning, in a classroom, in accordance with Naval Aviation Fundamentals, NAVAVSCOLSCOM-SG-200

2.352 IDENTIFY the purpose of a flight plan, in a classroom, in accordance with Naval Aviation Fundamentals, NAVAVSCOLSCOM-SG-200

2.353 IDENTIFY the pilot's responsibilities for acquiring a flight weather brief, in a classroom, in accordance with Naval Aviation Fundamentals, NAVAVSCOLSCOM-SG-200

2.354 IDENTIFY the provision which allows deviation from established rules, in a classroom, in accordance with Naval Aviation Fundamentals, NAVAVSCOLSCOM-SG-200

2.355 IDENTIFY the pilot's responsibilities concerning Authorized Airfields, Fuel Purchases, and Closing of Flight Plans, in a classroom, in accordance with Naval Aviation Fundamentals, NAVAVSCOLSCOM-SG-200

2.356 IDENTIFY the CNAF M-3710.7 requirements for Safety and Survival equipment, including Safety Belt and Shoulder Harness, Aircrew Personal Protective Equipment, Life Rafts, and Parachutes, in a classroom, in accordance with Naval Aviation Fundamentals, NAVAVSCOLSCOM-SG-200, and CNAF M-3710.7 (series)

2.357 IDENTIFY the requirements for oxygen use, in a classroom, in accordance with Naval Aviation Fundamentals, NAVAVSCOLSCOM-SG-200

2.358 IDENTIFY principal factors affecting aircrew performance, in a classroom, in accordance with Naval Aviation Fundamentals, NAVAVSCOLSCOM-SG-200

2.359 IDENTIFY the CNAF M-3710.7 regulations for Human Performance and Aeromedical Factors, in a classroom, in accordance with NATOPS General Flight and Operating Instructions Manual, CNAF M-3710.7 (series); Naval Aviation Fundamentals, NAVAVSCOLSCOM-SG-200

C. TOPIC OUTLINE

1. Introduction
2. This Lesson Topic
3. Federal Aviation Administration
4. Aviation Publications
5. Terminology
6. Priority of Regulations
7. Specific NATOPS Wording
8. Air Traffic Control (ATC) Organization

9. Flight Service Station (FSS)
10. Control Tower
11. Approach Control (APC)
12. Air Route Traffic Control Center (ARTCC)
13. Policy Guidance
14. Flight Planning
15. Preflight Planning
16. Flight Plans
17. Flight Plan Forms
18. Weather Brief
19. Deviations
20. Authorized Airfields, Fuel Purchases, Closing of Flight Plans
21. Safety Belt and Shoulder Harness, Aircrew Personal Protective Equipment, Life Rafts, and Parachutes
22. Oxygen Use
23. Principal Factors Affecting Aircrew Performance
24. CNAF M-3710.7 regulations for Human Performance and Aeromedical Factors
25. Summary and Review
26. Application
27. Assignment

INFORMATION SHEET 7-1-2

FEDERAL AVIATION ORGANIZATION

A. INTRODUCTION

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B. REFERENCES

1. Book, Aeronautical Information Manual, AIM
2. DoD Flight Information Publication (FLIP) General Planning, GP-1
3. Federal Aviation Regulations, 14 CFR Part 91
4. NATOPS General Flight and Operating Instructions Manual, CNAF M-3710.7 (series)

C. INFORMATION

FEDERAL AVIATION ADMINISTRATION (FAA)

The Federal Aviation Administration (FAA) is responsible for establishing, reviewing, and enforcing general regulations for all aviation activities in the United States.

FEDERAL AVIATION REGULATIONS (FAR)

To standardize its policies, the FAA publishes the Federal Aviation Regulations. The regulations are spelled out in a multipart document which contains the operating rules and guidelines for domestic aviation. The Federal Aviation Regulations are binding to all aviators in the United States, military and civilian. The section of the FAR which most affects Naval Aviators is FAR Part 91 entitled "General Operating and Flight Rules."

AERONAUTICAL INFORMATION MANUAL (AIM)

The AIM is published by the FAA as an official guide to basic flight information and Air Traffic Control procedures for use in the National Airspace System. It also contains items of interest to pilots concerning health, medical facts, and factors affecting flight safety and includes a glossary of terms used in the Air Traffic Control System. While wording in the AIM may be different, the information is consistent with FAR Part 91 and is normally easier to read.

Note: The AIM is a non-regulatory publication.

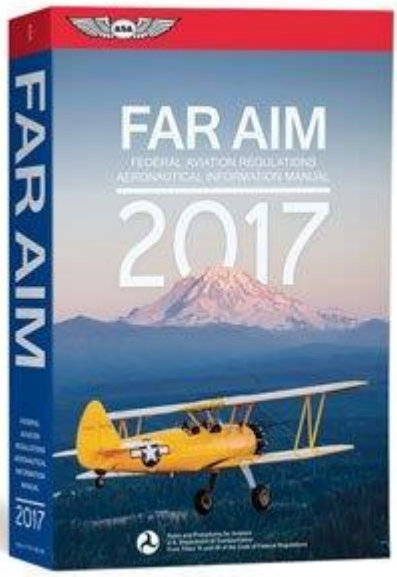

Figure 1-1 FAR AIM

FLIGHT INFORMATION PUBLICATIONS (FLIPs)

The Department of Defense (DoD) publishes these manuals for use by all branches of the military. FLIPs include en route charts, en route supplements, instrument approach plates, general planning guides, and area planning guides.

Figure 1-2 DoD FLIPs

NATOPS GENERAL FLIGHT AND OPERATING INSTRUCTION MANUAL (CNAF M-3710.7)

The Chief of Naval Air Force (CNAF) has set forth rules governing the operations of Naval aircraft throughout the world. These rules are published in an instruction, CNAF M-3710.7, entitled "NATOPS General Flight and Operating Instructions." NATOPS stands for Naval Air Training and Operating Procedures Standardization.

CNAF M-3710.7 states that "Naval aircraft shall be operated in accordance with applicable provisions of FAR Part 91 except where this manual prescribes more stringent requirements." There are a few areas in which the FAA has permitted the Department of the Navy to deviate from FAR Part 91. Departures from the FAR in areas dealing with aircraft speed, minimum fuel, alternate airport weather, special mission, and low-level mission requirements allow the Department of the Navy greater operational flexibility than permitted by FAR Part 91. Unless a requirement is specifically waived, compliance with NATOPS procedures is mandatory. However, nothing contained therein should prevent the pilot from taking necessary action to safeguard life and property under unusual or emergency conditions.

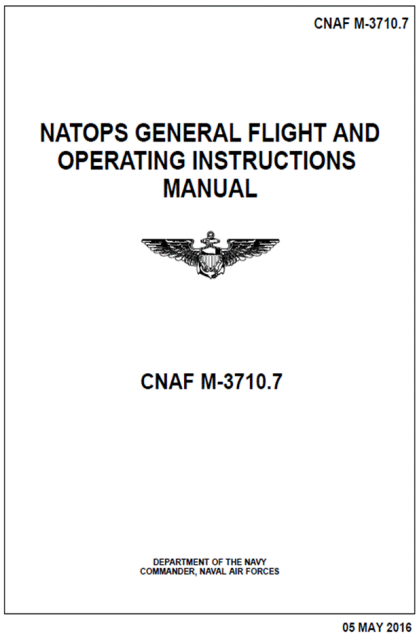

Figure 1-3 CNAF M-3710.7

AIRCRAFT NATOPS FLIGHT MANUAL

Individual NATOPS manuals (Figure 1-4) are available for every aircraft in the Naval inventory. The specific limitations imposed by the manual may be more restrictive than those delineated by CNAF M-3710.7 or the FAR.


AIR FORCE TO 1T-6B-1
NAVY (NAVAIR) A1-T6BAA-NFM-100

Flight Manual

USAF/USN SERIES T-6B AIRCRAFT

REFER TO https://www.toindex-s.wpafb.af.mil/ FOR CURRENT STATUS OF FLIGHT MANUALS, SAFETY SUPPLEMENTS, OPERATIONAL SUPPLEMENTS, AND FLIGHT CREW CHECKLISTS.

This publication supersedes Interim Operational Supplement TO 1T-6B-1S-5.

COMMANDERS ARE RESPONSIBLE FOR BRINGING THIS PUBLICATION TO THE ATTENTION OF ALL AIR FORCE AND NAVY PERSONNEL CLEARED FOR OPERATION OF SUBJECT AIRCRAFT.

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Figure 1-4 T-6 NATOPS

PRIORITY OF REGULATIONS

CNAF M-3710.7 gives the priority for regulation compliance in the following order:

• Specific Aircraft NATOPS Flight Manual, i.e., T-6 NATOPS

• CNAF M-3710.7

• Flight Information Publications
(FLIPs)

• Federal Aviation Regulations
Part 91

An example would be where NATOPS states an aircraft's minimum safe operating speed is greater than an airspeed restriction stated in the FAR. In this situation NATOPS takes precedence over the FAR. (Figure 1-5)

Figure 1-5 Priority of Regulations

AVIATION TERMINOLOGY

An extensive list of terms defined by CNAF M-3710.7, FAR, and AIM is provided in Appendix A. The following are some very basic definitions:

Air Traffic Clearance (clearance)

An authorization by Air Traffic Control (ATC) for an aircraft to proceed under specified traffic conditions within controlled airspace, for the purpose of preventing collision between known aircraft.

Notice to Airman (NOTAM)

A notice containing information (not known sufficiently in advance to publicize by other means) concerning the establishment, condition, or change in any component (facility, service, or procedure of, or hazard in the National Airspace System) the timely knowledge of which is essential to personnel concerned with flight operations (Figure 1-6).

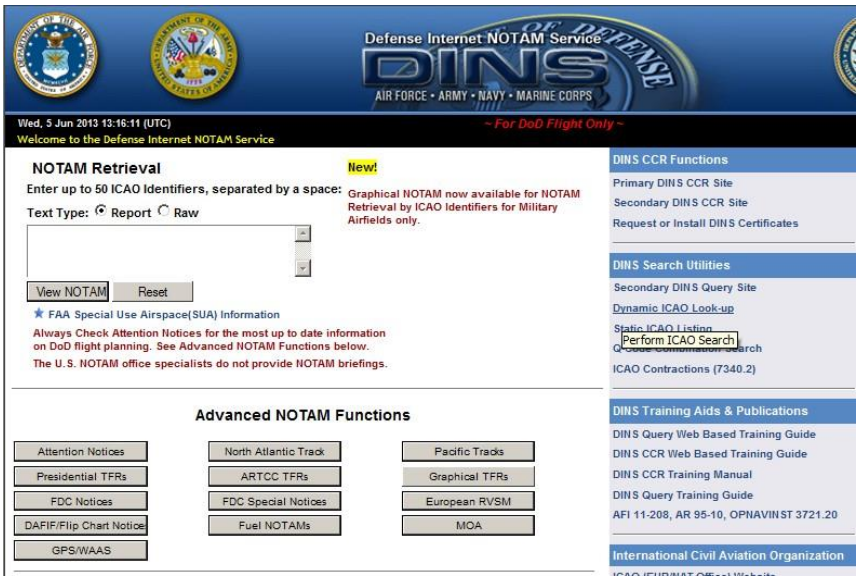


Figure 1-6 NOTAM

Transponder

The airborne radar beacon receiver/transmitter portion of the Air Traffic Control Radar Beacon System 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.

Mode 3 is a four-digit code and identifies the aircraft to ATC via their radars. It is also utilized by aircraft Traffic Collision Avoidance Systems (TCAS), on aircraft that are equipped with it. Mode C provides aircraft pressure altitude information to ATC, which aids in altitude deconfliction, and may be required depending on the classification of airspace being operated in.

WORDING

The word usage and intended meaning that has been adhered to throughout the NATOPS program is as follows:

• "Shall" means that a procedure is mandatory.

• "Should" means that a procedure is recommended

• "May" and "Need Not" mean that a procedure is optional.

• "Will" indicates futurity and never indicates any degree of requirement for application of a procedure.

AIR TRAFFIC CONTROL (ATC) ORGANIZATION

The agency of the FAA which enforces FAR Part 91 is called Air Traffic Control.
ATC also approves flight plans and grants clearances. Its subordinate agencies play an important part in the safe and orderly flow of all aircraft traffic in the United States. The commonly encountered sub-agencies are listed below (Figure 1-7).

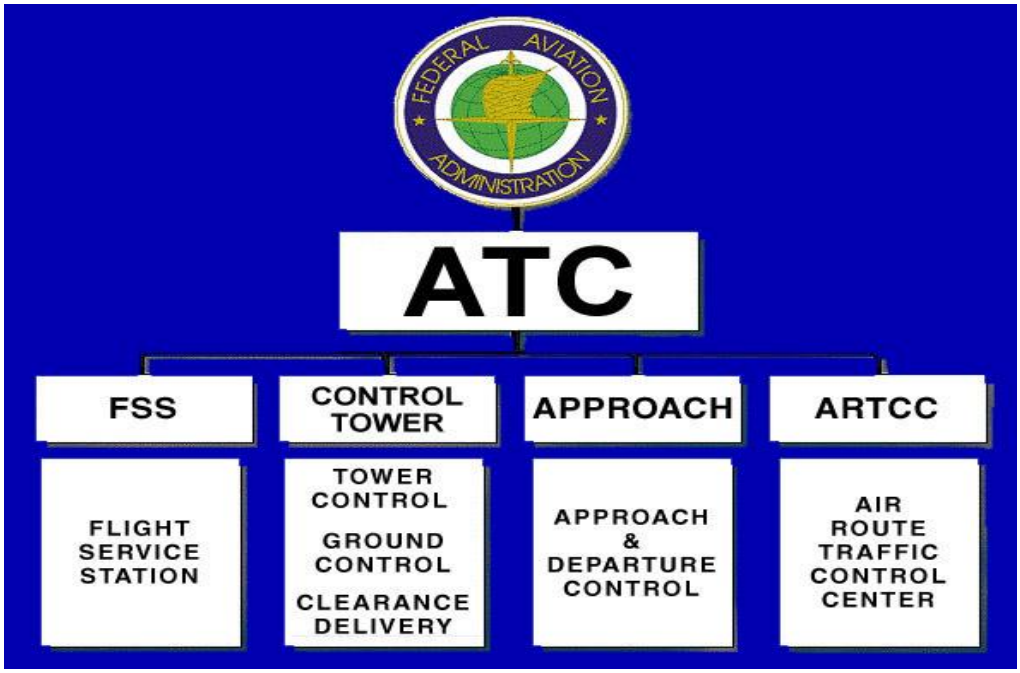


Figure 1-7 ATC

FLIGHT SERVICE STATION (FSS)

These facilities provide pilot briefings, en route communications, and some search and rescue services; assist lost aircraft and aircraft in emergency situations; relay ATC clearances; originate Notices to Airmen; broadcast aviation weather; receive and process flight plans; provide some flight following; and monitor navigational aids. In addition, some Flight Service Stations provide Enroute Flight Advisory Service (Flight Watch), take weather observations, issue airport advisories, and advise Customs and Immigration of trans-border flights (Figure 1-8).

At military airfields, there is usually a "Base Operations" that provides many of these services.

Figure 1-8 Air Operations

CONTROL TOWER

The Control Tower (Figure 1-9) is the agency responsible for the safe, orderly, and expeditious flow of traffic operating on and in the vicinity of an airport. A typical Control Tower has three stations, Clearance Delivery, Ground, and Tower, each with its own discrete radio frequency.

Figure 1-9 Tower

Clearance Delivery

Clearance Delivery relays ATC clearances to departing aircraft and has no control or surveillance capabilities. At some airports, this function may be handled by Ground and there will not be a separate Clearance Delivery.

Ground

Ground is responsible for aircraft movement on the ground up to the hold short line (Figure 1-10). Ground will provide clearance to taxi when traffic conditions permit. When an aircraft must taxi across a runway, explicit runway crossing clearances will be issued for each runway crossing. Ground does not clear aircraft onto the active runway for takeoff or for landing. Ground frequencies are provided to eliminate radio traffic congestion on the Tower frequency.

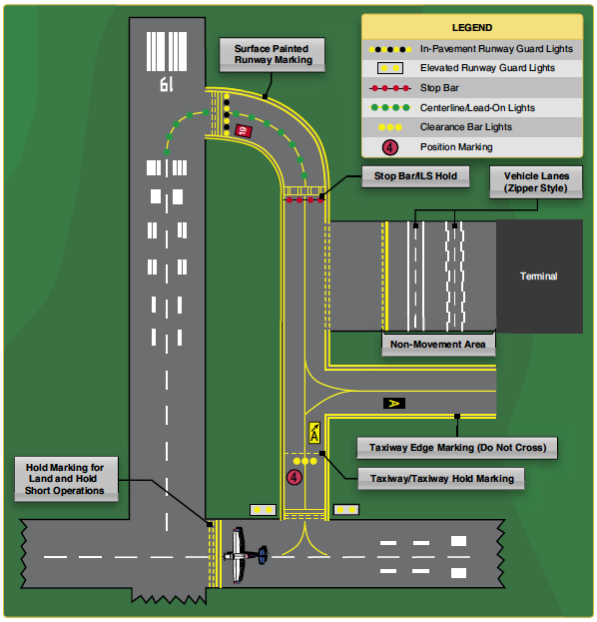


Figure 1-10 Airport

Tower

Tower maintains efficient flow of airport traffic in its assigned airspace. (Figure 1-10) Tower is the sole source of clearance to take off and to land. At an airfield where Tower is in operation, aircraft must have permission to taxi onto the runway and to land. In addition, Tower's permission is required for aircraft to cross runways, although Ground usually relays this clearance.

Note: Automatic Terminal Information Service (ATIS) is not a station of the ATC Control Tower. ATIS is the continuous broadcast of recorded non-control information (weather conditions, runway in use, etc.) on a discrete radio frequency. It is used in selected high activity terminal areas to improve controller effectiveness and relieve frequency congestion.

APPROACH CONTROL (APC)

The primary function of Approach Control is to control Instrument Flight Rules (IFR) traffic in the terminal area. (Figure 1-11) Terminal area is "a general term used to describe airspace in which Approach Control service or airport traffic control service is provided" and includes all instrument procedures into and out of the Control Tower's airspace. It is usually divided into several sectors, each assigned a controller with a radarscope. The number of controllers and radarscopes depends on the amount of traffic in the terminal area. APC will normally operate two frequencies in each sector, "Approach" for arriving traffic and "Departure" for departing traffic. Approach Control radar services include radar vectors to an approach fix, radar approaches [Airport Surveillance Radar (ASR), Precision Approach Radar (PAR)], and sequencing of departing and arriving traffic.

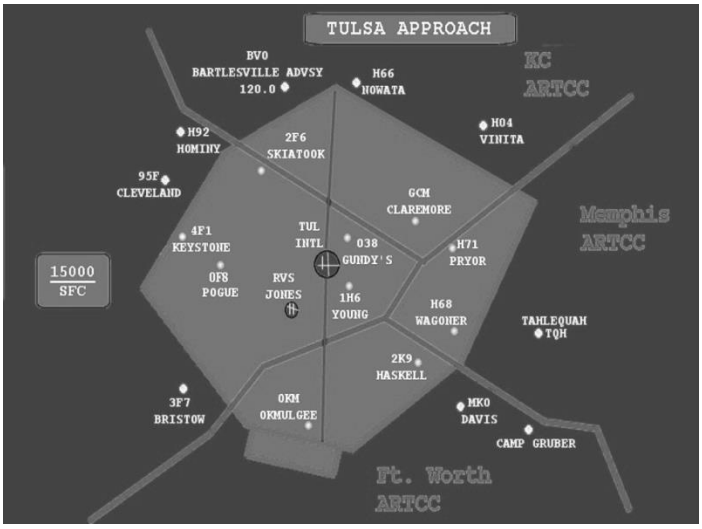


Figure 1-11 Terminal Area

AIR ROUTE TRAFFIC CONTROL CENTER (ARTCC)

"Center" is established primarily to control en route IFR traffic, i.e., IFR traffic that is between terminal areas. Any single Center controls vast amounts of airspace with remote radar sites and communication relay stations. (Figure 1-12)

Figure 1-12 ARTCC Area of Responsibility

When equipment capabilities and controller workload permit, certain advisory/assistance services may be provided to visual flight rules (VFR) aircraft.

POLICY GUIDANCE

PILOT IN COMMAND (PIC)

FAR defines PIC as "the pilot responsible for the operation and safety of an aircraft during flight time" and states that the PIC is "directly responsible for, and is the final authority as to the operation of that aircraft."

CNAF M-3710.7 defines "pilot in command" as the pilot who is assigned by the unit commander, or a delegated authority, the responsibility for the safe, orderly flight of the aircraft and well-being of the crew.

FLIGHT AUTHORIZATION, PLANNING, AND APPROVAL

PREFLIGHT PLANNING

CNAF M-3710.7 states that before commencing a flight, the pilot in command shall be familiar with all available information appropriate to the intended operation. (Figure1-13) This information should include, but is not limited to: available weather reports and forecasts, NOTAMs, fuel requirements, alternate airfields available if the flight cannot be completed as

planned, and any anticipated traffic delays. Flights shall be planned to circumvent areas of forecast atmospheric icing and thunderstorm conditions whenever practicable.

Figure 1-13 Preflight Planning

FLIGHT PLANS

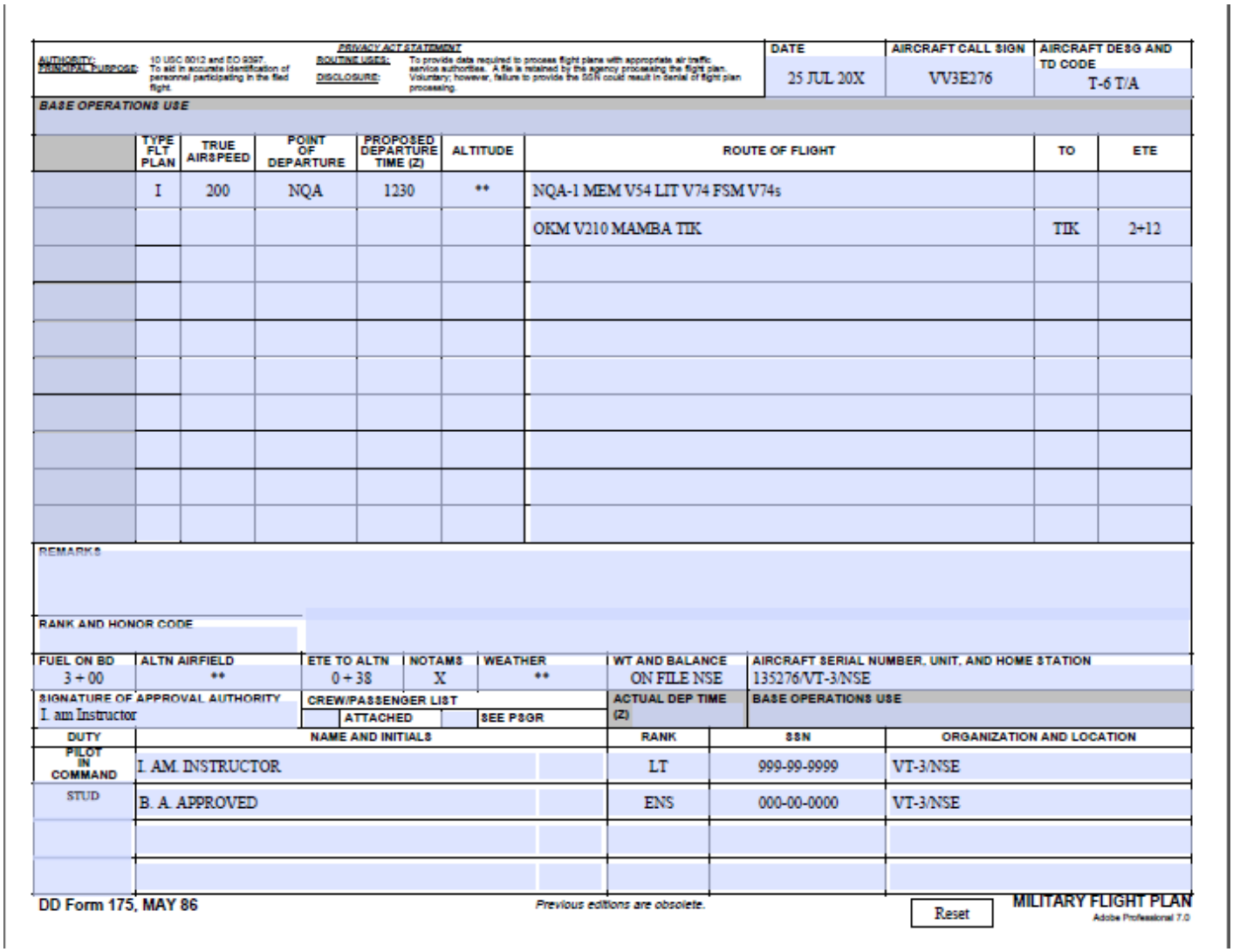
A flight plan is a way of relaying important information about the flight to the departure airport, destination airport, and all intermediate agencies. It also establishes a baseline for lost communication and missing aircraft procedures if necessary. A flight plan appropriate for the intended operation shall be submitted to the local air traffic control facility for all flights of Naval aircraft. Delivery of a properly prepared flight plan to the duty personnel at the Base Operations Office for the departure airport assures that the appropriate ATC facilities will be furnished with a takeoff report and the essential elements of the flight plan as initially approved.

