NAVAL AVIATION SCHOOLS COMMAND

NAS PENSACOLA, FLORIDA **NAVAVSCOLSCOM-SG-151**

FLIGHT RULES AND REGULATIONS

JANUARY 2007

DEPARTMENT OF THE NAVY
COMMANDING OFFICER
NAVAL AVIATION SCHOOLS COMMAND
181 CHAMBERS AVE SUITE C
PENSACOLA FL 32508-5221

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N3AC
19 Jan 07

NAVAVSCOLSCOM-SG-151

Subj: FLIGHT RULES AND REGULATIONS STUDENT GUIDE

1. NAVAVSCOLSCOM-SG-151 Flight Rules and Regulations is issued for information, standardization of instruction, and guidance to instructors and student in Naval Aviation Schools Command (NAVAVSCOLSCOM), as well as for reference during Naval Aviation Training Commands.

2. This publication will be used to supplement the Preflight Syllabus (Course Identification Number Q-9B-0020) in the Aviation Training School Department (N3B) of NAVAVSCOLSCOM.

3. Recommendations for changes to any NAVAVSCOLSCOM-SG-151, student guide, shall be submitted to the Commanding Officer, Naval Aviation Schools Command, Code N3A, Learning Management Office(LMO), via the Training Improvement Plan. Point of Contact is in LMO at 850-452-4210 or DSN 922-4210.

4. Questions concerning Preflight academics shall be referred to NAVAVSCOLSCOM Code N3B1, Preflight Director, 850-452-5557, DSN 922-5557.

5. NAVAVSCOLSCOM-SG-151 replaces CNATRA P-909 (Rev 06-02) under the realignment of NAVAVSCOLSCOM under Commander, Center for Naval Aviation Technical Training.

S. H. KIRBY

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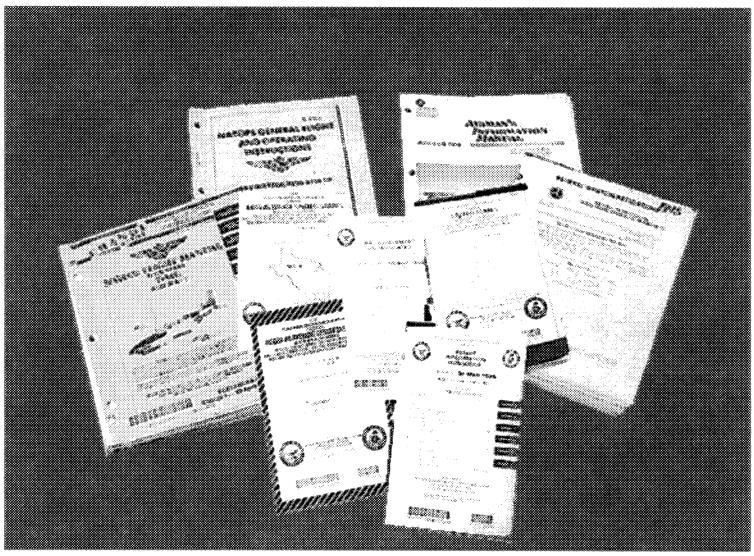
STUDENT GUIDE

FOR

PREFLIGHT

Q-9B-0020

UNIT 5



FLIGHT RULES AND REGULATIONS

Prepared by
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January 2007

CHANGE RECORD

Number	Description of Change	Entered by	Date

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SECURITY AWARENESS NOTICE

This course does not contain any classified material.

SAFETY NOTICE

All personnel must be reminded that personal injury, death or equipment damage can result from carelessness, failure to comply with approved procedures, or violations of warnings, cautions, and safety regulations.

SAFETY/HAZARD AWARENESS NOTICE

a. Safe training is the number one goal. Each year at training commands, lives are lost and thousands of man-hours and millions of dollars are wasted as the result of accidents. Most of these accidents could have been prevented. They are the result of actions performed incorrectly, either knowingly or unknowingly, by people who fail to exercise sufficient foresight, lack the requisite training, knowledge, or motivation, or who fail to recognize and report hazards.

b. A mishap is any unplanned or unexpected event causing personnel injury, occupational illness, death, material loss or damage or an explosion whether damage occurs or not.

c. A near miss or hazardous condition is any situation where, if allowed to go unchecked or uncorrected, has the potential to cause a mishap.

d. It is the responsibility of all Department of Defense personnel to report all mishaps and near misses. If a mishap, hazardous condition or near miss occurs let your instructor know immediately.

e. Students will report all hazardous conditions and near misses to the command high-risk safety officer via their divisional/departmental high-risk safety officer. Reports can be hand written on the appropriate form. Injuries shall be reported on the appropriate form.

HOW TO USE THIS STUDENT GUIDE

This publication is for your use while studying the Flight Rules and Regulations unit of Preflight. You may mark any pages in this book, including information sheets and assignment sheets. When filled in, this guide will become a useful reference. It may not be used during testing.

The Flight Rules and Regulations Unit is divided into Lesson Topics 1 through 3 covering the Federal Aviation Administration, Airspace classification, and General Flight Rules.

The knowledge to be acquired is stated for each topic so that you can check your progress. It is to your advantage to review the learning objectives prior to the class presentation.

Assignments in this guide are given for study. The effectiveness of the guide depends upon the conscientious accomplishment of the reading and study assignments.

Participation in a study group is highly recommended. Statistical analysis suggests that a study group of four members is optimum.

A written examination will be administered on the material following the completion of Flight Rules and Regulations.

Page numbers in this student guide consist of three parts: the unit number (5 for Flight Rules and Regulations), followed by a decimal point, the lesson topic number (1 through 3), followed by a dash (-), and finally, the page number within the lesson topic.

CLASS SCHEDULE

Topic No.	Type	Hours	Topic
4.1	Class	2.0	Federal Aviation Organization
4.2	Class	1.0	Visual / Instrument Flight Rules
4.3	Class	2.0	Airspace and General Flight Rules
	Exam	1.0	Final Examination

ASSIGNMENT SHEET

Federal Aviation Organization
Assignment Sheet 5.1.1A

INTRODUCTION

This lesson provides an introduction to the Federal Aviation Regulations (FAR) Part 91 and OPNAVINST 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.

LESSON TOPIC LEARNING OBJECTIVES

Terminal Objective:
Partially supported by this lesson topic:

5.0 Upon completion of this unit of instruction, the student will demonstrate knowledge of the regulations of Federal Aviation Regulations (FAR) Part 91 and OPNAVINST 3710.7 as they relate to Naval flight operations in all weather conditions and applicable airspaces.

Enabling Objectives:
Completely supported by this lesson topic:

5.1 Name the organization responsible for the publication of the Federal Aviation Regulations (FAR) and the Aeronautical Information Manual (AIM).

5.2 Explain the relationship between FAR Part 91, OPNAVINST 3710.7, and the AIM.

5.3 List the regulatory priority of applicable Department of the Navy (DON), Department of Defense (DoD), and Federal Aviation Administration (FAA) publications.

5.4 Define "shall", "should", "may", and "will" IAW OPNAVINST 3710.7.

5.5 State the responsibilities of Air Traffic Control (ATC), Flight Service Station (FSS), Control Tower, Approach Control (APC), and Air Route Traffic Control Center (ARTCC).

5.6 State the responsibilities of the Pilot in Command IAW FAR and OPNAVINST 3710.7.

5.7 List the OPNAVINST 3710.7 requirements for preflight planning.

5.8 .State the purpose of a flight plan.

5.9 State the pilots' responsibilities for acquiring a flight weather brief.

5.10 State the provision which allows deviation from established rules.

5.11 State the OPNAVINST 3710.7 requirements for oxygen use.

5.12 Describe runway orientation.

5.13 Identify airport visual devices, including: Aldis lamp signals, waveoff signals, and visual wind/landing indicators.

Review Information Sheet 5.1.1I and answer the Study Questions.

INFORMATION SHEET

Federal Aviation Organization
Information Sheet 5.1.1I

INTRODUCTION

This lesson topic provides an introduction to the Federal Aviation Regulations (FAR) Part 91 and OPNAVINST 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.

REFERENCES

1. Federal Aviation Regulations Part 91
2. OPNAVINST 3710.7
3. Aeronautical Information Manual

INFORMATION

FEDERAL AVIATION ADMINISTRATION (FAA)

The Federal Aviation Administration (FAA) (Figure 5.1-1) is responsible for establishing, reviewing, and enforcing general regulations for all aviation activities in the United States.

Figure 5.1-1 FAA Logo

AVIATION PUBLICATIONS

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 (Figure 5.1-2).

Note: The AIM is a nonregulatory publication.

Figure 5.1-2 FAR Cover

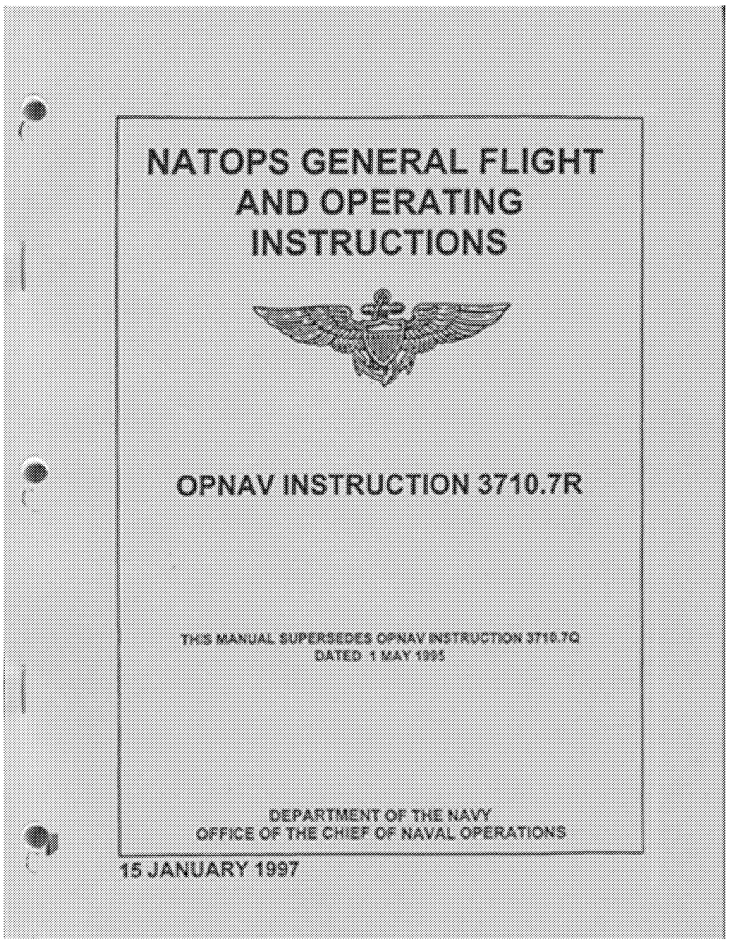
FLIGHT INFORMATION PUBLICATIONS (FLIPs)

The Department of Defense (DoD) publishes these manuals for use by all branches of the military. (Figure 5.1-3) FLIPs include en route charts, en route supplements, instrument approach plates, general planning guides, and area planning guides.

Figure 5.1-3 FLIPs

NATOPS GENERAL FLIGHT AND OPERATING INSTRUCTIONS (OPNAVINST 3710.7)

The Chief of Naval Operations (CNO) has set forth rules governing the operations of Naval aircraft throughout the world. These rules are published in an instruction, OPNAVINST 3710.7, entitled "NATOPS General Flight and Operating Instructions." (Figure 5.1-4) NATOPS stands for Naval Air Training and Operating Procedures Standardization.


NATOPS GENERAL FLIGHT AND OPERATING INSTRUCTIONS

OPNAV INSTRUCTION 3710.7R

THIS MANUAL SUPERSEDES OPNAV INSTRUCTION 3710.7Q DATED 1 MAY 1995

DEPARTMENT OF THE NAVY
OFFICE OF THE CHIEF OF NAVAL OPERATIONS

15 JANUARY 1997

Figure 5.1-4 OPNAVINST 3710.7

OPNAVINST 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.

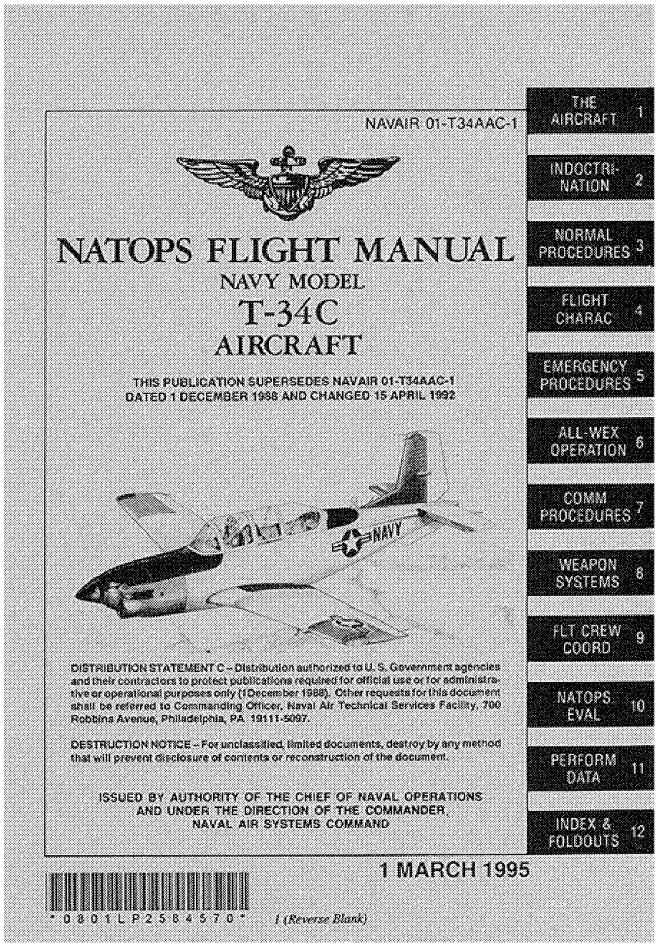
AIRCRAFT NATOPS FLIGHT MANUAL

Individual NATOPS manuals (Figure 5.1-5) are available for every aircraft in the Naval inventory. The specific limitations imposed by the manual may be more restrictive than those delineated by OPNAVINST 3710.7 or the FAR.

PRIORITY OF REGULATIONS

OPNAVINST 3710.7 gives the priority for regulation compliance in the following order:

- Specific Aircraft NATOPS Flight Manual, i.e., T-34 NATOPS
- OPNAVINST 3710.7
- Flight Information Publications (FLIPs)
- Federal Aviation Regulations Part 91


NAVAIR 01-T34AAC-1

NATOPS FLIGHT MANUAL
NAVY MODEL
T-34C
AIRCRAFT

THIS PUBLICATION SUPERSEDES NAVAIR 01-T34AAC-1
DATED 1 DECEMBER 1988 AND CHANGED 15 APRIL 1992

DISTRIBUTION STATEMENT C – Distribution authorized to U. S. Government agencies and their contractors to protect publications required for official use or for administrative or operational purposes only (1 December 1988). Other requests for this document shall be referred to Commanding Officer, Naval Air Technical Services Facility, 700 Robbins Avenue, Philadelphia, PA 19111-5097.

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ISSUED BY AUTHORITY OF THE CHIEF OF NAVAL OPERATIONS
AND UNDER THE DIRECTION OF THE COMMANDER,
NAVAL AIR SYSTEMS COMMAND

1 MARCH 1995

0801LP2584570 i (Reverse Blank)

THE AIRCRAFT 1
INDOCTRINATION 2
NORMAL PROCEDURES 3
FLIGHT CHARAC 4
EMERGENCY PROCEDURES 5
ALL-WEX OPERATION 6
COMM PROCEDURES 7
WEAPON SYSTEMS 8
FLT CREW COORD 9
NATOPS EVAL 10
PERFORM DATA 11
INDEX & FOLDOUTS 12

Figure 5.1-5 NATOPS

Figure 5.1-6 Priority of Regulations

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 5.1-6)

TERMINOLOGY

AVIATION TERMINOLOGY

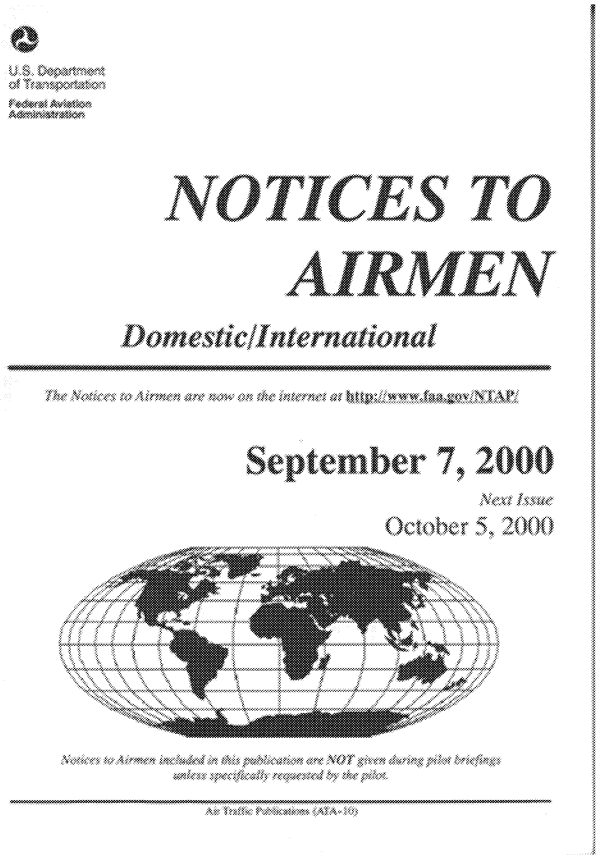
An extensive list of terms defined by OPNAVINST 3710.7, FAR, and AIM is provided in Appendix A. The following are some very basic definitions:

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 5.1-7).



U.S. Department of Transportation
Federal Aviation Administration

NOTICES TO AIRMEN

Domestic/International

The Notices to Airmen are now on the internet at http://www.faa.gov/NTAP/

September 7, 2000

Next Issue
October 5, 2000

Notices to Airmen included in this publication are NOT given during pilot briefings unless specifically requested by the pilot.

Air Traffic Publications (ATA-10)

Figure 5.1-7 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.

WORDING

The word usage and intended meaning that has been adhered to throughout the NATOPS program is as follows (Figure 5.1-8):

- **"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 5.1-9).

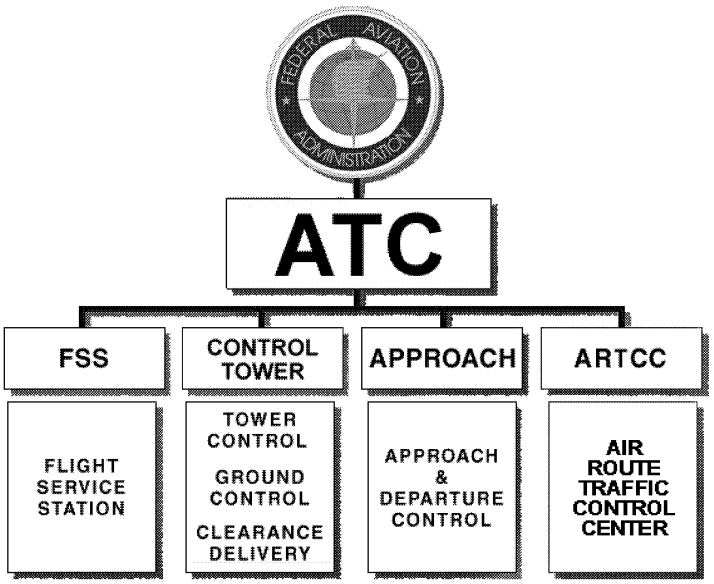


Figure 5.1-9 ATC

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 En route Flight Advisory Service (Flight Watch), take weather observations, issue airport advisories, and advise Customs and Immigration of transborder flights (Figure 5.1-10).

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

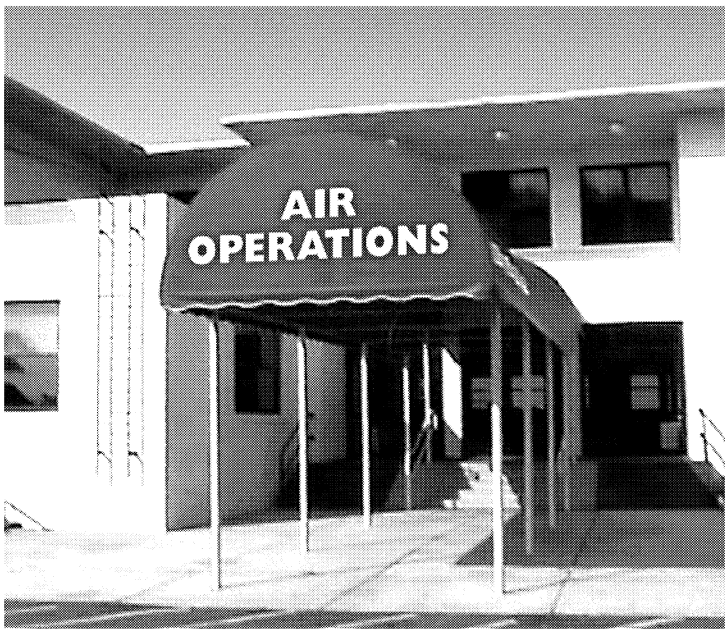


Figure 5.1-10 Air Operations

CONTROL TOWER

The Control Tower (Figure 5.1-11) 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 5.1-11 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 5.1-12). Ground will provide clearance to taxi when traffic conditions permit. A clearance to "taxi to" a runway is a clearance to cross all intersecting runways, but is not clearance to "taxi on" or "across" the runway named in the clearance. 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.

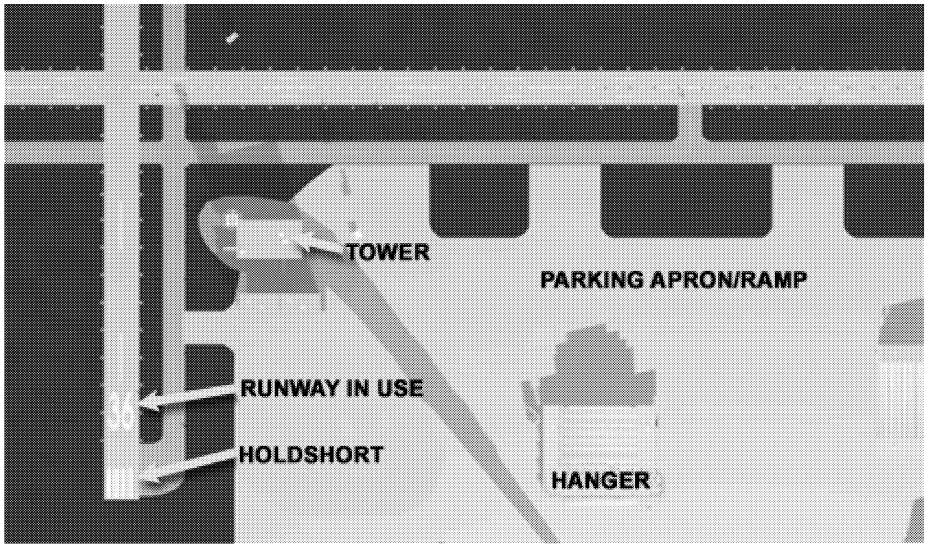


Figure 5.1-12 Airport

Tower

Tower maintains efficient flow of airport traffic in its assigned airspace. (Figure 5.1-12) 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 noncontrol 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 5.1-13) 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.

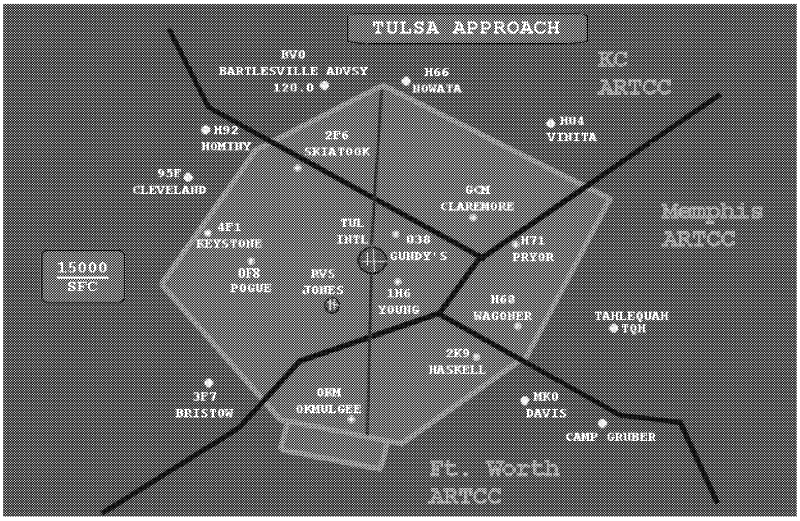


Figure 5.1-13 Terminal Area

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 5.1-14)

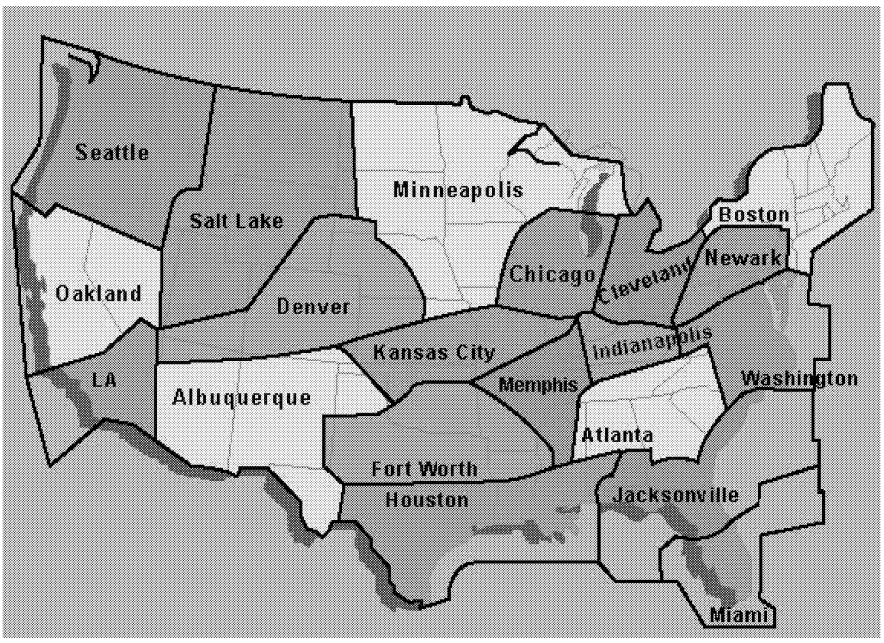


Figure 5.1-14 ARRTC Area of Responsibility

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."

