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FEDERAL AVIATION ADMINISTRATION

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PREFACE

This edition of the Aeronautical Information Publication (AIP) has been prepared in accordance with the standards and recommended practices of Annex 15 to the Chicago Convention and the guidance material in the Aeronautical Information Services Manual (Doc 8126-AN/872), and is published by the authority of the Administrator, Federal Aviation Administration.

The AIP contains Aeronautical information of a permanent nature, with interim changes published in various publications (see 1.4.4) and is updated by means of amendment service.

Aeronautical information of direct operational significance which is of an ephemeral nature or requires advance distribution and is appropriate to the AIP but needs immediate dissemination, is notified by means of NOTAM.

Aeronautical information of general technical interest or of a purely administrative nature and therefore inappropriate to NOTAM or AIP will be published as Advisory Circulars.

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ANGOLA	LUANDA
ARGENTINA	BUENOS AIRES
AUSTRALIA	SIDNEY
AUSTRIA	VIENNA
AZORES	SANTO MARIA
BAHAMAS	NASSAU
BAHRAIN	BAHRAIN
BANGLADESH	DHAKA (DACCA)
BELGIUM	BRUSSELS
BERMUDA	BERMUDA
BOLIVIA	LA PAZ
BRAZIL	RIO DE JANEIRO
BULGARIA	SOFIA
BURMA	RANGOON
CANADA	OTTAWA
CAPE VERDE ISLANDS	AMILCAR CABRAL
CHILE	SANTIAGO
CHINA	BEIJING
CHINA (FORMOSA)	TAIPEI
COLOMBIA	BOGOTA
CUBA	HAVANA
CYPRUS	NICOSIA
CZECHOSLOVAKIA	PRAGUE
DENMARK	COPENHAGEN
DOMINICAN REPUBLIC	SANTO DOMINGO
ECUADOR	GUAYAQUIL
ENGLAND	LONDON
ETHIOPIA	ADDIS ABABA
EYGPT	CAIRO
FIJI	NANDI
FINLAND	HELSINKI
FRANCE	PARIS
FRENCH POLYNESIA	TAHITI
GERMANY (EAST)	BERLIN
GERMANY (WEST)	FRANKFURT
GHANA	ACCRA
GREECE	ATHENS
GREENLAND	SONDRE STROMFJORD
GUYANA	GEORGETOWN
HAITI	PORT-AU-PRINCE
HONDURAS	TEQUCIGALPA
HONG KONG	HONG KONG
HUNGARY	BUDAPEST
ICELAND	REYKJAVIK
INDIA	BOMBAY
INDIA	CALCUTTA
INDIA	DELHI
INDIA	MADRAS
INDONESIA	JAKARTA
IRAN	TEHRAN (NOT AVBL)
IRELAND	SHANNON
ISRAEL	TEL AVIV
ITALY	ROME
JAMAICA	KINGSTON
JAPAN	TOKYO
JORDAN	AMMAN
KENYA	NAIROBI
KOREA (SOUTH)	SEOUL
KUWAIT	KUWAIT
LEBANON	BEIRUT
LIBERIA	ROBERTS
LIBYA	TRIPOLI
MALAYSIA	KUALA LUMPUR
MALTA	LUQA
MAURITIUS	PLAISANCE
MEXICO	MEXICO CITY
MOROCCO	CASABLANCA
MOZAMBIQUE	MAPUTO
NAURU ISLAND	NAURU
NETHERLANDS	AMSTERDAM
NETHERLANDS ANTILLES	CURACAO
NEW GUINEA	PORT MOSEBY
NEW ZEALAND	AUCKLAND
NIGERIA	LAGOS
NORWAY	OSLO
PAKISTAN	KARACHI
PANAMA	TOCUMEN
PARAGUAY	ASUNCION
PERU	LIMA
PHILLIPINES	MANILLA
POLAND	WARSAW
PORTUGAL	LISBON
ROMANIA	BUCHAREST
SAMOA	FALEOLA
SAUDI ARABIA	JEDDAH
SENEGAL	DAKAR
SEYCHELLES	MAHE
SINGAPORE	SINGAPORE
SOLOMON ISLANDS	HONIARA
SOUTH AFRICA	JOHANNESBURG
SOVIET UNION	MOSCOW
SPAIN	MADRID
SRI LANKA	COLOMBO
SUDAN	KHARTOUM
SURINAME	PARAMARIBO
SWEDEN	STOCKHOLM
SWITZERLAND	ZURICH
SYRIA	DAMASCUS
TANZANIA	DAR-ES-SALAAM
THAILAND	BANKOK
TRINIDAD	PORT OF SPAIN
TUNISIA	TUNIS
TURKEY	ANKARA
URUGUAY	MONTEVIDEO
VENEZUELA	CARACAS
YUGOSLAVIA	BELGRADE
ZAIRE	KINSHASA
ZAMBIA	LUSAKA
ZIMBABWE	HARARE

1.7 Pre-Flight Information Service at Aerodromes Available to International Flights.

Pre-Flight Information Units in the U.S. are either FAA operated Flight Service Stations (FSS) or National Weather Service operated Weather Service Offices (WS).

1.7.1 Flight Service Stations (FSSs) are air traffic facilities which provide pilot briefings, 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 National Airspace System (NAS) information, receive and process IFR flight plans, and monitor NAVAIDS. In addition, at selected locations FSSs provideEn Route Flight Advisory Service (Flight Watch), take weather observations, issue airport advisories, and advise Customs and Immigration of transborder flights.

1.7.1.1 Supplemental Weather Service Locations (SWSLs) are airport facilities staffed with contract personnel who take weather observations and provide current local weather to pilots via telephone or radio. All other services are provided by the parent FSS.

1.7.1.2 Flight Service Station (FSS) locations, services and telephone information are available in the U.S. Airport/Facility Directory, Supplement Alaska and Pacific Chart Supplement.

1.7.1.3 Flight Service Station, Pre-Flight information service coverage is designed primarily to provide service within a 500 mile area of the Flight Service Station. All Flight Service Stations, nevertheless, do have telecommunications access to all of the weather and NOTAM information available, on an as needed basis, for preflight briefing to international locations with which the U.S. International NOTAM office exchanges information.

1.7.1.4 A toll-free telephone service, 1-800-WX-BRIEF (1-800-992-7433), accessible from any telephone in the Bahamas Islands, is maintained by the Miami, Florida, International Flight Service Station (IFSS) for such flight services as air defense identification zone (ADIZ) and U.S. Customs Service information and requirements, weather briefings, and flight planning. Miami IFSS also maintains a remote communications outlet, frequency 118.4 MHz, on New Providence Island for en route services to aircraft in flight.

1.7.2 National Weather Service offices provide meteorological briefing services and flight documentation only. Services are provided on request. Weather Services offices are located at each of the following aerodromes serving international civil aviation:

Associated City	*State*
Phoenix	Arizona
Tucson	Arizona
Fresno	California
Los Angeles	California
Oakland	California
San Diego	California
San Francisco	California
Windsor Locks/Bradley	Connecticut
Washington	District of Columbia
Miami	Florida
Tampa	Florida
West Palm Beach	Florida
Chicago	Illinois
Indianapolis	Indiana
New Orleans	Louisiana
Baltimore	Maryland
Boston	Massachusetts
Detroit	Michigan
Minneapolis	Minnesota
St. Louis	Missouri
Las Vegas	Nevada
Newark	New Jersey
New York	New York
Syracuse	New York
Cleveland	Ohio
Portland	Oregon
Philadelphia	Pennsylvania
Pittsburgh	Pennsylvania
Corpus Christi	Texas
Dallas	Texas
El Paso	Texas
Houston	Texas
San Antonio	Texas
Seattle	Washington
Spokane	Washington
Milwaukee	Wisconsin
Anchorage	Alaska
Cold Bay	Alaska
Fairbanks	Alaska
Hilo	Hawaii
Honolulu	Hawaii
Kahului	Hawaii
San Juan	Puerto Rico
Pago Pago	Am. Samoa

2. SUMMARY OF NATIONAL REGULATIONS

2.1 Air Regulations for the United States and areas under its jurisdiction are published in parts entitled the Federal Aviation Regulations (FAR). It is essential that persons engaged in air operations in the U.S. airspace be acquainted with the relevant regulations. Copies of the FAR parts may be purchased from the:

Superintendent of Documents
U.S. Government Printing Office
North Capitol Street, NW
Washington, D.C. 20402

2.2 The following is a partial list of FAR Parts and their Respective subject matter:

FAR part No.	Title
1	Definitions and Abbreviations
11	General Rule-Making Procedures
13	Investigation and Enforcement Procedures
21	Certification Procedures for Products and Parts
23	Airworthiness Standards: Normal, Utility, and Acrobatic Category Airplanes
25	Airworthiness Standards: Transport Category Airplanes
27	Airworthiness Standards: Normal Category Rotorcraft
29	Airworthiness Standards: Transport Category Rotorcraft
31	Airworthiness Standards: Manned Free Balloons
33	Airworthiness Standards: Aircraft Engines
35	Airworthiness Standards: Propellers
36	Noise Standards: Aircraft Type and Airworthiness Certification
37	Technical Standard Order Authorizations
39	Airworthiness Directives
43	Maintenance, Preventive Maintenance, Rebuilding, and Alteration
45	Identification and Registration Marking
47	Aircraft Registration
49	Recording of Aircraft Titles and Security Documents
61	Certification: Pilots and Flight Instructors
63	Certification: Flight Crewmembers Other Than Pilots
65	Certification: Airmen Other Than Flight Crewmembers
67	Medical Standards and Certification
71	Designation of Class A, B, C, D, and E Airspace, and Reporting Points

FAR part No.	Title
73	Special Use Airspace
75	Establishment of Jet Routes and Area High Routes
77	Objects Affecting Navigable Airspace
91	General Operating and Flight Rules
93	Special Air Traffic Rules and Airport Traffic Patterns
95	IFR Altitudes
97	Standard Instrument Approach Procedures
99	Security Control of Air Traffic
101	Moored Balloons, Kites, Unmanned Rockets and Unmanned Free Balloons
105	Parachute Jumping
107	Airport Security
108	Airplane Operator Security
109	Indirect Air Carrier Security
121	Certification and Operations: Domestic, Flag, and Supplemental Air Carriers and Commercial Operators of Large Aircraft
123	Certification and Operations: Air Travel Clubs Using Large Airplanes
125	Certification and Operations Airplanes having a Seating capacity of 20 or More Passengers Or a Maximum Payload Capacity of 6,000 pounds or More.
127	Certification and Operations of Scheduled Air Carriers with Helicopters
129	Operations of Foreign Air Carriers
133	Rotorcraft External-Load Operations
135	Air Taxi Operators and Commercial Operators of Small Aircraft
137	Agricultural Aircraft Operations
139	Certification and Operations: Land Airports Serving Certain Air Carriers
141	Pilot Schools
143	Ground Instructors
145	Repair Stations
147	Aviation Maintenance Technician Schools
149	Parachute Lofts
150	Airport Noise Compatibility Planning
151	Federal Aid to Airports
152	Airport Aid Program
153	Acquisition of U.S. Land for Public Airports
154	Acquisition of U.S. Land for Public Airports Under the Airport and Airway Development Act of 1970.
155	Release of Airport Property from Surplus Property Disposal Restrictions
157	Notice of Construction, Alteration, Activation, and Deactivation of Airports
159	National Capital Airports
169	Expenditure of Federal Funds for Nonmilitary Airports or Air Navigation Facilities Thereon
171	Non-Federal Navigation Facilities
183	Representatives of the Administrator
185	Testimony by Employees and Production of Records in Legal Proceedings and Service of Legal Process and Pleadings
187	Fees
189	Use of Federal Aviation Administration Communications System
191	Withholding Security Information From Disclosure Under the Air Transportation Security Act of 1974.

3. DIFFERENCES FROM ICAO STANDARDS, RECOMMENDED PRACTICES AND PROCEDURES

See AIP Section DIF

4. ABBREVIATIONS

A list of abbreviations which are used in this AIP, the International Notices to Airmen, Notices to Airmen publication and International NOTAMs Class I, which differ from the ICAO abbreviations, is contained on page GEN 2-1.

Note: U.S. uses the terms "abbreviations" and "contractions" interchangeably.

5. UNITS OF MEASUREMENT

The following table identifies the units of measurement that have been selected for use in messages transmitted by all U.S. aeronautical stations, in the U.S. AIP, NOTAM dissemination, and other publications.

Measurements of	*Units in Blue Table*
Distance used in navigation, position reporting, etc. — generally in excess of 2 to 3 nautical miles	Nautical miles and tenths
Relatively short distances such as those relating to aerodrome (e.g., runway lengths).	Feet
Altitudes, elevations and heights.	Feet
Horizontal speed, including wind speed	Knots
Vertical speed.	Feet per minute
Wind direction for landing and taking off.	Degrees magnetic
Wind direction except for landing and taking off.	Degrees true
Visibility, including runway visual.	Statute miles or feet
Altimeter Setting.	Inches
Temperature.	Degrees Fahrenheit
Weight	Pounds
Time.	Hours and minutes, the day of 24 hours beginning at midnight Coordinated Universal Time

6. TIME SYSTEM

6.1 Coordinated Universal Time (UTC) is used in the Air Traffic and Communication services provided and in most documents published by the Aeronautical Information Services.

6.2 When local mean time is used, it will be so indicated as local standard time (LST). See GEN 2-2 for a depiction of the standard time zones within the continental United States.

7. NATIONALITY AND REGISTRATION MARKS

The nationality mark for the aircraft registered in the U.S. is the letter N, followed by a series of number or a series of numbers and letters.

8. SPECIAL EQUIPMENT TO BE CARRIED ON AIRCRAFT

Commercial air transport aircraft operating in the U.S. airspace must adhere to the provisions of Annex 6 — Operation of Aircraft, Part One, chapter six (Airplane Instruments, Equipment and Flight Documents) and chapter seven (Airplane Communications and Navigation Equipment).

9. MISCELLANEOUS INFORMATION

9.1 Commercial air transport operators in the United States must adhere to ANNEX 6 — Operation of Aircraft with the proviso that aircraft which have no operators' local representative available to them will be required to carry a fixed fuel reserve of not less than 45 minutes at the approved fuel consumption rate plus a variable reserve equivalent to 15% of the fuel required from departure to destination and to an alternate if an alternate is required; or where the reserve calculated in accordance with the above exceeds two hours at the approved fuel consumption rate — two hours reserve fuel.

10. MEDICAL FACTS FOR PILOTS

10.1 FITNESS FOR FLIGHT

10.1.1 Medical Certification

10.1.1.1 All pilots except those flying gliders and free air balloons must possess valid medical certificates in order to exercise the privileges of their airman certificates. The periodic medical examinations required for medical certification are conducted by designated Aviation Medical Examiners, who are physicians with a special interest in aviation safety and training in aviation medicine.

10.1.1.2 The standards for medical certification are contained in Part 67 of the Federal Aviation Regulations. Pilots who have a history of certain medical conditions described in these standards are mandatorily disqualified from flying. These medical conditions include a personality disorder manifested by overt acts, a psychosis, alcoholism, drug dependence, epilepsy, an unexplained disturbance of consciousness, myocardial infarction, angina pectoris and diabetes requiring medication for its control. Other medical conditions may be temporarily disqualifying, such as acute infections, anemia, and peptic ulcer. Pilots who do not meet medical standards may still be qualified under special issuance provisions or the exemption process. This may require that either additional medical information be provided or practical flight tests be conducted.

10.1.1.3 Student pilots should visit an Aviation Medical Examiner as soon as possible in their flight training in order to avoid unnecessary training expenses should they not meet the medical standards. For the same reason, the student pilot who plans to enter commercial aviation should apply for the highest class of medical certificate that might be necessary in the pilot's career.

CAUTION: The federal Aviation Regulations prohibit a pilot who possesses a current medical certificate from performing crewmember duties while the pilot has a known medical condition or increase of a known medical condition that would make the pilot unable to meet the standards for the medical certificate.

10.1.2 Illness

10.1.2.1 Even a minor illness suffered in day-to-day living can seriously degrade performance of many piloting tasks vital to safe fight. Illness can produce fever and distracting symptoms that can impair judgment, memory, alertness, and the ability to make calculations. Although symptoms from an illness may be under adequate control with a medication, the medication itself may decrease pilot performance.

10.1.2.2 The safest rule is not to fly while suffering from any illness. If this rule is considered too stringent for a particular illness, the pilot should contact an Aviation Medical Examiner for advice.

10.1.3 Medication

10.1.3.1 Pilot performance can be seriously degraded by both prescribed and over-the-counter medications, as well as by the medical conditions for which they are taken. Many medications, such as tranquilizers, sedatives, strong pain relievers, and cough-suppressant preparations, have primary effects that may impair judgment, memory, alertness, coordination, vision, and the ability to make calculations. Others, such as antihistamines, blood pressure drugs, muscle relaxants, and agents to control diarrhea and motion sickness, have side effects that may impair the same critical functions. Any medication that depresses the nervous system, such as a sedative, tranquilizer or antihistamine, can make a pilot much susceptible to hypoxia (see below).

10.1.3.2 The Federal Aviation Regulations prohibit pilots from performing crewmember duties while using any medication that affects the faculties in any way contrary to safety. The safest rule is not to fly as a crewmember while taking any medication, unless approved to do so by the FAA.

10.1.4 Alcohol

10.1.4.1 Extensive research has provided a number of facts about the hazards of alcohol consumption and flying. As little as one ounce of liquor, one bottle of beer, or four ounces of wine can impair flying skills, with the alcohol consumed in these drinks being detectable in the breath and blood at least three hours. Even after the body completely destroys a moderate amount of alcohol, a pilot can still be severely impaired for many hours by hangover. There is simply no way of increasing the destruction of alcohol or alleviating a hangover. Alcohol also renders a pilot much more susceptible to disorientation and hypoxia (see below).

10.1.4.2 A consistently high alcohol-related fatal aircraft accident rate serves to emphasize that alcohol and flying are a potentially lethal combination. The Federal Aviation Regulations prohibit pilots from performing crewmember duties within eight hours after drinking any alcoholic beverage or while under the influence of alcohol. However, due to the slow destruction of alcohol, a pilot may still be under the influence eight hours after drinking a moderate amount of alcohol. Therefore, an excellent rule is to allow at least 12 to 24 hours between "bottle and throttle." depending on the amount of alcoholic beverage consumed.

10.1.5 Fatigue

10.1.5.1 Fatigue continues to be one of the most treacherous hazards to flight safety, as it may not be apparent to a pilot until serious errors are made. Fatigue is best described as either acute (short-term) or chronic (long-term).

10.1.5.2 A normal occurrence of everyday living, acute fatigue is the tiredness felt after long periods of physical and mental strain, including strenuous muscular effort, immobility, heavy mental workload, strong emotional pressure, monotony, and lack

of sleep. Consequently, coordination and alertness, so vital to safe pilot performance, can be reduced. Acute fatigue is prevented by adequate rest and sleep, as well as regular exercise and proper nutrition.

10.1.5.3 Chronic fatigue occurs when there is not enough time for full recovery between episodes of acute fatigue. Performance continues to fall off, and judgment becomes impaired so that unwarranted risks may be taken. Recovery from chronic fatigue requires a prolonged period of rest.

10.1.6 Stress

10.1.6.1 Stress from the pressures of everyday living can impair pilot performance, often in very subtle ways. Difficulties, particularly at work, can occupy thought processes enough to markedly decrease alertness. Distraction can so interfere with judgment that unwarranted risks are taken, such as flying into deteriorating weather conditions to keep on schedule. Stress and fatigue (see above) can be an extremely hazardous combination.

10.1.6.2 Most pilots do leave stress "on the ground." Therefore when more than usual difficulties are being experienced, a pilot should consider delaying flight until these difficulties are satisfactorily resolved.

10.1.7 Emotion

10.1.7.1 Certain emotionally upsetting events, including a serious argument, death of a family member, separation or divorce, loss of job and financial catastrophe, can render a pilot unable to fly an aircraft safely. The emotions of anger, depression, and anxiety from such events not only decrease alertness but also may lead to taking risks that border on self-destruction. Any pilot who experiences an emotionally upsetting event should not fly until satisfactorily recovered from it.

10.1.8 Personal Checklist

10.1.8.1 Aircraft accident statistics show that pilots should be conducting preflight checklists on themselves as well as their aircraft, for pilot impairment contributes to many more accidents than failure of aircraft systems. A personal checklist that can be easily committed to memory, which includes all of the categories of pilot impairment discussed in this section, is being distributed by the FAA in form of a wallet-sized card.

PERSONAL CHECKLIST

I'm physically and mentally safe to fly.
Not being impaired by:
I llness,
M edication,
S tress,
A lcohol,
F atigue,
E motion.

10.2 EFFECTS OF ALTITUDE

10.2.1 Hypoxia

10.2.1.1 Hypoxia is a state of oxygen deficiency in the body sufficient to impair functions of the brain and other organs. Hypoxia from exposure to altitude is due only to the reduced barametric pressures encountered at altitude, for the concentration of oxygen in the atmosphere remains about 21 percent from the ground out to space.

10.2.1.2 Although a deterioration in night vision occurs at a cabin pressure altitude as low as 5,000 feet, other significant effects of altitude hypoxia usually do not occur in the normal healthy pilot below 12,000 feet. From 12,000 to 15,000 feet of altitude, judgment, memory, alertness, coordination and ability to make calculations are impaired, and headache, drowsiness, dizziness and either a sense of well-being (euphoria) or belligerence occur. The effects appear following increasingly shorter periods of exposure to increasing altitude. In fact, pilot performance can seriously deteriorate within 15 minutes at 15,000 feet.

10.2.1.3 At cabin pressure altitudes above 15,000 feet, the periphery of the visual field grays out to a point where only central vision remains (tunnel vision). A blue coloration (cyanosis) of the fingernails and lips develops. The ability to take corrective and protective action is lost in 20 to 30 minutes at 18,000 feet and 5 to 12 minutes at 20,000 feet, followed soon thereafter by unconsciousness.

10.2.1.4 The altitude at which significant effects of hypoxia occur can be lowered by a number of factors. Carbon monoxide inhaled in smoking or from exhaust fumes (see below), lowered hemoglobin (anemia), and certain medications can reduce the oxygen-carrying capacity of the blood to the degree that the amount of oxygen provided to body tissues will already be equivalent to the oxygen provided to the tissues when exposed to cabin pressure altitude of several thousand feet. Small amounts of alcohol and low doses of certain drugs, such as antihistamines, tranquilizers, sedatives and analgesics can, through their depressant actions, render the brain much more susceptible to hypoxia. Extreme heat and cold, fever, and anxiety increase the body's demand for oxygen, and hence its susceptibility to hypoxia.

10.2.1.5 The effects of hypoxia are usually quite difficult to recognize, especially when they occur gradually. Since symptoms of hypoxia do not vary in an individual, the ability to recognize hypoxia can be greatly improved by experiencing and witnessing the effects of hypoxia during an altitude chamber "flight." The FAA provides this opportunity through aviation physiology training, which is conducted at the FAA Civil Aeromedical Institute and at many military facilities across the United States, to attend the Physiological Training Program at the Civil Aeromedical Institute, Mike Monroney Aeronautical Center, Oklahoma City, OK, contact by telephone (405) 680-4837, or by writing Airmen Education Branch, AAM-420, CAMI, Mike Monroney Aeronautical Center, P.O. Box 25082, Oklahoma City, OK 73125.

NOTE.—To attend the Physiological Training Program at one of the military installations having the training capability, an application form and a fee must be submitted. Full particulars about location, fees, scheduling procedures, course content, individual requirements, etc. are contained in the Physiological Training Application, form number AC-3150-7, which is obtained by contacting the Accident Prevention Specialist or the Office Forms Manager in the nearest FAA office.

10.2.1.6 Hypoxia is prevented by heeding factors that reduce tolerance to altitude, by enriching the inspired air with oxygen from an appropriate oxygen system and by maintaining a comfortable, safe cabin pressure altitude. For optimum protection, pilots are encouraged to use supplemental oxygen above 10,000 feet during the day, and above 5,000 feet at night. The Federal Aviation Regulations require that the minimum flight crew be provided with and use supplemental oxygen after 30 minutes of exposure to cabin pressure altitudes between 12,500 and 14,000 feet, and immediately on exposure to cabin pressure altitudes

above 14,000. Every occupant of the aircraft must be provided with supplemental oxygen at cabin pressure altitudes above 15,00 feet.

10.2.2 Ear Block

10.2.2.1 As the aircraft cabin pressure decreases during ascent, the expanding air in the middle ear pushes the eustachian tube open and, by escaping down it to the nasal passages, equalizes in pressure with the cabin pressure. But during descent, the pilot must periodically open the eustachian tube to equalize pressure. This can be accomplished by swallowing, yawning, tensing muscles in the throat or, if these do not work, by the combination of closing the mouth, pinching the nose closed and attempting to blow through the nostrils (Valsalva manuever).

10.2.2.2 Either an upper respiratory infection, such as a cold or sore throat, or a nasal allergic condition can produce enough congestion around the eustachian tube to make equalization difficult. Consequently, the difference in pressure between the middle ear and aircraft cabin can build up to a level that will hold the eustachian tube closed, making equalization difficult if not impossible. This problem is commonly referred to as an "ear block."

10.2.2.3 An ear block produces severe ear pain and loss of hearing that can last from several hours to several days. Rupture of the ear drum can occur in flight or after landing. Fluid can accumulate in the middle ear and become infected.

10.2.2.4 An ear block is prevented by not flying with an upper respiratory infection or nasal allergic condition. Adequate protection is usually not provided by decongestant sprays or drops to reduce congestion around the eustachian tubes. Oral decongestants have side effects that can significantly impair pilot performance.

10.2.2.5 If an ear block does not clear shortly after landing, a physician should be consulted.

10.2.3 Sinus Block

10.2.3.1 During ascent and descent, air pressure in the sinuses equalizes with the aircraft cabin pressure through small openings that connect the sinuses to the nasal passages. Either an upper respiratory infection, such as a cold or sinusitis, or a nasal allergic condition can produce enough congestion around an opening to slow equalization and, as the difference in pressure between the sinus and cabin mounts, eventually plug the opening. This "sinus block" occurs most frequently during descent.

10.2.3.2 A sinus block can occur in the frontal sinuses, located above each eyebrow, or in the maxillary sinuses, located in each upper cheek. It will usually produce excruciating pain over the sinus area. A maxillary sinus block can also make the upper teeth ache. Bloody mucus may discharge from the nasal passages.

10.2.3.3 A sinus block is prevented by not flying with an upper respiratory infection or nasal allergic condition. Adequate protection is usually not provided by decongestant sprays or drops to reduce congestion around the sinus openings. Oral decongestants have side effects that can impair pilot performance.

10.2.3.4 If a sinus block does not clear shortly after landing, a physician should be consulted.

10.2.4 Decompression Sickness After Scuba Diving

10.2.4.1 A pilot or passenger who intends to fly after SCUBA diving should allow the body sufficient time to rid itself of excess nitrogen absorbed during diving. If not, decompression sickness due to evolved gas can occur during exposure to low altitude and create a serious inflight emergency.

10.2.4.2 The recommended waiting time before going to flight altitudes of up to 8,000 feet is at least 12 hours after diving which has not required controlled ascent (nondecompression stop diving), and at least 24 hours after diving which has required controlled ascent (decompression stop diving). The waiting time before going to flight altitudes above 8,000 feet should be at least 24 hours after any SCUBA dive. These recommended altitudes are actual flight altitudes above mean sea level (AMSL) and not pressurized cabin altitudes. This takes into consideration the risk of decompression of the aircraft during flight.

10.3 HYPERVENTILATION IN FLIGHT

10.3.1 Hyperventilation, or an abnormal increase in the volume of air breathed in and out of the lungs, can occur subconsciously when a stressed situation is encountered in flight. As hyperventilation "blows off" excessive carbon dioxide from the body, a pilot can experience symptoms of lightheadedness, suffocation, drowsiness, tingling in the extremities, and coolness — and react to them with even greater hyperventilation. Incapacitation can eventually result from incoordination, disorientation, and painful muscle spasms. Finally, unconsciousness can occur.

10.3.2 The symptoms of hyperventilation subside within a few minutes after the rate and depth of breathing are consciously brought back under control. The buildup of carbon dioxide in the body can be hastened by controlled breathing in and out of a paper bag held over the nose and mouth.

10.3.3 Early symptoms of hyperventilation and hypoxia are similar. Moreover, hyperventilation and hypoxia can occur at the same time. Therefore, if a pilot is using an oxygen system when symptoms are experienced, the oxygen regulator should immediately be set to deliver 100 percent oxygen, and then the system checked to assure that it has been functioning effectively before giving attention to rate and depth of breathing.

10.4 CARBON MONOXIDE POISONING IN FLIGHT

10.4.1 Carbon monoxide is a colorless, odorless and tasteless gas contained in exhaust fumes. When breathed even in minute quantities over a period of time, it can significantly reduce the ability of the blood to carry oxygen. Consequently, effects of hypoxia occur (see above).

10.4.2 Most heaters in light aircraft work by air flowing over the manifold. Use of these heaters while exhaust fumes are escaping through manifold cracks and seals is responsible every year for several non-fatal and fatal aircraft accidents from carbon monoxide poisoning.

10.4.3 A pilot who detects the odor of exhaust or experiences symptoms of headache, drowsiness, or dizziness while using the heater should suspect carbon monoxide poisoning, and immediately shut off the heater and open air vents. If symptoms are severe, or continue after landing, medical treatment should be sought.

10.5 ILLUSIONS IN FLIGHT

10.5.1 Introduction

10.5.1.1 Many different illusions can be experienced in flight. Some can lead to spatial disorientation. Others can lead to landing errors. Illusions rank among the most common factors cited as contributing to fatal aircraft accidents.

10.5.2 Illusions Leading to Spatial Disorientation

10.5.2.1 Various complex motions and forces and certain visual scenes encountered in flight can create illusions of motion and position. Spatial disorientation from these illusions can be prevented only by visual reference to reliable, fixed points on the ground or to flight instruments.

10.5.2.1.1 The leans — An abrupt correction of a banked attitude, which has been entered too slowly to stimulate the motion sensing system in the inner ear, can create the illusion of banking in the opposite direction. The disoriented pilot will roll the aircraft back into its original dangerous attitude or, if level flight is maintained, will feel compelled to lean in the perceived vertical plane until this illusion subsides.

10.5.2.1.2 Coriolis illusion — An abrupt head movement in a prolonged constant-rate turn that has ceased stimulating the motion sensing system can create the illusion of rotation or movement in an entirely different axis. The disoriented pilot will maneuver the aircraft into a dangerous attitude in an attempt to stop rotation. This most overwhelming of all illusions in flight may be prevented by not making sudden, extreme head movements, particularly while making prolonged constant-rate turns under IFR conditions.

10.5.2.1.3 Graveyard spin — A proper recovery from a spin that has ceased stimulating the motion sensing system can create the illusion of spinning in the opposite direction. The disoriented pilot will return the aircraft to its original spin.

10.5.2.1.4 Graveyard spiral — An observed loss of altitude during a coordinated constant-rate turn that has ceased stimulating the motion sensing system can create the illusion of being in a descent with the wings level. The disoriented pilot will pull back on the controls, tightening the spiral and increasing the loss of altitude.

10.5.2.1.5 Somatogravic illusion — A rapid acceleration during takeoff can create the illusion of being in a nose-up attitude. The disoriented pilot will push the aircraft into a nose-low, or dive attitude. A rapid deceleration by a quick reduction of the throttles can have the opposite effect, with the disoriented pilot pulling the aircraft into a nose-up, or stall attitude.

10.5.2.1.6 Inversion illusion — An abrupt change from climb to straight and level flight can create the illusion of tumbling backwards. The disoriented pilot will push the aircraft abruptly into a nose-low attitude, possibly intensifying this illusion.

10.5.2.1.7 Elevator illusion — An abrupt upward vertical acceleration, usually by an updraft, can create the illusion of being in a climb. The disoriented pilot will push the aircraft into a nose-low attitude. An abrupt downward vertical acceleration, usually by a downdraft, has the opposite effect, with the disoriented pilot pulling the aircraft into a nose-up attitude.

10.5.2.1.8 False horizon — Sloping cloud formations, an obscured horizon, a dark scene spread with ground lights and stars, and certain geometric patterns of ground lights can create illusions of not being aligned correctly with the actual horizon. The disoriented pilot will place the aircraft in a dangerous attitude.

10.5.2.1.9 Autokinesis — In the dark, a static light will appear to move about when stared at for many seconds. The disoriented pilot will lose control of the aircraft in attempting to align it with the light.

10.5.3 Illusions Leading to Landing Errors

10.5.3.1 Various surface features and atmospheric conditions encountered in landing can create illusions of incorrect height above and distance from the runway threshold. Landing errors from these illusions can be prevented by anticipating them during approaches, aerial visual inspection of unfamiliar airports before landing, using electronic glide slope or VASI systems when available, and maintaining optimum proficiency in landing procedures.

10.5.3.1.1 Runway width illusion — A narrower-than-usual runway can create the illusion that the aircraft is at a higher altitude than it actually is. The pilot who does not recognize this illusion will fly a lower approach, with the risk of striking objects along the approach path or landing short. A wider-than-usual runway can have the opposite effect, with the risk of leveling out high and landing hard or overshooting the runway.

10.5.3.1.2 Runway and terrain slopes illusion — An upsloping runway, upsloping terrain, or both, can create the illusion that the aircraft is at a higher altitude that it actually is. The pilot who does not recognize this illusion will fly a lower approach. A downsloping runway, downsloping approach terrain, or both, can have the opposite effect.

10.5.3.1.3 Featureless terrain illusion — An absence of ground features, as when landing over water, darkened areas and terrain made featureless by snow, can create the illusion that the aircraft is at a higher altitude that it actually is. The pilot who does not recognize this illusion will fly a lower approach.

10.5.3.1.4 Atmospheric illusions — Rain on the windscreen can create the illusion of greater height, and atmospheric haze can create the illusion of being at greater distance from the runway. The pilot who does not recognize these illusions will fly a lower approach. Penetration of fog can create the illusion of pitching up. The pilot who does not recognize this illusion will steepen the approach, often quite abruptly.

10.5.3.1.5 Ground lighting illusions — Lights along a straight path, such as a road, and even lights on moving trains can be mistaken for runway and approach lights. Bright runway and approach lighting systems, especially where few lights illuminate the surrounding terrain, may create the illusion of less distance to the runway. The pilot who does not recognize this illusion will fly a higher approach. Conversely, the pilot overflying terrain which has few lights to provide height cues may make lower than normal approach.

10.6 VISION IN FLIGHT

10.6.1 Introduction

10.6.1.1 Of the body senses, vision is the most important for safe flight. Major factors that determine how effectively vision can be used are the level of illumination and the technique of scanning the sky for other aircraft.

10.6.2 Vision Under Dim and Bright Illumination

10.6.2.1 Under conditions of dim illumination, small print and colors on aeronautical charts and aircraft instruments become unreadable unless adequate cockpit lighting is available. Moreover, another aircraft must be much closer to be seen unless its navigation lights are on.

10.6.2.2 In darkness, vision becomes more sensitive to light, a process called dark adaption. Although exposure to total darkness for at least 30 minutes is required for complete dark adaptation, the pilot can achieve a moderate degree of dark adaption within 20 minutes under dim red cockpit lighting. Since red light severely distorts colors, especially on aeronautical charts, and can cause serious difficulty in focusing the eyes on objects inside the aircraft, its use is advisable only where optimum outside night vision capability is necessary. Even so, white cockpit lighting must be available when needed for map and instrument reading, especially under IFR conditions. Dark adaptation is impaired by exposure to cabin pressure altitude above 5,000 feet, carbon monoxide inhaled in smoking and from exhaust fumes, deficiency of Vitamin A in the diet, and by prolonged exposure to bright sunlight. Since any degree of dark adaptation is lost within a few seconds of viewing a bright light, the pilot should close one eye when using a light to preserve some degree of night vision.

10.6.2.3 Excessive illumination, especially from light reflected off the canopy, surfaces inside the aircraft, clouds, water, snow, and desert terrain, can produce glare, with uncomfortable squinting, watering of the eyes, and even temporary blindness. Sunglasses for protection from glare should absorb at least 85 percent of visible light (15 percent transmittance) and all colors equally (neutral transmittance), with negligible image distortion from refractive and prismatic errors.

10.6.3 Scanning for Other Aircraft

10.6.3.1 Scanning the sky for other aircraft is a key factor in collision avoidance. It should be used continuously by the pilot and copilot (or right seat passenger) to cover all areas of the sky visible from the cockpit. Although pilots must meet specific visual acuity requirements, the ability to read an eye chart does not ensure that one will be able to efficiently spot other aircraft. Pilots must develop an effective scanning technique which maximizes one's visual capabilities. The probability of spotting a potential collision threat obviously increases with the time spent looking outside the cockpit. Thus, one must use timesharing techniques to efficiently scan the surrounding airspace while monitoring instruments as well.

10.6.3.2 While the eyes can observe an approximate 200 degree arc of the horizon at one glance, ony a very small center area called the fovea, in the rear of the eye, has the ability to send clear, sharply focused messages to the brain. All other visual information that is not processed directly theough the fovea will be of less detail. An aircraft at a distance of 7 miles which appears in sharp focus within the foveal center of vision would have to be as close as 7/10 of a mile in order to be recognized if it were outside of foveal vision. Because the eyes can focus only on this narrow viewing area, effective scanning is accomplished with a series of short, regularly spaced eye movements that bring successive areas of the sky into the central visual field. Each movement should not exceed 10 degrees, and each area should be observed for at least one second to enable detection. Although horizontal back-and-forth eye movements seem preferred by most pilots, each pilot should develop a scanning pattern that is most comfortable and then adhere to it to assure optimum scanning.

10.6.3.3 Studies show that the time a pilot spends on visual tasks inside the cabin should represent no more than ¼ to ⅓ of the scan time outside, or no more than 4 to 5 seconds on the instrument panel for every 16 seconds utside. Since the brain is already trained to process sight information that is presented from left to right, one may find it easier to start scanning over the left shoulder and proceed across the windshield to the right.

10.6.3.4 Pilots should realize that their eyes may require several seconds to refocus when switching views between items in the cockpit and distant objects. The eyes will also tire more quickly when forced to adjust to distances immediately after close-up focus, as required for scanning the instrument panel. Eye fatigue can be reduced by looking from the instrument panel to the left wing past the wing tip to the center of the first scan quadrant when beginning the exterior scan. After having scanned from left to right, allow the eyes to return to the cabin along the right wing from its tip inward. Once back inside, one should automatically commence the panel scan.

10.6.3.5 Effective scanning also helps avoid "empty-field myopia." This condition usually occurs when flying above the clouds or in a haze layer that provides nothing specific to focus on outside the aircraft. This causes the eyes to relax and seek a comfortable focal distance which may range from 10 to 30 feet. For the pilot, this means looking without seeing, which is dangerous.

10.7 JUDGEMENT ASPECTS OF COLLISION AVOIDANCE

10.7.1 Introduction

The most important aspects of vision and the techniques to scan for the other aircraft are described in Paragraph 10.6.3 above. Pilots should also be familiar with following information to reduce the possibility of mid-air collisions.

10.7.2 Determinimg Relative Altitude

Use the horizon as a reference point. If the other aircraft is above the horizon, it is probably on a higher flight path. If the aircraft appears to be below the horizon, it is probably flying at a lower altitude.

10.7.3 Taking Appropriate Action

Pilots should be familiar with rules on right-of-way, so if an aircraft is on an obvious collision course, one can take immediately evasive action, preferrable in compliance with applicable Federal Aviation Regulations.

10.7.4 Consider Multiple Threats

The decision to climb, descend, or turn is a matter of personal judgement, but one should anticipate that the other pilot may also be making a quick maneuver. Watch the other aircraft during the maneuver and begin your scanning again immediately since there may be other aircraft in the area.

10.7.5 Collision Course Targets

Any aircraft that appears to have no relative motion and stays in one scan quadrant is likely to be on a collision course. Also,

if a target shows no lateral or vertical motion, but increases in size,*TAKE EVASIVE ACTION.*

10.7.6 Recognize High Hazard Areas

Airways and especially VORs and Class B, C, D, and E surface areas are places where aircraft tend to cluster.

Remember, most collisions occur during days when the weather is good. Being in a "radar environment" still requires vigilance to avoid collisions.

10.7.7 Cockpit Management

Studying maps, checklists, and manuals before flight, with various other proper preflight planning (e.g., noting necessary radio frequecies) and organizing cockpit materials, can reduce the amount of time required to look at these items during flight permitting more scan time.

10.7.8 Windshield Conditions

Dirty or bug-smeared windshields can greatly reduce the ability of pilots to see other aircraft. Keep a clean windshield.

10.7.9 Visibility Conditions

Smoke, haze, dust, rain, and flying towards the sun can also greatly reduce the ability to detect targets.

10.7.10 Visual Obstruction in the Cockpit

Pilots need to move their heads to see around blind spots caused by fixed aircraft structures, such as door posts, wings, etc. It will be necessary at times to maneuver the aircraft (e.g., lift a wing) to facilitate seeing around this structure.

Pilots must insure that curtains and other cockpit objects (e.g., maps on glare shield) are removed and stowed during flight.

10.7.11 Lights On

Day or night, use of exterior lights can greatly increase the conspicuity of any aircraft.

Keep interior lights low at night.

10.7.12 ATC Support

ATC facilities often provide radar traffic advisories on a workload-permitting basis. Flight through the new Class C Airspace requires communication with ATC. Use this support whenever possible or when required.

ABBREVIATIONS, TIME ZONES AND METRIC CONVERSION TABLES

ABBREVIATIONS

NOTE — An "s" may be added for plural. Abbreviations used in FDC NOTAMs are italicized.