Flight Plan Forms

The forms listed below are used for the submission of flight plans in the circumstances indicated:

DD Form 175

A "DD-175," military flight plan, completed in accordance with FLIP General Planning is used for other than local flights originating from airfields in the United States at which a military operations department is located (Figure 1-14).



AUTHORITY: 10 USC 8012 and EO 9397.
PRINCIPAL PURPOSE: To aid in accurate identification of personnel participating in the filed flight.
PRIVACY ACT STATEMENT
ROUTINE USES: To provide data required to process flight plans with appropriate air traffic service authorities. A file is retained by the agency processing the flight plan.
DISCLOSURE: Voluntary; however, failure to provide the SSN could result in denial of flight plan processing.

DATE	AIRCRAFT CALL SIGN	AIRCRAFT DESG AND TD CODE
25 JUL 20X	VV3E276	T-6 T/A

BASE OPERATIONS USE

	TYPE FLT PLAN	TRUE AIRSPEED	POINT OF DEPARTURE	PROPOSED DEPARTURE TIME (Z)	ALTITUDE	ROUTE OF FLIGHT	TO	ETE
	I	200	NQA	1230	**	NQA-1 MEM V54 LIT V74 FSM V74s		
						OKM V210 MAMBA TIK	TIK	2+12

REMARKS

RANK AND HONOR CODE

FUEL ON BD	ALTN AIRFIELD	ETE TO ALTN	NOTAMS	WEATHER	WT AND BALANCE	AIRCRAFT SERIAL NUMBER, UNIT, AND HOME STATION
3+00	**	0+38	X	**	ON FILE NSE	135276/VT-3/NSE

SIGNATURE OF APPROVAL AUTHORITY	CREW/PASSENGER LIST			ACTUAL DEP TIME (Z)	BASE OPERATIONS USE
I. am Instructor		ATTACHED	SEE PSGR		

DUTY	NAME AND INITIALS	RANK	SSN	ORGANIZATION AND LOCATION
PILOT IN COMMAND	I. AM. INSTRUCTOR	LT	999-99-9999	VT-3/NSE
STUD	B. A. APPROVED	ENS	000-00-0000	VT-3/NSE

DD Form 175, MAY 86 Previous editions are obsolete. Reset MILITARY FLIGHT PLAN Adobe Professional 7.0

Figure 1-14 DD-175

The Squadron Flight Schedule

The most common form of a flight plan is the flight schedule. A daily schedule or abbreviated single copy DD-175 (Figure 1-14) may be authorized by the approval authority for use when the flight will be conducted within the established local flying area and adjacent offshore operating and training areas.

FAA Form 7233-1

An FAA flight plan, FAA Form 7233-1, (Figure 1-15) may be filed in lieu of a DD-175 at airfields in the United States without a military operations department.

FLIGHT PLAN

U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION

(FAA USE ONLY) ☐ PILOT BRIEFING ☐ VNR ☐ STOPOVER

TIME STARTED

SPECIALIST INITIALS

1. TYPE	2. AIRCRAFT IDENTIFICATION	3. AIRCRAFT TYPE / SPECIAL EQUIPMENT	4. TRUE AIRSPEED	5. DEPARTURE POINT	6. DEPARTURE TIME		7. CRUISING ALTITUDE
☐ VFR ☐ IFR ☐ DVFR			KTS		PROPOSED (Z)	ACTUAL (Z)	

8. ROUTE OF FLIGHT

9. DESTINATION (Name of airport and city)	10. EST. TIME ENROUTE		11. REMARKS
	HOURS	MINUTES	

12. FUEL ON BOARD		13. ALTERNATE AIRPORT(S)	14. PILOT'S NAME, ADDRESS & TELEPHONE NUMBER & AIRCRAFT HOME BASE	15. NUMBER ABOARD
HOURS	MINUTES		17. DESTINATION CONTACT/TELEPHONE (OPTIONAL)	

16. COLOR OF AIRCRAFT	CIVIL AIRCRAFT PILOTS. FAR Part 91 requires you file an IFR flight plan to operate under instrument flight rules in controlled airspace. Failure to file could result in a civil penalty not to exceed $1,000 for each violation (Section 901 of the Federal Aviation Act of 1958, as amended). Filing of a VFR flight plan is recommended as a good operating practice. See also Part 99 for requirements concerning DVFR flight plans.

Figure 1-15 FAA Form 7233-1

Weather Brief

Naval aviators shall be thoroughly familiar with weather conditions for the area in which flight is contemplated. Many sources of weather information, both governmental and commercial, are readily available to assist pilots in flight planning and operations. For flights where any portion of the intended route is forecast to be under Instrument Meteorological Conditions (IMC), naval aviators shall obtain a flight route weather brief from a DoD-qualified forecaster or approved forecasting service. Some airfields will have forecasters available directly at the airfield (Figure 1-16).

The primary method for requesting and obtaining flight route weather briefings ashore is online through the web-enabled Flight Weather Brief (FWB) system operated by DoD-qualified meteorological forecasters at the Naval Aviation Forecast Center (NAFC), its satellite components, or within the Marine Corps Weather Services. Alternate methods of delivery are available upon request (i.e. in person, via phone, fax, email, or weather-vision).

If operating from locations without access to FWB, naval aviators may obtain route weather forecast support from NAFC via 1-888-PILOTWX. Additionally, an approved flight route weather

briefing may be obtained via a FSS (1-800-WXBRIEF) or through Air Force Weather and Marine Corps Services, where available.

Flight weather briefs will be completed via the DD-175-1 form, commonly referred to as the "Dash-1". Weather briefings will include briefing (flimsy) number and brief void time. DD-175-1 briefs are only valid for 3.0 hours past briefing/FWB delivery time or estimated time of departure (ETD) plus 30 minutes, whichever time is earlier. Additionally, CNAF M-3710.7 states that flights shall be planned to circumvent areas of forecast atmospheric icing and thunderstorm conditions whenever practicable.

Figure 1-16 Weather Desk

Deviations

Both the FAR and CNAF M-3710.7 allow pilots to deviate from established rules during emergencies requiring immediate action. Such deviations are authorized when in the judgment of the pilot in command; safety of flight is in jeopardy. The pilot in command must be ready to answer to proper authorities for such deviations (Figure 1-17).

Figure 1-17 Accountability

AUTHORIZED AIRFIELDS

Naval aircraft are authorized to operate at and land at all U.S. military and joint civil-military airfields. When planning to operate at other than home airfields, local training airfields or outlying fields (OLFs) (Figure 1-18), pilots in command shall ensure that they are aware of and meet airfield operating requirements and, when necessary, have satisfied prior permission required (PPR) requirements.

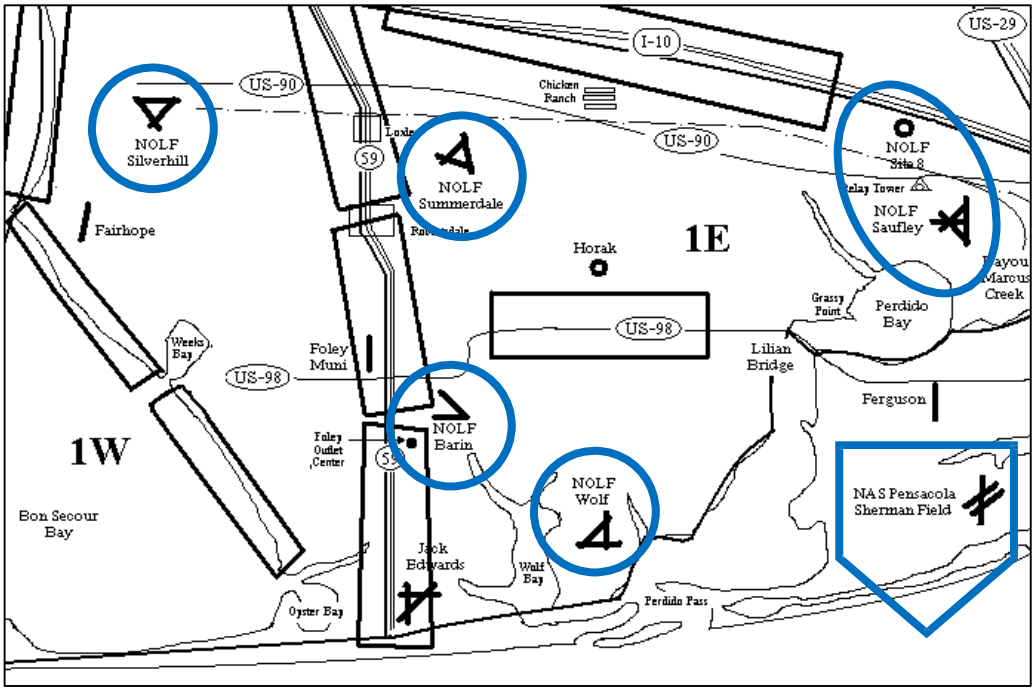


Figure 1-18 Out Lying Fields (OLF)

Naval aircraft are permitted to operate at civilian airfields listed in the DoD Enroute Supplement (FLIP) when such operations contribute to mission accomplishment, add value to training, or are otherwise in the interests of the government and taxpayer. Pilots in command and other authorizing officials should consider the following when flights are planned to civilian airfields:

Be familiar with any local or special procedures, practices or rules that apply at the civilian airfield.

Runway length and runway and taxi load-bearing capabilities are adequate.

DoD contract services are available for any required fueling and or servicing.

Appropriate security and force protection plans can be implemented whenever an aircraft is left unattended away from its home field.

The DoD Enroute Supplement includes information about authorized civilian airfields including airfield and runway lighting configurations, runway lengths and orientation, maximum taxi weights, operating hours, navigation aids (NAVA IDs), radio frequencies, and/or services available.

FUEL PURCHASE

Because the cost of fuel from non-contract commercial sources is considerably higher than that from military or contract sources, unit commanders and PICs shall make every effort to purchase fuel from military or government contract sources. Navy and Marine Corps flight personnel are not authorized to purchase aircraft fuel/oil from other than military government contract sources except when one of the following applies:

Mission requirements dictated stopping at a facility without military or contract fuel sources.

The flight terminated as the result of an emergency.

The flight terminated at an alternate airport in lieu of filed destination.

Figure 1-19 Fuel Truck

CLOSING OF FLIGHT PLANS

It is the responsibility of the PIC/formation leader to ensure that the proper agency is notified of flight termination.

Military Installations

At military installations, the pilot either shall verbally confirm the closing of the flight plan with tower or base operations personnel or deliver a copy of the flight plan form to base operations (Figure 1-20).

Figure 1-20 Base Operations

Nonmilitary Installations

At nonmilitary installations, the pilot shall close the flight plan with flight service (Figure 1-21) through any means of communication available. When appropriate communication links are known or suspected not to exist at the point of intended landing, a predicted landing time in lieu of the actual landing shall be reported to an appropriate aeronautical facility while airborne.

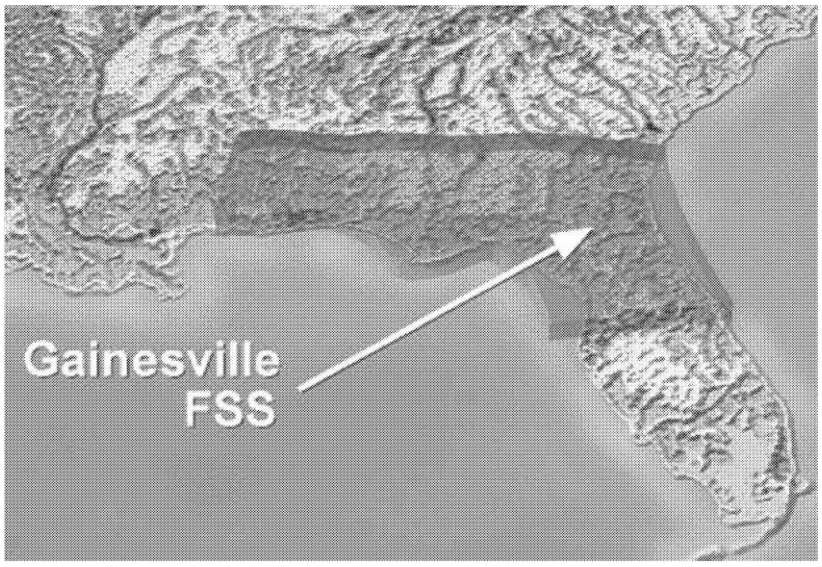


Figure 1-21 FSS

Note - Cancellation of an instrument flight plan (and proceeding VFR) does not meet the requirement for "closing out" the flight plan. When a landing report has been properly delivered, the flight plan will be considered closed out.

SAFETY AND SURVIVAL

To improve the survivability of flight personnel, CNAF has implemented the aircrew survivability enhancement program (ASEP). Sub-elements of this program are aviation life support systems (ALSS), Chemical Biological Radiation Nuclear Defense (CBRND), safety, human performance, and training. CNAF M-3710.7 has established minimum requirements for safety equipment and procedures to include all of the following paragraphs.

SAFETY BELT AND SHOULDER HARNESS

Each person's safety belt and shoulder harness (Figure 1-22) shall be worn and tightened prior to takeoff and shall be worn until completion of the flight except when necessary activities require temporary removal. Inertia reels, where provided, shall be manually locked for all takeoffs and landings and at all other times when high g forces may be encountered except where the procedure is detrimental to safe operation.

Figure 1-22 Harness

AIRCREW PERSONAL PROTECTIVE EQUIPMENT REQUIREMENTS

Aircrews of naval aircraft are required to wear (as a minimum) the personal flying equipment (Figure 1-23) in the list below. Items marked with an asterisk (*) may be omitted by flight personnel flying in fixed-wing cargo/transport class aircraft (C-130, C-2, etc.) if such flight does not involve carrier operations and omission is approved by the commanding officer.

Figure 1-23 Protective Gear

*Protective Helmet - The helmet shall be 100% covered with white reflective tape except as modified by approved aircrew system changes. Up to 30 square inches of light-colored reflective tape may be applied so long as the white tape remains visible from all directions. The use of reflective tape may degrade Night Vision Device (NVD) performance. Temporary, non-reflective cloth covers may be worn over the reflective tape.

*Aircrew safety/flyer boots.

*Fire-resistant (aramid) flight gloves.

*Fire-resistant flight suit (aramid) – Aramid or cotton-type undergarments shall be worn. Suitable fire-resistant unit issue clothing (aramid) may be substituted for the flight suit for flight personnel in non-ejection seat aircraft.

*Identification tags (i.e. Dog Tags) – Two tags on a chain worn around the neck; alternately, one tag may be laced into the boot, and the other carried elsewhere on the person.

*Survival knife – Do not wear exposed or attached to the life preserver.

*Personal survival kit – Appropriate to the area of operations.

*Signal device – Required for all night flights and flights over water or sparsely populated areas.

Survival radios

Emergency beacons – Line-of-sight emergency beacons in all ejection seats; Beyond line-of-sight emergency beacons in all multiplace rafts.

Flashlight – Required for all night flights.

Anti-exposure suits (i.e. Dry suits) – When required.

Anti-blackout suits (G-suits) – Shall be worn and connected on all flights in aircraft equipped for their use.

Inflatable life preservers – Shall be worn during all flights originating from or terminating on ships or landing platforms. Life preservers (Figure 1-24) shall be readily available when operating from aerodromes in the vicinity of coastal waters or when operating from inland aerodromes where takeoff, route of flight, or approach path is over water. Occupants of ejection seat aircraft shall wear the appropriate life preserver at all times. Life preservers shall be worn when mission requirements dictate operation over water below 1,000 feet exclusive of normal departures or approaches (e.g., maritime patrol operations).

Figure 1-24 Life Preserver Unit

Laser eye protection (LEP) – LEP shall be worn in known or suspected laser threat environment (e.g., rangefinder, designator, etc.) either in a single or multi-aircraft scenario, whether in training or real-world operations.

Supplemental Emergency Breathing Devices (SEBD) – SEBD shall be carried by all helicopter, tilt rotor, E-2, and C-2 aircrew during overwater flight.

CBRND protective equipment – Shall be worn or available for immediate use when operating in identified chemical, biological (CB) threat areas.

LIFE RAFTS

Life rafts (Figure 1-25) of sufficient capacity to accommodate passengers and crew shall be provided in all aircraft when there would be a significant risk of water entry in the event of a mishap.

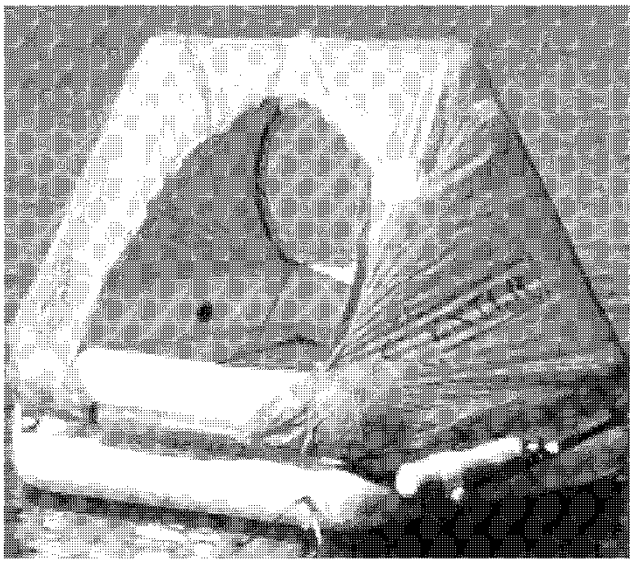


Figure 1-25 Life Raft

PARACHUTES

Parachutes (Figure 1-26) shall be provided as dictated by Type/Model/Series (T/M/S) NATOPS manuals. It is the responsibility of the PIC of a naval aircraft in which parachutes are required to ensure the following:

A parachute is available to all flight personnel and passengers in a location convenient to the intended user.

All flight personnel and passengers are familiar with the location, use of the type parachute provided, and bailout procedures for the aircraft in which embarked.

Due to an increased risk of severe injury or death during parachute landing falls when surface winds exceed 25 knots – high surface winds contribute to total landing velocity – CNAF M-3710.7 states that flight during these conditions should only be conducted as operational necessity dictates and will be determined by commanding officers.

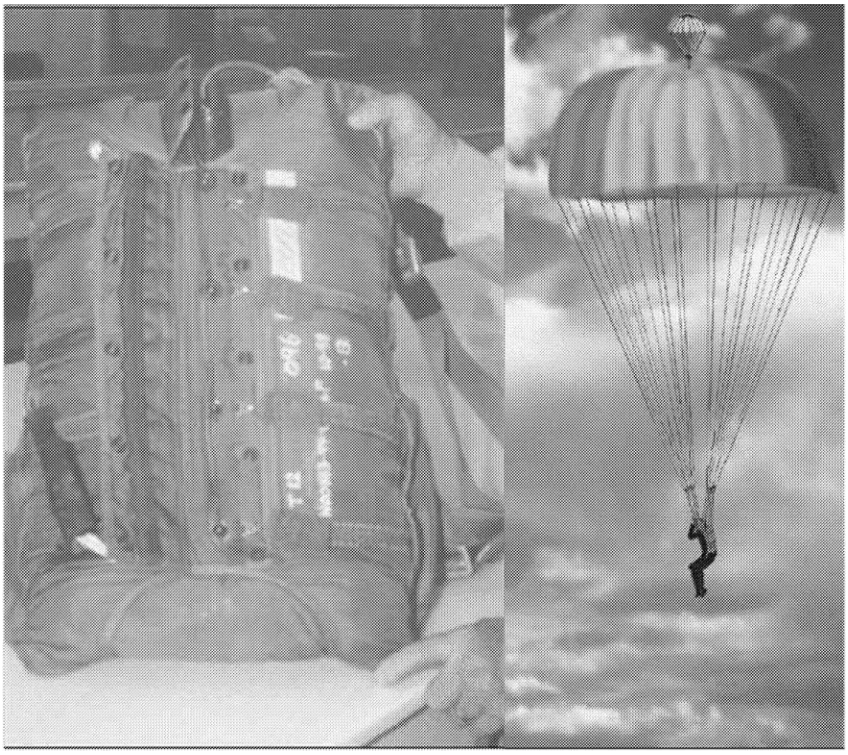


Figure 1-26 Parachute

OXYGEN / CABIN PRESSURIZATION

All occupants aboard naval aircraft shall use supplemental oxygen (Figure 1-27) on flights in which the cabin altitude exceeds 10,000'. Exceptions include:

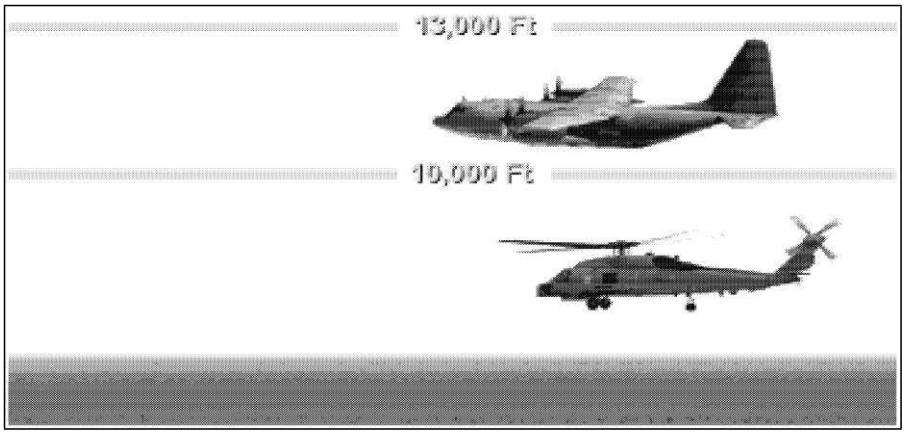


Figure 1-27 Oxygen Requirements

Unpressurized Aircraft

In unpressurized aircraft with oxygen systems, the pilot at the controls and aircrew participating in physical activity (loadmasters) shall use supplemental oxygen continuously when cabin altitude exceeds 10,000 feet. When oxygen is not available to other occupants, flight between 10,000 and 13,000 feet shall not exceed 3 hours duration, and flight above 13,000 feet is prohibited. In aircraft where oxygen systems are not available (such as helicopters), it must be determined that it is mission essential for flight altitude to exceed 10,000 feet. Time above 10,000 feet shall not exceed 1 hour and altitude shall not exceed 12,000 feet.

Tactical Jet and Tactical Jet Training Aircraft (Figure 1-28)

Oxygen shall be used by all occupants from takeoff to landing. Emergency bailout bottles, when provided, shall be connected prior to takeoff.