OPNAVINST 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

OPNAVINST 3710.7 states that before commencing a flight, the pilot in command shall be familiar with all available information appropriate to the intended operation. (Figure 5.1-15) This information should include, but is not limited to: available weather reports and forecasts, NOTAMs, fuel requirements, alternatives 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 5.1-15 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 5.1-16).

AUTHORITY: PRINCIPAL PURPOSE:	10 USC 8012 and EO 9397 To aid in accurate identification of personnel participating in the filed flight	PRIVACY ACT STATEMENT ROUTINE USES: DISCLOSURE:	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. Voluntary; however, failure to provide the SSN could result in denial of flight plan processing.	DATE 25 JUL 20XX	AIRCRAFT CALL SIGN VV3E276	AIRCRAFT DESG AND TD CODE 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	✓	**	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 MANIFEST		

DUTY	NAME AND INITIALS	RANK	SSN	ORGANIZATION AND LOCATION
PILOT IN COMMAND	I. AM. INSTRUCTOR	LT	999-99-9999	VT-3/NSE
STUD	R. U. READY	ENS	000-00-0000	VT-3/NSE
	**(TO BE DETERMINED IN THE SEMINAR)			

DD Form 175, MAY 86 0102-LF-001-7500 Previous editions are obsolete. MILITARY FLIGHT PLAN

Figure 5.1-16 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 5.1-16) 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 5.1-17) may be filed in lieu of a DD-175 at airfields in the United States without a military operations department.

Weather Brief

Pilots are responsible for reviewing and being familiar with weather conditions for the area in which flight is contemplated. Where Naval Weather Services are available, (Figure 5.1-18) a qualified meteorological forecaster shall conduct weather briefings. They may also be conducted in person or by telephone, autograph, or weather-vision.

FAA FLIGHT PLANS 4-21

FAA FORM 7233-1 FLIGHT PLAN

Form Approved: OMB No. 2120-0026

U.S. DEPARTMENT OF TRANSPORTATION FEDERAL AVIATION ADMINISTRATION FLIGHT PLAN	(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			KTS		PROPOSED (Z)	ACTUAL (Z)	
IFR							
DVFR							

8. ROUTE OF FLIGHT

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

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

16. COLOR OF AIRCRAFT	CIVIL AIRCRAFT PILOTS. FAR part 91 requires you to 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.

FAA Form 7233-1 (8-82) CLOSE VFR FLIGHT PLAN WITH _____ FSS ON ARRIVAL

Figure 5.1-17 FAA Form 7233-1

Figure 5.1-18 Weather Desk

Deviations

Both the FAR and OPNAVINST 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 5.1-19).

Figure 5.1-19 Accountability

AUTHORIZED AIRFIELDS

Naval pilots are encouraged to use military airfields unless a requirement exists to use a civil airfield. (Figure 5.1-20) Pilots shall not be cleared for airfields other than those listed in the Aerodrome/Facility directory of the current DoD FLIP unless such flights are necessary for the accomplishment of a mission assigned by higher authority. The pilot in command is responsible for ensuring that airfield facilities, servicing, and security are adequate for the type of aircraft involved.

Figure 5.1-20 Out Lying Fields (OLF)

All naval aircraft operating in the continental United States are prohibited from landing at or taking off from civil airfields identified as such in the FLIP Aerodrome/Facility Directory, unless they meet an exception listed in OPNAV 3710.7.

FUEL PURCHASE

There are three basic sources for the purchase of aircraft fuel and oil: direct military supply, government contract, and commercial sources. There is no economic justification for pilots to purchase fuel or oil from commercial sources. The cost of this fuel is considerably higher than that purchased from either military supply or contract sources. Navy and Marine Corps flight personnel are not authorized to purchase aircraft fuel or oil from other than military or contract sources unless they meet an exception listed in OPNAV 3710.7 (Figure 5.1-21).

Figure 5.1-21 Fuel Truck

CLOSING OF FLIGHT PLANS

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

Figure 5.1-22 Base Operations

Military Installations

The pilot shall either deliver a copy or verbally confirm the closing of the flight plan with Tower or Base Operations personnel (Figure 5.1-22).

Nonmilitary Installations

The pilot shall close the flight plan with Flight Service Station (FSS) (Figure 5.1-23) through any means of communication available. The FSS phone number (1-800-WXBRIEF) or long distance telephone service may be used if required. 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 the aircraft is still airborne.

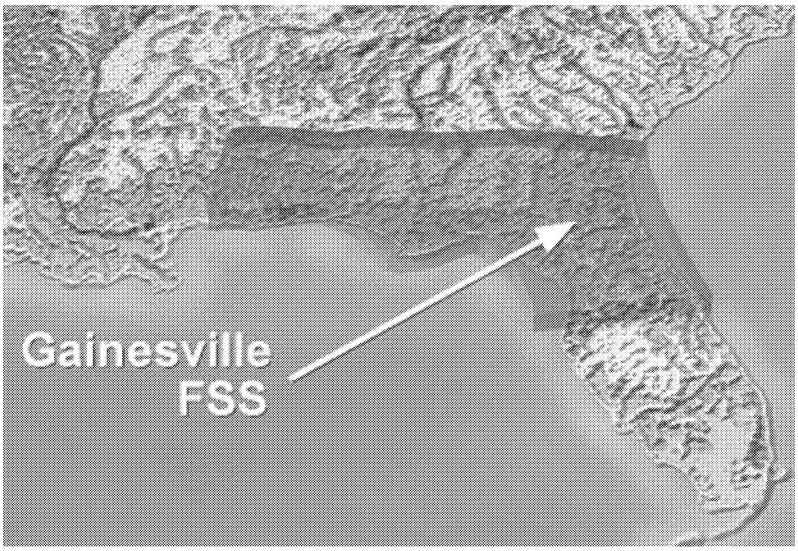


Figure 5.1-23 FSS

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.

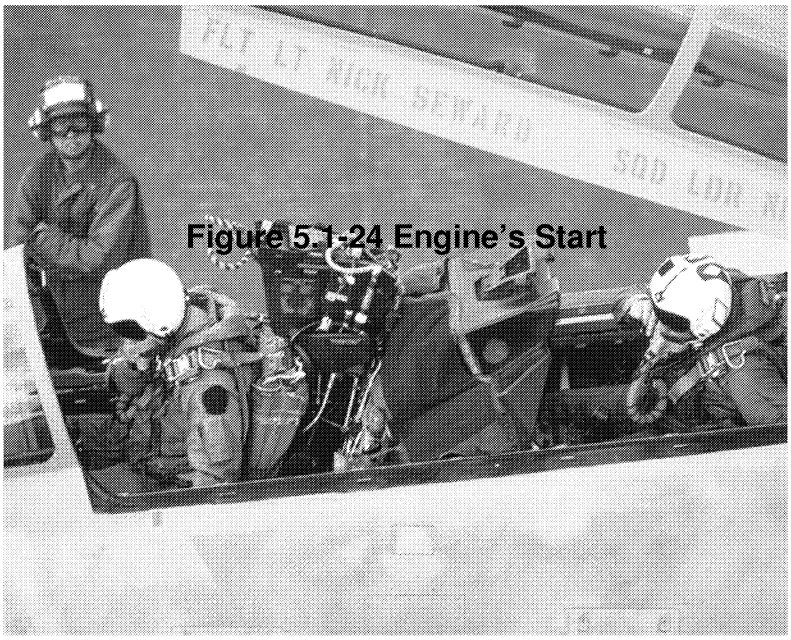


Figure 5.1-24 Engine's Start

STARTING, TURNING, AND TAXIING OF NAVAL AIRCRAFT

AUTHORIZED PERSONNEL

OPNAVINST 3710.7 states that an aircraft's engine shall not be started without a pilot or designated mechanic in the pilot's seat (Figure 5.1-24).

GENERAL PRESTART PRECAUTIONS

Before starting an engine, the wheels of the aircraft shall be chocked and the parking brake set (unless the applicable model NATOPS manual specifically authorizes a deviation from this requirement). Personnel with adequate fire extinguishing equipment, if available, shall be stationed in the immediate vicinity of the engine while safely clear of jet intakes and propellers. Jet intakes and the surrounding areas shall be inspected to eliminate the possibility of foreign object damage (FOD) (Figure 5.1-27).

Figure 5.1-27 Ground Crew

STARTING PROCEDURES

When an aircraft is started with external starting equipment, such as a power cart (Figure 5.1-28) or air start unit, special precautions are required. All hand signals between the person operating the starting devices and the person at the engine controls must be clearly understood, and so indicated by repetition, before actions are taken. If the engines are started entirely from within the aircraft, similar signals shall be exchanged between the outside observer and the person at the engine controls.

Figure 5.1-28 Power Cart

HELICOPTERS

When the engine of a helicopter is started, the controls should be manned by a qualified helicopter pilot. Commanding officers may authorize certain specially qualified personnel, other than pilots, to ground test helicopters when a pilot is not available. However, rotors shall not be engaged except by a qualified pilot (Figure 5.1-29).

Figure 5.1-29 TH-57

TURNUP

Before starting an engine for a high power turnup, aircraft other than transport and patrol class types shall be well tied down and placed in such a manner that the propeller or jet blast will not damage other aircraft, equipment, or property. During the runup (Figure 5.1-30), an outside observer shall be positioned to observe the person at the controls and the area behind the aircraft.

Figure 5.1-30 Run Up

TAXIING

When an aircraft is taxiing in the close vicinity of obstructions and other aircraft, a qualified taxi director shall attend the aircraft to ensure safe taxiing (Figure 5.1-31). All plane-handling directions shall be in accordance with the Aircraft Signals NATOPS. The pilot in command is ultimately responsible for safe taxi clearance.

Figure 5.1-31 Taxiing into Position

SAFETY AND SURVIVAL

To improve the survivability of flight personnel, OPNAVINST 3710.7 has certain safety requirements.

SAFETY BELT AND SHOULDER HARNESS

OPNAVINST 3710.7 states that each person's safety belt and shoulder harness shall be worn and tightened prior to takeoff and shall be worn until completion of the flight, except when necessary activities require temporary removal. Inertial reels shall be manually locked for all takeoffs and landings (Figure 5.1-32).

Figure 5.1-32 Harness

AIRCREW PERSONAL PROTECTIVE EQUIPMENT REQUIREMENTS

Figure 5.1-33 Protective Gear

Crewmen of naval aircraft are required to wear (as a minimum) the personal flying equipment in the list below. Items marked with an asterisk (*) may be omitted by flight personnel in fixed-wing cargo/transport aircraft not involved in carrier operations (Figure 5.1-33).

- Protective helmet. The helmet and visor housing 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.
- Boots. Only aircrew safety/flyer's boots are to be worn.
- Fire-resistant (aramid) flight gloves. Gloves may be removed on low-level over-water flights and during launch or recovery operations aboard ship.
- 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 fixed-wing cargo/transport class aircraft.
- Identification tags. Two tags on a chain worn around the neck are required to be worn by all crewmen.
- Survival knife and sheath. The knife and sheath are not to be worn exposed or attached to the life preserver.
- Personal survival kit. The personal survival kit contains items appropriate to the area of operations.
- Signal device. A signal device is required for all night flights and flights over water or sparsely populated areas.

- Survival radios and beacons.
- Flashlight. A flashlight is required for all night flights.
- Anti-exposure suits when required.
- Anti-blackout suits on all flights in aircraft equipped for their use.
- Pressure suit above FL 500.
- Life preservers. Inflatable life preservers shall be worn during all flights originating from or terminating on ships or landing platforms. Life preservers shall be readily available when operating from aerodromes in the vicinity of coastal waters or when operating from an inland aerodrome where takeoff, route of flight, or approach path is over water (Figure 5.1-34).
- Laser eye protection. When operating in/with aircraft having laser capability, which is in use, crewmembers shall wear eye protection devices specific to the type of laser in use.
- Helicopter emergency egress device (HEED). HEED shall be worn by all helicopter, E-2, and C-2 aircrew during overwater flights.

Figure 5.1-34 Life Preserver Unit

LIFE RAFTS

Life rafts (Figure 5.1-35) 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.

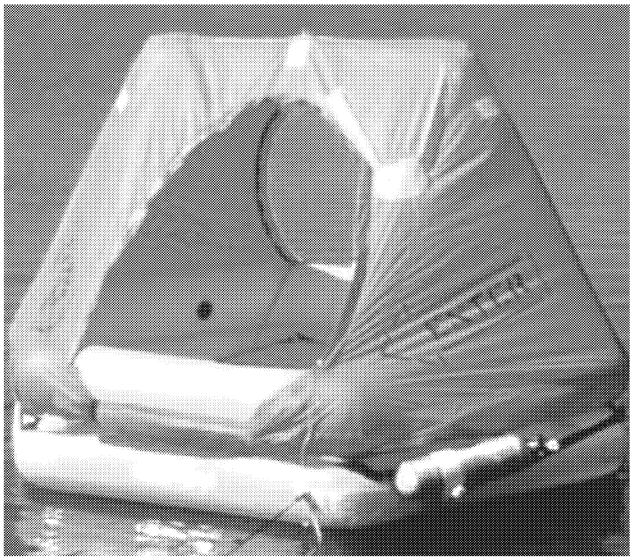


Figure 5.1-35 Life Raft

Officers in tactical command may waive this provision during troop movements between sea and shore when they deem it appropriate and adequate SAR facilities are available.

PARACHUTES

Parachutes (Figure 5.1-36) shall be provided for all occupants of naval aircraft except as follows:

- Multiengine transport and utility aircraft, except for functional check flights or as directed by the unit commander.
- Fleet air reconnaissance aircraft (EC-130 & E-6A only).
- Helicopter flights, unless involved in experimental or research operations.

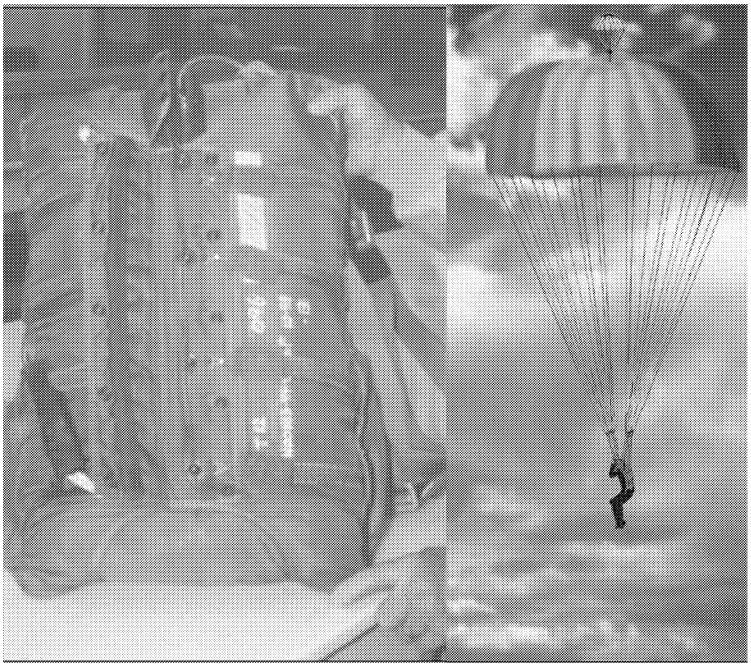


Figure 5.1-36 Parachute

OXYGEN / CABIN PRESSURIZATION

All occupants aboard naval aircraft shall use supplemental oxygen (Figure 5.1-37) on flights in which the cabin altitude exceeds 10,000'. Exceptions include:

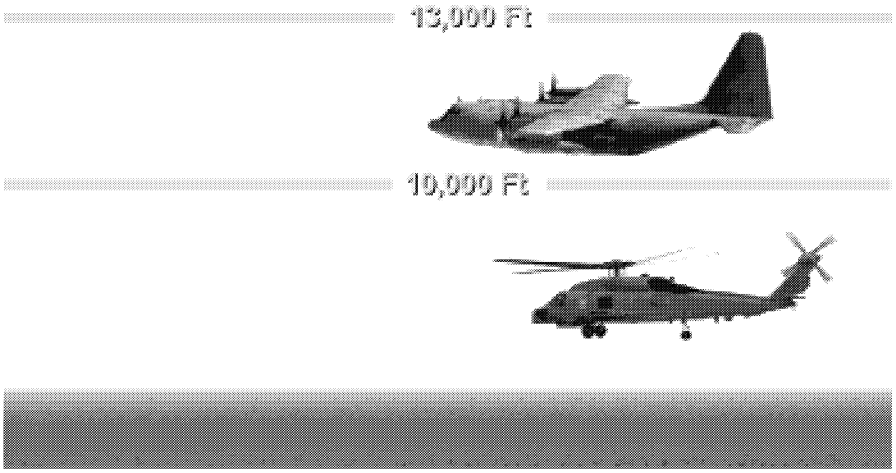


Figure 5.1-37 Oxygen Requirements

Unpressurized Aircraft

In unpressurized aircraft, the pilot at the controls shall use supplemental oxygen continuously when cabin altitude exceeds 10,000'. When oxygen is not available to other occupants, flight between 10,000 and 13,000' shall not exceed 3 hours duration, and flight above 13,000' is prohibited. When all occupants are equipped with oxygen, unpressurized aircraft may operate with a cabin altitude of 25,000' or less.

Tactical Jet and Tactical Jet Training Aircraft

Oxygen shall be used by all aircrew from takeoff to landing. Emergency bailout bottles, when provided, shall be connected prior to takeoff (Figure 5.1-38).

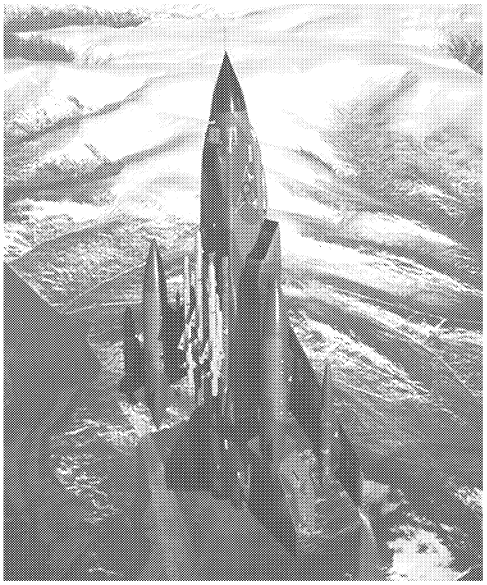


Figure 5.38-Tactical Jet

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 5.1-39), and the same runway approached from the east (heading 270°) would be Runway 27.

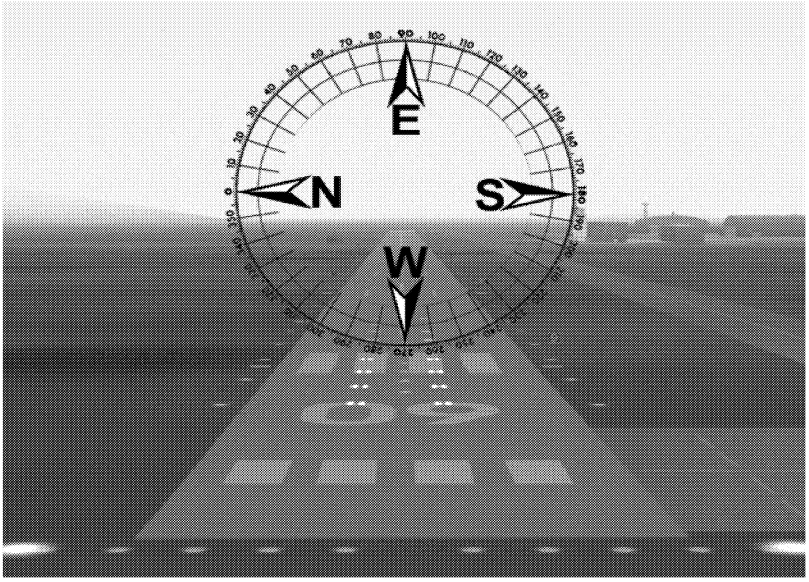


Figure 5-39 Runway Numbers

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 5.1-1).

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 5.1-1 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.

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 5.1-40).

Figure 5.1-40 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 5.1-41).

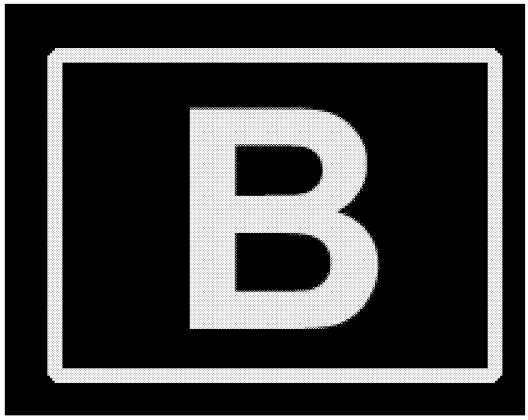


Figure 5.1-41 Taxiway Location Sign

Runway location signs use the same color scheme and will indicate the runway number (Figure 5.1-42).

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.

Figure 5.1-42 Runway Location Sign

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 5.1-43).

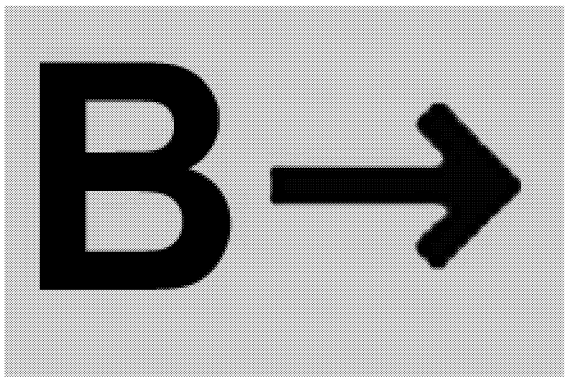


Figure 5.1-43 Direction Sign

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 5.1-44).

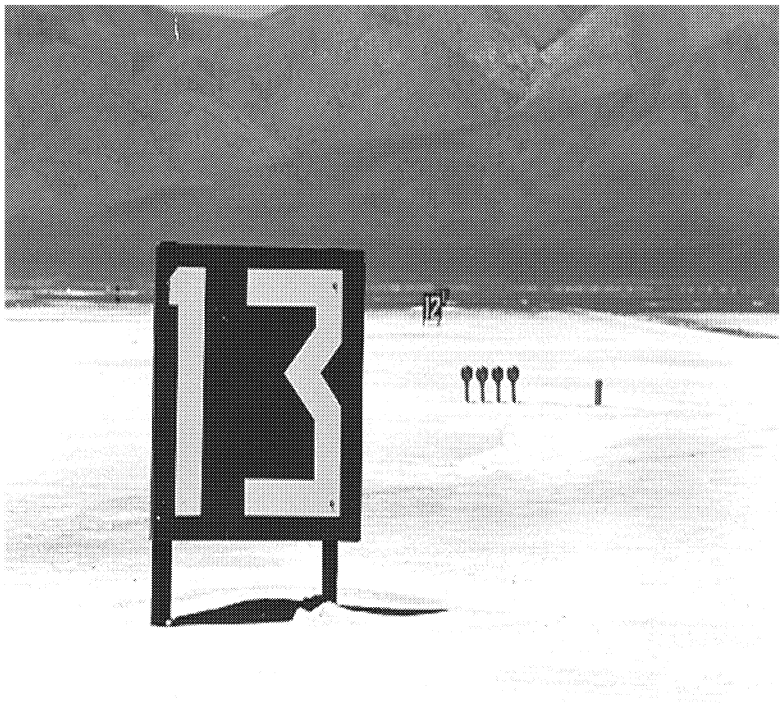


Figure 5.1-44 Runway Distance Remaining Sign

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.

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 Optical Landing System (OLS). 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 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 collocated with a wind tee, the wind tee may be manually aligned with the runway in use to indicate landing direction (Figure 5.1-45).