	A
/	and
AAS	Airport Advisory Service
A/C	Approach Control
ICAO:	AAP — approach control
	AC — altocumulus
acft	aircraft
ACR	Air Carrier
ADF	Automatic Direction Finder
AER	Approach End Runway
aft	After
AGL	above ground level
AIM	Airman's Information Manual
ALS	Approach light system
ALSF-1	Standard 2400' High-intensity Approach Lighting System with Sequenced Flashers, Category I Configuration
ALSF-2	Standard 2400' High-intensity Approach Lighting System with Sequenced Flashers, Category II Configuration
alt	altitude
altm	altimeter
altn	alternate
ALSTG	altimeter setting
amdt	amendment
ICAO:	AMD — amendment
apch	approach
apchg	approaching
aprx	approximate
apv	approve or approved or approval
arpt	airport
ICAO:	AD — aerodrome
arr	arrive or arrival
ARSR	Air Route Surveillance Radar
ARTCC	Air Route Traffic Control Center
ASDE	airport surface detection equipment
asph	Asphalt
ASR	Arpt Surveillance Radar
ATCT	air traffic control tower
ATIS	Automatic Terminal Information Service
avbl	available
awy	airway
	B
BC	back course
bcn	beacon
bcst	broadcast
bldg	building
brg	bearing
btn	between
byd	beyond
	C
CAT	category
ICAO:	CAT — clear air turbulence
CFR	crash fire rescue
clnc	clearance
ICAO:	CLR — clear/cleared to /clearance
clsd	close or closed or closing
cmsnd	commissioned
cntr	center
cntrln	centerline
ICAO:	cl—centerline
Comlo	Compass locator
const	construction
cpty	capacity
crs	course
ctc	contact
ICAO:	CTR — CONTROL ZONE
	D
ICAO:	D — danger area
dalgt	daylight
dcmsnd	decommissioned
DDT	Runway weight bearing capacity for aircraft with double dual-tandem type landing gear
degs	degrees
ICAO:	C — degrees Celsius (Centigrade)
	F — degrees Fahrenheit
dep	depart; departure
ICAO:	DEP — depart/departure/departure message
DF	direction finder
ICAO:	DF — I am connecting you to the station you request
DH	decision height
DME	UHF standard (TACAN compatible distance measuring equipment)
ICAO:	DME — distance meaning equipment
dsplcd	displaced

dstc	distance
ICAO:	DIST — distance
DT	Runway weight bearing capacity for aircraft with dual-tandem type landing gear
durg	during
ICAO:	DRG — during
DVFR	Defense Visual Flight rule
DW	Runway weight bearing capacity for aircraft with dual-wheel type landing gear
	E
E	east
ICAO:	E — east/east longitude
EFAS	Enroute Flight Avisory Service
elev	elevation
emerg	emergency
equip	equipment
ICAO:	EQPT — equipment
ETA	estimated time of arrival
ETE	estimated time en route
excp	except
ICAO:	EXC—except
extd	extend or extended
	F
FAF	final approach fix
FAR	Federal Aviation Regulation
FDC	Flight Data Center
Fl/P	flight information (permanent)
Fl/T	flight information (temporary)
FL	Flight Level
FM	fan marker
ICAO:	FM — from
freq	frequency
frq	frequent
FSS	Flight Service Station
ft	feet
	G
govt	government
GS	glide slope
ICAO:	GS — ground speed
	GP — glide path
GWT	gross weight
	H
HAA	height above airport
HAT	height above touchdown
ICAO:	HGT — height/height above
HIRL	High intensity Runway Lights
hol	holiday
hwy	highway
	I
IAF	initial approach fix
IAP	instrument approach procedure
ICAO:	INA — initial approach
ident	identification
ICAO:	ID — identifier/identification/identify
IF	intermediate fix
ICAO:	IF — intermediate approach fix
IFR	Instrument Flight Rules
IFSS	International Flight Service Station
ILS	instrument landing system
info	information
inop	inoperative
int	intersection
intl	international
intst	intensity
ISMLS	Interim Standard Microwave Landing System
	J
J-bar	jet runway barrier
	K
kHz	Kilohertz
	L
L	left (used only to designate rwys) eg rwy 12L
ICAO:	L — left/runway identification/locator (see LM, LO)
lat	latitude
lbs	pounds (weight)
lctd	located
LDA	Localizer type directional aid
ICAO:	LDA — landing distance available
	LLZ — localizer
LDIN	Lead-in Lighting System
lgtd	lighted
LMM	compass locator at middle marker ILS
lndg	landing
ICAO:	LDG — landing
loc	localizer
ICAO:	LOC—localizer or locally or location or located
LOM	compass locator at outer marker ILS
long	longitude
LRCO	Limited Remote Communications Outlet
	M
MAA	maximum authorized altitude
mag	magnetic
maint	maintain, maintenance
ICAO:	MNTN — maintain
	MAINT — maintenance
MALS	Medium Intensity Approach Light System
MALSR	Medium Intensity Approach Light System with Runway Alignment Indicator Lights
MAP	missed approach point
IAO:	MAP — aeronautical maps and charts
max	maximum
MCA	minimum crossing altitude
MDA	minimum descent altitude

MEA	minimum enroute IFR altitude
MHz	megahertz
min	minimum or minute
MIRL	Medium Intensity Runway Edge Lights
MLS	Microwave Landing System
MM	middle marker ILS
MOCA	minimum obstruction clearance altitude
MRA	minimum reception altitude
MSA	minimum safe altitude
MSL	mean sea level
muni	municipal
	N
N	north
NA	not authorized
natl	national
navaid	navigational aid
NDB	non-directional Radio Beacon
NM	nautical mile(s)
NOPT	no procedure turn required
Nr	number
	O
obstn	obstruction
ODALS	Omnidirectional Approach Lighting System
OM	outer marker ILS
oper	operate
opn	operation
ICAO:	OPR — operator/operate/operative/operating/operational
orig	original
OTS	Out of Service
ovrn	overrun
	P
PAR	Precision Apch Radar
pat	pattern
PCN	Pavement Classification Number
permly	permanently
POB	persons on board
PPR	Prior Permission Required
proc	procedure
	Q
quad	quadrant
	R
R	right (used only to designate rwys) e.g. rwy 19R
ICAO:	R — received (acknowledgement of receipt)/red/restricted area (followed by identification)/right (runway identification)
RADAR	Radio Detection and Ranging
RAPCON	radar approach control (USAF)
RCAG	Remote Center air/ground
RCLS	Runway Centerline Lights System
ICAO:	RCL — runway centerline
RCO	Remote Communications Outlet
rcv	receive
rcvg	receiving
REIL	Runway End Identifier Lights
req	request
RNAV	Area Navigation
RRP	Runway Reference Point
rstrd	restricted
RTS	returned to service
RVR	runway visual range
RVRM	Runway Visual Range Midpoint
RVRT	Runway Visual Range Touchdown
RVRR	Runway Visual Range rollout
RVV	runway visibility values
ry	Runway
ICAO:	RWY—runway
	S
S	south
S	Runway weight bearing capacity for aircraft with single-wheel type landing gear
ICAO:	S — south/south latitude
SDF	Simplified Directional Facility
sec	second
sfc	surface
SFL	Sequenced Flashing Lights
SI	straight-in approach
ICAO:	STA — straight-in approach
SM	statute mile(s)
SR	sunrise
SS	sunset
SSALF	Simplified Short Approach Lighting system with Sequenced Flashers
SSALS	Simplified Short Approach Lighting System
SSALR	Simplified Short Approach Light System with Runway Alignment Indicator Lights
STOL	Short take-off & landing runway
ICAO:	STOL — short takeoff and landing
svc	service
ICAO:	SVC — service message
	T
T	true (after a bearing)
ICAO:	T — temperature
TAC	Terminal Area Charts
TACAN	UHF navigational facility — omnidirectioal course and distance information
ICAO:	TACAN — VHF tactical navigational aid
TAS	true air speed
ICAO:	TMA — TERMINAL CONTROL AREA
TCH	Threshold Crossing Height
tfc	traffic
thr	threshold
thru	through

ICAO:	THRU — though/I am connecting you to another swithcboard
tkof	take-off
temprly	temporarily
tmpry	temporary/temporarily
ICAO:	TEMPO — Temporary/temporaily
TPA	Traffic Pattern Altitude
TRACON	Terminal Radar approach control
trml	terminal
TRSA	TERMINAL RADAR SERVICE AREA
tsnt	transient
TWEB	transcribed weather bcst
twr	tower
twy	taxiway
	U
UHF	Ultra high frequency
uavbl	unavailable
unlgtd	unlighted
unmon	unmonitored
unsked	unscheduled
unusbl	unusable
ICAO:	U/S — unserviceable
	V
VASI	Visual Approach Slope Indicator
vcnty	vicinity
VDP	viaual descent point
VFR	visual flight rules
VHF	Very high frequency
vsby	visibility
ICAO:	VIS — visibility
VOR	VHF Omni-Directional Radio Range
VORTAC	Combined VOR and TACAN System
VOT	a VOR Receiver testing facility
vsby	visibility
	W
W	west
wea	weather
ICAO:	WX — weather
wkday	weekday
wkend	weekend
wpt	waypont
WS	Weather Service
wt	weight
	Z
Z	Coordinated Universal Time
ICAO:	UTC — Coordinated Universal Time

RADIO CONTROL SYSTEM

Key Mike	*Function*
7 times within 5 seconds	Highest intensity available.
5 times within 5 seconds	Medium or lower intensity (Lower REIL or REIL-Off)
3 times within 5 seconds	Lowest intensity available (Lower REIL or REIL-Off)

10.8.5 For all public use airports with FAA standard systems the Airport/Facility Directory contains the types of lighting, runway and the frequency that is used to activate the system. Airports with instrument approach procedures include data on the approach chart identifying the light system(s), the runway on which they are installed, and the frequency that is used to activate the system(s).

Note. — Although the CTAF is used to activate the lights at many airports, other frequencies may also be used. The appropriate frequency for activating the lights on the airport is provided in the Airport/Facility Directory and the Standard Instrument Approach Procedures publications. It is not identified on the sectional charts.

10.8.6 Where the airport is not served by an instrument approach procedure, it may have either the standard FAA approach control system or an independent type system of different specification installed by the airport sponsor. The Airport/Facility Directory contains descriptions of pilot controlled lighting systems for each airport having other than FAA approved systems, and explains the type lights, method of control, and operating frequency in clear text. (See Appendix 2.)

10.9 Airport (Rotating) Beacon

10.9.1 The airport beacon has a vertical light distribution to make it most effective from one up to ten degrees above the horizon; however, it can be seen well above and below this peak spread. The beacon may be an omnidirection capacitor-discharge device, or, it may rotate at a constant speed which produces the visual effect of flashes at regular intervals. Flashes may be one or two colors alternately.

The total number of flashes are:

A. 12 to 30 per minute for beacons marking airports, landmarks, and points on Federal airways:

B. 30 to 60 per minute for beacons marking heliports;

C. 12 to 60 per minute for hazard beacons.

10.9.2 The colors and color combinations of rotating beacons and auxiliary lights are basically:

White and Green	Lighted land airport
*Green alone	Lighted land airport
White and Yellow	Lighted water airport
*Yellow alone	Lighted water airport
Red alone	Hazard
Green, Yellow, and White	Lighted heliport
White	Hazard

*Green alone or yellow alone is used only in connection with a white-and-green or white-and-yellow beacon display, respectively.

10.9.3 Military airport beacons flash alternately white and green, but are differentiated from civil beacons by dual-peaked (two quick) white flashes between the green flashes.

10.9.4 In Class B, C, D and E surface areas, operation of the airport beacon during the hours of daylight indicates that the ground visibility is less than 3 miles and/or the ceiling is less than 1,000 feet. An ATC clearance in accordance with FAR Part 91 is required for landing, takeoff and flight in the traffic pattern. Pilots should not rely solely on the operation of the airport beacon to indicate if weather conditions are IFR or VFR. At locations with control towers, when controls are in the tower, ATC personnel turn the beacon on. At many airports, the airport beacon is turned on by a photoelectric cell or time clocks and ATC personnel can not control it. There is no regulatory requirement for daylight operation and it is the pilot's responsibility to comply with proper pre-flight planning in accordance with FAR Part 91.103

10.10 TAXIWAY LIGHTS

10.10.1 Taxiway Edge Lights. — Taxiway edge lights are used to outline the edges of taxiways during periods of darkness or restricted visibility conditions. These fixtures emit blue light.

Note. — At most major airports these lights have variable intensity settings and may be adjusted at pilot request or when deemed necessary by the controller.

10.10.2 Taxiway Centerline Lights. — Taxiway centerline lights are used to facilitate ground traffic under low visibility conditions. They are located along the taxiway centerline in a straight line on straight portions, on the centerline of curved portions, and along designated taxiing paths in portions of runways, ramp, and apron areas. Taxiway centerline lights are steady burning and emit green light.

11. AIR NAVIGATION AND OBSTRUCTION LIGHTING

11.1 Aeronautical Light Beacons

11.1.1 An aeronautical light beacon is a visual NAVAID displaying flashes of white and/or colored light to indicate the location of an airport, a heliport, a landmark, a certain point of a Federal airway in mountainous terrain, or an obstruction. The light used may be a rotating beacon or one or more flashing lights. The flashing lights may be supplemented by steady burning lights of lesser intensity.

11.1.2 The color or color combination display by a particular beacon and/or its auxiliary lights tell whether the beacon is indicating a landing place, landmark, point of the Federal airways, or an obstruction. Coded flashes of the auxiliary lights, if employed, further identify the beacon site.

11.2 Code Beacons and Course Lights

11.2.1 Code Beacons

11.2.1.1 The code beacon, which can be seen from all directions, is used to identify airports and landmarks and to mark obstructions. The number of code beacon flashes are:

Green coded flashes not exceeding 40 flashes or character elements per minute, or constant flashes 12 to 15 per minute, for identifying land airports.

Yellow coded flashes not exceeding 40 flashes or character elements per minute, or constant flashes 12 to 15 per minute, for identifying water airports.

Red flashes, constant rate, 12 to 40 flashes per minute, for marking hazards.

11.2.2 Course Lights

11.2.2.1 The course light, which can be seen clearly from only one direction, is used only with rotating beacons of the Federal Airway System; two course lights, back to back, direct coded flashing beams of light in either direction along the course of airway.

Note. — Airway beacons are remnants of the "lighted" airways which antedated the present electronically equipped Federal Airways System. Only a few of those beacons exist today to mark airway segments in remote mountain areas. Flashes in Morse Code identify the beacon site.

11.3 Obstruction Beacon

11.3.1 Obstructions are marked/lighted to warn airmen of their presence during daytime and nighttime conditions. They may be marked/lighted in any of the following combinations:

Aviation Red Obstruction Lights. Flashing aviation red beacons and steady burning aviation red lights during nighttime operation. Aviation orange and white paint is used for daytime marking.

High Intensity White Obstruction Lights. Flashing high intensity white lights during daytime with reduced intensity for twilight and nighttime operation. When this type is used, the marking of structures with red obstruction lights and aviation orange and white paint may be omitted.

Dual Lighting.A combination of flashing aviation red beacons and steady burning aviation red lights for nighttime operations and flashing high intensity white lights for daytime operation. Aviation orange and white paint may be omitted.

11.3.2 High intensity flashing white lights are being used to identify some supporting structures of overhead transmission line located across rivers, chasms, gorges, etc. These lights flash in a middle, top, lower light sequence at approximately 60 flashes per minute. The top light is normally installed near the top of the supporting structure, while the lower light indicates the approximate lower portion of the wire span. The lights are beamed towards the companion structure to identify the area of the wire span.

11.3.3 High intensity flashing white lights are also employed to identify tall structures, such as chimneys and towers, and obstructions to air navigation. The lights provide a 360 degree coverage about the structure at 40 flashes per minute and consist of from one to seven levels of lights depending upon the height of the structure. Where more than one level is used the vertical banks flash simultaneously.

11.4 Airway Beacons

Airway beacons are remnants of the "lighted" airways which antedated the present electronically equipped Federal Airways System. Only a few of these beacons exist today to mark airway segments in remote mountain areas. Flashes in Morse Code identify the beacon site.

11.5 Airport Lead-in Lighting System (LDIN)

11.5.1 The lead-in lighting system consists of series of flashing lights installed at or near ground level to describe the desired course to a runway or final approach. Each group of lights is positioned and aimed so as to be conveniently sighted and followed from the approaching aircraft under conditions at or above approach minimums under consideration. The system may be curved, straight, or combination thereof, as required. The lead-in lighting system may be terminated at any approved approach lighting system, or it may be terminated at a distance from the landing threshold which is compatible with authorized visibility minimums permitting visual reference to the runway environment.

11.5.2 The outer portion uses groups of lights to mark segments of the approach path beginning at a point within easy visual range of a final approach fix. These groups are spaced close enough together (approximately one mile) to give continuous lead-in guidance. A group consists of at least three flashing lights in a linear or cluster configuration and may be augmented by steady burning lights where required. When practicable, groups flash in sequence toward runways. Each system is designed to suit local conditions and to provide the visual guidance intended. The design of all LDIN is compatible with the requirements of U.S. Standards for Terminal Instrument Procedures (TERPS) where such procedures are applied for establishing instrument minimums.

12. AIRPORT MARKING AIDS AND SIGNS

12.1 GENERAL

12.1.1 Airport marking aids and signs provide information that is useful to a pilot during landing, takeoff, and taxiing. The markings and signs described in this section reflect the FAA recommended standards.

12.1.2 Uniformity in airport marking and signs from one airport to another enhances safety and improves efficiency. Pilots are encouraged to work with the operators of the airports they use to achieve the marking and sign standards described in this section.

12.1.3 Pilots who encounter ineffective, incorrect, or confusing marking or signs on an airport should make the operator of the airport aware of the problem. These situations may also be reported under the Aviation Safety Reporting Program. (See SAR-4; SAFETY, HAZARD AND ACCIDENT REPORTS.) Pilots may also report these situations to the FAA regional airports division.

12.1.4 The FAA has issued revised standards on airport signs. The information contained in this section of the AIM is based upon these revised sign standards. Airports certificated under **Federal Aviation Regulation Part 139** are expected to be in compliance with the revised standards by January 1, 1994. Until that date, signs on these certificated airports may not be in accordance with the information provided herein. Airports not subject to certification under Part 139 may not be in compliance with these standards.

12.2 Airport Marking Aids

12.2.1 Markings for runways on airports and STOLports are white. Markings defining the landing area on a heliport are also white except for hospital heliports which use a red "H" on a white cross. Markings for taxiways, closed areas, hazardous areas, and holding positions (even if they are on a runway) are yellow.

Note.— Detailed airport marking information is published in FAA Advisory Circular 150/5340-1, Marking of Paved Areas On Airports.

12.2.2 Runway Designators — Runway numbers and letters are determined from the approach direction. The number is the whole number nearest one-tenth the magnetic azimuth of the centerline of the runway, measured clockwise from the magnetic

1 CITY, STATE/AERODROME: **GUAM, MARIANA ISLANDS/AGANA NAVAL AIR STATION**

2 REFERENCE POINT:
Lat. 13°28'54.1''N, Long. 144°47'35.5''E.

3 DISTANCE AND DIRECTION FROM CITY:
3 NM NE.

4 ELEVATION:
298 FT (91 M).

5 AERODROME REFERENCE TEMPERATURE (CENTIGRADE):
29°C. (August).

6 MAGNETIC VARIATION:
02°E.

7 TRANSITION ALTITUDE:

8 OPERATIONAL HOURS:
24 hours

9 AERODROME OPERATOR OR ADMINISTRATIVE AUTHORITY:
U.S. Navy

10 POSTAL ADDRESS:
Naval Air Station
PSC 456 Box 51
FPO AP 96539-1200

11 TELEGRAPHIC ADDRESSES:
AFTN: PGUM

12 TELEPHONE NUMBERS:
671-344-5281

13 OVERNIGHT ACCOMMODATION:
Yes.

14 RESTAURANT ACCOMMODATION:
Yes.

15 MEDICAL FACILITIES:
Hospital in city.

16 TRANSPORTATION AVAILABLE:
Taxis and rental cars.

17 CARGO HANDLING FACILITIES:
Yes.

18 FUEL GRADES:
100.

19 OIL GRADES:
Piston and turbine grades available.

20 OXYGEN AND RELATED SERVICING:
Low and high pressure oxygen and high pressure replacement bottles.

21 REFUELING FACILITIES AND LIMITATIONS:
Fuel available on prior arrangement.

22 HANGAR SPACE AVAILABLE FOR TRANSIENT AIRCRAFT:
Limited.

23 REPAIR FACILITIES AVAILABLE FOR TRANSIENT AIRCRAFT:
Minor aircraft and powerplant.

24 CRASH EQUIPMENT:
ARFF Index D.

25 SEASONAL AVAILABILITY:
All seasons.

26 LOCAL FLYING RESTRICTIONS AND AERODROME REMARKS:
An aviation facility license issued by the Department of the Navy is required prior to use of the AP. RITE TFC RWYS 24L/R. Do not exceed 1,300 FT (396) in TFC pattern. LDG fee.

27 PRE-FLIGHT ALTIMETER CHECK POINT(S):
None.

28 METEOROLOGICAL DATA

Mean daily maximum and minimum temperatures (C°)

Temperature	Jan	Feb	Mar	April	May	June	July	Aug	Sep	Oct	Nov	Dec
Max (A)	28	28	28	29	29	29	29	29	29	29	29	28
Min (B)	24	24	24	24	26	26	26	26	26	26	26	25

Monthly mean pressure in (MB) at approximately the time of maximum (A) and minimum (B) temperatures

(A)												
(B)												

Monthly mean of the relative humidity at approximately the times of maximum (A) and minimum (B) temperatures

(A)	71	68	65	66	68	69	72	74	76	76	73	72
(B)	85	85	84	85	86	86	88	89	91	89	87	86

29 SLOPE (GRADIENT): See diagram.

CONTINUED — **GUAM, MARIANA ISLANDS/AGANA NAVAL AIR STATION**

30 PHYSICAL CHARACTERISTICS

Runway			Declared Distances				THR ELEV (ft)	Stopway (m)	Clearway (m)	PCN	Runway Surface	Stopway Surface
Designation	True BRG	Length/Width (m)	TORA (m)	TODA (m)	ASDA (m)	LDA (m)						
a	b	c	d	e	f	g	h	i	k	l	m	n
06L 24R	64°57' 244°57'	3053 x 45	3053 3053	3053 3053	3190 3053	3053 3053	239 297	137 -	- -	81/F/C/X/T	ASPH-CONC-Grooved	ASPH -
06R 24L	64°57' 244°57'	2439 x 45	2439 2439	2439 2439	2439 2439	2439 2439	231 284	- -	- -	66/R/C/W/T	ASPH-CONC	- -

Landing Area Remarks: None.

31 MOVEMENT AREAS

APRONS: Asphaltic concrete. TAXIWAYS: Asphaltic concrete. HELICOPTER ALIGHTING AREA: Yes—adjacent TWR.

VISUAL GROUND AREAS

32 TAXIING GUIDANCE SYSTEM: B TWY LGTS primary TWYS.

33 VISUAL AIDS TO LOCATION: Rotating BCN—ALTN W and G.

34 INDICATORS AND GROUND SIGNALLING DEVICES: Tee, three cones, LGTD.

35 LIGHTING AIDS

APPROACH LIGHTS: RWY 06L—MALSR.
RVR: No.
REIL: No.
VASI: RWYS 06L, 24R.
THRESHOLD LIGHTS: All THRS—G.
RUNWAY LIGHTS: RWY 06L/24R—W high INTST. RWY 06R/24L—W medium INTST.

36 EMERGENCY LIGHTING AND SECONDARY POWER SUPPLY: Yes.

37 OBSTRUCTION MARKING AND LIGHTING: R obstruction LGTS—day and NGT.

38 MARKING AIDS: RWY CL, sidestripes and numerals. TWY CL. RWY 06L/24R and 06R/24L has distance markers every 1,000 FT (305) from RWY 6 THR.

39 OBSTRUCTION IN APPROACH AND TAKE-OFF AREAS

Runway Identification	06L	24R	06R	24L
Controlling Obstruction	Mtn	Tree	Mtn	Trees
Obstn Clnc Slope	48:1	29:1	49:1	30:1
Dist from Runway End	30,100 (9 174)	1,500 (457)	30,100 (9 174)	1,800 (549)

Obstruction Remarks: LGTD tower 772 FT (235) MSL located 1.3 NM ENE of FLD. All DEP ACFT shall maintain RWY heading until crossing end of RWY at ALT of at least 1,000'.

41 DISABLED AIRCRAFT REMOVAL CAPABILITY: Yes, B-747

1 CITY, STATE/AERODROME: **HILO, HI/HILO INTERNATIONAL** [ALTERNATE]

2 REFERENCE POINT:
Lat. 19°43'13''N, Long. 155°02'54.5''W.

3 DISTANCE AND DIRECTION FROM CITY:
2 NM E.

4 ELEVATION:
38 FT (11 M).

5 AERODROME REFERENCE TEMPERATURE (CENTIGRADE):
28°C. (August).

6 MAGNETIC VARIATION:
11°E.

7 TRANSITION ALTITUDE:

8 OPERATIONAL HOURS:
0700-1530 local daily.

9 AERODROME OPERATOR OR ADMINISTRATIVE AUTHORITY:
Hawaii State Airports Division DOT.

10 POSTAL ADDRESS:
Honolulu International Airport
Honolulu, HI 96819

11 TELEGRAPHIC ADDRESSES:
AFTN: PHTO

12 TELEPHONE NUMBERS:
808-329-2484

13 OVERNIGHT ACCOMMODATION:
Yes.

14 RESTAURANT ACCOMMODATION:
Yes.

15 MEDICAL FACILITIES:
Yes.

16 TRANSPORTATION AVAILABLE:
Limited.

17 CARGO HANDLING FACILITIES:
Limited.

18 FUEL GRADES:
80, 100, Jet A.

19 OIL GRADES:
Piston and turbine grades available.

20 OXYGEN AND RELATED SERVICING:
None.

21 REFUELING FACILITIES AND LIMITATIONS:
Fuel available 0800-1800 daily, other times 1 HR PPR; 808-961-5591 (day), 808-966-4671 (night).

22 HANGAR SPACE AVAILABLE FOR TRANSIENT AIRCRAFT:
Limited.

23 REPAIR FACILITIES AVAILABLE FOR TRANSIENT AIRCRAFT:
Minor airframe.

24 CRASH EQUIPMENT:
ARFF Index C.

25 SEASONAL AVAILABILITY:
All seasons.

26 LOCAL FLYING RESTRICTIONS AND AERODROME REMARKS:
Birds in VCY.

27 PRE-FLIGHT ALTIMETER CHECK POINT(S):
None.

28 METEOROLOGICAL DATA

Mean daily maximum and minimum temperatures (C°)

Temperature	Jan	Feb	Mar	April	May	June	July	Aug	Sep	Oct	Nov	Dec
Max (A)	26	26	26	26	27	28	28	28	28	18	27	26
Min (B)	17	17	17	18	18	19	19	20	20	19	19	18

Monthly mean pressure in (MB) at approximately the time of maximum (A) and minimum (B) temperatures

(A)
(B)

Monthly mean of the relative humidity at approximately the times of maximum (A) and minimum (B) temperatures

(A)
(B)

29 SLOPE (GRADIENT): See diagram.

CONTINUED — HILO, HI/HILO INTERNATIONAL [ALTERNATE]

30 PHYSICAL CHARACTERISTICS

Runway			Declared Distances				THR ELEV (ft)	Stopway (m)	Clearway (m)	PCN	Runway Surface	Stopway Surface
Designation	True BRG	Length/Width (m)	TORA (m)	TODA (m)	ASDA (m)	LDA (m)						
a	b	c	d	e	f	g	h	i	k	l	m	n
03 21	40°47' 220°47'	1707 x 45	1707 1707	1707 1707	1707 1707	1601 1707	34 25	- -	- -	56/F/A/X/T	ASPH	- -
08 26	90°00' 270°00'	2987 x 45	2987 2987	2987 2987	2987 2987	2987 2987	27 37	- -	- -	54/F/A/X/T	ASPH- Grooved	- -

Landing Area Remarks: Paved area 1,325 FT (404) APCH end RWY 08 marked by chevrons and cannot be used in computing TKOF data. TWR controls entry/exit TFC on TWY F and E to east terminal ramp. RWY 03 THR displaced 349 FT (106).

31 MOVEMENT AREAS

APRONS: ASPH. TAXIWAYS: ASPH. HELICOPTER ALIGHTING AREA: No.

VISUAL GROUND AREAS

32 TAXIING GUIDANCE SYSTEM: B TWY LGTS.

33 VISUAL AIDS TO LOCATION: Rotating BCN—ALTN W and G.

34 INDICATORS AND GROUND SIGNALLING DEVICES: LGTD tee. Segmented circle.

35 LIGHTING AIDS

APPROACH LIGHTS: RWY 26—MALSR. RWY 08—ODALS. Activate MALSR RWY 26, ODALS RWY 08—key 118.1
VASI: RWYS 03, 08, 26.
REIL: RWY 03.
THRESHOLD LIGHTS: All THRS—G.
RUNWAY LIGHTS: RWY 08/26—W high INTST. RWY 03/21—W medium INTST.

36 EMERGENCY LIGHTING AND SECONDARY POWER SUPPLY: Yes.

37 OBSTRUCTION MARKING AND LIGHTING: R obstruction LGTS—day and NGT.

38 MARKING AIDS: RWY CL and numerals, THR, touchdown, and sidestripes RWY 08/26. TWY CL and TWY hold markings.

39 OBSTRUCTION IN APPROACH AND TAKE-OFF AREAS

Runway Identification	08	26	03	21
Controlling Obstruction	Tree	Tree	Fence	Pole
Obstn Clnc Slope	28:1	32:1	0:1	27:1
Dist from Runway End	2,000 (609)	1,500 (457)	200 (61)	800 (243)

Obstruction Remarks: RWY 08—6 FT (2) fence 400 FT left of CL. LGTD 181 FT (55) smoke stack ½ mile S of fld. RWY 03—APCH ratio 34:1 FR displaced THR.

41 DISABLED AIRCRAFT REMOVAL CAPABILITY: Yes, C-402

1 CITY, STATE/AERODROME: **KING SALMON, AK/KING SALMON** [ALTERNATE]

2 REFERENCE POINT:
Lat. 58°40'36.5''N, Long. 156°38'57.2''W.

3 DISTANCE AND DIRECTION FROM CITY:
Adj SE.

4 ELEVATION:
57 ft (17 M)

5 AERODROME REFERENCE TEMPERATURE (CENTIGRADE):
17°C. (July).

6 MAGNETIC VARIATION:
21°E.

7 TRANSITION ALTITUDE:

8 OPERATIONAL HOURS:
Monday-Friday 0730-1630.

9 AERODROME OPERATOR OR ADMINISTRATIVE AUTHORITY:
State of Alaska
Department of Transportation

10 POSTAL ADDRESS:
Department of Transportation
Pouch 196900
Anchorage, AK 99519-6900

11 TELEGRAPHIC ADDRESSES:
AFTN: PAKN

12 TELEPHONE NUMBERS:
907-246-3325

13 OVERNIGHT ACCOMMODATION:
Yes.

14 RESTAURANT ACCOMMODATION:
Yes.

15 MEDICAL FACILITIES:
First-aid room and ambulance at local military facility.

16 TRANSPORTATION AVAILABLE:
None.

17 CARGO HANDLING FACILITIES:
Available by prior arrangement.

18 FUEL GRADES:
100LL, 100, Jet A.

19 OIL GRADES:
Piston grades available.

20 OXYGEN AND RELATED SERVICING:
None.

21 REFUELING FACILITIES AND LIMITATIONS:

22 HANGAR SPACE AVAILABLE FOR TRANSIENT AIRCRAFT:
Yes.

23 REPAIR FACILITIES AVAILABLE FOR TRANSIENT AIRCRAFT:
Major airframe and powerplant.

24 CRASH EQUIPMENT:
ARFF Index BS.

25 SEASONAL AVAILABILITY:
All seasons.

26 LOCAL FLYING RESTRICTIONS AND AERODROME REMARKS:
Scramble by Air Defense Command acft at any time. When tower inoperative, contact FSS bfr beginning apch or ldg. Birds in vcy. Clsd to air carrier ops with more than 30 pax seats exc PPR, Box 65, King Salmon AK 99613. Lndg fee acft 6,00 lbs or over, PPR 907-266-1485.

27 PRE-FLIGHT ALTIMETER CHECK POINT(S):
None.

28 METEOROLOGICAL DATA

Mean daily maximum and minimum temperatures (C°)

Temperature	Jan	Feb	Mar	April	May	June	July	Aug	Sep	Oct	Nov	Dec
Max (A)	-6	-4	-1	5	11	16	17	17	13	6	-2	-6
Min (B)	-14	-12	-10	-4	1	6	8	9	4	-2	-9	-14

Monthly mean pressure in (MB) at approximately the time of maximum (A) and minimum (B) temperatures

(A)
(B)

Monthly mean of the relative humidity at approximately the times of maximum (A) and minimum (B) temperatures

(A)
(B)

29 SLOPE (GRADIENT): See diagram.

CONTINUED — **KING SALMON, AK/KING SALMON** [ALTERNATE]

30 PHYSICAL CHARACTERISTICS

Runway			Declared Distances				THR ELEV (ft)	Stopway (m)	Clearway (m)	PCN	Runway Surface	Stopway Surface
Designa-tion	True BRG	Length/Width (m)	TORA (m)	TODA (m)	ASDA (m)	LDA (m)						
a	b	c	d	e	f	g	h	i	k	l	m	n
11 29	131°50' 311°50'	2591 x 45	2591 2591	2591 2591	2591 2591	2591 2591	44 57	- -	- -	51/F/A/X/T	ASPH	- -
18 36	196°19' 16°19'	1398 x 30	1398 1398	1398 1398	1398 1398	1398 1398	50 44	- -	- -	-	ASPH	- -

Landing Area Remarks: Dips in paving Rwy 18/36.

31 MOVEMENT AREAS

APRONS: Asphalt.
TAXIWAYS: Asphalt.
HELICOPTER ALIGHTING AREA: Yes—as directed by control tower.

VISUAL GROUND AREAS

32 TAXIING GUIDANCE SYSTEM:
Blue taxiway lights—north taxiway.

33 VISUAL AIDS TO LOCATION:
Rotating beacon—alternating white and green.

34 INDICATORS AND GROUND SIGNALLING DEVICES:
Two lighted cones, segmented circle.

35 LIGHTING AIDS

APPROACH LIGHTS: Rwy 11—ALSF1.
VASI: Rwys 11, 29.
RVV: Rwy 11.
THRESHOLD LIGHTS: All thresholds—green.
RUNWAY LIGHTS: Rwy 11/29—white high intensity. Rwy lights oper on request thru twr, other times thru FSS.

36 EMERGENCY LIGHTING AND SECONDARY POWER SUPPLY:
No.

37 OBSTRUCTION MARKING AND LIGHTING:
Red obstruction lights—day and night.

38 MARKING AIDS:
Runway centerline and sidestripes, numerals, threshold, and taxiway markings.

39 OBSTRUCTION IN APPROACH AND TAKE-OFF AREAS

Runway Identification	11	29	18	36
Controlling Obstruction			Tree	
Obstn Clnc Slope	50:1	50:1	26:1	50:1
Dist from Runway End			1,000 (305)	

Obstruction Remarks: Seven 90 ft unlgtd twrs 930 ft to 1230 ft N of apch end Rwy 11.

41 DISABLED AIRCRAFT REMOVAL CAPABILITY:
Yes, B-737

1 CITY, STATE/AERODROME: **McALLEN, TX/MILLER INTERNATIONAL**

2 REFERENCE POINT:
Lat. 26°10'32.7''N, Long. 98°14'18.8''W.

3 DISTANCE AND DIRECTION FROM CITY:
2 NM S.

4 ELEVATION:
107 FT (33 M).

5 AERODROME REFERENCE TEMPERATURE (CENTIGRADE):
36°C. (August).

6 MAGNETIC VARIATION:
07°E.

7 TRANSITION ALTITUDE:

8 OPERATIONAL HOURS:
0600-0000.

9 AERODROME OPERATOR OR ADMINISTRATIVE AUTHORITY:
City of McAllen.

10 POSTAL ADDRESS:
Miller International Airport
2600 S. Main St.
McAllen, TX 78503

11 TELEGRAPHIC ADDRESSES:
AFTN: KMFE

12 TELEPHONE NUMBERS:
210-682-9101/1890

13 OVERNIGHT ACCOMMODATION:
Yes.

14 RESTAURANT ACCOMMODATION:
Yes.

15 MEDICAL FACILITIES:
Yes.

16 TRANSPORTATION AVAILABLE:
Yes.

17 CARGO HANDLING FACILITIES:
Limited.

18 FUEL GRADES:
100LL, Jet A.

19 OIL GRADES:
Piston and turbine grades available.

20 OXYGEN AND RELATED SERVICING:
High pressure oxygen replacement bottles.

21 REFUELING FACILITIES AND LIMITATIONS:
None.

22 HANGAR SPACE AVAILABLE FOR TRANSIENT AIRCRAFT:
Yes.

23 REPAIR FACILITIES AVAILABLE FOR TRANSIENT AIRCRAFT:
Major airframe and powerplant.

24 CRASH EQUIPMENT:
ARFF Index C.

25 SEASONAL AVAILABILITY:
All seasons.

26 LOCAL FLYING RESTRICTIONS AND AERODROME REMARKS:
For ARFF, when ATCT clsd ctc SJT AFSS or McAllen Police 210-682-4321.

27 PRE-FLIGHT ALTIMETER CHECK POINT(S):
None.

28 METEOROLOGICAL DATA

Mean daily maximum and minimum temperatures (C°)

Temperature	Jan	Feb	Mar	April	May	June	July	Aug	Sep	Oct	Nov	Dec
Max (A)	22	24	27	30	33	34	36	36	34	31	26	23
Min (B)	10	12	14	18	21	23	23	23	22	18	18	10

Monthly mean pressure in (MB) at approximately the time of maximum (A) and minimum (B) temperatures

(A)												
(B)												

Monthly mean of the relative humidity at approximately the times of maximum (A) and minimum (B) temperatures

(A)	74	72	70	71	71	69	65	66	70	71	73	75
(B)	89	90	88	90	91	91	92	92	92	90	88	89

29 SLOPE (GRADIENT): See diagram.

CONTINUED — **McALLEN, TX/MILLER INTERNATIONAL**

30 PHYSICAL CHARACTERISTICS

Runway			Declared Distances				THR ELEV (ft)	Stopway (m)	Clearway (m)	PCN	Runway Surface	Stopway Surface
Designation	True BRG	Length/Width (m)	TORA (m)	TODA (m)	ASDA (m)	LDA (m)						
a	b	c	d	e	f	g	h	i	k	l	m	n
13 31	140°34' 320°34'	2167 x 45	2167 2167	2167 2167	2167 2167	2126 2167	107 102	- -	- -	57/F/C/X/U	ASPH-Grooved	- -
18 36	- -	807 x 18	807 807	807 807	807 807	807 807	- -	- -	- -	07/F/C/Z/U	ASPH	- -

Landing Area Remarks: RWY 13 THR displaced 135 FT (41). RWY 18/36 CLSD to ACFT over 12,500 LB (5 670) MAX GROSS LDG WT.

31 MOVEMENT AREAS

APRONS: ASPH. TAXIWAYS: 40 FT (12) width—ASPH. HELICOPTER ALIGHTING AREA: None.

VISUAL GROUND AREAS

32 TAXIING GUIDANCE SYSTEM: B TWY LGTS.

33 VISUAL AIDS TO LOCATION: Rotating BCN—ALTN W and G.

34 INDICATORS AND GROUND SIGNALLING DEVICES: Wind indicator LGTD; segmented circle.

35 LIGHTING AIDS

APPROACH LIGHTS: RWY 13—MALSR. When TWR CLSD, key 118.5, 7 times for high INTST, 5 for medium, 3 for low.
RVR: None.
REIL: RWY 31.
VASI: RWYS 31, 18, 36.
THRESHOLD LIGHTS: RWY 13/31—G.
RUNWAY LIGHTS: RWYS 13/31, 18/36—medium INTST. (RWY 18/36 MIRL does not operate when TWR CLSD; RWY 13/31 preset low intst only.

36 EMERGENCY LIGHTING AND SECONDARY POWER SUPPLY: No.

37 OBSTRUCTION MARKING AND LIGHTING:

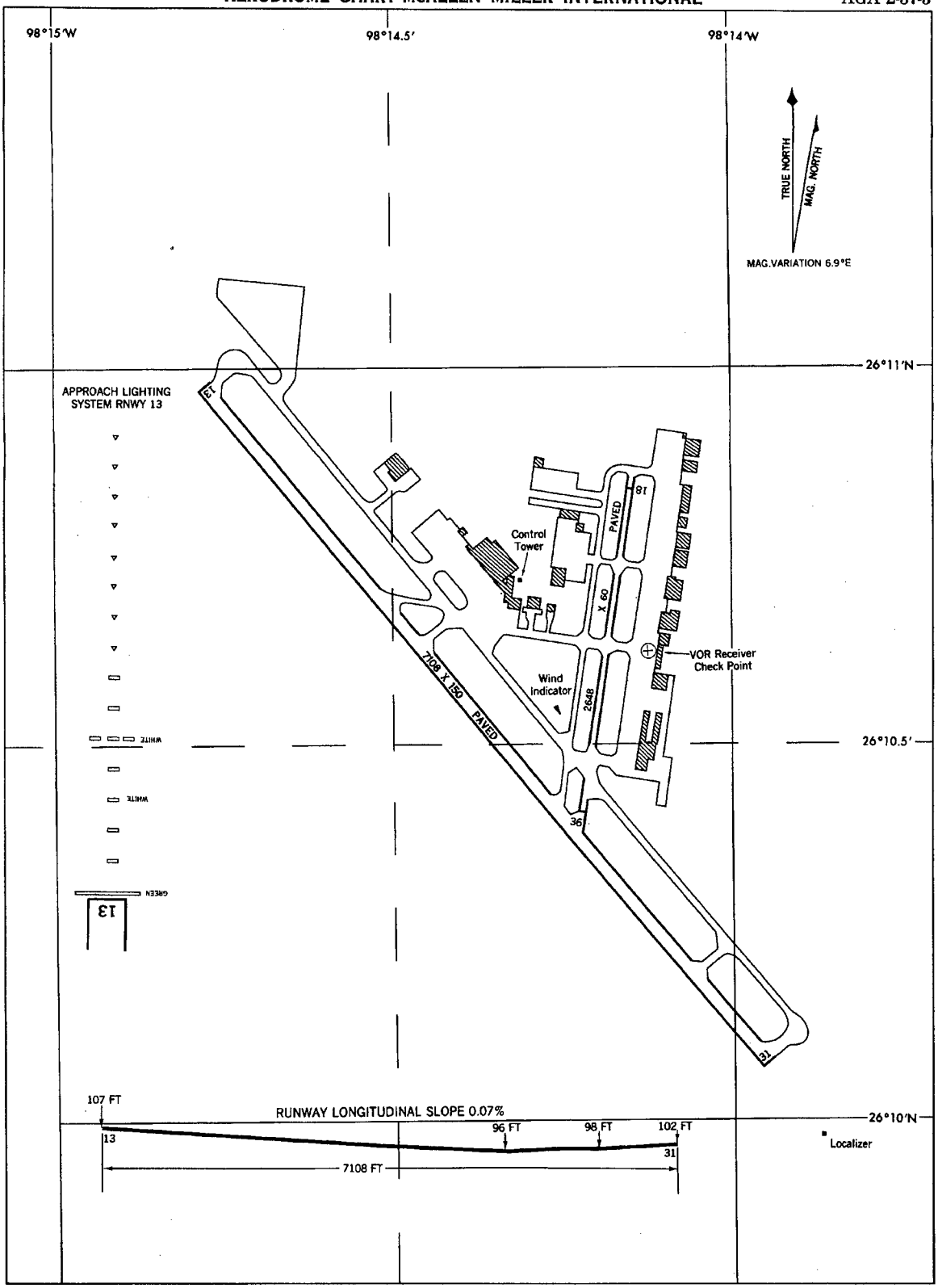
38 MARKING AIDS: CL, sidestripe, THR and numerals.

39 OBSTRUCTION IN APPROACH AND TAKE-OFF AREAS

Runway Identification	13	31	18	36
Controlling Obstruction	Road		Pole	
Obstn Clnc Slope	32:1	50:1	20:1	50:1
Dist from Runway End	650 (198)		1,250 (381)	

Obstruction Remarks: RWY 13 APCH ratio to displaced THR 37:1.

41 DISABLED AIRCRAFT REMOVAL CAPABILITY: Yes, DC-9


98°15'W
98°14.5'
98°14'W
TRUE NORTH
MAG. NORTH
MAG.VARIATION 6.9°E
26°11'N
APPROACH LIGHTING SYSTEM RNWY 13
13
Control Tower
PAVED
18
X 60
VOR Receiver Check Point
Wind Indicator
2648
7108 X 150 PAVED
26°10.5'
WHITE
WHITE
GREEN
13
36
31
107 FT
RUNWAY LONGITUDINAL SLOPE 0.07%
26°10'N
96 FT
98 FT
102 FT
13
31
7108 FT
Localizer

1 CITY, STATE/AERODROME: **PHOENIX, AZ/PHOENIX SKY HARBOR INTERNATIONAL**

2 REFERENCE POINT:
Lat. 33°26'10.0''N, Long. 112°00'34.2''W.

3 DISTANCE AND DIRECTION FROM CITY:
3 NM E.

4 ELEVATION:
1,133 ft. (345 M).

5 AERODROME REFERENCE TEMPERATURE (CENTIGRADE):
40°C. (July).

6 MAGNETIC VARIATION:
13°E.

7 TRANSITION ALTITUDE:

8 OPERATIONAL HOURS:
24 hours.

9 AERODROME OPERATOR OR ADMINISTRATIVE AUTHORITY:
City of Phoenix.

10 POSTAL ADDRESS:
3400 Sky Harbor Blvd.
Phoenix, AZ 85034

11 TELEGRAPHIC ADDRESSES:
AFTN: KPHX

12 TELEPHONE NUMBERS:
602-273-3300

13 OVERNIGHT ACCOMMODATION:
Motel on airport—unlimited in town.

14 RESTAURANT ACCOMMODATION:
Yes.

15 MEDICAL FACILITIES:
Hospital in adjacent area.

16 TRANSPORTATION AVAILABLE:
Busses, taxis, and limousines.

17 CARGO HANDLING FACILITIES:
Adequate for all anticipated requirements.

18 FUEL GRADES:
100, 100LL Jet A.

19 OIL GRADES:
Piston and turbine grades available.

20 OXYGEN AND RELATED SERVICING:
High and low pressure oxygen and replacement bottles.

21 REFUELING FACILITIES AND LIMITATIONS:
None.

22 HANGAR SPACE AVAILABLE FOR TRANSIENT AIRCRAFT:
No.

23 REPAIR FACILITIES AVAILABLE FOR TRANSIENT AIRCRAFT:
Major and minor powerplant and airframe.

24 CRASH EQUIPMENT:
ARFF Index D.

25 SEASONAL AVAILABILITY:
All seasons.

26 LOCAL FLYING RESTRICTIONS AND AERODROME REMARKS:
Right hand tfc Rwys 08R, 26R. Fly base leg at least 5 miles fr ap. Unless advised by ATC, all turbine acft and acft 12,500 lbs (5 670) and over remain at or above 3,000 ft (914) until established on final. Fee for all charters, travel clubs, and certain revenue producing acft. Overnight parking fee.