Figure 1-28 Tactical Jet

HUMAN PERFORMANCE AND AEROMEDICAL FACTORS

Operational readiness and aviation safety are enhanced by assuring that flight crew and flight support personnel achieve and maintain an optimal state of physical and emotional health. It is important that personnel are adequately rested and that conditions which contribute to fatigue, impair health, decrease performance and increase mishap potential are reduced or eliminated. Limits and guidelines imposed by CNAF M-3710.7 may be exceeded should operational necessity dictate, and when approved by the senior aviation commander responsible for conduct of air operations. The below human performance and aeromedical factors, along with applicable limits, rules, and restrictions, are per CNAF M-3710.7.

FACTORS AFFECTING AIRCREW HUMAN PERFORMANCE

Numerous complex factors affect the performance of flight and support personnel. Commanders and mission planners must assess the impact of factors that contribute to operational fatigue and reduce aircrew performance. The principal factors include: weather, extremes of temperature, nighttime operations, use of vision imaging systems, mission delays, personal equipment and Aviation Life Support Systems (ALSS), duration of the duty period, quality and duration of sleep (prior to duty), number of hours flown during the previous several duty periods, time of day relative to the body's internal circadian clock, degree of circadian desynchrony (jet lag), physical health, additional duties, misuse of alcohol, caffeine, tobacco, or dietary supplements and adequacy of crew rest facilities. These factors must be understood by all concerned and appropriate countermeasures established to assure they do not reduce personnel readiness.

Of all causes of fatigue, one of the most treatable is dehydration. Early stages of dehydration can lead to emotional alterations and impaired judgment. Ingestion of plain water throughout the day will reduce probability of dehydration and resultant fatigue.

Flight personnel should report any physical indisposition to superiors, and flight surgeon when applicable, and assume flight duty only when fit to do so.

CREW REST AND SLEEP

Crew rest is the non-duty time before a flight duty period begins. Crew rest includes free time for meals, transportation and rest and must include an opportunity for 8 hours of uninterrupted sleep time for every 24-hour period. Crew rest does not begin until after termination of official duties and is required prior to reporting for preflight preparations. Flight crew should not be scheduled for continuous alert and/or flight duty (required awake) in excess of 18 hours. Both flight and ground support personnel schedules shall be made with due consideration for watch standing, collateral duties, training, and off-duty activities (official and unofficial functions). As the time continuously awake duty time exceeds 16 hours, performance efficiency begins to drop. After 18 hours, performance efficiency rapidly declines to 75 percent of effectiveness or less, with effects that include lapses in attention, increased reaction time, slowed information processing, decreased vigilance, and increased error frequency. Accident rates for just about every type of human activity increase after 18 hours of wakefulness, particularly during the night "circadian trough" when sleep would normally occur.

CIRCADIAN RHYTHM

Circadian rhythms are cyclic fluctuations of numerous body functions that are set like a "biological clock" by daylight exposure and sleep/awake periods. Changing local sleep/awake periods or rapidly crossing more than three time zones disrupts circadian rhythms and can cause a marked decrease in performance. This condition, called "jet lag," is compounded by illness, fatigue, dehydration, alcohol use, poor nutrition, or drugs, and is resolved only by accommodation to the new local time or sleep/awake period. The accommodation period can be estimated by allowing one day for every time zone crossed in excess of three time zones.

NUTRITION & SUPPLEMENTS

Failure to eat within 12 hours preceding end of flight may impair performance and ability to adequately control aircraft. Reducing diets should be under supervision of a Flight Surgeon (FS) for all naval aircrew. Other nutrition and diet information may be available from a naval aerospace physiologist (NAP), Aeromedical Safety Officer (AMSO) or FS.

A nutritional supplement is a product taken by mouth that contains a "dietary ingredient" intended to supplement the diet. The ingredients in these products may include vitamins, minerals, herbs or other botanicals, amino acids, protein, and substances such as enzymes, organ tissues, glandular extracts, and metabolites. Dietary supplements can also be extracts or concentrates, and may be found in many forms such as tablets, capsules, softgels, gelcaps, liquids, or powders, and food bars. Use of nutritional/dietary and other over-the-counter supplements/products by flight personnel except those approved by BUMED is prohibited. Harmful effects are often associated when used in very high doses or in non-standard manner and virtually none are tested or assured safe in the aviation environment.

The term “natural” does not mean it is safe. FSs shall be consulted to assist with making informed decisions regarding nutritional supplements. The use of nutritional supplements of all types shall be reported to the FS and recorded during every periodic physical examination or physical health assessment (PHA).

DRUGS

Drugs are defined as any chemical that when taken into the body causes a physiological response. Legal drugs are those medically prescribed or legally purchased for treatment of illness. The use of illicit drugs is prohibited. Use of both prescription and over-the-counter (OTC) drugs is prohibited for flight personnel unless specifically approved by a FS because of the possibility of adverse side effects and unpredictable reactions. The use of nutritional/dietary and other OTC supplements/products by flight personnel except those approved by BUMED is prohibited. Guidance and restrictions are provided in the NAMI on-line Aeromedical Reference and Waiver Guide at http://www.med.navy.mil/sites/navmedmpte/nomi/nami/arwg.

Alcohol — The well-recognized effects of excessive alcohol consumption are detrimental to safe operations (i.e., intoxication and hangover). Consumption of any type of alcohol is prohibited within 12 hours of any mission brief or flight planning. Adherence to the letter of this rule does not guarantee a crewmember will be free from the effects of alcohol after a period of 12 hours. Alcohol can adversely affect the vestibular system for as long as 48 hours even when blood alcohol content is zero. Special caution should be exercised when flying at night, over water, or in Instrument Meteorological Conditions (IMC). In addition to abstaining from alcohol for 12 hours prior to mission brief or flight planning, flight crews shall ensure that they are free of hangover effects prior to flight. Detectable blood alcohol or symptomatic hangover shall be cause for grounding of flight personnel and the restriction of the activities of aviation ground personnel.

Tobacco — Smoking has been shown to cause lung disease and impair night vision, dark adaptation, and increase susceptibility to hypoxia. The use of tobacco products in naval aircraft is prohibited. Also, lighters with plastic liquid reservoirs and/or containers for refilling any lighter are prohibited, as well as lighters with butane, propane, or methyl alcohol as a fuel.

Caffeine — Excessive intake of caffeine from coffee, tea, cola, etc., can cause excitability, sleeplessness, loss of concentration, decreased awareness, and dehydration. Caffeine intake of 450 mg per day (3 to 4 cups of drip coffee) is the recommended maximum intake. Caffeine use when managed appropriately, can aid in maximizing performance during long sorties or periods of sustained operations, however, the caffeine effect is maximized in individuals who are not habituated to its effects as regular users.

PREGNANCY

Because of the medical hazards of flight, pregnant flight personnel shall consult with their FS when they first suspect they are pregnant. Flight personnel are grounded during pregnancy unless a clearance to continue inflight status is granted by the aviation unit commanding officer.

ILLNESS

Acute minor illnesses, such as upper respiratory infections, vomiting, or diarrhea, can produce serious impairment of flight personnel. All illnesses shall be evaluated by flight surgeons, or competent medical authority and followed up by a flight surgeon. Recommendations for grounding or aeromedical clearances shall be issued only by a FS.

IMMUNIZATIONS AND INJECTIONS

Flight personnel shall not participate in flight duties for 12 hours after receiving an immunization or injection unless cleared sooner by a FS. Those showing protracted or delayed reaction shall be grounded until cleared by a FS.

BLOOD DONATION

Although blood donated in small quantities is quickly replaced and does not adversely affect ground activities, the hazards of hypoxia and reduced barometric pressure make it desirable to limit such donations by flight personnel. Flight personnel shall not participate in flight duties or perform low-pressure chamber runs for 4 days following donation of 450 cc of blood (1 pint).

ASSIGNMENT SHEET 7-1-3

FEDERAL AVIATION ORGANIZATION

A. INTRODUCTION

This lesson provides an introduction to the Federal Aviation Regulations (FAR) Part 91 and CNAF M-3710.7 as they relate to Federal aviation organizations, aviation publications, terminology, air traffic control organization, policy guidance concerning flight operations, flight planning, flight safety, and survival.

B. ENABLING OBJECTIVES

C. STUDY ASSIGNMENT

1. Complete Assignment Sheet Federal Aviation Organization before this class.

D. STUDY QUESTIONS

1. The regulatory publication issued by the FAA which most concerns the Navy aircrew member is _____

2. In addition to the regulations set forth by the FAA, what set of regulations issued by the Navy governs the operation of all naval aircraft throughout the world?

a. CNAF M-3710.7 b. T-6 NATOPS
c. FAR Part 91
d. AIM

3. What agency of the FAA grants all IFR clearances? _____

4. Name four subordinate agencies of Air Traffic Control and state their functions.

   a. _____
   b. _____
   c. _____
   d. _____

5. The responsibility for the movement of air and ground traffic at and around an airport lies with the _____.

6. What subordinate agency of ATC is responsible for handling all terminal instrument air traffic?

   a. Approach Control
   b. ARTCC
   c. Control Tower
   d. FSS

7. As the "pilot in command," you will be responsible for which of the following functions?

   a. Operation and safety of the aircraft
   b. Safe and orderly conduct of the flight
   c. Well-being of the crew
   d. All of the above

8. When, if ever, is it permissible to violate FAR Part 91? _____

9. The FAA permits a pilot to deviate from FAR Part 91 to ensure the safety of the aircraft.

   a. True
   b. False

10. According to CNAF M-3710.7, pre-flight planning is required on which of the following occasions?

    a. Urgent combat missions
    b. Local training flights
    c. Flights departing uncontrolled airports with no control tower
    d. All of the above

11. Flight planning requirements for the pilot in command should include, but not be limited to:

    a. _____
    b. _____
    c. _____
    d. _____
    e. _____

12. All occupants aboard Naval aircraft shall use supplemental oxygen on flights in which the cabin altitude exceeds 10,000'.

    a. True
    b. False

13. Naval Flight Weather Briefs are completed via a _____ form and are valid for a period of _____ past brief time, or ETD _____.

14. For naval aircraft operating at a civilian airfield, the PIC should consider:

    a. Local or special procedures
    b. Runway length
    c. If DoD contract services are available
    d. Security and force protection
    e. All of the above

15. Who is responsible to ensure flight plans are closed?

    a. PIC
    b. Formation leader
    c. Both A & B
    d. None of the above

16. List 10 of the minimum PPE items required for aircrew of naval aircraft.

_____	_____
_____	_____
_____	_____
_____	_____
_____	_____

17. List factors that affect fatigue and aircrew human performance.

_____	_____
_____	_____
_____	_____
_____	_____

18. Crew rest must include an opportunity for _____ uninterrupted sleep, and crew day should not exceed _____.

19. Consumption of alcohol is prohibited within _____ hours of any mission brief or flight planning.

    a. 6
    b. 12
    c. 18
    d. 24

20. What is the recommended maximum intake of caffeine?

    a. 3-4 cups of coffee
    b. 450 mg per day
    c. Both A & B
    d. None of the above

21. Immunizations medically down aircrew for _____.

22. If donating 1 pint of blood, aircrew shall not participate in flight duties for _____.

Answers to Lesson Topic 7.1 Study Questions

1. FAR Part 91

2. a. CNAF M-3710.7

3. Air Traffic Control (ATC)

4. a. Flight Service Station – Pilot briefing, en route communications relay, search and rescue, NOTAMS, weather, flight plan filing, NAVA IDs, en route flight following

   b. Control Tower – Safe, orderly & expeditious flow of traffic in vicinity of airport

   c. Approach Control – Control of IFR traffic in the terminal areas

   d. Air Route Traffic Control Center – Positive Control of enroute IFR traffic

5. Control Tower

6. a. Approach Control

7. d. All of the above

8. During Emergencies

9. a. True

10. d. All of the above

11. a. available weather reports and forecasts

    b. Notices to Airmen (NOTAMS)

    c. fuel requirements

    d. alternates available if the flight cannot be completed as planned

    e. and any anticipated traffic delays

12. a. True

13. DD-175-1, 3 Hours, +30 minutes

14. e. All of the above

15. c. Both A & B

16. Protective Helmet, Aircrew Safety / Flyer Boots, Fire resistant flight suit, Personal survival kit, signal device, Survival radios, Flashlight, Inflatable life preserver, Identification tags, Survival knife

17. Weather, Extremes of Temperature, Nighttime operations, Use of vision image systems, Mission delays, Personal equipment and ALSS, Duration of duty period, Quality and duration of sleep, Circadian clock, Dehydration

18. 8 Hours, 18 Hours

19. b. 12

20. c. Both A & B

21. 12 Hours

22. 4 Days

OUTLINE SHEET 7-2-1

VISUAL / INSTRUMENT FLIGHT RULES

A. INTRODUCTION

This lesson provides an introduction to the airport environment, and to CNAF M-3710.7 and Federal Aviation Regulations as they apply to Altitudes, Flight Weather Conditions, Visual Flight Rules, Instrument Flight Rules, Semicircular Cruising Altitude Rules, and Aerobatic Flight.

B. ENABLING OBJECTIVES

2.360 DESCRIBE runway orientation, in a classroom, in accordance with Naval Aviation Fundamentals, NAVAVSCOLSCOM-SG-200

2.361 IDENTIFY airport visual devices, including Aldis lamp signals, airport signs, waveoff signals, visual wind/landing indicators, and airport lighting, in a classroom, in accordance with Naval Aviation Fundamentals, NAVAVSCOLSCOM-SG-200

2.362 IDENTIFY the following terms: Visual Meteorological Conditions (VMC), Instrument Meteorological Conditions (IMC), Visual Flight Rules (VFR), and Instrument Flight Rules (IFR), in a classroom, in accordance with Naval Aviation Fundamentals, NAVAVSCOLSCOM-SG-200

2.363 IDENTIFY the principle of see and avoid, in a classroom, in accordance with Naval Aviation Fundamentals, NAVAVSCOLSCOM-SG-200

2.364 IDENTIFY the weather requirements for VFR flight, including takeoff, en route, and destination weather, in a classroom, in accordance with Naval Aviation Fundamentals, NAVAVSCOLSCOM-SG-200

2.365 IDENTIFY the alternatives if en route weather is less than required for VFR flight, in a classroom, in accordance with Naval Aviation Fundamentals, NAVAVSCOLSCOM-SG-200

2.366 IDENTIFY the general requirements for IFR, in a classroom, in accordance with Naval Aviation Fundamentals, NAVAVSCOLSCOM-SG-200

2.367 IDENTIFY the requirements for IFR flight, including instrument approaches, landing minimums, destination and alternate flight planning weather minimums, and IFR fuel requirements, in a classroom, in accordance with Naval Aviation Fundamentals, NAVAVSCOLSCOM-SG-200

2.368 IDENTIFY the rules concerning VFR and IFR cruising altitudes, in a classroom, in accordance with Naval Aviation Fundamentals, NAVAVSCOLSCOM-SG-200

2.369 IDENTIFY aerobatic flight, in a classroom, in accordance with Naval Aviation Fundamentals, NAVAVSCOLSCOM-SG-200

2.370 IDENTIFY the rules concerning aerobatic flight, in a classroom, in accordance with Naval Aviation Fundamentals, NAVAVSCOLSCOM-SG-200

2.371 IDENTIFY the rules concerning unusual maneuvers in class B, C, and D airspace, in a classroom, in accordance with Naval Aviation Fundamentals, NAVAVSCOLSCOM-SG-200

C. TOPIC OUTLINE

1. Introduction
2. This Lesson Topic
3. Aeronautical Lighting and other Airport Visual Aids
4. Airport Marking Aids and Signs
5. Airport Lighting Aids
6. Weather Condition Terms and Definitions
7. Forecasts
8. Visual Flight Rules (VFR)
9. Instrument Flight Rules (IFR)
10. See and Avoid
11. VFR Weather Minimums
12. Weather Conditions Precluding VFR Flight
13. Instrument Flight Rules
14. General Requirements for IFR Flight
15. Instrument Approaches and Landing Minimums
16. Destination and Alternate Flight Planning
17. IFR Fuel Requirements
18. VFR/IFR Cruising Altitudes/Semi-Circular Rules
20. Aerobatic Flight

21. Aerobatic Flight Precautions
22. Unusual Maneuvers within Class B, C, or D Airspace
23. Summary and Review
24. Assignment
25. Application

INFORMATION SHEET 7-2-2

VISUAL / INSTRUMENT FLIGHT RULES

A. INTRODUCTION

This lesson provides an introduction to the airport environment, and to CNAF M-3710.7 and Federal Aviation Regulations as they apply to Altitudes, Flight Weather Conditions, Visual Flight Rules, Instrument Flight Rules, Semicircular Cruising Altitude Rules, and Aerobatic Flight.

B. REFERENCES

1. Book, Aeronautical Information Manual, AIM
2. DoD Flight Information Publication (FLIP) General Planning, GP-1
3. Federal Aviation Regulations, 14 CFR Part 91
4. NATOPS General Flight and Operating Instructions Manual, CNAF M-3710.7 (series)
5. Naval Aviation Fundamentals, NAVAVSCOLSCOM-SG-200 Weather, Ch 1 & 4

C. INFORMATION

AERONAUTICAL LIGHTING AND OTHER AIRPORT VISUAL AIDS

AIRPORT MARKING AIDS AND SIGNS
Runway Numbers (Orientation)

Runway numbers are determined from the direction an aircraft approaches. Runways are numbered in relation to the magnetic direction of their centerline rounded off to the nearest ten degrees. Thus, a runway running east and west when approached from the west (heading 090°) would be Runway 09 (Figure 2-1), and the same runway approached from the east (heading 270°) would be Runway 27.

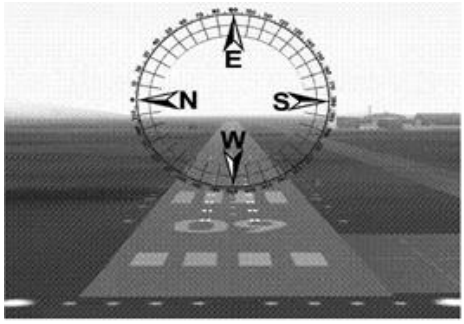


Figure 2-1 Runway Numbers

Aldis Lamp Signals

In the event of lost communication, the Control Tower may communicate with the pilot using the Aldis lamp. The Aldis lamp is a hand held, variable color, directional light located in the control tower. The Aldis lamp signals are colored green, red, or white and will be steady or flashing. The signals are similar to those traffic signals seen on the highway (Table 2-1).

Color and type of signal	**Meaning with respect to aircraft on the ground**	**Meaning with respect to aircraft in flight**
Steady green	Cleared to takeoff	Cleared to land
Flashing green	Cleared to taxi	Return for landing (followed by steady green at proper time)
Steady red	Stop	Give way to other aircraft and continue circling
Flashing red	Taxi clear of runway in use	Airport unsafe Do Not Land
Flashing white	Return to starting point on airport	Not Used by FAA
Alternating red and green	Exercise extreme caution	Exercise extreme caution

Table 2-1 Aldis Lamp Signals

Note: Because of the many white lights encountered around an airport, the FAA does not use a steady white signal light. The flashing white signal is applicable only to aircraft on the ground.

Airport Marking Aids

Airport marking aids are the numbers and symbols depicted on the surface of the runways and taxiways. They are painted white for runways and yellow for taxiways.

Airport Signs

There are six types of signs installed on airports: mandatory instruction signs, location signs, direction signs, destination signs, information signs, and runway remaining signs.

Type of Sign	Action or Purpose
4-22	**Taxiway/Runway Hold Position:** Hold short of runway on taxiway
26-8	**Runway/Runway Hold Position:** Hold short of intersecting runway
8-APCH	**Runway Approach Hold Position:** Hold short of aircraft on approach
ILS	**ILS Critical Area Hold Position:** Hold short of ILS approach critical area
⊖	**No Entry:** Identifies paved areas where aircraft entry is prohibited
B	**Taxiway Location:** Identifies taxiway on which aircraft is located
22	**Runway Location:** Identifies runway on which aircraft is located
4	**Runway Distance Remaining:** Provides remaining runway length in 1,000 feet increments
Type of Sign	**Action or Purpose**
	Runway Safety Area/Obstacle Free Zone Boundary: Exit boundary of runway protected areas
	ILS Critical Area Boundary: Exit boundary of ILS critical area
J→	**Taxiway Direction:** Defines direction & designation of intersecting taxiway(s)
↙L	**Runway Exit:** Defines direction & designation of exit taxiway from runway
22↑	**Outbound Destination:** Defines directions to takeoff runways
↖MIL	**Inbound Destination:** Defines directions for arriving aircraft
	Taxiway Ending Marker: Indicates taxiway does not continue
↙A G L→	**Direction Sign Array:** Identifies location in conjunction with multiple intersecting taxiways

Figure 2-2 Airport Signs

Mandatory Instruction Signs

Mandatory instruction signs have white letters on a red background and are used to denote the entrance to a runway or critical area or prohibited areas. The runway "Hold Short" line is indicated by a mandatory instruction sign, which indicates the runway designation (Figure 2-3).

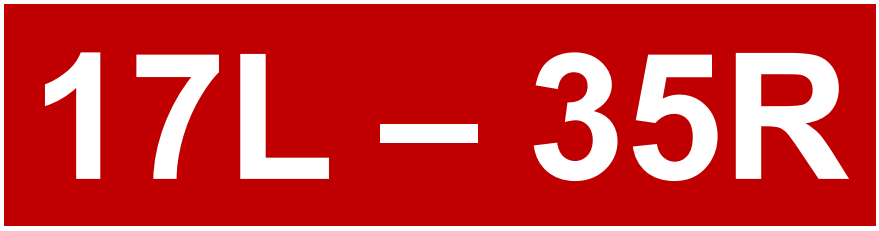


Figure 2-3 Mandatory Instruction Sign

Location Signs

Location signs identify the taxiway or runway on which an aircraft is located or other important boundaries. A taxiway location sign has yellow letters and a yellow border on a black background and indicates the taxiway designation (Figure 2-4).

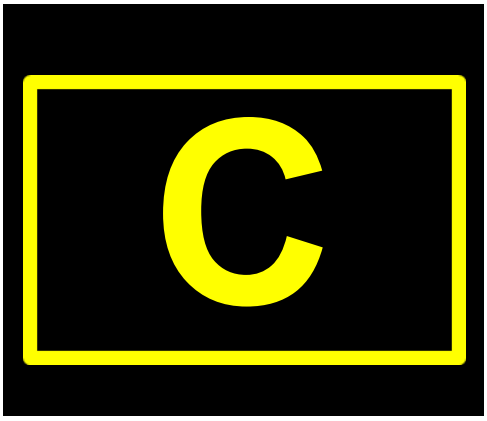


Figure 2-4 Taxiway Location Sign

Runway location signs use the same color scheme and will indicate the runway number (Figure 2-5).

Figure 2-5 Runway Location Sign

The runway boundary and Instrument Landing System critical boundary signs have black figures on a yellow background. These figures augment their respective pavement markings and are intended to provide pilots with another visual cue of their location.

Direction Signs

Direction signs are used at the intersection of taxiways to indicate the direction of turn for a specified taxiway. They have black letters on a yellow background and will identify the taxiway designation and an arrow in the direction of turn (Figure 2-6).

Figure 2-6 Direction Sign

Destination Signs

Destination signs are used to provide taxi direction to specific locations on an airport. They have black letters on a yellow background and will have an arrow showing the direction of the taxiing route to the destination indicated on the sign.

Information Signs

Information signs have black letters on a yellow background. They provide information such as frequencies or NAVAID check data.

Runway Distance Remaining Signs

Runway distance remaining signs have white numbers on a black background and indicate the landing distance remaining in thousands of feet. They are installed along one or both sides of the runway (Figure 2-7).