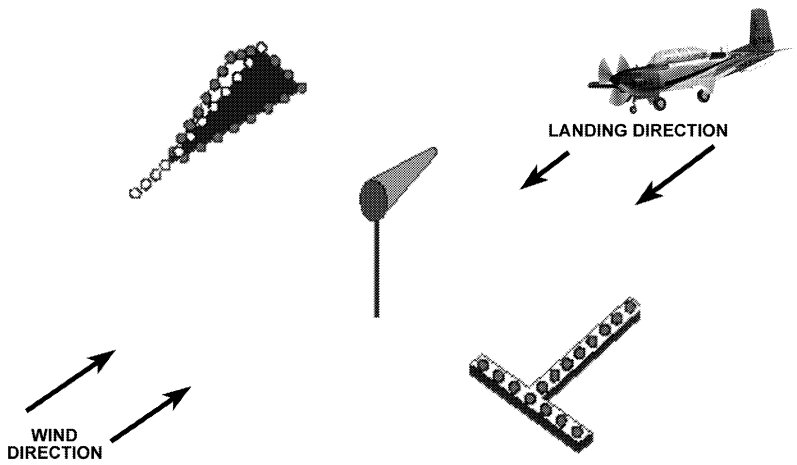


Figure 5.1-45 Visual Wind/Landing Direction Indicators

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.

AIRPORT LIGHTING AIDS

Approach Light Systems (ALS)

Approach light systems (Figure 5.1-46) 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 5.1-46 ALS

Figure 5.1-47 VASI

Visual Glideslope Indicators

These are pilot aids used to maintain optimum glideslope alignment during the visual phase of landing. Three basic visual glideslope indicators are the Visual Approach Slope Indicator (VASI) (Figure 5.1-47), the Optical Landing System (OLS), and the Stabilized Glide Slope Indicator (SGSI).

VASI

VASI is a system of lights or lighted panels. When the pilot maneuvers the aircraft to visually align them, the aircraft is on the optimum glideslope. They are visible at ranges of 3 to 5 miles in daylight and up to 20 miles at night.

OLS

Figure 5.1-48 OLS

The U.S. Navy Optical Landing System (Figure 5.1-48) 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 Air Stations. It consists of an amber central 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 ball will appear to go below the green lights and change to red when the aircraft is below the glideslope.

SGSI

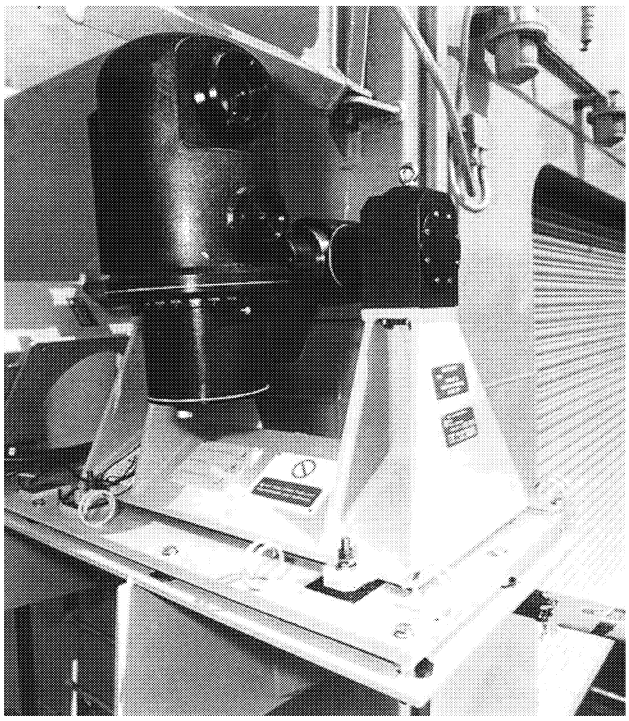


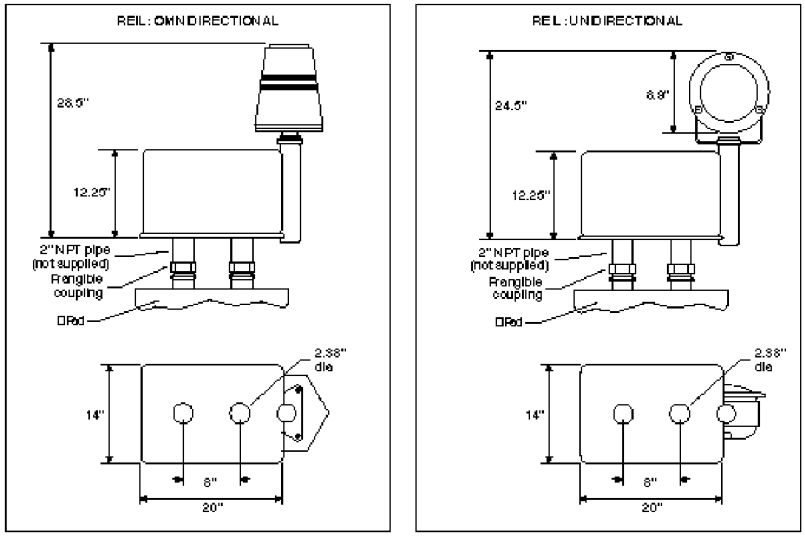
Figure 5.1-49 SGSI

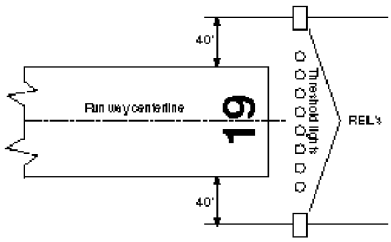
The SGSI (Figure 5.1-49) is a gyro-stabilized light system that is used for shipboard helicopter landing operations. The SGSI emits a tri-colored light beam that consists of a green beam on top, an amber beam in the center, and a red beam on the bottom. The pilot will see a red light if the aircraft 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.

Runway End Identifier Lights (REIL)

The REIL are a pair of synchronized flashing lights located laterally on each side of the runway threshold. This system helps to identify the runway when the runway lacks contrast with the surrounding terrain, there are numerous other lighting systems in use, or during low visibility (Figure 5.1-50).





Ordering Codes

Code	Config.	Power
FTS 412	Omnidirectional	Voltage-powered
FTS 432	Omnidirectional	Current-driven
FTS 812	Unidirectional	Voltage-powered
FTS 832	Unidirectional	Current-driven

Figure 5.1-50 REIL

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 transverse 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 v centerline of the runway. Viewed from the landing threshold they are white until the last 3000' 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 5.1-51).

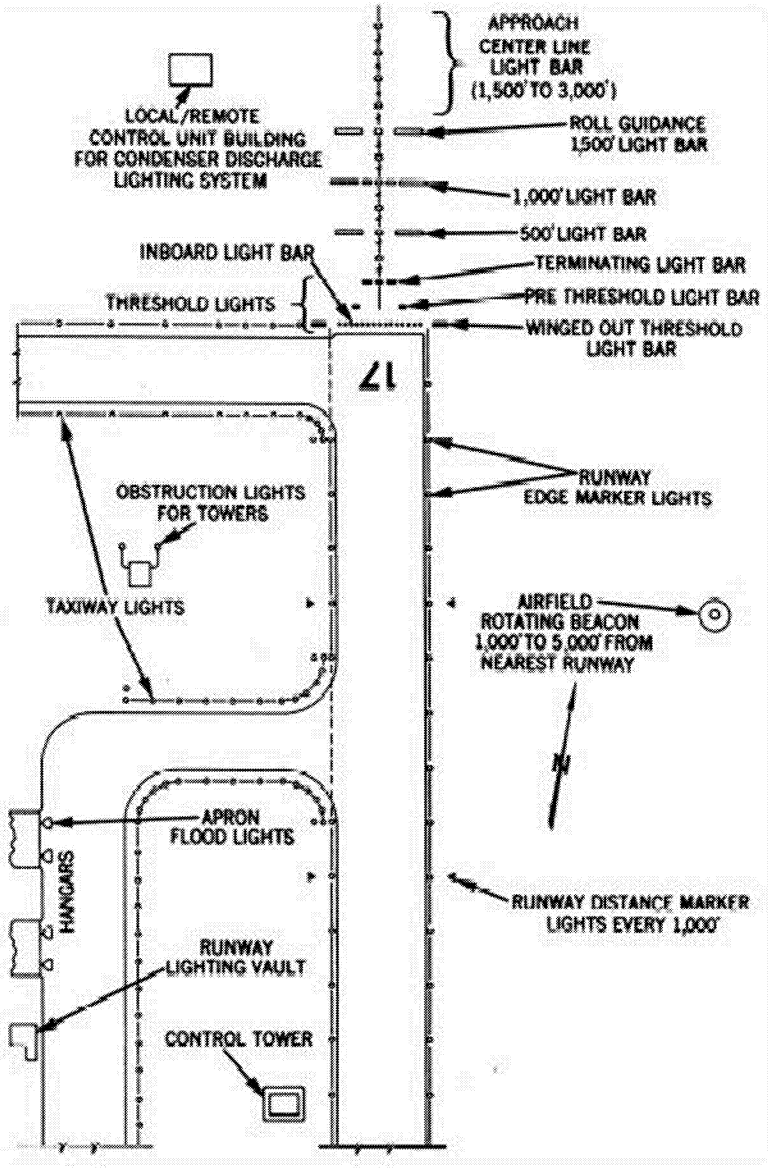


Figure 5.1-51 Airport Lights

Taxiway Turnoff Lights

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

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. The beacon is on from sunset to sunrise and sometimes during daylight hours when visibility is restricted.

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.

STUDY QUESTIONS

Federal Aviation Organization

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. OPNAVINST 3710.7
   b. T-34C 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 only
   b. Safe and orderly conduct of the flight only
   c. Well-being of the crew only
   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 OPNAVINST 3710.7, "pre-flight planning" is required on which of the following occasions?

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

11. Flight planning requirements for the pilot in command shall 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. While flying at night, you approach an airport on a heading of 180º. The tetrahedron's spar is pointed 90º left of the aircraft's heading. On what runway are you expected to land?

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

14. 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

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

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

17. The colors of the lights for a tetrahedron are _____ and _____

ASSIGNMENT SHEET

Visual / Instrument Flight Rules
Assignment Sheet 5.2.1A

INTRODUCTION

This lesson provides an introduction to OPNAVINST 3710.7 and Federal Aviation Regulations as they apply to Altitudes, Flight Weather Conditions, Visual Flight Rules, Instrument Flight Rules, Semicircular Cruising Altitude Rules, Formation Flying, and Aerobatic Flight.

LESSON TOPIC LEARNING OBJECTIVES

Terminal Objective:
Partially supported by this lesson topic:

5.0 Upon completion of this unit of instruction, the student will demonstrate knowledge of the regulations of Federal Aviation Regulation (FAR) Part 91 and OPNAVINST 3710.7 as they relate to Naval flight operations in all weather conditions and applicable airspaces.

Enabling Objectives:
Completely supported by this lesson topic:

5.14 Explain the following terms: Visual Meteorological Conditions (VMC), Instrument Meteorological Conditions (IMC), Visual Flight Rules (VFR), and Instrument Flight Rules (IFR)

5.15 State the principle of see and avoid.

5.16 State the weather requirements for VFR flight, including takeoff, en route, and destination weather.

5.17 State the alternatives if en route weather is less than required for VFR flight.

5.18 State the general requirements for IFR.

5.19 State the rules concerning VFR and IFR cruising altitudes IAW FAR.

5.20 Determine VFR and IFR cruising altitudes IAW FAR.

5.21 Define aerobatic flight IAW OPNAVINST 3710.7.

5.22 State the rules concerning aerobatic flight IAW FAR and OPNAVINST 3710.7.

Review Information Sheet 5.2.1I and answer the Study Questions.

INFORMATION SHEET

Visual / Instrument Flight Rules
Information Sheet 5.2.1I

INTRODUCTION

This lesson provides an introduction to OPNAVINST 3710.7 and Federal Aviation Regulations as they apply to Altitudes, Flight Weather Conditions, Visual Flight Rules, Instrument Flight Rules, Semicircular Cruising Altitude Rules, Formation Flying, and Aerobatic Flight.

REFERENCES

1. Federal Aviation Regulations, Part 91
2. OPNAVINST 3710.7
3. Aeronautical Information Manual

INFORMATION

ALTITUDES

Altitude is defined as the height above a given reference. Three significant altitudes are discussed in this unit: true altitude, absolute altitude, and pressure altitude (Figure 5.2-1). A pilot must understand the terminology and be able to distinguish one type of altitude from another.

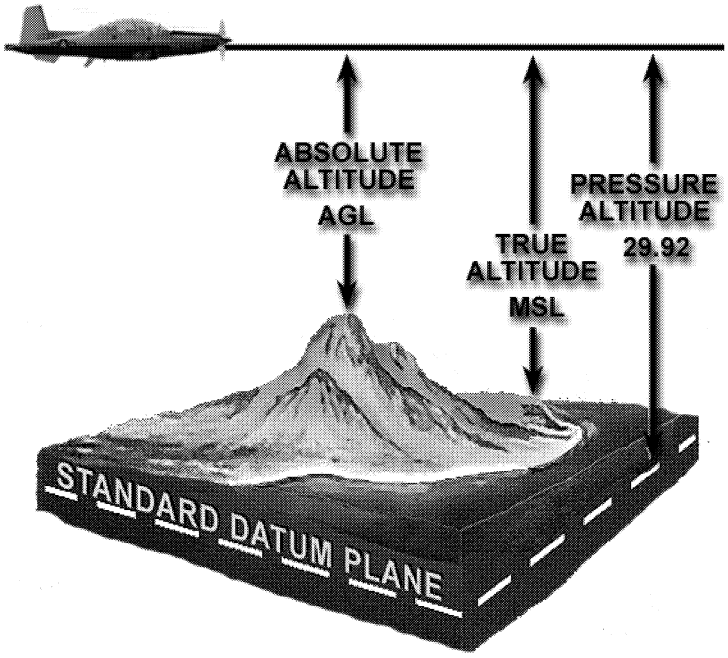


Figure 5.2-1 Altitudes

TRUE ALTITUDE

The calibrated altitude corrected for non-standard atmospheric conditions is known as the true altitude. It is the actual height above Mean Sea Level (MSL). FAR requires that aircrew obtain an updated barometric altimeter setting from any station along the route of flight and within 100 nm of the aircraft's present position. Airport and terrain elevations are also stated in true altitude.

ABSOLUTE ALTITUDE

The altitude above the terrain and directly beneath the aircraft is commonly referred to as height Above Ground Level (AGL). Absolute altitude is displayed on a radar altimeter or by subtracting the charted terrain elevation from current true altitude. Pilots flying low-level navigation, weapons delivery, search and rescue, or antisubmarine warfare would all be concerned with their absolute altitude.

PRESSURE ALTITUDE (PA)

The height above the standard datum plane is a reference established where the barometric pressure of the atmosphere is 29.92 in-Hg. A pilot flying a pressure altitude will have 29.92 set into the barometric altimeter instead of the local pressure setting. FAR requires that all aircraft operate at pressure altitudes when flying at or above 18,000' MSL to ensure consistent altitude separation. Pressure altitudes are called flight levels (FL), i.e., 25,000' of pressure altitude equals FL250.

WEATHER CONDITION TERMS AND DEFINITIONS

Before discussing Visual Flight Rules and Instrument Flight Rules, an understanding of certain weather phenomena is important.

CLOUD COVERAGE AND OBSTRUCTIONS TO VISION

The terms contained in Table 5.2-1 are used to report the percentage of sky/cloud coverage and obstructions to vision.

Term	Symbol	Condition
Clear	CLR	Less than 1/10 sky coverage
Scattered	SCT	1/10 - 5/10 sky coverage
Broken	BKN	6/10 - 9/10 sky coverage
Overcast	OVC	Greater than 9/10 sky coverage
Thin	(-)	Used as prefix to SCT, BKN, or OVC
Obscured	X	Sky completely hidden by precipitation or surface-based obscuration to vision such as smoke, haze, or fog
Partial obscuration	-X	1/10 to 9/10 of sky hidden by precipitation or surface-based phenomena

Table 5.2-1 Sky / Cloud Coverage and Obstructions to Vision

CEILING (CIG)

"Ceiling" is defined as the height above the ground (AGL) of the lowest cloud layer reported as broken, overcast, or obscured and NOT classified as scattered or further modified as "thin" or "partial." Therefore, a broken layer of clouds reported at 1,500’ is a ceiling, while a partial obscuration or thin broken layer is not.

VISIBILITY

Visibility is defined as the ability to see and identify prominent unlighted objects by day and prominent lighted objects by night, and is expressed in statute miles, hundreds of feet, or meters. There are several methods of reporting visibility, some of which are listed below.

Flight Visibility - The average forward horizontal distance, measured in statute miles from the cockpit of an aircraft in flight, at which prominent unlighted objects may be seen and identified by day and prominent lighted objects may be seen and identified by night.

Prevailing Visibility – The greatest horizontal visibility, measured in statute miles, equaled or exceeded throughout at least half the horizon circle, which need not be continuous.

Ground Visibility – The prevailing horizontal visibility, measured in statute miles, near the earth's surface as reported by the United States National Weather Service or an accredited observer.

Runway Visual Range (RVR) – The horizontal distance, expressed in hundreds of feet or meters, a pilot will see by looking down the runway from the approach end. It is based on the measurement of a transmissometer, which provides a continuous indication of visibility for the runway. RVR represents horizontal visual range.

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 5.2-3).

Figure 5.2-3 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 OPNAVINST 3710.7, Instrument Meteorological Conditions also exist any time a visible horizon is not distinguishable (Figure 5.2-4).

Figure 5.2-4 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: –

- 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."

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. The Navy 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 ground visibility must be 3 sm or greater (Figure 5.2-5). 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

Figure 5.2-5 VFR Takeoff

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.

En route - Maintain VMC throughout flight.

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.

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, OPNAVINST 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-34C, as for all turbine powered, fixed-wing aircraft, fuel reserve is based on maximum endurance operation at 10,000’ MSL.

<u>INSTRUMENT FLIGHT RULES</u>

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 (Figure 5.2-8).

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 <u>an electronic glideslope is not provided</u> (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 5.2-6). 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.

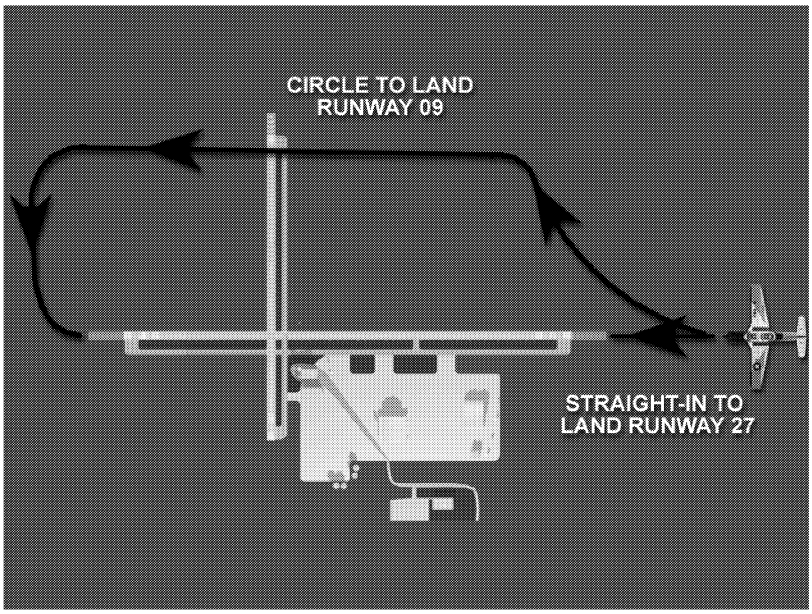


Figure 5.2-6 Circle To Land

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 visibility 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 OPNAVINST 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, <u>execution of the missed approach is mandatory</u>. 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.

SPECIAL VISUAL FLIGHT RULES (SPECIAL VFR)

Rules permitting some VFR aircraft to operate within controlled airspace designated for an airport, in meteorological conditions below the minimums for VFR flight.

INSTRUMENT DEPARTURES

Takeoff Minimums – Takeoff weather minimums depend upon the instrument flight rating of the pilot. There are two types of instrument ratings for Navy pilots: standard and special. A standard rating is the initial rating for qualified pilots. The special instrument rating requires five years of flying experience, 2,000 flight hours, 100 hours of actual instrument flight time, and is issued at the commanding officer's discretion. The annual requirements for an instrument rating include attending an instrument ground school, satisfactorily completing a written examination, completing a specified number of instrument approaches, obtaining sufficient hours of instrument flight time, and successfully completing an instrument check flight.

Standard Instrument Rating – A pilot with a standard instrument rating may take off if existing weather conditions meet the published minimums for the available non-precision approach but is not less than 300 foot ceiling and 1 sm visibility. When a precision approach compatible with installed and operable aircraft equipment is available, with published minimums less than 300/1, takeoff is authorized provided the weather is at least equal to the precision approach minimums for the landing runway in use, but in no case when the weather is less than 200 foot ceiling and 1/2 sm visibility / 2,400 foot RVR.

Special Instrument Rating – With a special instrument rating, <u>no takeoff ceiling or visibility minimums apply</u>. The decision to take off shall depend on the judgment of the pilot and the urgency of the mission.

Standard Instrument Departure (SID) – The standard instrument departure is a published procedure for leaving an airport under instrument conditions. It includes specific headings, altitudes, and navigational aids to be used. All information necessary to complete the departure is included on one page. At locations where SIDs are available, pilots are encouraged to utilize them for each IFR departure, provided no unacceptable flight degradation will ensue. An appropriate SID procedure should be selected during preflight planning for pilots to realize the greatest benefit from standardization of instrument departures and to have a clear course of action to follow in the event of communication failure.

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 though not required for filing purposes.

The criteria in Table 5.2-2 (from OPNAVINST 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 one (1) hour</th><th colspan="3">ALTERNATE WEATHER
ETA plus and minus one (1) hour</th></tr>
<tr><td>0-0 up to but not including published minimums</td><td colspan="3">3,000 - 3 or better</td></tr>
<tr><td rowspan="3">Published minimums up to but not including 3,000 - 3 (single-piloted absolute minimums 200 - ½)</td><td rowspan="2">NON-PRECISION</td><td colspan="2">PRECISION</td></tr>
<tr><td>ILS</td><td>PAR</td></tr>
<tr><td>*Published Minimums Plus 300-1</td><td>Published Minimums Plus 200-½</td><td>*Published Minimums Plus 200-½</td></tr>
<tr><td>3,000 - 3 or better</td><td colspan="3">No alternate required</td></tr>
<tr><td colspan="4">* In the case of single-piloted or other aircraft with only one operable UHF/VHF transceiver, radar approach minimums MAY NOT be used as the basis for selection of an alternate airfield.</td></tr>
</table>

Table 5.2-2 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 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-34C, as for all turbine powered, fixed-wing aircraft, fuel reserve is based on maximum endurance operation at 10,000' MSL.

SPECIAL VFR OPERATIONS

FAR Part 91 provides an exception to the VFR weather condition requirements for operations to or from an airport in controlled airspace; this exception is called a Special VFR Clearance. A Special VFR clearance may be granted by ATC except at airports prohibited by FAR Part 91. Special VFR operations are subject to the following conditions:

- The operation must be approved by ATC and conducted within Class B, C, D, or E airspace designated for an airport.
- Aircraft must remain clear of clouds.
- For fixed-wing operations, including take off and landing, visibility must be at least 1 sm.
- OPNAVINST 3710.7 adds that pilot and aircraft must be certified for instrument flight, and there must be a minimum ceiling of 500'.

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 at. To determine the appropriate VFR or VFR-ON-TOP cruising altitude, use the semicircular rules (Figure 5.2-7).

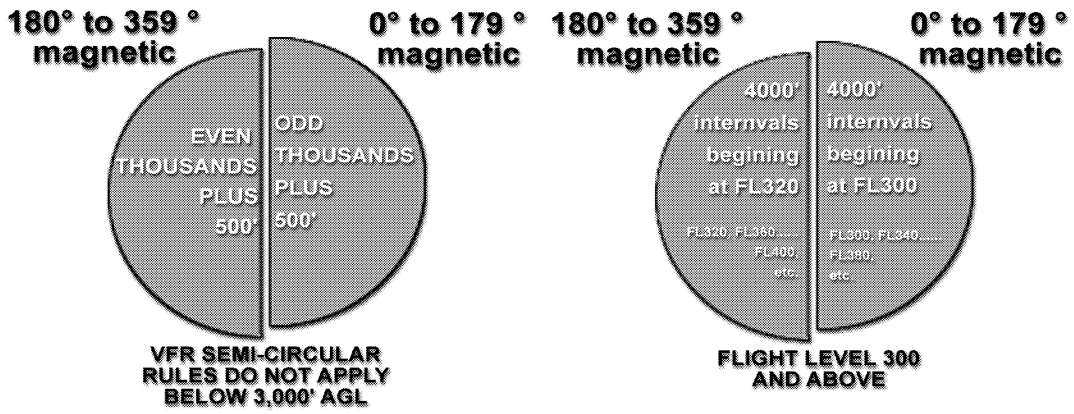


Figure 5.2-7 VFR Cruising Altitudes

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

<u>For flights above 3,000' AGL and below 18,000' MSL, with a magnetic course of</u>:

- 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.)

<u>For flights above 18,000' MSL to FL 290, with a magnetic course of</u>:

- 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.)