27 PRE-FLIGHT ALTIMETER CHECK POINT(S):
None.

28 METEOROLOGICAL DATA

Mean daily maximum and minimum temperatures (C°)

Temperature	Jan	Feb	Mar	April	May	June	July	Aug	Sep	Oct	Nov	Dec
Max (A)	18	20	24	29	34	39	40	39	37	30	23	19
Min (B)	2	4	6	10	14	19	24	23	20	13	6	3

Monthly mean pressure in (MB) at approximately the time of maximum (A) and minimum (B) temperatures

(A)												
(B)												

Monthly mean of the relative humidity at approximately the times of maximum (A) and minimum (B) temperatures

(A)	31	27	24	17	14	13	20	26	27	20	30	36
(B)	66	61	58	45	37	36	48	59	60	53	63	69

29 SLOPE (GRADIENT): See diagram.

CONTINUED — **PHOENIX, AZ/PHOENIX SKY HARBOR INTERNATIONAL**

30 PHYSICAL CHARACTERISTICS

Runway			Declared Distances				THR ELEV (ft)	Stopway (m)	Clearway (m)	PCN	Runway Surface	Stopway Surface
Designation	True BRG	Length/Width (m)	TORA (m)	TODA (m)	ASDA (m)	LDA (m)						
a	b	c	d	e	f	g	h	i	k	l	m	n
08L 26R	90°04' 270°04'	3353 x 45	3353 3353	3353 3353	3353 3353	3353 3353	1108 1133	- -	- -	47/F/B/X/U	ASPH-Grooved	- -
08RL 26LR	90°02' 270°02'	3140 x 45	3140 3140	3140 3140	3140 3140	3140 3140	1107 1130	- -	- -	63/F/A/X/U	ASPH-Grooved	- -

Landing Area Remarks: High speed exits Rwys 08R, 26L.

31 MOVEMENT AREAS

APRONS: Concrete.
TAXIWAYS: Concrete and bituminous.
HELICOPTER ALIGHTING AREA: Yes, turf. Not marked.

VISUAL GROUND AREAS

32 TAXIING GUIDANCE SYSTEM:
Blue taxiway lights all taxiways except taxiway 04.

33 VISUAL AIDS TO LOCATION:
Rotating beacon—alternating white and green.

34 INDICATORS AND GROUND SIGNALLING DEVICES:
Lighted cone.

35 LIGHTING AIDS

APPROACH LIGHTS: Rwy 08R—MALSR.
RVV: Rwy 08R.
REIL: Rwys 08L, 26R, 26L.
VASI: Rwys 08L/26R, 26L.
THRESHOLD LIGHTS: Rwys 08R/26L, 08L/26R—green.
RUNWAY LIGHTS: Rwy 08R/26L—high intensity. Rwy 08L/26R—high intensity.

36 EMERGENCY LIGHTING AND SECONDARY POWER SUPPLY:
Yes.

37 OBSTRUCTION MARKING AND LIGHTING:
Red obstruction lights—day and night.

38 MARKING AIDS:
Runway centerline sidestripes and numerals. Threshold, touchdown, taxiway centerline, and taxiway hold markings. Rwy 08R/26L distance remaining markers located north side.

39 OBSTRUCTION IN APPROACH AND TAKE-OFF AREAS

Runway Identification	08R	26L	08L	26R
Controlling Obstruction	Bldg	Ant	Bldg	Pole
Obstn Clnc Slope	50:1	41:1	13:1	26:1
Dist from Runway End	1,100 (335)	17,582 (5 360)	400 (122)	1,290 (393)

Obstruction Remarks: None.

41 DISABLED AIRCRAFT REMOVAL CAPABILITY:
Yes, B-727-200

1 CITY, STATE/AERODROME: **PONCE, PR/MERCEDITA**

2 REFERENCE POINT:
Lat. 18°00'30.1''N, Long. 66°33'46.8''W.

3 DISTANCE AND DIRECTION FROM CITY:
3 NM E.

4 ELEVATION:
29 FT (9 M).

5 AERODROME REFERENCE TEMPERATURE (CENTIGRADE):
32°C. (August).

6 MAGNETIC VARIATION:
10°W.

7 TRANSITION ALTITUDE:

8 OPERATIONAL HOURS:
24 hours.

9 AERODROME OPERATOR OR ADMINISTRATIVE AUTHORITY:
Puerto Rico Port Authority.

10 POSTAL ADDRESS:
Mercedita Airport
Ponce, PR 00715

11 TELEGRAPHIC ADDRESSES:
AFTN: MJPS

12 TELEPHONE NUMBERS:
809-842-6292

13 OVERNIGHT ACCOMMODATION:
Yes.

14 RESTAURANT ACCOMMODATION:
Yes.

15 MEDICAL FACILITIES:
Yes.

16 TRANSPORTATION AVAILABLE:
Yes.

17 CARGO HANDLING FACILITIES:
No.

18 FUEL GRADES:
100, Jet A1.

19 OIL GRADES:
Piston grades available.

20 OXYGEN AND RELATED SERVICING:
No.

21 REFUELING FACILITIES AND LIMITATIONS:
Fee on purchase of aviation fuel in lieu of landing fee aircraft 7,500 LB. (3404) or less.

22 HANGAR SPACE AVAILABLE FOR TRANSIENT AIRCRAFT:
Limited.

23 REPAIR FACILITIES AVAILABLE FOR TRANSIENT AIRCRAFT:
Minor airframe and powerplant.

24 CRASH EQUIPMENT:
ARFF Index B. PPR 24hrs for index C.

25 SEASONAL AVAILABILITY:
All seasons.

26 LOCAL FLYING RESTRICTIONS AND AERODROME REMARKS:
RITE TFC RWY 12. Fee for ACFT over 7,500 LB (3 404) and/or revenue FLTS. Ultralight opns prohibited

27 PRE-FLIGHT ALTIMETER CHECK POINT(S):
None.

28 METEOROLOGICAL DATA

Mean daily maximum and minimum temperatures (C°)

Temperature	Jan	Feb	Mar	April	May	June	July	Aug	Sep	Oct	Nov	Dec
Max (A)	31	31	31	31	31	32	32	32	32	32	32	31
Min (B)	19	19	19	21	22	23	23	23	23	22	21	20

Monthly mean pressure in (MB) at approximately the time of maximum (A) and minimum (B) temperatures

(A)
(B)

Monthly mean of the relative humidity at approximately the times of maximum (A) and minimum (B) temperatures

(A)
(B)

29 SLOPE (GRADIENT): See diagram.

CONTINUED — **PONCE, PR/MERCEDITA**

30 PHYSICAL CHARACTERISTICS

Runway			Declared Distances				THR ELEV (ft)	Stopway (m)	Clearway (m)	PCN	Runway Surface	Stopway Surface
Designation	True BRG	Length/Width (m)	TORA (m)	TODA (m)	ASDA (m)	LDA (m)						
a	b	c	d	e	f	g	h	i	k	l	m	n
12 30	107°55' 287°55'	2104 x 45	2104 2104	2104 2104	2104 2104	1863 2104	29 27	- -	- -	42/F/B/X/T	ASPH-CONC	- -

Landing Area Remarks: RWY 12 thr displaced 789 (241).

31 MOVEMENT AREAS

APRONS: ASPH. TAXIWAYS: ASPH. HELICOPTER ALIGHTING AREA: None.

VISUAL GROUND AREAS

32 TAXIING GUIDANCE SYSTEM: B TWY LGTS.

33 VISUAL AIDS TO LOCATION: ROTATING BCN—ALTN W AND G.

34 INDICATORS AND GROUND SIGNALLING DEVICES: Wind indicator—lgtd; segmented circle.

35 LIGHTING AIDS

APPROACH LIGHTS: None.
RVR: None.
REILS: RWYS 12, 30—unicom.
VASI: RWYS 12, 30—unicom.
THRESHOLD LIGHTS: None.
RUNWAY LIGHTS: W medium INTST operate dusk—2200. Other HR, request on 122.8.

36 EMERGENCY LIGHTING AND SECONDARY POWER SUPPLY: No.

37 OBSTRUCTION MARKING AND LIGHTING: R obstruction LGTS—day and NGT.

38 MARKING AIDS: RWY CL, sidestripes, numerals.

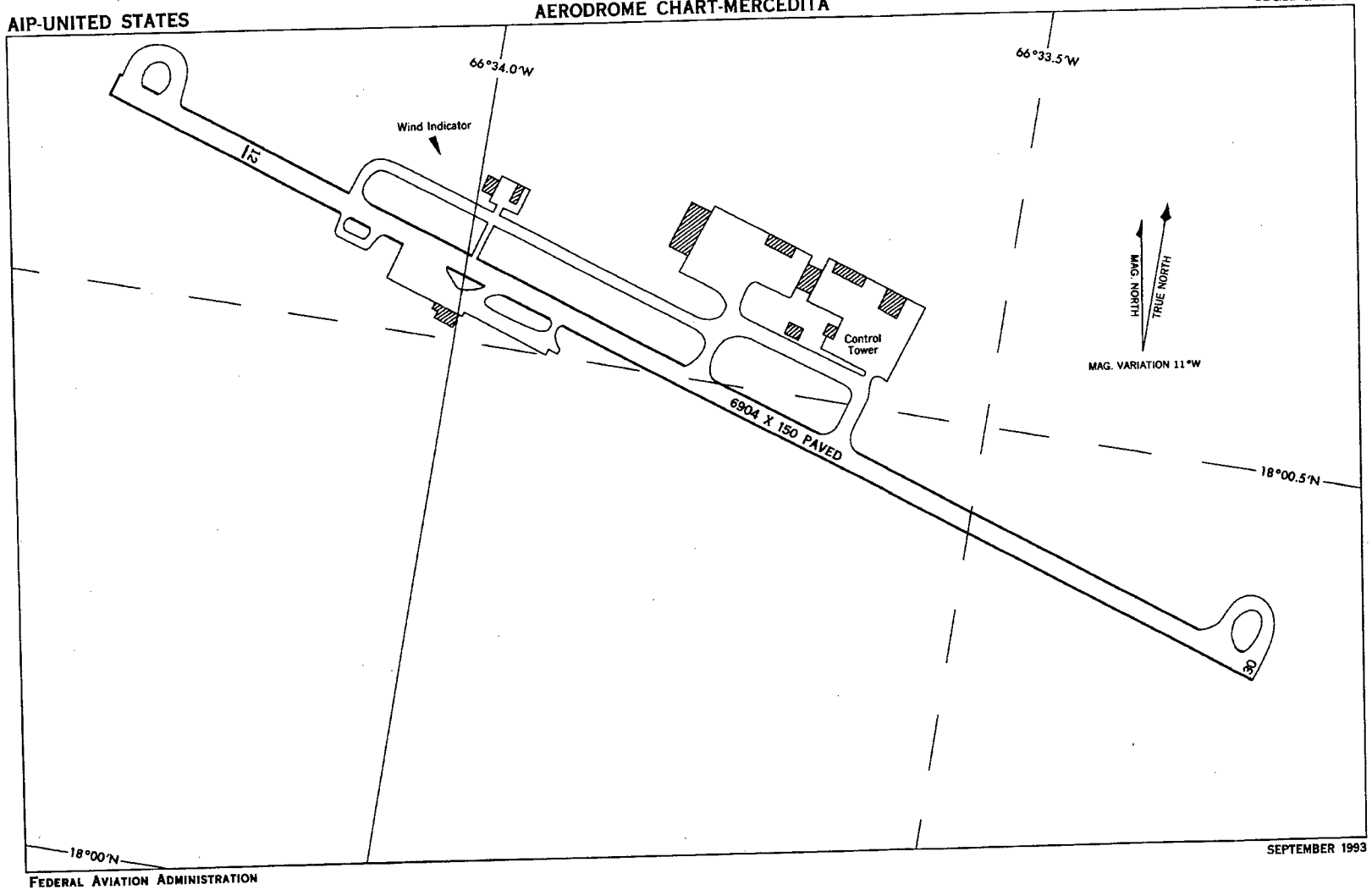
39 OBSTRUCTION IN APPROACH AND TAKE-OFF AREAS

Runway Identification	12	30
Controlling Obstruction	P-line	Pole
Obstn Clnc Slope	13:1	29:1
Dist from Runway End	4,155 (1 266)	1,570 (479)

Obstruction Remarks: Apch ratio to dsplce thr: RWY 12, 18:1.

41 DISABLED AIRCRAFT REMOVAL CAPABILITY: Yes, B-727

AERODROME CHART-MERCEDITA



1 CITY, STATE/AERODROME: **PORTLAND, OR/PORTLAND INTERNATIONAL** [ALTERNATE]

2 REFERENCE POINT:
Lat. 45°35'19.3''N, Long. 122°35'51''W.

3 DISTANCE AND DIRECTION FROM CITY:
4 NM NE.

4 ELEVATION:
27 ft (8 M).

5 AERODROME REFERENCE TEMPERATURE (CENTIGRADE):
25°C. (July).

6 MAGNETIC VARIATION:
19°E.

7 TRANSITION ALTITUDE:

8 OPERATIONAL HOURS:
24 hours.

9 AERODROME OPERATOR OR ADMINISTRATIVE AUTHORITY:
Port of Portland

10 POSTAL ADDRESS:
7000 NE Airport Way
Portland, OR 97218

11 TELEGRAPHIC ADDRESSES:
AFTN: KPDX

12 TELEPHONE NUMBERS:
503-231-5000

13 OVERNIGHT ACCOMMODATION:
Unlimited.

14 RESTAURANT ACCOMMODATION:
Unlimited.

15 MEDICAL FACILITIES:
First-aid room at airport.
Physician on call.
Hospitals in city.

16 TRANSPORTATION AVAILABLE:
Busses, limousines and rental cars.

17 CARGO HANDLING FACILITIES:
Yes.

18 FUEL GRADES:
100, Jet A.

19 OIL GRADES:
Piston and turbine grades available.

20 OXYGEN AND RELATED SERVICING:
High and low pressure oxygen and replacement bottles.

21 REFUELING FACILITIES AND LIMITATIONS:
No.

22 HANGAR SPACE AVAILABLE FOR TRANSIENT AIRCRAFT:
Yes.

23 REPAIR FACILITIES AVAILABLE FOR TRANSIENT AIRCRAFT:
Major airframe and powerplant.

24 CRASH EQUIPMENT:
ARFF Index D.

25 SEASONAL AVAILABILITY:
All seasons.

26 LOCAL FLYING RESTRICTIONS AND AERODROME REMARKS:
Right tfc Rwys 10R and 28R. Clsd to glider acft. Birds in vcy. Noise abatement proc in effect.

27 PRE-FLIGHT ALTIMETER CHECK POINT(S):
None.

28 METEOROLOGICAL DATA

Mean daily maximum and minimum temperatures (C°)

Temperature	Jan	Feb	Mar	April	May	June	July	Aug	Sep	Oct	Nov	Dec
Max (A)	6	9	13	17	20	23	26	26	23	17	11	8
Min (B)	0	1	3	5	8	11	13	13	11	8	4	2

Monthly mean pressure in (MB) at approximately the time of maximum (A) and minimum (B) temperatures

(A)
(B)

Monthly mean of the relative humidity at approximately the times of maximum (A) and minimum (B) temperatures

(A)
(B)

29 SLOPE (GRADIENT): See diagram.

CONTINUED — **PORTLAND, OR/PORTLAND INTERNATIONAL [ALTERNATE]**

30 PHYSICAL CHARACTERISTICS

Runway			Declared Distances				THR ELEV (ft)	Stopway (m)	Clearway (m)	PCN	Runway Surface	Stopway Surface
Designation	True BRG	Length/Width (m)	TORA (m)	TODA (m)	ASDA (m)	LDA (m)						
a	b	c	d	e	f	g	h	i	k	l	m	n
02 20	45°01' 225°01'	2134 x 45	2134 2134	2134 2134	2134 2134	2134 1985	18 23	- -	- -	34/F/A/X/T	ASPH	- -
10L 28R	119°01' 299°01'	2440 x 45	2440 2440	2440 2440	2440 2440	2440 2440	25 25	- -	- -	63/F/A/X/T	ASPH-Grooved	- -
10R 28L	119°00' 299°00'	3353 x 45	3353 3353	3353 3353	3653 3353	3353 3353	19 19	- -	- -	63/F/A/X/T	ASPH-Grooved	- -

Landing Area Remarks: Rwy 20 thr displaced 489 ft (149). 180 deg turns by acft heavier than 12,500 lbs (5 670) prohibited on all rwys and twys. Rwy 28R 19 ft (6) levee aprx parallel to rwy cl extd at 200 ft (61) from thr; dike aprx 480 ft 9146) 480 ft (146) NE fr rwy cl.

31 MOVEMENT AREAS

APRONS: Asphaltic concrete and concrete.
TAXIWAYS: 100 ft (30) width. Asphaltic concrete.
HELICOPTER ALIGHTING AREA: None.

VISUAL GROUND AREAS

32 TAXIING GUIDANCE SYSTEM:
Blue taxiway lights all taxiways.

33 VISUAL AIDS TO LOCATION:
Rotating beacon—alternating white and green.

34 INDICATORS AND GROUND SIGNALLING DEVICES:
Wind indicator—lighted.

35 LIGHTING AIDS

APPROACH LIGHTS: Rwy 28R—ALSF1. Rwy 10L—MALS. Rwy 10R—ALSF2.
RVR: Rwys 28R, 10R, 28L.
RVV: None.
REIL: Rwy 20.
VASI: Rwys 10L, 20, 28L.
THRESHOLD LIGHTS: All thresholds—green.
RUNWAY LIGHTS: Rwys 10R/28L, 10L/28R—white high intensity. Rwy 02/20—white medium intensity. Centerline—Rwy 10R/28L. Touchdown zone—Rwy 10R.

36 EMERGENCY LIGHTING AND SECONDARY POWER SUPPLY:
No.

37 OBSTRUCTION MARKING AND LIGHTING:

38 MARKING AIDS:
Runway centerline, sidestripes, numerals, thresholds, and touchdown markings. Taxiway centerline and taxi-hold.

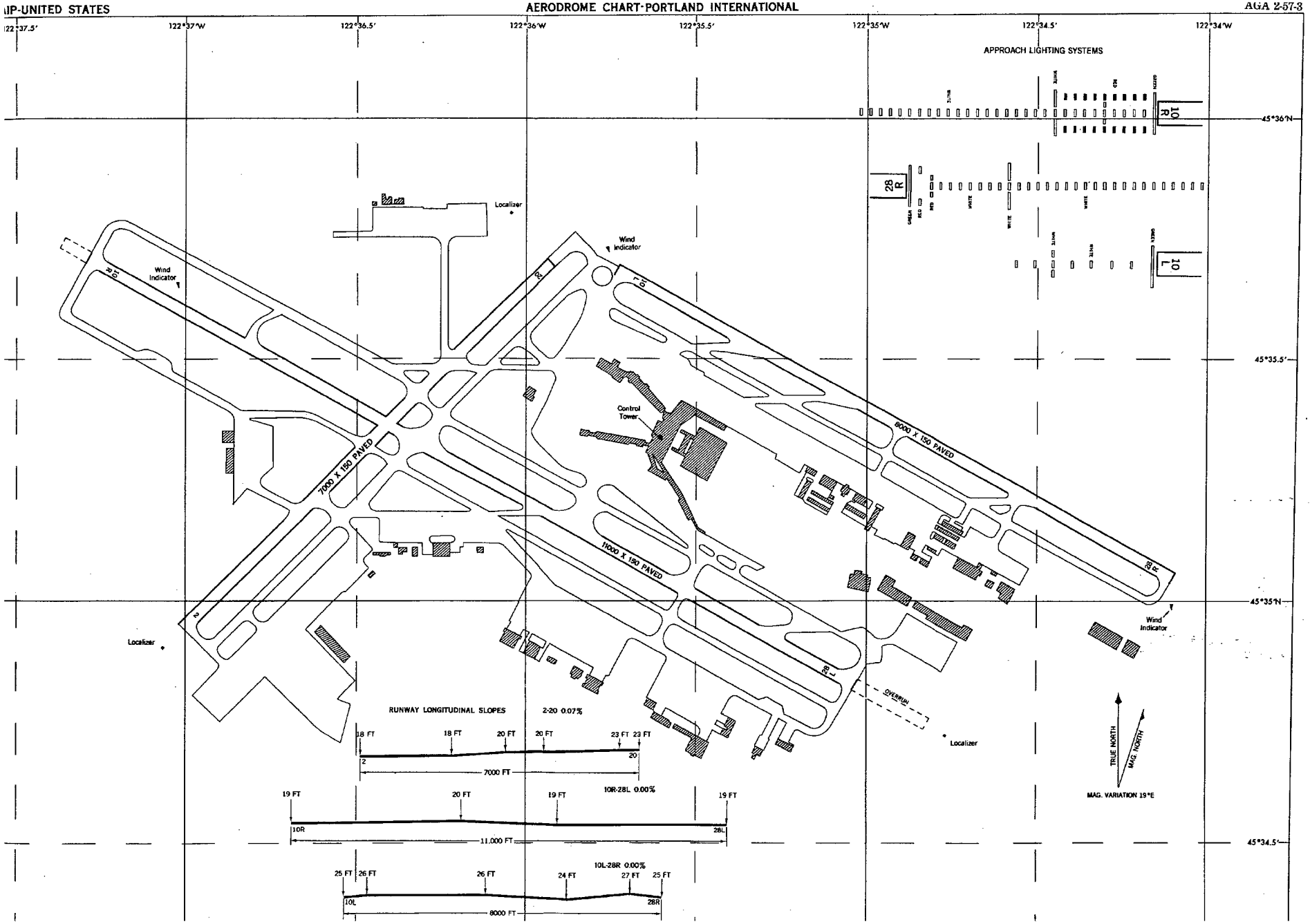
39 OBSTRUCTION IN APPROACH AND TAKE-OFF AREAS

Runway Identification	10R	28L	10L	28R	02	20
Controlling Obstruction				Road	Tree	Road
Obstn Clnc Slope	50:1	50:1	50:1	0:1	20:1	14:1
Dist from Runway End				200 (61)	1700 (487)	475 (145)

Obstruction Remarks: Rwy 20 displaced thr provides 50:1 over road on levee and 24:1 over trees at 8,640 ft (2 603).

41 DISABLED AIRCRAFT REMOVAL CAPABILITY:
No

AERODROME CHART-PORTLAND INTERNATIONAL



4.6.13.2 The following have been designated "Continuous Power Airports," and have independent back up capability for the equipment installed.

Airport/Ident	*Runway No.*
Albuquerque (ABQ)	08
Andrews AFB (ADW)	1L
Atlanta (ATL)	9R
Baltimore (BWI)	10
Bismarck (BIS)	31
Boise (BOI)	10R
Boston (BOS)	4R
Chicago (ORD)	14R
Charlotte (CLT)	36L
Cincinnati (CVG)	36
Cleveland (CLE)	5R
Dallas/Ft Worth (DFW)	17L
Denver (DEN)	35R
Des Moines (DSM)	30R
Detroit (DTW)	3L
El Paso (ELP)	22
Great Falls (GTF)	03
Houston (IAH)	08
Indianapolis (IND)	4L
Jacksonville (JAX)	07
Kansas City (MCI)	19
Los Angeles (LAX)	24R
Memphis (MEM)	35L
Miami (MIA)	9L
Milwaukee (MKE)	01
Minneapolis (MSP)	29L
Nashville (BNA)	2L
Newark (EWR)	4R
New Orleans (MSY)	10
New York (JFK)	4R
New York (LGA)	22
Oklahoma City (OKC)	35R
Omaha (OMA)	14
Ontario, Calif (ONT)	26R
Philadelphia (PHL)	9R
Phoenix (PHX)	08R
Pittsburgh (PIT)	10L
Reno (RNO)	16
Salt Lake City (SLC)	34L
San Antonio (SAT)	12R
San Diego (SAN)	09
San Franciso (SFO)	28R
St Louis (STL)	24
Seattle (SEA)	16R
Tampa (TPA)	36L
Tulsa (TUL)	35R
Washington (DCA)	36
Washington (IAD)	1R
Wichita (ICT)	01

Note. — The existing CPA runway is listed. Pending and future changes at some locations will require a revised runway designation.

4.7 *Simplified Directional Facility (SDF)*

4.7.1 The SDF provides a final approach course similar to that of the ILS localizer. A clear understanding of the ILS localizer and the additional factors listed below completely describe the operational characteristics and use of the SDF.

4.7.2 The SDF transmits signals within the range of 108.10 to 111.95 MHz. It provides no glide slope information.

4.7.3 Approach techniques and procedures used in an SDF instrument approach are essentially those employed in executing a standard no-glide-slope localizer approach except the SDF course may not be aligned with the runway and the course may be wider, resulting in less precision.

4.7.4 Usable off-course indications are limited to 35° either side of the course centerline. Instrument indications received beyond 35 degrees should be disregarded.

4.7.5 The SDF antenna may be offset from the runway centerline. Because of this, the angle of convergence between the final approach course and the runway bearing should be determined by reference to the instrument approach procedure chart. This angle is generally not more than 3°. However, it should be noted that inasmuch as the approach course originates at the antenna site, an approach which is continued beyond the runway threshold will lead the aircraft to the SDF offset position rather than along the runway centerline.

4.7.6 The SDF signal is fixed at either 6 degrees or 12 degrees as necessary to provide maximum "fly ability" and optimum course quality.

4.7.7 Identification consists of a three letter identifier transmitted on the SDF frequency. Example: SAN, ETT, etc. The appropriate instrument approach chart will indicate the identifier used at a particular airport.

4.8 Microwave Landing System (MLS)

4.8.1 *General*

4.8.1.1 The MLS provides precision navigation guidance for exact alignment and descent of aircraft on approach to a runway. It provides azimuth, elevation and distance information. The elevation transmitter is located to the side of the runway near the approach threshold. The Prescision DME, which provides range information, is normally collocated with the azimuth transmitter.

4.8.1.2 Both lateral and vertical guidance may be displayed on conventional course deviation indicators or incorporated into multipurpose cockpit displays. Range information can be displayed by conventional DME indicators and also incorporated into multipurpose displays.

4.8.1.3 The MLS initially supplements and will eventually replace ILS as the standard landing system in the United States for civil, military and international civil aviation. The transition plan assures duplicate ILS and MLS facilities where needed to protect current users of ILS. At international airports ILS service is protected to the year 1995.

4.8.1.4 The system may be divided into five functions:

a. Approach azimuth

b. Back azimuth

c. Approach elevation

d. Range

e. Data communications

4.8.1.5 *The standard configuration*of MLS ground equipment includes:

4.8.1.5.1 An azimuth station to perform functions (a) and (e) above. In addition to providing azimuth navigation guidance, the azimuth station also transmits basic data which consists of information associated directly with the operation of the landing system, as well as advisory data on the performance of the ground equipment.

4.8.1.5.2 An elevation station to perform function (c) above.

4.8.1.5.3 Precision Distance Measuring Equipment (DME/P) to perform function (d). The DME/P provides continuous range information that is compatible with standard navigation DME but has improved accuracy and additional channel capabilities.

4.8.1.6 MLS Expansion Capabilities. The standard configuration can be expanded by adding one or more of the following functions or characteristics.

4.8.1.6.1 Back azimuth — Provides lateral guidance for missed approach and departure navigation.

4.8.1.6.2 Auxiliary data transmissions — Provides additional data, including refined airborne positioning, meteorological information, runway status, and other supplementary information.

4.8.1.6.3 Larger proportional guidance.

4.8.1.7 MLS identification is a four-letter designation starting with the letter M. It is transmitted in International Morse Code at least six times per minute by the approach azimuth (and back azimuth) ground equipment.

4.8.2 *Approach Azimuth Guidance*

4.8.2.1 The azimuth station transmits MLS angle and data on one of the 200 channels within the frequency range of 5031 to 5091 MHz. See Appendix Three for MLS angle and data channeling, and Appendix Four for the DME.

4.8.2.2 The equipment is normally located about 1,000 feet beyond the stop end of the runway, but there is considerable flexibility in selecting sites. For example, for heliport operations the azimuth transmitter can be collocated with the elevation transmitter.

4.8.2.3 The azimuth coverage (see Appendix Five), extends:

a. Laterally, at least 40 degrees on either side of the runway.

b. In elevation, up to an angle of 15 degrees — and to at least 20,000 feet.

c. In range, to at least 20 NM.

4.8.3 *Back Azimuth Guidance (See Appendix Five)*

4.8.3.1 The back azimuth transmitter is essentially the same as the approach azimuth transmitter. However, the equipment transmits at a somewhat lower data rate because the guidance accuracy requirements are not as stringent as for the landing approach. The equipment operates on the same frequency as the approach azimuth but at a different time in the transmission sequence.

4.8.3.2 The equipment is normally located about 1,000 feet in front of the approach end of the runway. On runways that have MLS service on both ends (e.g. Runway 9 and 27), the azimuth equipments can be switched in their operation from the approach azimuth to the back azimuth and vice versa, and thereby reduce the amount of equipment required.

4.8.3.3 The back azimuth provides coverage as follows:

a. Laterally, at least 40 degrees on either side of the runway.

b. In elevation, up to an angle of 15 degrees.

c. In range, to at least 7 NM from the runway stop end.

Note. — The actual coverage is normally the same as for the approach azimuth.

4.8.4 *Elevation Guidance (See Appendix Five)*

4.8.4.1 The elevation station transmits signals on the same frequency as the azimuth station. A single frequency is time-shared between all angle and data functions.

4.8.4.2 The elevation transmitter is normally located about 400 feet from the side of the runway between runway threshold and the touchdown zone.

4.8.4.3 Elevation coverage is provided in the same airspace as the azimuth guidance signals;

a. In elevation, to at least + 15 degrees.

b. Laterally, 40 degrees on either side of the runway centerline.

c. In range, to at least 20 NM.

4.8.5 *Range Guidance*

4.8.5.1 The MLS Precision Distance Measuring Equipment (DME/P) functions the same as the navigation DME, but with some technical differences. The beacon transponder operates in the frequency band 962 to 1105 MHz and responds to an aircraft interrogator. The MLS DME/P accuracy is improved to be consistent with the accuracy provided by the MLS azimuth and elevation stations.

4.8.5.2 A DME/P channel is paired with the azimuth and elevation channel. A complete listing of the 200 paired channels of the DME/P with the angle functions is contained in FAA Standard 022 (MLS Interoperability and Performance Requirements). For illustrative purposes the first page is shown in Appendix Five.

4.8.5.3 The DME/P is an integral part of the MLS and is installed at all MLS facilities unless a waiver is obtained. This occurs infrequently— and only at outlying, low density airports where marker beacons or compass locators are already in place.

4.8.6 *Data Communications*

4.8.6.1 The data transmission can include both basic and auxiliary data words. All MLS facilities transmit basic data. In the future, facilities at some airports, including most high density airports, will also transmit auxiliary data.

4.8.6.2 Coverage limits: MLS data are transmitted throughout the azimuth (and back azimuth when provided) coverage sectors.

4.8.6.3 Basic Data content — Representative data include:

a. Station identification.

b. Exact locations of azimuth, elevation and DME/P stations (for MLS receiver processing functions).

c. Ground equipment performance level.

d. DME/P channel and status.

4.8.6.4 Auxiliary data content — Representative data include:

a. 3-D locations of MLS equipment.

b. Waypoint coordinates.

c. Runway conditions.

d. Weather (e.g. RVR, ceiling, altimeter setting, wind, wake vortex, wind shear).

4.8.6.5 Operational flexibility. The MLS has the capability to fulfill a variety of needs in the transition, approach, landing, missed approach and departure phases of flight. For example: curved and segmented approaches; selectable glide path angles; accurate 3-D positioning of the aircraft in space; and the establishment of boundaries to ensure clearance from obstructions in the terminal area. While many of these capabilities are available to any MLS-equipped aircraft, the more sophisticated capabilities (such as curved and segmented approaches) are dependent upon the particular capabilities of the airborne equipment.

4.8.7 *Summary*

4.8.7.1 Accuracy. The MLS provides precision three-dimensional navigation guidance — accurate enough for all approach and landing maneuvers.

4.8.7.2 Coverage. Accuracy is consistent throughout the coverage volumes shown in Appendix Five.

4.8.7.3 Environment. The system has low susceptibility to interference from weather conditions and airport ground traffic.

4.8.7.4 Channels. MLS has 200 channels — enough for any foreseeable need.

4.8.7.5 Data. The MLS transmits ground-air data messages associated with system operation.

4.8.7.6 Range information. Continuous range information is provided with an accuracy of about 100 feet.

4.9. *Interim Standard Microwave Landing System (ISMLS)*

4.9.1 The ISMLS is designed to provide approach information similar to the ILS for an aircraft on final approach to a runway. The system provides both lateral and vertical guidance which is displayed on a conventional course deviation indicator or approach horizon. Operational performance and coverage areas are also similar to the ILS as defined above.

4.9.2 ISMLS operates in the C-band microwave frequency range (about 5000 MHz) so the signal will not be received by unmodified VHF/UHF ILS receivers. Aircraft utilizing ISMLS must be equipped with a C-band receiving antenna in addition to other special equipment mentioned below. The C-band antenna limits reception of the signal to an angle of about 50° from the inbound course. An aircraft so equipped will not receive the ISMLS signal until flying a magnetic heading within 50° either side of the inbound course. Because of this ISMLS procedures are designed to restrict the use of the ISMLS signal until the aircraft is in position for the final approach. Transition to the ISMLS, holding and procedure turns at the ISMLS facility must be predicated on other navigation aids such as NDB, VOR, etc. Once established on the approach course inbound, the system can be flown the same as an ILS. No back course is provided.

4.9.3 The Interim Standard Microwave Landing System consists of the following basic components:

C-Band (5000 MHz — 5030 MHz) localizer.
C-Band (5220 MHz — 5250 MHz) glide path.
VHF marker beacons (75 MHz).
A VHF/UHF ILS receiver modified to receive the ISMLS signals.
C-Band antenna.
Converter unit.
A Microwave/ILS Mode Control.

4.9.4 Identification consists of a three letter Morse Code identifier preceded by the Morse Code for "M" (—). Example: "M — STP" The "M" will distinguish this system from ILS which is preceded by the letter "I" (..).

4.9.5 Approaches published in conjunction with the ISMLS are identified as "MLS Rwy — (Interim)." The frequency displayed on the ISMLS approach chart is a VHF frequency. ISMLS frequencies are tuned by setting the receiver to the listed VHF frequencies. When the ISMLS mode is selected, receivers modified to accept ISMLS signals is a paired C-Band frequency that is processed by the receiver.

CAUTION: Pilots should not attempt to fly ISMLS procedures unless the aircraft is so equipped.

4.10 *Precision Approach Radar (PAR)*

4.10.1 Precision approach radar is designed to be used as a landing aid, rather than an aid for sequencing and spacing aircraft. PAR equipment may be used as a primary landing aid, or it may be used to monitor other types of approaches. It is designed to display*range, azimuth*and*elevation*information.

4.10.2 Two antennas are used in the PAR array, one scanning a vertical plane, and the other scanning horizontally. Since the range is limited to 10 miles, azimuth to 20 degrees, and elevation to 7 degrees, only the final approach area is covered. Each scope is divided into two parts. The upper half presents altitude and distance information, and the lower half presents azimuth and distance.

4.11 Loran

4.11.1 LORAN-A service has been terminated in the U.S. coastal confluence region.

4.11.2 LORAN-C was developed to provide the Department of Defense with a radio navigation capability having longer range and much greater accuracy than its predecessor, LORAN-A. LORAN-C was subsequently selected by the U.S. Government as the radio navigation system for civil marine use in the U.S. coastal areas. Later, it was adopted as a supplemental means of navigation for civil aviation.

4.11.3 Operation

LORAN-C is a pulsed, hyperbolic system, operating in the 90-110 kHz frequency band. The system is based upon measurement of the difference in time of arrival of pulses of radio-frequency energy radiated by a group, or chain of transmitters which are separated by hundreds of miles. Within a chain, one station is designated as the Master station (M), and the other stations are designated as Secondary stations, Whiskey (W), X-ray (X), Yankee (Y), and Zulu (Z). Signals transmitted from the Secondary stations are synchronized with those from the Master station. The measurement of a time-difference (TD) is made by a receiver that achieves accuracy by comparing a zero crossing of a specified radio- frequency cycle within the pulses received from the Master and Secondary stations of a chain. Only groundwave signals are used for air navigation in the National Airspace System. Within the groundwave range, LORAN-C will provide the user, who uses an adequate receiver, with predict-

able accuracy of 0.25 nautical miles (2 drms) or better. All accuracy is dependent on the user's location within the signal coverage area of the chain of stations.

4.11.4 Signal coverage

The LORAN-C system provides signal coverage throughout the conterminous 48 states and much of Alaska. The so called "Mid-Continent Gap" was closed officially during May 1991.

4.11.5 Aviation uses

Note: The use of LORAN-C for navigation in the National Airspace System (NAS) has increased considerably in recent years. In 1990, LORAN-C installations in aircraft were estimated to be in excess of 100,000. Most of these installations are for VFR use only. Approximately 10 percent of the aircraft LORAN-C installations are approved for IFR use during en route and terminal operations. However, none of the installations are approved (as of August 1991) for use during non-precision instrument approach operations. Several manufacturers of LORAN-C airborne equipment currently are seeking FAA certification of receiver models to be used for non-precision instrument approach operations. Once approved, the approach model can also be used for en route and terminal use. Since LORAN-C receivers will be installed in aircraft with either of two types of IFR approval; (1) en route and terminal or (2) en route, terminal, and approach, or with a basic VFR capability only, pilots must be aware of the authorized operational approval level of the receiver installed in their aircraft. Approval information is contained in the Aircraft Flight Manual Supplement, on FAA Form 337 or in aircraft maintenance records, or possibly by a placard installed near or on the control panel. Pilots must familiarize themselves with the above referenced documents to verify the approval level of the LORAN-C receiver they are operating so the requirements of FAR 91.9 are met. All LORAN-C systems (both the receiver and its installation) installed in aircraft and used in the NAS must have FAA approval that is traceable through aircraft records.

4.11.6 Planned expansion

As part of the FAA's continued development of a national aviation LORAN-C system, 196 signal monitors were installed in VOR stations across the country to monitor the system. The monitors will provide data as the source of correction values published with approach charts to ensure the accuracy of LORAN-C during non-precision approaches. The correction values will adjust for seasonal errors that degrade LORAN-C accuracy. By the end of 1992, the Automatic Blink System should be operational. Currently manually activated, signal Blink provides a warning to LORAN-C receivers that a LORAN-C signal is out of tolerance. On November 15, 1990, 10 public use LORAN-C approaches were approved for use. Additional approaches will be approved as soon as resources permit. The FAA has a list of 500 proposed LORAN-C approaches it is considering. The list was compiled when each state provided the FAA the names of the top 10 priority sites within each state.

4.11.7 Notices to Airman (NOTAMs) are issued for LORAN-C chain or station outages. Domestic NOTAM (D)'s are issued under the identifier "LRN." International NOTAMs are issued under the KNMH series. Pilots may obtain these NOTAMs from Flight Service Station briefers upon request.

4.11.8 LORAN-C status information

Prerecorded telephone answering service messages pertaining to LORAN-C are available as follows:

RATE	CHAIN	TELEPHONE
5930	Canadian East Coast	709-454-3261*
7980	Southeast U.S.	904-569-5241
8970	Great Lakes	607-869-5395
9960	Northeast U.S.	607-869-5395

*St. Anthony, Newfoundland, Canada

Information can also be obtained directly from the office of the Coordinator of Chain Operations (COCO) for each chain. The following telephone numbers are for each COCO office:

RATE	CHAIN	TELEPHONE	LOCATION
4990	Central Pacific	808-247-5591	Kaneohe, HI
5930	Canadian East Coast	709-454-2392	St. Anthony, NF
5990	Canadian West Coast	604-666-0472	Vancouver, BC
7930	North Atlantic	011-44-1-409-4758	London, UK
7960	Gulf of Alaska	907-487-5583	Kodiak, AK
7970	Norwegian Sea	011-44-1-409-4758	London, UK
7980	Southeast U.S.	205-899-5225	Malone, FL
7990	Mediterranean Sea	011-44-1-409-4758	London, UK
8290	North Central U.S.	707-987-2911	Middletown, CA
8970	Great Lakes	607-869-5393	Seneca, NY

RATE	CHAIN	TELEPHONE	LOCATION
9610	South Central U.S.	205-899-5225	Malone, FL
9940	West Coast U.S.	707-987-2911	Middletown, CA
9960	Northeast U.S.	607-869-5393	Seneca, NY
9970	Northwest Pacific	415-437-3224	San Francisco, CA
9990	North Pacific	907-487-5583	Kodiak, AK

4.12 OMEGA and OMEGA/VLF Navigation Systems

4.12.1 *Omega*

4.12.1.1 Omega is a network of eight transmitting stations located throughout the world to provide worldwide signal coverage. These stations transmit in the Very Low Frequency (VLF) band. Because of the low frequency, the signals are receivable to ranges of thousands of miles. The stations are located in Norway, Liberia, Hawaii (USA), North Dakota (USA), La Reunion, Argentina, Australia, and Japan.

4.12.1.2 Presently each station transmits on four basic navigational frequencies: 10.2 kHz, 11.05 kHz, 11.3 kHz, and 13.6 kHz, in sequenced format. This time sequenced format prevents inter-station signal interference. The pattern is arranged so that during each transmission interval only three stations are radiating, each at a different frequency. With eight stations and a silent .2-second interval between each transmission, the entire cycle repeats every 10 seconds.

4.12.1.3 In addition to the four basic navigational frequencies, each station transmits a unique navigation frequency. An Omega station is said to be operating in full format when the station transmits on the basic frequencies plus the unique frequency. Unique frequencies are presently assigned as follows:

Station A Norway	12.1 kHz
Station B Liberia	12.0 kHz
Station C Hawaii	11.8 kHz
Station D North Dakota	13.1 kHz
Station E La Reunion	12.3 kHz
Station F Argentina	12.9 kHz
Station G Australia	13.0 kHz
Station H Japan	12.8 kHz

4.12.1.4 Interruptions in service of Omega navigation facilities are advertised by NOTAM (Class I).

4.12.2 *Omega/VLF*

4.12.2.1 The U.S. Navy operates a communications system in the VLF band. The stations are located worldwide and transmit at powers of 500-1000 kW. Some airborne Omega receivers have the capability to receive and process these VLF signals for navigation in addition to Omega signals. The VLF stations generally used for navigation are located in Australia, Japan, England, Hawaii and on the U.S. mainland in Maine, Washington state, and Maryland.

4.12.2.2 Although the Navy does not object to the use of VLF communications signals for navigation, the system is not dedicated to navigation. Signal format, transmission, and other parameters of the VLF system are subject to change at the Navy's discretion. The VLF communications stations are individually shut down for scheduled maintenance for a few hours each week. Regular NOTAM service regarding the VLF system or station status is not available. However, the Naval Observatory provides a taped message concerning phase differences, phase values, and shutdown information for both the VLF communications network and the Omega system (phone 202-653-1757).

4.12.3 *Operational Use of Omega and Omega/VLF*

4.12.3.1 The Omega navigation network is capable of providing consistent fixing information to an accuracy of +/-2 NM depending upon the level of sophistication of the receiver/processing system. Omega signals are affected by propagation variables which may degrade fix accuracy. These variables include daily variation of phase velocity, polar cap absorption, and sudden solar activity. Daily compensation for variation within the receiver/processor, or occasional excessive solar activity and its effect on Omega cannot be completely forecast or anticipated. If an unusual amount of solar activity disturbs the Omega signal enlargement paths to any extent, the U.S. Coast Guard advises the FAA and an appropriate NOTAM is sent.

4.12.3.2 At 16 minutes past each hour, WWV (Fort Collins, Colorado) broadcasts a message concerning the status of each Omega station, signal irregularities, and other information concerning Omega. At 47 minutes past each hour, WWVH (Hawaii) broadcasts similar information. The U.S. Coast Guard provides a taped Omega status report (phone 703-313-5906). NOTAMs concerning Omega are available through any Flight Service Station. Omega NOTAMs should be requested by Omega station name.