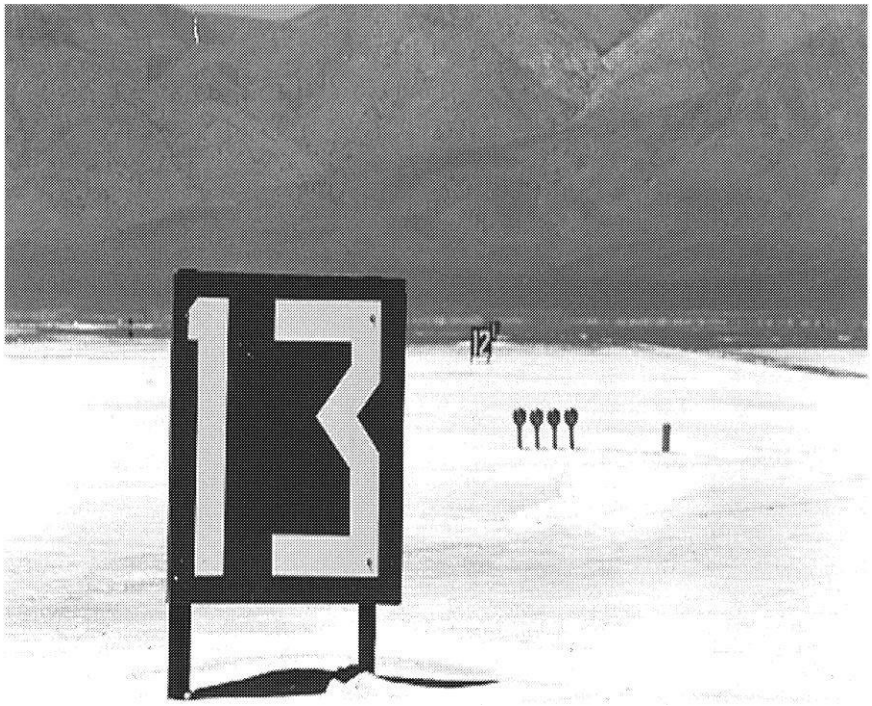


Figure 2-7 Runway Distance Remaining Sign

Aircraft Arresting Devices

Aircraft arresting devices are used to stop an aircraft rapidly in an emergency. In most cases, they are left rigged and have no effect on runway operations. Where parts of the gear cross the runway, special markings are required. These markings consist of 10 foot diameter yellow circles, 30' between centers, perpendicular to runway centerline, across the entire runway width.

Figure 2-8 Arresting Gear

Waveoff Signals

A waveoff signal tells the pilot "DO NOT LAND" and is mandatory except in an emergency. Waveoff signals can be grouped into two basic categories. The first group is generally used by personnel stationed beside the runway, such as Runway Duty Officers (RDO), Landing Signals Officer (LSO), or Wheels Watch. These may include a red pyrotechnic flare, hand paddles/flags, or Aldis lights. The second is the high intensity red runway waveoff lights within the approach lighting system or similar lights on the Improved Fresnel Lens Optical Landing System (IFLOLS). These are normally operated from the Control Tower.

Visual Wind/Landing Indicators

Wind direction is important because pilots takeoff and land into the wind. A wind cone, windsock, or wind tee may be installed near the operational runway and indicates to the pilot wind direction and, in case of wind cone or wind sock, approximate velocity.

Wind Cone, Wind Sock, Wind Tee

The large end of the wind cone or wind sock points into the wind as does the large end (cross bar) of the wind tee. In lieu of a tetrahedron and where a windsock or wind cone is co-located with a wind tee, the wind tee may be manually aligned with the runway in use to indicate landing direction (Figure 2-9).

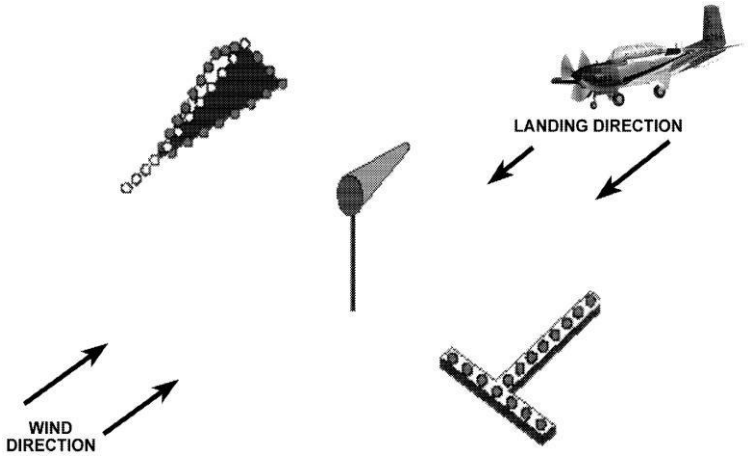


Figure 2-9 Visual Wind/Landing Direction Indicators

Tetrahedron

A tetrahedron (elongated, 3 sided pyramid) lying on its side is often located near the operational runway to indicate the direction of landings and takeoffs. The spar of the tetrahedron points in the direction of landing. The tetrahedron may be lit during hours of darkness. Its lighting is similar to an aircraft's with red lights on the left side and green lights on the right side, central ridge, and spar.

Pilots are cautioned against using a tetrahedron for any purpose other than as an indicator of landing direction. Further, pilots should use extreme caution when making runway selection by use of a tetrahedron in very light or calm wind conditions, as the tetrahedron may not be aligned with the designated calm wind runway. A tetrahedron is mechanically or manually aligned with the active runway; it does not move with the wind.

AIRPORT LIGHTING AIDS

Approach Light Systems (ALS)

Approach light systems (Figure 2-10) provide the basic means to transition from instrument flight to visual flight for landing. They are a configuration of signal lights starting at the landing threshold and extending into the approach area for 2,400 to 3,000' for precision instrument runways, and 1,400 to 1,500' for non-precision runways. Some systems include sequenced flashing lights, which appear to the pilot as a ball of light traveling towards the runway at high speed (twice a second). Different ALS are graphically depicted in section of the FLIP Flight Information Handbook.

Figure 2-10 ALS

Visual Glideslope Indicators

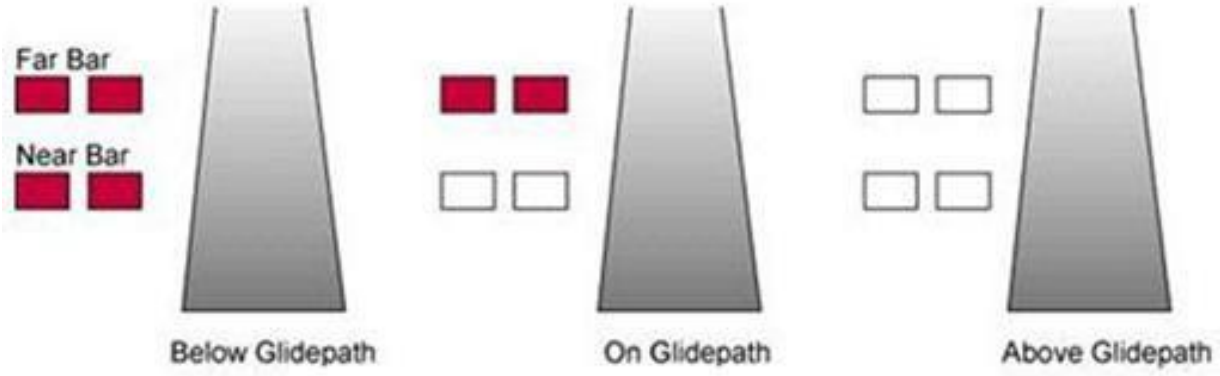
Visual glideslope indicators are pilot aids used to maintain optimum glideslope alignment during the visual phase of landing. Examples of visual glideslope indicators include the Visual Approach Slope Indicator (VASI) (Figure 2-11), Precision Approach Path Indicator (PAPI) (Figure 2-11), the Improved Fresnel Lens Optical landing System (IFLOLS), and the Stabilized Glide Slope Indicator (SGSI).

VASI/PAPI

VASI is a system of lights. Each light is designed so that the light appears as either white or red, depending on the angle at which it is viewed. When the pilot is approaching the lights at the proper angle, meaning the pilot is on glideslope, the first set of lights (near bar) appears white and the second set (far bar) appears red. When both sets of lights are white, the aircraft is too high. When both sets are red, the aircraft is too low.

PAPI uses light units similar to the VASI but are installed in a single row of either two or four light units. These lights are visible from about 5 miles during the day and up to 20 miles at night. The row of light units is normally installed on the left side of the runway.

VASI



PAPI

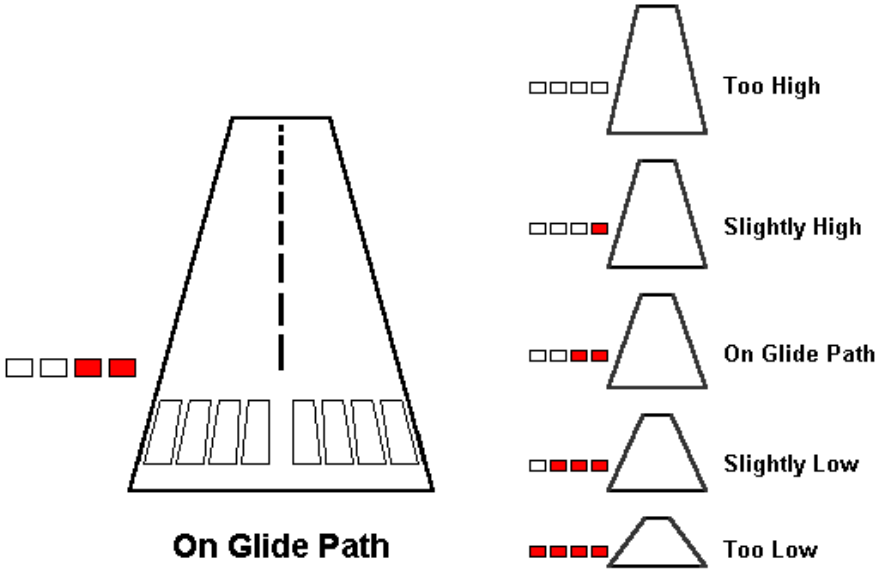


Figure 2-11 VASI/PAPI

IFLOLS

The U.S. Navy Improved Fresnel Lens Optical Landing System (IFLOLS) (Figure 2-12) is commonly referred to as the “meatball.” This self-contained system was designed for use on Navy ships and has been installed at many Naval and Marine Corps Air Stations. It consists of an amber center ball, which moves up or down in relation to aircraft position on the glideslope. When the aircraft is on the glideslope, the ball is aligned with a bar of green lights (the datum). The ball will appear to go below the green lights and change to red when the aircraft is below glideslope. The IFLOLS also has waveoff lights in case the Landing Signals Officer (LSO) or Runway Duty Officer (RDO) needs to order a waveoff from the aircraft on approach.

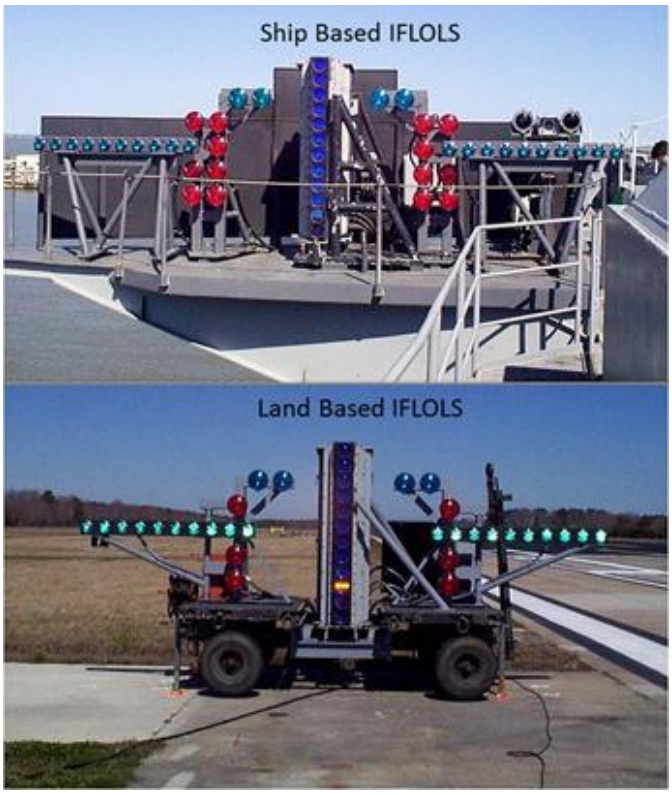


Figure 2-12 IFLOLS

SGSI

The SGSI (Figure 2-13) is a gyro-stabilized light system that is used for shipboard helicopter landing operations. The SGSI emits a tri-colored light beam that consists of a green beam on top, an amber beam in the center, and a red beam on the bottom. The pilot will see a red light if the aircraft is below glideslope. An amber-red interface appears when the aircraft is on proper glideslope. An amber light indicates the aircraft is slightly above glideslope while a green light indicates the aircraft is well above glideslope.

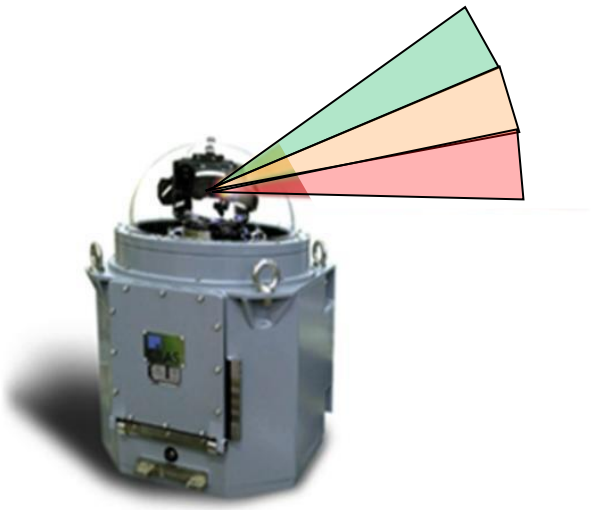


Figure 2-13 SGSI

Runway Edge Light Systems

These are used to outline the edges of the runways during periods of darkness or restricted visibility. Runway edge lights are classified according to the intensity or brightness they are capable of producing, i.e., High Intensity Runway Lights (HIRL), Medium Intensity Runway Lights (MIRL), and Low Intensity Runway Lights (LIRL).

The sides of the runway are outlined by white runway edge lights.

Lights marking the ends of the runway are green on one side and red on the other. When viewed from approaching aircraft, they are green, indicate the landing threshold, and are referred to as "threshold lights." When viewed from the runway, these lights are red to mark the end of useable runway, and are referred to as "overrun lights."

In-Runway Lighting

There are numerous combinations of in-runway lighting used at airports throughout the United States. Some of the more common systems are as follows:

Touchdown Zone Lighting (TDZL)

TDZL consists of two rows of white light bars on both sides of the runway centerline. They extend approximately 3,000' down the runway or to the midpoint of the runway length, whichever is less.

Runway Centerline Lighting (RCLS)

RCLS are lights spaced at 50 foot intervals along the centerline of the runway. Viewed from the landing threshold they are white until the last 3,000' of the runway. The white lights alternate with red for the next 2,000'. For the last 1,000' of the runway there are red lights (Figure 2-14).

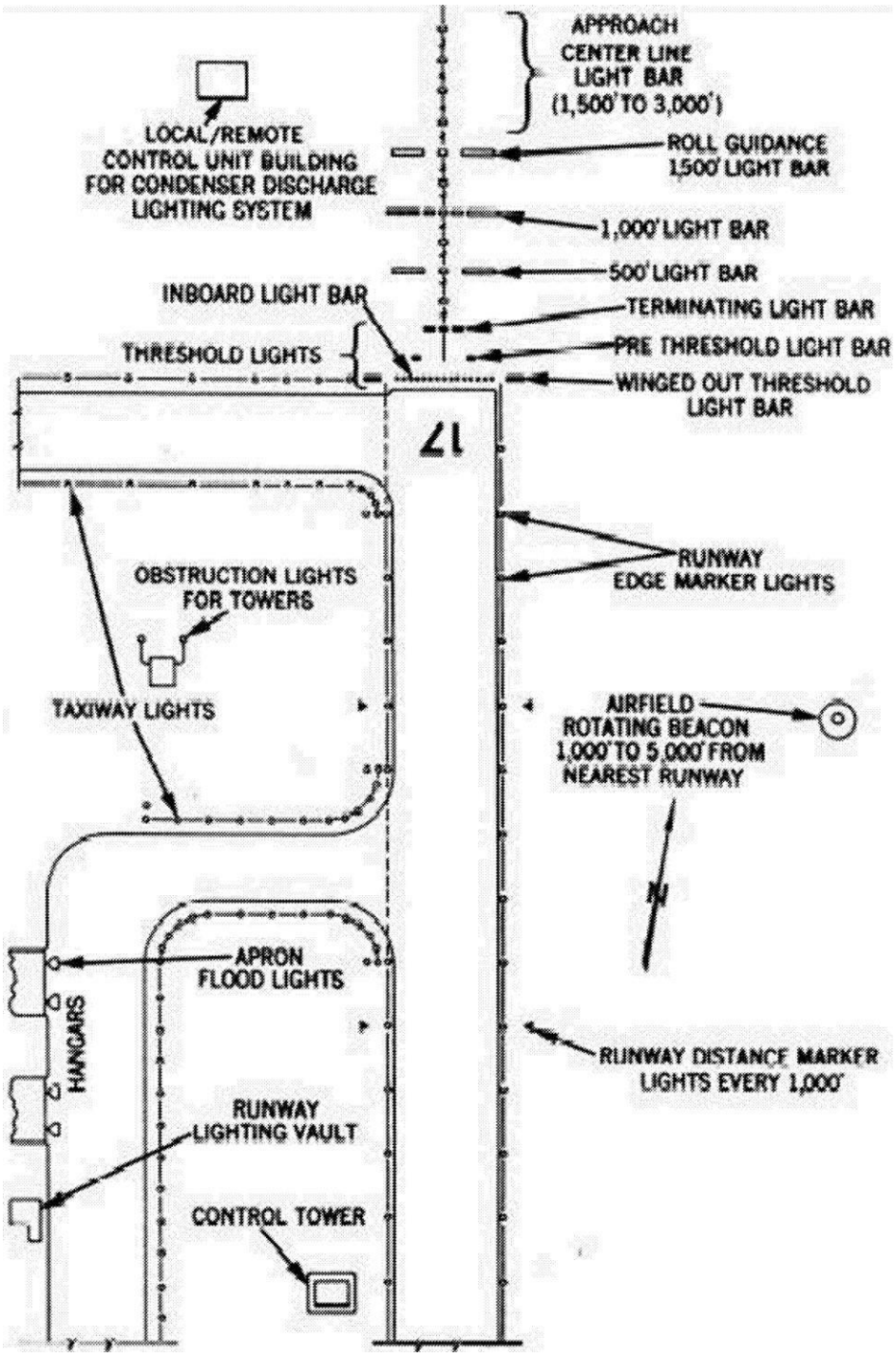


Figure 2-14 Airport Lights

Taxiway Turnoff Lights

Taxiway Turnoff lights are green lights, which define a curved path, leading to the centerline of an intersecting taxiway.

Taxiway Lights

Taxiways are outlined with blue lights. Taxiway centerline lights are green in color and evenly spaced along the taxiway centerline.

Obstruction Lights

Obstructions such as tall buildings or towers are lighted to warn aviators of their presence. Obstruction lights consist of white high-intensity strobes or red flashing or steady lights.

Control of Lighting Systems

The Control Tower can vary the intensity of the lighting systems at most locations. Upon request, the lights may be turned up or down by the tower to accommodate prevailing meteorological conditions. At some airports, the lighting is automatically turned on at dark and off again at dawn. At these locations, the intensity is normally not variable.

Pilot Control of Airport Lighting

At some airports, the pilot can control runway lighting and its intensity from the air. This is accomplished by keying the microphone on a radio set to the appropriate frequency.

Airport (Rotating) Beacon

The primary purpose of the rotating beacon is to indicate the position or location of a lighted airport at night. The rotating beacon will have a green and white light, 180° apart. A civilian beacon will have a solid white light alternating with solid green. A military rotating beacon can be distinguished from a civilian beacon by the dual-peaked (two-quick) white flashes alternating with a solid green flash (Figure 2-15). The beacon is on from sunset to sunrise and sometimes during daylight hours when visibility is restricted.

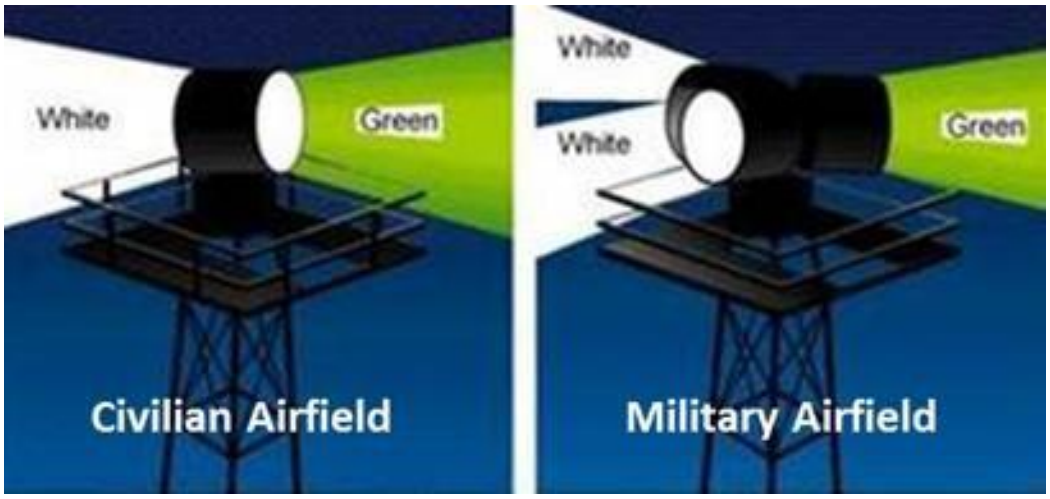


Figure 2-15 Rotating Beacons

ALTITUDES

Recall during the Aviation Weather module, altitude is defined as the height above a given reference. Three significant altitudes are discussed in that unit: true altitude (MSL), absolute altitude (AGL), and pressure altitude (PA) (Figure 2-16). A pilot must understand the terminology and be able to distinguish one type of altitude from another, in order to adhere to aviation regulations.

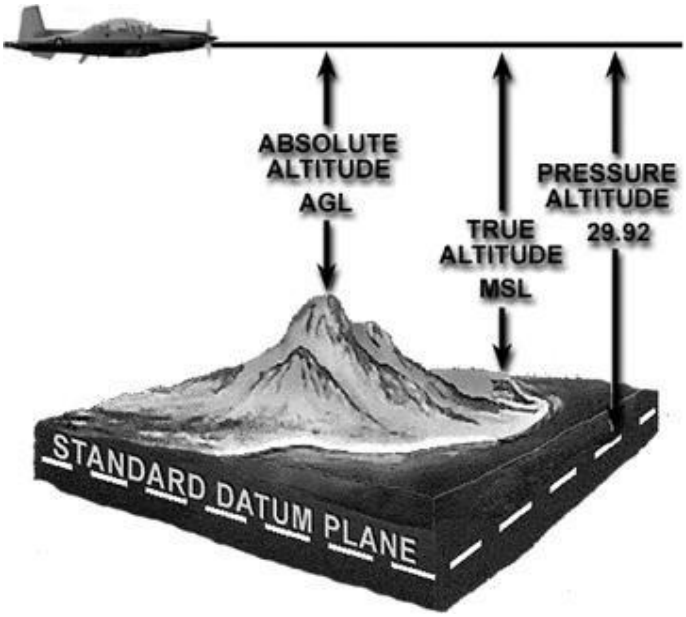


Figure 2-16 Altitudes

WEATHER CONDITION TERMS AND DEFINITIONS

CLOUD COVERAGE AND OBSTRUCTIONS TO VISION

Also during the Aviation Weather module, recall information defining cloud coverage, ceilings (Table 2-2) and visibility. Flight rules are heavily based on the weather conditions experienced by aircraft in the air, and during flight planning on the ground.