<u>For flights above FL 290, with a magnetic course of</u>:

- 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 conditions 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 5.2-8).

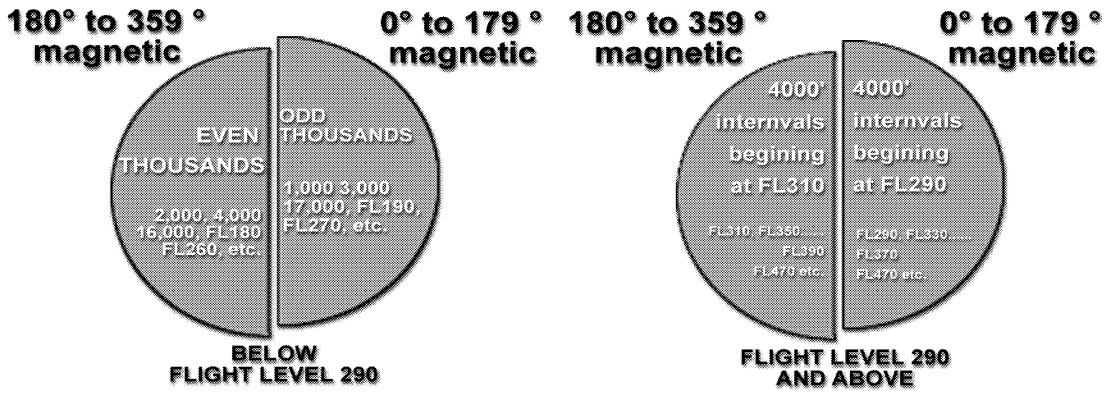


Figure 5.2-8 IFR Cruising Altitudes

<u>For flights below 18,000' MSL, with a magnetic course of</u>:

- 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.)

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

- 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.)

<u>For flights at FL 290 or above, with a magnetic course of</u>:

- 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.)

FORMATION FLYING

GENERAL

The FAR place two restrictions on formation flights. They are designed to ensure the safety of the general public rather than to regulate military operations. The two regulations are as follows:

- The pilots in command of the aircraft involved must have prearranged the formation.

- There must be no passengers for hire (paying passengers) in the aircraft.

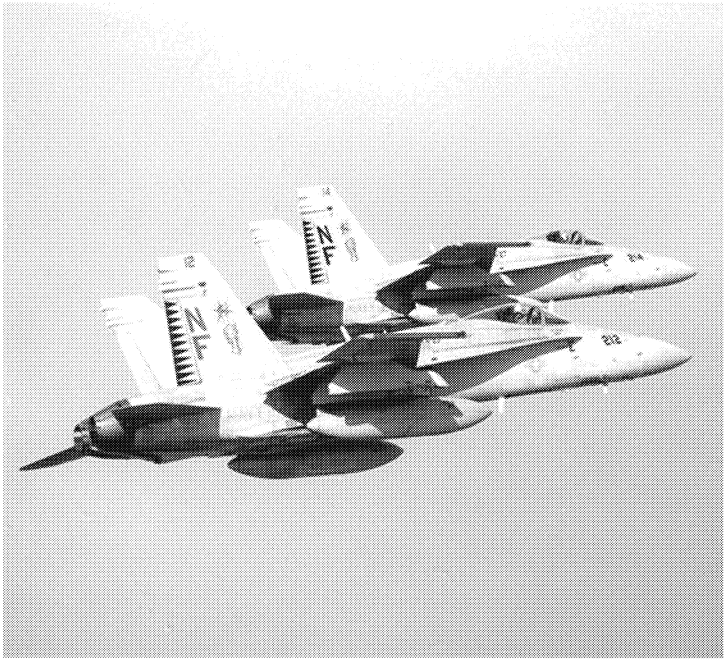


Figure 5.2-9 Formation Flying

OPNAVINST 3710.7 states that formation flying is authorized only for those units and types of aircraft for which a valid requirement exists (Figure 5.2-9). Appropriate commanders shall ensure issuance of, and adherence to, specific instructions and standard operating procedures for all aspects of formation flying.

PREFLIGHT

OPNAVINST 3710.7 requires that the formation leader shall execute one flight plan for the entire formation and shall

- Sign the flight plan form as the pilot in command.

- Ensure that all pilots are briefed on en route weather and navigational aids.

- Ensure that each pilot holds a valid instrument rating if any portion of that flight is to be conducted under IFR.

- Ensure that a flight leader formation brief is conducted to include but not to be limited to loss of sight lost communication, inadvertent IMC, and emergency procedures.

- Ensure that necessary maps, charts, and publications are in the possession of each pilot.
- Ensure that formation integrity is maintained in flight.

FORMATION TAKEOFFS

OPNAVINST 3710.7 authorizes two-plane section takeoffs for aircraft of similar performance only for units and types of aircraft whose military missions require formation flying (Figure 5.2-10), including essential pilot training. On ground roll, safe lateral separation shall be maintained (in the event of a blown tire, aborted takeoff, etc.) with the leading aircraft on the downwind side (if crosswind exists). Differences in flying characteristics, especially stall speeds due to gross weight and/or configuration, shall be considered.

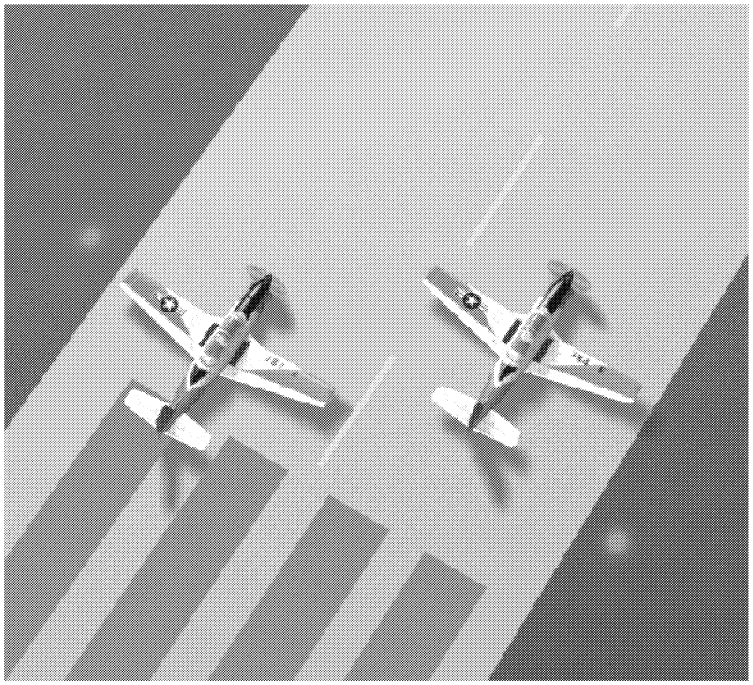


Figure 5.2-10 Section Takeoff

INSTRUMENT DEPARTURES

OPNAVINST 3710.7 authorizes two-plane formation takeoffs for subsequent flight into instrument conditions provided the weather (ceiling and visibility) is at or above the published circling minimums for the runway in use. In the event a circling approach is not authorized, the ceiling and visibility must be at least 1,000' and 3 sm.

JOINING FORMATIONS

OPNAVINST 3710.7 states a single aircraft or formation of aircraft shall not join a formation in the air unless specifically ordered. The order for joining a formation in the air shall be given prior to takeoff of the aircraft concerned or by radio, and the leader of the formation to be joined shall be informed that the order has been given. Exceptions to this paragraph may be made when the leader of a formation signals another aircraft to join the formation.

APPROACH CRITERIA FOR AIRCRAFT IN FORMATION

OPNAVINST 3710.7 states that <u>approaches in IMC, with or without intent to land, by formation flights of more than two aircraft, are not authorized</u>. <u>Penetration of IMC to obtain VMC by these formations is authorized</u>. Formation flights shall not commence an instrument approach when the reported weather is

less than circling minimums for the runway in use. In the event a circling approach is not authorized, the ceiling and visibility must be at least 1,000' and 3 sm. Once an approach has been commenced, the leader may, at his discretion, continue the approach in formation to the minimums prescribed for the type of aircraft being flown.

DISSIMILAR FORMATION FLIGHT

OPNAVINST 3710.7 requires pilots involved in dissimilar formation flight should perform a preflight brief delineating all aspects of the pending formation flight. Items to be briefed in addition to those identified for all formation flights shall include items peculiar to the aircraft communities involved. Examples include limitations, capabilities, hazards affecting the flight, rendezvous, join-up, and separation.

UNPLANNED FORMATION FLIGHT

In the event unscheduled formation flight becomes necessary, OPNAVINST 3710.7 requires the aircrew involved to make every attempt to conduct a sufficient in-flight brief prior to join-up.

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 5.2-11). A "break" maneuver that conforms to the model NATOPS Flight Manual is not considered to be aerobatic flight. Both FAR and OPNAVINST 3710.7 have restrictions on the conduct of aerobatic maneuvers as to location and weather conditions.

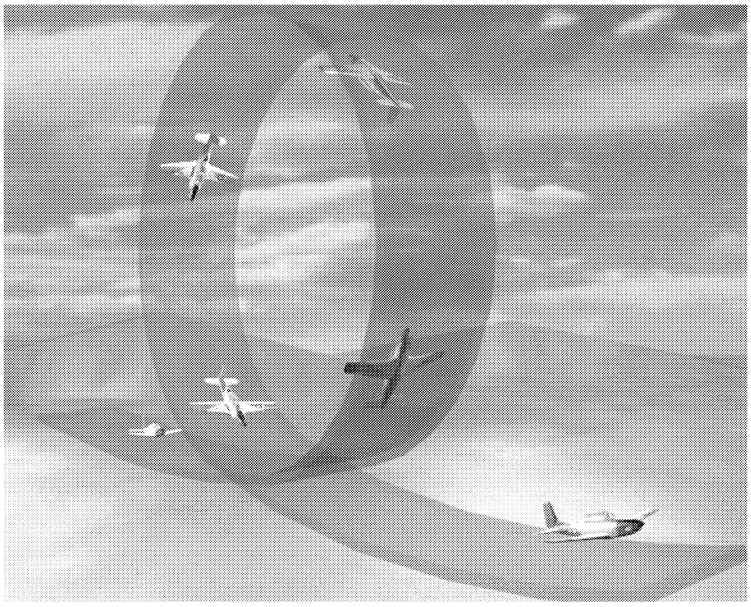


Figure 5.2-11 Aerobatic Flight

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 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

OPNAVINST 3710.7

OPNAVINST 3710.7 additionally states that aerobatic flight maneuvers shall not be performed

- If prohibited by a particular aircraft's NATOPS Manual
- Unless the aircraft remains in VFR conditions and at an altitude of at least 1,500' above the highest obstruction to flight or cloud tops within a horizontal distance of 5 sm

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

OPNAVINST 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.

STUDY QUESTIONS

Visual / Instrument Flight Rules

1. 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

2. A magnetic course of 0° is considered (semicircular rules) _____ and 180° is considered _____.

3. VFR semicircular rules start at what altitude? _____

4. 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

5. 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

6. IFR semicircular altitudes are used only for pre-flight planning and when the aircraft is flying in _____ airspace.

7. 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

8. Aerobatic flight is defined as an intentional maneuver involving abrupt _____, _____, or _____.

9. Where can naval aviators execute aerobatic maneuvers?

   a. Over congested areas
   b. In VFR conditions, if they remain at least 1,500' above the highest cloud tops within 5 sm
   c. Within a federal airway
   d. Within Class A airspace in IMC

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ASSIGNMENT SHEET

Airspace and General Flight Rules
Assignment Sheet 5.3.1A

INTRODUCTION

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

LESSON TOPIC LEARNING OBJECTIVES

Terminal Objective:
Partially supported by this lesson topic:

5.0 Upon completion of this unit of instruction, the student will demonstrate knowledge of the regulations of Federal Aviation Regulation (FAR) Part 91 and OPNAVINST 3710.7 as they relate to Naval flight operations in all weather conditions and applicable airspaces.

Enabling Objectives:
Completely supported by this lesson topic:

5.23 Explain the difference between controlled and uncontrolled airspace.

5.24 State the dimensions of and requirements for entry into Class A, Class B, Class C, Class D, and Class E airspaces.

5.25 State the dimensions of and types of airspace that make up VOR Airways and Jet Routes.

5.26 State the dimensions of the Mode C veil around Class B and Class C airspaces.

5.27 State the VFR weather minimums for all classifications of airspace.

5.28 State the purposes of and entry restrictions for the following Special Use Airspaces: Prohibited Area, Restricted Area, Warning Area, Controlled Firing Area, Military Operations Area (MOA), and Alert Area.

5.29 Cite the rules concerning the use of aircraft lighting IAW OPNAVINST 3710.7.

5.30 Identify an aircraft's relative position by using aircraft position lights.

5.31 Cite the rules concerning right-of-way between aircraft IAW FAR and OPNAVINST 3710.7.

5.32 State the rules concerning VFR and IFR altitude restrictions.

5.33 State the airspeed restrictions IAW FAR Part 91: Below 10,000' MSL, in Class B airspace and its lateral limits, and in Class C and D airspace IAW FAR.

5.34 State the policy concerning careless or reckless flying IAW FAR.

5.35 State the rule concerning the annoyance to civilians and endangering private property IAW OPNAVINST 3710.7.

5.36 Cite examples of noise sensitive areas IAW OPNAVINST 3710.7.

5.37 State the restrictions on flight in the vicinity of noise sensitive and wilderness areas, temporary flight restrictions, and commercial carriers and aircraft of civil registry, IAW OPNAVINST 3710.7.

5.38 State the rule concerning the disturbance of wildlife IAW OPNAVINST 3710.7.

5.39 Define flat hatting.

5.40 Cite the restrictions on flat hatting and zooming of vessels IAW OPNAVINST 3710.7.

Review Information Sheet 5.3.1I and answer the Study Questions.

INFORMATION SHEET

Airspace and General Flight Rules
Information Sheet 5.3.1I

INTRODUCTION

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

REFERENCES

1. Federal Aviation Regulations, Part 91
2. OPNAVINST 3710.7
3. Aeronautical Information Manual

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 5.3-1).

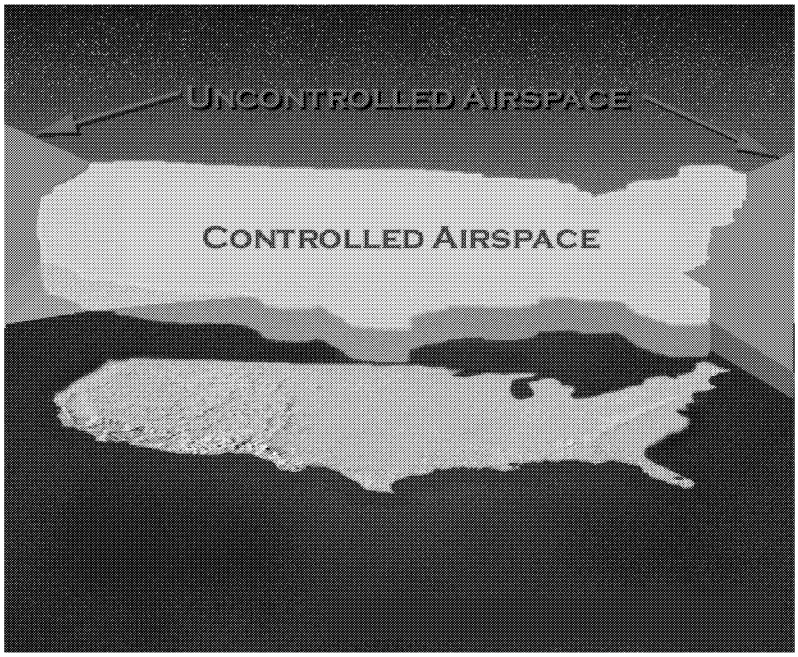

Figure 5.3-1 Airspace Overview

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 5.3-2).

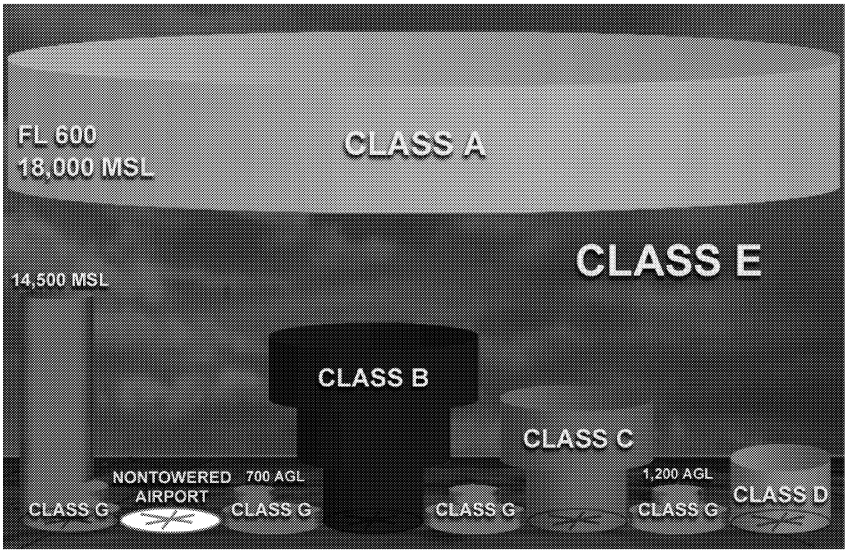

Figure 5.3-2 Controlled Airspace

UNCONTROLLED AIRSPACE

A generic term for all airspace under FAA jurisdiction that is <u>not Class A, B, C, D, or E</u>, and in which <u>no air traffic control services are provided</u>.

<u>AIRSPACE CLASSIFICATION – DIMENSIONS AND REQUIREMENTS</u>

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 5.3-3). 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 5.3-3 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 5.3-4). 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 these requirements are

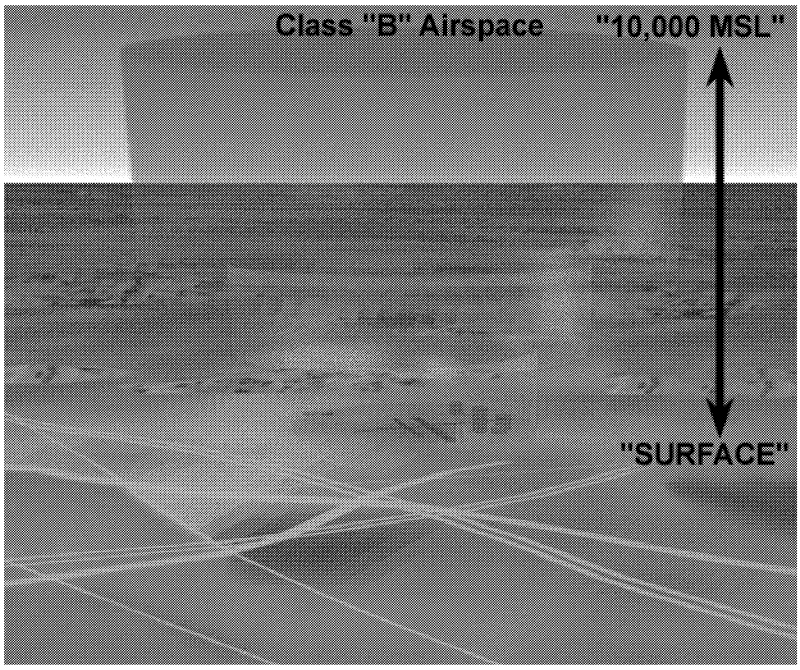

Figure 5.3-4 Class "B" Airspace

- 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.

CLASS C AIRSPACE

Generally, Class C airspace consists of that airspace <u>from the surface to 4,000' AGL (charted in MSL)</u> 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 boardings (Figure 5.3-5). 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' above the airport elevation and a 10 nm radius shelf area that extends from 1,200' to 4,000' above the airport elevation.

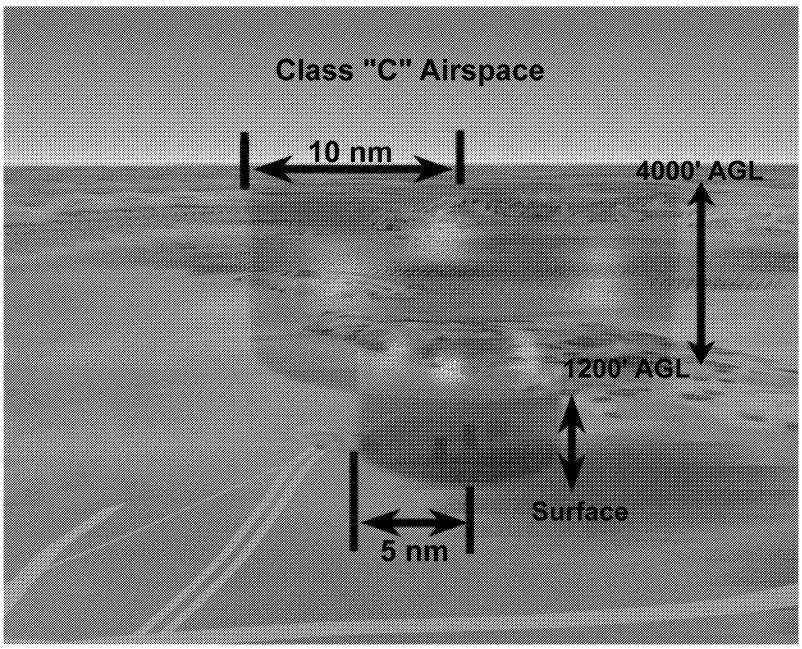

Figure 5.3-5 Class "C" Airspace

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.

- 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.

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 5.3-6). The horizontal limits are tailored to individual airports but generally have a core radius of 4.4 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.

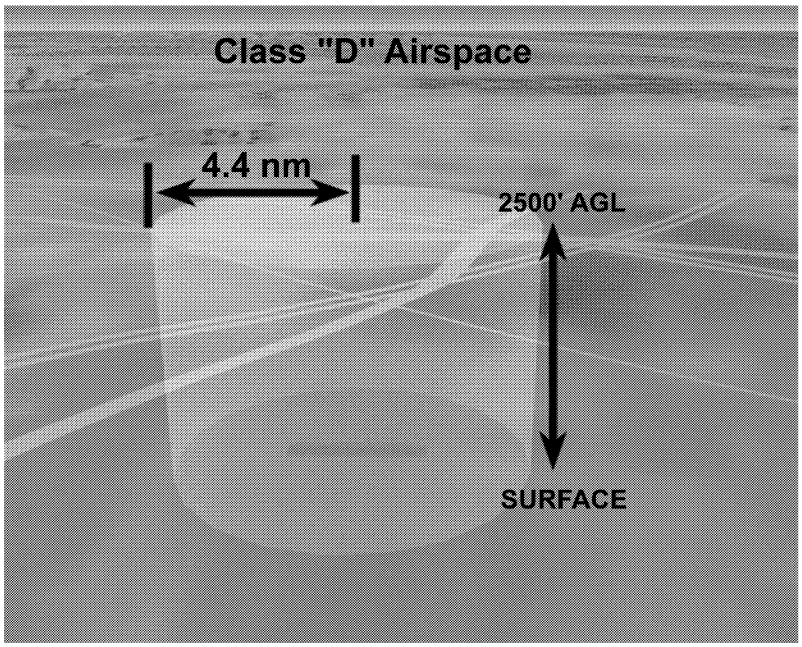

Figure 5.3-6 Class "D" Airspace

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 1500' AGL. 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.

- 1200' 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 NAVAIDs and the "Victor" Airways based on VOR NAVAIDS.

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 of 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 5.3-7). 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).

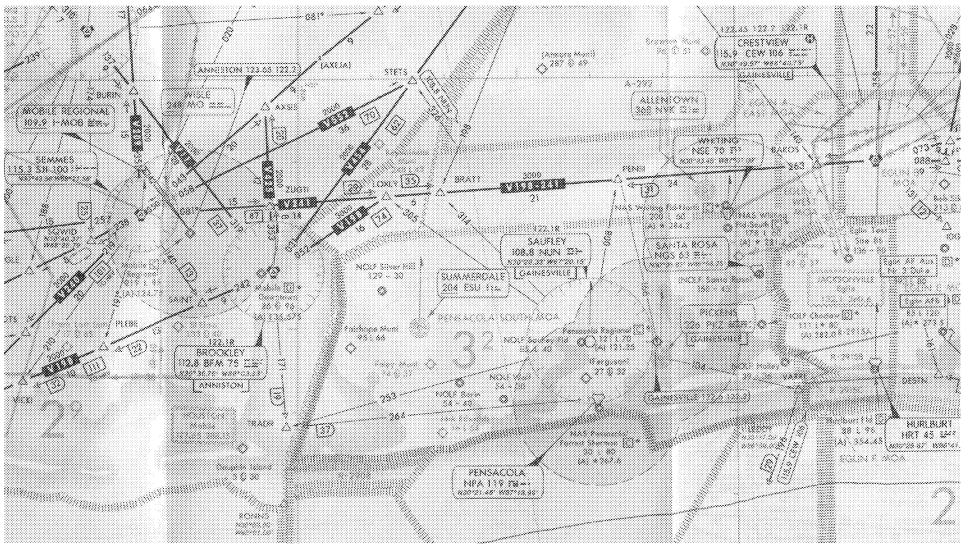

Figure 5.3-7 VOR Airway

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-J2. They extend from 18,000' MSL to FL450 and have no defined width (Figure 5.3-8). The upper limit is established to prevent interference between stations with similar frequencies.