4.12.3.3 The FAA has recognized Omega and Omega/VLF systems as an additional, but not the sole, means of en route IFR navigation in the conterminous United States and Alaska when approved in accordance with FAA guidance information. Use of Omega or Omega/VLF requires that all navigation equipment otherwise required by the Federal Aviation Regulations be installed and operating. When flying RNAV routes, VOR and DME equipment is required.

4.12.3.4 The FAA recognizes the use of the Naval VLF communications system as a supplement to Omega, but not the sole means of navigation.

4.13 Inertial Navigation System (INS)

4.13.1 The Inertial Navigation System is a totally self-contained navigation system, comprised of gyros, accelerometers, and a navigation computer, which provides aircraft position and navigation information in response to signals resulting from inertial effects on system components, and does not require information from external references. INS is aligned with accurate position information prior to departure, and thereafter calculates its position as it progresses to the destination. By programming a series of waypoints, the system will navigate along a predetermined track. New waypoints can be inserted at any time if a revised routing is desired. INS accuracy is very high initially following alignment, and decays with time at the rate of about 1-

2 nautical miles per hour. Position update alignment can be accomplished inflight using ground based references, and many INS systems now have sophisticated automatic update using dual DME and or VOR inputs. INS may be approved as the sole means of navigation or may be used in combination with other systems.

4.14 Doppler Radar

4.14.1 Doppler Radar is a semiautomatic self-contained dead reckoning navigation system (radar sensor plus computer) which is not continuously dependent on information derived from ground based or external aids. The system employs radar signals to detect and measure ground speed and drift angle, using the aircraft compass system as its directional reference. Doppler is less accurate than INS or OMEGA however, and the use of an external reference is required for periodic updates if acceptable position accuracy is to be achieved on long range flights.

4.15 Flight Management System (FMS)

4.15.1 The Flight Management System is a computer system that uses a large data base to allow routes to be preprogrammed and fed into the system by means of a data loader. The system is constantly updated with respect to position accuracy by reference to conventional navigation aids. The sophisticated program and its associated data base insures that the most appropriate aids are automatically selected during the information update cycle.

4.16 Global Positioning System (GPS)

4.16.1 The Global Positioning System is a space-base radio positioning, navigation, and time-transfer system being developed by Department of Defense. When fully deployed, the system is intended to provide highly accurate position and velocity information, and precise time, on a continuous global basis, to an unlimited number of properly equipped users. The system will be unaffected by weather, and will provide a worldwide common grid reference system. The GPS concept is predicated upon accurate and continuous knowledge of the spatial position of each satellite in the system with respect to time and distance from a transmitting satellite to the user. The GPS receiver automatically selects appropriate signals from the satellites in view and translates these into a three-dimensional position, velocity, and time. Predictable system accuracy for civil users is projected to be 100 meters horizontally. Performance standards and certification criteria have not yet been established.

5. NAVAID IDENTIFIER REMOVAL DURING MAINTENANCE

5.1 During periods of routine or emergency maintenance, coded identification (or code and voice, where applicable) is removed from certain FAA navaids. Removal of the identification serves as warning to pilots that the facility is officially off the air for tune-up or repair and may be unreliable even though intermittent or constant signals are received.

Note.—During periods of maintenance VHF ranges may radiate a T-E-S-T code (- . ... -).

6. USER REPORTS ON NAVAID PERFORMANCE

6.1 Users of the National Airspace System can render valuable assistance in the early correction of navaid malfunctions by reporting their observation of undesirable performance. Although NAVAID's are monitored by electronic detectors adverse effects of electronic interference, new obstructions or changes in terrain near the NAVAID can exist without detection by the ground monitors. Some of the characteristics of malfunction or deteriorating performance which should be reported are: Erratic course or bearing indications; intermittent, or full, flag alarm; garbled, missing or obviously improper coded identification; poor quality communications reception; or, in the case of frequency interference, an audible hum or tone accompanying radio communications or navaid identification.

6.2 Reporters should identify the NAVAID, location of the aircraft, time of the observation, type of aircraft and describe the condition observed; the type of receivers in use will also be useful information. Reports can be made in any of the following ways:

6.2.1 Immediately, by radio communication to the controlling Air Route Traffic Control Center, Control Tower, or Flight Service Station. This provides the quickest result.

6.2.2 By telephone to the nearest FAA facility.

6.2.3 By FAA Form 8000-7, Safety Improvement Report, a postage-paid card designed for this purpose. These cards may be obtained at FAA Flight Service Stations, General Aviation District Offices, Flight Standards District Offices, and General Aviation Fixed Base Operations.

6.3 In aircraft that have more than one receiver, there are many combinations of possible interference between units. This can cause either erroneous navigation indications or, complete or partial blanking out of the communications. Pilots should be familiar enough with the radio installation of particular airplanes they fly to recognize this type of interference.

7. RADIO COMMUNICATIONS PHRASEOLOGY AND TECHNIQUES

7.1 General

7.1.1 Radio communications are a critical link in the ATC system. The link can be a strong bond between pilot and controller — or it can be broken with surprising speed and disastrous results. Discussion herein provides basic procedures for new pilots and also highlights safe operating concepts for all pilots.

7.1.2 The single, most important thought in pilot-controller communications is understanding. It is essential, therefore, that pilots acknowledge each radio communication with ATC by using the appropriate aircraft call sign. Brevity is important, and contacts should be kept as brief as possible, but the controller must know what you want to do before he can properly carry out his control duties. And you, the pilot, must know exactly what he wants you to do. Since concise phraseology may not always be adequate, use whatever words are necessary to get your message across. Pilots are to maintain vigilance in monitoring air traffic control radio communications frequencies for potential traffic conflicts with their aircraft especially when operating on an active runway and/or when conducting a final approach to landing.

7.1.3 All pilots will find the Pilot/Controller Glossary very helpful in learning what certain words or phrases mean. Good phraseology enhances safety and is the mark of a professional pilot. Jargon, chatter and "CB" slang have no place in ATC communications. The Pilot/Controller Glossary is the same glossary used in the ATC controller's handbook. We recommend

that it be studied and reviewed from time to time to sharpen your communication skills.

7.2 Radio Technique

7.2.1 *Listen* before you transmit. Many times you can get the information you want through ATIS or by monitoring the frequency. Except for a few situations where some frequency overlap occurs, if you hear someone else talking, the keying of your transmitter will be futile and you will probably jam their receivers causing them to repeat their call. If you have just changed frequency, pause for your receiver to tune, listen and make sure the frequency is clear.

7.2.2 *Think* before keying your transmitter. Know what you want to say and if it is lengthy, e.g., a flight plan or IFR position report, jot it down. (But do not lock your head in the cockpit.)

7.2.3 The microphone should be very close to your lips and after pressing the mike button, a slight pause may be necessary to be sure the first word is transmitted. Speak in a normal conversational tone.

7.2.4 When you release the button, wait a few seconds before calling again. The controller or FSS specialist may be jotting down your number, looking for your flight plan, transmitting on a different frequency, or selecting his transmitter to your frequency.

7.2.5 Be alert to the sounds or lack of sounds in your receiver. Check your volume, recheck your frequency and make sure that your microphone is not stuck in the transmit position. Frequency blockage can, and has, occurred for extended periods of time due to unintentional transmitter operation. This type of interference is commonly referred to as a "stuck mike," and controllers may refer to it in this manner when attempting to assign an alternate frequency. If the assigned frequency is completely blocked by this type of interference, use the procedures described in RAC-3, En Route IFR, Radio Frequency Outage, to establish/reestablish communications with ATC.

7.2.6 Be sure that you are within the performance range of your radio equipment and the ground station equipment. Remote radio sites do not always transmit and receive on all of a facilities available frequencies, particularly with regard to VOR sites where you can hear but not reach a ground station's receiver. Remember that higher altitude increases the range of VHF "line of sight" communications.

7.3 Use of Aircraft Call Signs.

7.3.1 Improper use of call signs can result in pilots executing a clearance intended for another aircraft. *Call signs should never be abbreviated on an initial contact or at any time when other aircraft call signs have similar numbers/sounds or identical letters/numbers,* (e.g., Cessna 6132F, Cessna 1622F, Baron 123F, Cherokee 7732F, etc.). As an example, assume that a controller issues an approach clearance to an aircraft at the bottom of a holding stack and an aircraft with a similar call sign (at the top of the stack) acknowledges the clearance with the last two or three numbers of his call sign. If the aircraft at the bottom of the stack did not hear the clearance and intervene, flight safety would be affected, and there would be no reason for either the controller or pilot to suspect that anything is wrong. This kind of "human factors" error can strike swiftly and is extremely difficult to rectify. Pilots, therefore, must be certain that aircraft identification is complete and clearly identified before taking action on an ATC clearance. ATC specialists will not abbreviate call signs of air carrier or other civil aircraft having authorized call signs. ATC specialists may initiate abbreviated call signs of other aircraft by using the prefix and the last three digits/letters of the aircraft identification after communications are established. The pilot may use the abbreviated call sign in subsequent contacts with the ATC specialist. When aware of similar/identical call signs, ATC specialists will take action to minimize errors by emphasizing certain numbers/letters, by repeating the entire call sign, repeating the prefix, or by asking pilots to use a different call sign temporarily. Pilots should use the phrase "Verify clearance for (your complete call sign)" if doubt exists concerning proper identity.

7.3.2 **Civil aircraft** pilots should state the aircraft type, model or manufacturer's name followed by the digits/letters of the registration number. When the aircraft manufacturer's name or model is stated, the prefix "N" is dropped.

Examples:

"BONANZA SIX FIVE FIVE GOLF," "DOUGLAS ONE ONE ZERO," "BREEZY SIX ONE THREE ROMEO EXPERIMENTAL" (Omit "Experimental" after initial contact).

7.3.3 **Air Taxi** or other commercial operators not having FAA authorized call signs should prefix their normal identification with the phonetic word "Tango." For example, Tango Aztec Two Four Six Four Alpha.

7.3.4 **Air carriers and commuter air carriers** having FAA authorized call signs should identify themselves by stating the complete call sign, using group form for the numbers.

Examples:

UNITED TWENTY-FIVE, MIDWEST COMMUTER SEVEN ELEVEN.

7.3.5 **Military** aircraft use a variety of systems including serial numbers, word call signs and combinations of letter/numbers. Examples include Army Copter 48931, Air Force 61782, REACH 31792, Pat 157, Air Evac 17652, Navy Golf Alpha Kilo 21, Marine 4 Charlie 36, etc.

7.3.6 **Air Ambulance Flights.** Because of the priority afforded air ambulance flights in the ATC system, extreme discretion is necessary when using the term "LIFEGUARD." It is only intended for those missions of an urgent medical nature and to be utilized only for that portion of the flight requiring expeditious handling. When requested by the pilot, necessary notification to expedite ground handling of patients, etc., is provided by ATC; however, when possible, this information should be passed in advance through non-ATC communications systems.

7.3.6.1 Civilian air ambulance flights responding to medical emergencies (first call to an accident scene, carrying patients, organ donors, organs, or other urgently needed lifesaving medical material) will be expedited by ATC when necessary. When expeditious handling is necessary, add the word "LIFEGUARD" in the remarks section of the flight plan. In radio communications, use the call sign "LIFEGUARD" followed by the aircraft registration letters/numbers.

7.3.6.2. Similar provisions have been made for the use of "Air-Evac" and "Med-Evac" by military air ambulance flights, except that these military flights will receive priority only when specifically requested.

Example:

LIFEGUARD TWO SIX FOUR SIX.

7.3.6.3. Air carrier and air taxi flights responding to medical emergencies will also be expedited by ATC when necessary. The nature of these medical emergency flights usually concerns the transportation of urgently needed lifesaving medical materials or vital organs. IT IS IMPERATIVE THAT THE COMPANY/PILOT DETERMINE, BY THE NATURE/URGENCY OF THE SPECIFIC MEDICAL CARGO, IF PRIORITY ATC ASSISTANCE IS REQUIRED. Pilots shall ensure that the word "LIFEGUARD" is included in the remarks section of the flight plan and use the call sign "LIFEGUARD" followed by the company name and flight number, for all transmissions when expeditious handling is required. It is important for ATC to be aware of "LIFEGUARD" status, and it is the pilot's responsibility to ensure that this information is provided to ATC.

Example:

LIFEGUARD DELTA THIRTY-SEVEN.

7.3.7 Student Pilots Radio Identification. The FAA desires to help the student pilot in acquiring sufficient practical experience in the environment in which he will be required to operate. To receive additional assistance while operating in areas of concentrated air traffic, a student pilot need only identify himself as a student pilot during his initial call to an FAA radio facility. For instance, "Dayton Tower, this is Fleetwing 1234, Student Pilot." This special identification will alert FAA air traffic control personnel and enable them to provide the student pilot with such extra assistance and consideration as he may need. This procedure is not mandatory.

7.4 Description of Interchange or Leased Aircraft

7.4.1 Controllers issue traffic information based on familiarity with airline equipment and color/markings. When an air carrier dispatches a flight using another company's equipment and the pilot does not advise the terminal ATC facility, the possible confusion in aircraft identification can compromise safety.

7.4.2 Pilot flying an "interchange" or "leased" aircraft not bearing the colors/markings of the company operating the aircraft should inform the terminal ATC facility on first contact the name of the operating company and trip number, followed by the company name as displayed on the aircraft, and aircraft type.

Example:

Air Cal 311, United (Interchange/Lease), Boeing 727.

7.5 Use of Ground Station Call Signs

Pilots, when calling a ground station, should begin with the name of the facility being called followed by the type of the facility being called, as indicated in the following examples.

Examples are self-explanatory:

Airport Unicom	"Shannon Unicom"
FAA Flight Service Station	"Shannon Radio"
FAA Flight Service Station (En Route Flight Advisory Service (Weather).	"Seattle Flight Watch"
Airport Traffic Control Tower	"Augusta Tower"
Clearance Delivery Position (IFR).	"Dallas Clearance Delivery"
Ground Control Position in Tower.	"Miami Ground"
Radar or Nonradar Approach Control Position.	"Oklahoma City Approach"
Radar Departure Control Position.	"St. Louis Departure"
FAA Air Route Traffic Control Center.	"Washington Center"

7.6 Radio Communications Phraseology

7.6.1 Phonetic Alphabet

The International Civil Aviation Organization (ICAO) phonetic alphabet is used by FAA personnel when communications conditions are such that the information cannot be readily received without their use. Air traffic control facilities may also request pilots to use phonetic letter equivalents when aircraft with similar sounding identifications are receiving communications on the same frequency. Pilots should use the phonetic alphabet when identifying their aircraft during initial contact with air traffic control facilities. Additionally use the phonetic equivalents for single letters and to spell out groups of letters or difficult words during adverse communications conditions.

CHARACTER	MORSE CODE	TELEPHONY	PHONIC (PRONUNCIATION)
A	.-	Alfa	(AL-FAH)
B	-...	Bravo	(BRAH-VOH)
C	-.-.	Charlie	(CHAR-LEE) or (SHAR-LEE)
D	-..	Delta	(DELL-TAH)
E	.	Echo	(ECK-OH)
F	..-.	Foxtrot	(FOKS-TROT)
G	--.	Golf	(GOLF)
H	....	Hotel	(HOH-TEL)
I	..	India	IN-DEE-AH)
J	.---	Juliett	(JEW-LEE-ETT)
K	-.-	Kilo	(KEY-LOH)
L	.-..	Lima	(LEE-MAH)
M	--	Mike	(MIKE)
N	-.	November	(NO-VEM-BER)
O	---	Oscar	(OSS-CAH)
P	.--.	Papa	(PAH-PAH)
Q	--.-	Quebec	(KEH-BECK)

CHAR-ACTER	MORSE CODE	TELEPHONY	PHONIC (PRONUNCIATION)
R	.-.	Romeo	(ROW-ME-OH)
S	...	Sierra	(SEE-AIR-RAH)
T	-	Tango	(TANG-GO)
U	..-	Uniform	(YOU-NEE-FORM) or (OO-NEE-FORM)
V	...-	Victor	(VIK-TAH)
W	.--	Whiskey	(WISS-KEY)
X	-..-	Xray	(ECKS-RAY)
Y	-.--	Yankee	(YANG-KEY)
Z	--..	Zulu	(ZOO-LOO)
1	.----	One	(WUN)
2	..---	Two	(TOO)
3	...--	Three	(TREE)
4	....-	Four	(FOW-ER)
5	.....	Five	(FIFE)
6	-....	Six	(SIX)
7	--...	Seven	(SEV-EN)
8	---..	Eight	(AIT)
9	----.	Nine	(NIN-ER)
0	-----	Zero	(ZEE-RO)

7.6.2 *Figures*

7.6.2.1 Figures indicating hundred and thousands in round number, as for ceiling heights, and upper wind levels up to 9900 shall be spoken in accordance with the following:

Examples:

500 ..... FIVE HUNDRED
54,500 ..... FOUR THOUSAND FIVE HUNDRED

7.6.2.2 Numbers above 9900 shall be spoken by separating the digits preceding the word "thousand."

Examples:

10,000 ..... ONE ZERO THOUSAND
13,500 ..... ONE THREE THOUSAND FIVE HUNDRED

7.6.2.3 Transmit airway or jet route numbers as follows:

Examples:

V12 ..... VICTOR TWELVE
J533 ..... J FIVE THIRTY THREE

7.6.2.4 All other numbers shall be transmitted by pronouncing each digit.

Example:

10 ..... ONE ZERO

7.6.2.5 When a radio frequency contains a decimal point, the decimal point is spoken as "Point."

Examples:

122.1 ..... ONE TWO TWO POINT ONE
(ICAO Procedures require the decimal point be spoken as "DECIMAL" The FAA will honor such usage by military aircraft and all other aircraft required to use ICAO Procedures.)

7.6.3 Altitudes and Flight Levels

7.6.3.1 Up to but not including 18,000' MSL — by stating the separate digits of the thousands, plus the hundreds.

Examples:

12,000 ..... ONE TWO THOUSAND
12,500 ..... ONE TWO THOUSAND FIVE HUNDRED

7.6.3.2 At and above 18,000' MSL (FL 180) by stating the words "flight level" followed by the separated digits of the flight level.

Example:

190 ..... FLIGHT LEVEL ONE NINER ZERO

7.6.4 Directions

The three digits of a magnetic course, bearing, heading or wind direction, should always be magnetic. The word "true" must be added when it applies.

Examples:

(magnetic course) 005 ..... ZERO ZERO FIVE
(true course) 050 ..... ZERO FIVE ZERO TRUE
(magnetic bearing) 360 ..... THREE SIX ZERO
(magnetic heading) 100 ..... ONE ZERO ZERO
(wind direction) 220 ..... TWO TWO ZERO

7.6.5 Speeds

The separate digits of the speed are to be followed by the word 'knots' except that controllers may omit the word "knots" when using speed adjustment procedures (e.g., "Reduce/Increase Speed To Two Five Zero").

Examples:

250 ..... TWO FIVE ZERO KNOTS
190 ..... ONE NINER ZERO KNOTS

The separate digits of the mach number are to be preceded by the word "MACH."

Examples:

1.5 ..... MACH ONE POINT FIVE
.64 ..... MACH POINT SIX FOUR
.7 ..... MACH POINT SEVEN

7.6.6 Time

7.6.6.1 FAA uses Coordinated Universal Time (UTC) for all operations. The term "Zulu" is used when ATC procedures require a reference to UTC.

Example:

0920.....ZERO NINER TWO ZERO ZULU

To Convert From:	To Coordinated Universal Time:
Eastern Standard Time	Add 5 hours*
Central Standard Time	Add 6 hours*
Mountain Standard Time	Add 7 hours*
Pacific Standard Time	Add 8 hours*
Alaska Standard Time	Add 9 hours*
Hawaii Standard Time	Add 10 hours*

*For Daylight Time subtract 1 hour.

7.6.6.2 The 24-hour clock system is used in radiotelephone transmissions. The hour is indicated by the first two figures and the minutes by the last two figures.

Examples:

0000.....ZERO ZERO ZERO ZERO
0920.....ZERO NINER TWO ZERO

7.6.6.3 Time may be stated in minutes only (two figures) in radio telephone communications when no misunderstanding is likely to occur.

7.6.6.4 Current time in use at a station is stated in the nearest quarter minute in order that pilots may use this information for time checks. Fractions of a quarter minute or more, but less than eight seconds more, are stated as the preceding quarter minute; fractions of a quarter minute of eight seconds or more are stated as the succeeding quarter minute.

Examples: Time

0929:05.....TIME, ZERO NINER TWO NINER
0929:10.....TIME, ZERO NINER TWO NINER AND ONE-QUARTER

7.7 Procedures for Ground Station Contact

7.7.1 Initial Contact.

7.7.1.1 The term "initial contact" or initial call up" means the first radio call you make to a given facility, or the first call to a different controller/FSS specialist within a facility. Use the following format: (a) name of facility being called, (b) your full aircraft identification as filed in the flight plan or as discussed under aircraft call signs, (c) type of message to follow or your request if it is short, and (d) the word "Over", if required.

Examples:

"NEW YORK RADIO, MOONEY THREE ONE ONE ECHO." "COLUMBIA GROUND CONTROL, CESSNA THREE ONE SIX ZERO FOXTROT, IFR MEMPHIS."

Example:

"MIAMI CENTER BARON FIVE SIX THREE HOTEL, REQUEST VFR TRAFFIC ADVISORIES."

7.7.1.2 Many FSSs are equipped with ROCs and can transmit on the same frequency at more than one location. The frequencies available at specific locations are indicated on charts above FSS communications boxes. To enable the specialist to utilize the correct transmitter, advise the location and frequency on which you expect a reply.

Example:

St. Louis FSS can transmit on frequency 122.3 at either Farmington, MO, or Decatur, IL. If you are in the vicinity of Decatur, your callup should be "SAINT LOUIS RADIO, PIPER SIX NINER SIX YANKEE, RECEIVING DECATUR ONE TWO TWO POINT THREE."

7.7.1.3 If radio reception is reasonably assured, inclusion of your request, your position or altitude, the phrase "Have numbers" or "Information Charlie received" (for ATIS) in the initial contact helps decrease radio frequency congestion. Use discretion and do not overload the controller with information he does not need. When you do not get a response from the ground station, recheck your radios or use another transmitter and keep the next contact short.

Example:

"ATLANTA CENTER, DUKE FOUR ONE ROMEO, REQUEST VFR TRAFFIC ADVISORIES, TWENTY NORTHWEST ROME, SEVEN THOUSAND FIVE HUNDRED, OVER."

7.7.2 Initial contact when your transmitting and receiving frequencies are different.

7.7.2.1 If you are attempting to establish contact with a ground station and you are receiving on a different frequency than that transmitted, indicate the VOR name or the frequency on which you expect a reply. Most FSSs and control facilities can transmit on several VOR stations in the area. Use the appropriate FSS call sign as indicated on charts.

Example:

New York FSS transmits on the Kennedy, Deer Park and Calverton VORTACs. If you are in the Calverton area, your callup should be "New York Radio, Cessna Three One Six Zero Foxtrot, Receiving Riverhead VOR, Over."

7.7.2.2 If the chart indicates FSS frequencies above the VORTAC or in FSS communications boxes, transmit or receive on those frequencies nearest your location.

7.7.2.3 When unable to establish contact and you wish to call any ground station, use the phrase "any radio (tower) (station), give Cessna Three One Six Zero Foxtrot a call on (frequency) or (VOR)." If an emergency exists or you need assistance, so state.

7.7.3 Subsequent Contacts and Responses to Call up from a Ground Facility. Use the same format as used for initial contact except you should state your message or request with the call up in one transmission. The ground station name and the word "Over" may be omitted if the message requires an obvious reply and there is no possibility for misunderstandings. You should acknowledge all callups or clearances unless the controller of FSS specialist advises otherwise. There are some occasions when the controller must issue time-critical instructions to other aircraft and he may be in a position to observe your response, either visually or on radar. If the situation demands your response, take appropriate action or immediately advise the facility of any problem. Acknowledge with your aircraft identification and one of the words "Wilco, Roger, Affirmative, Negative" or other appropriate remarks; e.g., "Piper Two One Four Lima, Roger." If you have been receiving services, e.g., VFR traffic advisories and you are leaving the area or changing frequencies, advise the ATC facility and terminate contact.

7.7.4 Acknowledgement of Frequency Changes.

7.7.4.1 When advised by ATC to change frequencies, acknowledge the instruction. If you select the new frequency without an ackowledgement, the controller's workload is increased because he has no way of knowing whether you received the instruction or have had radio communications failure.

7.7.4.2 At times, a controller/specialist may be working a sector with multiple frequency assignments. In order to eliminate unnecessary verbiage and to free the controller/specialist for higher priority transmissions, the controller/specialist may request the pilot "(Identification), change to my frequency 123.4." This phrase should alert the pilot that he is only changing frequencies, not controller/specialist, and that initial call up phraseology may be abbreviated.

EXAMPLE:

"United 222 on 123.4."

7.7.5 Compliance with Frequency Changes. When instructed by ATC to change frequencies, select the new frequency as soon as possible unless instructed to make the change at a specific time, fix, or altitude. A delay in making the change could result in an untimely receipt of important information. If you are instructed to make the frequency change at a specific time, fix, or altitude, monitor the frequency you are on until reaching the specified time, fix, or altitudes unless instructed otherwise by ATC.

8. COMMUNICATIONS FOR VFR FLIGHTS

8.1 FAA Flight Service Stations (FSSs) and Supplemental Weather Service Locations (SWSLs) are allocated frequencies for different functions; for example, 122.0 MHz is assigned as the En Route Flight Advisory Service frequency at selected FSSs. In addition, certain FSSs provide Local Airport Advisory on 123.6 MHz. Frequencies are listed in the Airport/Facility Directory. If you are in doubt as to what frequency to use, 122.2 MHz is assigned to the majority of FSSs as a common en route simplex frequency.

Note.—In order to expedite communications, state the frequency being used and the aircraft location during initial call-up.

Example:

"DAYTON RADIO, THIS IS N12345 ON 122.2 MHz OVER SPRINGFIELD VOR, OVER."

8.1.1 Certain VOR voice channels are being utilized for recorded broadcasts, i.e., ATIS, HIWAS, etc. These services and appropriate frequencies are listed in the Airport/Facility Directory. On VFR flights, pilots are urged to monitor these frequencies. When in contact with a control facility, notify the controller if you plan to leave the frequency to monitor these broadcasts.

8.2 Hazardous Area Reporting Service

8.2.1 Selected Flight Service Stations provide flight monitoring where regularly traveled VFR routes cross large bodies of water, swamps, and mountains, for the purpose of expeditiously alerting Search and Rescue facilities when required.

8.2.1.1 When requesting the service either in person, by telephone or by radio, pilots should ask for the service desired and be prepared to give the following information — type of aircraft, altitude, indicated airspeed, present position, route of flight, heading.

8.2.1.2 Radio contacts are desired at least every 10 minutes. If contact is lost for more than 15 minutes, Search and Rescue will be alerted. Pilots are responsible for cancelling their request for service when they are outside the service area boundary. Pilots experiencing two-way radio failure are expected to land as soon as practicable and cancel their request for the service. The illustration in Appendix Two includes the areas and the FSS facilities involved in this program.

8.2.2 Long Island Sound Reporting Service (LIRS)

The New York and Bridgeport AFSSs provide Long Island Sound Reporting service on request for aircraft traversing Long Island Sound.

8.2.2.1 When requesting the service pilots should ask for SOUND REPORTING SERVICE and should be prepared to provide the following appropriate information: (1) Type and color of aircraft, (2) The specific route and altitude across the sound including the shore crossing point, (3) The overwater crossing time, (4) Number of persons on board, (5) True air speed.

8.2.2.2 Radio contacts are desired at least every 10 minutes, however, for flights of shorter duration a midsound report is requested. If contact is lost for more than 15 minutes, Search and Rescue will be alerted. Pilots are responsible for cancelling their request for the Long Island Sound Reporting Service when outside the service area boundary. Aircraft as soon as practicable and cancel their request for the service.

8.2.2.3 COMMUNICATIONS: Primary communications — pilot transmits 122.1 MHz and listens on the VOR frequency.

NEW YORK AFSS
- Hampton RCO.....T122.6/R122.6 MHz
- Calverton VORTAC.....T117.2 MHz
- Kennedy VORTAC.....T115.9/R122.1 MHz

BRIDGEPORT AFSS
- Madison VORTAC.....T110.4/R122.1 MHz
- Groton VOR.....T111.8/R122.1 MHz
- Bridgeport VOR.....T108.8/R122.1 MHz

8.2.3 Block Island Reporting Service (BIRS)

Within the Long Island Reporting Service, the New York FSS/IFSS also provides an additional service for aircraft operating between Montauk Point and Block Island. When requesting this service, pilots should ask for BLOCK ISLAND REPORTING SERVICE and should be prepared to provide the same flight information as that required for the Long Island Sound Reporting Service.

8.2.3.1 A minimum of three position reports are mandatory for this service. These are:

1. Report leaving Montauk Point or Block Island.
2. Midway report.
3. Report when over Montauk Point or Block Island at which time the pilot cancels the overwater service.

8.2.3.2 COMMUNICATIONS: Pilots are to transmit and receive on 122.6 MHz.

8.2.3.3 Pilots are advised that 122.6 MHz is a remote receiver located at the Hampton VORTAC site and designed to provide radio coverage between Hampton and Block Island. Flights proceeding beyond Block Island may contact the Bridgeport AFSS by transmitting on 122.1 MHz and listing on Groton VOR (TMU) frequency 111.8 MHz.

8.2.4 Cape Cod and Islands Radar Overwater Flight Following

In addition to normal VFR radar advisory service, traffic permitting, Otis Approach Control provides a radar overwater flight

following service for aircraft traversing the Cape Code and adjacent Island area. Pilots desiring this service may contact Cape RAPCON on 118.2 MHz

8.2.4.1 Pilots requesting this service should be prepared to give the following information: (1) type and color of aircraft, (2) altitude, (3) position and heading, (4) route of flight, and (5) true airspeed.

8.2.4.2 For best radar coverage pilots are encouraged to fly at 1,500 feet MSL or above.

8.2.4.3 Pilots are responsible for cancelling their request for overwater flight following when they are over the mainland and/or outside the service area boundary.

9. OVER-WATER FLIGHTS RADIO PROCEDURE

9.1 Pilots should remember that there is a need to continuously guard the VHF emergency frequency 121.5 MHz when on long over-water flights, except when communications on other VHF channels, equipment limitations, or cockpit duties prevent simultaneous guarding of two channels. Guarding of 121.5 MHz is particularly critical when operating in proximity to flight information region (FIR) boundaries, for example, operations on Route R220 between Anchorage and Tokyo, since it serves to facilitate communications with regard to aircraft which may experience in-flight emergencies, communications, or navigational difficulities. (Reference ICAO Annex 10, Vol II Paras 5.2.2.1.1.1 and 5.2.2.1.1.2.)

U.S. AERONAUTICAL TELECOMMUNICATIONS SERVICES

(Services Available for Aircraft Engaged in International or Overseas Flight)

The aeronautical voice communication stations listed are available to and utilized by the U.S. Federal Aviation Administration Air Traffic Control Centers for air traffic control purposes.

The frequencies in use will depend upon the time of day or night and conditions which affect radio wave propagation. Voice communications handled on a single channel simplex basis (i.e., with the aircraft and the ground station using the same frequency for transmission and reception) unless otherwise noted in remarks.

The stations will remain on continuous watch for aircraft within their communications areas and, when practicable will transfer this watch to another station when the aircraft reaches the limit of the communications area.

Stations listed below which are designated "FAA" are operated by the U.S. Federal Aviation Administration. Stations designated "ARINC" are operated by Aeronautical Radio, Incorporated, 2551 Riva Road, Annapolis, Md. 21401, telephone number 410-266-4000; cable address ARINC Annapolis, Md. or HDQXGXA

STATION AND OPERATING AGENCY	RADIO CALL	TRANSMITTING FREQUENCIES	REMARKS
HONOLULU (ARINC)	Honolulu	2998 4666 6532 8903 11384 13300 17904 21985 kHz	Central West Pacific Network
		3467 5643 8867 13261 17904 kHz	South Pacific Network
		3413 5574 8843 13354 17904 kHz	Central East Pacific One Network
		5547 11282 13288 17904 kHz	Central East Pacific Two Network
		2932 5628 6655 8915 8951 10048 11330 13273 17946 21925 kHz	North Pacific Network
		6640 11342 13348 17925 21964 kHz	Long-Distance Operations Control (LDOC) Service (phone patch). Communications are limited to operational control matters only. Public correspondence (personal messages) to/from crew or passengers can not be accepted.
		131.95 mHz	Extended range VHF. Coverage area includes tracks to mainland extending outward from HNL to approximately 400 NM. Range on other tracks is approximately 300 NM.
HONOLULU (FAA)	Honolulu Radio	122.6 122.2 #121.5 mHz	#Emergency. Frequency 122.1 also available for receiving only.
	Volmet	2863 6679 8828 13282 kHz	Broadcast at H+200-05 and H+230-35; Aerodrome Forecasts, HONOLULU, HILO, GUAM. SIGMET. Hourly Report, Honolulu, Hilo, Kahului, Guam.
			Broadcasts at H+05-10 and H+35-40; Hourly Reports, San Francisco, Los Angeles, Seattle, Portland, Sacramento, Ontario, Las Vegas. SIGEMT. Aerodrome forecasts, SAN FRANCISCO, SEATTLE, LOS ANGELES.
			Broadcasts at H+25-30 and H+55-00; Hourly Reports, Anchorage, Elmendorf, Fairbanks, Cold Bay, King Salmon, Vancouver. SIGMET. Aerodrome Forecasts, ANCHORAGE, FAIRBANKS, COLD BAY, VANCOUVER.
MIAMI (FAA)	Miami Radio	126.7 118.9 126.9 122.2 123.65 122.75 mHz	Local and Short Range.
		#121.5 mHz	#Emergency.
NEW YORK (FAA)	New York Radio (Volmet)	3485 6604 10051 13270 kHz	Broadcasts at H+00-05; Aerodrome Forecasts, DETROIT, CHICAGO, CLEVELAND. Hourly Reports, Detroit, Chicago, Cleveland, Niagara Falls, Milwaukee, Indianapolis.

STATION AND OPERATING AGENCY	RADIO CALL	TRANSMITTING FREQUENCIES	REMARKS
			Broadcasts at H+05-10; SIGMET (Oceanic—New York). Aerodrome Forecasts, BANGOR, PITTSBURGH, CHARLOTTE. Hourly Reports, Bangor, Pittsburgh, Windsor Locks, St. Louis, Charlotte, Minneapolis.
			Broadcasts at H+10-15; Aerodrome Forecasts, NEW YORK, NEWARK, BOSTON. Hourly reports, New York, Newark, Boston, Baltimore, Philadelphia, Washington.
			Broadcasts at H+15-20; SIGMET (Oceanic—Miami/San Juan). Aerodrome Forecasts, BERMUDA, MIAMI, ATLANTA. Hourly Reports, Bermuda, Miami, Nassau, Freeport, Tampa, West Palm Beach, Atlanta.
			Broadcasts at H+30-35; Aerodrome Forecasts, NIAGARA FALLS, MILWAUKEE, INDIANAPOLIS. Hourly Reports, Detroit, Chicago, Cleveland, Niagara Falls, Milwaukee, Indianapolis.
			Broadcasts at H+35-40; SIGMET (Oceanic—New York). Aerodrome Forecasts, WINDSOR LOCKS, ST. LOUIS. Hourly Reports, Bangor, Pittsburgh, Windsor Locks, St. Louis, Charlotte, Minneapolis.
			Broadcasts at H+40-45; Aerodrome Forecasts, BALTIMORE, PHILADELPHIA, WASHINGTON. Hourly Reports, New York, Newark, Boston, Baltimore, Philadelphia, Washington.
			Broadcasts at H+45-50; SIGMET (Oceanic—Miami/San Juan). Aerodrome Forecasts, NASSAU, FREEPORT. Hourly Reports, Bermuda, Miami, Nassau, Freeport, Tampa, West Palm Beach, Atlanta.
NEW YORK (ARINC)	New York	3016 5598 8906 13306 17946 kHz	North Atlantic Family A Network
		2962 6628 8825 11309 13354 17946 kHz	North Atlantic Family E Network
		2887 5550 6577 8918 11396 13297 17907 kHz	Caribbean Family A Network
		3455 5520 6586 8846 11330 17907 kHz	Caribbean Family B Network
		3494 6640 11342 13330 17925 21964 kHz	Long Distance Operations Control (LDOC) Service (phone-patch). Communications are limited to operational control matters only. Public coorespondence (personal messages) to/from crew or passengers can not be accepted.
		129.90 mHz	Extended range VHF. Coverage area includes Canadian Maritime Provinces, and oceanic routes to Bermuda and the Caribbean, from Boston, New York and Washington areas to approximately 250 nautical miles from the east coast.
		130.7 mHz	Extended range VHF. Full period service is provided within most of the Gulf of Mexico. Also on routes between Miami and San Juan to a distance of approximately 250 nautical miles from the Florida coast and within approximately 250 nautical miles of San Juan. Dial-up station are provided when within approximately 250 nautical miles of Nassau and Grand Turk Islands. To operate these, click mike (3) three times and wait one minute for station to dial a New York operator.
SAN FRANCISCO (ARINC)	San Francisco	3413 5574 8843 10057 13354 17904 kHz	Central East Pacific One Network
		2869 5547 6673 11282 13288 17904 kHz	Central East Pacific Two Network

STATION AND OPERATING AGENCY	RADIO CALL	TRANSMITTING FREQUENCIES	REMARKS
		3013 6640 11342 13348 17925 21964 kHz	Long-Distance Operations Control (LDOC) Service (phone patch). Communications are limited to operational control matters only. Public correspondence (personal messages) to/from crew or passengers can not be accepted.
		131.95 mHz	Extended range VHF. Coverage area includes tracks to HNL from SFO and LAX out to approximately 300 nautical miles from west coast.
		129.40 mHz	For en route communications for aircraft operating on Seattle/Anchorage/Routes/.
OAKLAND (FAA)	Oakland Radio	122.5 122.2 121.5 mHz	Emergency. Frequency 122.1 also available for receiving only.
SAN JUAN P.R. (FAA)	San Juan Radio	#121.5 122.2 126.7 123.65 #243.0 255.4 114.0 113.5 108.2 108.6 109.0 110.6 mHz	Unscheduled broadcast H+15 H+30 H+45 as appropriate, for Weather and Military Activity Advisories, on 110.6, 109.0, 108.6, 108.2, 113.5, and 114.0. #Emergency. For frequencies 114.0, 113.5, 108.2, and 109.0 use 122.1 for transmissions to San Juan Radio. For frequency 108.6 use 123.6.

All users of the North Atlantic HF MWARA services should consult International NOTAMS and ICAO Regional Supplementary Procedures, Document 7030, for current procedures concerning the operational use of the North Atlantic HF families. At present, procedures for the distribution of HF communications traffic in the North Atlantic are: (a) All aircraft registered in the hemisphere west of 30W should use family alpha on the southern route and family bravo on the central and northern routes. (Southern routes are those which enter the New York, San Juan and Santa Maria FIRs. The central and northern routes comprise all others.) (b) All aircraft registered in the hemisphere east of 30W should use family alpha on the southern route and family charlie on the central and northern routes. (c) All aircraft should use family alpha on the southern route and family delta on the central and northern routes while outside the organized track system (OTS). (d) Aircraft registered in Australia will use families designated to aircraft registered east of 30W. Aircraft operating in the Anchorage Arctic CTA/FIR beyond line of sigh range of remote control VHF air/ground facilities operated from the Anchorage ACC, shall maintain communications with Cambridge Bay radio and a listening or SELCAL watch on HF frequencies of the North Atlantic D (NAT D) network (2971 kHz, 4675 kHz, 8891 kHz and 11279 kHz). Additionally, and in view of reported marginal reception of the Honolulu Pacific VOLMET broadcasts in that and adjacent Canadian airspace, Cambridge Bay radio can provide Anchorage and Fairbanks surface observations and terminal forecasts to flight crews on request.

SELECTIVE CALLING SYSTEM (SELCAL) FACILITIES AVAILABLE

Selective Calling (SELCAL) is a communication system which permits the selective calling of individual aircraft over radio-telephone channels from the ground station to properly equipped aircraft, so as to eliminate the need for the flight crew to constantly monitor the frequency in use.

Location	Operator	HF	VHF
Honolulu	ARINC	X	X
New York	ARINC	X	X
San Francisco	ARINC	X	X

RULES OF THE AIR AND AIR TRAFFIC SERVICES (RAC)

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AIR TRAFFIC SERVICE—INTRODUCTION

1. INTRODUCTION

1.1 Responsible Authority

1.1.1 The authority responsible for the overall administration of air traffic services provided for civil aviation in the U.S. and its territories, possessions and international airspace under its jurisdiction is the Associate Adstministrator for Air Traffic, acting under the authority of the Federal Aviation Administration.

Postal Address:
Director
Air Traffic Operations Service
Federal Aviation Administration 800 Independence Ave., SW
Washington, D.C. 20591
Telephone: 202-267-9155
Telex: 892-562
Commercial Telegraphic Address:
FAA WSH
AFTN Address:
KDCAYAYX

1.2 Area of Responsibility

1.2.1 Air traffic services as indicated in the following paragraphs are provided for the entire territory of the Conterminous U.S., Alaska, Hawaii, Puerto Rico and the U.S. Virgin Islands, and the Panama Canal Zone, as well as the International airspace in oceanic areas under the jurisdiction of the U.S. which lies within the ICAO Caribbean (CAR), North Atlantic (NAT), North American (NAM) and Pacific (PAC) regions.

1.3 Air Traffic Services

1.3.1 With the exception of terminal control services at certain civil aerodromes and military aerodromes, air traffic service in the U.S. is provided by the Air Traffic Operations Service, Federal Aviation Administration.

1.3.2 Air Traffic control is exercised within the area of responsibility of the U.S.:

(a) On all airways;

(b) In Class B, C, D and E Airspace;

(c) Within the Class A Airspace whose vertical extent is from 18,000 feet to and including FL 600 throughout most of the conterminous U.S. and, in Alaska, from 18,000 feet to and including FL 600 but not including the airspace less than 1,500 feet above the surface of the earth and the Alaskan Peninsula west of longitude 160° 00'' West (a complete description of Class A Airspace is contained in FAR Part 71).

1.3.3 Air Traffic Control and Alerting Services are provided by various ATC units and are described in RAC 3.

1.3.4 Radar service is an integral part of the ATS system. A description of Radar services and procedures is provided in RAC 1.

1.3.5 The description of airspace designated for air traffic services is found in RAC 3.

1.3.6 Procedural data and descriptions are found in RAC 4.

1.3.7 Numerous restricted and prohibited areas are established within U.S. territory. These areas, none of which interfere with normal air traffic, are given in RAC 5. Activation of areas subject to intermittent activity is notified in advance by NOTAM, giving reference to the area by its identification.

1.3.8 In general, the air traffic rules and procedures in force and the organization of the air traffic services are in conformity with ICAO Standards, Recommended Practices and Procedures. Differences between the national and international rules and procedures are given in RAC 1 and 2—the regional supplementary procedures and altimeter setting procedures being reproduced in full with an indication wherein there is a difference.

1.3.9 Coordination between the operator and air traffic services is effected in accordance with 2.11 of Annex II, and 2.1.1.4 and 2.1.2.5 of Part VIII of the PANS-RAC (DOC 4444-RAC/501).

1.3.10 Minimum Flight Altitudes on the ATS routes as listed in RAC 3 have been determined so as to ensure at least 1,000 feet vertical clearance above the highest obstacle within 4 NM on each side of centerline of the route. However, where the regular divergence (4.5 degrees) of the navigational aid signal in combination with the distance between the navigational aids could result in the aircraft being more than 4 NM on either side of the centerline, the 4 NM protection limit is increased by the extent to which the divergence is more than 4 NM from the centerline.

1.3.11 PILOT Visits to Air Traffic Facilities. Pilots are encouraged to visit air traffic facilities (Towers, Centers, and Flight Service Stations) and familiarize themselves with the ATC system. On rare occasions, facilities may not be able to approve a visit because of workload or other reasons. It is, therefore, requested that pilots contact the facility prior to the visit and advise of the number of persons in the group, the time and date of the proposed visit, and the primary interest of the group. With this information available, the facility can prepare an itinerary and have someone available to guide the group through the facility.