Reportable Contractions	Meaning	Amount of Sky Cover
SKC or CLR[1]	Sky Clear	0
FEW[2]	Few	> 0/8 - 2/8
SCT	Scattered	3/8 - 4/8
BKN	Broken	5/8 - 7/8
OVC	Overcast	8/8
VV	Obscured[3]	8/8 (surface based)

1. The abbreviation CLR is used at automated stations when no clouds at or below 12,000 feet are reported; the abbreviation SKC is used at manual stations when no clouds are reported.
2. Any amount less than 1/8 is reported as FEW.
3. The last 3 digits report the height of the vertical visibility into an indefinite ceiling.

Table 2-2 Sky / Cloud Coverage and Obstructions to Vision

FORECAST

A forecast is the worst conditions expected to occur during the period from one hour prior to one hour after the estimated time of arrival (ETA± 1 hr). We generally refer to forecast conditions by stating the ceiling and visibility. For brevity, only the numbers are stated, with the ceiling first, followed by the visibility (i.e., "1000/3" means a 1000 foot ceiling and 3 statute miles visibility).

VISUAL METEOROLOGICAL CONDITIONS (VMC)

Meteorological conditions, expressed in terms of visibility, distance from clouds, and ceiling, equal to or better than specified minima. VMC are flight weather conditions (Figure 2-17).

Figure 2-17 VMC

INSTRUMENT METEOROLOGICAL CONDITIONS (IMC)

Meteorological conditions expressed in terms of visibility, distance from clouds, and ceiling less than the minima specified for VMC. According to CNAF M-3710.7, Instrument Meteorological Conditions also exist any time a visible horizon is not distinguishable (Figure 2-18).

Figure 2-18 IMC

VISUAL FLIGHT RULES (VFR)

VFR are defined as rules governing the procedures for conducting flight under visual conditions. The term "VFR" can also be used in the following ways:

- "VFR" is used in the United States to indicate weather conditions equal to or greater than minimum VFR requirements, which are 1000/3.
- Indicates the rules an airport is operating under, i.e. if MCAS Miramar has weather equal to or greater than 1000/3, controllers will report "Miramar is VFR";
- Indicates a type of flight plan, i.e. "I am on a VFR flight plan."

INSTRUMENT FLIGHT RULES (IFR)

IFR are defined as rules governing the procedures for conducting flight under instrument conditions. The term "IFR" can also be used in the following ways:

- IFR is used in the United States to indicate weather conditions less than the minimum VFR requirements;

- Indicates the rules an airport is operating under, i.e. if NAS Pensacola has weather less than 1000/3, controllers will report "Sherman Field is IFR";

- Indicates a type of flight plan, i.e. "I am on an IFR flight plan."

- IFR flight plans can be conducted in either VMC or IMC.

VFR-ON-TOP

ATC authorization for an IFR aircraft to operate in VFR conditions at any appropriate VFR altitude. A pilot receiving this authorization must comply with the VFR visibility, distance from cloud criteria, and minimum IFR altitudes. This can be used after climbing through a cloud layer under ATC control, and then when "on-top" flying at an appropriate VFR altitude in lieu of an ATC assigned altitude, for example.

VISUAL FLIGHT RULES

SEE AND AVOID

When weather conditions permit, regardless of flight plan type, pilots are required to observe the presence of, and maneuver to avoid, other aircraft. CNAF M-3710.7 adds two measures to supplement the regulation. For multi-seat aircraft, electronic equipment such

as airborne radar should be used when feasible. Second, all aircraft shall request radar advisory services when available.

VFR WEATHER MINIMUMS

Takeoff--For VFR takeoff, the ceiling at the point of departure must be at least 1,000' AGL, and the prevailing visibility must be 3 SM or greater (Figure 2-19). If more stringent VFR minimums have been established for a particular airport, then the ceiling and visibility must be at or above those established minimums. There are special provisions
for flights that will remain in the traffic pattern for an airport under conditions less than stated above, provided the aircraft remain clear of clouds.

Figure 2-19 VFR Takeoff

En route--Maintain VMC throughout flight, per the weather criteria for the classification of airspace being flown in.

Destination--Destination weather minimums must also be 1,000' / 3 SM, (or above established minimums) and be forecast to remain so for a period of one hour before to one hour after the estimated time of arrival (ETA +/- 1 hour).

WEATHER CONDITIONS PRECLUDING VFR FLIGHT

The pilot in command has the following alternatives when encountering weather conditions en route which preclude compliance with VFR minimums:

- Alter route of flight so as to continue under VMC, or
- Remain in VMC until a change of flight plan is filed and IFR clearance is obtained, or
- Remain in VMC and land at a suitable alternate.

ADDITIONAL REQUIREMENTS

Aircraft may be operated on a VFR clearance above "broken clouds" or an "overcast sky," provided climb to and descent from such "on top" flight can be made in accordance with visual flight rules. However, aircraft shall be equipped and pilots qualified for instrument flight.

VFR FUEL PLANNING REQUIREMENTS

In addition to weather minimums, CNAF M-3710.7 imposes certain fuel requirements for ALL flights. All aircraft shall carry sufficient usable fuel, considering weather and mission requirements to fly from takeoff to the destination airfield plus a reserve of 10% of planned fuel requirements. In no case shall the 10% fuel reserve be less than that needed for 20 minutes of flight time, computed for the type of aircraft concerned. In the T-6, as for all turbine powered, fixed-wing aircraft, fuel reserve is based on maximum endurance operation at 10,000' MSL.

INSTRUMENT FLIGHT RULES

Instrument Flight Rules enable a pilot to fly when the weather conditions are less than the prescribed minimums for VFR flight. During flight in IMC, pilots are unable to provide their own visual separation; therefore, it must be achieved through external sources. This separation is provided by strict adherence to the instrument flight rules and is the responsibility of ATC.

GENERAL REQUIREMENTS

Increased Use of IFR Filing and Positive Control--To decrease the probability of midair collisions, all flights in naval aircraft shall be conducted in accordance with instrument flight rules to the maximum extent practicable. This requirement shall include all point-to-point and round-robin flights using Federal airways and other flights or portions thereof, such as flights to and from target or operating areas accessible through IFR filing. All other portions of flights shall be conducted under positive control to the maximum extent possible.

ATC Clearance Requirement--Flights shall not be made in IFR conditions within controlled airspace until an ATC clearance has been obtained.

INSTRUMENT APPROACHES AND LANDING MINIMUMS

General- An instrument approach is a series of predetermined maneuvers for the orderly transfer of aircraft under instrument flight conditions from the beginning of the initial approach to a landing or to a point from which a landing may be made visually. All approaches provide course and glideslope information. There are two types of approaches, precision and non-precision.

Precision Approach--A standard instrument approach procedure in which an electronic glideslope is provided (e.g., ILS and PAR).

Non-Precision Approach--A standard instrument approach procedure in which an electronic glideslope is not provided (e.g., VOR, TACAN, LOC, NDB, ASR).

Landing minimums are the lowest ceiling and visibility that can exist for a pilot to legally "shoot" an approach. They depend on the approach being executed and the approach speed of the aircraft. The more accurate the course and glideslope information, the lower the minimums will be. Therefore precision approaches will usually have the lowest landing minimums.

Depending on the direction of landing, the instrument approach will terminate as a "straight in" or "circle to land" (Figure 2-20). For example, a pilot can execute a TACAN RWY 27 approach to land on any runway at the airport. If the winds are out of the west (270°) and the runway in use is 27, the pilot would execute a "straight in" landing to runway 27. If the winds were out of the east and the airport was landing runway 09, the pilot could execute the same TACAN RWY 27 approach, but once the required visual reference to the airport was established, the pilot would "circle" the runway to land on 09.

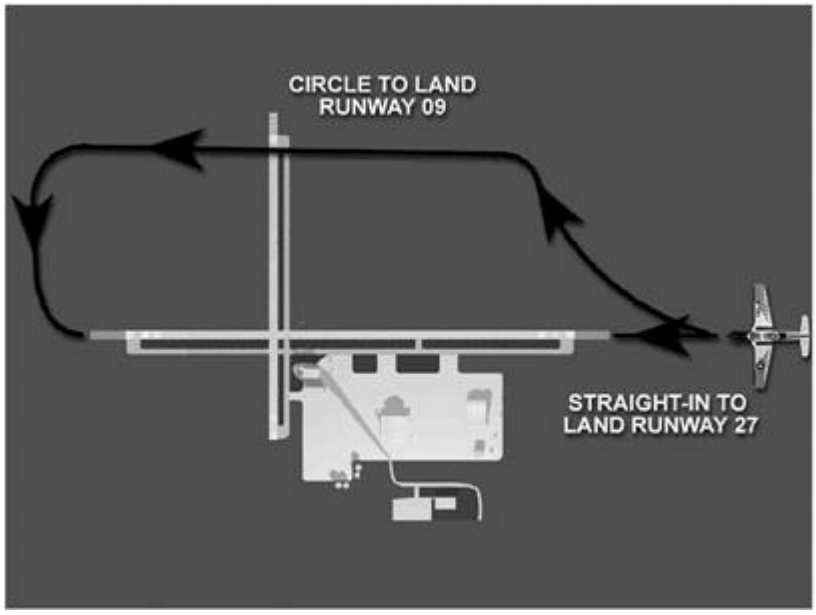


Figure 2-20 Circle To Land

Instrument approach procedures and landing minimums are published in DOD FLIP (Terminal Instrument Approach Procedures) or other similar type publication. For straight-in approaches, pilots shall use RVR, if available, to determine if visibility meets the weather criteria for approaches set forth in the following subparagraphs. Prevailing visibility shall be used for circling approach criteria.

Helicopter and title rotor required visibility minimum may be reduced by one-half, but not less than one-fourth mile / 1,200' RVR. Special instrument approach procedures designated "COPTER" shall not have their visibility reduced.

Approach Criteria for Multi-piloted Aircraft--When reported weather is at or below published landing minimums for the approach to be conducted, an approach shall not be commenced in multi-piloted aircraft unless the aircraft has the capability to proceed to a suitable alternate in the event of a missed approach.

Approach Criteria for Single-Piloted Aircraft--An instrument approach shall not be commenced if the reported weather is below published minimums for the type of approach being conducted. Once an approach has been commenced, pilots may, at their discretion, continue the approach to the approved published landing minimums as shown in the appropriate Flight Information Publication for the type approach being conducted. Absolute minimums for a single-piloted aircraft executing a precision approach are 200 foot ceiling / height above touchdown (HAT) and visibility ½ SM / 2,400' RVR or the

published minimums, whichever is higher.

Single-piloted aircraft that are configured for and assigned all-weather missions with side-by-side seating occupied by the pilot in command and an assisting naval flight officer (NFO) may operate within the same filing, clearance, and approach criteria specified above for multi-piloted aircraft, with the following provisions:

- The assisting NFO is instrument qualified in accordance with CNAF M-3710.7 and NATOPS qualified in the model aircraft in which NFO duties are being performed, and

- Cockpit configuration is such that the assisting NFO can monitor the pilot's flight instruments, monitor and control communications, and assist the pilot in acquiring the runway visually.

Criteria for Continuing Instrument Approaches to a Landing--Pilots shall not descend below the prescribed minimum descent altitude (MDA) or continue an approach below the decision height (DH) unless they have the runway environment in sight and in their judgment a safe landing can be executed, either straight-in or from a circling approach, whichever is specified in their clearance.

Reasons for Directing a Missed Approach--The controller will issue instructions to execute a missed approach or to climb and maintain a specific altitude and heading whenever the completion of a safe approach is questionable. Some situations that would require a missed approach include field conditions, conflicting traffic, or other unsafe conditions observed from the tower that might prevent approach completion.

When so directed, execution of the missed approach is mandatory. The controller phraseology will be "Execute missed approach," followed by the reason for the missed approach (i.e., "Aircraft ahead of you has taken the arresting gear"); or the controller will issue instructions to climb to and maintain a specific altitude and fly a specified heading and give the reason for such instructions.

Note: Pilots may execute a missed approach at their own discretion at any time.

DESTINATION AND ALTERNATE FLIGHT PLANNING WEATHER MINIMUMS

When an IFR flight plan is required, there are occasions when weather conditions (fog, snow, thunderstorms) rapidly deteriorate below the approach weather minimums at the destination airfield. An aviator should always consider this possibility when filing an IFR flight plan and should select an "alternate" airfield even if not required for filing

purposes.

The criteria in Table 2-3 (from CNAF M-3710.7) are used to determine alternate airport requirements for flight-planning purposes. The forecast for the planned destination during the time frame of ETA± 1 hour is used to determine if an alternate airfield is required, and if so what the forecast at that alternate needs to be.

<table>
<tr><th>DESTINATION WEATHER
ETA plus and minus 1 hour</th><th colspan="2">ALTERNATE WEATHER
ETA plus and minus 1 hour</th></tr>
<tr><td>0 – 0 up to but not including Published minimums</td><td colspan="2">3,000 – 3 or better</td></tr>
<tr><td rowspan="2">Published minimums up to but not including 3,000 – 3 (single – piloted absolute minimums 200 – 1/2) (single – piloted helicopter/tilt – rotor absolute minimums 200 – 1/4)</td><td>NON-PRECISION</td><td>PRECISION</td></tr>
<tr><td>*Published minimums plus 300 – 1</td><td>*Published minimums plus 200 – 1/2</td></tr>
<tr><td>3,000 – 3 or better</td><td colspan="2">No alternate required</td></tr>
<tr><td colspan="3">*In the case of single – piloted or other aircraft with only one operable UHF/VHF transceiver, radar/airport surveillance approach (PAR/ASR) minimums may not be used as the basis for selection of an alternate airfield.</td></tr>
</table>

Table 2-3 IFR Filing Criteria

When an alternate is required, it must have a published approach compatible with installed operable aircraft navigational equipment (i.e., VOR or TACAN) that can be flown without the use of two-way radio communications whenever either of the following conditions is met:

- The destination lacks the above-described approach.
- The forecast weather at the alternate is below 3,000-foot ceiling and 3 SM visibility during the period 1 hour before ETA until 1 hour after ETA.

This ensures that in the event of a two-way radio failure, the aircraft is equipped to execute a published approach at either the destination or alternate.

IFR FUEL REQUIREMENTS

No Alternate Required--The minimum fuel requirements for an IFR flight with no alternate required are the same as those for VFR flight.

Alternate Required--If an alternate is required, the aircraft shall carry sufficient useable fuel to fly from takeoff to the approach fix serving the destination and thence to an alternate airfield plus a reserve of 10% of planned fuel requirements.

In no case shall the 10% fuel reserve be less than that needed for 20 minutes of flight time, computed for the type of aircraft concerned. In the T-6, as for all turbine powered, fixed-wing aircraft, fuel reserve is based on maximum endurance operation at 10,000' MSL.

VFR / IFR CRUISING ALTITUDES / SEMICIRCULAR RULES

Cruising altitudes for VFR, VFR-ON-TOP, and IFR air traffic are determined by established semicircular rules. The compass has been divided into two general directions: east and west. Magnetic courses (not headings) of 0° through 179°
are considered east for cruising altitude purposes. Magnetic courses of 180° through 359° are considered west for cruising altitude purposes.

VFR CRUISING ALTITUDES

These cruising altitudes apply to flights above 3,000' AGL and will determine the altitude the pilot will fly. To determine the appropriate VFR or VFR-ON-TOP cruising altitude, use the semi-circular rules (Figure 2-21).

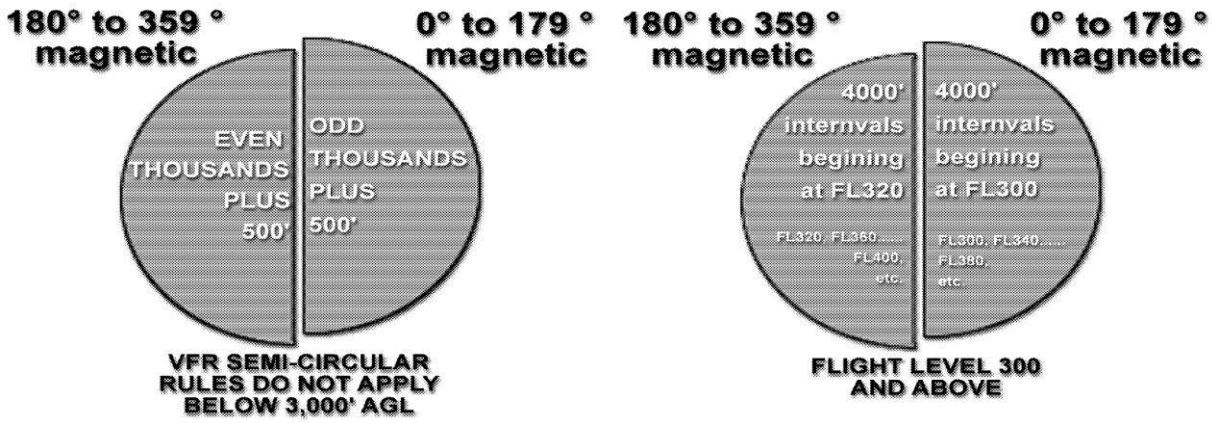


Figure 2-21 VFR Cruising Altitudes

Note: Aircraft flying VFR at 3,000' AGL or below may use any altitude desired regardless of the direction of flight.

For flights above 3.000' AGL and below 18.000' MSL. with a magnetic course of:

- 0° to 179° Odd thousand foot MSL altitude plus 500' (3,500, 5,500, 9,500, etc.)
- 180° to 359° Even thousand foot MSL altitude plus 500' (4,500, 6,500, 10,500 etc.)

For flights above 18.000' MSL to FL 290. with a magnetic course of:

- 0° to 179° Odd flight levels plus 500' (FL 195, FL 215, FL 235, etc.)
- 180° to 359° Even flight levels plus 500' (FL 185, FL 205, FL 225,

etc.) For flights above FL 290. with a magnetic course of:

- 0° to 179° Any flight level, at 4,000 foot intervals, beginning at and including FL 300 (FL 300, FL 340, FL 420 etc.)
- 180° to 359° Any flight level at 4,000 foot intervals, beginning at and including FL 320 (FL 320, FL 360, FL 440 etc.)

VFR flights above 18,000' MSL are regularly conducted outside of U.S. airspace. An example is an operational mission from an air station to an aircraft carrier. The aircraft will go operational VFR outside of U.S. airspace and will utilize the VFR cruising altitudes. Also, while you are following an IFR flight plan in VMC, if ATC approves your request for "VFR on top," the VFR semicircular rules apply.

IFR CRUISING ALTITUDES

Cruising altitudes for IFR flights operating in controlled airspace will be assigned by ATC. The semicircular rules are used primarily for preflight planning and for flights in uncontrolled airspace (Figure 2-22).

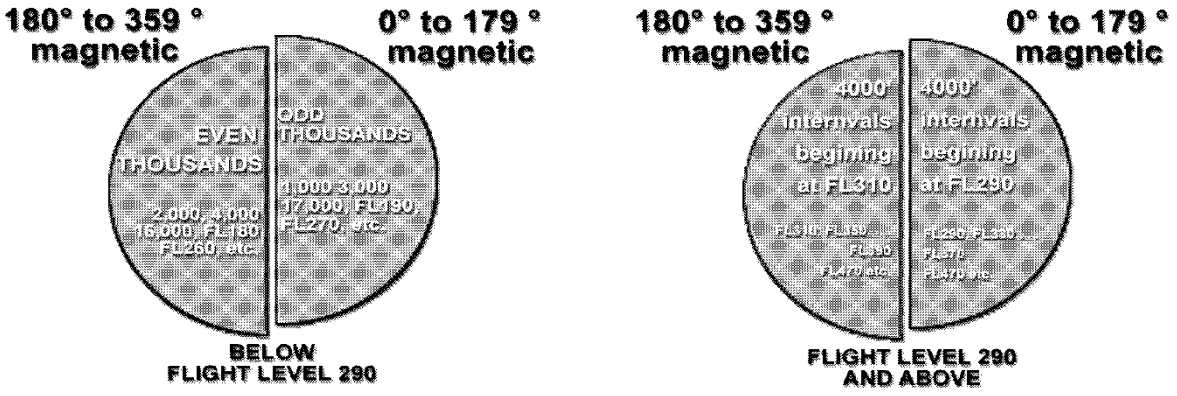


Figure 2-22 IFR Cruising Altitudes

For flights below 18,000' MSL, with a magnetic course of:

- 0° to 179° Odd thousand foot MSL altitude (3,000, 5,000, 9,000, etc.)
- 180° to 359° Even thousand foot MSL altitude (4,000, 6,000, 10,000, etc.)

For flights above 18,000' MSL and below FL 290, with a magnetic course of:

- 0° to 179° Odd flight levels (FL 190, FL 210, FL 230, etc.)
- 180° to 359° Even flight levels (FL 200, FL 220, FL 240, etc.)

For flights at FL 290 or above, with a magnetic course of:

- 0° to 179° Any flight level, at 4,000 foot intervals, beginning at and including FL 290 (FL 330, FL 370, FL 450 etc.)
- 180° to 359° Any flight level at 4,000 foot intervals, beginning at and including FL 310 (FL 350, FL 390, FL 470 etc.)

AEROBATIC FLIGHT

Aerobatic flight is defined as an intentional maneuver involving abrupt bank angles greater than 60°, pitch angles greater than ±45°, or accelerations greater than 2.0 g (Figure 2-23). A "break" maneuver that conforms to the model NATOPS Flight Manual is not considered to be aerobatic flight. Both FAR and CNAF M-3710.7 have restrictions on the conduct of aerobatic maneuvers as to location and weather conditions.

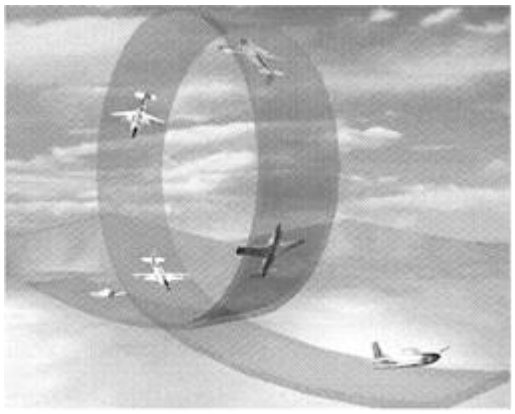


Figure 2-23 Aerobatic Flight

GENERAL

The CNO does not desire to discourage or curtail aerobatic training; however, it is of the utmost importance that aerobatic training be well regulated as to time, place, and conditions which enhance safety of flight.

AEROBATIC FLIGHT P

PRECAUTIONS FAR Part 91

FAR Part 91 states that no person may operate an aircraft in aerobatic flight:

- Over any congested area of a city, town, or settlement
- Over an open air assembly of persons
- Within Class B, C, D, or E airspace designated for an airport, or within the limits of Federal airways
- Below an altitude of 1,500' AGL
- When visibility is less than 3 SM

CNAF M-3710.7

CNAF M-3710.7 states all of the above FAR Part 91 aerobatic flight restrictions, and additionally states that aerobatic flight maneuvers shall not be performed:

- If prohibited by a particular aircraft's NATOPS Manual

CNAF M-3710.7 restates the FAR restrictions in order to apply those restrictions to naval aircraft operating world-wide; not just while operating under FAA jurisdiction.

Note: Individual commands may be more restrictive. For example, 5,000' AGL is the minimum altitude for aerobatic flight in Training Command aircraft.

Designated Aerobatic Areas

Appropriate commanders shall establish and designate areas in which aerobatics may be performed in compliance with the above restrictions and, pursuant to FAR Part 91, in airspace where FAR apply. Pilots are encouraged to conduct aerobatic flight within the limits of designated aerobatic areas whenever the assigned mission permits.