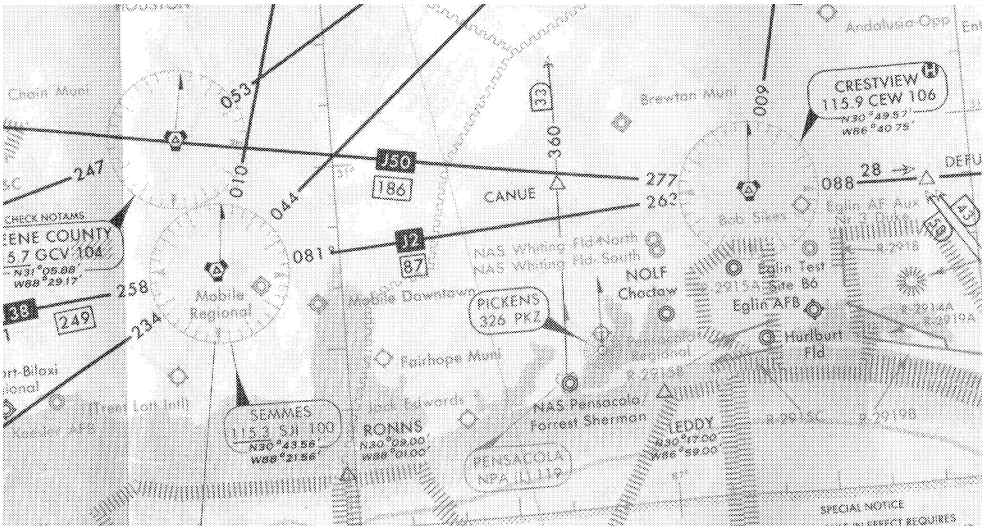

Figure 5.3-8 Jet Route

MODE C VEIL

All aircraft operating within the following areas, in addition to previously defined requirements, must be equipped with an operable Mode C transponder:

- All airspace at and above 10,000' MSL.
- All airspace within 30 nm of a Class B airport from the surface to 10,000' MSL.
- All airspace above the ceiling and within the lateral boundaries of Class B or Class C airspace upward to 10,000' MSL (Figure 5.3-9).

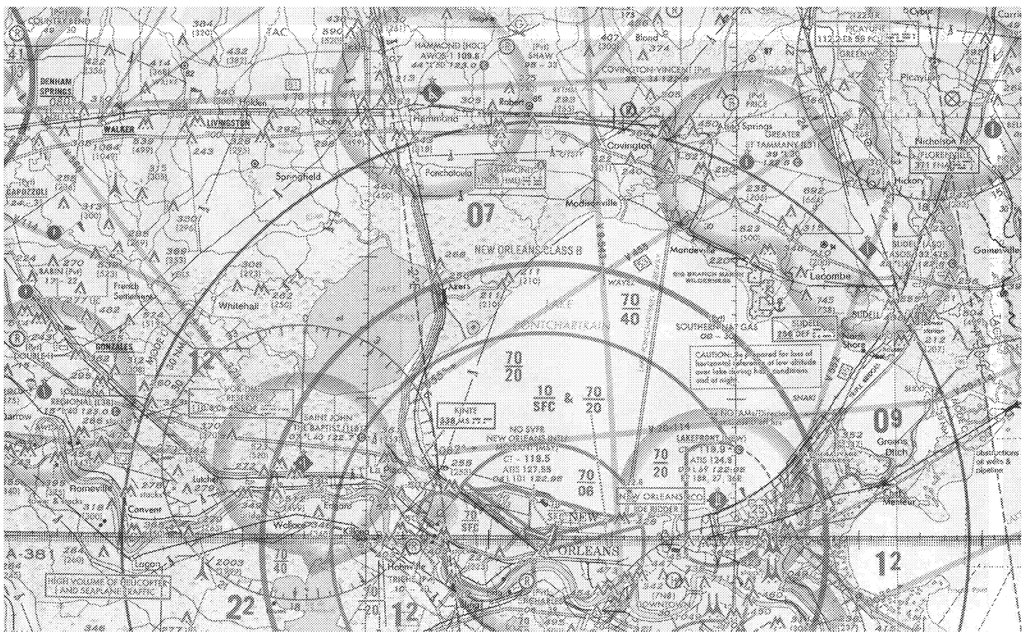

Figure 5.3-9 Mode C Veil

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 5.3-1).

VFR Weather Minimums

Airspace	Visibility	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 [3] 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	5 Miles	1,000' Below 1,000' Above 1 sm Horizontal

Table 5.3-1 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 5.3-10). 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 5.3-10 Prohibited Area

RESTRICTED AREA

Restricted Areas contain airspace within which the flight of aircraft, while not wholly prohibited, is subject to restriction (Figure 5.3-11). 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

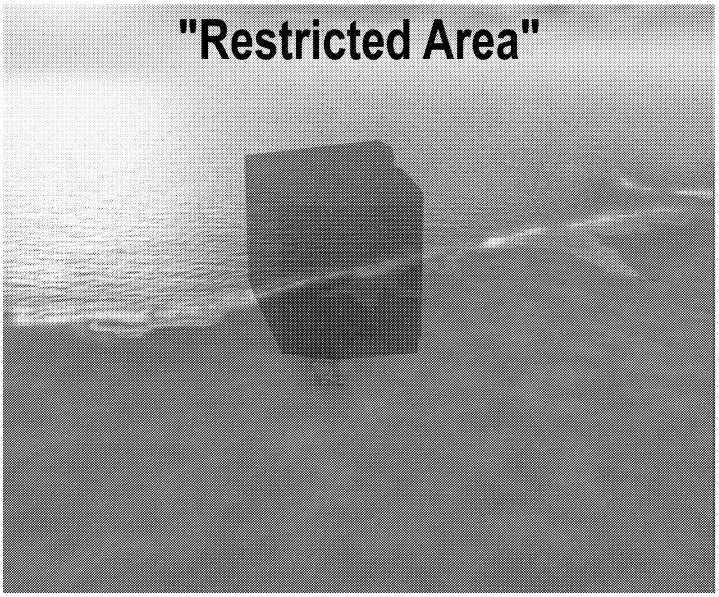

Figure 5.3-11 Restricted Area

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 in international airspace (Figure 5.3-12). They are established beyond the three-mile limit over international waters. 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.

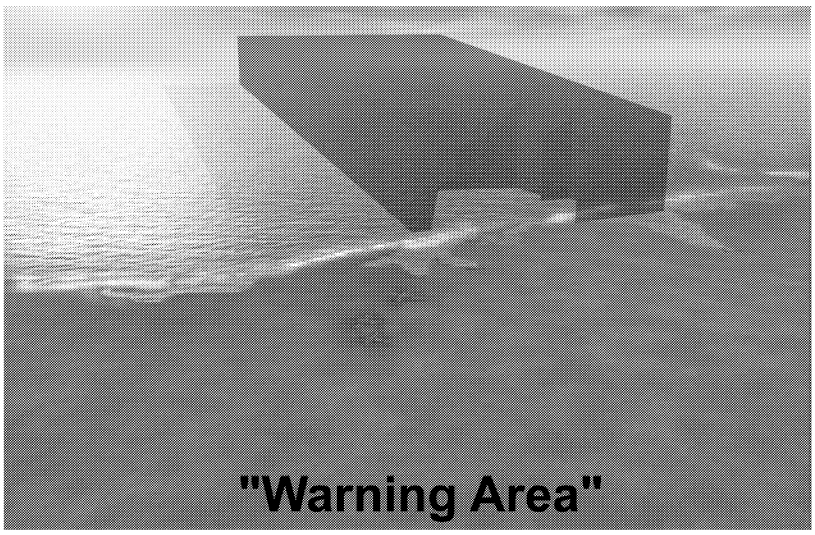

Figure 5.3-12 Warning Area

Figure 5.3-13 Alert Area

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 (Figure 5.3-13). Pilots should be particularly alert when flying in

these areas. All activity within an Alert Area shall be conducted in accordance with FAR. 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.

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 (Figure 5.3-14). 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.

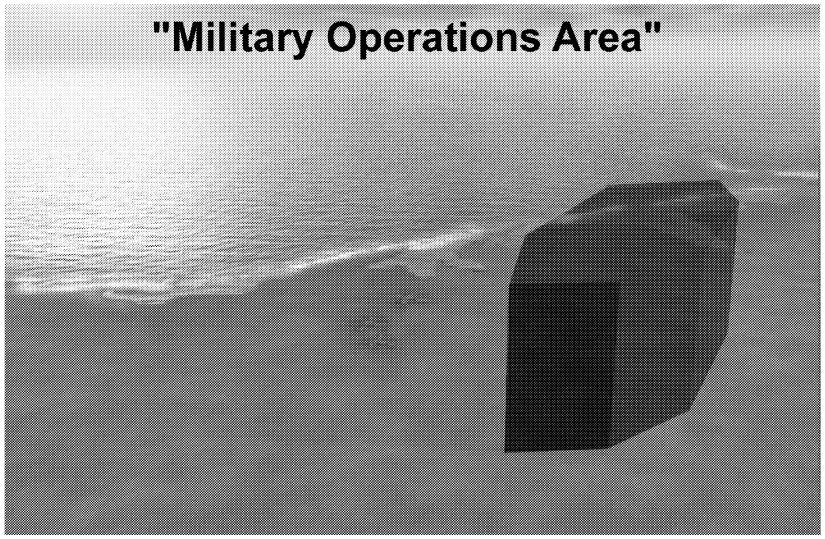

Figure 5.3-14 Military Operatins Area

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.

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.

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. OPNAVINST 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 on the tail (Figure 5.3-15). They shall be used during the period 30 minutes prior to official sunset until 30 minutes after official sunrise or when the prevailing visibility as seen from the cockpit is less than 3 sm. During these conditions, they shall be on before engine starts and remain on while engines are turning.

Figure 5.3-15 Position Lights

Anti-Collision Lights – These are bright strobes or 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. OPNAVINST 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.

In Distress – An aircraft in distress has the right of way over all other air traffic (Figure 5.3-16).

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.

Figure 5.3-16 Aircraft In Distress

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.

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.

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 5.3-17).

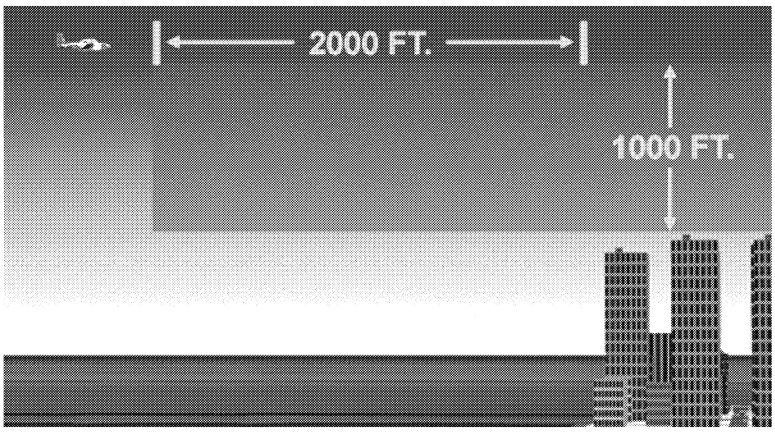

Figure 5.3-17 Congested Area

Over Other Than Congested Areas – 500' AGL is the minimum altitude except over open water or sparsely populated areas (Figure 5.3-18). In those areas, the aircraft may not be operated closer than 500' to any person, vessel, vehicle, or structure.

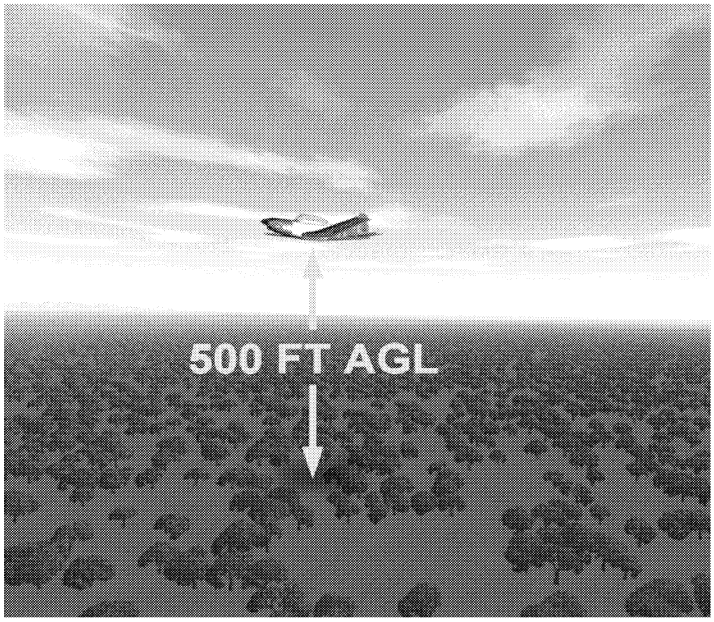

Figure 5.3-18 Other than Congested Area

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.

OPNAVINST 3710.7

This reference 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 1,200' above the highest terrain, surface of the water, or obstacle within 22 miles of the intended line of flight (Figure 5.3-19). Over designated mountainous terrain, the minimum altitude is 2,000'.

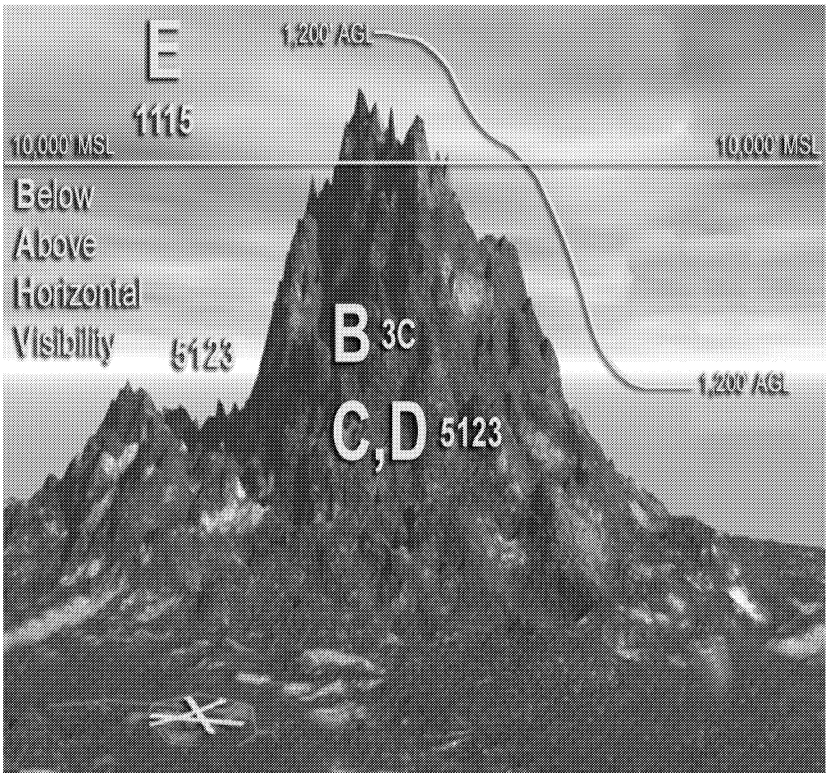

Figure 5.3-19 Mountainous Terrain

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 knots (Figure 5.3-20)

Figure 5.3-20 Airspeed Below 10,000 MSL

Underneath Class B Airspace – Below and within the lateral limits of Class B airspace - 200 knots (Figure 5.3-21)

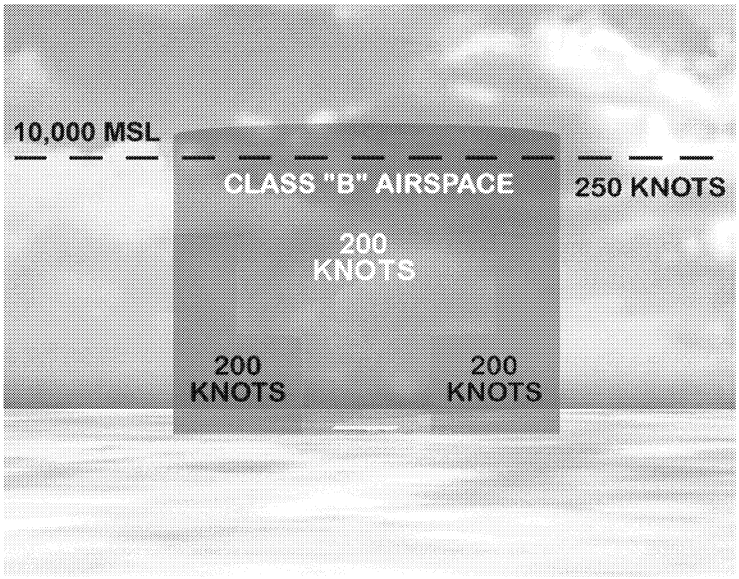

Figure 5.3-21 Airspeed Below Class "B" Airspace

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 (Figure 5.3-22).

Since the airspace dimensions of Class D airspace are 4.4nm, there is, in effect, a .4nm buffer to reduce airspeed from 250 knots to 200 knots (Figure 5.3-23).

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.

OPNAVINST 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 OPNAVINST 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.

Figure 5.3-22 Airspeed in Class "C" Airspace

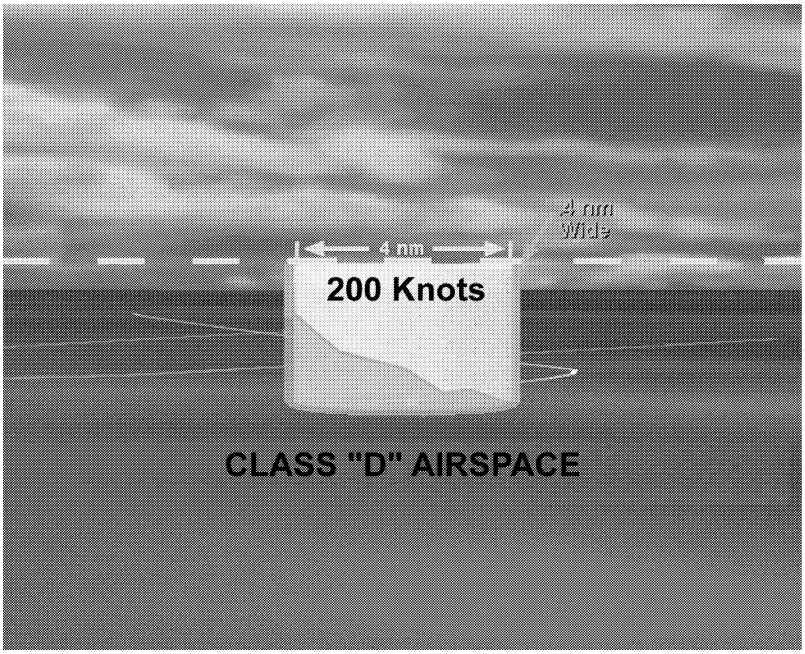

Figure 5.3-23 Class "D" Airspace

- 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 OPNAVINST 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.

OPNAVINST 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 that 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

OPNAVINST 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 5.3-24).

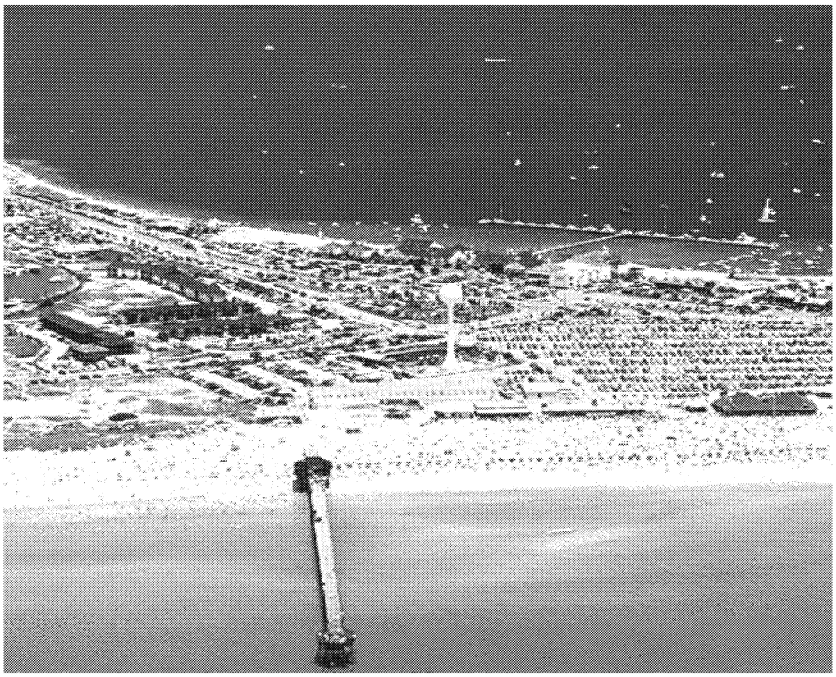

Figure 5.3-24 Noise Sensitive Area

WILDLIFE PRESERVES

OPNAVINST 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' shall be maintained, conditions permitting (Figure 5.3-25).

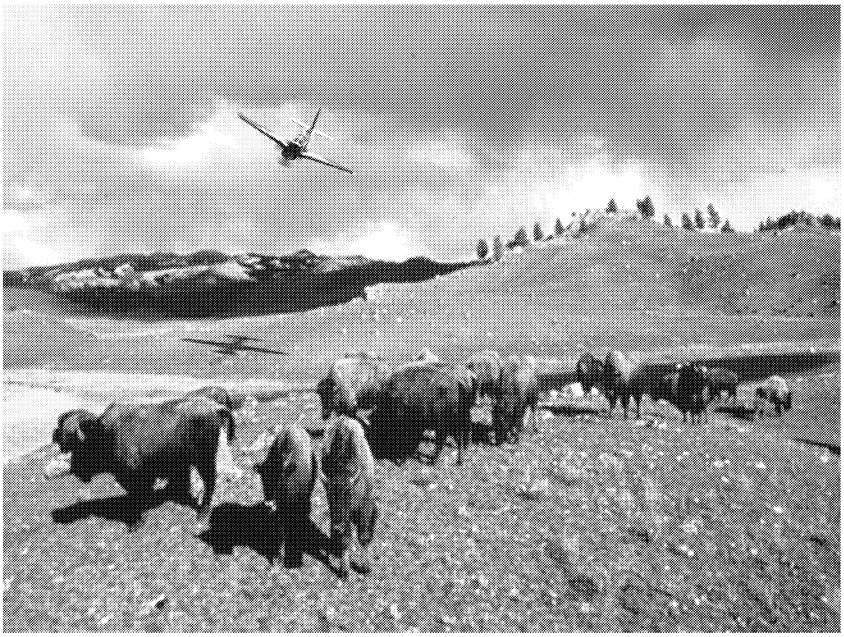

Figure 5.3-25 Livestock Considerations

TEMPORARY FLIGHT RESTRICTIONS (PUBLIC INTEREST AREAS)

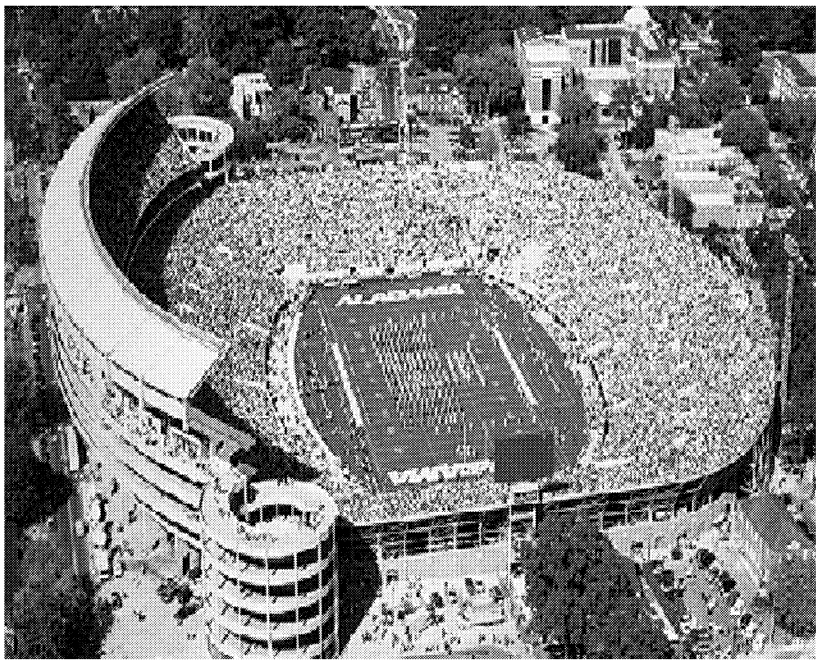

Figure 5.3-26 Major Sporting Event

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 5.3-26). Some examples include natural disasters, riots, major sporting events, parades, forest fires, train accidents. OPNAVINST 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.

FLAT HATTING

OPNAVINST 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

OPNAVINST 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 5.3-27).