1.3.12 Operation Take-off and Operation Raincheck. Operation Take-off is a program that educates pilots in how best to utilize the FSS modernization efforts and services available in Automated Flight Service Stations (AFSS), as stated in FAA Order 7230.17. Operation Raincheck is a program designed to familiarize pilots with the ATC system, its functions, responsibilities and benefits.

RULES OF THE AIR AND RADAR SERVICES PROCEDURES

1. DIFFERENCES BETWEEN NATIONAL AND INTERNATIONAL RULES AND PROCEDURES

1.1 The air traffic rules and procedures applicable to air traffic in U.S. Class A, B, C, D and E airspace conform with Annexes 2 and 11 to the Convention on International Civil Aviation and to those portions, applicable to aircraft in the Procedures for Air Navigation Services — Rules of the Air and Air Traffic Services (Doc 4444 — RAC/501/10) and to the Regional Supplementary Procedures (DOC 7030) applicable to the NAM,NAT, CAR and PAC Regions, except as noted in the cases below. All differences have been registered with the International Civil Aviation Organization.

1.1.1 *Annex 3 — Rules of the Air*

See AIP section DIF.

1.1.2 *Annex 11 — Air Traffic Services*

See AIP section DIF.

1.1.3 *Procedures for Air Navigation Services — Rules of the Air (DOC 4444) and Air Traffic Services (RAC/501/10)*

See AIP section DIF.

1.1.4 *Regional Supplementary Procedures (Doc 7030)*

See AIP section DIF.

2. RADAR SERVICES AND PROCEDURES

2.1 General

2.1.1 Radar Capabilities

2.1.1.1 Radar is a method whereby radio waves are transmitted into the air and are then received when they have been reflected by an object in the path of the beam. Range is determined by measuring the time it takes (at the speed of light) for the radio wave to go out to the object and then return to the receiving antenna. The direction of a detected object from a radar site is determined by the position of the rotating antenna when the reflected portion of the radio wave is received.

2.1.1.2 More reliable maintenance and improved equipment have reduced radar system failures to a negligible factor. Most facilities actually have some components duplicated — one operating and another which immediately takes over when a malfunction occurs to the primary component.

2.1.2 Radar Limitations

It is very important for the aviation community to recognize the fact that there are limitations to radar service and that ATC controllers may not always be able to issue traffic advisories concerning aircraft which are not under ATC control and cannot be seen on radar.

2.1.2.1 The characteristics of radio waves are such that they normally travel in a continuous straight line unless they are:

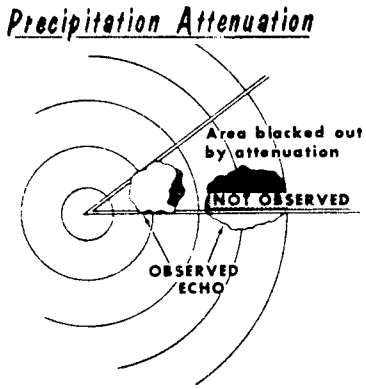
(a) "Bent" by abnormal atmospheric phenomena such as temperature inversions;

(b) Reflected or attenuated by dense objects such as heavy clouds, precipitation, ground obstacles, mountains, etc.; or

(c) Screened by high terrain features.

2.1.2.2 The bending of radar pulses, often called anomalous propagation or ducting, may cause many extraneous blips to appear on the radar operator's display if the beam has been bent toward the ground or may decrease the detection range if the wave is bent upward. It is difficult to solve the effects of anomalous propagation, but using beacon radar and electronically eliminating stationary and slow moving targets by a method called moving target indicator (MTI) usually negate the problem.

2.1.2.3 Radar energy that strikes dense objects will be reflected and displayed on the operator's scope thereby blocking out aircraft at the same range and greatly weakening or completely eliminating the display of targets at a greater range. Again, radar beacon and MTI are very effectively used to combat ground clutter and weather phenomena, and a method of circularly polarizing the radar beam will eliminate some weather returns. A negative characteristic of MTI is that an aircraft flying a speed that coincides with the canceling signal of the MTI (tangential or "blind" speed) may not be displayed to the radar controller.



The nearby target absorbs and scatters so much of the out-going and returning energy that the radar does not detect the distant target.

2.1.2.4 Relatively low altitude aircraft will not be seen if they are screened by mountains or are below the radar beam due to earth curvature. The only solution to screening is the installation of strategically placed multiple radars which has been done in some areas.

2.1.2.5 There are several other factors which affect radar control. The amount of reflective surface of an aircraft will determine the size of the radar return. Therefore, a small light air-

plane or a sleek jet fighter will be more difficult to see on radar than a large commercial jet or military bomber. Here again, the use of radar beacon is invaluable if the aircraft is equipped with an airborne transponder. All ARTCC radars in the conterminous U.S. and many airport surveillance radars have the capability to interrogate Mode C and display altitude information to the controller from appropriately equipped aircraft. However, there are a number of airport surveillance radars that are still two dimensional (range and azimuth) only and altitude information must be obtained from the pilot.

2.1.2.6 At some locations within the ATC en route environment, secondary-radar-only (no primary radar) gap filler systems are used to give lower altitude radar coverage between two larger radar systems, each of which provides both primary and secondary radar coverage. In those geographical areas served by secondary-radar-only, aircraft without transponders cannot be provided with radar service. Additionally, transponder equipped aircraft cannot be provided with radar advisories concerning primary targets and weather.

2.1.2.7 The controllers' ability to advise a pilot flying on instruments or in visual conditions if his proximity to another aircraft will be limited if the unknown aircraft is not observed on radar, if no flight plan information is available, or if the volume of traffic and workload prevent his issuing traffic information. First priority is given to establishing vertical, lateral, or longitudinal separation between aircraft flying IFR under the control of ATC.

2.1.3 *Surveillance radar*

2.1.3.1 Surveillance radars are divided into two general categories: Airport Surveillance Radar (ASR) and Air Route Surveillance Radar (ARSR)

2.1.3.1.1 ASR is designed to provide relatively short range coverage in the general vicinity of an airport and to serve as an expeditious means of handling terminal area traffic through observation of precise aircraft locations on a radar scope. The ASR can also be used as an instrument approach aid.

2.1.3.1.2 ARSR is a long-range radar system designed primarily to provide a display of aircraft locations over large areas.

2.1.3.1.3 Center Radar Automated Radar Terminal Systems (ARTS) Processing (CENRAP) was developed to provide an alternative to a nonradar environment at terminal facilities should an ASR fail or malfunction. CENRAP sends aircraft radar beacon target information to the ASR terminal facility equipped with ARTS. Procedures used for the separation of aircraft may increase under certain conditions when a facility is utilizing CENRAP because radar target information updates at a slower rate than the normal ASR radar. Radar services for VFR aircraft are also limited during CENRAP operations because of the additional workload required to provide services to IFR aircraft.

2.1.3.2 Surveillance radars scan through 360° of azimuth and present target information on a radar display located in a tower or center. This information is used independently or in conjunction with other navigational aids in the control of air traffic.

2.2 Secondary Surveillance Radar

2.2.1 The AIR TRAFFIC CONTROL RADAR BEACON SYSTEM (ATCRBS), or Secondary Surveillance Radar, consists of three main components:

2.2.1.1 Interrogator. Primary radar relies on a signal being transmitted from the radar antenna site and for this signal to be reflected or "bounced back" from an object (such as an aircraft). This reflected signal is then displayed as a "target" on the controller's radar-scope. In the ATCRBS, the Interrogator, a ground based radar beacon transmitter-receiver, scans in synchronism with the primary radar and transmits discrete radio signals which repetitiously requests all transponders, on the mode being used, to reply. The replies received are then mixed with the primary returns and both are displayed on the same radar scope.

2.2.1.2 Transponder. This airborne radar beacon transmitter-receiver automatically receives the signals from the interrogator and selectively replies with a specific pulse group (code) only to those interrogations being received on the mode to which it is set. These replies are independent of, and much stronger than a primary radar return.

2.2.1.3 Radarscope. The radarscope used by the controller displays returns from both the primary radar system and the ATCRBS. These returns, called targets, are what the controller refers to in the control and separation of traffic.

2.2.2 The job of identifying and maintaining identification of primary radar targets is a long and tedious task for the controller. Some of the advantages of ATCRBS over primary radar are:

(a) Reinforcement of radar targets.

(b) Rapid target identification.

(c) Unique display of selected codes

2.2.3 A part of the ATCRBS ground equipment is the decoder. This equipment enables the controller to assign discrete transponder codes to each aircraft under his control. Normally only one code will be assigned for the entire flight. Assignments are made by the ARTCC computer on the basis of the National Beacon Code Allocation Plan. The equipment is also designed to receive Mode C altitude information from the aircraft. See Appendices one and two for an illustration of the target symbology depicted on radar scopes in the NAS Stage A (en route), the ARTS III (terminal) Systems, and other nonautomated (broadband) radar systems.

2.3 Precision Approach Radar

See AIP Section COM.

2.4 Radar Availability

2.4.1 FAA radar units operate continuously at the locations shown in the Airport/Facility Directory, and their services are available to all pilots, both civil and military. Contact the associated FAA control tower or ARTCC on any frequency guarded for initial instructions, or in an emergency, any FAA facility for information on the nearest radar service.

3. RADAR APPLICATION

3.1 Transponder Operation

3.1.1 *General*

3.1.1.1 Pilots should be aware that proper application of these procedures will provide both VFR and IFR aircraft with a high degree of safety in the environment where high-speed closure rates are possible. Transponders substantially increase the capability of radar to see an aircraft and the Mode C feature enables the controller to quickly determine where potential traffic con-

flicts may exist. Even VFR pilots who are not in contact with ATC will be afforded greater protection from IFR aircraft and VFR aircraft which are receiving traffic advisories. Nevertheless, pilots should never relax their visual scanning vigilance for other aircraft.

3.1.1.2 Air Traffic Control Radar Beacon System (ATC-RBS) is similar to and compatible with military coded radar beacon equipment. Civil Mode A is identical to military Mode 3.

3.1.1.3 Civil and military transponders should be adjusted to the "on" or normal operating position as late as practicable prior to takeoff and to "off" or "standby" as soon as practicable after completing landing roll, unless the change to "standby" has been accomplished previously at the request of ATC. IN ALL CASES, WHILE IN CLASS A, B, C, D AND E AIRSPACE EACH PILOT OPERATING AN AIRCRAFT EQUIPPED WITH AN OPERABLE ATC TRANSPONDER MAINTAINED IN ACCORDANCE WITH FAR 91.413 *SHALL* OPERATE THE TRANSPONDER, INCLUDING MODE C IF INSTALLED, ON THE APPROPRIATE CODE OR AS ASSIGNED BY ATC. IN CLASS G AIRSPACE, THE TRANSPONDER SHOULD BE OPERATING WHILE AIRBORNE UNLESS OTHERWISE REQUESTED BY ATC.

3.1.1.4 If a pilot on an IFR flight cancels his IFR flight plan prior to reaching his destination, he should adjust his transponder according to VFR operations.

3.1.1.5 If entering a U.S. domestic Controlled airspace from outside the U.S., the pilot should advise on first radio contact with a U.S. radar air traffic control facility that such equipment is available by adding "transponder" to the aircraft identification.

3.1.1.6 It should be noted by all users of the ATC Transponders that the coverage they can expect is limited to "line of sight." Low altitude or aircraft antenna shielding by the aircraft itself may result in reduced range. Range can be improved by climbing to a higher altitude. It may be possible to minimize antenna shielding by locating the antenna where dead spots are only noticed during abnormal flight attitudes.

3.1.2 *Transponder Code Designation*

3.1.2.1 For ATC to utilize one or a combination of the 4096 discrete codes FOUR DIGIT CODE DESIGNATION will be used, e.g., code 2100 will be expressed as TWO ONE ZERO ZERO. Due to the operational characteristics of the rapidly expanding automated air traffic control system, THE LAST TWO DIGITS OF THE SELECTED TRANSPONDER CODE SHOULD ALWAYS READ '00' UNLESS SPECIFICALLY REQUESTED BY ATC TO BE OTHERWISE.

3.1.3 *Automatic Altitude Reporting (MODE C)*

3.1.3.1 Some transponders are equipped with a Mode C automatic altitude reporting capability. This system converts aircraft altitude in 100 foot increments, to coded digital information which is transmitted together with MODE C framing pulses to the interrogating radar facility. The manner in which transponder panels are designed differs, therefore, a pilot should be thoroughly familiar with the operation of his transponder so that ATC may realize its full capabilities.

3.1.3.2 Adjust transponder to reply on the Mode A/3 code specified by ATC and, if equipped, to reply on Mode C with altitude reporting capability activated unless deactivation is directed by ATC or unless the installed aircraft equipment has not been tested and calibrated as required by FAR 91.217. If deactivation is required by ATC, run off the altitude reporting feature of your transponder. An instruction by ATC to "STOP ALTITUDE SQUAWK, ALTITUDE DIFFERS (number of feet) FEET," may be an indication that your transponder is transmitting incorrect altitude information or that you have an incorrect altimeter setting. While an incorrect altimeter setting has no effect on the Mode C altitude information transmitted by your transponder (transponders are preset at 29.92), it would cause you to fly at an actual altitude different from your assigned altitude. When a controller indicates that an altitude readout is invalid, the pilot should initiate a check to verify that the aircraft altimeter is set correctly.

3.1.3.3 Pilots of aircraft with operating Mode C altitude reporting transponders should exact altitude/flight level to the nearest hundred foot increment when establishing initial contact with an air traffic control facility. Exact altitude/flight level reports on initial contact provide air traffic control with information that is required prior to using Mode c altitude information for separation purposes. This will significantly reduce altitude verification requests.

3.1.4 *Transponder IDENT Feature*

3.1.4.1 The transponder shall be operated only as specified by ATC. Activate the "IDENT" feature only upon request of the ATC controller.

3.1.5 *Code Changes*

3.1.5.1 When making routine code changes, pilots should avoid inadvertent selection of codes 7500, 7600, or 7700 thereby causing momentary false alarms at automated ground facilities. For example when switching from code 2700 to code 7200, switch first to 2200 then 7200, NOT to 7700 and then 7200. This procedure applies to nondiscrete code 7500 and all discrete codes in the 7600 and 7700 series (i.e., 7600-7677, 7700-7777) which will trigger special indicators in automated facilities. Only nondiscrete code 7500 will be decoded as the hijack code.

3.1.5.2 Under no circumstances should a pilot of a civil aircraft operate the transponder on Code 7777. This code is reserved for military interceptor operations.

3.1.5.3 Military pilots operating VFR or IFR within restricted/warning areas should adjust their transponders to code 4000 unless another code has been assigned by ATC

3.1.6 *MODE C Transponder Requirements*

3.1.6.1 Specific details concerning requirements to carry and operate Mode C transponders, as well as exceptions and ATC authorized deviations from the requirements are found in FAR 91.215 and FAR 99.12.

3.1.6.2 In general, the FAR requires aircraft to be equipped with Mode C transponders when operating:

(a) at or above 10,000 feet MSL over the 48 contiguous states or the District of Columbia, excluding that airspace below 2,500 feet AGL;

(b) within 30 miles of a Class B airspace primary airport, below 10,000 feet MSL. Balloons, gliders, and aircraft not equipped with an engine driven electrical system are excepted from the above requirements when operating below the floor of Class A airspace and/or; outside of Class B airspace and below

the ceiling of the Class B airspace (or 10,000 feet MSL, whichever is lower);

(c) within and above all Class C airspace up to 10,000 feet MSL;

(d) within 10 miles of certain designated airports from the surface to 10,000 feet MSL, excluding that airspace which is both outside Class D airspace and below 1,200 feet AGL. Balloons, gliders and aircraft not equipped with an engine driven electrical system are excepted from this requirement.

3.1.6.3 FAR 99.12 requires all aircraft flying into, within, or across the contiguous U.S. ADIZ be equipped with a Mode C or Mode S transponder. Balloons, gilders and aircraft not equipped with an engine driven electrical system are excepted from this requirement.

3.1.6.4 Pilots shall ensure that their aircraft transponder is operating on an appropriate ATC assigned VFR/IFR code and Mode C when operating in such airspace. If in doubt about the operational status of either feature of your transponder while airborne, contact the nearest ATC facility or FSS and they will advise you what facility you should contact for determining the status of your equipment.

3.1.6.5 In-flight requests for "immediate" deviation from the transponder requirements may be approved by controllers only when the flight will continue IFR or when weather conditions prevent VFR descent and continued VFR flight in airspace not affected by the FAR. All other requests for deviation should be made by contacting the nearest Flight Service or Air Traffic facility in person or by telephone. The nearest ARTCC will normally be the controlling agency and is responsible for coordinating requests involving deviations in other ARTCC areas.

3.1.7 *Transponder Operation Under Visual Flight Rules (VFR)*

3.1.7.1 Unless otherwise instructed by an Air Traffic Control Facility adjust Transponder to reply on Mode 3/A code 1200 regardless of altitude.

3.1.7.2 Adjust transponder to reply on Mode C, with altitude reporting capability activated if the aircraft is so equipped, unless deactivation is directed by ATC or unless the installed equipment has not been tested and calibrated as required by FAR 91.217. If deactivation is required and your transponder is so designed, turn off the altitude reporting switch and continue to transmit Mode C framing pulses. If this capability does not exist, turn off Mode C.

3.1.8 *Radar Beacon Phraseology*

Air Traffic controllers, both civil and military, will use the following phraseology when referring to operation of the Air Traffic Control Radar Beacon System (ATCRBS). Instructions by air traffic control refer only to Mode A/3 or Mode C operations and do not affect the operation of the transponder on other Modes.

SQUAWK (number) — Operate radar beacon transponder on designated code in Mode A/3.

IDENT — Engage the "IDENT" feature (military I/P) of the transponder.

SQUAWK (number) AND IDENT — Operate transponder on specified code in Mode A/3 and engage the "IDENT" (military I/P) feature.

SQUAWK STANDBY — Switch transponder to standby position.

SQUAWK LOW/NORMAL — Operate transponder on low or normal sensitivity as specified. Transponder is operated in "NORMAL" position unless ATC specified "LOW" ("ON" is used instead of "NORMAL" as a master control label on some types of transponders.)

SQUAWK ALTITUDE — Activate Mode C with automatic altitude reporting.

STOP ALTITUDE SQUAWK — Turn off altitude reporting switch and continue transmitting Mode C framing pulses. If your equipment does not have this capability, turn off Mode C.

STOP SQUAWK (mode in use) — Switch off specified mode. (Use for military aircraft when the controller is unaware if a military service requires the aircraft to continue operating on another Mode.

STOP SQUAWK — Switch off transponder.

SQUAWK MAYDAY — Operate transponder in the emergency position. (Mode A Code 7700 for civil transponder. Mode 3 Code 7700 and emergency feature for military transponder.)

SQUAWK VFR — Operate radar beacon transponder on code 1200 in the MODE A/3, or other appropriate VFR code.

3.1.9 *Emergency Operation*

3.1.9.1 When an emergency occurs, the pilot of an aircraft equipped with a coded radar beacon transponder, who desires to alert a ground radar facility to an emergency condition and who cannot establish communications without delay with an air traffic control facility may adjust the transponder to reply on Mode A/3, Code 7700.

3.1.9.2 Pilots should understand that they may not be within a radar coverage area and that, even if they are, certain radar facilities are not yet equipped to automatically recognize Code 7700 as an emergency signal. Therefore, they should establish radio communications with an air traffic control facility as soon as possible.

3.1.10 *Radio Failure Operation*

3.1.10.1 Should the pilot of an aircraft equipped with a coded radar beacon transponder experience a loss of two-way radio capability the pilot should:

(a) Adjust his transponder to reply on Mode A/3, code 7700 for a period of 1 minute.

(b) then change to code 7600 and remain on 7600 for a period of 15 minutes or the remainder of the flight, whichever occurs first.

(c) repeat steps 1 and 2, as practicable.

3.1.10.2 Pilots should understand that they may not be in an area of radar coverage. Also many radar facilities are not presently equipped to automatically display code 7600 and will interrogate 7600 only when the aircraft is under direct radar control at the time of radio failure. However, replying on code 7700 first, increases the probability of early detection of a radio failure conditional

3.2 Radar Services

3.2.1 *Safety Alert*

3.2.1.1 A safety alert will be issued to pilots of aircraft being controlled by ATC if the controller is aware the aircraft is at an altitude which, in the controller's judgment, places the air-

craft in unsafe proximity to terrain, obstructions or other aircraft. The provision of this service is contingent upon the capability of the controller to have an awareness of situations involving unsafe proximity to terrain, obstructions and uncontrolled aircraft. The issuance of an safety alert cannot be mandated but it can be expected on a reasonable, though intermittent basis. Once the alert is issued, it is solely the pilot's prerogative to determine what course of action, if any, he will take. This procedure is intended for use in time critical situations where aircraft safety is in question. Noncritical situations should be handled via the normal traffic alert procedures.

3.2.1.2 Terrain/obstruction Alert

3.2.1.2.1 The controller will immediately issue an alert to the pilot of an aircraft under his control when he recognizes that the aircraft is at an altitude which, in his judgment, may be in unsafe proximity to terrain/obstructions. The primary method of detecting unsafe proximity is through Mode C automatic altitude reports.

Example:

LOW ALTITUDE ALERT, CHECK YOUR ALTITUDE IMMEDIATELY, THE as appropriate, MEA/MVA/MOCA IN YOUR AREA IS (altitude) or, if past the final approach fix (non precision approach) or the outer marker or fix used in lieu of the outer marker (precision approach), THE, as appropriate, MDA/DH (if know) is (altitude).

3.2.1.2.2 Terminal ARTS IIA, III, and IIIA facilities have an automated function which, if operating, alerts the controller when a tracked Mode C equipped aircraft under his control is below or predicted to below a predetermined minimum safe altitude. This function, called Minimum Safe Altitude Warning (MSAW), is designed solely as a controller aid in detecting potentially unsafe aircraft proximity to terrain/obstructions. The ARTS IIA, III, and IIIA facility will, when MSAW is operating, provide MSAW monitoring for all aircraft with an operating Mode C altitude encoding transponder that are tracked by the system and are:

(a) Operating on a IFR flight plan, or

(b) Operating VFR and have requested MSAW monitoring.

3.2.1.2.3 Terminal AN/TPX-42A (number beacon decoder system) facilities have an automated function called Low Altitude Alert System (LAAS). Although not as sophisticated as MSAW, LAAS alerts the controller when a Mode C transponder equipped aircraft operating on a IFR flight plan is below a predetermined minimum safe altitude.

Note — Pilots operating VFR may request MSAW or LAAS monitoring if their aircraft are equipped with Mode C transponders.

EXAMPLE:

APACHE THREE THREE PAPA REQUESTS MSAW/LAAS.

3.2.1.3 Aircraft Conflict Alert

3.2.1.3.1 The controller will immediately issue an alert to the pilot of an aircraft under his control if he is aware of an aircraft that is not under his control is at an altitude which, in the controller's judgment, places both aircraft in unsafe proximity to each other. With the alert, when feasible, the controller will offer the pilot the position of the traffic if time permits and an alternate course(s) of action. Any alternate course of action the controller may recommend to the pilot will be predicated only on other traffic under his control.

Example;

AMERICAN THREE, TRAFFIC ALERT, (POSITION OF TRAFFIC, IF TIME PERMITS), ADVISE YOU TURN LEFT/RIGHT HEADING (DEGREES) AND/OR CLIMB/DESCENT TO (ALTITUDE) IMMEDIATELY.

3.2.2 *Radar Traffic Information Service (RTIS)*

A service provided by radar air traffic control facilities. Pilots receiving this service are advised of any radar target observed on the radar display which may be in such proximity to the position of their aircraft or its intended route of flight that it warrants their attention. This service is not intended to relieve the pilot of his responsibility for continual vigilance to see and avoid other aircraft.

3.2.2.1 Purpose of this Service —

3.2.2.1.1 The issuance of traffic information as observed on a radar display is based on the principle of assisting and advising a pilot that a particular radar target's position and track indicates it may intersect or pass in such proximity to his intended flight path that it warrants his attention. This is to alert the pilot to the traffic so that he can be on the lookout for it and thereby be in a better position to take appropriate action should the need arise.

3.2.2.1.2 Pilots are reminded that the surveillance radar used by ATC does not provide altitude information unless the aircraft is equipped with Mode C and the Radar Facility is capable of displaying altitude information.

3.2.2.2 Provision of the Service

3.2.2.2.1 Many factors, such as limitations of the radar, volume of traffic, controller workload and communications frequency congestion, could prevent the controller from providing this service. The controller possesses complete discretion for determining whether he is able to provide or continue to provide this service in a specific case. His reason against providing or continuing to provide the service in a particular case is not subject to question nor need it be communicated to the pilot. In other words, the provision of this service in entirely dependent up whether the controller believes he is in a position to provide it. Traffic information is routinely provided to all aircraft operating on IFR Flight Plans except when the pilot advises he does not desire the service, or the pilot is operating within Class A airspace. Traffic information may be provided to flights not operating on IFR Flight Plans when requested by pilots of such flight.

Note — Radar ATC facilities normally display and monitor both primary and secondary radar when it is available, except that secondary radar may be used as the sole display source in Class A airspace, and under some circumstances outside of Class A airspace (beyond primary coverage and in en route areas where only secondary is available). Secondary radar may also be used outside Class A airspace as the sole display source when the primary radar is temporarily unusable or out of service. Pilots in contact with the affected ATC facility are normally advised when a temporary outage occurs; i.e., "primary radar out of service; traffic advisories available on transponder aircraft only." This means simply that only the aircraft which have transponders installed and in use will be depicted on ATC radar indicators when the primary radar is temporarily out of service.

3.2.2.2.2 When receiving VFR radar advisory service, pilots should monitor the assigned frequency at all times. This is to preclude controllers' concern for radio failure of emergency as-

sistance to aircraft under his jurisdiction. VFR radar advisory service does not include vectors away from conflicting traffic unless requested by the pilot. When advisory service is no longer desired, advise the controller before changing frequencies then change your transponder code to 1200 if applicable. THE, as appropriate, MEA/MVA/MOCA IN YOUR AREA IS (altitude) or if past the final approach fix, THE, as appropriate, MDA/DH (if known) is (altitude). Except in programs where radar service is automatically terminated, the controller will advise the aircraft when radar is terminated.

Note — Participation by VFR pilots in formal programs implemented at certain terminal locations constitutes pilot request. This also applies to participating pilots at those locations where arriving VFR flights are encouraged to make their first contact with the tower on the approach control frequency.

3.2.2.3 Issuance of Traffic Information — Traffic information will include the following concerning a target which may constitute traffic for an aircraft that is:

3.2.2.3.1 Radar identified;

(a) Azimuth from the aircraft in terms of the twelve hour clock;

(b) When rapidly maneuvering civil test or military aircraft prevent accurate issuance of traffic as in (a) above, specify the direction from an aircraft's position in terms of the eight cardinal compass points (N, NE, E, SE, S, SW, W, NW). This method shall be terminated at the pilot's request.

(c) Distance from the aircraft in nautical miles;

(d) Direction in which the target is proceeding; and

(e) Type of aircraft and altitude if known.

Example:

Traffic 10 o'clock, 3 miles, west-bound (type aircraft and altitude, if known, of the observed traffic). The altitude may be known, by means of MODE C, but not verified with the pilot for accuracy. (To be valid for separation purposes by ATC, the accuracy of MODE C readouts must be verified. This is usually accomplished upon initial entry into the radar system by a comparison of the readout to pilot stated altitude, or the field elevation in the case of continuous readout being received from an aircraft on the airport.) When necessary to issue traffic advisories containing unverified altitude information, the controller will issue the advisory in the same manner as if it were verified due to the accuracy of these readouts. The pilot may, upon receipt of traffic information, request a vector (heading) to avoid such traffic. The vector will be provided to the extent possible as determined by the controller provided the aircraft to be vectored is within the airspace under the jurisdiction of the controller

3.2.2.3.2 Not radar identified:

(a) Distance and direction with respect to a fix;

(b) Direction in which the target is proceeding; and

(c) Type of aircraft and altitude if known.

Example:

TRAFFIC 8 MILES SOUTH OF THE AIRPORT NORTHEASTBOUND, (TYPE AIRCRAFT AND ALTITUDE IF KNOWN).

3.2.2.4 The examples depicted in the following figures point out the possible error in the position of this traffic when it is necessary for a pilot to apply drift correction to maintain this track. This error could also occur in the event a change in course is made at the time radar traffic information is issued.

3.2.2.4.1 Example 1:

In the figure, traffic information would be issued to the pilot of aircraft "A" as 12 o'clock. The actual position of the traffic as seen by the pilot of aircraft "A" would be one o'clock. Traffic information issued to aircraft "B" would also be given as 12 o'clock, but in this case, the pilot of "B" would see his traffic at 11 o'clock.

3.2.2.4.2 Example 2:

In this figure, traffic information would be issued to the pilot of aircraft "C" as two o'clock. The actual position of the traffic as seen by the pilot of aircraft "C" would be three o'clock. Traffic information issued to aircraft "D" would be at an 11 o'clock position. Since it is not necessary for the pilot of aircraft "D" to apply wind correction (crab) to make good his track, the actual position of the traffic issued would be correct. Since the radar controller can only observe aircraft track (course) on his radar display, he must issue traffic advisories accordingly, and pilots should give due consideration to this fact when looking for reported traffic.

3.2.3 *Radar Assistance to VFR Aircraft*

3.2.3.1 Radar equipped FAA Air Traffic Control facilities provide radar assistance and navigation service (vectors) to VFR aircraft provided the aircraft can communicate with the facility, are within radar coverage, and can be radar identified.

3.2.3.2 Pilots should clearly understand that authorization to proceed in accordance with such radar navigational assistance does not constitute authorization for the pilot to violate Federal Aviation Regulations. In effect, assistance provided is on the basis that navigational guidance information issued is advisory in nature and the job of flying the aircraft safely, remains with the pilot.

3.2.3.3 In many cases, the controller will be unable to determine if flight into instrument conditions will result from his instruction. To avoid possible hazards resulting from being vectored into IFR conditions, pilots should keep the controller advised of the weather conditions in which he is operating and along the course ahead.

3.2.3.4 Radar navigation assistance (vectors) may be initiated by the controller when one of the following conditions exist.

(a) The controller suggests the vector and the pilot concurs.

(b) A special program has been established and vectoring service has been advertised.

(c) In the controller's judgment the vector is necessary for air safety.

3.2.3.5 Radar navigation assistance (vectors) and other radar derived information may be provided in response to pilot requests. Many factors, such as limitations of radar, volume of traffic, communications frequency, congestion, and controller workload could prevent the controller from providing it. The controller has complete discretion for determining if he is able to provide the service in a particular case. His decision not to provide the service in a particular case is not subject to question.

3.2.4 *Terminal Radar Programs for VFR Aircraft*

3.2.4.1 Basic Radar Service

3.2.4.1.1 In addition to the use of radar for the control of IFR aircraft, all commissioned radar facilities provide the following basic radar services for VFR aircraft:

(a) Safety alerts.

(b) Traffic advisories.

(c) Limited radar vectoring (on a workload permitting basis).

(d) Sequencing at locations where procedures have been established for this purpose and/or when covered by a letter of agreement.

Note. — When the Stage services were developed, two basic radar services (traffic advisories and limited vectoring) were identified as "Stage I." This definition became unnecessary and the term "Stage I" was eliminated from use. The term "Stage II" has been eliminated in conjunction with the airspace reclassification, and sequencing services to locations with local procedures and/or letters of agreement to provide this service have been included in basic services to VFR aircraft. These basic services will still be provided by all terminal radar facilities whether they include Class B, C, D or E airspace. "Stage III" services have been replaced with "Class B" and "Terminal Radar Service Area" service where applicable.

3.2.4.1.2 Vectoring service may be provided when requested by the pilot or with pilot concurrence when suggested by ATC.

3.2.4.1.3 Pilots of arriving aircraft should contact approach control on the publicized frequency and give their position, altitude, aircraft callsign, type aircraft, radar beacon code (if transponder equipped), destination, and request traffic information.

3.2.4.1.4 Approach control will issue wind and runway, except when the pilot states "have numbers" or this information is contained in the ATIS broadcast and the pilot states that the current ATIS information has been received. Traffic information is provided on a workload permitting basis. Approach control will specify the time or place at which the pilot is to contact the tower on local control frequency for further landing information. Radar service is automatically terminated upon being advised to contact the tower.

3.2.4.1.5 Sequencing for VFR aircraft is available at certain terminal locations (see locations listed in the Airport/Facility Directory). The purpose of the service is to adjust the flow of arriving VFR and IFR aircraft into the traffic pattern in a safe and orderly manner and to provide radar traffic information to departing VFR aircraft. Pilot participation is urged but is not mandatory. Traffic information is provided on a workload permitting basis. Standard radar separation between VFR or between VFR and IFR aircraft is not provided.

3.2.4.1.6 Pilots of arriving VFR aircraft should initiate radio contact on the publicized frequency with approach control when approximately 25 miles from the airport at which sequencing services are being provided. On initial contact by VFR aircraft, approach control will assume that sequencing service is requested. After radar contact is established, the pilot may use pilot navigation to enter the traffic pattern or, depending on traffic conditions, approach control may provide the pilot with routings or vectors necessary for proper sequencing with other participating VFR and IFR traffic en route to the airport. When a flight is positioned behind a preceding aircraft and the pilot reports having that aircraft in sight, the pilot will be instructed to follow the preceding aircraft. THE ATC INSTRUCTION TO FOLLOW THE PRECEDING AIRCRAFT DOES NOT AUTHORIZE THE PILOT TO COMPLY WITH ANY ATC CLEARANCE OR INSTRUCTION ISSUED TO THE PRECEDING AIRCRAFT. If other "nonparticipating" or "local" aircraft are in the traffic pattern, the tower will issue a landing sequence. Radar service will be continued to the runway. If an arriving aircraft does not want the service, the pilot should state "NEGATIVE RADAR SERVICE" or make a similar comment, on initial contact with approach control.

3.2.4.1.7 Pilots of departing VFR aircraft are encouraged to request radar traffic information by notifying ground control on initial contact with their request and proposed direction of flight.

Example:

XRAY GROUND CONTROL, NOVEMBER ONE EIGHT SIX, CESSNA ONE SEVENTY TWO, READY TO TAXI, VFR SOUTHBOUND, HAVE INFORMATION BRAVO AND REQUEST RADAR TRAFFIC INFORMATION.

Note. — Following takeoff, the tower will advise when to contact departure control.

3.2.4.1.8 Pilots of aircraft transiting the area and in radar contact/communication with approach control will receive traffic information on a controller workload permitting basis. Pilots of such aircraft should give their position, altitude, aircraft callsign, aircraft type, radar beacon code (if transponder equipped), destination, and/or route of flight.

3.2.4.2 Terminal Radar Service Area (TRSA) Service (Radar Sequencing and Separation Service for VFR Aircraft in a TRSA).

3.2.4.2.1 This service has been implemented at certain terminal locations. The service is advertised in the Airport/Facility Directory. The purpose of this service is to provide separation between all participating VFR aircraft and all IFR aircraft operating within the airspace defined as the (TRSA). Pilot participation is urged but is not mandatory.

3.2.4.2.2 If any aircraft does not want the service, the pilot should state "NEGATIVE TRSA SERVICE" or make a similar comment, on initial contact with approach control or ground control, as appropriate.

3.2.4.2.3 TRSA's are depicted on sectional aeronautical charts and listed in the Airport/Facility Directory.

3.2.4.2.4 While operating within a TRSA, pilots are provided TRSA service and separation as prescribed in this paragraph. In the event of a radar outage, separation and sequencing of VFR

aircraft will be suspended as this service is dependent on radar. The pilot will be advised that the service is not available and issued wind, runway information, and the time or place to contact the tower. Traffic information will be provided on a workload permitting basis.

3.2.4.2.5 Visual separation is used when prevailing conditions permit and it will be applied as follows:

(a) When a VFR flight is positioned behind a preceding aircraft and the pilot reports having that aircraft in sight, the pilot will be instructed by ATC to follow the preceding aircraft. THE ATC INSTRUCTION TO FOLLOW THE PRECEDING AIRCRAFT DOES NOT AUTHORIZE THE PILOT TO COMPLY WITH ANY ATC CLEARANCE OR INSTRUCTION ISSUED TO THE PRECEDING AIRCRAFT. Radar service will be continued to the runway.

(b) If other "nonparticipating" or "local" aircraft are in the traffic pattern, the tower will issue a landing sequence.

(c) Departing VFR aircraft may be asked if they can visually follow a preceding departure out of the TRSA. The pilot will be instructed to follow the other aircraft provided that the pilot can maintain visual contact with that aircraft.

3.2.4.2.6 Until visual separation is obtained, standard vertical or radar separation will be provided.

(a) 1000 feet vertical separation may be used between IFR aircraft.

(b)500 feet vertical separation may be used between VFR aircraft, or between a VFR and an IFR aircraft.

(c) Radar separation varies depending on size of aircraft and aircraft distance from the radar antenna. The minimum separation used will be 1-1/2 miles for most VFR aircraft under 12,500 pounds GWT. If being separated from larger aircraft, the minimum is increased appropriately.

3.2.4.2.7 Participating pilots operating VFR in a TRSA

(a) Must maintain an altitude when assigned by ATC unless the altitude assignment is to maintain at or below a specified altitude. ATC may assign altitudes for separation that do not conform to FAR 91.159. When the altitude assignment is no longer needed for separation or when leaving the TRSA, the instruction will be broadcast, "RESUME APPROPRIATE VFR ALTITUDES." Pilots must then return to an altitude that conforms to FAR 91.159 as soon as practicable.

(b) When not assigned an altitude, the pilot should coordinate with ATC prior to any altitude change.

3.2.4.2.8 Within the TRSA, traffic information on observed but unidentified targets will, to the extent possible, be provided all IFR and participating VFR aircraft. The pilot will be vectored to avoid the observed traffic, provided the aircraft to be vectored is within the airspace under the jurisdiction of the controller.

3.2.4.2.9 Departing aircraft should inform ATC of their intended destination and/or route of flight and proposed cruising altitude.

3.2.4.2.10 ATC will normally advise participating VFR aircraft when leaving the geographical limits of the TRSA. Radar service is not automatically terminated with this advisory unless specifically stated by the controller.

3.2.4.3 PILOT RESPONSIBILITY: THESE SERVICES ARE NOT TO BE INTERPRETED AS RELIEVING PILOTS OF THEIR RESPONSIBILITIES TO SEE AND AVOID OTHER TRAFFIC OPERATING IN BASIC VFR WEATHER CONDITIONS, TO ADJUST THEIR OPERATIONS AND FLIGHT PATH AS NECESSARY TO PRECLUDE SERIOUS WAKE ENCOUNTERS, TO MAINTAIN APPROPRIATE TERRAIN AND OBSTRUCTION CLEARANCE, OR TO REMAIN IN WEATHER CONDITIONS EQUAL TO OR BETTER THAN THE MINIMUMS REQUIRED BY FAR 91.155. WHENEVER COMPLIANCE WITH AN ASSIGNED ROUTE, HEADING AND/OR ALTITUDE IS LIKELY TO COMPROMISE PILOT RESPONSIBILITY RESPECTING TERRAIN AND OBSTRUCTION CLEARANCE, VORTEX EXPOSURE, AND WEATHER MINIMUMS, APPROACH CONTROL SHOULD BE SO ADVISED AND A REVISED CLEARANCE OR INSTRUCTION OBTAINED.

3.2.4.4 ATC services for VFR aircraft participating in terminal radar services are dependent on air traffic control radar. Services for VFR aircraft are not available during periods of a radar outage and are limited during CENRAP operations. The pilot will be advised when VFR services are limited or not available.

Note. — CLASS B and CLASS C AIRSPACE are areas of regulated airspace. The absence of ATC radar does not negate the requirement of an ATC clearance to enter CLASS B AIRSPACE or two way radio contact with ATC to enter CLASS C AIRSPACE.

3.2.4.5 Class C Service — This service provides, in addition to basic radar service, approved separation between IFR and VFR aircraft, and sequencing of VFR arrivals to the primary airport.

3.2.4.6 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).

3.2.5 *Tower En Route Control (TEC)*

3.2.5.1 TEC is an ATC program to provide a service to aircraft proceeding to and from metropolitan areas. It links designated approach control areas by a network of identified routes made up of the existing airway structure of the National Airspace System. The FAA has initiated an expanded TEC program to include as many facilities as possible. The program's intent is to provide an overflow resource in the low altitude system which would enhance ATC services. A few facilities have historically allow turbojets to proceed between certain city pairs, such as Milwaukee and Chicago, via tower en route and these locations may continue this service. However, the expanded TEC program will be applied, generally, for nonturbojet aircraft operating at and below 10,000 feet. The program is entirely within the approach control airspace of multiple terminal facilities. Essentially, it is for relatively short flights. Participating pilots are encouraged to use TEC for flights of 2 hours duration or less. If longer flights are planned, extensive coordination may be required with the multiple complex which could result in unanticipated delays.

3.2.5.2 Pilots requesting TEC are subject to the same delay factor at the destination airport as other aircraft in the ATC system. In addition, departure and en route delays may occur depending upon individual facility workload. When a major metropolitan airport is incurring significant delays, pilots in the TEC program may want to consider an alternative airport experiencing no delay.

3.2.5.3 There are no unique requirements upon pilots to use the TEC program. Normal flight plan filing procedures will en-

sure proper flight plan processing. Pilots should include the acronym "TEC" in the remarks selection of the flight plan when requesting tower en route.

3.2.5.4 All approach controls in the system may not operate up to the maximum TEC altitude of 10,000 feet. IFR flight may be planned to any satellite airport in proximity to the major primary airport via the same routing.

4. Services in Offshore Controlled Airspace.

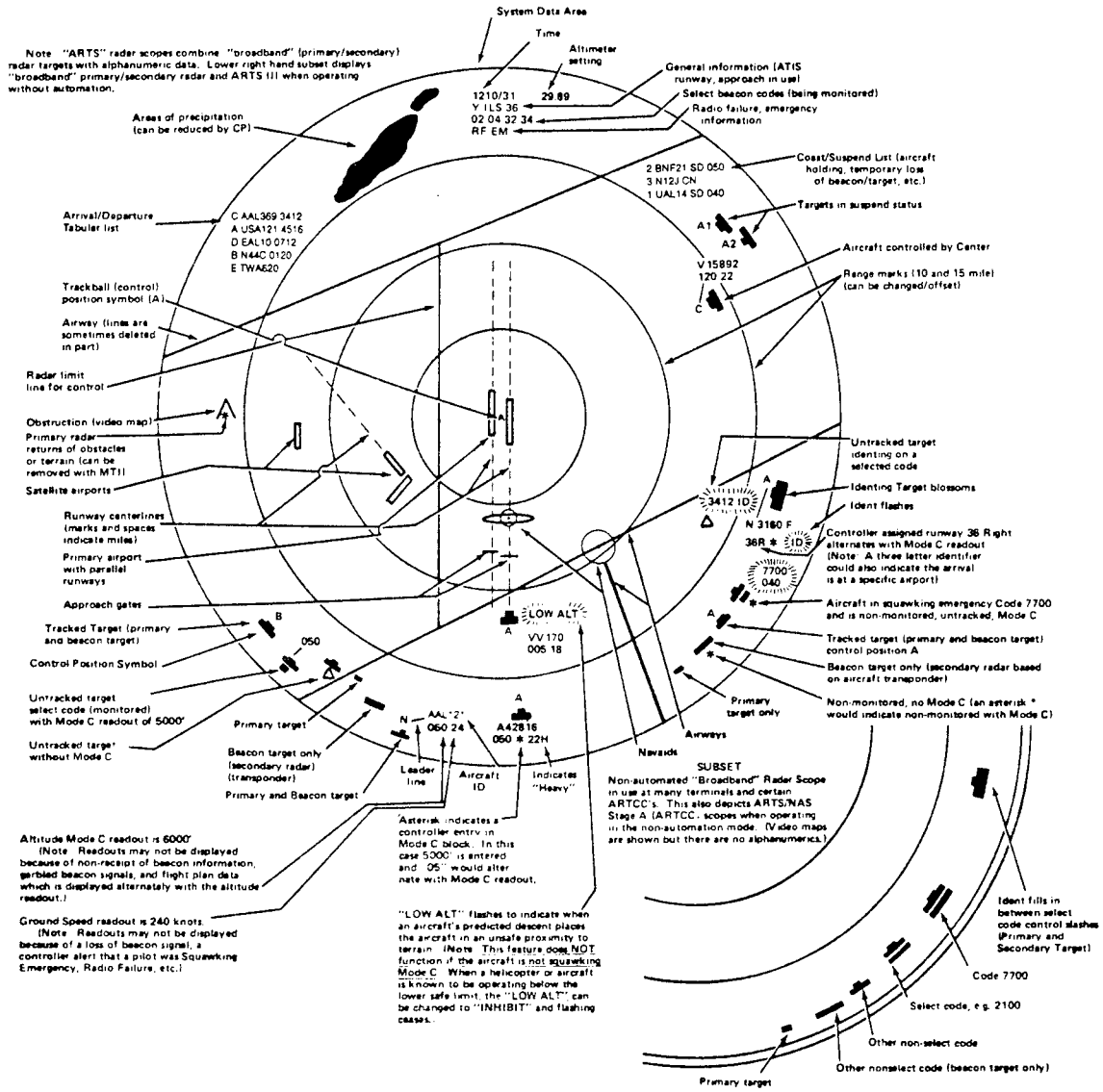
4.1 Flights which operate between the U.S. 3-mile territorial limit and the adjoining oceanic controlled airspace/flight information region (CTA/FIR) boundaries generally operate in airspace designated by federal regulation as "controlled airspace," or "offshore controlled airspace."