Unusual Maneuvers Within Class B, C, and D Airspace

CNAF M-3710.7 states that pilots shall not perform or request clearance to perform unusual maneuvers within Class B, C, or D airspace if such maneuvers are not essential to the performance of the flight. ATC personnel are not permitted to approve a pilot's request or ask a pilot to perform these maneuvers.

Unusual maneuvers include unnecessary low passes, unscheduled flybys, climbs at very steep angles, practice approaches to altitudes below specific minimums (unless a landing is to be made), or any so-called "flat hatting" wherein a flight is conducted at a low altitude and/or a high rate of speed for thrill purposes.

ASSIGNMENT SHEET 7-2-3

VISUAL / INSTRUMENT FLIGHT RULES

A. INTRODUCTION

This lesson provides an introduction to the airport environment, and to CNAF M-3710.7 and Federal Aviation Regulations as they apply to Altitudes, Flight Weather Conditions, Visual Flight Rules, Instrument Flight Rules, Semicircular Cruising Altitude Rules, and Aerobatic Flight.

B. ENABLING OBJECTIVES

C. STUDY ASSIGNMENT

1. Complete Assignment Sheet Visual / Instrument Flight Rules before this class.

D. STUDY QUESTIONS

1. While flying at night, you approach an airport on a heading of 180^{o}. The tetrahedron's spar is pointed 90^{o} left of the aircraft's heading. On what runway are you expected to land?

   a. 09
   b. 18
   c. 27
   d. 36

2. Match the Aldis lamp signals in Column I with the appropriate meanings in Column II regarding an airborne aircraft.

	Column I		Column II
_____	Flashing red	a.	Give way to other aircraft and continue circling
_____	Alternating red & green	b.	Return for landing
_____	Flashing green	c.	Has no meaning
_____	Steady red	d.	Cleared to land
_____	Steady green	e.	Exercise extreme caution
_____	Flashing white	f.	Airport unsafe, do not land

3. What airport signs have white letters on a red background?

   a. Location signs
   b. Direction signs
   c. Information signs
   d. Mandatory instruction signs

4. A waveoff tells the pilot _____ and is _____.

5. A wind sock is a free-swing indicator installed near the operational area of an airport to indicate _ _____

6. A tetrahedron is located near the operational runway and is used to indicate _____

7. The colors of the lights for a tetrahedron are _____and _____

8. For a VASI glideslope indicator, what would two red lights over two white lights indicate to a pilot on final approach?

   a. Below glideslope
   b. On glideslope
   c. Above glideslope
   d. Waveoff

9. What are the basic VFR minimums?

   a. 300'/1 SM
   b. 1,000'/1 SM
   c. 1,000'/3 SM
   d. 3,000'/ 3 SM

10. An instrument approach that provides an electronic glideslope is a _____approach.

11. What table from CNAF M-3710.7 is used to determine if an alternate airport is required for a flight plan?

    a. IFR filing criteria
    b. IFR alternate criteria
    c. DoD enroute flight planning
    d. Weather for naval aviators

12. Per semi-circular rules, a magnetic course of 360° is considered _____ and 180° is considered_____

13. VFR semicircular rules start at what altitude? _____

14. You are on an easterly course on a VFR flight plan. According to the semicircular rules, you would fly at which of the following altitudes?

    a. 13,500' MSL
    b. 14,500' MSL
    c. 15,000' MSL
    d. 16,000' MSL

15. An aircraft flying IFR eastbound in Class A airspace would fly at which of the following altitudes?

    a. FL 230
    b. FL 245
    c. FL 260
    d. The assigned altitude

16. IFR semicircular altitudes are used only for pre-flight planning and when the aircraft is flying in _____airspace.

17. While planning an IFR flight, you compute a magnetic heading of 358° to maintain a magnetic course of 004°. What altitude would you request?

    a. 5,000' MSL
    b. 10,500' MSL
    c. 11,500' MSL
    d. 16,000' MSL

18. Aerobatic flight is defined as a(n) _____ maneuver involving abrupt bank angles greater than _____, pitch angles greater than _____, or accelerations greater than _____ .

19. Where can naval aviators execute aerobatic maneuvers?

    a. Over congested areas
    b. If they remain at least 1,500' above the surface and have at least 3 statute miles visibility
    c. Within a federal airway
    d. Within Class A airspace in IMC

Answers to Lesson Topic 7.2 Study Questions

1. a. 09
2. f, e, b, a, d, c
3. d. Mandatory instruction signs
4. "Do Not Land", Mandatory
5. wind direction and approximate velocity
6. direction of landing and take off
7. green, red
8. b. On glideslope
9. c. 1,000' / 3 SM
10. Precision
11. a. IFR filing criteria
12. east, west
13. 3,000' AGL
14. a. 13,500' MSL
15. d. The assigned altitude
16. uncontrolled
17. a. 5,000' MSL
18. intentional, bank angles greater than 60°, pitch angles greater than ±45°, accelerations greater than 2.0g.
19. b. If they remain at least 1,500' above the surface and have at least 3 statute miles visibility.

Semi-Circular Rules

V	-	**VFR**	**V**	**+500**
I	-	**IFR**	**I**	**+000**
E	-	**EAST**	**E**	**ODD**
W	-	**WEST**	**W**	**EVEN**

	Sea Level to 18,000' MSL				FL 180 to FL 290			FL 290 and above	
IFR EAST	1000	3000	5000…	17,000	FL 190	FL 210…	FL 270	FL 290	FL 330…
VFR EAST		3500	5500…	17,500	FL 195	FL 215…	FL 275	FL 300	FL 340…
IFR WEST	2000	4000	6000…	FL 180	FL 200	FL 220…	FL 280	FL 310	FL 350…
VFR WEST		4500	6500…	FL 185	FL 205	FL 225…	FL 285	FL 320	FL 360…

OUTLINE SHEET 7-3-1

AIRSPACE AND GENERAL FLIGHT RULES

A. INTRODUCTION

This lesson provides an introduction to CNAF M-3710.7 and Federal Aviation Regulations as they apply to Airspace, Airspace Classification, VFR Weather Minimums, Special Use Airspace, and General Flight Rules.

B. ENABLING OBJECTIVES

2.372 IDENTIFY the difference between controlled and uncontrolled airspace, in a classroom, in accordance with Naval Aviation Fundamentals, NAVAVSCOLSCOM-SG-200

2.373 IDENTIFY the dimensions of and requirements for entry into the following controlled airspaces: Class A, Class B, Class C, Class D, Class E, and Class G, in a classroom, in accordance with Naval Aviation Fundamentals, NAVAVSCOLSCOM-SG-200

2.374 IDENTIFY the dimensions of and types of airspace that make up VOR airways and Jet Routes, in a classroom, in accordance with Naval Aviation Fundamentals, NAVAVSCOLSCOM-SG-200

2.375 IDENTIFY the requirements for Mode C, in a classroom, in accordance with Naval Aviation Fundamentals, NAVAVSCOLSCOM-SG-200

2.376 IDENTIFY the VFR weather minimums for all classifications of airspace, in a classroom, in accordance with Naval Aviation Fundamentals, NAVAVSCOLSCOM-SG-200

2.377 IDENTIFY the purposes of, and entry restrictions for, the following Special Use Airspaces: Prohibited Area, Restricted Area, Warning Area, Military Operations Area (MOA), and Alert Area, in a classroom, in accordance with Naval Aviation Fundamentals, NAVAVSCOLSCOM-SG-200

2.378 IDENTIFY the rules concerning the use of aircraft lighting, in a classroom, in accordance with Naval Aviation Fundamentals, NAVAVSCOLSCOM-SG-200

2.379 IDENTIFY an aircraft's relative position by using aircraft position lights, in a classroom, in accordance with Naval Aviation Fundamentals, NAVAVSCOLSCOM-SG-200

2.380 IDENTIFY the rules concerning right-of-way between aircraft, in a classroom, in accordance with Naval Aviation Fundamentals, NAVAVSCOLSCOM-SG-200

2.381 IDENTIFY the FAR Part 91 and CNAF M-3710.7 (series) rules concerning altitude restrictions, in a classroom, in accordance with Naval Aviation Fundamentals, NAVAVSCOLSCOM-SG-200, FAR Part 91, and CNAF M-3710.7 (series)

2.382 IDENTIFY the airspeed restrictions in the following airspaces: Below 10,000' MSL, Below Class B Airspace, and within Class B, C, and D Airspace, in a classroom, in accordance with Naval Aviation Fundamentals, NAVAVSCOLSCOM-SG-200

2.383 IDENTIFY the rule concerning careless or reckless flying, in a classroom, in accordance with Naval Aviation Fundamentals, NAVAVSCOLSCOM-SG-200

2.384 IDENTIFY the rule concerning the annoyance to civilians and endangering private property, in a classroom, in accordance with Naval Aviation Fundamentals, NAVAVSCOLSCOM-SG-200

2.385 IDENTIFY the restrictions on flight in the vicinity of the following areas: Noise sensitive and wilderness areas, wildlife preserves, temporary flight restrictions, commercial carriers, and aircraft of civil registry, in a classroom, in accordance with Naval Aviation Fundamentals, NAVAVSCOLSCOM-SG-200

2.386 IDENTIFY the restrictions on flat hatting and zooming of vessels, in a classroom, in accordance with Naval Aviation Fundamentals, NAVAVSCOLSCOM-SG-200

C. TOPIC OUTLINE

1. Introduction
2. This Lesson Topic
3. Airspace
4. Airspace Classification, Dimensions, and Requirements
5. Airways and Route Systems
6. Mode C Requirements
7. VFR Weather Minimums
8. Special Use Airspace
9. Aircraft Lighting
10. Right-of-Way Rules
11. Altitude Restrictions

12. Airspeed Restrictions
13. Reducing Flight-Related Disturbances
14. Careless or Reckless Flying
15. Noise Sensitive and Wilderness Areas
16. Noise Sensitive and Wilderness Area Restrictions
17. Wildlife Preserves
18. Temporary Flight Restrictions (Public Interest Areas)
19. Flat Hatting
20. Zooming of Vessels
21. Summary and Review
22. Assignment
23. Application

INFORMATION SHEET 7-3-2

AIRSPACE AND GENERAL FLIGHT RULES

A. INTRODUCTION

This lesson provides an introduction to CNAF M-3710.7 and Federal Aviation Regulations as they apply to Airspace, Airspace Classification, VFR Weather Minimums, Special Use Airspace, and General Flight Rules.

B. REFERENCES

1. Book, Aeronautical Information Manual, AIM
2. DoD Flight Information Publication (FLIP) General Planning, GP-1
3. Federal Aviation Regulations, 14 CFR Part 91
4. NATOPS General Flight and Operating Instructions Manual, CNAF M-3710.7 (series)

C. INFORMATION

AIRSPACE

Airspace can be divided into two broad categories: controlled and uncontrolled. The differentiation is based on the complexity or density of aircraft movements, the nature of the operations conducted within the airspace, and the level of safety required. It is important that aviators be familiar with the operational requirements for each (Figure 3-1).

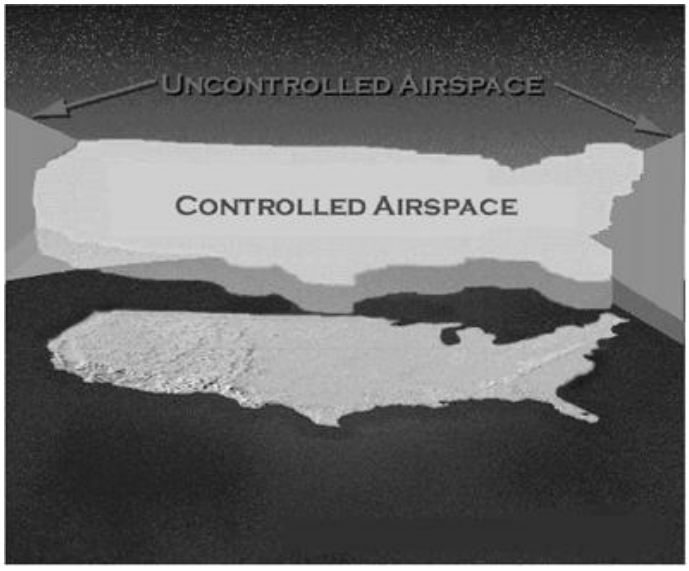


Figure 3-1 Airspace Overview

CONTROLLED AIRSPACE

A generic term that covers the different classifications of airspace (Class A, B, C, D, and E) and defined dimensions within which air traffic control service is provided in accordance with the airspace classification (Figure 3-2). In controlled airspace, the respective ATC has both the authority and ability to control that airspace.

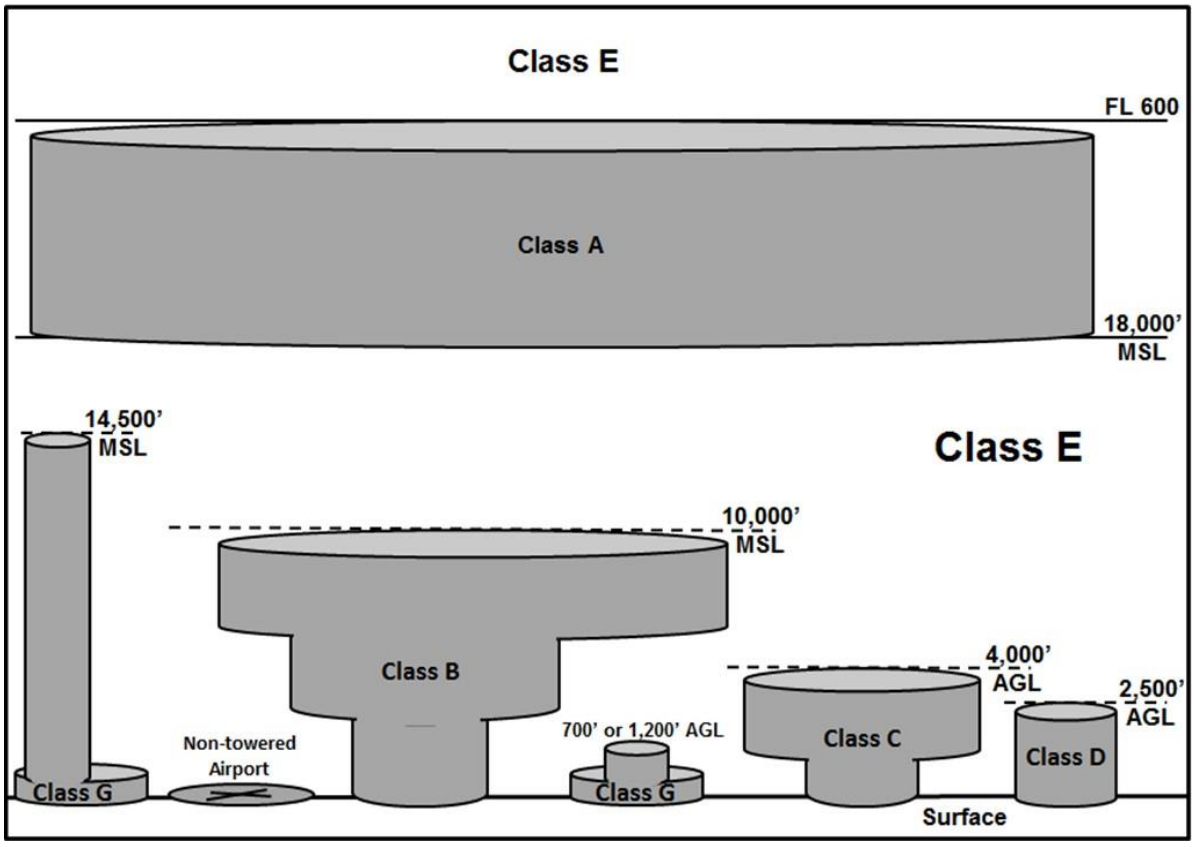


Figure 3-2 Controlled Airspace

UNCONTROLLED AIRSPACE

A generic term for all airspace under FAA jurisdiction that is not Class A, B, C, D, or E, and in which no air traffic control services are provided. In uncontrolled airspace, the respective ATC has either no authority or no ability to control that airspace, or both.

AIRSPACE CLASSIFICATION - DIMENSIONS AND REQUIREMENTS

The FAA in conjunction with ICAO has divided airspace into six classes, Classes A through E and G. The competent pilot must know the characteristics of each class in order to comply with the operating regulations. Except for Class A airspace, the airspaces are clearly marked on aeronautical charts. The classes are individually described below. Unless otherwise stated, all altitudes are MSL.

CLASS A AIRSPACE

Generally, Class A consists of all airspace from 18,000' MSL up to and including FL600, overlying the continental United States, including the airspace within 12 nautical miles of the coast (Figure 3-3). Class A airspace also exists over most of, but not all of, Alaska. Unless otherwise authorized, all aircraft within Class A airspace must operate under IFR. ATC will not authorize VFR or VFR-ON-TOP in Class A airspace.

Figure 3-3 Class "A" Airspace

Additionally, the following requirements apply:

• The pilot and aircraft must be instrument certified.

• A transponder with Mode C (automatic altitude reporting).

• Prior permission in the form of an IFR clearance must be received from ATC prior to entering Class A airspace.

• Establish two-way radio communications with ATC prior to entry and maintain those communications thereafter.

CLASS B AIRSPACE

Class B airspace generally consists of that airspace from the surface to 10,000' MSL surrounding the nation's busiest airports in terms of IFR operations or passenger boardings (Figure 3-4). The configuration of each Class B airspace is individually tailored and consists of a surface area and

two or more layers. Class B airspace areas resemble upside-down wedding cakes. The airspace is configured to contain all published instrument procedures for the Class B airport. Included among the requirements to operate in the airspace are:

• The pilot must have at least a Private Pilot Certificate (designated aviator when flying a military aircraft).

• For IFR operations, an operable VOR or TACAN receiver.

• A transponder with Mode C.

• ATC clearance prior to operations.

• Establish two-way radio communications with ATC prior to entry and maintain those communications thereafter.

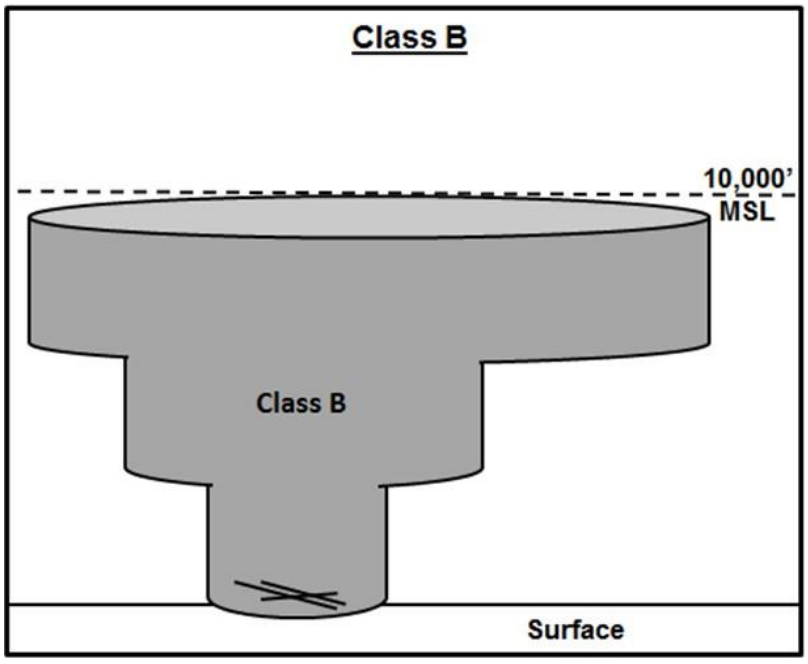


Figure 3-4 Class "B" Airspace

CLASS C AIRSPACE

Generally, Class C airspace consists of that airspace from the surface to 4,000' AGL (airport elevation is charted in MSL) surrounding those airports that have an operational control tower, are serviced by a radar approach control, and have a certain number of IFR operations or passenger boarding's (Figure 3-5). Although the configuration of each Class C airspace area

can be individually tailored, the airspace usually consists of a 5 nm radius core surface area that extends from the surface up to 4,000' AGL and a 10 nm radius shelf area that extends from 1,200' to 4,000' AGL.

Pilots operating within the boundaries of Class C are required to meet the following requirements:

• The aircraft must have an operable transponder with Mode C.

• Establish two-way radio communications with ATC prior to entry and maintain those communications thereafter.

Note: Two-way communications is considered established, for the purposes of entry into Class C airspace when ATC responds with the aircraft's specific call sign.

For example, 2E123 calls Pensacola Approach to make a request; and Pensacola Approach responds, "2E123, this is Pensacola Approach, stand by." Two-way communications have been established and 2E123 can legally enter the Pensacola Class C airspace (provided the aircraft has an operating transponder with Mode C). If Pensacola Approach responds, "Aircraft calling Pensacola Approach, stand by;" two-way communications have not been established and 2E123 cannot legally enter the Pensacola Class C airspace.

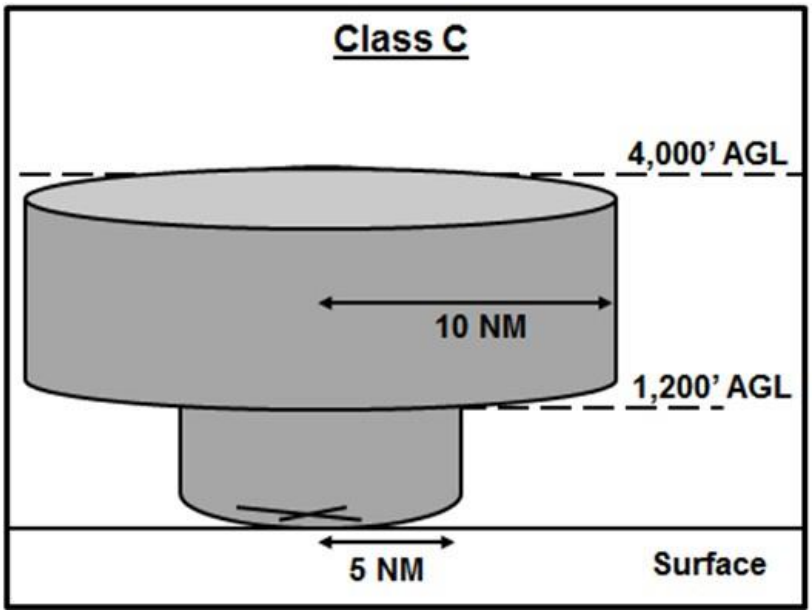


Figure 3-5 Class "C" Airspace

CLASS D AIRSPACE

Generally, Class D airspace consists of the airspace extending from the surface to 2,500' AGL surrounding airports with an operational control tower (Figure 3-6). The horizontal limits are tailored to individual airports but generally have a core radius of 4 nm and extensions as necessary for instrument approaches. Two-way radio communication with the ATC facility providing ATC services must be established before the aircraft enters and maintained while operating within Class D airspace.

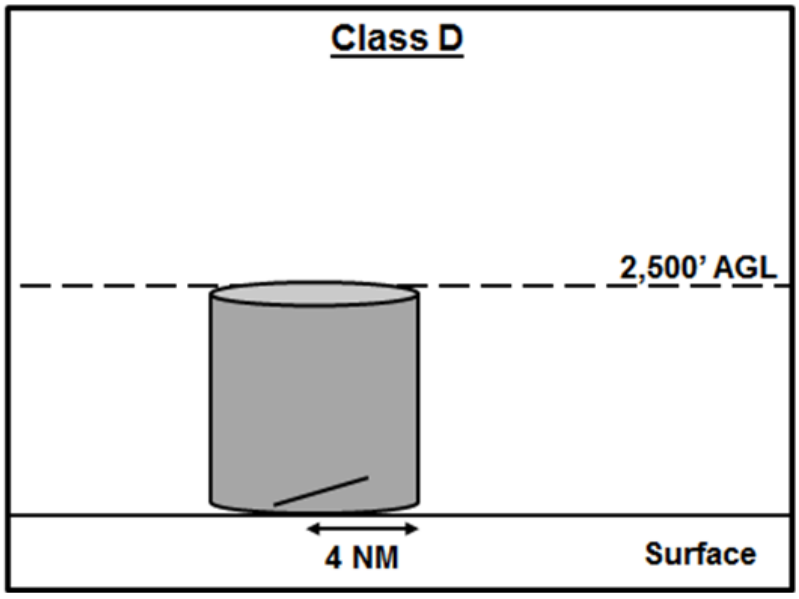


Figure 3-6 Class "D" Airspace

CLASS E AIRSPACE

Class E airspace is the controlled airspace that is not designated Class A, B, C, or D. Its dimensions and requirements are as follows:

• Except for 18,000' MSL, Class E airspace has no defined vertical limit; rather it extends upward to the overlying or adjacent controlled airspace. Unless designated at a "lower altitude," Class E airspace begins at 14,500' MSL, excluding airspace less than 1,500' AGL (i.e. mountainous terrain). The "lower altitude" mentioned would be:

- The surface in the case of a surface area designated for an airport without an operating control tower.