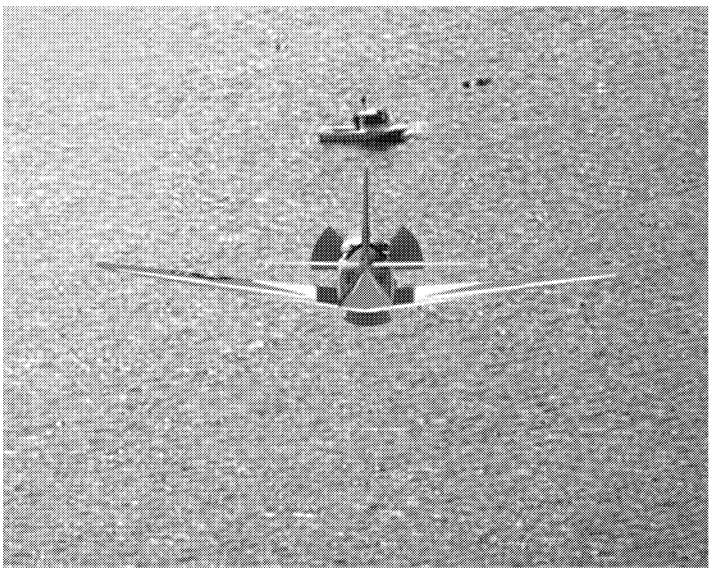

Figure 5.3-27 Zooming a Vessel

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." OPNAVINST 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.

STUDY QUESTIONS

Airspace and General Flight Rules

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. What are the vertical dimensions of a Victor airway? 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 area?

   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
   b. 1,000' above, 1,000' below, 1 mile horizontally
   c. Clear of clouds, 1 sm visibility
   d. 500' above, 1,000' below, 2,000' horizontally

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 airspaces which may contain hazards to nonparticipating aircraft and are located 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. 0830, 0430
    b. 1830, 0600
    c. 1900, 0430
    d. 1900, 0530

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

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 over taking 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 aircraft speed beneath the lateral limits of Class B airspace?

21. In reference to careless and reckless flying, OPNAVINST 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 sm
    b. below 2,000' AGL within 5 sm
    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.

APPENDIX

Glossary
Appendix No. 5.A

INTRODUCTION

This glossary is for reference purposes only. Where deviation occurs from local publications (i.e. Flight Training Instructions (FTIs)), those publications will take precedence!

REFERENCES

The explanation or definitions of terms and abbreviations commonly used in aviation can be found in FAR, Parts 1 and 91; AIM, Pilot/Controller Glossary; DOD FLIP General Planning (GP), Chapter 2; and OPNAVINST 3710.7, Chapter 1. Unless annotated otherwise, all terms in this glossary have been taken from the AIM Pilot/Controller Glossary.

actual instrument approach
When actual instrument conditions are encountered below 1,000 feet above the airport or flight deck elevation during an instrument approach. (OPNAVINST 3710.7)

actual instrument conditions
Conditions external to the aircraft in flight which do not permit visual reference to the horizon. (OPNAVINST 3710.7)

"advise intentions"
Tell me what you plan to do.

aerobatic flight
An intentional maneuver involving an abrupt change in aircraft attitude, intentionally performed spins, or other maneuvers requiring pitch/dive angles greater than 45°, bank angles greater that 60°, or accelerations greater than 2g's. A "break" maneuver that conforms to the model NATOPS manual is not considered to be aerobatic flight. (OPNAVINST 3710.7)

Aeronautical Information Manual (AIM)
An primary FAA publication whose purpose is to instruct airmen about operating in the National Airspace System of the U.S. It provides basic flight information, ATC procedures and general instruction information concerning health, medical facts, factors affecting flight safety, accident and hazard reporting, and types of aeronautical charts and their use.

"affirmative"
Yes.

aircraft
Device(s) that are used or intended to be used for flight in the air, and when used in air traffic control terminology, may include the flight crew.

aircraft approach category

A grouping of aircraft based on a speed of 1.3 times the stall speed in the landing configuration at maximum gross landing weight. An aircraft shall fit in only one category. If it is necessary to maneuver at speeds in excess of the upper limit of a speed range for a category, the minimums for the next higher category should be used. For example, an aircraft which fall in Category A, but is circling to land at a speed in excess of 91 knots, should use the approach Category B minimums when circling to land. The categories are as follows:

1. Category A – Speed less than 91 knots.
2. Category B – Speed 91 knots or more but less than 121 knots.
3. Category C – Speed 121 knots or more but less thatn141 knots.
4. Category D – Speed 141 knots or more but less than 166 knots.
5. Category E – Speed 166 knots or more.

aircraft class

A broad classification as to the general mission purpose of an aircraft design (i.e., attack, fighter, helicopter, patrol, transport, vertical takeoff and landing). (OPNAVINST 3710.7)

aircraft [weight] classes

For the purposes of Wake Turbulence Separation Minima, ATC classifies aircraft as heavy, large, and small as follows:

1. Heavy – Aircraft capable of takeoff weights of 300,000 pounds or more whether or not they are operating at this weight during a particular phase of flight.
2. Large – Aircraft of more than 12,500 pounds, maximum certificated takeoff weight, up to 300,000 pounds
3. Small – Aircraft of 12,600 pounds or less maximum certificated take off weight.

aircraft model

The basic mission symbol and design number (i.e., P-3, S-3, F-14, H-3, A-6). (OPNAVINST 3710.7)

aircraft series

The collective group of all aircraft of the same type and model (i.e., AV-8A or B; C-130F, R, or T; CH-53A, D, or E; EA-6A or B). (OPNAVINST 3710.7)

aircraft type

The broadest classification of aircraft as to physical characteristics (i.e., fixed wing or rotary wing). (OPNAVINST 3710.7)

AIRMET

In-flight weather advisories issued only to amend the area forecast concerning weather phenomena which are of operational interest to all aircraft and potentially hazardous to aircraft having limited capability because of lack of equipment, instrumentation, or pilot qualifications. AIRMET's concern weather of less severity than that covered by SIGMET's or Convective SIGMET's AIRMET's cover moderate icing or turbulence, sustained winds of 30 knots or more at the surface, widespread areas of ceiling/visibilities of less than 1,000/3, and extensive mountain obscurement.

airport advisory area
The area within ten miles of an airport without a control tower or where the tower is not in operation, and on which a Flight Service Station is located.

airport elevation
The highest point of an airport's usable runways measured in feet from mean sea level.

Airport/Facility Directory
A publication designed primarily as a pilot's operational manual containing all airports, seaplane bases, and heliports open to the public including communications data, navigational facilities, and certain special notices and procedures. This publication is issued in seven volumes according to geographical area.

airport rotating beacon
A visual NAVAID operated at many airports. At civil airports, alternating white and green flashes indicate the location of the airport. At military airports, the beacons flash alternately white and green, but are differentiated from civil beacons by dual-peaked (two quick) white flashes between the green flashes.

Airport Surveillance Radar (ASR)
Approach control radar used to detect and display an aircraft's position in the terminal area. ASR provides range and azimuth information but does not provide elevation data. Coverage of the ASR can extend up to 60 miles.

airport traffic control service
A service provided by a control tower for aircraft operating on the movement area and in the vicinity of an airport.

Air Route Surveillance Radar (ARSR)
Air Route Traffic Control Center radar used primarily to detect and display an aircraft's position while en route between terminal areas. The ARSR enables controllers to provide radar air traffic control service when aircraft are within the ARSR coverage. In some instances, ARSR may enable an ARTCC to provide terminal radar services similar to but usually more limited than those provided by a radar approach control.

Air Route Traffic Control Center (ARTCC)
A facility established to provide air traffic control service to aircraft operating on IFR flight plans within controlled airspace and principally during the en route phase of flight. When equipment capabilities and controller workload permit, certain advisory/assistance services may be provided to VFT aircraft.

airspace hierarchy
Within the airspace classes there is a hierarchy and, in the event of an overlap of airspace: Class A preempts Class B, Class B preempts Class C, Class C preempts Class D, Class D preempts Class E, and Class E preempts Class G.

airspeed
The speed of an aircraft relative to its surrounding air mass. The unqualified term "airspeed" means one of the following:

1. Indicated Airspeed – The speed shown on the aircraft airspeed indicator. This is the speed used in pilot/controller communications under the general term "airspeed."

2. True Airspeed – The airspeed of an aircraft relative to undisturbed air. Used primarily in flight planning and en route portion of flight. When used in pilot/controller communications, it is referred to as “true airspeed” and not shortened to “airspeed.”

air taxi

Used to describe a helicopter or VTOL aircraft movement conducted above the surface but normally not above 100 feet AGL. The aircraft may proceed either via hover taxi or flight at speeds more than 20 knots. The pilot is solely responsible for selecting a safe airspeed/altitude for the operation being conducted.

air traffic clearance (ATC clearance)

An authorization by air traffic control for the purpose of preventing collision between known aircraft, for an aircraft to proceed specified traffic conditions within controlled airspace. The pilot-in-command of an aircraft may not deviate from the provisions of a visual flight rules or instrument flight rules air traffic clearance except in an emergency or unless an amended clearance has been obtained. Additionally, the pilot may request a different clearance form that which has been issued by air traffic control if information available to the pilot makes another course of action more practicable or if aircraft equipment limitations or company procedures forbid compliance with the clearance issued. Pilots may also request clarification or amendment, as appropriate, any time a clearance is not fully understood, or considered unacceptable because of safety of flight. Controllers should, in such instances and to the extent of operational practicality and safety, honor the pilot’s request. FAR Part 91 states, “The pilot-in-command of an aircraft is directly responsible, and is the final authority as to, the operation “of that aircraft.” The pilot is responsible to request an amended clearance if ATC issues a clearance that would cause a pilot to deviate from a rule or regulation, or in the pilot’s opinion, would place the aircraft in jeopardy.

Air Traffic Control (ATC)

A service operated by appropriate authority to promote the safe, orderly and expeditious flow of air traffic.

air traffic service

A generic term meaning:

1. Flight Information Service
2. Alerting Service
3. Air Traffic Advisory Service
4. Air Traffic Control Service
   a. Area Control Service
   b. Approach Control Service, or
   c. Airport Control Service.

airway

Class E airspace area established in the form of a corridor, the centerline of which is defined by radio navigational aids.

ALDIS lamp

See light gun.

Alert Area

See special use airspace.

alert notice

A request originated by a Flight Service Station or an Air Route Traffic Control Center for an extensive

communication search for overdue, unreported, or missing aircraft.

altitude
The height of a level, point, or object measured in feet above ground level (AGL) or from mean sea level (MSL).

AP
DOD FLIP Area Planning Publication

approach clearance
Authorization by ATC for a pilot to conduct an instrument approach. The type of instrument approach for which a clearance and other pertinent information is provided in the approach clearance when required.

Approach Control (APC) Facility
A terminal ATC facility that provides approach control service in a terminal area.

Approach Control Service
Air traffic control service provided by an approach control facility for arriving and departing

approach speed
The recommended speed contained in aircraft manuals used by pilots when making an approach to landing. This speed will vary for different segments of an approach as well as for aircraft weight and configuration.

apron
A defined area on an airport or heliport intended to accommodate aircraft for purposes of loading or unloading passengers or cargo, refueling, parking, or maintenance. With regard to seaplanes, a ramp is used for access to the apron from the water.

Automatic Direction Finder (ADF)
An aircraft radio navigation system which senses and indicates the direction to a L/MF nondirectional radio beacon (NDB) ground transmitter. Direction is indicated to the pilot as a magnetic gearing or as a relative bearing to the longitudinal axis of the aircraft.

base leg
See traffic pattern.

below minimums
Weather conditions below the minimums prescribed by regulation for the particular action involved; e.g., landing minimums, takeoff minimums.

bolter
An attempted arrested landing on a carrier in which some portion of the aircraft, such as the landing gear or hook, touches the deck but the arresting gear is not engaged and the aircraft continues in flight. (OPNAVINST 3710.7)

ceiling
The heights above the earth's surface of the lowest layer of clouds or obscuring phenomena that is reported as "broken," "overcast," or "obscuration," and not classified as "thin" or "partial."

Center
See air traffic clearance.

circle-to-land maneuver

A maneuver initiated by the pilot to align the aircraft with a runway for landing when a straight-in landing from an instrument approach is not possible or is not desirable. This maneuver is make only after ATC authorization has been obtained and the pilot has established required visual reference to the airport.

"circle to runway (runway number)"

Instruction used by ATC to inform the pilot that he must circle to land because the runway in use is other than the runway aligned with the instrument approach procedure.

clear-air turbulence (CAT)

Turbulence encountered in air where no clouds are present. This term is commonly applied to high-level turbulence associated wit wind shear. CAT is often encountered in the vicinity of the jet stream.

clear of the runway-

1. A taxiing aircraft, which is approaching a runway, is clear of the runway when all parts of the aircraft are held short of the applicable holding position marking.
2. A pilot or controller may consider an aircraft, which is exiting or crossing a runway, to be clear of the runway when all parts of the aircraft are belong the runway edge and there is no ATC restriction to its continued movement beyond the applicable holding position marking.
3. Pilots and controllers shall exercise good judgment to ensure that adequate separation exists between all aircraft on runways and taxi ways at airports with inadequate runway edge line or holding position markings.

clearance

See air traffic clearance.

clearance limit

The fix, point, or location to which an aircraft is cleared when issued an air traffic clearance.

"cleared as filed"

Means the aircraft is cleared to proceed in accordance with the route of flight filed in the flight plan. This clearance does not include the altitude, SID, or SID Transition.

"cleared for (type of) approach"

ATC authorization for an aircraft to execute a specific instrument approach procedure to an airport; e.g., "Cleared ILS Runway Three Six Approach."

"cleared for takeoff"

ATC authorization for an aircraft to depart. It is predicated on known traffic and know physical airport conditions.

"cleared for the option"

ATC authorization for an aircraft to make a touch-and-go, low approach, missed approach, stop and go, or full stop landing at the direction of the pilot. It is normally used in training so that an instructor can evaluate a student's performance under changing situations.

"cleared to land"

ATC authorization for an aircraft to land. It is predicated on known traffic and known physical airport conditions.

climbout
That portion of flight operation between takeoff and the initial cruising altitude.

"climb to VFR"
ATC authorization for an aircraft to climb to VFR conditions within Class B, C, D, and E surface areas when the only weather limitation is restricted visibility, the aircraft must remain clear of clouds while climbing to VFR.

closed traffic
Successive operations involving takeoffs and landings or low approaches where the aircraft does not exit the traffic pattern.

clutter
In radar operations, clutter refers to the reception and visual display of radar returns caused by precipitation, chaff, terrain, numerous aircraft targets, or other phenomena. Such returns may limit or preclude ATC from providing services based on radar.

codes
The number assigned to a particular multiple pulse reply signal transmitted by a transponder.

common traffic advisory frequency (CTAF)
A frequency designed for the purpose of carrying out airport advisory practices while operating to or from an airport without an operating control tower. The CTAF may be a UNICOM, Multicom, FSS, or tower frequency and is identified in appropriate aeronautical publications.

compass rose
A circle, graduated in degrees, printed on some charts or marked on the ground at an airport. It is used as a reference to either true or magnetic direction.

composite flight plan
A flight plan which specifies VFR operation for one portion of flight and IFR for another portion. It is used primarily in military operations.

conflict alert
A function of certain air traffic control automated systems designed to alert radar controllers to existing or pending situations between tracked targets (known IFR or VFR aircraft) that require his immediate attention/action.

contact-
1. Establish communication with (followed by the name of the facility and, if appropriate, the frequency to be used).
2. A flight condition wherein the pilot ascertains the attitude of his aircraft and navigates by visual reference to the surface.

contact approach
An approach wherein an aircraft on an IFR flight plan, having an air traffic control authorization, operating clear of clouds with at least 1 mile flight visibility and a reasonable expectation of continuing to the destination airport in those conditions, may deviate from the instrument approach procedure and proceed to the destination airport by visual reference to the surface. This approach will only be authorized when requested by the pilot and the reported ground visibility at the destination airport is at least 1 statute mile.

conterminous United States
The 48 adjoining States and the District of Columbia.

continental United States
The 49 States located on the continent of North America and the District of Columbia.

control (radar)-

1. Advisory – The tactical control of aircraft by a designated control unit in which the pilot receives directions and recommendations. Aircraft commanders are not relieved of responsibility for their own safety and navigation.
2. Close – the tactical control of aircraft by a designated control unit, where by the pilot receives orders affecting aircraft movements. The pilot will not deviate from controller instructions unless given permission or unless unusual circumstances require immediate action for the safety of the flight. In either case, the pilot will inform the controller of the action taken. This type of control requires two-way radio communication and radar contact. The controller is responsible for the sage separation of the aircraft, and the pilot must be informed whenever the aircraft is not held on the radarscope for periods in excess of 1 minute or five sweeps of the radar and, as a result, is being dead reckoned. The ultimate safety of the aircraft is the responsibility of the pilot.
3. Positive – The tactical control of aircraft by a designated control unit, whereby the pilot receives orders affecting aircraft movements which transfers responsibility for the safe navigation of the aircraft to the unit issuing such orders. The ultimate safety of the aircraft is the responsibility of the pilot. (OPNAVINST 3710.7)

controller
A person authorized to provide air traffic control service.

controlled airspace
A generic term that covers the different classification 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.

Controlled Firing Area
See special use airspace.

control sector
An airspace area of defined horizontal and vertical dimensions for which a controller or group of controllers has air traffic control responsibility, normally within an ARTCC or an APC facility. Sectors are established based on predominant traffic flow, altitude strata and controller workload. Pilot communications during operations within a sector are normally maintained on discrete frequencies assigned to the sector.

Convective SIGMET
A weather advisory concerning convective weather significant to the safety of all aircraft. Convective SIGMET's are issued for tornadoes, lines of thunderstorms, embedded thunderstorms of any intensity level, areas of thunderstorms greater than or equal to VIP level 4 with an area

coverage of 4/10 (40%) or more, and hail 3/4 inch or greater.

CNO
Chief of Naval Operations

course
The intended direction of flight in the horizontal plane measured in degrees from north.

cross-country flight
A flight that either does not remain in the local flying area or remains in the local flying area and terminates at a facility other than an activity military facility. (OPNAVINST 3710.7)

crosswind-
1. When used concerning the traffic pattern, the word means "crosswind leg."
2. When used concerning wind conditions, the word means a wind not parallel to the runway or the path of an aircraft.

crosswind component
The wind component measured in knots at 90° to the longitudinal axis of the runway.

cruising altitude
An altitude or flight level maintained during en route level flight. This is a constant altitude and should not be confused with a cruise clearance.

cruise climb
A climb technique employed by aircraft, usually at a constant power setting, resulting in an increase of altitude as the aircraft weight decreases.

decision height (DH)
With respect to the operation of aircraft, means the height at which a decision must be made during an ILS, MLS, or PAR instrument approach to either continue the approach or to execute a missed approach.

departure control
A function of an approach control facility providing air traffic control service for departing IFR and, under certain conditions, VFR aircraft.

discrete code
As used in the Air Traffic Control Radar Beacon System, any one of the 4096 selectable Mode 3/A aircraft transponder codes except those ending in zero zero; e.g., discrete codes: 0010, 1201, 2317, 7777; non discrete codes: 0100, 1200, 7700. Non discrete codes are normally reserved for radar facilities that are not equipped with discrete decoding capability and for other purposes such as emergencies (7700), VFR aircraft (1200), etc.

discrete frequency
A separate radio frequency for use in direct pilot-controller communications in air traffic control which reduces frequency congestion by controlling the number of aircraft operating on a particular frequency at one time. Discrete frequencies are normally designated for each control sector in en route/terminal ATC facilities. Discrete frequencies are listed in the Airport/Facility Directory and the DOD FLIP IFR En Route Supplement.

displaced threshold
A threshold that is located at a point on the runway other than the designated beginning of the runway.

Distance Measuring Equipment (DME)
Equipment (airborne and ground) used to measure, in nautical miles, the slant range distance of an aircraft from the DME navigational aid.

distress
A condition of being threatened by serious and/or imminent danger and of requiring immediate assistance.

DOD
Department of Defense

DOD FLIP
Department of Defense Flight Information Publications used for flight planning, en route, and terminal operations. FLIP is produced by the Defense Mapping Agency for world-wide use. United States Government Flight Information Publications (en route charts and instrument approach procedure charts) are incorporated in DOD FLIP for use in the National Airspace System (NAS).

downwind leg
See traffic pattern.

domestic airspace
Airspace which overlies the continental land mass of the United States plus Hawaii and U.S. possessions. Domestic airspace extends to 12 miles offshore.

Emergency Locator Transmitter (ELT)
A radio transmitter attached to the aircraft structure which operates from its own power source on 121.5 MHz and 243.0 MHz. It aids in locating downed aircraft by radiating a downward sweeping audio tone, 2-4 time per second. It is designed to function without human action after an accident.

En Route Air Traffic Control Services
Air traffic control service provided aircraft on IFR flight plans, generally by centers, when these aircraft are operating between departure and destination, terminal areas. When equipment, capabilities, and controller workload permit, certain advisory/assistance services may be provided to VFR aircraft.

En Route Flight Advisory Service (Flight Watch)
A service specifically designed to provide, upon pilot request, timely weather information pertinent to his type of flight, intended route of flight, and altitude.

ETA
Estimated time of arrival.

ETD
Estimated time of departure.

“execute missed approach”
Instructions issued to a pilot making an instrument approach which means continue inbound to the missed approach point and execute the missed approach procedures as described on the Instrument Approach Procedure Chart or as previously assigned by ATC. The pilot may climb immediately to the altitude specified in the missed approach procedure upon making a missed approach. No turns should be initiated prior to reaching the missed approach point. When

conducting an ASR or PAR approach, execute the assigned missed approach procedure immediately upon receiving instructions to "execute missed approach."

"expect (altitude) at (time) or (fix)"
Used under certain conditions to provide a pilot with an altitude to be used in the event of two-way communications failure. It also provides altitude information to assist the pilot in planning.

expedite
Instruction used by ATC when prompt compliance is required to avoid the development of an imminent situation.

Federal Aviation Administration (FAA)
The organization responsible for establishing general regulations for all aviation activities in the United States. (Text)

Federal Aviation Regulations (FAR)
Regulations published by the Federal Aviation Administration for the purpose of standardizing its policies. The regulations are spelled out in a multipart document which contains the operating rules and guidelines for domestic aviation. The FAR are binding to all aviators in the United States, military and civilian. (Text)

"final"
Commonly used to mean that an aircraft is on the final approach course or is aligned with a landing area.

final approach course
A straight line extension of a runway centerline without regard to distance.

final controller
The controller providing information and final approach guidance during PAR and ASR approaches utilizing radar equipment.

Flight Information Service
A service provided for the purpose of giving advice and information useful for the safe and efficient conduct of flights.

flight level (FL)
A level of constant atmospheric pressure related to a reference datum of 29.92 in-Hg. Each is stated in three digits that represent hundreds of feet. For example, flight level 250 represents a barometric altimeter indication of 25,000 feet; flight level 255, and indication of 25,500 feet.

flight plan
Specified information relating to the intended flight of an aircraft that is filed orally or in writing with an FSS or an ATC facility.

Flight Service Station (FSS)
Air traffic facilities which provide pilot briefing, en route communications and VFR search and rescue services, assist lost aircraft and aircraft in emergency situations, relay ATC clearances, originate Notices to Airmen, broadcast aviation weather and NAS information, receive and process IFR flight plans, and monitor NAVAID's. In addition, at selected locations, FSS's provide En Route Flight Advisory Service (Flight Watch), take weather observations, issue airport advisories, and advise Customs and Immigration of transborder flights.

FLIP
See DOD FLIP.

FOD
Foreign object damage.

formation flight
More than one aircraft which, by prior arrangement between the pilots, operate as a single aircraft with regard to navigation and position reporting. Separation between aircraft within the formation is the responsibility of the flight leader and the pilots of the other aircraft in the flight. This includes transition periods when aircraft within the formation are maneuvering to attain separation from each other to effect individual control and during join-up and breakaway. A standard formation is one in which a proximity of no more than 1 mile laterally or longitudinally and within 100 feet vertically from the flight leader is maintained by each wingman.

FSS
See Flight Service Station.

fuel remaining
A phrase used by either pilots or controllers when relating to the fuel remaining on board until actual fuel exhaustion . When transmitting such information in response to either a controller question or pilot initiated cautionary advisory to air traffic control, pilots will state the approximate number of minutes the flight can continue with the fuel remaining. All reserve fuel should be included in the time stated, as should an allowance for established fuel gauge system error.

fuel siphoning
Unintentional release of fuel caused by overflow, puncture, loose cap, etc.

glidescope/glidepath
Provides vertical guidance for aircraft during approach and landing. The glidescope/glidepath is based on the following:

1. Electronic components emitting signals which provide vertical guidance by reference to airborne instruments during instrument approaches such as ILS/MLS, or
2. Visual ground aids, such as VASI, which provide vertical guidance for a VFR approach or for the visual portion of an instrument approach and landing.
3. PAR – Used by ATC to inform an aircraft making a PAR approach of its vertical position (elevation) relative to the descent profile.

Global Positioning System (GPS)
A space-based radio positioning, navigation, and time-transfer system. The system provides highly accurate position and velocity information, and precise time, on a continuous global basis, to an unlimited number of properly equipped users. The system is unaffected by weather, and provides a worldwide common grid reference system. System accuracy for civil users is normally 100 meters horizontally.

“go ahead”
Instructions to proceed with your message. Not to be used for any other purpose.