4.2 Within the designated areas ATC radar surveillance, ground based navigational signal coverage, and air/ground communications are capable of supporting air traffic services comparable to those provided over U.S. domestic controlled airspace.

4.3 Pilots should be aware that domestic procedures will be applied in offshore controlled airspace to both VFR and IFR aircraft using ATC services.

APPENDIX ONE

ARTS III Radar Scope with Alphanumeric Data



ARTS III Radar Scope with Alphanumeric Data. Note: A number of radar terminals do not have ARTS equipment. Those facilities and certain ARTCC's outside the contiguous US would have radar displays similar to the lower right hand subset. ARTS facilities and NAS Stage A ARTCC's, when operating in the non-automation mode would also have similar displays and certain services based on automation may not be available.

PREFLIGHT PREPARATION AND FLIGHT PLAN REQUIREMENTS

1. PREFLIGHT PREPARATION

1.1 Every pilot is urged to receive a preflight briefing and to file a flight plan. This briefing should consist of the latest or most current weather, airport, and en route NAVAID information. Briefing service may be obtained from a Flight Service Station either by telephone/interphone, by radio when airborne, or by a personal visit to the station. In the contiguous 48 States, pilots with a current FAA medical certificate may access toll-free the Direct User Access Terminal System (DUATS) through a personal computer. DUATS will provide alpha-numeric preflight weather data and allow pilots to file domestic VFR and IFR flight plans. (For a list of DUATS vendors, see MET 5.5, FAA WEATHER SERVICES.)

Note—Pilots filing flight plans via "fast file" who desire to have their briefing recorded, should include a statement at the end of the recording as to the source of their weather briefing.

1.2 The information required by the FAA to process flight plans is contained on FAA Form 7233-1, Flight Plan. (See RAC-3 FLIGHT PLAN REQUIREMENTS.) The forms are available at all flight service stations. Additional copies will be provided on request.

1.3 Consult an FSS or Weather Service Office (WSO) for preflight weather briefing. Supplemental Weather Service Locations (SWSLs) do not provide weather briefings.

1.4 FSS's are required to advise of pertinent NOTAM's if a **standard** briefing is requested, but if they are overlooked, don't hesitate to remind the specialist that you have not received NOTAM information. Additionally, NOTAM's which are known in sufficient time for publication and are of 7 days duration or longer are normally incorporated into the Notices to Airmen publication and carried there until cancellation time. FDC NOTAM's, which apply to instrument flight procedures, are also included in Notices to Airmen publication up to and including the number indicated in the FDC NOTAM legend. These NOTAM's are not provided during a briefing unless specifically requested by the pilot since the FSS specialist has no way of knowing whether the pilot has already checked Notices to Airmen publication prior to calling. Remember to ask for NOTAM's contained in the Notices to Airmen publication; they are not normally furnished during your briefing.

1.5 Pilots are urged to use only the latest issue of aeronautical charts in planning and conducting flight operations. Aeronautical charts are revised and reissued on a periodic basis to ensure that depicted data are current and reliable. In the conterminous United States, sectional charts are updated each 6 months, IFR en route charts each 56 days, and amendments to civil IFR approach charts are accomplished on a 56-day cycle with a change notice volume issued on the 28-day mid-cycle. Charts that have been superseded by those of a more recent date may contain obsolete or incomplete flight information.

1.6 When requesting a preflight briefing, identify yourself as a pilot and provide the following:

a. Type of flight planned; e.g., VFR or IFR.

b. Aircraft number or pilot's name.

c. Aircraft type.

d. Departure Airport.

e. Route of flight.

f. Destination.

g. Flight altitude (s).

h. ETD and ETE.

1.7 Prior to conducting a briefing, briefers are required to havethe background information listed above so that they may tailor the briefing to the needs of the proposed flight. The objective is to communicate a "picture" of meteorological and aeronautical information necessary for the conduct of a safe and efficient flight. Briefers use all available weather and aeronautical information to summarize data applicable to the proposed flight. They do not read weather reports and forecasts verbatim unless specifically requested by the pilot. Refer to MET-0 para 5.3.3 for those items of a weather briefing that should be expected or requested.

1.8 The Federal Aviation Administration (FAA) by Federal Aviation Regulation, Part 93, Subpart K, has designated High Density Traffic Airports (HDTA) and has prescribed air traffic rules and requirements for operating aircraft (excluding helicopter operations) to and from these airports (see details in Airport/Facility Directory, Special Notices Section).

1.9 In addition to the filing of a flight plan, if the flightwill traverse or land in one or more foreign countries, it is particularly important that pilots leave a complete itinerary with someone directly concerned, keep that person advised of the flights progress and inform him that, if serious doubt arises as the the safety of the flight, he should first contact the FSS.

1.10 Pilots operating aircraft underthe provisions of an FAR Part 135, ATCO, certificate and not having an FAA assigned 3-letter designator, are urged to prefix the normal aircraft registration (N) number with the letter "T" on flight plan filing.

Example: TN 1234B.

1.11 Follow IFR Procedure Event When Operating VFR

1.11.1 To maintain IFR proficiency, pilots are urged to practice IFR procedures whenever possible, even when operating VFR. Some suggested practices include:

a. Obtain a complete preflight and weather briefing. Check the NOTAM's.

b. File a flight plan. This is an excellent low cost insurance policy. The cost is the time it takes to fill it out. The insurance includes the knowledge that someone will be looking for you if your become overdue at your destination.

c. Use current charts.

d. Use the navigation aids. Practice maintaining a good course—keep the needle centered.

e. Maintain a constant altitude appropriate for direction of flight.

f. Estimate en route position times.

g. Make accurate and frequent position reports to the FSS's along your route of flight.

1.11.2 Simulated IFR flight is recommended (under the hood); however, pilots are cautioned to review and adhere to the requirements specified in FAR 91.109 before and during such flight.

1.11.3 VFR At Night

When flying VFR at night, in addition to the altitude appropriate for the direction of flight, pilots should maintain an altitude which is at or above the minimum en route altitude as shown on charts. This is especially true in mountainous terrain, where there is usually very little ground reference. Do not depend on your eyes alone to avoid rising unlighted terrain, or even lighted obstructions such as TV towers.

2. DOMESTIC NOTICE TO AIRMEN (NOTAM) SYSTEM

2.1 Time-critical aeronautical information which is of either a temporary nature or is not sufficiently known in advance to permit publication on aeronautical charts or in other operational publications, receives immediate dissemination via the National Notice to Airmen (NOTAM) System.

Note—NOTAM information is that aeronautical information that could affect a pilot's decision to make a flight. It includes such information as airport or primary runway closures, changes in the status of navigational aids, ILS, radar service availability, and other information essential to planned en route, terminal, or landing operations.

2.2 NOTAM information is classified into three categories. These are NOTAM (D) or distant, NOTAM (L) or local, and Flight Data Center (FDC) NOTAM's.

2.2.1 NOTAM (D)

2.2.1.1 NOTAM (D) information is disseminated for all navigational facilities that are part of the National Airspace System (NAS), all public use airports, seaplane bases, and heliports listed in the Airport/Facility Directory (A/FD). The complete file of all NOTAM (D) information is maintained in a computer data base at the National Communications Center (NATCOM), located in Kansas City, Missouri. This category of information is distributed automatically, appended to the hourly weather reports, via the Service A telecommunications system. Air traffic facilities, primarily FSS's, with Service A capability have access to the entire NATCOM data base of NOTAM's. These NOTAM's remain available via Service A for the duration of their validity or until published.

2.2.2 NOTAM (L)

2.2.2.1 NOTAM (L) information includes such data as taxiway closures, personnel and equipment near or crossing runways, airport rotating beacon outages, and airport lighting aids that do not affect instrument approach criteria, such as VASI.

2.2.2.2 NOTAM (L) information is distributed locally only and is not attached to the hourly weather reports. A separate file of local NOTAM's is maintained at each FSS for facilities in their area only. NOTAM (L) information for other FSS areas must be specifically requested directly from the FSS that has responsibility for the airport concerned.

Note—DUATS vendors are not required to provide NOTAM (L) information.

2.2.3 FDC NOTAM's

2.2.3.1 On those occasions when it becomes necessary to disseminate information which is regulatory in nature, the National Flight Data Center (NFDC) in Washington, D.C., will issue an FDC NOTAM. FDC NOTAM's contain such things as amendments to published IAP's and other current aeronautical charts. They are also used to advertise temporary flight restrictions caused by such things as natural disasters or large scale public events that may generate a congestion of air traffic over a site.

2.2.3.2 FDC NOTAM's are transmitted via Service A only once and are kept on file at the FSS until published or canceled. FSS's are responsible for maintaining a file of current, unpublished FDC NOTAM's concerning conditions within 400 miles of their facilities. FDC information concerning conditions that are more than 400 miles from the FSS, or that is already published, is given to a pilot only on request.

Note 1—DUATS vendors will provide FDC NOTAM's only upon site-specific requests using a location identifier.

Note 2—NOTAM data may not always be current due to the changeable nature of the National Airspace System components, delays inherent in processing the information, and occasional temporary outages of the United States NOTAM System. While en route, pilots should contact FSS's and obtain updated information for their route of flight and destination.

2.3 An integral part of the NOTAM System is the biweekly Notice to Airmen publication. Data is included in this publication to reduce congestion on the telecommunications circuits and, therefore, is not available via Service A. Once published, this information is not provided during pilot weather briefings unless specifically requested by the pilot. This publication contains two sections:

2.3.1 The first section consists of notices which meet the criteria for NOTAM (D), and are expected to remain in effect for an extended period, and FDC NOTAM's current at the time of publication. Occasionally, some NOTAM (L) and other unique information is included in this section when it will contribute to flight safety.

2.3.2 The second section contains special notices that are too long or concern a wide or unspecified geographic area and are not suitable for inclusion in the first section. The content of these notices vary widely and there are no specific criteria for their inclusion, other than their enhancement of flight safety.

2.3.3 The number of the last FDC NOTAM included in the publication is noted on the first page to aid the user in updating the listing contained, with any FDC NOTAM's which may have been issued between the cutoff date and the date the publication is received. All information contained will be carried until the information expires, is canceled, or in the case of permanent conditions, is published in other publications, such as the A/FD.

2.3.4 All new notices entered, excluding FDC NOTAM's, will be published only if the information is expected to remain in effect for at least 7 days after the effective date of the publication.

2.4 NOTAM information is not available from a Supplemental Weather Service Location (SWSL).

3. FLIGHT PLAN REQUIREMENTS

Flight plans are required for flights into airspace controlled by an ATC facility. Class A, B, C, D and E airspace is defined in

RAC 3-4. (See RAC 3.1; 3, for detailed flight plan illustration.)
The types of flight plans in U.S. airspace are;

Visual Flight Rules (VFR
Defense Visual Flight Rules (DVFR
Instrument Flight rules (IFR)
Composite Flight Plan Visual-Instrument Flight Rules (VFR-IFR)
IFR flight plans requesting VFR operations

Note—ICAO flight plans are required whenever the flight intends to cross an international boundary or an oceanic CTA/FIR boundary. For flights departing U.S. airports and operate over U.S. domestic airspace and/or offshore control areas, but do not penetrate the oceanic CTA/FIR boundary or borders, a U.S. domestic flight plan is preferred.

3.1 Flight Plan—VFR Flights

3.1.1 Except for operations in or penetrating a Coastal or Domestic ADIZ or DEWIZ (see RAC 8), a flight plan is not required for VFR flight; however, it is strongly recommended that one be filed.

3.1.2 To obtain maximum benefits of the flight plan program, flight plans should be filed directly with the nearest flight service station. for your convenience, FSS's provide one-call (telephone/interphone) or one-stop (personal) aeronautical and meteorological briefings while accepting flight plans. Radio may be used to file if no other means are available. Also, some states operate aeronautical communications facilities which will accept and forward flight plans to the FSS for further handling.

3.1.3 When a "stopover" flight is anticipated to cove an extended period of time, it is recommended that a separate flight plan be filed for each "leg" when the stop is expected to be more than one hour duration.

3.1.4 Pilots are encouraged to give their departure times directly to the flight service station serving the departure airport or as otherwise indicated by the FSS when the flight plan is filed. This will ensure more efficient flight plan service and permit the FSS to advise you of significant changes in aeronautical facilities or meteorological conditions. When a VFR flight plan is filed, it will be held by the FSS until one hour after the proposed departure time and then canceled unless:

a. The actual departure time is received.

b. A revised proposed departure time is received.

c. At a time of filing, the FSS is informed that the proposed departure time will be met, but actual time cannot be given because of inadequate communications (assumed departures).

3.1.5 On pilot's request, at a location having an active tower, the aircraft identification will be forwarded by the tower to the FSS for reporting the actual departure time. This procedure should be avoided at busy airports.

3.1.6 Although position reports are not required for VFR flight plans, periodic reports to FAA Flight Service Stations along the route are good practice. Such contacts permit significant information to be passed to the transiting aircraft and also serve to check the progress of the flight should it be necessary for any reason to locate the aircraft.

Example 1:
Bonanza 31K, over Kingfisher at (time), VFR flight plan, Tulsa to Amarillo.

Example 2:
Cherokee 5123J, over Oklahoma city at (time), Shreveport to Denver, no flight plan.

3.1.7 Pilots not operating on an IFR flight plan, and when in level cruising flight, are cautioned to conform with VFR cruising altitudes appropriate to direction of flight.

3.1.8 Indicate aircraft equipment capabilities when filing VFR flight plans by appending the appropriate suffix to aircraft type in the same manner as that prescribed for IFR flight (see FLIGHT PLAN-IFR FLIGHTS 3.3.5.1 Block 3). Under some circumstances, ATC computer tapes can be useful in constructing the radar history of a downed or crashed aircraft. In each case, knowledge of the aircraft's transponder equipment is necessary in determining whether or not such computer tapes might prove effective.

3.1.9 *Flight Plan Form*

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
					PROPOSED (Z)	ACTUAL (Z)	
☐ VFR ☐ IFR ☐ DVFR			KTS				

8 ROUTE OF FLIGHT

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

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

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

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

3.1.10 *Explanation of VFR Flight plan items*

Block 1. Check the type flight plan. Check both the VFR and IFR blocks if composite VFR/IFR.

Block 2. Enter your complete aircraft identification including the prefix "N" if applicable.

Block 3. Enter the designator for the aircraft or, if unknown, the aircraft manufacturer's name.

Block 4. Enter your true airspeed (TAS).

Block 5. Enter the departure airport identifier code (or the name if identifier is unknown).

Block 6. Enter the proposed departure time in Coordinated Universal Time (UTC). If airborne, specify the actual or proposed departure time as appropriate.

Block 7. Enter the appropriate VFR altitude (to assist the briefer in providing weather/wind information).

Block 8. Define the route of flight by using NAVAID identifier codes and airways.

Block 9. Enter the destination airport identifier code (or name if identifier is unknown). Include the city name (or even the state name) if needed for clarity.

Block 10. Enter your estimated time en route, in hours and minutes.

Block 11. Enter only those remarks pertinent to ATC or to the clarification of other flight plan information such as the appropriate radiotelephony (call sign) associated with the designator filled in Block 2. Items of a personal nature are not accepted.

Block 12. Specify the fuel on board, in hours and minutes.

Block 13. Specify an alternate airport if desired.

Block 14. Enter your complete name, address, and telephone number. Enter sufficient information to identify home base, airport, or operator. This information is essential in the event of search and rescue operations.

Block 15. Enter total number of persons on board including crew (POB).

Block 16. Enter the predominant color(s).

Block 17. Record the FSS name for closing the flight plan. If the flight plan is closed with a different FSS or a Air Traffic facility, state the recorded FSS name that would normally have closed your flight plan. **(Optional)**—Record a destination telephone number to assist Search and Rescue contact should you fail to report or cancel your flight plan within 1/2 hour after your estimated time of arrival (ETA). *Caution: A control tower at destination point does not automatically close VFR flight plans, it remains the responsibility of a pilot to close his own flight plan.*

Note—The information transmitted to the destination FSS will consist only of flight plans blocks 2,3,9, and 10. Estimated time en route (ETE) will be converted to the correct estimated time of arrival (ETA).

3.2 Flight Plan—Defense VFR (DVFR) FLIGHTS

VFR flights into a Coastal or Domestic ADIZ/DEWIZ are required to file DVFR flight plans for security purposes. Detailed ADIZ procedures are found in RAC 8. (See Far 99.)

3.3 Flight Plan—IFR Flights

3.3.1 *General*

3.3.1.1 Prior to departure from within, or prior to entering Class A, B, C, D and E airspace, a pilot must submit a complete flight plan and receive an air traffic clearance if weather condi-

tions are below VFR minimums. Instrument flight plans may be submitted to the nearest Flight Service Station or the airport traffic control tower either in person or by telephone (or by radio if no other means are available). Pilots should file IFR flight plans at least 30 minutes prior to estimated time of departure to preclude possible delay in receiving a departure to preclude possible delay in receiving a departure clearance from ATC. To minimize your delay in entering a Class B, C, D or E surface area at destination when IFR weather conditions exist or are forecast at the airport, an IFR flight plan should be filed before departure. Otherwise, a 30-minute delay is not unusual in receiving an ATC clearance because of time spent in processing flight plan data. Traffic saturation frequently prevents control personnel from accepting flight plans by radio. In such cases the pilot is advised to contact the nearest flight services station for the purpose of filing the flight plan.

Note—There are several methods of obtaining IFR clearance at nontower, nonflight service stations and outlying airports. The procedure may vary due to geographical features, weather conditions, and the complexity of the ATC system. To determine the most effective means of receiving an IFR clearance, pilots should ask the nearest flight service station for the most appropriate means of obtaining the IFR clearance.

3.3.1.2 When filing an IFR flight plan for a Traffic Alert and Collision Avoidance System (TCAS)/heavy equipped aircraft, add the prefix "T" for TCAS, "H" for Heavy, or "B" for both TCAS and heavy to the aircraft type.

Example:
H/DC10/U T/B727/A B/747/R

3.3.1.3 When filing an IFR flight plan for flight in an aircraft equipped with a radar beacon transponder, DME equipment, TACAN-only equipment or an combination of both, identify equipment capability by adding a suffix to the AIRCRAFT TYPE preceded by a slant, as follows:

- /X no transponder
- /T transponder with no altitude encoding capability.
- /U transponder with altitude encoding capability.
- /D DME, no transponder.
- /B DME, transponder with no altitude encoding capability.
- /A DME, transponder with altitude encoding capability.
- /M TACAN-only, no transponder
- /N TACAN-only, transponder with no altitude encoding capability.
- /P TACAN-only, transponder with altitude encoding capability.
- /C RNAV, transponder with no altitude encoding capability.
- /R RNAV, transponder with altitude encoding capability.
- /W RNAV, no transponder.
- /G Flight Management System (FMS) and Electronic Flight Instrument System (EFIS) equipped aircraft with /R capability having a "Special Aircraft and Aircrew Authorization" issued by the FAA.

Note 1—Criteria for use of the /G designation is presently indentified only for certain /R equipped air carrier aircraft and specially qualified crews. Authorization for use of the "/G" designation is obtained through the All-Weather Operations Branch of the FAA Flight Standards Service and an air carrier's certificate holding district office.

Note 2—The use of "/G" is limited to aircraft which operate totally within airspace controlled by U.S. air traffic control facilities.

3.3.1.4 It is recommended that pilots file the maximum transponder/navigation capability of their aircraft in the equipment suffix. This will provide air traffic control with the necessary information to utilize all facets of navigational equipment and transponder capabilities available. In the case of area navigation equipped aircraft, pilots should file the /C, /R, or /W capability of the aircraft even though an RNAV route or random RNAV route has not been requested. This will ensure ATC awareness of the pilot's ability to navigate point-to-point and may by utilized to expedite the flight.

Note—The suffix is not to be added to the aircraft identification or be transmitted by radio as part of the aircraft identification.

3.3.2 *Airways/Jet Routes Depiction on Flight Plan*

3.3.2.1 It is vitally important that the route of flight be accurately and completely described in the flight plan. To simplify definition of the proposed route, and to facilitate air traffic control, pilots are requested to file via airways or jet routes established for use at the altitude or flight level planned.

3.3.2.2 If flight is to be conducted via designated airways or jet routes, describe the route by indicating the type and number designators of the airway(s) or jet route(s) requested. If more than one airway or jet route is to be used, clearly indicate points of transition. If the transition is made at an unnamed intersection, show the next succeeding NAVAID or named intersection on the intended route and the complete route from that point. Reporting points should be identified by using authorized name/code as depicted on appropriate aeronautical charts. The following two examples illustrate the need to specify the transition point when two routes share more than one transition fix.

Example 1:
ALB J37 BUMPY J14 BHM
Spelled out: From Albany, New York, via Jet Route 37, transitioning to Jet Route 14 at BUMPY intersection, thence via Jet Route 14 to Birmingham, Alabama.

Example 2:
ALB J37 ENO J14 BHM
Spelled Out: From Albany, New York, via Jet Route 37 transitioning to Jet Route 14 at Kenton VORTAC (ENO), thence via Jet Route 14 to Birmingham, Alabama.

3.3.2.2.1 The route of flight may also be described by naming the reporting points or NAVAID's over which the flight will pass, provided the points named are established for use at the altitude or flight level planned.

Example:
BWI V44 SWANN V433 DQO
Spelled Out: From Baltimore-Washington International, via Victor 44 to SWANN Intersection, transitioning to Victor 433 at SWANN, thence via V433 to Dupont.

3.3.2.2.2 When the route of flight is defined by named reporting points, whether alone or in combination with airways or jet routes, and the navigational aids (VOR, VORTAC, TACAN, LF, RBN) to be used for the flight are a combination of different types of aids, enough information should be included to clearly indicate the route requested.

Example:
LAX J5 LKV J3 GEG YXC FL 330 J500 VLR J515 YWG
Spelled Out: From Los Angeles International via Jet Route 5 Lakeview, Jet Route 3 Spokane, direct Cranbrook, British

Columbia VOR/DME, Flight Level 330, Jet Route 500 to Langruth, Manitoba VORTAC, Jet Route 515 to Winnipeg, Manitoba.

3.3.2.2.3 When filing IFR, it is to the pilot's advantage to file a "preferred route."

Note—Preferred IFR routes are described and tabulated in the Airport/Facility Directory.

3.3.2.2.4 ATC may issue Standard Instrument Departure (SID) or a Standard Terminal Arrival (STAR) as appropriate (See RAC 4).

Note—Pilots not desiring a SID/STAR should so indicate in the remark section of the flight plan as "NO SID" or "NO STAR."

3.3.3 *Direct Flights*

3.3.3.1 All or any portions of the route which will not be flown on the radials/courses of established airways or routes; e.g., direct route flights, must be defined by indicating the radio fixes over which the flight will pass. Fixes selected to define the route shall be those over which the position of the aircraft can be accurately determined. Such fixes automatically become compulsory reporting points for the flight, unless advised otherwise by ATC. Only those navigational aids established for use in a particular structure; i.e., in the Low or High structures, may be used to define the en route phase of a direct flight within that structure.

3.3.3.2 The azimuth feature of VOR aids and the azimuth and distance (DME) features of VORTAC/TACAN aids are assigned certain frequency protected areas of airspace which are intended for application to established airway and route use, and to provide guidance for planning flights outside of established airways or routes. These areas of airspace are expressed in terms of cylindrical service volume of specified dimensions called "class limits" or "categories." An operational service volume has been established for each class in which adequate signal coverage and frequency protection can be assured. To facilitate use of VOR, VORTAC, or TACAN aids, consistent with their operational service volume limits, pilot use of such aids for defining a direct route of flight in Class A, B, C, D and E airspace should not exceed the following:

(1) Operations above Flight Level 450—Use aids not more than 200 nautical miles apart. These aids are depicted on the Enroute High Altitude Chart—U.S.

(2) Operation off established routes from 18,000 feet MSL to Flight Level 450—Use aids not more than 260 nautical miles apart. These aids are depicted on the Enroute High Altitude Chart—U.S.

(3) Operation off established airways below 18,000 feet MSL—Use aids not more than 80 nautical miles apart. These aids are depicted on the Enroute Low Altitude Chart—U.S.

(4) Operation off established airways between 14,500 feet MSL and 17,999 feet MSL in the conterminous United States—(H) facilities not more than 200 NM apart may be used.

3.3.3.3 Increasing use of self-contained airborne navigational systems which do not rely on the VOR/VORTAC/TACAN system has resulted in pilot requests for direct routes which exceed NAVAID service volume limits. These direct route requests will be approved only in a radar environment, with approval based on pilot responsibility for navigation on the authorized direct route. "Radar flight following" will be provided by ATC for air traffic control purposes.

3.3.3.4. At times, ATC will initiate a direct route in a radar environment which exceeds NAVAID service volume limits. In such cases ATC will provide radar monitoring and navigational assistance as necessary.

3.3.3.5. Airway or jet route numbers, appropriate to the stratum in which operation will be conducted, may also be included to describe portions of the route to be flown.

Example:

MDW V262 BDF V10 BRL STJ SLN GCK

Spelled Out: From Chicago Midway Airport via Victor 262 to Bradford, Victor 10 to Burlington, Iowa, direct St. Joseph, Missouri, direct Salina, Kansas, direct Garden City, Kansas.

Note—When route of flight is described by radio fixes, the pilot will be expected to fly a direct course between the points named.

3.3.3.6. Pilots are reminded that they are responsible for adhering to obstruction clearance requirements on those segments of direct routes that are outside of Class A, B, C, D and E airspace. The MEA's and other altitudes shown on Low Altitude IFR Enroute Charts pertain to those route segments within Class A, B, C, D and E airspace, and those altitudes may not meet obstruction clearance criteria when operating off those routes.

3.3.4 *Area Navigation (RNAV)*

3.3.4.1 Random RNAV routes can only be approved in a radar environment. Factors that will be considered by ATC in approving random RNAV routes include the capability to provide radar monitoring and compatibility with traffic volume and flow. ATC will radar monitor each flight, however, navigation on the random RNAV route is the responsibility of the pilot.

3.3.4.2 To be certified for use in the National Airspace System, RNAV equipment must meet the specifications outlined in AC 90-45. The pilot is responsible for variations in equipment capability, and must advise ATC if a RNAV clearance can not be accepted as specified. The controller need only be concerned that the aircraft is RNAV equipped; if the flight plan equipment suffix denotes RNAV capability, the RNAV routing can be applied.

3.3.4.3 Pilots of aircraft equipped with operational area navigation equipment may file for random RNAV routes throughout the National Airspace System, where radar monitoring by ATC is available, in accordance with the following procedures.

(1) File airport to airport flight plans prior to departure.

(2) File the appropriate RNAV capability certification suffix in the flight plan.

(3) Plan the random route portion of the flight plan to begin and end over appropriate arrival/departure transition fixes or appropriate navigation aids for the altitude stratum within which the flight will be conducted. The use of normal preferred departure and arrival routes (SID/STAR), where established, is recommended.

(4) File route structure transitions to and from the random route portion of the flight.

(5) Define random routes by waypoints. File route description waypoints by using degree-distance fixes based on navigational aids which are appropriate for the altitude stratum.

(6) File a minimum of one route description waypoint for each ARTCC through whose area the random route will be flown. These waypoints must be located within 200 NM of the preceding center's boundary.

(7) File an additional route description waypoint for each turnpoint in the route.

(8) Plan additional route description waypoints as required to ensure accurate navigation via the filed route of flight. Navigation is the pilots's responsibility unless ATC assistance is requested.

(9) Plan the route of flight so as to avoid Prohibited and Restricted Airspace by 3 NM unless permission has been obtained to operate in that airspace and the appropriate ATC facilities are advised.

3.3.4.4 Pilots of aircraft equipped with latitude/longitude coordinate navigation capability independent of VOR/TACAN references may file for random RNAV routes at and above FL 390 within the conterminous United States using the following procedures.

(1) File airport to airport flight plans prior to departure.

(2) File the appropriate RNAV capability certification suffix in the flight plan.

(3) Plan the random route portion of the flight to begin and end over published departure/arrival transition fixes or appropriate navigation aids for airports without published transition procedures. The use of preferred departure and arrival routes, such as SID and STAR where established, is recommended.

(4) Plan the route of fight so as to avoid prohibited and restricted airspace by 3 NM unless permission has been obtained to operate in that airspace and the appropriate ATC facility is advised.

(5) Define the route of flight after the departure fix, including each intermediate fix (turnpoint) and the arrival fix for the destination airport, in terms of latitude/longitude coordinates plotted to the nearest minute. The arrival fix must be identified by both the latitude/longitude coordinates and a fix identifier.

Example:

a	b	c	d	e
MIA	SRQ	3407/10615	3407/11546 TNP	LAX

a. Departure airport

b. Departure fix

c. Intermediate fix (turning point)

d. Arrival fix

e. Destination airport.

(6) Record latitude/longitude coordinates by four figures describing latitude in degrees and minutes followed by a solidus and five figures describing longitude in degrees and minutes.

(7) File at FL 390 or above for the random RNAV portion of the flight.

(8) Fly all routes/route segments on Great Circle tracks.

(9) Make any in-flight requests for random RNAV clearances or route amendments to an en route ATC facility.

3.3.5 *Flight Plan Form*

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
					PROPOSED (Z)	ACTUAL (Z)	
☐ VFR							
☐ IFR							
☐ DVFR			KTS				

8. ROUTE OF FLIGHT

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

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

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

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

3.3.5.1 *Explanation of IFR Flight plan items*

Block 1. Check the type flight plan. Check both the VFR and IFR blocks if composite VFR/IFR.

Block 2. Enter your complete aircraft identification including the prefix "N" if applicable.

Block 3. Enter the designator for the aircraft or, if unknown, the aircraft manufacturer's name; e.g., Cessna, followed by a slant (/) and the transponder/DME equipment code letter; e.g., C-182U. Heavy aircraft add prefix "H" to aircraft type: Example: H/DC10/U.

Block 4. Enter your computer true airspeed (TAS). Note: If the average TAS changes plus or minus 5 percent or 10 knots, whichever is greater, advise ATC.

Block 5. Enter the departure airport identifier code (or the name if identifier is unknown). Note: Use of identifier codes will expedite the processing of your flight plan.

Block 6. Enter the proposed departure time in Coordinated Universal Time (UTC) (Z). If airborne, specify the actual or proposed departure time as appropriate.

Block 7. Enter the requested en route altitude or flight level. Note: Enter only the initial requested altitude in this block. When more than one IFR altitude or flight level is desired along the route of flight, it is best to make a subsequent request direct to the controller.

Block 8. Define the route of flight by using NAVAID identifier codes (or names if the code is unknown), airways, jet routes, and waypoints (for RNAV). Note: Use NAVAID's or Waypoints to define direct routes and radials/bearing to define other unpublished routes.

Block 9. Enter the destination airport identifier code (or name if identifier is unknown).

Block 10. Enter your estimated time en route based on latest forecast winds.

Block 11. Enter only those remarks pertinent to ATC or to the clarification of other flight plan information such as the appropriate radiotelephony (call sign) associated with the designator filled in Block 2. Items of a personal nature are not accepted. Do not assume that remarks will be automatically transmitted to every controller. Specific ATC or en route requests should be made directly to the appropriate controller.

Block 12. Specify the fuel on board, computed from the departure point.

Block 13. Specify an alternate airport if desired or required, but do not include routing to the alternate airport.

Block 14. Enter your complete name, address, and telephone number of pilot in command or, in the case of a formation flight, the information commander. Enter sufficient information to identify home base, airport, or operator. Note: This information would be essential in the event of a search and rescue operation.

Block 15. Enter the total number of persons on board including crew.

Block 16. Enter the predominant color(s).

Note—Close IFR flight plans with tower, approach control, ARTCC's, or if unable, with FSS. When landing at an airport with a functioning control tower, IFR flight plans are automatically canceled.

3.3.5.2 The information transmitted to the ARTCC for IFR Flight Plans will consist of only flight plan blocks 2, 3, 4, 5, 6, 7, 8, 9, 10, and 11.

3.3.5.3 A description of the International Flight Plan Form is contained in the International Flight Information Manual.

3.4 IFR Operations to High Altitude Destinations

3.4.1 Pilots planning IFR flights to airports located in mountainous terrain are cautioned to consider the necessity for an alternate airport even when the forecast weather conditions would technically relieve them from the requirement to file one (Reference: FAR 91.167). The FAA has identified three possible situations where the failure to plan for an alternate airport when flying IFR to such destination airport could result in a critical situation if the weather is less than forecast and sufficient fuel is not available to proceed to a suitable airport.

3.4.2 An IFR flight to an airport where the MDA's or landing visibility minimums for ALL INSTRUMENT APPROACHES are higher than the forecast weather minimums specified in FAR 91.167. For example, there are 11 high altitude airports in the United States with approved instrument approach procedures where all of the Minimum Descent Altitudes (MDA's) are greater than 2,000 feet and/or the landing visibility minimums are greater than 3 miles (Bishop, California; South Lake Tahoe, California; Ukiah, California; Aspen-Pitkin Co./Sardy Field, Colorado; Butte, Montana; Helena, Montana; Missoula, Montana; Chadron, Nebraska; Ely, Nevada; Klamath Falls, Oregon; and Omak, Washington). In the case of these 11 airports, it is possible for a pilot to elect, on the basis of forecasts, not to carry sufficient fuel to get to an alternate when the ceiling and/or visibility is actually lower than that necessary to complete the approach.

3.4.3 A small number of other airports in mountainous terrain have MDA's which are slightly (100 to 300 feet) below 2000 feet AGL. In situations where there is an option as to whether to plan for an alternate, pilots should bear in mind that just a slight worsening of the weather conditions from those forecasts could place the airport below the published IFR landing minimums.

3.4.4 An IFR flight to an airport which requires special equipment; i.e. DME, glide slope, etc., in order to make the available approaches to the lowest minimums. Pilots should be aware that all other minimums on the approach charts may require weather conditions better than those specified in FAR 91.167. An inflight equipment malfunction could result in the inability to comply with the published approach procedures or, again, in the position of having the airport below the published IFR landing minimums for all remaining instrument approach alternatives.

3.5 Composite Flight Plan (VFR/IFR Flights)

3.5.1 Flight plans which specify VFR operation for one portion of a flight, and IFR for another portion, will be accepted by the FSS at the point of departure. If VFR flight is conducted for the first portion of the flight, the pilot should report his departure time to the FSS with which he filed his VFR/IFR flight plan; and, subsequently, close the VFR portion and request ATC clearance from the FSS nearest the point at which change from VFR to IFR is proposed. Regardless of the type facility you are communicating with (FSS, center, or tower), it is the pilot's responsibility to request that facility to "CLOSE VFR FLIGHT PLAN." The pilot must remain in VFR weather conditions until operating in accordance with the IFR clearance.

3.5.2 When a flight plan indicates IFR for the first portion of flight and VFR for the latter portion, the pilot will normally be cleared to the point at which the change is proposed. Once the pilot has reported over the clearance limit and does not desire further IFR clearance, he should advise Air Traffic Control to cancel the IFR portion of his flight plan. Then, he should contact the nearest FSS to activate the VFR portion of his flight plan. If the pilot desires to continue his IFR flight plan beyond the clearance limit, he should contact Air Traffic Control at least five minutes prior to the clearance limit and request further IFR clearance. If the requested clearance is not received prior to reaching the clearance limit fix, the pilot will be expected to establish himself in a standard holding pattern on the radial/course to the fix unless a holding pattern for the clearance limit fix is depicted on a U.S. Government or commercially produced (meeting FAA requirements) Low/High Altitude Enroute, Area, or STAR chart. In this case the pilot will hold according to the depicted pattern

4. INITIATING A CHANGE TO FLIGHT PLANS ON FILE

4.1 Changes to proposed flight plans should be initiated through the Flight Service Station with which the flight plan was originally filed. if this is not possible, initiate changes through the nearest FSS or ATC facility. All changes should be initiated at least 30 minutes prior to departure to insure that the change can be effected prior to the ATC clearance delivery.

4.1.1 *Change in Proposed Departure time*

4.1.1.1 To prevent computer saturation in the en route environment, time out parameters have been established to delete non-activated proposed departure flight plans. Most centers have this parameter set so as to delete these flight plans a minimum of 1 hour after the proposed departure time. To ensure that a flight plan remains active, pilots whose actual departure time will be delayed 1 hour or more beyond their filed departure time, are requested to notify ATC of their departure time.

4.1.1.2 Due to traffic saturation, control personnel frequently will be unable to accept these revisions via radio. It is recommended that you forward these revisions to the nearest flight service station.

4.1.2 *Other Changes*

In addition to altitude/flight level, destination and/or route changes, increasing or decreasing the speed of an aircraft constitutes a change in a flight plan. Therefore, at any time the average true airspeed at cruising altitude between reporting points varies or is expected to vary from that given in the flight plan by *plus or minus 5 percent, or 10 knots, whichever is greater,* air traffic control should be advised.

5. CANCELING FLIGHT PLANS

5.1 Closing VFR and DVFR Flight Plans

A pilot is responsible for ensuring that his VFR or DVFR flight plan is canceled (See FAR 91.153). You should close your flight plan with the nearest Flight Service Station, or if one is not available you may request any ATC facility to relay your cancellation to the FSS. *Control towers do not automatically close VFR or DVFR flight plans* as they may not be aware that a particular VFR aircraft is on a flight plan. If you fail to report or cancel your flight plan within ½ hour after your ETA, search and rescue procedures are started. (See AIP section SAR.)

5.2 Canceling IFR Flight Plan

5.2.1 FAR 91.153 includes the statement "When a flight plan has been filed, the pilot in command, upon canceling or completing the flight under the flight plan, shall notify the nearest Flight Service Station or ATC facility."

5.2.2 An IFR flight plan may be canceled at any time the flight is operating in VFR conditions outside Class A airspace by the pilot stating "CANCEL MY IFR FLIGHT PLAN" to the controller or air/ground station with which he is communicating. Immediately after canceling an IFR flight plan, a pilot should take necessary action to change to the appropriate air/ground frequency, VFR radar beacon code and VFR altitude or flight level.

5.2.3 ATC separation and information services will be discontinued, including radar services (where applicable). Consequently, if the canceling flight desires VFR radar advisory service the pilot must specifically request it.

Note—Pilots must be aware that other procedures may be applicable to a flight that cancels an IFR flight plan within an area where a special program, such as a designated Terminal Radar Service Area, Class C airspace or Class B airspace, has been established.

5.2.4 If a DVFR flight plan requirement exists the pilot is responsible for filing this flight plan to replace the canceled IFR flight plan. If a subsequent IFR operation becomes necessary, a new IFR flight plan must be filed and an ATC clearance obtained before operating in IFR conditions.

5.2.5 If operating on an IFR flight plan to an airport with a functioning control tower, the flight plan is automatically closed upon landing.

5.2.6 If operating on an IFR flight plan to an airport where there is no functioning control tower, the pilot must initiate cancellation of the IFR flight plan. This can be done after landing if there is a functioning Flight Service Station or other means of direct communications with ATC. In the event there is no Flight Service Station and air/ground communications with ATC is not possible below a certain altitude, the pilot would, weather conditions permitting, cancel his IFR flight plan while still airborne and able to communicate with ATC by radio. This will not only save the time and expense of canceling the flight plan by telephone but will quickly release the airspace for use by other aircraft.

AIRPORT OPERATIONS

1. GENERAL

1.1 Increased traffic congestion, aircraft in climb and descent attitudes, and pilots preoccupation with cockpit duties are some factors that increase the hazardous accident potential near the airport. The situation is further compounded when the weather is marginal—that is, just meeting VFR requirements. Pilots must be particularly alert when operating in the vicinity of an airport. This section defines some rules, practices, and procedures that pilots should be familiar with, and adhere to, for safe airport operations.

1.2 Each airport operator regularly serving scheduled air carriers has put into use security measures designed to prevent or deter unauthorized persons from having access to "Air Operations Area." The "Air Operations Area" means any area of the airport used or intended to be used for landing, takeoff, or surface maneuvering of aircraft. Pilots are encouraged to obtain airport security instructions by posted signs or radio communication.

2. VISUAL INDICATORS AT UNCONTROLLED AIRPORTS

2.1 At those airports without an operating control tower, a segmented circle visual indicator system, if installed, is designed to provide traffic pattern information. The segmented circle system consists of the following components:

The segmented circle—Located in a position affording maximum visibility to pilots in the air and on the ground and providing a centralized location for other elements of the system.

The wind direction indicator—A wind cone, wind sock, or wind tee installed near the operational runway to indicate wind direction. The large end of the wind cone/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 wind sock 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. These signaling devices may be located in the center of the segmented circle and may be lighted for night use. Pilots are cautioned against using a tetrahedron to indicate wind direction.

The landing direction indicator—A tetrahedron is installed when conditions at the airport warrant its use. It may be used to indicate the direction of landings and takeoffs. A tetrahedron may be located at the center of a segmented circle and may be lighted for night operations. The small end of the tetrahedron points in the direction of landing. 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. At airports with control towers, the tetrahedron should only be referenced when the control tower is not in operation. Tower instructions supersede tetrahedron indications.

Landing strip indicators—Installed in pairs as shown in the segmented circle diagram, and used to show the alignment of landing strips.

Traffic pattern indicators—Arranged in pairs in conjunction with landing strip indicators and used to indicate the direction of turns when there is a variation from the normal left traffic pattern. If there is no segmented circle installed at the airport, traffic pattern indicators may be installed on or near the end of the runway.

2.1.1 Preparatory to landing at an airport without a control tower, or when the control tower is not in operation, the pilot should concern himself with the indicator for the approach end of the runway to be used. When approaching for landing, all turns must be made to the left unless a traffic pattern indicator indicates that turns should be made to the right. If the pilot will mentally enlarge the indicator for the runway to be used, the base and final approach legs of the traffic pattern to be flown immediately become apparent. Similar treatment of the indicator at the departure end of the runway will clearly indicate the direction of turn after takeoff.

2.1.2 When two or more aircraft are approaching an airport for the purpose of landing, the aircraft at the lower altitude has the right of way, but it shall not take advantage of this rule to cut in front of another which is on final approach to land, or to overtake that aircraft. (Reference: FAR 91.113(f).)

2.1.3 Graphic Representation: Nontower Airports

See RAC 3.2, Appendix One.

3. OPERATIONS AT TOWER CONTROLLED AIRPORTS

Towers have been established to provide for a safe, orderly, and expeditious flow of traffic on and in the vicinity of an airport. When the responsibility has been so delegated, towers also provide for the separation of IFR aircraft in the terminal areas (Approach Control).

3.1 When operating to an airport where traffic control is being exercised by a control tower, pilots are required to maintain two-way radio contact with the tower while operating within the Class D airspace unless the tower authorizes otherwise. Initial call-up should be made about 15 miles from the airport. Unless there is a good reason to leave the tower frequency before exiting the Class D airspace, it is a good operating practice to remain on the tower frequency for the purpose of receiving traffic information. In the interest of reducing tower frequency congestion, pilots are reminded that it is not necessary to request permission to leave the tower frequency once outside the Class D airspace.

3.2 When necessary, the tower controller will issue clearances or other information for aircraft to generally follow the desired flight path (traffic pattern) when flying in the Class D airspace, and the proper taxi routes when operating on the ground. If not otherwise authorized or directed by the tower, pilots approach to land in an airplane must circle the airport to the left, and pi-

lots approaching to land in a helicopter must avoid the flow of fixed wing traffic. However, an appropriate clearance must be received from the tower before landing.