- 700' AGL or higher when designated in conjunction with an airport for which an approved instrument approach procedure has been prescribed.

- 1,200' AGL or higher when transitioning to or from the terminal or enroute environment
- 1,200' AGL or higher when designated in conjunction with segments of airways or routes.

• The lower limit of 14,500' MSL is found mostly in the western United States where there are large areas with minimal air traffic. The 1,500' AGL exclusion accounts for low altitudes in mountainous areas where there is limited radar coverage. The 700' and 1,200' AGL floors are sometimes established when radar coverage cannot be guaranteed below these altitudes.

• There are no specific pilot certification, equipment, arrival, or through-flight entry requirements for Class E airspace. Therefore, Class E airspace is controlled airspace; but you must volunteer for control. There are many types of Class E airspace, including:

- Extensions to Class B, C, and D surface areas providing controlled airspace to contain standard instrument approach procedures, without imposing a communications requirement on pilots operating VFR.
- Transition airspace used for transition to/from the terminal or en route environment.
- Federal airways. These include the colored airways based on L/MF NAVA IDs and the "Victor" Airways based on VOR NAVA IDs.

CLASS G AIRSPACE

Class G airspace is uncontrolled airspace. It is generally found where radar coverage is incomplete or where air traffic is minimal. The FAA provides minimal guidance to pilots in uncontrolled airspace.

AIRWAYS AND ROUTE SYSTEMS

In addition to the area surrounding an airport, controlled airspace has been established to regulate and standardize routing of air traffic between airports. These airways and routes are defined by two or more radio navigational aids, such as VOR or VORTAC stations, between which exists a corridor of controlled airspace with defined dimensions. These are often described as the "highways in the sky" because most air traffic is on the airway or route system.

VOR Airways are commonly called Victor Airways because they are identified by the letter "V" followed by a number, e.g., V198 or V5. They extend from 1,200' AGL to, but not including, 18,000' MSL (unless otherwise specified) (Figure 3-7). The width of the Victor Airway is 4 nm either side of centerline (8 nm total). They are numbered the same as our national highway system (east/west--even, north/south--odd).

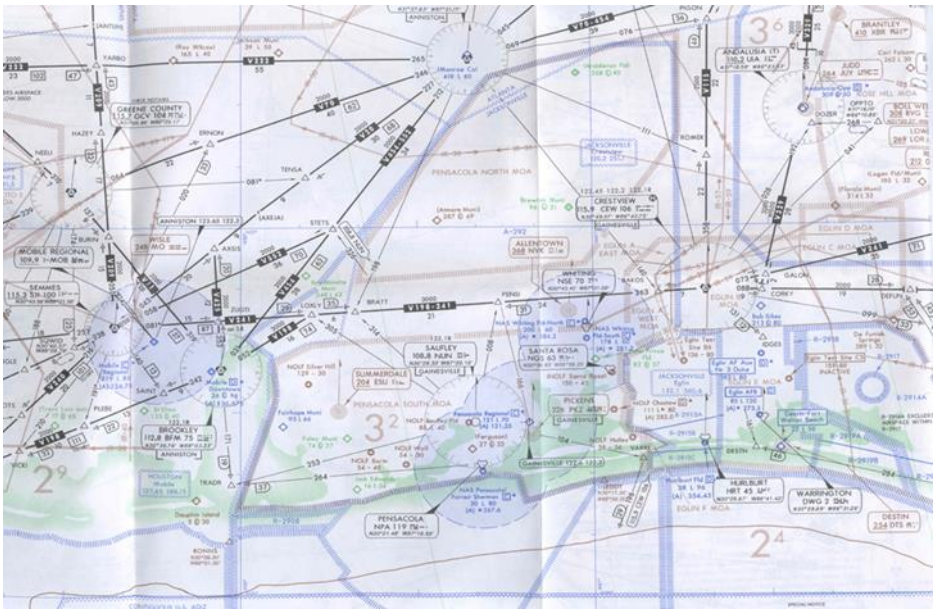


Figure 3-7 VOR Airway

Jet Routes are not airways. They standardize routing in Class A airspace and are designated by the letter "J" and a number, e.g., J145 or J2. They extend from 18,000' MSL to FL450 and have no defined width (Figure 3-8). The upper limit is established to prevent interference between stations with similar NAVAID frequencies.

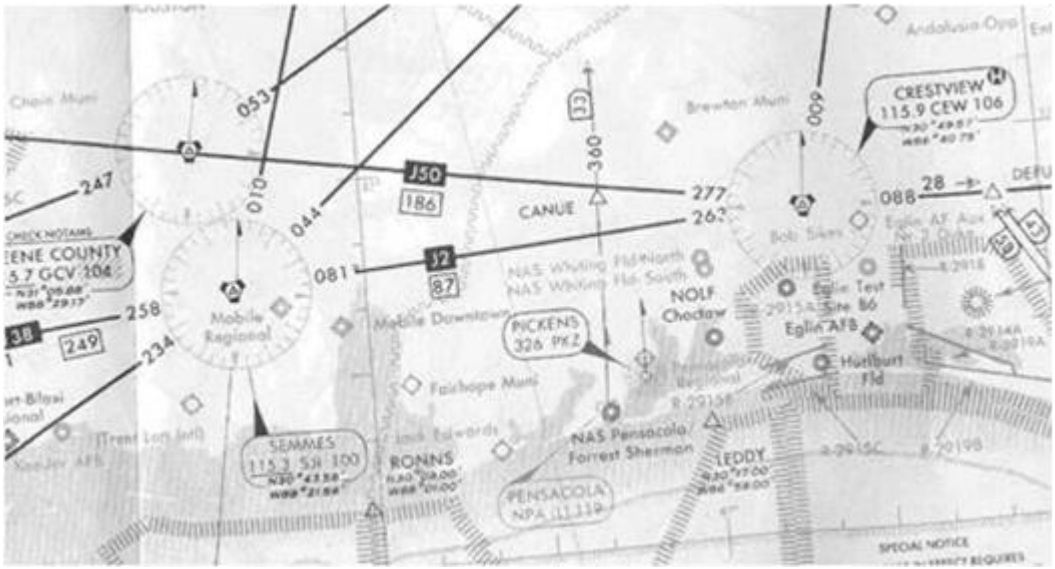


Figure 3-8 Jet Route

MODE C REQUIREMENTS

All aircraft operating within the following areas, in addition to previously defined requirements for Class A, B, and C airspaces, must be equipped with an operable Mode C transponder (Figure 3-9):

• All airspace at and above 10,000' MSL.

Class B:
• All airspace within 30 nm of a Class B airport from the surface to 10,000' MSL.
• Extensions beyond 30 nm, above the ceiling up to 10,000’ MSL.

Class C:
• Above the ceiling and lateral boundaries, up to 10,000’ MSL.

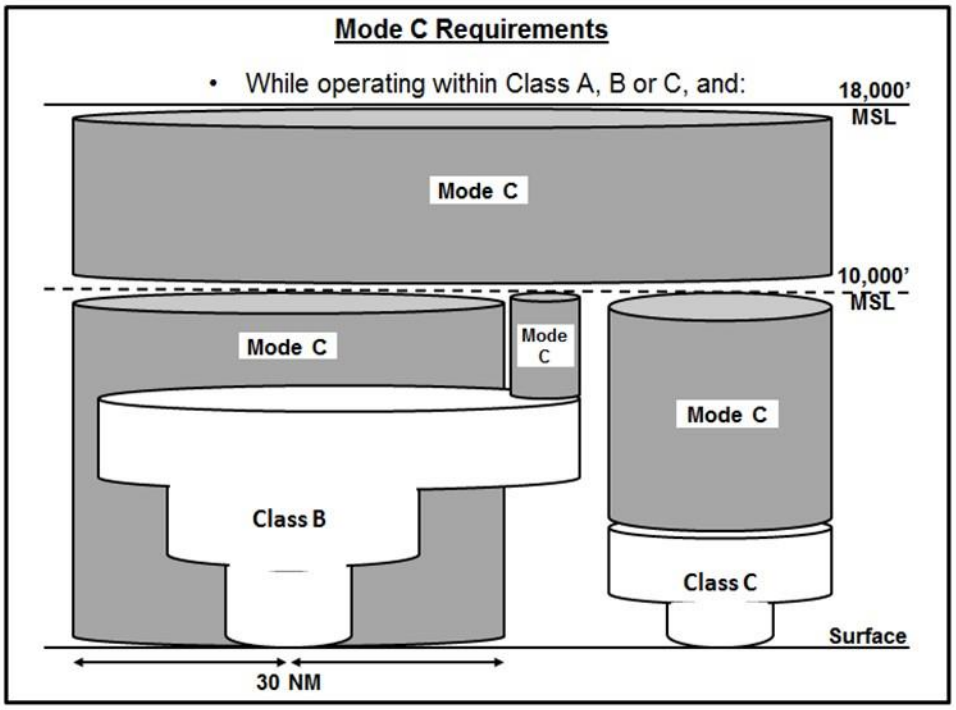


Figure 3-9 Mode C Requirements

VFR WEATHER MINIMUMS

In order to remain Visual Meteorological Conditions (VMC), a pilot must maintain the cloud clearances and flight visibilities required by the FAR (Table 3-1).

VFR Weather Minimums

Airspace	Visibility SM	Cloud Clearance
CLASS A	VFR Not allowed	VFR Not allowed
CLASS B	3 Miles	Clear of clouds
CLASS C	3 Miles	500' Below 1,000' Above 2,000' Horizontal
CLASS D	3 Miles	500' Below 1,000' Above 2,000' Horizontal
CLASS E < 10,000' MSL	3 Miles	500' Below 1,000' Above 2,000' Horizontal
CLASS E ≥ 10,000' MSL	5 Miles	1,000' Below 1,000' Above 1 SM Horizontal
CLASS G Day < 1,200' AGL Regardless of MSL alt	1 Mile	Clear of clouds
CLASS G Night < 1,200' AGL Regardless of MSL alt	3 Miles	500' Below 1,000' Above 2,000' Horizontal
CLASS G Day > 1,200' AGL and < 10,000' MSL	1 Mile	500' Below 1,000' Above 2,000' Horizontal
CLASS G Night > 1,200' AGL and < 10,000' MSL	3 Miles	500' Below 1,000' Above 2,000' Horizontal
CLASS G > 1,200' AGL and > 10,000' MSL (i.e. mountains)	5 Miles	1,000' Below 1,000' Above 1 SM Horizontal

Table 3-1 VFR Requirements

SPECIAL USE AIRSPACE

In addition to controlled and uncontrolled airspace, there are six divisions of airspace designated "special use" which are of vital importance to military and government operations. Special use airspace consists of that airspace wherein activities must be confined because of their nature, or wherein limitations are imposed upon aircraft operations that are not a part of those activities, or both. Except for Controlled Firing Areas, special use airspace areas are depicted on aeronautical charts. Special use airspaces include:

PROHIBITED AREA

Prohibited Areas contain airspace of defined dimensions within which the flight of aircraft is prohibited (Figure 3-10). Such areas are established for security or other reasons associated with the national welfare. Examples of Prohibited Areas are airspace over the White House, government office buildings in Washington, the Kennedy Space Center, and nuclear testing installations. These areas are published in the Federal Register and are depicted on aeronautical charts.

Figure 3-10 Prohibited Area

RESTRICTED AREA

Restricted Areas contain airspace within which the flight of aircraft, while not wholly prohibited, is subject to restriction. Restricted Areas denote the existence of unusual, often invisible, hazards to aircraft such as artillery firing, aerial gunnery, or guided missiles. In order to fly through these areas, aircraft must have prior approval granted by the controlling authority. Penetration of Restricted Areas without authorization from the using or controlling agency may be extremely hazardous to the aircraft and its occupants. Restricted Areas can be designated joint use, with both IFR and VFR operations authorized by ATC. Where joint use is authorized, the name of the ATC controlling facility is included, with the area's identification number, on aeronautical charts.

WARNING AREA

Warning Areas are airspaces which may contain hazards to nonparticipating aircraft generally in international airspace. They are established beyond the three-mile limit over domestic waters, international waters, or both. Though the activities conducted within Warning Areas may be as hazardous as those in Restricted Areas, the FAA has no jurisdiction over international airspace. Penetration of Warning Areas during periods of activity may be hazardous to the aircraft and its occupants. Aircraft need not receive permission prior to entering Warning Areas. However, if you enter those areas without prior coordination, you will do so at your own risk.

MILITARY OPERATIONS AREA (MOA)

MOAs consist of airspace of defined vertical and lateral limits established for the purpose of separating certain military training activities from IFR traffic. When a MOA is being used, nonparticipating IFR traffic may be cleared through the MOA if IFR separation can be provided by ATC. Otherwise, ATC will reroute or restrict nonparticipating IFR traffic.

Pilots operating under VFR should exercise extreme caution while flying within a MOA when military activity is being conducted. Information regarding activity in MOAs may be obtained from any FSS within 100 miles of the area. Prior to flying through a MOA, the pilot should contact the controlling agency for traffic advisories. Pilots do not need to receive permission to fly VFR through a MOA.

ALERT AREA

Alert Areas are depicted on aeronautical charts to inform nonparticipating pilots of areas that may contain a high volume of pilot training or an unusual type of aerial activity, such as hot air ballooning, parachuting, or glider plane operations. Pilots should be particularly alert when flying in these areas. All activity within an Alert Area shall be conducted in accordance with FAR, and with visual flight rules. Pilots of participating aircraft as well as pilots transiting the area shall be equally responsible for collision avoidance. Pilots do not need to receive permission to fly through these areas.

CONTROLLED FIRING AREAS

Controlled Firing Areas contain activities which, if not in a controlled environment, could be hazardous to nonparticipating aircraft. The distinguishing feature of a Controlled Firing Area is that its activity is suspended immediately when spotter aircraft, radar, or ground lookout positions indicate that an aircraft is approaching the area. There is no need to chart controlled firing areas since they do not cause a nonparticipating aircraft to change its flight path.

GENERAL FLIGHT RULES

AIRCRAFT LIGHTING

Aircraft lighting has become a serious issue for aviation safety programs. Increased traffic, high closure rates, and reduced visibility all have led to the development of regulations for lighting beyond the hours of darkness. The FAR include procedures for the lighting of all aircraft. CNAF M-3710.7 dictates the following more stringent requirements:

Position Lights--All naval aircraft are required to have position lights which are red on the left wing, green on the right wing, and white facing behind the aircraft (Figure 3-11). They shall be on during the period 30 minutes prior to official sunset until 30 minutes after official sunrise or when the flight visibility as seen from the cockpit is less than 3 sm.

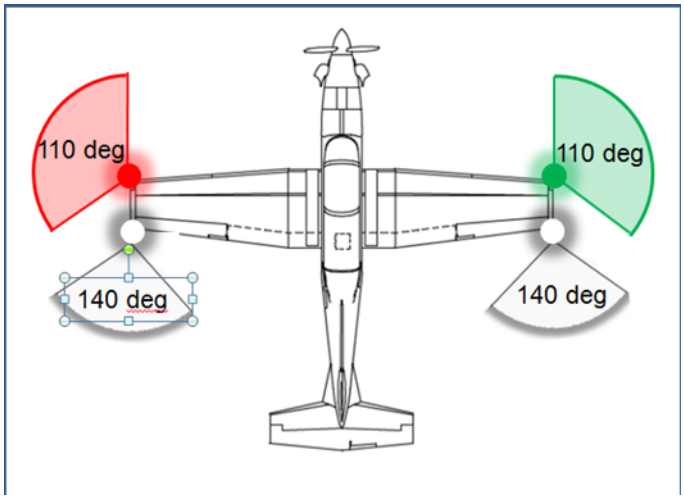


Figure 3-11 Position Lights

Anti-Collision Lights--These are bright strobes or rotating beacons, colored red or white, which instantly identify an aircraft's position. They shall be used before engine starts and remain on until engine shutdown. CNAF M-3710.7 states that anti-collision lights may be turned off when the aircraft is flying through clouds (to prevent distraction of the pilot) and when the use of such lights adversely affects ground operations (taxiing, arming and de-arming, refueling operations, etc.).

Landing / Taxi Lights--The use of landing/taxi lights is an effective means of illuminating surface hazards during taxi movements at night and alerting all concerned of an aircraft's presence/position in flight. Landing/taxi lights should be utilized for all taxi movements ashore during the hours of darkness unless a taxi signalman is directing the aircraft. Use of these lights during landing approaches (both day and night) is recommended when meteorological conditions permit.

Formation Flight Lighting--To the extent necessary for safety, lighting configuration for formation flights may be varied according to aircraft model and mission requirements. Normally, all aircraft in the flight shall have external lights on, and at least one aircraft shall have lights on bright and the anti-collision light on when lighting is required.

RIGHT-OF-WAY RULES

When another aircraft has the right-of-way, the pilot shall give way to that aircraft and may not pass over, under, or ahead of it unless well clear.

Right of way Rules are based on aircraft maneuverability as defined by aircraft category.

Categories, in order of increasing maneuverability, are:

Maneuverability	Category	Priority
Lowest	Hot Air Balloons	Highest
Lower	Gliders	Higher
Low	Airships	High
Higher	Airplanes	Lower
Highest	Helicopters	Lowest

Some situations require departure from this hierarchy.

In Distress - An aircraft in distress has the right of way over all other air traffic (Figure 3-12).

3-12 Aircraft In Distress

Landing--Landing aircraft or aircraft on final approach to land have the right of way over other aircraft in flight or operating on the surface. When two or more aircraft are approaching an airport for landing, the aircraft at the lower altitude has the right of way.

Overtaking--An aircraft that is being overtaken has the right of way, and the pilot of an overtaking aircraft shall alter course to the right to pass well clear.

Approaching Head-On--When aircraft are approaching each other head-on, or nearly so, at the same altitude, each pilot of each aircraft shall alter course to the right to pass well clear.

Converging--When aircraft of the same category are converging at approximately the same altitude (except head-on, or nearly so) the aircraft to the other's right has the right of way.

ALTITUDE RESTRICTIONS

FAR

FAR Part 91 states that except for takeoff and landing no person may operate an aircraft below the following minimum safe altitudes.

Over Congested Areas --When flying over any congested area of a city, town, or settlement, or over any open-air assembly of persons, a pilot shall maintain an altitude of 1,000' above the highest obstacle within a horizontal radius of 2,000' of the aircraft (Figure 3-13).

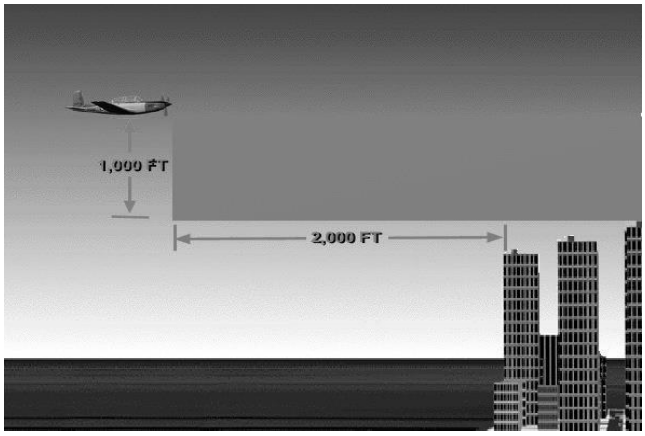


Figure 3-13 Congested Area

Over Other Than Congested Areas --500' AGL is the minimum altitude except over open water or sparsely populated areas (Figure 3-14). In those areas, the aircraft may not be operated closer than 500' to any person, vessel, vehicle, or structure.

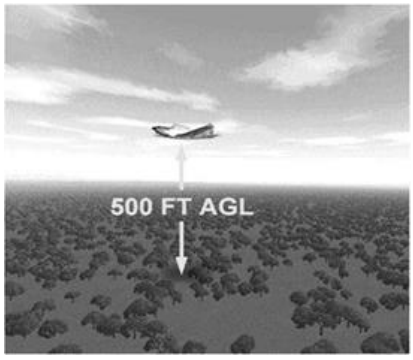


Figure 3-14 Other than Congested Area

Anywhere--A pilot should maintain an altitude such that if the engine fails, an emergency landing may be executed without undue hazard to persons or property on the surface.

Note: Helicopters may be operated at less than the minimums prescribed above if the operation is conducted without hazard to persons or property on the surface.

CNAF M-3710.7

CNAF M-3710.7 places the following more stringent requirements on naval pilots by stating:

During VFR Operations--Except when necessary for takeoff and landing, or when the mission of the flight requires otherwise, flights in fixed-wing aircraft shall not be conducted below an altitude of 500' above the terrain or surface of the water.

During IFR Operations--When out of controlled airspace and unless the mission of the flight requires otherwise, an aircraft shall not be flown less than 1,000' above the highest terrain, surface of the water, or obstacle within 22 miles of the intended line of flight. Over designated mountainous terrain, the minimum altitude is 2,000'.

AIRSPEED RESTRICTIONS

FAR

In order to reduce the midair collision hazard, FAR Part 91 imposes the following maximum airspeed limitations:

Below 10,000' MSL-250 KIAS (Figure 3-15)

Figure 3-15 Airspeed Below 10,000 MSL

Inside Class B Airspace- 250 knots. Below and no further than the lateral limits – 200 knots (also known as the “underlying” area or “shelf”) (Figure 3-16).

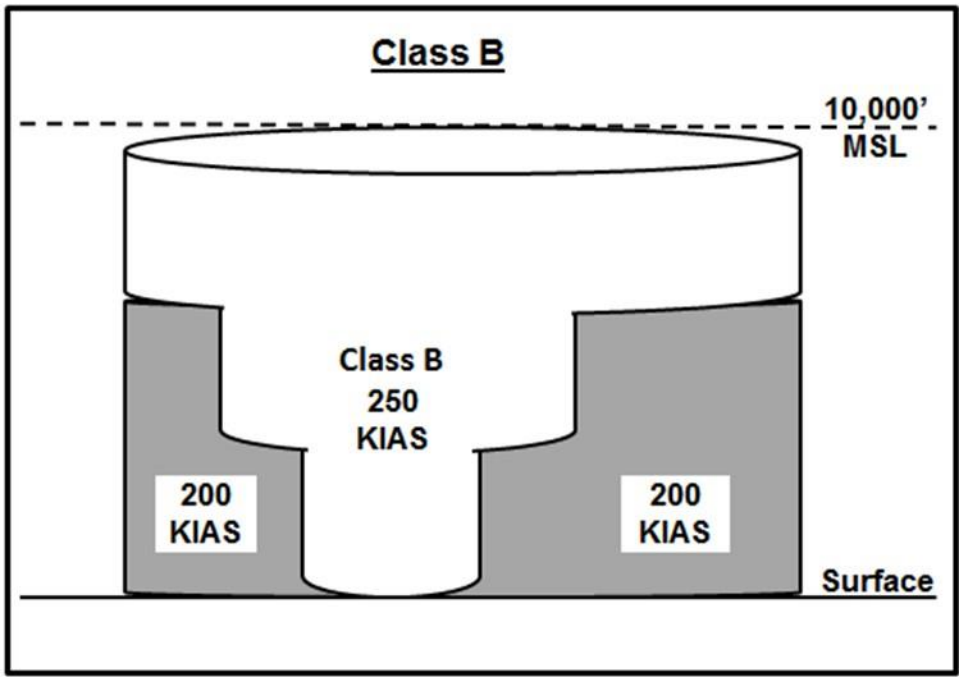


Figure 3-16 Airspeed Within and Below Class "B" Airspace

Class C and D Airspace--Within 4 nm of the primary airport of a Class C or D airspace, surface up to 2,500' AGL 200 knots (Figures 3-17 and 3-18).