“go around”
Instructions for a pilot to abandon his approach to landing. Additional instructions may follow. Unless otherwise advised by ATC, a VFT aircraft or an aircraft conducting visual approach should overfly the runway while climbing to traffic pattern altitude and enter the traffic pattern via the crosswind leg. A pilot on an IFR flight plan making an instrument approach should execute the published missed approach procedure or proceed as instructed by ATC.

ground clutter
A pattern produced on the radar scope by ground returns which may degrade other radar returns in the affected area. The effect of ground clutter is minimized by the use of moving target indicator (MTI) circuits in the radar equipment resulting in a radar presentation which displays only targets which are in motion.

Ground Controlled Approach (GCA)
A radar approach system operated from the ground by air traffic control personnel transmitting instructions to the pilot by radio. The approach may be conducted with surveillance radar (ASR) only or with both surveillance and precision approach radar (PAR). Usage of the term “GCA” by pilots is discouraged except when referring to a GCA facility. Pilots should specifically request a “PAR” approach when a precision radar approach is desired or request an “ASR” or “surveillance” approach when a nonprecision radar approach is desired.

groundspeed
The speed of an aircraft relative to the surface of the earch.

GP
DOD FLIP General Planning Publication

handoff
An action taken to transfer the radar identification of an aircraft from one controller to another if the aircraft will enter the receiving controller’s airspace and radio communications with the aircraft will be transferred.

“have numbers”
Used by pilots to inform ATC that they have received runway, wind, and altimeter information only.

Hazardous in Flight Weather Advisory Service (HIWAS)
Continuous recorded hazardous in flight weather forecasts broadcast to airborne pilots over selected VOR outlets defined as an HIWAS BROADCAST AREA.

hazardous weather information
Summary of significant meteorological information (SIGMET/WS), convective significant meteorological information (convective SIGMET/WST), urgent pilot weather reports (urgent PIREP/UUA), center weather advisories (CWA), airmen’s meteorological information (AIRMET/WA) and any other weather such as isolated thunderstorms that are rapidly developing and increasing in intensity, or low ceilings and visibilities that are becoming widespread which is considered significant and are not included in a current hazardous weather advisory.

height above landing (HAL)
The height above a designate helicopter landing area used for helicopter instrument approach procedures.

height above touchdown (HAT)
The height of the decision height or minimum descent altitude above the highest runway elevation in the touchdown zone. HAT is published on instrument approach charts in conjunction with all straight-in minimums.

helicopter (copter)
Rotorcraft that, for its horizontal motion, depends principally on its engine-driven rotors.

high frequency (HF)
The frequency band between 3 and 30 MHz.

hold short
That area of the airport taxiway that is immediately adjacent to the departure point of the active duty runway.

"hold short"
Instruction used by ATC to inform a pilot to taxi up to the hold short line. It is not a clearance to taxi onto the duty runway.

hover taxi
Used to describe a helicopter/VTOL aircraft movement conducted above the surface and in ground effect at airspeeds less than approximately 20 knots.

"ident"
A request for a pilot to activate the aircraft transponder identification feature. This will help the controller to confirm an aircraft identity or to identify an aircraft.

ident feature
The special feature in the Air Traffic Control Radar Beacon System equipment. It is used to immediately distinguish one displayed beacon target from other beacon targets.

IFR aircraft
An aircraft conducting flight in accordance with instrument flight rules.

IFR conditions
Weather conditions below the minimum for flight under visual flight rules.

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

immediately
Used by ATC when such action compliance is required to avoid an imminent situation.

initial approach fix
The fixes depicted on instrument approach procedure charts that identify the beginning of the initial approach segment(s).

instrument approach procedure
A series of predetermined maneuvers for the orderly transfer of an aircraft under instrument flight conditions from the beginning of the initial approach to

a landing or to a point from which a landing may be make visually. It is prescribed and approved for a specific airport by competent authority.

Instrument Flight Rules (IFR)
Rules governing the procedures for conducting instrument flight. Also a term used by pilots and controllers to indicate type of flight plan.

Instrument Landing System (ILS)
A precision instrument approach system which normally consists of the following electronic components and visual aids:
1. Localizer.
2. Glideslope.
3. Outer Marker.
4. Middle Marker.
5. Approach Lights.

instrument meteorological conditions (IMC)
Meteorological conditions expressed in terms of visibility, distance from cloud, and ceiling less than the minima specified for visual meteorological conditions.

instrument runway
A runway equipped with electronic and visual navigation aids for which a precision or non precision approach procedure having straight-in landing minimums has been approved.

International Civil Aviation Organization (ICAO)
A specialized agency of the United Nations whose objective is to develop the principles and techniques of international air navigation and to foster planning and development of international civil air transport.

interrogator
The ground-based surveillance radar beacon transmitter-receiver, which normally scans in synchronism with a primary radar, transmitting discrete radio signals which repetitiously request all transponders on the mode being used to reply. The replies received are mixed with the primary radar returns and displayed on the same plan position indicator (radar scope). Also, applied to the airborne element of the TACAN/DME system.

jet route
A route designed to serve aircraft operations from 18,000 feet MSL up to and including flight level 450. the routes are referred to as “J” routes with numbering to identify the designated route; e.g., J106.

landing direction
A device which visually indicates the direction in which landings and takeoffs should be made.

light gun/ALDIS lamp
A handheld directional light signaling device which emits a brilliant narrow beam of white, green, or red light as selected by the tower controller. The color and type of light transmitted can be used to approve or disapprove anticipated pilot actions where radio communication is not available. The light gun is used for controlling traffic operating in the vicinity of the airport.

local flying area

The airspace above a geographic area not to exceed 350 miles from a facility and designated as the local flying area by the commanding officer. Insofar as practicable, local flying areas shall be bound by prominent terrain features and/or air navigation aid radials/bearings. (OPNAVINST 3710.7)

localizer-

1. The component of an ILS which provides course guidance to the runway.
2. A NAVAID used for nonprecision instrument approaches which is not part of a complete ILS and is not aligned with the runway.

lost communications (NORDO)

Loss of the ability to communicate by radio. Standard pilot procedures are specified in FAR Part 91. Radar controllers issue procedures for pilots to follow in the event of lost communications during a radar approach when weather reports indicate that an aircraft will likely encounter IFR weather conditions during the approach.

Low Altitude Airway Structure

The network of airways serving aircraft operations up to but not including 18,000 MSL.

low approach

An approach over an airport or runway following an instrument approach or a VFR approach including the go-around maneuver where the pilot intentionally does not make contact with the runway.

low frequency (LF)

The frequency band between 30 and 300 kHz.

"make short approach"

Instruction used by ATC to inform a pilot to alter his traffic pattern so as to make a short final approach.

"mayday"

The international radio telephone distress signal. When repeated three times, it indicates imminent and grave danger and that immediate assistance is requested.

medium frequency (MF)

The frequency band of 300 kHz to 3MHz. (FLIPs)

mile

All distances referred to in OPNAVINST 3710.7 are nautical miles unless otherwise specified. (OPNAVINST 3710.7)

Military Operations Area (MOA)

See special use airspace.

minimum descent altitude (MDA)

The lowest altitude, expressed in feet MSL, to which descent is authorized on final approach or during circle-to-land maneuvering in execution of a standard instrument approach procedure where no electronic glideslope is provided.

minimum fuel

Indicates that an aircraft's fuel supply has reached a state where, upon reaching the destination, it can accept little or no delay. This is not an emergency situation but merely indicates an emergency situation is

possible should any undue delay occur.

minimums
Weather condition requirements established for a particular operation or type of operation; e.g., IFR takeoff or landing, alternate airport for IFR flight plans VFR flight, etc.

missed approach-
1. A maneuver conducted by a pilot when an instrument approach cannot be completed to a landing. The route of flight and altitude are shown on instrument approach procedure charts. A pilot executing a missed approach prior to the missed approach point (MAP) must continue along the final approach path to the MAP. The pilot may climb immediately to the altitude specified in the missed approach procedure.
2. A term used by the pilot to inform ATC that he is executing the missed approach.
3. At locations where ATC radar service is provided, the pilot should conform to radar vectors when provided by ATC in lieu of the published missed approach procedure.

missed approach point (MAP)
A point prescribed in each instrument approach procedure at which a missed approach procedures shall be executed if the required visual reference does not exist.

mode
The letter or number assigned to a specific pulse spacing of radio signals transmitted or received by a ground interrogator or an airborne transponder components of the Air Traffic Control Radar Beacon System.

mode C
Subset of the IFF transponder providing automatic altitude reporting to ARTCC or any unit capable of mode C interrogations.

multi-piloted aircraft
Any aircraft having two sets of flight controls and instruments and operated by two pilots, both of whom meet the requirements of the NATOPS Manual for that model aircraft. (OPNAVINST 3710.7)

National Airspace System (NAS)
The common network of U.S. airspace; air navigation facilities, equipment and services, airports or landing areas; aeronautical charts, information and services; rules, regulations and procedures, technical information, and manpower and material. Included are system components shared jointly with the military.

NATOPS
Naval Air Training Operating Procedures Standardization

nautical mile (NM)
6000 feet.

NAVAID classes
Navigational aids are classified according to their operational use. The three classes of NAVAIDs are: T-Terminal, L-Low altitude, and H-High altitude.

navigational aid (NAVAID)
Any visual or electronic device airborne or on the surface which provides point-to-point guidance information or position data to aircraft in flight (VOR, TACAN, and VORTAC).

NDB
See Nondirectional Beacon

"negative"
"No" or "permission not granted," or "that is not correct."

"negative contact"
Term used by pilots to inform ATC that:
1. Previously issued traffic is not in sight. It may be followed by the pilot's request for the controller to provide assistance in avoiding the traffic.
2. They were unable to contact ATC on a particular frequency.

Nondirectional Beacon (NDB)
An L/MF or UHF radio beacon transmitting nondirectional signals whereby the pilot of an aircraft equipped with direction finding equipment can determine his bearing to or from the radio beacon and "home" on or track to or from the station.

nonprecision approach procedure
A standard instrument approach procedure in which no electronic glideslope is provided; e.g., TACAN, VOR, NDB, LOC, and ASR.

Notices to Airmen (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.

Notices to Airmen Publication (NTAP)
A publication issued every 14 days, designed primarily for the pilot which contains current NOTAM information considered essential to the safety of flight as well as supplemental data to other aeronautical publications.

official business
The necessity to contact personnel, units, or organizations for the purpose of conducting transactions in the service of and in the interest of the United States Government. This definition does not authorize the use of "official business only" airfields, their services, or other items attendant to itinerant operations when making en route stops while proceeding to an airfield at which official business is to be conducted. "Official business only" restrictions do not preclude the use of the facility as an alternate during IFR conditions. (OPNAVINST 3710.7)

option approach
An approach requested and conducted by a pilot which will result in either a touch-and-go, missed approach, low approach, stop-and-go, or full stop landing.

"out"
The conversation is ended and no response is expected.

outer area
(associated with Class C airspace) Nonregulatory airspace surrounding

designated Class C airspace airports wherein ATC provides radar vectoring and sequencing on a full-time basis for all IFR and participating VFR aircraft. The service provided in the outer area is called Class C service which includes: IFR/IFR-standard IFR separation; IFR/VFR-traffic advisories and conflict resolution; and VFR/VFR-traffic advisories and, as appropriate, safety alerts. The normal radius will be 20 nautical miles with some variations based on site-specific requirements. The outer area extends outward from the primary Class C airspace airport and extends from the lower limits of radar/radio coverage up to the ceiling of the approach control's delegated airspace excluding the Class C charted area and other airspace as appropriate.

"over"
My transmission is ended; I expect a response.

"pan-pan"
The international radio-telephony urgency signal. When repeated three times, indicates uncertainly or alert followed by the nature of the urgency.

parallel runways
Two or more runways at the same airport whose center-lines are parallel. In addition to runway number, parallel runways are designated as L (left), C (center), and R (right).

permanent echo
Radar signals reflected from fixed object on the earth's surface; e.g., buildings, towers, terrain. Permanent echoes are distinguished from "ground clutter" by being definable locations rather than large areas. Under certain conditions they may be used to check radar alignment.

pilot weather report (PIREP)
A report of meteorological phenomena encountered by aircraft in flight.

port
Left.

"position and hold"
Direction from Tower for an aircraft to continue beyond the hold short, take position on the active runway, and await takeoff clearance from Tower.

precision approach procedure
A standard instrument approach procedure in which an electronic glideslope/glidepath is provided; e.g., ILS/MLS and PAR.

Precision Approach Radar (PAR)
Radar equipment in some ATC facilities operated by the FAA and/or the military services at joint-use civil/military locations and separate military installations to detect and display azimuth, elevation, and range of aircraft on the final approach course to a runway. This equipment may be used to monitor certain nonradar approaches, but is primarily used to conduct a precision instrument approach (PAR) wherein the controller issues guidance instructions to the pilot based on the aircraft's position in relation to the final approach course (azimuth), the glidepath (elevation), and the distance (range) from the touchdown point on the runway as displayed on the radar scope.

progressive taxi

Precise taxi instructions given to a pilot unfamiliar with the airport or issued in stages as the aircraft proceeds along the taxi route.

Prohibited Area

See special use airspace.

quadrant

A quarter part of a circle, centered on a NAVAID, oriented clock-wise from magnetic north as follows: NE quadrant 000089, SE quadrant 090-179, SW quadrant 180-269, NW quadrant 270-059.

radar (radio detection and ranging)

A device which, by measuring the time interval between transmission and reception of radio pulses and correlating the angular orientation of the radiated antenna beam or beams in azimuth and/or elevation, provides information on range, azimuth, and/or elevation of objects in the path of the transmitted pulses.

1. Primary Radar – A radar system in which a minute portion of a radio pulse transmitted from a site is reflected by an object and then received back at that site for processing and display at an air traffic control facility.
2. Secondary Radar/Radar Beacon - A radar system I which the object to be detected is fitted with cooperative equipment in the form of a radio receiver/transmitter (transponder). Radar pulses transmitted from the searching transmitter/receiver in the cooperative equipment and used to trigger a distinctive transmission from the transponder. This reply transmission, rather than a reflected signal, is then received back at the transmitter/receiver site for processing and display at an air traffic control facility.

radar advisory

The provision of advice and information based on radar observations.

radar approach

An instrument approach procedure which utilizes Precision Approach Radar (PAR) or Airport Surveillance Radar (ASR).

Radar Approach Control Facility

A terminal ATC facility that uses radar and nonradar capabilities to provide approach control services to aircraft arriving, departing, or transiting airspace controlled by the facility. The facility may provide services of a ground controlled approach (GCA); i.e., ASR and PAR approaches. A radar approach control facility may be operated by FAA, USAF, US Army, USN, USMC, or jointly by FAA and a military service. Specific facility nomenclatures are used for administrative purposes only and are related to the physical location of the facility and the operating service generally as follows:
Army Radar Approach Control (ARAC) (Army).
Radar Air Traffic Control Facility (RATCF) (Navy/FAA).
Radar Approach Control (RAPCON) (Air Force/FAA).
Terminal Radar Approach Control (TRACON) (FAA).
Tower/Airport Traffic Control Tower

(ATCT) (FAA). (Only those towers delegated approach control authority.)

radar arrival

An aircraft arranging at an airport served by a radar facility and in radar contact with the facility.

"radar contact"-

1. Used by ATC to inform an aircraft that it is identified on the radar display and radar flight following will be provided until radar identification is terminated. Radar service may also be provided within the limits of necessity and capability. When a pilot is informed of "radar contact," he automatically discontinues reporting over compulsory reporting points.
2. The term used to inform the controller that the aircraft is identified and approval is granted for the aircraft to enter the receiving controllers airspace.

"radar contact lost"

Used by ATC to inform a pilot that radar data used to determine the aircraft's position is no longer being received, or is no longer being provided. The loss may be attributed to several factors including the aircraft merging with weather or ground clutter, the aircraft operating below radar line of sight coverage, the aircraft entering an area of poor radar return, failure of the aircraft transponder, or failure of the ground radar equipment.

radar environment

An area in which radar service may be provided.

radar flight following

The observation of the progress of radar identified aircraft, whose primary navigation is being provided by the pilot, wherein the controller retains and correlates the aircraft identify with the appropriate target or target symbol displayed o the radar scope.

radar identification

The process of ascertaining that an observed radar target is the radar return from a particular aircraft.

radar service

A term which includes one or more of the following services based on the use of radar which can be provided by a controller to a pilot of a radar identified aircraft.

1. Radar Monitoring – The radar flight-following of aircraft, whose primary navigation is being performed by the pilot, to observe and note deviations from its authorized flight path, airway, or route. When being applied specifically to radar monitoring of instrument approaches; i.e., with precision approach radar (PAR) or radar monitoring of simultaneous ILS/MLS approaches, it includes advice and instructions whenever an aircraft nears or exceeds the prescribed PAR safety limit or simultaneous ILS/MLS no transgression zone.
2. Radar Navigational Guidance – Vectoring aircraft to provide course guidance.
3. Radar Separation – Radar spacing of aircraft in accordance with established minima.

"radar service terminated"

Used by ATC to inform a pilot that he will no longer be provided of the services that could be received while in radar contact. Radar service is automatically terminated, and the pilot is not advised in the following cases:

1. An aircraft cancels its IFR flight plan, except within Class B airspace, Class C airspace, a TRSA, or where Basic Radar service is provided.
2. An aircraft conducting an instrument, visual, or contact approach has landed or has been instructed to change to advisory frequency.
3. An arriving VFR aircraft, receiving radar service to a tower-controlled airport within Class B airspace, Class C airspace, a TRSA, or where sequencing service is provided, has landed; or to all other airports, is instructed to change to tower or advisory frequency.
4. An aircraft completes a radar approach.

radar surveillance

The radar observation of a given geographical area for the purpose of performing some radar function.

radar traffic advisories

Advisories that are issued to alert pilots to known or observed radar traffic which may affect the intended route of flight of their aircraft.

radar weather echo intensity levels

Existing radar systems cannot detect turbulence. However, there is a direct correlation between the degree of turbulence and other weather features associated with thunderstorms and the radar weather echo intensity. The National Weather Service has categorized radar weather echo intensity for precipitation into six levels. These levels are sometimes expressed during communications as "VIP LEVEL" 1 through 6 (derived from the component of the radar that produces the information-Video Integrator and Processor). The following list gives the "VIP LEVELS" in relation to the precipitation intensity within a thunderstorm:

Level 1 – WEAK
Level 2 – MODERATE
Level 3 – STRONG
Level 4 – VERY STRONG
Level 5 – INTENSE
Level 6 – EXTREME

radio –

1. A device used for communication.
2. Used to refer to a flight service station; e.g., "Seattle Radio" is used to call Seattle FSS.

radio magnetic indicator (RMI)

An aircraft navigational instrument coupled with a gyro compass or similar compass that indicates the direction of a selected NAVAID and indicates bearing with respect to the heading of the aircraft.

ramp

See apron.

Remote Communications Air/Ground (RCAG) Facility

An unmanned VHF/UHF transmitter/receiver facility which is used to expand ARTCC air/ground communications coverage and to facilitate direct contact between pilots and controllers. RCAG facilities are

sometimes not equipped with emergency frequencies 121.5 MHz and 243.0 MHz.

Remote Communications Outlet (RCO)/ Remote Transmitter/Receiver (RTR)
An unmanned communication facility remotely controlled by air traffic personnel. RCO's serve FSS's. RTR's serve terminal ATC facilities. An RCO or RTR may be UHF or VHF and will extend the communication range of the air traffic facility.

Restricted Area
See special use airspace.

"resume own navigation"
Used by ATC to advise a pilot to resume his own navigational responsibility. It is issued after completion of a radar vector or when radar contact is lost while the aircraft is being radar vectored.

"roger"
I have received all of our last transmission. It should not be used to answer a question requiring a yes or a no answer.

runway
A defined rectangular area on a land airport prepared for the landing and takeoff run of aircraft along its length. Runways are normally numbered in relation to their magnetic direction rounded off to the nearest 10 degrees.

runway heading
The magnetic direction that corresponds with the runway centerline extended, no the painted runway number. When cleared to "fly or maintain runway heading," pilots are expected to fly or maintain the heading that corresponds with the extended centerline of the departure runway. Drift correction shall not be applied; e.g., Runway 4, actual magnetic heading of the runway centerline 044, fly 044.

runway in use/active runway/duty runway
Any runway or runways currently being used for takeoff or landing. When multiple runways are used, they are all considered active runways.

runway overrun
In military aviation exclusively, a stabilized or paved area beyond the end of a runway, of the same width as the runway plus shoulder, centered on the extended runway centerline.

runway safety area (RSA)
A defined surface surrounding the runway prepared, or suitable, for reducing the risk of damage to airplanes in the event of an undershoot, overshoot, or excursion from the runway. The dimensions of the RSA vary.

safety alert
A safety alert issued by ATC to aircraft under their control if ATC is aware the aircraft is at an altitude which, in the controller's judgment, places the aircraft in usage proximity to terrain, obstructions, or other aircraft. The controller may discontinue the issuance of further alerts if the pilot advises he is taking action to correct the situation or has the other aircraft in sight.

1. Terrain/Obstruction Alert – A safety alert issued a by ATC to aircraft under their control if ATC is aware the aircraft is at an altitude which, in the controller's judgment, places the aircraft in to usage proximity to terrain/ obstructions; e.g., "Low Altitude Alert, check your altitude immediately."
2. Aircraft Conflict Alert – A safety alert issued by ATC to aircraft under their control if ATC is aware of an aircraft that is not under their control at an altitude which, in the controller's judgment, places both aircraft in unsafe proximity to each other. With the alert, ATC will offer the pilot an alternate course of action when feasible; e.g., "Traffic Alert, advice you turn right heading zero niner zero or climb to eight thousand immediately." The issuance of a safety alter is contingent upon the capability of the controller to have an awareness of an unsafe condition. The course of action provided will be predicated on other traffic under ATC control. Once the alert is issued, it is solely the pilot's prerogative to determine what course of action, if any, he will take.

search and rescue (SAR)
A service which seeks missing aircraft and assists those found to be in need of assistance. It is a cooperative effort using the facilities and services of available Federal, state and local agencies. The U.S. Coast Guard is responsible for coordination of search and rescue for the Maritime Region, and the U.S. Air Force is responsible for search and rescue should be passed through any air traffic facility or be transmitted directly to the Rescue Coordination Center by telephone.

search and rescue facility
A facility responsible for maintaining and operating a search and rescue service to render aid to persons and property in distress. It is any SAR unit, station, NET, or other operational activity which can be usefully employed during an SAR Mission; e.g., a Civil Air Patrol Wing, or a Coast Guard Station.

short takeoff and landing (STOL) aircraft
An aircraft which, at some weight within its approved operation weight, is capable of operating from a STOL runway.

Significant Meteorological Information (SIGMET)
A weather advisory issued concerning weather significant concerning weather significant to the safety of all aircraft. SIGMET advisories cover severe and extreme turbulence, severe icing, and widespread dust or sandstorms that reduce visibility to less than 3 miles.

simulated instrument approach
An instrument approach flown under simulated instrument conditions. (OPNAVINST 3710.7)

simulated instrument conditions
Conditions external to the aircraft in flight are VMC, but pilot vision is limited primarily to the interior of the aircraft. (OPNAVINST 3710.7)

single-pilot aircraft
Any aircraft that has only one set of

flight controls or any aircraft that has two sets of flight control and is being operated by only one pilot who meets the requirements of the NATOPS manual for that model aircraft. (OPNAVINST 3710.7)

special use airspace

Airspace of defined dimensions identified by an area on the surface of the earth wherein activities must be confined because of their nature and/or wherein limitations may be imposed upon aircraft operations that are not part of those activities. Types of special use airspace are:

1. Alert Area – Airspace which may contain a high volume of pilot raining activities or an unusual type of aerial activity, neither of which is hazardous to aircraft. Alert Areas are depicted on aeronautical charts for the information of nonparticipating pilots. All activities within an Alert Area are conducted in accordance with FAR, and pilots of participating aircraft as well as pilots transitioning the area are equally responsible for collision avoidance.
2. Controlled Firing Area – Airspace wherein activities are conducted under conditions so controlled as to eliminate hazards to nonparticipating aircraft and to ensure the safety of persons and property on the ground.
3. Military Operations Area (MOA) – An airspace of defines vertical and lateral dimensions established outside positive control areas to separate/ segregate certain military activities from IFR traffic and to identify for VFR traffic where these activities are conducted.
4. Prohibited Area – Designated airspace within which the flight of aircraft is prohibited.
5. Restricted Area – Airspace designated under FAR, Part 73, within which the flight of aircraft, while not wholly prohibited, is subject to restriction. Most restricted areas are designated joint use and IFR/VFR operations in the area may be authorized by the controlling ATC facility when it is not being utilized by the using agency. Where joint use is authorized, the name of the ATC controlling facility is also shown.
6. Warning Area – Airspace which may contain hazards to nonparticipating aircraft in international airspace.

Special VFR conditions

Meteorological conditions that are less than those required for basic VFR flight in Class B, C, D, or E surface areas and in which some aircraft are permitted flight under visual flight rules.

Special VFR operations

Aircraft operating in accordance with clearance within Class B, C, D, and E surface area in weather conditions less than the basic VFR weather minima. Such operations must be requested by the pilot and approved by ATC.