3.3 The following terminology for the various components of a traffic pattern has been adopted as standard for use by control towers and pilots:

Upwind leg—A flight path parallel to the landing runway in the direction of landing.

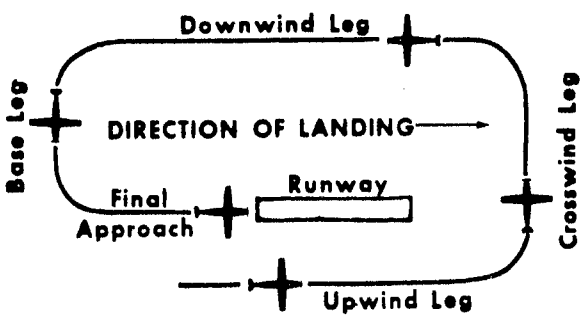
Crosswind leg—A flight path a right angles to the landing runway off its takeoff end.

Downwind leg—A flight path parallel to the landing runway in the opposite direction of landing.

Base leg—A flight path at right angles to the landing runway off its approach end and extending from the downwind leg to the intersection of the extended runway center line.

Final approach—A flight path in the direction of landing along the extended runway center line from the base leg to the runway.

3.4 Graphic Representation: Tower Airports



Note. — This diagram is intended only to illustrate terminology used in identifying various components of a traffic pattern. It should not be used as a reference or guide on how to enter a traffic pattern.

3.5 Many towers are equipped with a tower radar display. The radar uses are intended to enhance the effectiveness and efficiency of the local control, or tower, position. They are not intended to provide radar services or benefits to pilots except as they may accrue through a more efficient tower operation. The four basic uses are:

3.5.1 To determine an aircraft's exact location—This is accomplished by radar identifying the VFR aircraft through any of the techniques available to a radar position; such as having the aircraft ident. Once identified, the aircraft's position and spatial relationship to other aircraft can be quickly determined, and standard instructions regarding VFR operation in the aircraft traffic area will be issued. Once initial radar identification of a VFR aircraft has been established and the appropriate instructions have been issued, radar monitoring may be discontinued. The reason being that the local controller's primary means of surveillance in VFR conditions is usually scanning the airport and local area.

3.5.2 To provide radar traffic advisories—Radar traffic advisories may be provided to the extent that the local controller is able to monitor the radar display. Local control has primary control responsibilities to the aircraft operating on the runways which will normally supersede radar monitoring duties.

3.5.3 To provide a direction or suggested heading—The local controller may provide pilots flying VFR with generalized instructions which will facilitate operations; e.g., "PROCEED SOUTHWEST BOUND, ENTER A RIGHT DOWNWIND RUNWAY THREE ZERO;" or provide a suggested heading to establish radar identification or as an advisory aid to navigation; e.g., "SUGGESTED HEADING TWO TWO ZERO, FOR RADAR IDENTIFICATION." In both cases, the instructions are advisory aids to the pilot flying VFR and are not radar vectors. PILOTS HAVE COMPLETE DISCRETION REGARDING ACCEPTANCE OF THE SUGGESTED HEADING OR DIRECTION AND HAVE SOLE RESPONSIBILITY FOR SEEING AND AVOIDING OTHER AIRCRAFT.

3.5.4 To provide information and instructions to aircraft operating within Class D airspace—In an example of this situation, the local controller would use the radar to advise a pilot on an extended downwind when to turn base leg.

Note. — The above tower radar applications are intended to augment the standard functions of the local control position. There is no controller requirement to maintain constant radar identification and, in fact, such a requirement could compromise the local controller's ability to visually scan the airport and local area to meet FAA responsibilities to the aircraft operating on the runways and within Class D airspace. Normally, pilots will not be advised of being in radar contact since that continued status cannot be guaranteed and since the purpose of the radar identification is not to establish a link for the provision of radar services.

3.5.5 A few of the radar-equipped towers are authorized to use the radar to ensure separation between aircraft in specific situations, while still others may function as limited radar approach controls. The various radar uses are strictly a function of FAA operational need. The facilities may be indistinguishable to pilots since they are all referred to as tower and no publication lists the degree of radar use. Therefore, WHEN IN COMMUNICATION WITH A TOWER CONTROLLER WHO MAY HAVE RADAR AVAILABLE, DO NOT ASSUME THAT CONSTANT RADAR MONITORING AND COMPLETE ATC RADAR SERVICES ARE BEING PROVIDED.

3.6 Ground Control Frequencies

3.6.1 The majority of ground control frequencies are in the 121.6-121.9 MHz bandwidth. Ground control frequencies are provided to eliminate frequency congestion on the tower (local control) frequency and are limited to communications between the tower and aircraft on the ground and between the tower and utility vehicles on the airport, provide a clear VHF channel for arriving and departing aircraft. They are used for issuance of taxi information, clearances, and other necessary contacts between the tower and aircraft or other vehicles operated on the airport. A pilot who has just landed should not change from the tower frequency to the ground control frequency until he is directed to do so by the controller. Normally, only one ground control frequency is assigned at an airport; however, at locations where the amount of traffic so warrants, a second ground control frequency and/or another frequency designated as a clearance delivery frequency may be assigned.

3.6.2 A controller may omit the ground or local frequency if the controller believes the pilot knows which frequency is in use. If the ground control frequency is in the 121 MHz bandwidth, the controller may omit the numbers preceding the decimal point; e.g., 121.7, "CONTACT GROUND POINT

SEVEN." However, if any doubt exists as to what frequency is in use, the pilot should promptly request the controller to provide that information.

3.6.3 Controllers will normally avoid issuing a radio frequency change to helicopters, known to be single-piloted, which are hovering, air taxiing, or flying near the ground. At times, it may be necessary for pilots to alert ATC regarding single pilot operations to minimize delay of essential ATC communications. Whenever possible, ATC instructions will be relayed through the frequency being monitored until a frequency change can be accomplished. You must promptly advise ATC if you are unable to comply with a frequency change. Also, you should advise ATC if you must land to accomplish the frequency change unless it is clear the landing, e.g., on a taxiway or in a helicopter operating area, will have no impact on other air traffic

3.7 Tower Control Light Signals

3.7.1 The following procedures are used by airport traffic control towers in the control of aircraft, ground vehicles, equipment, and personnel not equipped with radio. These same procedures will be used to control aircraft, ground vehicles, equipment, and personnel equipped with radio if radio contact cannot be established. Airport traffic control personnel use a directive traffic control signal which emits an intense narrow beam of a selected color (either red, white, or green) when controlling traffic by light signals.

3.7.2 Although the traffic signal light offers the advantage that some control may be exercised over nonradio-equipped aircraft, pilots should be cognizant of the disadvantages which are:

3.7.2.1 The pilot may not be looking at the control tower at the time a signal is directed toward him.

3.7.2.2 The directions transmitted by a light signal are very limited since only approval of a pilot's anticipated actions may be transmitted. No supplement or explanatory information may be transmitted except by the use of the "General Warning Signal" which advises the pilot to be on the alert.

3.7.3 Between sunset and sunrise, a pilot wishing to attract the attention of the control tower should turn on a landing light and taxi the aircraft into a position, clear of the active runway, so that light is visible to the tower. The landing light should remain on until appropriate signals are received from the tower.

3.7.4 Air Traffic Control Tower Light Gun Signals:

COLOR AND TYPE OF SIGNAL	MOVEMENT OF VEHICLES EQUIPMENT AND PERSONNEL	AIRCRAFT ON THE GROUND	AIRCRAFT IN FLIGHT
Steady green	Cleared to cross, proceed, or go	Cleared for takeoff	Cleared to land
Flashing green	Not applicable	Cleared for taxi	Return for landing (to be followed by steady green at the proper time)
Steady red	STOP	STOP	Give way to other aircraft and continue circling
Flashing red	Clear the taxiway/runway	Taxi clear of the runway in use	Airport unsafe, do not land
Flashing white	Return to starting point on airport	Return to starting point on airport	Not applicable
Alternating red and green	Exercise extreme caution	Exercise extreme caution	Exercise extreme caution

3.7.5 During daylight hours, acknowledge tower transmissions or light signals by moving the ailerons or rudder. At night, acknowledge by blinking the landing or navigation lights. If radio malfunction occurs after departing the parking area, watch the tower for light signals or monitor tower frequency.

3.8 Communications With Tower When Aircraft Transmitter/Receiver or Both Are Inoperative

3.8.1 Arriving Aircraft

3.8.1.1 Receiver inoperative—If you have reason to believe your receiver is inoperative, remain outside or above Class D airspace until the direction and flow of traffic has been determined; then, advise the tower of your type aircraft, position, altitude, intention to land, and request that you be controlled with light signals. When you are approximately 3 to 5 miles from the airport, advise the tower of your position and join the airport traffic pattern. From this point on, watch the tower for light signals. Thereafter, if a complete pattern is made, transmit your position when downwind and/or turning base leg.

3.8.1.2 Transmitter inoperative—Remain outside or above Class D airspace until the direction and flow of traffic has been determined, then join the airport traffic pattern. Monitor the primary local control frequency as depicted on Sectional Charts for landing or traffic information, and look for a light signal which may be addressed to your aircraft. During hours of daylight, acknowledge tower transmissions or light signals by rocking your wings. At night, acknowledge by blinking the landing or navigational lights.

Note. — To acknowledge tower transmissions during daylight hours, hovering helicopters will turn in the direction of the controlling facility and flash the landing light. While in flight, helicopters should show their acknowledgment of receiving a transmission by making shallow banks in opposite directions. At night, helicopters will acknowledge receipt of transmissions by flashing either the landing or the search light.

3.8.1.3 Transmitter and receiver inoperative—Remain outside or above Class D airspace until the direction and flow of traffic has been determined, then join the airport traffic pattern and maintain visual contact with tower to receive light signals.

3.8.2 Departing Aircraft

3.8.2.1 If you experience radio failure prior to leaving the parking area, make every effort to have the equipment repaired. If you are unable to have the malfunction repaired, call the tower by telephone and request authorization to depart without two-way radio communications. If tower authorization is granted, you will be given departure information and requested to monitor the tower frequency or watch for light signals, as appropriate. During daylight hours, acknowledge tower transmissions or light signals by moving the ailerons or rudder. At night, acknowledge by blinking the landing or navigation lights. If radio malfunction occurs after departing the parking area, watch the tower for light signals or monitor tower frequency.

4. AIRPORT TRAFFIC PATTERNS

4.1 At most airports and military air bases, traffic pattern altitudes for propeller driven aircraft generally extend from 600 feet to as high as 1,500 feet above the ground. Also traffic pattern altitudes for military turbojet aircraft sometimes extend up to 2,500 feet above the ground. Therefore, pilots of en route aircraft should be constantly on the alert for other aircraft in traffic patterns and avoid these areas whenever possible. Traffic pattern altitudes should be maintained unless otherwise required by the applicable distance from cloud criteria (FAR 91.155).

4.2 Unexpected Maneuvers in Traffic Patterns

There have been several incidents in the vicinity of controlled airports that were caused primarily by aircraft executing unexpected maneuvers. ATC service is based upon observed or known traffic and airport conditions. Controllers establish the sequence of arrive and departing aircraft by requiring them to adjust flight as necessary to achieve proper spacing. These adjustments can only be based on observed traffic, accurate pilot reports, and anticipated aircraft maneuvers. Pilots are expected to cooperate so as to preclude disruption of traffic flow or creation of conflicting patterns. The pilot in command of an aircraft is directly responsible for and is the final authority as to the operation of that aircraft. On occasion it may be necessary for a pilot to maneuver his aircraft to maintain spacing with the traffic he has been sequenced to follow. The controller can anticipate minor maneuvering such as shallow "S" turns. The controller cannot, however, anticipate a major maneuver such as a 360 degree turn. If a pilot makes a 360 degree turn after he has obtained a landing sequence, the result is usually a gap in the landing interval and more importantly it causes a chain reaction which may result in a conflict with following traffic and interruption of the sequence established by the tower or approach controller. Should a pilot decide he needs to make maneuvering turns to maintain spacing behind a preceding aircraft, he should always advise the controller if at all possible. Except when requested by the controller or in emergency situations, a 360 degree turn should never be executed in the traffic pattern or when receiving radar service without first advising the controller.

5. RUNWAY USAGE

5.1 Runways are identified by numbers which indicate the nearest 10-degree increment of the azimuth of the runway centerline. For example, where the magnetic azimuth is 183 degrees, the runway designation would be 18; for a magnetic azimuth of 87 degrees, the runway designation would be 9. For a magnetic azimuth ending in the number 5, such as 185, the runway designation could be either 18 or 19. Wind direction issued by the tower is also magnetic and wind velocity is in knots.

5.2 Airport proprietors are responsible for taking the lead in local aviation noise control. Accordingly, they may propose specific noise abatement plans to the FAA. If approved, these plans are applied in the form of Formal or Informal Runway Use Programs for noise abatement purposes.

5.2.1 At airports where no runway use program is established, ATC clearance may specify:

a. The runway most nearly aligned with the wind when it is five knots or more;

b. The "calm wind" runway when wind is less than five knots, or;

c. Another runway if operationally advantageous.

Note. — It is not necessary for a controller to specifically inquire if the pilot will use a specific runway or to offer him a choice of runways. If a pilot prefers to use a different runway than that specified or the one most nearly aligned with the wind, he is expected to inform ATC accordingly.

5.2.2 At airports where a runway use program is established, ATC will assign runways deemed to have the least noise impact. If in the interest of safety a runway different than that specified is preferred, the pilot is expedited to advise ATC accordingly. ATC will honor such requests and advise pilots when the requested runway is noise sensitive. When use of a runway other that the one assigned is requested, pilot cooperation is encouraged to preclude disruption of traffic flows or creation of conflicting patterns.

5.3 At some airports, the airport proprietor may declare that sections of a runway at one or both ends are not available for landing or takeoff. For these airports, the declared distance of runway length available for a particular operation is published in the Airport/Facility Directory. Declared distances TORA, TODA, ASDA, and LDA are defined in the Pilot/Controller Glossary. These distances are calculated by adding to the full length of paved runway any applicable clearway or stopway and subtracting from that sum the sections of the runway unsuitable for satisfying the required takeoff run, takeoff, accelerate/stop, or landing distance.

6. LOW LEVEL WIND SHEAR ALERT SYSTEM (LLWAS)

6.1 This computerized system detects the presence of a possible hazardous low level wind shear by continuously comparing the winds measured by sensors installed around the periphery of an airport with the wind measured at the centerfield location. If the difference between the centerfield wind sensor and a peripheral wind sensor becomes excessive, a thunderstorm or thunderstorm gust front wind shear is probable. When this condition exists, the tower controller will provide arrival and departure aircraft with an advisory of the situation which includes the centerfield wind plus the remote site location and wind.

6.2 Since the sensors are not all associated with specific runways, descriptions of the remote sites will be based on an eight point compass system. For example: "Delta One Twenty Four, centerfield wind two seven zero at one zero. South boundary wind one four zero at three zero."

6.3 An airport equipped with the Low Level Wind Shear Alert System (LLWAS) is so indicated in the Airport/Facility Directory under "Weather Data Sources" for that particular airport.

7. BRAKING ACTION

7.1 Braking Action Reports And Advisories

7.1.1 When available, ATC furnishes pilots the quality of braking action received from pilots or airport management. The quality of braking action is described by the terms "good," "fair," "poor," and "nil," or a combination of these terms. When pilots report the quality of braking action by using the terms noted above, they should use descriptive terms that are easily understood, such as, "braking action poor the first/last half of the runway," together with the particular type of aircraft.

7.1.2 For NOTAM purposes, braking action reports are classified according to the most critical term used. Reports containing the terms "good" or "fair" are classified as NOTAM(L). Reports containing the terms "poor" or "nil" are classified as NOTAM(D).

7.2.3 When tower controllers have received runway braking action reports which include the terms "poor" or "nil" or whenever weather conditions are conducive to deteriorating or rapidly changing runway braking conditions, the tower will include on the ATIS broadcast the statement. "BRAKING ACTION ADVISORIES ARE IN EFFECT."

7.2.4 During the time that Braking Action Advisories are in effect, ATC will issue the latest braking action report for the runway in use to each arriving and departing aircraft. Pilots should be prepared for deteriorating braking conditions and should request current runway condition information if not volunteered by controllers. Pilots should also be prepared to provide a descriptive runway condition report to controllers after landing.

7.2 Runway Friction Reports And Advisories

7.2.1 Friction is defined as the ratio of the tangential force needed to maintain uniform relative motion between two contacting surfaces (aircraft tires to the pavement surface) to the perpendicular force holding them in contact (distributed aircraft weight to the aircraft tire area). Simply stated, friction quantifies slipperiness of pavement surfaces.

7.2.2 The greek letter MU (pronounced "myew"), is used to designate a friction value representing runway surface conditions.

7.2.3 MU (friction) values range from 0 to 100 where zero is the lowest friction value and 100 is the maximum friction value obtainable. For frozen contaminants on runway surfaces, a MU value of 40 or less is the level when the aircraft braking performance starts to deteriorate and directional control begins to be less responsive. The lower the MU value, the less effective braking performance becomes and the more difficult directional control becomes.

7.2.4 At airports with friction measuring devices, airport management should conduct friction measurements on runways covered with compacted snow and/or ice.

(1) Numerical readings may be obtained by using any FAA approved friction measuring device. It is not necessary to designate the type of friction measuring device since they provide essentially the same numerical reading when the values are 40 or less.

(2) When the MU value for any one-third zone of an active runway is 40 or less, a report should be given to ATC by airport management for dissemination to pilots. The report will identify the runway, the time of measurement, MU values for each zone, and the contaminant conditions, e.g., wet snow, dry snow, slush, deicing chemicals, etc. Measurements for each one-third zone will be given in the direction of takeoff and landing on the runway. A report should also be given when MU values rise above 40 in all zones of a runway previously reporting a MU below 40.

(3) Airport management should initiate a NOTAM(D) when the friction measuring device is out of service.

7.2.5 When MU reports are provided by airport management, the ATC facility providing approach control or local airport advisory will provide the report to any pilot upon request.

7.2.6 Pilots should use MU information with other knowledge including aircraft performance characteristics, type, and weight, previous experience, wind conditions, and aircraft tire type (i.e., bias ply vs. radial constructed) to determine runway suitability.

7.2.7 No correlation has been established between MU values and the descriptive terms "good," "fair," "poor," and "nil" used in braking action reports.

8. COMMUNICATIONS PRIOR TO DEPARTURE

8.1 Nontower Controlled Airports

8.1.1 At airports not served by a Flight Service Station located on the airport, the pilot in command should broadcast his intentions on the prescribed frequency prior to aircraft movement and departure.

8.1.2 At airports served by a Flight Service Station located on the airport, the pilot in command should obtain airport advisory service prior to aircraft movement and departure.

8.1.3 Aircraft departing on an IFR clearance must obtain the clearance prior to departure via telephone, the appropriate Flight Service station, or via direct communications with the ATC facility issuing the clearance as appropriate. An IFR clearance does not relieve the pilot from the communication stated above prior to aircraft movement and departure.

8.2 Tower Controlled Airports

8.2.1 Pilots of departing aircraft should communicate with the control tower on the appropriate ground control/clearance delivery frequency prior to starting engines to receive engine start time, taxi, and/or clearance information. Unless otherwise advised by the tower, remain on the frequency during taxiing and run up, then change to local control frequency when ready to request takeoff clearance.

Note. — Refer to Automatic Terminal Information Service (ATIS) for continuous broadcast of terminal information.

8.2.1.1 Gate Holding Due to Departure Delays

Pilots should contact ground control/clearance delivery prior to starting engines as gate hold procedures will be in effect whenever departure delays exceed or are anticipated to exceed 15 minutes. The sequence for departure will be maintained in accordance with initial call up unless modified by flow control restrictions. Pilots should monitor the ground control/clearance delivery frequency for engine startup advisories or new proposed start time if the delay changes.

8.2.2 The tower controller will consider that pilots of turbine-powered aircraft are ready for takeoff when they reach the runway/warm-up block unless advised otherwise.

9. TAXIING PROCEDURES

9.1 General: Approval must be obtained prior to moving an aircraft or vehicle onto the movement area during the hours an airport traffic control tower is in operation.

9.1.1 Always state your position on the airport when calling the tower for taxi instructions.

9.1.2 The movement area is normally described in local bulletins issued by the airport manager or control tower. These bulletins may be found in FSS's, fixed base operators offices, air carrier offices, and operations offices.

9.1.3 The control tower also issues bulletins describing areas where they cannot provide airport traffic control service due to nonvisibility or other reasons.

9.1.4 A clearance must be obtained prior to taxiing on a runway, taking off, or landing during the hours an airport traffic control tower is in operation.

9.1.5 When ATC clears an aircraft to "taxi to" an assigned takeoff runway, the absence of holding instructions authorizes the aircraft to "cross" all runways which the taxi route intersects except the assigned takeoff runway. It does not include authorization to "taxi onto" or "cross" the assigned takeoff runway at any point. In order to preclude misunderstandings in radio communications, ATC will not use the word "cleared" in conjunction with authorization for aircraft to taxi.

9.1.6 In the absence of holding instructions, a clearance to "taxi to" any point other than an assigned takeoff runway is a clearance to cross all runways that intersect the taxi route to that point.

9.1.7 Air traffic control will first specify the runway, issue taxi instructions, and then state any required hold short instructions, when authorizing an aircraft to taxi for departure. This does not authorize the aircraft to "enter" or "cross" the assigned departure runway at any point. AIR TRAFFIC CONTROLLERS ARE REQUIRED TO OBTAIN FROM THE PILOT A READBACK OF ALL RUNWAY HOLD SHORT INSTRUCTIONS.

9.2 ATC clearances or instructions pertaining to taxiing are predicated on known traffic and known physical airport conditions. Therefore, it is important that pilots clearly understand the clearance or instruction. Although an ATC clearance is issued for taxiing purposes, when operating in accordance with the FAR's, it is the responsibility of the pilot to avoid collision with other aircraft. Since "the pilot in command of an aircraft is directly responsible for, and is the final authority as to, the operation of that aircraft" the pilot should obtain clarification of any clearance or instruction which is not understood. (See MET-0;10.1)

9.2.1 Good operating practice dictates that pilots acknowledge all runway crossing, hold short, or takeoff clearances unless there is some misunderstanding, at which time the pilot should query the controller until the clearance is understood. AIR TRAFFIC CONTROLLERS ARE REQUIRED TO OBTAIN FROM THE PILOT A READBACK OF ALL RUNWAY HOLD SHORT INSTRUCTIONS. Pilots operating a single pilot aircraft should monitor only assigned ATC communications after being cleared onto the active runway for departure. Single pilot aircraft should not monitor other than ATC communications until flight from Class D airspace is completed. This same procedure should be practiced from after receipt of the clearance for landing until the landing and taxi activities are complete. Proper effective scanning for other aircraft, surface vehicles, or other objects should be continuously exercised in all cases.

9.2.2 If the pilot is unfamiliar with the airport or for any reason confusion exists as to the correct taxi routing, a request may be made for progressive taxi instructions which include step-by-step routing directions. Progressive instructions may also be issued if the controller deems it necessary due to traffic or field conditions; i.e., construction or closed taxiways.

9.3 At those airports where the United States Government operates the control tower and ATC has authorized noncompliance with the requirement for two-way radio communications while operating within Class D airspace, or at those airports where the United States Government does not operate the control tower and radio communications cannot be established, pilots shall obtain a clearance by visual light signal prior to taxiing on a runway and prior to takeoff and landing.

9.4 1The following phraseologies and procedures are used in radio-telephone communications with aeronautical ground stations.

9.4.1 Request for taxi instructions prior to departure— State your aircraft identification, location, type of operation planned (VFR or IFR), and the point of first intended landing.

Example:

Aircraft: "WASHINGTON GROUND, BEECHCRAFT ONE THREE ONE FIVE NINER AT HANGAR EIGHT, READY TO TAXI, IFR TO CHICAGO."

Tower: "BEECHCRAFT ONE THREE ONE FIVE NINER, WASHINGTON GROUND, TAXI TO RUNWAY THREE SIX, WIND ZERO THREE ZERO AT TWO FIVE, ALTIMETER THREE ZERO ZERO FOUR,"

or

Tower: "BEECHCRAFT ONE THREE ONE FIVE NINER, WASHINGTON GROUND, RUNWAY TWO SEVEN, TAXI VIA TAXIWAYS CHARLIE AND DELTA, HOLD SHORT OF RUNWAY THREE THREE LEFT."

Aircraft: "BEECHCRAFT ONE THREE ONE FIVE NINER, HOLD SHORT OF RUNWAY THREE THREE LEFT."

9.4.2 Receipt of air traffic control clearance—Air route traffic control clearances are relayed to pilots by airport traffic controllers in the following manner:

Example:

Tower: "BEECHCRAFT ONE THREE ONE FIVE NINER, CLEARED TO THE CHICAGO MIDWAY AIRPORT VIA VICTOR EIGHT, MAINTAIN EIGHT THOUSAND."

Aircraft: "BEECHCRAFT ONE THREE ONE FIVE NINER, CLEARED TO THE CHICAGO MIDWAY AIRPORT VIA VICTOR EIGHT, MAINTAIN EIGHT THOUSAND."

Note. — Normally, an ATC IFR clearance is relayed to a pilot by the ground controller. At busy locations, however, pilots may be instructed by the ground controller to "CONTACT CLEARANCE DELIVERY" on a frequency designated for this purpose. No surveillance or control over the movement of traffic is exercised by this position of operation. (See RAC 3.3)

9.4.3 Request for taxi instructions after landing—State your aircraft identification, location, and that you request taxi instructions.

Example:

Aircraft: "DULLES GROUND, BEECHCRAFT ONE FOUR TWO SIX ONE CLEARING RUNWAY ONE RIGHT ON TAXIWAY ECHO THREE, REQUEST CLEARANCE TO PAGE."

Tower: "BEECHCRAFT ONE FOUR TWO SIX ONE, DULLES GROUND, TAXI TO PAGE VIA TAXIWAYS ECHO THREE, ECHO ONE, AND ECHO NINER."

or

Aircraft: "ORLANDO GROUND, BEECHCRAFT ONE FOUR TWO SIX ONE CLEARING RUNWAY ONE EIGHT LEFT AT TAXIWAY BRAVO THREE, REQUEST CLEARANCE TO PAGE."

Tower: "BEECHCRAFT ONE FOUR TWO SIX ONE, ORLANDO GROUND, HOLD SHORT OF RUNWAY ONE EIGHT RIGHT."

Aircraft: "BEECHCRAFT ONE FOUR TWO SIX ONE, HOLD SHORT OF RUNWAY ONE EIGHT RIGHT."

9.5 Taxi During Low Visibility

9.5.1 Pilots and aircraft operators should be constantly aware that during certain low visibility conditions the movement of aircraft and vehicles on airports may not be visible to the tower controller. This may prevent visual confirmation of an aircraft's adherence to taxi instructions. Pilots should, therefore, exercise extreme vigilance and proceed cautiously under such conditions.

9.5.2 Of vital importance is the need for pilots to notify the controller when difficulties are encountered or at the first indication of becoming disoriented. Pilots should proceed with extreme caution when taxiing toward the sun. When vision difficulties are encountered pilots should immediately inform the controller.

10. INTERSECTION TAKEOFFS

10.1 In order to enhance airport capacities, reduce taxiing distances, minimize departure delays, and provide for more efficient movement of air traffic, controllers may initiate intersection takeoffs as well as approve them when the pilot requests. If for ANY reason a pilot prefers to use a different intersection or the full length of the runway or desires to obtain the distance between the intersection and the runway end, HE IS EXPECTED TO INFORM ATC ACCORDINGLY.

10.2 An aircraft is expected to taxi to (but not onto) the end of the assigned runway unless prior approval for an intersection departure is received from ground control.

10.3 Pilots should state their position on the airport when calling the tower for takeoff from a runway intersection.

Example:

CLEVELAND TOWER, APACHE 3722P, AT THE INTERSECTION OF TAXIWAY OSCAR AND RUNWAY TWO THREE RIGHT, READY FOR DEPARTURE.

10.4 Controllers are required to separate small aircraft (12,500 pounds or less maximum certificated takeoff weight) departing (same or opposite direction) from an intersection behind a large nonheavy aircraft on the same runway by ensuring that at least a 3-minute interval exists between the time the preceding large aircraft has taken off and the succeeding small aircraft begins takeoff roll. To inform the pilot of the required 3-minute hold, the controller will state, "Hold for wake turbulence." If after considering wake turbulence hazards, the pilot feels that a lesser time interval is appropriate, he may request a waiver to the 3-minute interval. Pilots must initiate such a request by stating, "Request waiver to 3-minute interval," or by making a similar statement. Controllers may then issue a takeoff clearance if other traffic permits, since the pilot has accepted responsibility for his own wake turbulence separation.

10.5 The 3-minute interval is not required when the intersection is 500 feet or less from the departure point of the preceding aircraft and both aircraft are taking off in the same direction. Controllers may permit the small aircraft to alter course after takeoff to avoid the flight path of the preceding departure.

10.6 The 3-minute interval is mandatory behind a heavy aircraft in all cases

11. RESERVED

12. AIRPORT OPERATIONS FOR ARRIVING AIRCRAFT

12.1 VFR Flights in Terminal Areas

Use reasonable restraint in exercising the prerogative of VFR flight, especially in terminal areas. The weather minimums and distances from clouds are minimums. Giving yourself a greater margin in specific instances is just good judgment.

12.1.1 Approach Area

Conducting a VFR operation in Class D and E Airspace when the official visibility is 3 or 4 miles is not prohibited, but good judgment would dictate that you keep out of the approach area.

12.1.2 Reduced Visibility

It has always been recognized that precipitation reduces forward visibility. Consequently, although again it may be perfectly legal to cancel your IFR flight plan at any time you can proceed VFR, it is good practice, when precipitation is occurring, to continue IFR operation into a terminal area until you are reasonably close to your destination.

12.1.3 Simulated Instrument Flights

In conducting simulated instrument flights, be sure that the weather is good enough to compensate for the restricted visibility of the safety pilot and your greater concentration on your flight instruments. Give yourself a little greater margin when your flight plan lies in or near a busy airway or close to an airport.

12.2 VFR Approach Maneuvers

12.2.1 Low Approach

12.2.1.1 A low approach (sometimes referred to as a low pass) is the go-around maneuver following approach. Instead of landing or making a touch-and-go, a pilot may wish to go around (low approach) in order to expedite a particular operation—a series of practice instrument approaches is an example of such an operation. Unless otherwise authorized by ATC, the low approach should be made straight ahead with no turns or climb made until the pilot has made a thorough visual check for other aircraft in the area.

12.2.1.2 When operating within Class D airspace, a pilot intending to make a low approach should contact the tower for approval. This request should be made prior to starting the final approach.

12.2.1.3 When operating to an airport within Class E airspace, a pilot intending to make low approach should, prior to leaving the final approach fix inbound (nonprecision approach) or the outer marker or fix used in lieu of the outer marker inbound (precision approach), so advise the FSS, UNICOM, or make a broadcast as appropriate.

12.2.2 Practice Instrument Approaches

12.2.2.1 Various air traffic incidents required adoption of measures to achieve more organized and controlled operations where practice instrument approaches are conducted. Practice instrument approaches are considered to be instrument approaches made by either a VFR aircraft not on an IFR flight plan or an aircraft on an IFR flight plan. To achieve this and thereby enhance air safety, it is Air Traffic Operations Service policy to provide for separation of such operations at locations where approach control facilities are located and, as resources permit, at certain other locations served by Air Route Traffic Control Centers or approach control facilities. Pilot requests to practice instrument approaches may be approved by ATC subject to traffic and workload conditions. Pilots should anticipate that in some instances the controller may find it necessary to deny approval or withdraw previous approval when traffic conditions warrant. It must be clearly understood, however, that even though the controller may be providing separation, pilots on VFR flight plans are required to comply with basic visual flight rules (FAR 91.155). Application of ATC procedures or any action taken by the controller to avoid traffic conflictions does not relieve IFR and VFR pilots of their responsibility to see and avoid other traffic while operating in VFR conditions (FAR 91.113). In addition to the normal IFR separation minimums (which includes visual separation) during VFR conditions, 500 feet vertical separation may be applied between VFR aircraft and between a VFR aircraft and an IFR aircraft. Pilots not on IFR flight plans desiring practice instrument approaches should always state "practice" when making requests to ATC. Controllers will instruct VFR aircraft requesting an instrument approach to maintain VFR. This is to preclude misunderstandings between the pilot and controller as to the status of the aircraft. If the pilot wishes to proceed in accordance with instrument flight rules, he must specifically request and obtain an IFR clearance.

12.2.2.2 Before practicing an instrument approach, pilots should inform the approach control facility or the tower of the type of practice approach they desire to make and how they intend to terminate it; i.e., full-stop landing, touch-and-to, or missed/low approach maneuver. This information may be furnished progressively when conducting a series of approaches. Pilots on an IFR flight plan, who have made a series of instrument approaches to full stop landings, should inform ATC when they make their final landing. The controller will control flights practicing instrument approaches so as to ensure that they do not disrupt the flow of arriving and departing itinerant IFR or VFR aircraft. The priority afforded itinerant aircraft over practice instrument approaches is not intended to be so rigidly applied that it causes a grossly inefficient application of services. A minimum delay to itinerant traffic may be appropriate to allow an aircraft practicing an approach to complete that approach.

Note. — A clearance to land means that appropriate separation on the landing runway will be ensured. A landing clearance does not relieve the pilot from compliance with any previously issued restriction.

12.2.2.3 At airports without a tower, pilots wishing to make practice instruments approaches should notify the facility having control jurisdiction of the desired approach as indicated on the approach chart. All approach control facilities and Air Route Traffic Control Centers are required to publish a Letter to Airmen depicting those airports where they provide standard separation to both VFR and IFR aircraft conducting practice instrument approaches.

12.2.2.4 The controller will provide approved separation between both VFR and IFR aircraft when authorization is granted to make practice approaches to airports where an approach control facility is located and to certain other airports served by approach control or an Air Route Traffic Control Center. Controller responsibility for separation of VFR aircraft begins at the point where the approach clearance becomes effective or when the aircraft enters Class B or TRSA airspace airspace, whichever comes first.

12.2.2.5 Visual flight rules aircraft practicing instrument approaches are not automatically authorized to execute the missed approach procedure. This authorization must be specifically requested by the pilot and approved by the controller. Separation will not be provided unless the missed approach has been approved by ATC.

12.2.2.6 Except in an emergency, aircraft cleared to practice instrument approaches must not deviate from the approved procedure until cleared to do so by the controller.

12.2.2.7 At radar approach control locations when a full approach procedure (procedure turn, etc.) cannot be approved, pilots should expect to be vectored to a final approach course for a practice instrument approach which is compatible with the general direction of traffic at that airport.

12.2.2.8 When granting approval for a practice instrument approach, the controller will usually ask the pilot to report to the tower prior to or over the final approach fix inbound (nonprecision approaches) or over the outer marker or fix used in lieu of the outer marker inbound (precision approaches).

12.2.2.9 When authorization is granted to conduct practice instrument approaches to an airport with a tower but where approved standard separation is not provided to aircraft conducting practice instrument approaches, the tower will approve the practice approach, instruct the aircraft to maintain VFR and issue traffic information, as required.

12.2.2.10 When an aircraft notifies a flight service station providing Airport Advisory Service of intent to conduct a practice instrument approach and if separation will be provided, you will be instructed to contact the appropriate facility on a specified frequency prior to initiating the approach. At airports where separation is not provided, the flight service station will acknowledge the message and issue known traffic information but will neither approve or disapprove the approach.

12.2.2.11 Pilots conducting practice instrument approaches should be particularly alert for other aircraft operating in the local traffic pattern or in proximity to the airport.

12.2.3 Option Approach

The "Cleared for the Option" procedure will permit an instructor pilot/flight examiner/pilot the option to make a touch-and-go,

low approach, missed approach, stop-and-go, or full stop landing. This procedure can be very beneficial in a training situation in that neither the student pilot nor examinee would know what maneuver would be accomplished. The pilot should make his request for this procedure passing the final approach fix inbound on an instrument approach or entering downwind for a VFR traffic pattern. The advantages of this procedure as a training aid are that it enables an instructor/examiner to obtain the reaction of a trainee/examinee under changing conditions, the pilot would not have to discontinue an approach in the middle of the procedure due to student error or pilot proficiency requirements, and finally it allows more flexibility and economy in training programs. This procedure will only be used at those locations with an operational control tower and will be subject to ATC approval/disapproval.

13. SIMULTANEOUS OPERATIONS ON INTERSECTING RUNWAYS

13.1 Despite the many new and lengthened runways which have been added to the Nation's airports in recent years, limited runway availability remains a major contributing factor to operational delays. Many high-density airports have gained operational experience with intersecting runways which clearly indicates that simultaneous operations are safe and feasible. Tower controllers may authorize simultaneous landings or a simultaneous landing and takeoff on intersecting runways when the following conditions are met:

13.1.1 The runways are dry and the controller has received no reports that braking action is less than good.

13.1.2 A simultaneous takeoff and landing operation may be conducted only in VFR conditions.

13.1.3 Instructions are issued to restrict one aircraft form entering the intersecting runway being used by another aircraft.

13.1.4 Traffic information issued is acknowledged by the pilots of both aircraft.

13.1.5 The measured distance from the runway threshold to the intersection is issued if the pilot requests it.

13.1.6 The conditions specified in 13.1.3, 13.1.4 and 13.1.5 are met at or before issuance of the landing clearance.

13.1.7 The distance from the landing threshold to the intersection is adequate for the category of aircraft being held short. Controllers are provided a general table of aircraft category/minimum runway length requirements as a guide. Operators of STOL aircraft should identify their aircraft as such on initial contact with the tower, unless a letter of agreement concerning this fact, is in effect. WHENEVER A HOLD SHORT CLEARANCE IS RECEIVED, IT IS INCUMBENT ON THE PILOT TO DETERMINE HIS/HER ABILITY TO HOLD SHORT OF AN INTERSECTION AFTER LANDING WHEN INSTRUCTED TO DO SO. ADDITIONALLY, PILOTS SHOULD INCLUDE THE WORDS "HOLD SHORT OF (POINT)" IN THE ACKNOWLEDGEMENT OF SUCH CLEARANCES.

13.1.8 There is no tailwind for the landing aircraft restricted to hold short of the intersection.

13.2 The safety and operation of an aircraft remain the responsibility of the pilot. If for any reason; e.g., difficulty in discerning the location of an intersection at night, inability to hold short of an intersection, wind factors, etc., a pilot elects to use the full length of the runway, a different runway, or desires to obtain the distance from the landing threshold to the intersection, he is expected to promptly inform ATC accordingly.

14. EXITING THE RUNWAY AFTER LANDING

The following procedures should be followed after landing and reaching taxi speed.

14.1 Exit the runway without delay at the first available taxiway or on a taxiway as instructed by air traffic control (ATC).

14.2 Taxi clear of the runway unless otherwise directed by ATC. In the absence of ATC instructions the pilot is expected to taxi clear of the landing runway even if that requires the aircraft to protrude into or cross another taxiway, runway, or ramp area. This does not authorize an aircraft to cross a subsequent taxiway/runway/ramp after clearing the landing runway.

Note. — The tower will issue the pilot with instructions which will normally permit the aircraft to enter another taxiway, runway, or ramp area when required to taxi clear of the runway.

14.3 Stop the aircraft after clearing the runway if instructions have not been received from ATC.

14.4 Immediately change to ground control frequency when advised by the tower and obtain a taxi clearance.

Note 1. — The tower will issue instructions required to resolve any potential conflictions with other ground traffic prior to advising the pilot to contact ground control.

Note 2. — A clearance from ATC to taxi to the ramp authorizes the aircraft to cross all runways and taxiway intersections. Pilots not familiar with the taxi route should request specific taxi instructions from ATC.

15. AIRPORT TRAFFIC HAND SIGNALS

See RAC 3.2, Appendix Two.

16. USE OF AIRCRAFT LIGHTS

16.1 Aircraft position and anticollision lights are required to be lighted on aircraft operated from sunset to sunrise. Anticollision lights, however, need not be lighted when the pilot in command determines that, because of operating conditions, it would be in the interest of safety to turn off the lights (FAR 91.209). For example, strobe lights should be turned off on the ground when they adversely affect ground personnel or other pilots and in flight when there are adverse reflections from clouds.

16.2 An aircraft anticollision light system can use one or more rotating beacons and/or strobe lights, be colored either red or white, and have different (higher than minimum) intensities when compared to other aircraft. Many aircraft have both a rotating beacon and a strobe light system.

16.3 The FAA has a voluntary pilot safety program, *Operating Lights On,* to enhance the *see-and-avoid* concept. Pilots are encouraged to turn on their anticollision lights any time the engine/s are running, day or night. Use of these lights is especially encouraged when operating on airport surfaces during periods of reduced visibility and when snow or ice control vehicles are or may be operating. Pilots are also encouraged to turn on their landing lights during takeoff; i.e., either after takeoff clearance has been received or when beginning takeoff roll. Pilots are further encouraged to turn on their landing lights when operating below 10,000 feet, day or night, especially when operating within 10 miles of any airport or in conditions of reduced visibility and in areas where flocks of birds may be expected; i.e., coastal areas, lake areas, around refuse dumps, etc. Although turning on aircraft lights does enhance the *see-and-avoid* concept, pilots

should not become complacent about keeping a sharp lookout for other aircraft. Not all aircraft are equipped with lights, and some pilots may not have their lights turned on. Aircraft manufacturers' recommendations for operation of landing lights and electrical systems should be observed.

16.4 Prop and jet blast forces generated by large aircraft have overturned or damaged several smaller aircraft taxiing behind them. To avoid similar results and in the interest of preventing upsets and injuries to ground personnel from such forces, the FAA recommends that air carriers and commercial operators turn on their rotating beacons anytime their aircraft engines are in operation. General aviation pilots using rotating beacon-equipped aircraft are also encouraged to participate in this program which is designed to alert others to the potential hazard. Since this is a voluntary program, exercise caution and do not rely solely on the rotating beacon as an indication that aircraft engines are in operation.

17. FLIGHT INSPECTION/"FLIGHT CHECK" AIRCRAFT IN TERMINAL AREAS.

17.1 "Flight Check" is a call sign used to alert pilots and air traffic controllers when an FAA aircraft is engaged in flight inspection/certification of NAVAID's and flight procedures. Flight Check aircraft fly preplanned high/low altitude flight patterns such as grids, orbits, DME arcs, and tracks, including low passes along the full length of the runway to verify NAVAID performance. In most instances, these flight checks are being automatically recorded and/or flown in an automated mode.

17.2 Pilots should be especially watchful and avoid the flight paths of any aircraft using the call sign "Flight Check" or "Flight Check Recorded." The latter call sign; e.g. "Flight Check 47 Recorded," indicates that automated flight inspections are in progress in terminal areas. These flights will normally receive special handling from ATC. Pilot patience and cooperation in allowing uninterrupted recordings can significantly help expedite flight inspections, minimize costly, repetitive runs, and reduce the burden on the U.S. taxpayer.

ATC CLEARANCE AND SEPARATION—PILOT/CONTROLLER ROLES AND RESPONSIBILITIES

1. CLEARANCE

A clearance issued by ATC is predicated on known traffic and known physical airport conditions. An ATC clearance means an authorization by ATC, for the purpose of preventing collision between known aircraft, for an aircraft to proceed under specified conditions within Class A, B, C, D and E airspace. IT IS NOT AUTHORIZATION FOR A PILOT TO DEVIATE FROM ANY RULE, REGULATION OR MINIMUM ALTITUDE NOR TO CONDUCT UNSAFE OPERATION OF HIS AIRCRAFT.

1.1

FAR 91.3(a) states: "The pilot in command of an aircraft is directly responsible for, and is the final authority as to, the operation of that aircraft." 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, IT IS THE PILOT'S RESPONSIBILITY TO REQUEST AN AMENDED CLEARANCE. Similarly, if a pilot prefers to follow a different course of action, such as make a 360 degree turn for spacing to follow traffic when established in a landing or spacing to follow traffic when established in a landing or approach sequence, land on a different runway, takeoff from a different intersection, takeoff from the threshold instead of an intersection or delay his operation, HE IS EXPECTED TO INFORM ATC ACCORDINGLY. When he requests a different course of action, however, the pilot is expected to cooperate so as to preclude the disruption of the traffic flow or the creation of conflicting patterns. The pilot is also expected to use the appropriate aircraft call sign to acknowledge all ATC clearances, frequency changes, or advisory information.