Note: FAR Part 91 also states that if the minimum safe airspeed for any particular operation is greater than the maximum speed prescribed above, the aircraft may be operated at that minimum speed.

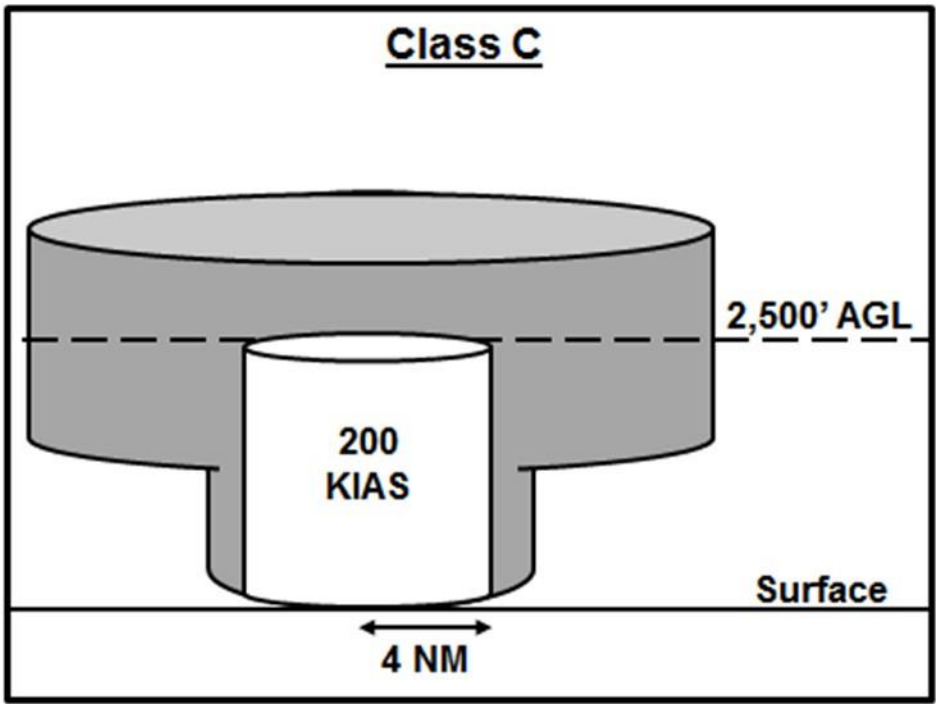


Figure 3-17 Airspeed in Class "C" Airspace

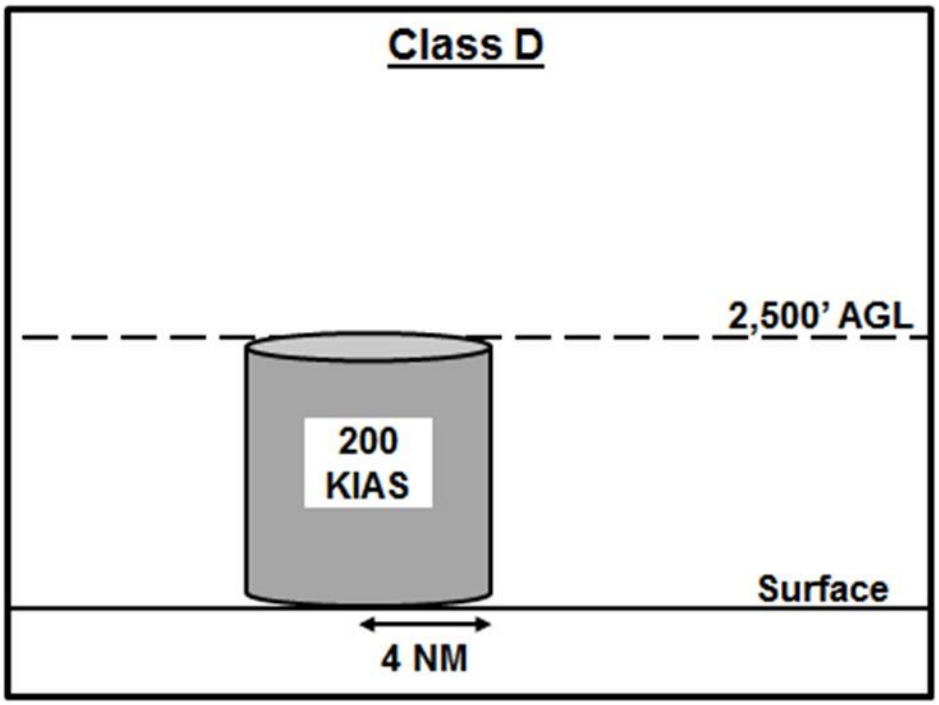


Figure 3-18 Class "D" Airspace

CNAF M-3710.7

The FAA has granted an exemption to naval aircraft from the above speed limitations in order to accommodate certain high-performance aircraft and military missions. Those operations are fully delineated in CNAF M-3710.7. Examples of operations where the exemption applies are:

• Climbs and descents from traffic patterns, designated training areas, and authorized low-level navigation routes.

• Flying within restricted areas and MOAs.

• Those instances where the safety of the crew or aircraft requires operation in excess of the speed limitation.

Holding airspeed

Maximum holding airspeed is 175 KIAS for all propeller-driven aircraft (including turboprop).

Except for military aircraft listed in the FLIP General Planning, maximum-holding airspeeds for all turbojet aircraft below 14,000' MSL is 230 KIAS, and above 14,000' MSL is 265 KIAS.

Helicopters hold at 80 KIAS.

REDUCING FLIGHT-RELATED DISTURBANCES

FAR and CNAF M-3710.7 have set forth rules relating to the protection of individuals, cities, and property. Compliance with these rules is mandatory, and any violation by naval aircraft is an extremely serious matter.

CARELESS OR RECKLESS FLYING

The FAR prohibit pilots from operating an aircraft in a careless or reckless manner so as to endanger the life or property of another.

CNAF M-3710.7 places a more stringent requirement on the operation of naval aircraft. It states, "Flights of naval aircraft shall be conducted so that a minimum of annoyance is experienced by persons on the ground. It is not enough for the pilot to be satisfied that no person is actually endangered. Definite and particular effort shall be taken to fly in such a manner those individuals do not believe they or their property are endangered."

From the above statement, you can see that naval aviators must take precautions to ensure that there is no perception of danger to the average person without any aviation experience. What is important is not what the pilot thinks but what the affected person thinks. A common example of

an infraction of this rule is the buzzing of, or flying in close proximity to, a house or group of people on the ground. In rural areas, flying at low altitude may cause injury to livestock.

NOISE SENSITIVE AND WILDERNESS AREAS

CNAF M-3710.7 states that pilots shall avoid noise-sensitive and wilderness areas when at altitudes of less than 3,000' AGL, except when in compliance with an approved traffic or approach pattern, VFR and IFR training routes, or special use airspace. Examples of noise-sensitive areas are breeding farms, resorts, beaches, and those areas designated by the U.S. Department of Interior as National Parks, National Monuments, and National Recreational Areas (Figure 3-19).

Figure 3-19 Noise Sensitive Area

WILDLIFE PRESERVES

CNAF M-3710.7 states that commanding officers of aviation units shall take steps to prevent aircraft from frightening wild fowl or driving them from their feeding grounds. When it is necessary to fly over known wildlife habitations, an altitude of at least 3,000' AGL shall be maintained, conditions permitting (Figure 3-20).

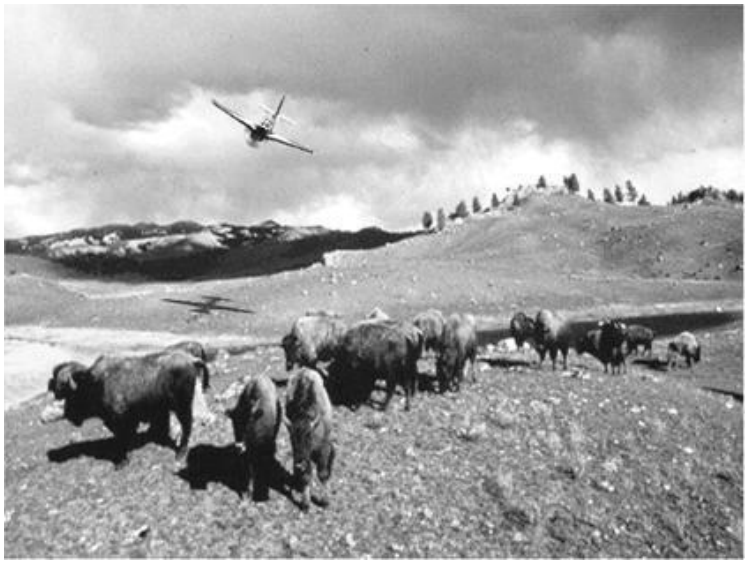


Figure 3-20 Livestock Considerations

TEMPORARY FLIGHT RESTRICTIONS (PUBLIC INTEREST AREAS)

Incidents or events, which generate a high degree of public interest, can create hazardous air traffic congestion. In such cases, temporary flight restrictions may be imposed prohibiting the operation of nonessential aircraft in airspace over the area (Figure 3-21). Some examples include natural disasters, riots, major sporting events, parades, forest fires, train accidents. CNAF M-3710.7 states that aircraft shall not be operated within an area designated by a Notices to Airmen (NOTAM) within which temporary flight restrictions apply. The exact dimensions will be included in the NOTAM designating the flight restrictions.

Figure 3-21 Major Sporting Events

FLAT HATTING

CNAF M-3710.7 prohibits flat hatting or any maneuvers conducted at low altitude and/or a high rate of speed for thrill purposes over land or water.

ZOOMING OF VESSELS

CNAF M-3710.7 restrictions on zooming are not intended to hamper standardized shipping/ antisubmarine warfare surveillance rigging and photography procedures as defined in appropriate fleet operating instructions (Figure 3-22).

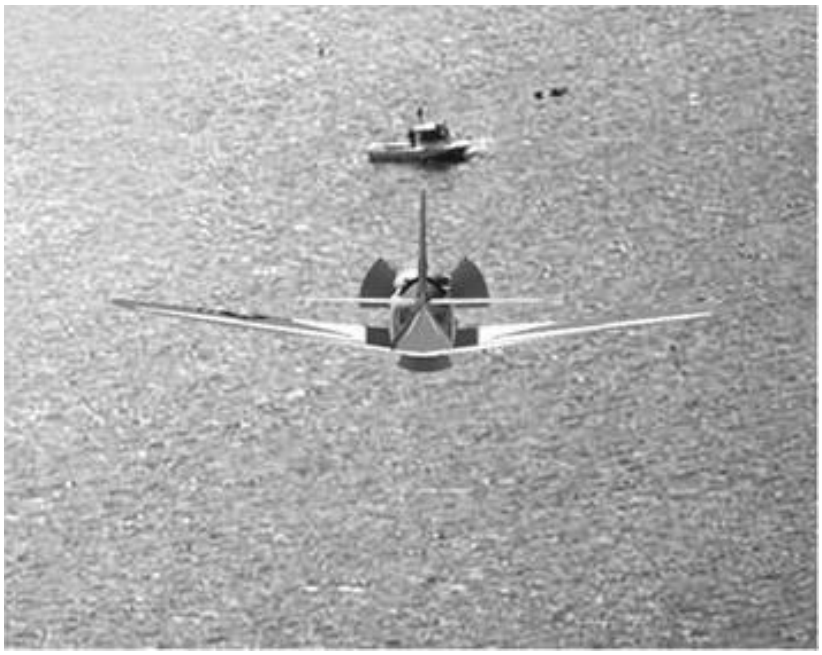


Figure 3-22 Zooming a Vessel

AVOIDANCE OF COMMERCIAL CARRIERS AND AIRCRAFT OF CIVIL REGISTRY

FAR states that no person may operate an aircraft so close to another aircraft as to create a collision hazard. Normally, commercial carriers and civil aircraft are comparatively difficult to maneuver and are relatively "blind." CNAF M-3710.7 therefore is more stringent than the general FAR and requires such aircraft be scrupulously avoided by a margin of at least 500' vertically and/or 1 SM laterally, unless ordered otherwise by competent air traffic control authority. Under no circumstances shall aircraft be flown erratically or acrobatically in the close vicinity of civil aircraft.

ASSIGNMENT SHEET 7-3-3

AIRSPACE AND GENERAL FLIGHT RULES

A. INTRODUCTION

This lesson provides an introduction to CNAF M-3710.7 and Federal Aviation Regulations as they apply to Airspace, Airspace Classification, VFR Weather Minimums, Special Use Airspace, and General Flight Rules.

B. ENABLING OBJECTIVES

C. STUDY ASSIGNMENT

1. Complete Assignment Sheet Airspace and General Flight Rules before this class.

D. STUDY QUESTIONS

1. Airspace is divided into two types; name them.

   a. _____
   b. _____

2. What are the requirements for flying within Class A airspace?

   a _____
   b _____
   c _____
   d _____

3. To operate a fixed wing aircraft VFR within Class B airspace, a pilot must be a(n) _____ or _____, and meet the following requirements:

   a _____
   b _____
   c _____

4. A pilot may fly VFR within Class C airspace without first establishing two• way radio communications with ATC.

   a. True
   b. False

5. Class D airspace exists only when a _____ is in operation, which is responsible for the movement of all known aircraft within the lateral boundaries of the airspace, from the surface up to but not including feet AGL.

6. What is the vertical limit of Class E Airspace? _____

_____

_____

7. The vertical dimensions of a Victor airway are 1,200 AGL up to, but NOT including

a. 10,000' MSL
b. 14,500' MSL
c. 18,000' MSL
d. FL 600

8. A cloud clearance of 1,000' vertically above, 500' vertically below, 2,000' horizontally, and 3 SM visibility is required for VFR flight in what class of airspace?

a. Class A
b. Class C
c. Class D
d. Both Class C and Class D

9. When flying VFR in Class E airspace above 10,000' MSL, you must adhere to which of the following weather minimums?

a. 1,000' above, 500' below, 2,000' horizontally, 3 SM
b. 1,000' above, 1,000' below, 1 SM horizontally, 5 SM
c. Clear of clouds, 1 SM visibility
d. 500' above, 1,000' below, 2,000' horizontally, 3 SM

10. Restricted areas are so designated because

a. the area is restricted in the interest of national security.
b. no navigational aids are available in these areas.
c. they denote the existence of unusual, often invisible, hazards to aircraft.
d. excessive turbulence is always prevalent in that area.

11. Prior to flight through a restricted area, you must obtain permission from the

_____

12. Warning Areas are airspace which may contain hazards to nonparticipating aircraft and are located generally over _____ waters.

13. The position light on the left wing is what color? _____

14. A C-130 is departing for a night flight at 1830 and will land at 0600. Sunset occurs at 1930 and sunrise at 0500. The aircraft will have its position lights on from _____ to _____.

    a. 1830, 0430
    b. 1830, 0600
    c. 1900, 0630
    d. 1900, 0530

15. Pilots should turn on their position lights during the day when visibility is less than _____.

16. Anti-collision lights are required to be on from _____ to _____.

17. An aircraft in _____ has the right-of-way over all other air traffic. When two or more aircraft are approaching an airport for landing, the aircraft at the _____ altitude has the right-of-way.

18. An aircraft being overtaken has the right-of-way. The overtaking aircraft must alter course to the _____ and pass well clear.

19. Aircraft flying in a head-on situation, regardless of category, are required to alter heading to the right.

    a. True
    b. False

20. What is the limit for airspeed beneath the lateral limits of Class B airspace? _____

21. In reference to careless and reckless flying, CNAF M-3710.7 states that the only requirement is that the pilot must fly in a safe and non-threatening manner to both people and property on the ground.

    a. True
    b. False

22. Which of the following have been designated noise-sensitive areas?

    a. Resorts
    b. Beaches
    c. Breeding farms
    d. All of the above

23. You must avoid noise-sensitive areas when

    a. below 1,000' AGL within 3 nm
    b. below 2,000' AGL within 5 nm
    c. below 3,000' AGL
    d. None of the above

24. Any maneuver conducted at low altitude and/or high airspeed for thrill purposes over land or water is considered

    a. zooming.
    b. disturbance to wildlife.
    c. flat hatting.
    d. autorotation.

25. Mode C is required to be on while operating within class(es) _____ airspace and also while:

    a. _____
    b. _____
    c. _____
    d. _____

26. Flying at night, a pilot looks directly ahead of the aircraft and sees a red and green position light of another aircraft, at the same altitude. What is the other aircraft's orientation to the first, and what direction is it travelling?

    a. Tail on, same direction
    b. Head on, opposite direction
    c. Left side is closest, 90^{o} to the right
    d. Head on, same direction

Answers to Lesson Topic 7.3 Study Questions

1. a Controlled
   Uncontrolled

2. a Instrument rated pilot and aircraft
   b Transponder with mode C
   c IFR Clearance
   d Two-way radio communications

3. private pilot, a military aviator
   a. Transponder with mode C
   b. ATC clearance
   c. Two-way radio comms

4. b. False

5. Control Tower, 2,500

6 Except for 18,000' MSL, there is no defined vertical limit, but Class E extends upward from either the surface or a designated altitude to the overlying or adjacent Airspace.

7 c 18,000' MSL

8 d Both Class C and Class D

9. b. 1,000' above, 1,000' below, 1 SM horizontally

10. c. they denote the existence of unusual, often invisible, hazards to aircraft.

11. controlling authority.

12. international

13. Red

14. d. 1900, 0530

15. 3 SM

16. engine start, engine shutdown

17. distress, lower

18. right

19. a. True

20. 200 KIAS

21. b. False

22. d. All of the above

23. c. below 3,000'AGL

24. c. flat hatting

25. A, B, C

a. At and above 10,000' MSL.

b. All airspace within 30nm of a Class B airport from the surface to 10,000' MSL.

c. Extensions beyond 30nm, above the ceiling up to 10,000' MSL.

d. Above Class C ceiling and lateral boundaries, up to 10,000' MSL.

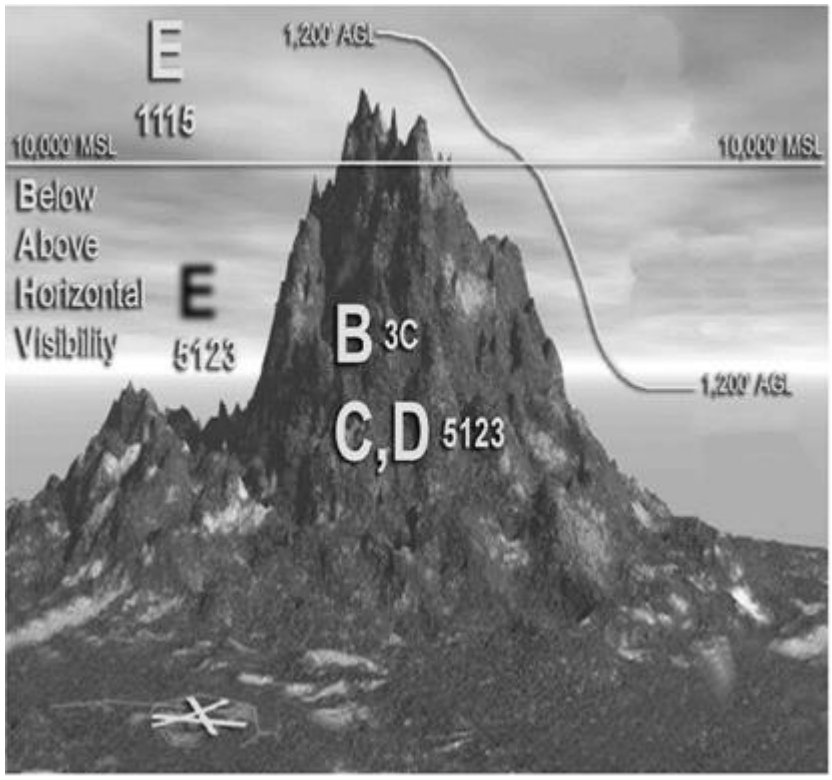
26. b. Head on, opposite direction.

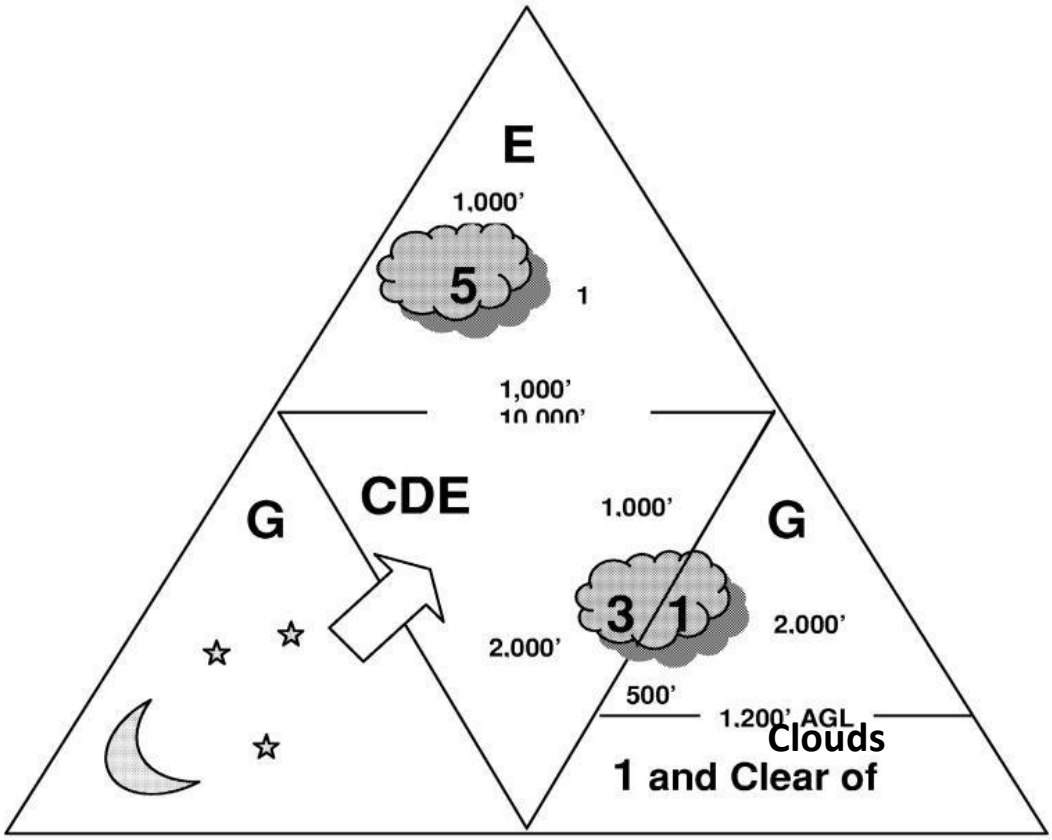
Airspace Classification - Requirements

	Class A	Class B	Class C	Class D	Class E
Rating (pilot)	Instrument Rating	Private Pilot Military Aviator	NONE	NONE	NONE
Equip-ment (aircraft)	Instrument A/C Transponder with Mode C	*VOR/TACAN Transponder with Mode C	Transponder with Mode C	NONE	NONE
Operating Rules	IFR clearance Two-way comms	ATC clearance Two-way comms	Two-way comms	Two-way comms	NONE

* Required for IFR operations.

VFR Weather Minimums





*Class B airspace requires 3 miles and remain clear of clouds