“squawk (mode, code, function)”

Activate specific modes/codes/ functions on the aircraft transponder; e.g., “Squawk three/alpha, two one zero five, low.”

standard datum plane
The reference for flying pressure altitudes. 29.92 in-Hg is set into altimeters above 18,000 feet MSL.

standard instrument departure (SID)
A preplanned IFR air traffic control departure procedure printed for pilot use in graphic and/or textual form. SID's provide transition from the terminal to the appropriate en route structure.

standard rate turn (SRT)
A turn of three degrees per second.

standard terminal arrival (STAR)
A preplanned IFR air traffic control arrival procedure published for pilot use in graphic and/or textual form. STAR's provide transition from the en route structure to an outer fix or an instrument approach fix/arrival way point in the terminal area.

"stand by"
Means the controller or pilot must pause for a few seconds, usually to attend to other duties of a higher priority. Also means to wait as in "stand by for clearance." The caller should reestablish contact if a delay is lengthy. "Stand by" is not an approval or denial.

stereo route
Routinely used route of flight established by users and ARTCC identified by a coded name; e.g., ALPHA 2. These routes simplify flight plan handling and communications. (OPNAVINST 3710.7)

"stop altitude squawk"
Instruction used by ATC to inform an aircraft to turn off the automatic altitude reporting feature of its transponder. It is issued when the verbally reported altitude varies 300 feet or more from the automatic altitude report.

stop-and-go
A procedure wherein an aircraft will land, make a complete stop on the runway, and then commence a takeoff from that point.

stopover flight plan
A flight plan format which permits in a single submission the filing of a sequence of flight plans through interim full-stop destinations to a final destination.

"stop squawk (mode or code)"
Instruction used by ATC to tell the pilot to turn specified functions of the aircraft transponder off.

straight-in approach-IFR
An instrument approach wherein final approach is begun without first having executed a procedure turn, not necessarily completed with a straight-in landing or made to straight-in landing minimums.

straight-in approach-VFR
Entry into the traffic pattern by interception of the extended runway centerline (final approach course) without executing any other portion of the traffic pattern.

straight-in landing
A landing made on a runway aligned within 30° of the final approach course following completion of an instrument approach.

surface area
The airspace contained by the lateral boundary of the Class B, C, D, or E airspace designated for an airport that begins at the surface and extends upward.

surveillance approach (ASR)
An instrument approach wherein the air traffic controller issues instructions, for pilot compliance, based on aircraft position in relation to the final approach course (azimuth), and the distance (range) from the end of the runway as displayed on the controller's radar scope. The controller will provide recommended altitudes on final approach if requested by the pilot.

sm or mi
Statute mile (5280 feet).

starboard
Right.

Tactical Air Navigation (TACAN)
An ultra-high frequency electronic rho-theta air navigation aid which provides suitable equipped aircraft a continuous indication of bearing and distance to the TACAN station.

tailwind
Any wind more than 90° to the longitudinal axis of the runway. The magnetic direction of the runway shall be used as the basis for determining the longitudinal axis.

target
The indication shown on a radar display resulting from a primary radar return or a radar beacon reply.

taxi
The movement of an airplane under its own power on the surface of an airport. Also it describes the surface movement of helicopters equipped with wheels.

"taxi into position and hold"
Instruction used by ATC to inform a pilot to taxi onto the departure runway in takeoff position and hold. It is not authorization for takeoff. It is used when takeoff clearance cannot immediately be issued because of traffic or other reasons.

Telephone Information Briefing Service (TIBS)
A continuous telephone recording of meteorological and/or aeronautical information.

terminal area
A general term used to describe airspace in which approach control service or airport traffic control service is provided.

terminal area facility
A facility providing air traffic control service for arriving and departing IFR, VFR, Special VFR, and on occasion en route aircraft.

Terminal VFR Radar Service
A national program instituted to extend the terminal radar services provided IFR aircraft to VFR aircraft. The program is divided into four types service referred to as basic radar service, terminal radar service area (TRSA) service, Class B service and Class C service. The type of service provided at a particular location is contained in the Airport/Facility Directory.

1. Basic Radar Service – These services are provided for VFT aircraft by all commissioned terminal radar facilities. Basic radar service includes safety alerts, traffic advisories, limited radar vectoring when requested by the pilot, and sequencing at locations where procedures have been established for this purpose and/or when covered by a letter of agreement. The purpose of this service is to adjust the flow of arriving IFR and VFR aircraft into the traffic pattern in a safe and orderly manner and to provide traffic advisories to departing VFR aircraft.
2. TRSA Service – This service provides, in addition to basic radar service, sequencing of all IFR and participating VFR aircraft to the primary airport and separation between all participating VFR aircraft. The purpose of this service is to provide separation between all participating VFR aircraft and all IFR aircraft operating within the area defined as a TRSA.
3. Class C Service – This service provides, in addition to basic radar service, approved separation between IFR and VFR aircraft, and sequencing of VFR aircraft, and sequencing of VFR arrivals to the primary airport.
4. Class B Service – This service provides, in addition to basic radar service, approved separation of aircraft based on IFR, VFR, and/or weight, and sequencing of VFR arrivals to the primary airport(s).

Terminal Radar Service Area (TRSA)
Airspace surrounding designated airports wherein ATC provides radar vectoring, sequencing, and separation on a full-time basis for all IFR and participating VFR aircraft. Service provided in a TRSA is called Stage III Service. The AIM contains and explanation of TRSA. TRSA's are depicted on VFR aeronautical charts. Pilot participation is urged but is not mandatory.

terrain following
The flight of a military aircraft maintaining a constant AGL altitude above the terrain or the highest obstruction. The altitude of the aircraft will constantly change with the varying terrain and/or obstruction.

tetrahedron
A device normally located on uncontrolled airports and used as a landing direction indicator. The small end of a tetrahedron points in the direction of landing. At controlled airports, the tetrahedron, if installed, should be disregarded because tower instructions supersede the indicator.

threshold
The beginning of that portion of the runway usable for landing.

touch-and-go
An operation by an aircraft that lands and departs on a runway without stopping or exiting the runway.

touchdown-
1. The point at which an aircraft first makes contact with the landing surface.
2. Concerning a precision radar approach (PAR), it is the point

where the glide path intercepts the landing surface.

touchdown zone

The first 3,000 feet of the runway beginning at the threshold. The area is used for determination of touchdown zone elevation in the development of straight-in landing minimums for instrument approaches.

touchdown zone elevation (TDZE)

The highest elevation in the first 3,000 feet of the landing surface. TDZE is indicated on the instrument approach procedure chart when straight-in landing minimums are authorized.

Tower

A terminal facility that uses air/ground communications, visual signaling, and other devices to provide ATC services to aircraft operating in the vicinity of an airport or on the movement area. Authorizes aircraft to land or takeoff at the airport controlled by the Tower or to transit the Class D airspace area regardless of flight plan or weather conditions (IFR or VFR). A Tower may also provide approach control services (radar or nonradar).

tower en route control service (tower-to-tower)

The control of IFR en route traffic within delegated airspace between two or more adjacent approach control facilities. This service is designed to expedite traffic and reduce control and pilot communication requirements.

traffic-

1. A term used by a controller to transfer radar identification of an aircraft to another controller for the purpose of coordinating separation action.
2. A term used by ATC to refer to one or more aircraft.

traffic advisories

Advisories issued to alert pilots to other known or observed air traffic which may be in such proximity to the position or intended route of flight of their aircraft to warrant their attention. Such advisories may be based on:

1. Visual observation.
2. Observation of radar identified and non identified aircraft targets on an ATC radar display, or
3. Verbal reports from pilots or other facilities.

The word “traffic” followed by additional information, if know, is used to provide such advisories; e.g., “Traffic, 2 o’clock, one zero miles, southbound, eight thousand.” Traffic advisory service will be provided to the extent possible depending on higher priority duties of the controller or other limitations; e.g., radar limitations, volume of traffic, frequency congestion, or controller workload.

Radar/nonradar traffic advisories do not relive the pilot of his responsibility to see and avoid other aircraft. Pilots are cautioned that there are many times when the controller is not able to give traffic advisories concerning all traffic in the aircraft’s proximity; in other words, when a pilot requests or is receiving traffic advisories, he should not assume that all traffic will be issued.

“traffic in sight”
used by pilots to inform a controller that previously issued traffic is in sight.

“traffic no factor”
Indicates that the traffic describe in a previously issued traffic advisory is no factor.

traffic pattern
The traffic flow that is prescribe for aircraft landing at, taxiing on, or taking off from an airport. The components of a typical traffic pattern are upwind leg, crosswind leg, downwind leg, base leg, and final approach.

1. Upwind Leg – A flight path parallel to the landing runway in the direction of landing.
2. Crosswind Leg – A flight path at right angles to the landing runway off its upwind end.
3. Downwind Leg – A flight path parallel to the landing runway in the direction opposite to landing. The downwind leg normally extends between the crosswind leg and the base leg.
4. Base Leg – A flight path at right angles to the landing runway off its approach end. The base leg normally extend from the downwind leg to the intersection of the extended runway centerline.
5. Final Approach – A flight path in the direction of landing along the extended runway centerline. The final approach normally extends from the base leg to the runway. An aircraft making a straight-in approach VFR is also considered to be on final approach.

Transcribed Weather Broadcast (TWEB)
A continuous recording of meteorological and aeronautical information that is broadcast on L/MF and VOR facilities for pilots.

transfer of control
That action whereby the responsibility for the separation of an aircraft is transferred from one controller to another.

transition-

1. The general term that describes the change from one phase of flight or flight condition to another; e.g., transition from en route flight to the approach or transition from instrument flight to visual flight.
2. A published procedure (SID Transition) used to connect the basic SID to one of several en route airways/jet routes, or a published procedure (STAR Transition) used to connect one of several en route airways/jet routes to the basic STAR.

transitional airspace
That portion of controlled airspace wherein aircraft change from one phase of flight or flight condition to another.

transmissometer
An apparatus used to determine visibility by measuring the transmission of light through the atmosphere. It is the measurement source for determining runway visual range and runway visibility value.

“transmitting in the blind”
A transmission from one station to other stations in circumstances where two-way communication cannot be established where it is believed that

the called stations may be able to receive the transmission.

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.

turbojet aircraft
An aircraft having a jet engine in which the energy of the jet operates a turbine which in turn operates the air compressor.

turboprop aircraft
An aircraft having a jet engine in which the energy of the jet operates a turbine which drives the propeller.

ultrahigh frequency (UHF)
The frequency band between 300 and 3,000 MHz. The bank of radio frequencies used for military air/ground voice communication. In some instances this may go as low as 225 MHz and still be referred to as UHF.

ultralight vehicle
An aeronautical vehicle operated for sport or creational purposes which does not require FAA registration, an airworthiness certificate, nor pilot certification. They are primarily single occupant vehicles, although some two-placed vehicles are authorized for training purposes. Operation of an ultralight vehicle in certain airspace requires authorization from ATC.

"unable"
Indicates inability to comply with a specific instruction, request, or clearance.

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. (Text)

under the hood
Indicates that the pilot is using a hood to restrict visibility outside the cockpit while simulating instrument flight. An appropriately rated pilot is required in the other control seat while this operation is being conducted.

UNICOM
A nongovernment communication facility which may provide airport information at certain airports. Locations and frequencies of UNICOMs are shown on aeronautical charts and publications.

upwind leg
See traffic pattern.

vector
A heading issued to an aircraft to provide navigational guidance by radar.

vertical takeoff and landing (VTOL) aircraft
Aircraft capable of vertical climbs and/or descents and using very short runways or small areas for takeoff and landings. These aircraft include, but are not limited to, helicopters.

very high frequency (VHF)
The frequency band between 30 and 300 MHz. Portions of this band, 108 to 118 MHz, are used for certain NAVAIDS; 118 to 136 MHz are used for civil air/ground voice communications. Other frequencies in this band are used for purposes not related to air traffic control.

VFR aircraft
An aircraft conducting flight in accordance with visual flight rules.

"VFR conditions"
Weather conditions equal to or better than the minimum for flight under visual flight rules. The term may be used as an ATC clearance/instruction only when:

1. An IFR aircraft requests a climb/descent in VFR conditions.
2. The clearance will result in noise abatement benefits where part of the IFR departure route does not conform to an FAA approved noise abatement route or altitude.
3. A pilot has requested a practice instrument approach and is not on an IFR flight plan. All pilots receiving this authorization must comply with the VFR visibility and distance from cloud criteria in Part 91. use of the term does not relieve controllers of their responsibility to separate aircraft in Class B and Class C airspace or TRSA's as required by FAA Order 7110.65. When used as an ATC clearance/instruction, the term may be abbreviated "VFR;" e.g., "maintain VFR," "climb/descend VFR," etc.

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

"VFR not recommended"
An advisory provided by a flight service station to a pilot during a preflight or in flight weather briefing that flight under visual flight rules is not recommended. To be given when the current and/or forecast weather conditions are at or below VFR minimums. It does not abrogate the pilot's authority to make his own decision.

"VFR-ON-TOP"
ATC authorization for an IFR aircraft to operate in VFR conditions at any appropriate VFR altitude (as specified in FAR and as restricted by ATC). A pilot receiving this authorization must comply with the VFR visibility, distance from cloud criteria, and the minimum IFR altitudes specified in Part 91. The use of this term does not relieve controllers of their responsibility to separate aircraft in Class B and Class C airspace or TRSA's as required by FAA Order 7110.65.

visibility
The ability, as determined by atmospheric conditions and expressed in units of distance, to see and identify prominent unlighted objects by day and prominent lighted objects by night. Visibility is reported as statute miles, hundreds of feet or meters.

1. Flight Visibility – The average forward horizontal distance, from the cockpit of an aircraft in flight, at which prominent unlighted

objects may be identified by day and prominent lighted objects may be seen and identified by night.

2. Ground Visibility – Prevailing horizontal visibility near the earth's surface as reported by the U.S. National Weather Service or an accredited observer.
3. Prevailing Visibility – The greatest horizontal visibility equaled or exceeded throughout at least half the horizon circle which need not necessarily be continuous.
4. Runway Visual Range (RVR) – An instrumentally derived value, based on standard calibrations, that represents the horizontal distance a pilot will see down the runway from the approach end. RVR, in contrast to prevailing or runway visibility, is based on what a pilot in a moving aircraft should see looking down the runway.

visual approach

An approach conducted on an IFR flight plan which authorized the pilot to proceed visually and clear of clouds to the airport. The pilot must, at all times, have either the airport or the preceding aircraft in sight. This approach must be authorized and under the control of the appropriate air traffic control facility. Reported weather at the airport must be ceiling at or above 1,000 feet and visibility of 3 miles or greater.

Visual Flight Rules (VFR)

Rules that govern the procedures for conducting flight under visual conditions. The term "VFR" is also used in the United States to indicate weather condition that are equal to or greater than minimum VFR requirements. In addition, it is used by pilots and controllers to indicate type of flight plan.

visual meteorological conditions (VMC)

Meteorological conditions expressed in terms of visibility, cloud distance, and ceiling that are equal to or better than specified minimums. Basic weather conditions prescribed for flight under visual flight rules. (OPNAVINST 3710.7)

visual separation

A means employed by ATC to separate aircraft in terminal areas. There are two ways to effect this separation:

1. The tower controller sees the aircraft involved and issues instructions, as necessary, to ensure that the aircraft avoid each other.
2. A pilot sees the other aircraft involved and upon instructions from the controller provides his own separation by maneuvering his aircraft as necessary to avoid it. This may involve following another aircraft or keeping it in sight until it is no longer a factor.

VOR (VHF Omni Directional Range)

A ground-based electronic navigation aid transmitting very high frequency navigation signals, 360° in azimuth, oriented from a magnetic north. Used as the basis for navigation in the National Airspace System. The VOR periodically identifies itself by Morse Code and may have an additional voice identification feature. Voice features may be used by ATC or FSS for transmitting instructions/information to pilots.

VORTAC
A navigation aid providing VOR azimuth, TACAN azimuth, and TACAN distance measuring equipment (DME) at one site.

wake turbulence
Phenomena resulting from the passage of an aircraft through the atmosphere. The term includes vortices, jet blast, jet wash, propeller wash, and rotor wash both on the ground in the air.

Warning Area
See special use airspace.

weather advisory
In aviation weather forecast practice, an expression of hazardous weather conditions not predicted in the area forecast, as they affect the operation of air traffic and as prepared by the NWS.

"when able"
When used in conjunction with ATC instructions, gives the pilot the latitude to delay compliance until a condition or event has been reconciled. Unlike "pilot discretion," when instructions are prefaced "when able," the pilot is expected to seek the first opportunity to comply. Once a maneuver has been initiated, the pilot is expected to continue until the specifications of the instructions have been met. "When able," should not be used when expeditious compliance is required.

"wilco"
I have received your message, understand it, and will comply with it.

wind shear
A change in wind speed and/or wind direction in a short distance resulting in a tearing or shearing effect. It can exit in a horizontal or vertical direction and occasionally in both.

WX
Weather

APPENDIX

Answers to Study Questions
Appendix No. 5.B

References are located in brackets following the answers. The first term in the brackets is the ELO, the second term is the paragraph number within the student guide, e.g., [5.3, B.5] – ELO 5.3, paragraph B.5.

Answers to Lesson Topic 5.1 Study Questions

1. FAR Part 91 [5.2, B.1]

2. a. OPNAVINST 3710.7 [5.2, B.4]

3. Air Traffic Control (ATC) [5.4, C]

4. a. Flight Service Station – Pilot briefing, enroute communications relay, search and rescue, NOTAMS, weather, flight plan filing, NAVAIDS, enroute flight following [5.1, C.1]
   b. Control Tower – Safe, orderly & expeditious flow of traffic in vicinity of airport [5.4, C.2]
   c. Approach Control – Control of IFR traffic in the terminal areas [5.4, C.2]
   d. Air Route Traffic Control Center – Positive Control of enroute IFR traffic [5.4, C.4]

5. Control Tower [5.4, C.2]

6. a. Approach Control [5.4, C.3]

7. d. All of the above [5.6, E.1]

8. During Emergencies [5.7, E.2]

9. a. True [5.7, E.2]

10. d. All of the above [5.8, F.1]

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 [5.8, F.1]

12. a. True [5.11, H.2]

13. a. 09 [5.13, I..2.a]

14. f, e, b, a, d, c [5.14, I.2.e]

15. wind direction and approximate velocity [5.14, I.2.g]

16. direction of landing and take off [5.14, I.2.g.(2)]

17. green, red [5.14, I.2.g.(2)]

Answers to Lesson Topic 5.2 Study Questions

1. c. 1,000' / 3 sm [5.14, I.2.g]

2. east, west [5.21, F]

3. 3000' AGL [5.21, F.1]

4. a. 13,500' MSL [5.22, F.1]

5. d. The assigned altitude [5.22, F.2]

6. uncontrolled [5.21, F.2]

7. a. 5,000' MSL [5.22, F.2]

8. bank angles greater than 60°, pitch angles greater than ±45°, accelerations greater than 2.0g. [5.24, H]

9. b. In VFR conditions, if they remain at least 1,500' above the highest cloud tops within 5 sm [5.25, H.2.b.(2)]

Answers to Lesson Topic 5.3 Study Questions

1. a. Controlled
   b. Uncontrolled [5.26, A]

2. a. Instrument rated pilot and aircraft
   b. 4096 transponder with mode C
   c. IFR Clearance
   d. Two-way radio communications [5.27, B.1]

3. private pilot, a military aviator
   a. 4096 transponder with mode C
   b. ATC clearance
   c. Two-way radio comms [5.27, B.2]

4. b. False [5.27, B.3]

5. Control Tower 2.500 [5.27, B.4]

6. Excepts 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 controlled airspace. [5.27, B.5.a]

7. c. 18,000' MSL [5.28, B.6.a]

8. d. Both Class C and Class D [5.30, C]

9. b. 1,000' above, 1,000' below, 1 mile horizontally [5.30, C]

10. c. they denote the existence of unusual, often invisible, hazards to aircraft. [5.31, D.2]

11. controlling authority. [5.31, D.2]

12. international [5.31, D.3]

13. Red [5.33, E.1.a]

14. d. 1900, 0530 [5.32, E.1.a]

15. 3 sm [5.32, E.1.a]

16. engine start, engine shutdown [5.32, E.1.b]

17. distress, lower [5.34, E.2.a,b]

18. right [5.34, E.2.d]

19. a. True [5.34, E.2.c]

20. 200 KIAS [5.36, E.4.a.(2)]

21. b. False [5.38, F.1]

22. d. All of the above [5.39, F.2]

23. c. below 3,000’ AGL. [5.40, F.2]

24. c. flat hatting. [5.2, F.5]

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APPENDIX

Answers to Study Questions
Appendix No. 5.B

Semi-Circular Rules
(Chapter 2.F)

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

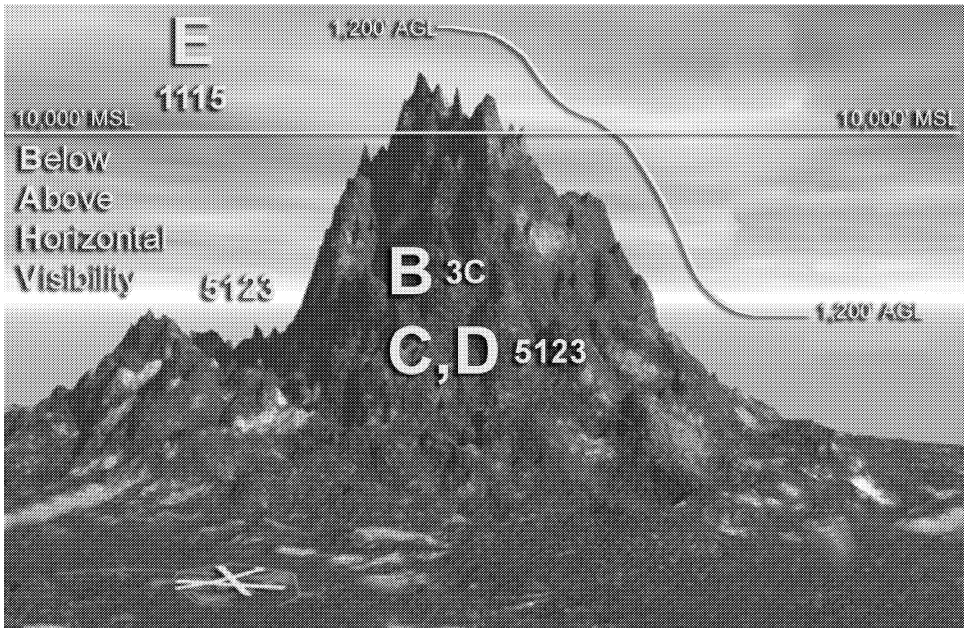
	Sea Level to 18,000' MSL				FL 180 to FL 290			FL 290 and above	
IFR EAST	1000	3000	5000…	17,000	FL 190	FL 210…	FL 270	FL 290	FL 330…
VFR EAST		3500	5500…	17,500	FL 195	FL 215…	FL 275	FL 300	FL 340…
IFR WEST	2000	4000	6000…	FL 180	FL 200	FL 220…	FL 280	FL 310	FL 350…
IFR WEST		4500	6500…	FL 185	FL 205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

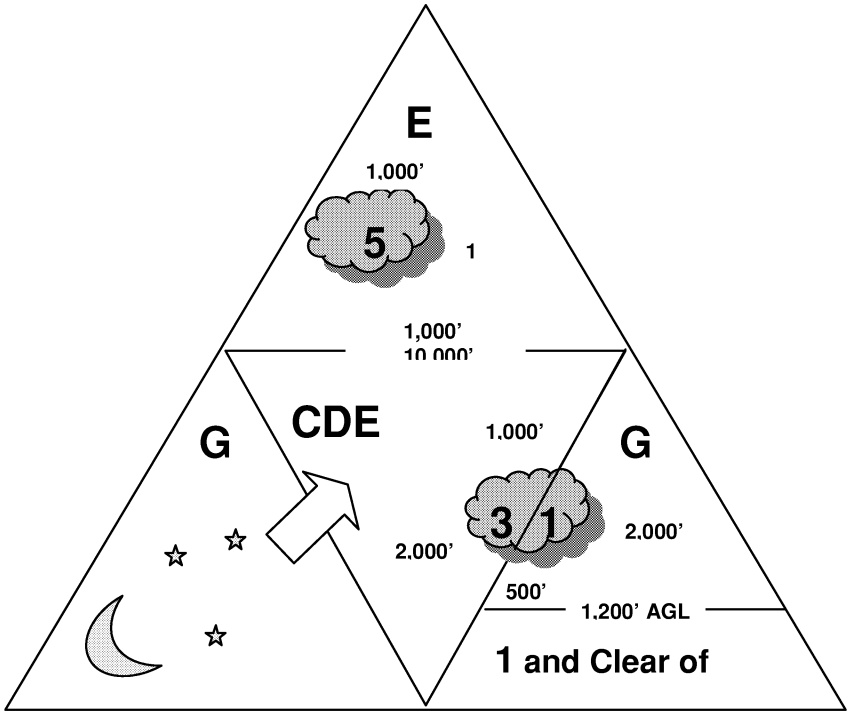
Airspace Classification - Requirements
(Chapter 3.B)

	Class A	Class B	Class C	Class D	Class E
Rating (pilot)	Instrument Rating	Private Pilot Military Aviator	NONE	NONE	NONE
Equipment (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
(Chapter 3.C)





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

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