1.2

Each pilot who deviates from an ATC clearance in response to a Traffic Alert and Collision Avoidance System resolution advisory shall notify ATC of that deviation as soon as possible

1.3

When weather conditions permit, during the time an IFR flight is operating, it is the direct responsibility of the pilot to avoid other aircraft since VFR flights may be operating in the same area without the knowledge of ATC, and traffic clearances provide standard separation only between IFR flights.

1.4 Clearance Items

An ATC clearance normally contains the following:

1.4.1 Clearance Limit

The traffic clearance issued prior to departure will normally authorize flight to the airport of intended landing. Under certain conditions at some locations, a short-range clearance procedure is utilized whereby a clearance is issued to a fix within or just outside the terminal area and the pilot is advised of the frequency on which he will receive the long-range clearance direct from the center controller.

1.4.2 Departure Procedure

Headings to fly and altitude restrictions may be issued to separate a departure from other air traffic in the terminal area. Where the volume of traffic warrants Standard Instrument Departures (SID's) have been developed. (See RAC 4.)

1.4.3 Route of Flight

1.4.3.1 Clearances are normally issued for the altitude/flight level and route filed by the pilot. However, due to traffic conditions, it is frequently necessary for ATC to specify an altitude/flight level or route different from that requested by the pilot. In addition, flow patterns have been established in certain congested areas, or between congested areas, whereby traffic capacity is increased by routing all traffic on preferred routes. Information on these flow patterns is available in offices where preflight briefing is furnished or where flight plans are accepted.

1.4.3.2 When required air traffic clearances include data to assist pilots in identifying radio reporting points. It is responsibility of a pilot to notify ATC immediately if his radio equipment cannot receive the type of signals he must utilize to comply with his clearance.

1.4.4 Altitude Data

1.4.4.1 The altitude/flight level instructions in an ATC clearance normally require that a pilot "MAINTAIN" the altitude/flight level to which the flight will operate when in Class A, B, C, D and E airspace. Altitude/flight level changes while en route should be requested prior to the time the change is desired.

1.4.4.2 When possible, if the altitude assigned is different than that requested by the pilot, ATC will inform an aircraft when to expect climb or descent clearance or to request altitude change from another facility. If this has not been received prior to crossing the boundary of the ATC facility's area and assignment at a different flight level is still desired, the pilot should reinitiate his request with the next facility.

1.4.4.3 The term "CRUISE" may be used instead of "MAINTAIN" to assign a block of airspace, to a pilot, from the minimum IFR altitude up to and including the altitude specified in the cruise clearance. The pilot may level off at any intermediate altitude within this block of airspace. Climb/descent within the block is to be made at the discretion of the pilot. However, once the pilot starts descent and verbally reports leaving an altitude in the block, he may not return to that altitude without additional ATC clearance.

1.4.5 Holding Instructions

1.4.5.1 Whenever an aircraft is cleared to a fix other than the destination airport and delay is expected, it is the responsibility of the ATC controller to issue complete holding instructions (unless the pattern is charted), an EFC time, and his best estimate of any additional en route/terminal delay.

1.4.5.2 If the holding pattern is charted and the controller doesn't issue complete holding instructions, the pilot is expected to hold as depicted on the appropriate chart. When the pattern

is charted, the controller may omit all holding instructions except the charted holding direction and the statement "AS PUBLISHED;" e.g., "HOLD EAST AS PUBLISHED." Controllers shall always issue complete holding instructions when pilots request them.

Note. — Only those holding patterns depicted on U.S. Government or commercially produced (meeting FAA requirements) low/high altitude enroute, and area or STAR charts should be used.

1.4.5.3 If no holding pattern is charted and holding instructions have not been issued, the pilot should ask ATC for holding instructions prior to reaching the fix. This procedure will eliminate the possibility of an aircraft entering a holding pattern other than that desired by ATC. If the pilot is unable to obtain holding instructions prior to reaching the fix (due to frequency congestion, stuck microphones, etc.), he should hold in a standard pattern on the course on which he approached the fix and request further clearance as soon as possible. In this event, the altitude/flight level of the aircraft at the clearance limit will be protected so that separation will be provided as required.

1.4.5.4 When an aircraft is 3 minutes or less from a clearance limit and a clearance beyond the fix has not been received, the pilot is expected to start a speed reduction so that he will cross the fix, initially, at or below the maximum holding airspeed.

1.4.5.5 When no delay is expected, the controller should issue a clearance beyond the fix as soon as possible and, whenever possible, at least 5 minutes before the aircraft reaches the clearance limit.

1.4.5.6 Pilots should report to ATC the time and altitude/flight level at which the aircraft reaches the clearance limit and report leaving the clearance limit.

Note. — In the event of two-way communications failure, pilots are required to comply with FAR 91.185.

1.5 Amended Clearance

1.5.1 Amendments to the initial clearance will be issued at any time an air traffic controller deems such action necessary to avoid possible confliction between aircraft. Clearances will require that a flight "hold" or change altitude prior to reaching the point where standard separation from other IFR traffic would no longer exist. Some pilots have questioned this action and requested "traffic information" and were at a loss when the reply indicated "no traffic reported." In such cases the controller has taken action to prevent a traffic confliction which would have occurred at a distant point.

1.5.2 A pilot may wish an explanation of the handling of his flight at the time of occurrence; however, controllers are not able to take time from their immediate control duties nor can they afford to overload the ATC communications channels to furnish explanations. Pilots may obtain an explanation by directing a letter or telephone call to the chief controller of the facility involved.

1.5.3 The pilot has the privilege of requesting a different clearance from that which has been issued by ATC if he feels that he has information which would make another course of action more practicable or if aircraft equipment limitations or company procedures forbid compliance with the clearance issued.

1.5.4 Pilots should pay particular attention to the clearance and not assume that the route and altitude/flight level are the same as requested in the flight plan. It is suggested that pilots make a written report of clearances at the time they are received, and verify, by a repeat back, any portions that are complex or about which a doubt exists. It will be the responsibility of each pilot to accept or refuse the clearance issued.

1.6 Special VFR Clearance

1.6.1 An ATC clearance must be obtained *prior* to operating within Class B, C, D and E surface areas when the weather is less than that required for VFR flight. A VFR pilot may request and be given a clearance to enter, leave or operate within most Class D and E surface areas and some Class B and C surface areas in special VFR conditions, traffic permitting, and providing such flight will not delay IFR operations. All special VFR flights must remain clear of clouds. The visibility requirements for Special VFR aircraft (other than helicopters) are:

1.6.1.1 At least one statute mile flight visibility for operations within Class B, C, D and E surface areas.

1.6.1.2 At least one statute mile ground visibility if taking off or landing. If ground visibility is not reported at that airport, the flight visibility must be at least one statute mile.

1.6.1.3 The restriction in (1) and (2) do not apply to helicopters. Helicopters must remain clear of clouds and may operate in Class B, C, D and E surface areas with less than one statute mile visibility.

1.6.2 When a control tower is located within Class B, C and D surface areas, requests for clearances should be to the tower. If no tower is located within the surface area, a clearance may be obtained from the nearest tower, flight service station or center.

1.6.3 It is not necessary to file a complete flight plan with the request for clearance but the pilot should state his intentions in sufficient detail to permit air traffic control to fit his flight into the traffic flow. The clearance will not contain a specific altitude as the pilot must remain clear of clouds. The controller may require the pilot to fly at or below a certain altitude due to other traffic, but the altitude specified will permit flight at or above the minimum safe altitude. In addition, at radar locations, flight may be vectored if necessary for control purposes or on pilot request.

Note. — The pilot is responsible for obstacle or terrain clearance (reference FAR 91.119).

1.6.4 Special VFR clearances are effective within Class B, C, D and E surface areas only. ATC does not provide separation after an aircraft leaves Class D surface area on a special VFR clearance.

1.6.5 Special VFR operations by fixed-wing aircraft are prohibited in some Class B and C surface areas due to the volume of IFR traffic. A list of these Class B and C surface areas is contained in FAR 93.113, and also depicted on Sectional Aeronautical Charts.

1.6.6 ATC provides separation between special VFR flights and between them and other IFR flights.

1.6.7 Special VFR operations by fixed-wing aircraft are prohibited between sunset and sunrise unless the pilot is instrument rated and the aircraft is equipped for IFR flight.

1.7 Clearance Prefix

A clearance, information, or request for information originated by an ATC facility and relayed to the pilot through an air/ground communication station will be prefixed by "ATC CLEARS," "ATC ADVISES," or "ATC REQUESTS."

1.8 VFR/IFR Flights

1.8.1 A pilot departing VFR, either intending to or needing to obtain an IFR clearance en route, must be aware of the position of the aircraft and the relative terrain/obstructions. When accepting a clearance below the MEA/MIA/MVA, pilots are responsible for their own terrain/obstruction clearance until reaching the MEA/MIA/MVA. If the pilot is unable to maintain terrain/obstruction clearance the controller will advise the pilot to state intentions.

2. PILOT RESPONSIBILITIES UPON CLEARANCE ISSUANCE

2.1 RECORD ATC CLEARANCE—When conducting an IFR operation, make a written record of your ATC clearance. The specified conditions which are a part of your air traffic clearance may be somewhat different from those included in your flight plan. Additionally, ATC may find it necessary to ADD conditions, such as a particular departure route. The very fact that Air Traffic Control specifies different or additional conditions means that other aircraft are involved in the traffic situation.

2.2 ATC CLEARANCE/INSTRUCTION READBACK—Pilots of airborne aircraft should read back those parts of the ATC clearances/instructions containing altitude assignments or vectors, as a means of mutual verification. The readback of the "numbers" serves as a double check between pilots and controllers, and such, it is an invaluable aid in reducing the kinds of communications errors that occur when a number is either "misheard" or is incorrect.

2.2.1 Precede all readbacks/acknowledgments with the aircraft identification. This is the only way that controllers can determine that the correct aircraft received the clearance/instruction. The requirement to include aircraft identification in all readbacks/acknowledgments becomes more important as frequency congestion increases and when aircraft with similar call signs are on the same frequency.

2.2.2 Read back altitudes, altitude restrictions, and vectors in the same sequence as they are given in the clearance/instruction.

2.2.3 Altitudes contained in charted procedures such as SID's, instrument approaches, etc., should not be read back unless they are specifically stated by the controller.

2.3 It is the responsibility of the pilot to accept or refuse the clearance issued.

3. PILOT RESPONSIBILITIES UPON CLEARANCE EXECUTION—ADHERENCE TO CLEARANCE

3.1 When air traffic clearance has been obtained under either the Visual or Instrument Flight Rules, the pilot in command of the aircraft shall not deviate from the provisions thereof unless an amended clearance is obtained. When ATC issues a clearance or instruction pilots are expected to execute its provisions upon receipt. ATC, in certain situations, will include the word "IMMEDIATELY" in a clearance or instruction to impress urgency of an imminent situation and expeditious compliance by the pilot is expected and necessary for safety. The addition of a VFR or other restriction; i.e., climb/descent point or time, crossing altitude, etc., does not authorize a pilot to deviate from the route of flight or any other provision of the ATC clearance.

3.2 When a heading is assigned or a turn is requested by ATC, pilots are expected to promptly initiate the turn, to complete the turn, and maintain the new heading unless issued additional instructions.

3.3 The term "at pilots discretion" included in the altitude information of an ATC clearance means that ATC has offered the pilot the option to start climb or descent when he wishes. He is authorized to conduct the climb or descent at any rate he wishes and to temporarily level off at any intermediate altitude he may desire. However, once he has vacated an altitude, he may not return to that altitude.

3.4 When ATC has not used the term "AT PILOT'S DISCRETION" nor imposed any climb/descent restrictions, pilots should initiate climb or descent promptly on acknowledgement of the clearance. Descend or climb at an optimum rate consistent with the operating characteristics of the aircraft to 1,000 feet above or below the assigned altitude, and then attempt to descend or climb at a rate of between 500 and 1,500 feet per minute until the assigned altitude is reached. If at any time the pilot is unable to climb/descend at a rat of at least 500 feet a minute, advise ATC. If it is necessary to level off at an intermediate altitude, during climb or descent, advise ATC, except for level off at 10,000 feet MSL on descent or 3,000 feet above airport elevation (prior to entering a Class B, C or D surface area), when required for speed reduction (FAR 91.117).

Note. — Leveling off at 10,000 feet MSL on descent, or 3,000 feet above airport elevation (prior to entering in a Class B, C or D surface area), to comply with FAR 91.117 airspeed restrictions, is commonplace. Controllers anticipate this action and plan accordingly. Leveling off at any other time, on climb or descent, may seriously affect air traffic handling by ATC. Consequently, it is imperative that pilots make every effort to fulfill the above expected actions to aid ATC in safely handling and expediting traffic.

3.5 If the altitude information of an ATC DESCENT clearance includes a provision to "CROSS (fix) AT/AT OR ABOVE/BELOW (altitude)," the manner in which the descent is executed to comply with the crossing altitude is at the pilot's discretion. This authorization to descend at pilot's discretion is only applicable to that portion of the flight to which the crossing altitude restriction applies, and the pilot is expected to comply with the crossing altitude as a provision of the clearance. Any other clearance in which pilot execution is optional will so state: "AT PILOT'S DISCRETION."

Examples:

"UNITED FOUR SEVENTEEN, DESCEND AND MAINTAIN SIX THOUSAND."

Note. — The pilot is expected to commence descent upon receipt of the clearance and to descend at the suggested rates specified above until reaching the assigned altitude of 6,000 feet.

"UNITED FOUR SEVENTEEN, DESCEND AT PILOT'S DISCRETION, MAINTAIN SIX THOUSAND."

Note. — The pilot is authorized to conduct descent within the context of the term AT PILOT'S DISCRETION as described above.

"UNITED FOUR SEVENTEEN, CROSS LAKEVIEW V-O-R AT OR ABOVE FLIGHT LEVEL TWO ZERO ZERO, DESCEND AND MAINTAIN SIX THOUSAND."

Note. — The pilot is authorized to conduct descent AT PILOT'S DISCRETION until reaching Lakeview VOR. He must comply with the clearance provision to cross the Lakeview VOR at or above FL 200. After passing Lakeview VOR, he is expected to descend at the rates specified above until reaching the assigned altitude of 6,000 feet.

"UNITED FOUR SEVENTEEN, CROSS LAKEVIEW V-O-R AT SIX THOUSAND, MAINTAIN SIX THOUSAND."

Note. — The pilot is authorized to conduct descent AT PILOT'S DISCRETION; however, he must comply with the clearance provision to cross the Lakeview VOR at 6,000 feet.

"UNITED FOUR SEVENTEEN, DESCEND NOW TO FLIGHT LEVEL TWO SEVEN ZERO, CROSS LAKEVIEW V-O-R AT OR BELOW ONE ZERO THOUSAND, DESCEND AND MAINTAIN SIX THOUSAND."

Note. — The pilot is expected to promptly execute and complete descent to FL 270 upon receipt of the clearance. After reaching FL 270, he is authorized to descend "at pilot's discretion" until reaching Lakeview VOR. He must comply with the clearance provision to cross Lakeview VOR at or below 10,000 feet. After Lakeview VOR, he is expected to descend at the rates specified above until reaching 6,000 feet.

"UNITED THREE TEN, DESCEND NOW AND MAINTAIN FLIGHT LEVEL TWO FOUR ZERO, PILOT'S DISCRETION AFTER REACHING FLIGHT LEVEL TWO EIGHT ZERO."

Note. — The pilot is expected to commence descent upon receipt of the clearance and to descend at the suggested rates until reaching flight level 280. At that point, the pilot is authorized to continue descent to flight level 240 within the context of the term "AT PILOTS'S DISCRETION" as described above.

3.6 In case emergency authorization is used to deviate from the provisions of an ATC clearance, the pilot in command shall notify ATC as soon as possible and obtain an amended clearance. In an emergency situation which results in no deviation from the rules prescribed in Part 91 but which requires air traffic control to give priority to an aircraft, the pilot of such aircraft shall when requested by ATC make a report within 48 hours of such emergency situation to the chief of the ATC facility.

3.7 The guiding principle is that the last ATC clearance has precedence over the previous ATC clearance. When the route or altitude in a previously issued clearance is amended, the controller will restate applicable altitude restrictions. If altitude to maintain is changed or restated, whether prior to departure or while airborne, and previously issued altitude restrictions are omitted, including SID altitude restrictions, then those altitude restrictions are canceled.

Examples:

A departure flight receives a clearance to the destination airport to maintain Flight Level 290. The clearance incorporates a SID which has certain altitude crossing restrictions. Shortly after takeoff, the flight receives a new clearance changing the maintaining Flight Level from 290 to 250. If the altitude restrictions are still applicable, the controller restates them.

A departing aircraft is cleared to cross Fluky intersection at or above 3,000, Gordonsville VOR at or above 12,000, maintain FL 200. Shortly after departure, the altitude to be maintained is changed to FL 240. If the altitude restrictions are still applicable the controller issues an amended clearance as follows, "CROSS FLUKY INTERSECTION AT OR ABOVE THREE THOUSAND, CROSS GORDONSVILLE V-O-R AT OR ABOVE ONE TWO THOUSAND, MAINTAIN FLIGHT LEVEL TWO FOUR ZERO."

An arriving aircraft is cleared to the destination airport via V45 Delta VOR direct, cross Delta at 10,000, maintain 6,000. Prior to Delta VOR, the controller issues an amended clearance as follows, "TURN RIGHT HEADING ONE EIGHT ZERO FOR VECTORS TO RUNWAY THREE SIX I-L-S APPROACH, MAINTAIN SIX THOUSAND." Because the altitude restriction "cross Delta VOR at 10,000" was omitted from the amended clearance, it is no longer in effect.

3.8 Pilots of turbojet aircraft equipped with afterburner engines should advise ATC prior to takeoff if they intend to use afterburning during their climb to the en route altitude. Often, the controller may be able to plan his traffic to accommodate a high performance climb and allow the

4. IFR CLEARANCE VFR-ON-TOP

4.1 A pilot on an IFR flight plan operating in VFR weather conditions, may request VFR ON TOP in lieu of an assigned altitude. This would permit the pilot to select an altitude or flight level of his choice (Subject to any ATC restrictions).

4.2 Pilots desiring to climb through a cloud, haze, smoke, or other meteorological formation and then either cancel their IFR flight plan or operate VFR ON TOP may request a climb to VFR ON TOP. The ATC authorization shall contain either a top report or a statement that no top report is available, and a request to report reaching VFR ON TOP. Additionally, the ATC authorization limit, routing and an alternative clearance if VFR ON TOP is not reached by a specified altitude.

4.3 A pilot on an IFR flight plan operating in VFR conditions may request to climb/descend in VFR conditions.

4.4 ATC may not authorize VFR ON TOP/VFR CONDITIONS operations unless the pilot requests the VFR operation or a clearance to operate in VFR CONDITIONS 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.

4.5 When operating in VFR conditions with an ATC authorization to "MAINTAIN VFR ON TOP/MAINTAIN VFR CONDITIONS," pilots on IFR flight plans must:

4.5.1 Fly at the appropriate VFR altitude as prescribed in FAR 91.159.

4.5.2 Comply with the VFR visibility and distance from cloud criteria in FAR 91.155 (BASIC VFR WEATHER MINIMUMS).

4.5.3 Comply with instrument flight rules that are applicable to his flight; i.e., minimum IFR altitude, position reporting, radio communications, course to be flown, adherence to ATC clearance, etc. Pilots should advise ATC prior to any altitude change to insure the exchange of accurate traffic information.

4.6 ATC authorization to "MAINTAIN VFR ON TOP" is not intended to restrict pilots so that they must operate only above an obscuring meteorological formation (layer). Instead, it permits operation above, below, between layers or in areas where there is no meteorological obscuration. It is imperative that clearance to operate "VFR ON TOP/VFR CONDITIONS" does not imply cancellation of the IFR.

4.7 Pilots operating VFR ON TOP/VFR CONDITIONS, may receive traffic information from ATC, on other pertinent IFR or VFR aircraft. However, aircraft operating in Class B or Class C airspace and TRSAs shall be separated as required by FAA Order 7110.65. When operating in VFR weather conditions, it is the pilot's responsibility to be vigilant so as to see and avoid other aircraft.

4.8 ATC will not authorize VFR or VFR ON TOP operations in Class A Airspace. (See RAC 3.4, Class A Airspace).

5. SEPARATION STANDARDS

5.1 Runway Separation

Tower controllers establish the sequence of arriving and departing aircraft by requiring them to adjust flight or ground operation as necessary to achieve proper spacing. They may "HOLD" an aircraft short of the runway to achieve spacing between it and another arriving aircraft; the controller may instruct a pilot to "EXTEND DOWN-WIND" in order to establish spacing from another arriving or departing aircraft. At times a clearance may include the word "IMMEDIATE." For example: "CLEARED FOR IMMEDIATE TAKEOFF." In such cases "IMMEDIATE" is used for purposes of *air traffic separation.* It is up to the pilot to refuse the clearance if, in his opinion, compliance would adversely affect his operation.

5.2 Visual Separation

5.2.1 Visual separation is a means employed by ATC to separate IFR aircraft only in terminal areas. There are two methods employed to effect this separation:

5.2.1.1 The tower controller sees the aircraft involved and issues instructions, as necessary, to ensure that the aircraft avoid each other.

5.2.1.2 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 in-trail behind another aircraft or keeping it in sight until it is no longer a factor.

5.2.2 A pilot's acceptance of instructions to follow another aircraft or provide visual separation from it is an acknowledgment that the pilot will maneuver his/her aircraft as necessary to avoid the other aircraft or to maintain in-trail separation. In operations conducted behind heavy jet aircraft, it is also an acknowledgment that the pilot accepts the responsibility for wake turbulence separation.

5.2.3 When a pilot has been told to follow another aircraft or to provide visual separation from it, he/she should promptly notify the controller is visual contact with the other aircraft is lost or cannot be maintained or if the pilot cannot accept the responsibility for the separation for any reason.

5.2.4 Pilots should remember, however, that they have a regulatory responsibility (FAR 91.113) to see and avoid other aircraft when weather conditions permit.

5.2.5 Pilot Visual Clearing Procedures

5.2.5.1 Before Takeoff. Prior to taxiing onto a runway or landing area in preparation for takeoff, pilots should scan the approach areas for possible landing traffic, executing appropriate clearing maneuvers to provide him a clear view of the approach areas.

5.2.5.2 Climbs and Descents. During climbs and descents in flight conditions which permit visual detection of other traffic, pilots should execute gentle banks, left and right at a frequency which permits continuous visual scanning of the airspace about them.

5.2.5.3 Straight and Level. Sustained periods of straight and level flight in conditions which permit visual detection of other traffic should be broken at intervals with appropriate clearing procedures to provide effect visual scanning.

5.2.5.4 Traffic patterns. Entries into traffic patterns while descending create specific collision hazards and should be avoided.

5.2.5.5 Traffic at VOR sites. All operators should emphasize the need for sustained vigilance in the vicinity of VOR's and airway intersections due to the convergency of traffic.

5.2.5.6 Training operations. Operators of pilot training programs are urged to adopt the following practices:

5.2.5.6.1 Pilots undergoing flight instruction at all levels should be requested to verbalize clearing procedures (call out, "Clear" left, right, above, or below) to instill and sustain the habit if vigilance during maneuvering.

5.2.5.6.2 High-wing airplane—momentarily raise the wing in the direction of the intended turn and look.

5.2.5.6.3 Low-wing airplane—momentarily lower the wing in the direction of the intended turn and look.

5.2.5.6.4 Appropriate clearing procedures should precede the execution of all turns including chandelles, lazy eights, stalls, slow flight, climbs, straight and level, spins, and other combination maneuvers.

5.3 IFR Separation Standards

5.3.1 ATC effects separation of aircraft vertically by assigning different altitudes; longitudinally by providing an interval expressed in time or distance between aircraft on the same, converging, or crossing courses; and laterally by assigning different flight paths.

5.3.2 Separation will be provided between all aircraft operating on IFR flight plans except during that part of the flight (outside a Class B, Class C airspace or a TRSA) being conducted on a VFR CONDITIONS ON TOP/VFR CONDITIONS clearance. under these conditions, ATC may issue traffic advisories but it is the sole responsibility of the pilot to be vigilant so as to see and avoid other aircraft.

5.3.3 When radar is employed in the separation of aircraft at the same altitude, a minimum of 3 miles separation is provided between aircraft operating within 40 miles of the radar antenna site, and 5 miles between aircraft operating beyond 40 miles from the antenna site. These minimums may be increased or decreased in certain specific situations.

Note. — Certain separation standards are increased in the terminal environment when Center Radar ARTS Presentation/Processing (CENRAP) is being utilized.

5.4 Speed Adjustments

5.4.1 ATC will issue speed adjustments to pilots of radar controlled aircraft to achieve or maintain required or desired spacing.

5.4.2 ATC will express all speed adjustments in terms of knots based on indicated airspeed (IAS) in 10 knot increments except that at or above FL 240 speeds may be expressed in terms of Mach numbers in .01 increments. The use of Mach numbers is restricted turbojet aircraft with Mach meters.

5.4.3 Pilots of aircraft in U.S. domestic Class A, B, C, D and E airspace complying with speed adjustments should maintain a speed of ±10 knots or 0.02 Mach number, whichever is less, of the assigned speed.

5.4.3.1 Pilots of aircraft in offshore Controlled Airspace or oceanic Controlled Airspace shall adhere to the ATC assigned air-

speed and shall request ATC approval before making any change thereto. If it is essential to make an immediate temporary change in the Mach number (e.g., due to turbulence), ATC shall be notified as soon as possible. If it is not feasible to maintain the last assigned Mach number during an en route climb or descent due to aircraft performance, advise ATC at the time of the request.

5.4.4 Unless pilot concurrence is obtained, ATC requests for speed adjustments will be in accordance with the following minimums:

5.4.4.1 To aircraft operating between FL 280 and 10,000 feet, a speed not less than 250 knots or the equivalent Mach number.

5.4.4.2 To turbine powered aircraft operating below 10,000 feet, a speed not less than 210 knots, except within 20 flying miles of the runway threshold of the airport of intended landing, a speed not less than 170 knots.

5.4.4.3 Reciprocating engine or turboprop aircraft within 20 flying miles of the runway threshold of the airport of intended landing, a speed not less than 150 knots.

5.4.4.4 Departures, for turbine powered aircraft, a speed not less than 230 knots; for reciprocating engine aircraft, a speed not less than 150 knots.

5.4.5 When ATC combines a speed adjustment with a descent clearance, the sequence of delivery with the word "then" between, indicates the expected order of execution; i.e., "DESCEND AND MAINTAIN (altitude); THEN, REDUCE SPEED TO (speed)," or "REDUCE SPEED TO (speed); THEN, DESCEND AND MAINTAIN (altitude)." However, the maximum speeds below 10,000 feet as established in FAR 91.117 still apply. If there is any doubt concerning the manner in which such a clearance is to be executed, request clarification from ATC.

5.4.6 If ATC determines (before an approach clearance is issued) that it is no longer necessary to apply speed adjustment procedures, they will inform the pilot to resume normal speed. Approach clearances supersede any prior speed adjustment assignments, and pilots are expected to make their own speed adjustments, as necessary, to complete the approach. Under certain circumstances however, it may be necessary for ATC to issue further speed adjustments after approach clearance is issued to maintain separation between successive arrivals. Under such circumstances, previously issued speed adjustments will be restated if that speed is to be maintained or additional speed adjustments are requested. ATC must obtain pilot concurrence for speed adjustments after approach clearances are issued. Speed adjustments should not be assigned inside the final approach fix on final or a point 5 miles from the runway, whichever is closer to the runway.

5.4.7 The pilots retain the prerogative of rejecting the application of speed adjustment by ATC if the minimum safe airspeed for any particular operation is greater than the speed adjustment. IN SUCH CASES, PILOTS ARE EXPECTED TO ADVISE ATC OF THE SPEED THAT WILL BE USED.

5.4.8 Pilots are reminded that they are responsible for rejecting the application of speed adjustment by ATC if, in their opinion, it will cause them to exceed the maximum indicated airspeed prescribed by FAR 91.117. IN SUCH CASES, THE PILOT IS EXPECTED TO SO INFORM ATC. Pilots operating at or above 10,000 feet MSL who are issued speed adjustments which exceed 250 knots IAS and are subsequently cleared below 10,000 feet MSL are expected to comply with FAR 91.117(a).

5.4.9 For operations conducted below 10,000 feet MSL when outside the United States and beneath Class B airspace, airspeed restrictions apply to all U.S. registered aircraft. For operations conducted below 10,000 feet MSL when outside the United States within Class B Airspace, there are no speed restrictions.

5.4.10 For operations in a Class B, C or D surface area, ATC is authorized to request or approve a speed greater than the maximum indicated airspeeds prescribed for operation within that airspace. (Reference FAR 91.117(b).)

5.4.11 When in communication with the ARTCC, pilots should, as a good operating practice, any ATC assigned speed restriction on initial radio contact associated with an ATC communications frequency change.

6. PILOT/CONTROLLER ROLES/RESPONSIBILITIES

6.1 General

6.1.1 The roles and responsibilities of the pilot and controller for effective participation in the ATC system are contained in several documents. Pilot responsibilities are in the Federal Aviation Regulations (FAR's) and the air traffic controller's are in the Air Traffic Control Handbook (7110.65) and supplemental FAA directives. Additional and supplemental information for pilots can be found in the current Airman's Information Manual, Notices to Airmen, advisory circulars, and aeronautical charts. Since there are many other excellent publications produced by nongovernment organizations as well as other Government organizations with various updating cycles, questions concerning the latest or most current material can be resolved by cross-checking with the above mentioned documents.

6.1.2 The pilot in command of an aircraft is directly responsible for and is the final authority as to the safe operation of that aircraft. In an emergency requiring immediate action, the pilot in command may deviate from any rule in the General, Subpart A, and Flight Rules, Subpart B, in accordance with FAR 91.3

6.1.3 The air traffic controller is responsible to give first priority to the separation of aircraft and to the issuance of radar safety alerts second priority to other services that are required, but do not involve separation of aircraft and third priority to additional services to the extent possible.

6.1.4 In order to maintain a safe and efficient air traffic system, it is necessary that each party fulfill his responsibilities to the fullest.

6.1.5 The responsibilities of the pilot and the controller intentionally overlap in many areas providing a degree of redundancy. Should one or the other fail in any manner, this over lapping responsibility is expected to compensate, in many cases, for failures that may affect safety.

6.1.6 The following, while not intended to be all inclusive, is a brief listing of pilot and controller responsibilities for some commonly used procedures or phases of flight. More detailed explanations are contained in the appropriate Federal Aviation Regulations, Advisory Circulars and similar publications. The information provided here is an overview of the principles involved and is not meant as an interpretation of the rules nor is it intended to extend or diminish responsibilities.

6.2 Air Traffic Clearance

6.2.1 Pilot

6.2.1.1 Acknowledges receipt and understanding of an ATC clearance.

6.2.1.2 Readbacks any hold short of runway instructions issued by ATC.

6.2.1.3 Request clarification or amendment, as appropriate, any time a clearance is not fully understood, or considered unacceptable from a safety standpoint.

6.2.1.4 Promptly complies with an air traffic clearance upon receipt except as necessary to cope with an emergency. Advises ATC as soon as possible and obtains an amended clearance if deviation is necessary,

Note. — A clearance to land means that appropriate separation on the landing runway will be ensured. A landing clearance does not relieve the pilot from compliance with any previously issued altitude crossing restriction.

6.2.2 Controller

6.2.2.1 Issues appropriate clearances for the operation being or to be conducted in accordance with established criteria.

6.2.2.2 Assigns altitudes in IFR clearances that are at or above the minimum IFR altitudes in Class A, B, C, D and E airspace.

6.2.2.3 Ensures acknowledgements by the pilot for issued information, clearance or instructions.

6.2.2.4 Ensures that readbacks by the pilot of altitude, heading, or other items are correct. If incorrect, distorted, or incomplete, makes corrections as appropriate.

6.3 Contact Approach

6.3.1 Pilot

6.3.1.1 This approach must be requested by the pilot and is made in lieu of a standard or special instrument approach.

6.3.1.2 By requesting the contact approach, the pilot indicates that the flight is operating clear of clouds, has at least 1 mile flight visibility, and can reasonably expect to continue to the destination airport in those conditions.

6.3.1.3 Be aware that while conducting a contact approach, the pilot assumes responsibility for obstruction clearance.

6.3.1.4 Advise ATC immediately if you are unable to continue the contact approach or if you encounter less than 1 mile flight visibility.

6.3.1.5 Be aware that, if radar service is being received, it may automatically terminate when the pilot is told to contact the tower. (See RADAR SERVICE TERMINATED in the *Pilot/Controller Glossary.)*

6.3.2 Controller

6.3.2.1 Issues clearance for contact approach only when requested by the pilot. Does not solicit the use of this procedure.

6.3.2.2 Before issuing clearance, ascertains that reported ground visibility at destination airport is at least 1 mile.

6.3.2.3 Provides approved separation between aircraft cleared for contact approach and other IFR or special VFR aircraft. When using vertical separation, does not assign a fixed altitude but clears the aircraft at or below an altitude which is at least 1,000 feet below any IFR traffic but not below minimum safe altitudes prescribed in FAR 91.119.

6.3.2.4 Issues alternative instructions if, in his judgment, weather conditions may make completion of the approach impracticable.

6.4 Instrument Approach

6.4.1 Pilot

6.4.1.1 Be aware that the controller issues clearance for approach based only on known traffic.

6.4.1.2 Follow the procedures as shown on the instrument approach chart including all restrictive notations, such as:

6.4.1.2.1 Procedure not authorized at night;

6.4.1.2.2 Approach not authorized when local area altimeter not available;

6.4.1.2.3 Procedure not authorized when control tower not in operation;

6.4.1.2.4 Procedure not authorized when glide slope not used;

6.4.1.2.5 Straight-in minimums not authorized at night, etc.;

6.4.1.2.6 Radar required; or

6.4.1.2.7 The circling minimums published on the instrument approach chart provide adequate obstruction clearance and the pilot should not descend below the circling altitude until the aircraft is in a position to make final descent for landing. Sound judgment and knowledge of his and the aircraft's capabilities are the criteria for a pilot to determine the exact maneuver in each instance since airport design and the aircraft position, altitude, and airspeed must all be considered. (See RAC 4, Paragraph 3.9.13, Circling Minimums.)

6.4.1.3 Upon receipt of an approach clearance while on an unpublished route or being radar vectored:

6.4.1.3.1 Comply with the minimum altitude for IFR and;

6.4.1.3.2 Maintain last assigned altitude until established on a segment of a published route or Instrument Approach Procedure (IAP), at which time published altitudes apply.

6.4.2 Controller

6.4.2.1 Issues an approach clearance based on known traffic.

6.4.2.2 Issues an IFR approach clearance only after aircraft is established on a segment of published route or IAP, or assigns an appropriate altitude for the aircraft to maintain until so established.

6.5 Missed Approach

6.5.1 Pilot

6.5.1.1 Execute a missed approach when one of the following conditions exist:

6.5.1.1.1 Arrival at the missed approach point (MAP) or the decision height (DH) and visual reference to the runway environment is insufficient to complete the landing.

6.5.1.1.2 Determine that a safe landing is not possible.

6.5.1.1.3 Instructed to do so by ATC.

6.5.1.2 Advise ATC that a missed approach will be made. Include the reason for the missed approach unless initiated by ATC.

6.5.1.3 Comply with the missed approach instructions for the instrument approach procedure being executed unless other missed approach instructions are specified by ATC.

6.5.1.4 If executing a missed approach prior to reaching the MAP or DH, advise ATC and fly the instrument procedure to the MAP at an altitude at or above the MDA or DH before executing a turning maneuver.

6.5.1.5 Radar vectors issued by ATC when informed that a missed approach is being executed supersedes the previous missed approach procedure.

6.5.1.6 If making a missed approach from a radar approach, execute the missed approach procedure previously given or climb to the altitude and fly the heading specified by the controller.

6.5.1.7 Following a missed approach, request clearance for specific action; i.e., another approach, hold for improved conditions, proceed to an alternate airport, etc.

6.5.2 Controller

6.5.2.1 Issues an approved alternate missed approach procedure if it is desired that the pilot execute a procedure other than as depicted on the instrument approach chart.

6.5.2.2 May vector a radar identified aircraft executing a missed approach when operationally advantageous to the pilot or the controller.

6.5.2.3 In response to the pilot's stated intentions, issues a clearance to an alternate airport, to a holding fix, or for reentry into the approach sequence, as traffic conditions permit.

6.6 Radar Vectors

6.6.1 Pilot

6.6.1.1 Promptly comply with headings and altitudes assigned to you by the controller

6.6.1.2 Question any assigned heading or altitude believed to be incorrect.

6.6.1.3 If operating VFR and compliance with any radar vector or altitude would cause a violation of any FAR, advise ATC and obtain a revised clearance or instruction.

6.6.2 Controller

6.6.2.1 Vectors aircraft in Class A, B, C, D and E airspace:

6.6.2.1.1 For separation.

6.6.2.1.2 For noise abatement.

6.6.2.1.3 To obtain an operational advantage for the pilot or the controller.

6.6.2.2 Vectors aircraft in Class A, B, C, D, E and G airspace when requested by the pilot.

6.6.2.3 Vectors IFR aircraft at or above minimum vectoring altitudes.

6.6.2.4 May vector VFR aircraft, not at an ATC assigned altitude, at any altitude. In these cases, terrain separation is the pilot's responsibility.

6.7 Speed Adjustments

6.7.1 Pilot (In U.S. Domestic Class A, B, C, D and E airspace)

6.7.1.1 Except as stated in paragraphs 6.7.3 and 6.7.4, advise ATC anytime the true airspeed at cruising level varies or is expected to vary by ±10 knots or 0.02 Mach number, whichever is less, of the filed true airspeed.

6.7.1.2 Comply with speed adjustments from ATC unless:

6.7.1.2.1 The minimum or maximum safe airspeed for any particular operation is greater or less than the requested airspeed. In such cases, advise ATC.

6.7.1.2.2 Operating at or above 10,000 feet MSL on an ATC assigned SPEED ADJUSTMENT of more than 250 knots IAS and subsequent clearance is received for descent below 10,000 feet MSL. In such cases, pilots are expected to comply with FAR 97.117(a).

6.7.2 Controller (In U.S. Domestic Class A, B, C, D and E airspaces)

6.7.2.1 Assigns aircraft to speed adjustments when necessary but not as a substitute for good vectoring technique.

6.7.2.2 Adheres to the restrictions of 7110.65 as to when speed adjustment procedures may be applied.

6.7.2.3 Avoids speed adjustments requiring alternate decreases and increases.

6.7.2.4 Assigns speed adjustments to a specified IAS knots/Mach number or to increase or decrease speed utilizing increments of 10 knots or multiples thereof.

6.7.2.5 Advises pilots to resume normal speed when speed adjustments are no longer required.

6.7.2.6 Gives due consideration to aircraft capabilities to reduce speed while descending

6.7.3 Pilot (In Oceanic Class A and E airspace)

6.7.3.1 If ATC has not assigned an airspeed, advise ATC anytime the true airspeed at cruising level varies or is expected to vary by ±10 knots or 0.02 Mach number, whichever is less, of the filed true airspeed.

6.7.3.2 If ATC has assigned an airspeed, aircraft shall adhere to the ATC assigned airspeed and shall request ATC approval before making any change thereto. If it is essential to make an immediate temporary change in the Mach number (e.g., due to turbulence), ATC shall be notified as soon as possible. If it is not feasible, due to aircraft performance, to maintain the last assigned Mach number during an en route climb or descent, advise ATC at the time of the request.

6.7.4 Controller (In Oceanic Class A and E airspace)

6.7.4.1 Assigns airspeed when necessary for separation of aircraft to comply with FAR, ICAO regulations and procedures, or letters of agreement.

6.8 Traffic Advisories (Traffic Information)

6.8.1 Pilot

6.8.1.1 Acknowledge receipt of traffic advisories.

6.8.1.2 Inform controller if traffic is in sight.

6.8.1.3 Advise ATC if a vector to avoid traffic is desired.

6.8.1.4 Do not expect to receive radar traffic advisories on all traffic. Some aircraft may not appear on the radar display. Be aware that the controller may be occupied with high priority duties and unable to issue traffic information for a variety of reasons.

6.8.1.5 Advise controller if service not desired.

6.8.2 Controller

6.8.2.1 Issues radar traffic to the maximum extent consistent with higher priority duties except in Class A airspace.

6.8.2.2 Provides vectors to assist aircraft to avoid observed traffic when requested by the pilot.

6.8.2.3 Issues traffic information to aircraft in Class D airspace for sequencing purposes

6.9 Safety Alert

6.9.1 Pilot

6.9.1.1 Initiate appropriate action if a safety alert is received from ATC.

6.9.1.2 Be aware that this service is not always available and that many factors affect the ability of the controller to be aware of a situation in which unsafe proximity to terrain, obstructions, or another aircraft may be developing.

6.9.2 Controller

6.9.2.1 Issues a safety alert if he is aware an aircraft under his control is at an altitude which, in the controller's judgment, places the aircraft in unsafe proximity to terrain, obstructions or another aircraft. Types of safety alerts are:

6.9.2.1.1 Terrain/Obstruction Alerts—Immediately issued to an aircraft under his control if he is aware the aircraft is at an altitude believed to place the aircraft in unsafe proximity to terrain/obstruction.

6.9.2.1.2 Aircraft Conflict Alerts—Immediately issued to an aircraft under his control if he is aware of an aircraft not under his control at an altitude believed to place the aircraft in unsafe proximity to each other. With the alert, he offers the pilot an alternative if feasible.

6.9.2.2 Discontinues further alerts if informed by the pilot that he is taking action to correct the situation or that he has the other aircraft in sight.

6.10 See and Avoid

6.10.1 Pilot

6.10.1.1 When meteorological conditions permit, regardless of type of flight plan or whether or not under control of an radar facility, the pilot is responsible to see and avoid other traffic, terrain, or obstacles.

6.10.2 Controller

6.10.2.1 Provides radar traffic information to radar identified aircraft operating outside positive control airspace on a workload permitting basis.

6.10.2.2 Issues a safety advisory to an aircraft under his control if he is aware the aircraft is at an altitude believed to place the aircraft in unsafe proximity to terrain, obstructions or other aircraft.

6.11 Visual Approach

6.11.1 Pilot

6.11.1.1 If a visual approach is not desired, advise ATC

6.11.1.2 Comply with controller's instructions for vectors toward the airport of intended landing or to a visual position behind a preceding aircraft.

6.11.1.3 After being cleared for a visual approach, proceed to the airport in a normal manner or follow designated traffic and/or charted flight procedures, as appropriate, remaining in VFR at all times.

6.11.1.4 Acceptance of a visual approach clearance to visually follow a preceding aircraft is pilot acknowledgement that he will establish a safe landing interval behind the preceding aircraft and that he accepts responsibility for his own wake turbulence separation.

6.11.1.5 Advise ATC immediately if you are unable to continue following a designated aircraft or encounter less than basic VFR weather conditions.

6.11.1.6 Be aware that radar service is automatically terminated, without advising the pilot, when the aircraft is instructed to change to advisory frequency.

6.11.1.7 Be aware that there may be other traffic in traffic pattern and the landing sequence may differ from the traffic sequence assigned by the approach control or air route traffic control center.

6.11.2 Controller

6.11.2.1 Does not vector an aircraft for a visual approach to an airport with weather reporting service unless the reported ceiling at the airport is 500 feet or more above the MVA and visibility is 3 miles or more.

6.11.2.2 Informs the pilot when weather is not available for the destination airport and does not vector for a visual approach to those airports unless there is reasonable assurance that descent and flight to the airport can be made in VFR conditions.

6.11.2.3 Does not clear an aircraft for a visual approach unless the aircraft is and can remain in VFR conditions.

6.11.2.4 Issues visual approach clearance when the pilot reports sighting the airport or a preceding aircraft which is to be followed.

6.11.2.5 Provides separation except when visual separation is being applied by the pilot of the aircraft executing the visual approach.

6.11.2.6 Continues flight following and traffic information until the aircraft has landed or has been instructed to change to advisory frequency.

6.11.2.7 Informs the pilot conducting the visual approach of the aircraft class when pertinent traffic is known to be a heavy aircraft.

6.12 Visual Separation

6.12.1 Pilot

6.12.1.1 Acceptance of instructions to follow another aircraft or to provide visual separation from it is an acknowledgment that the pilot will maneuver his/her aircraft as necessary to avoid the other aircraft or to maintain intrail separation.

6.12.1.2 If instructed by ATC to follow another aircraft or to provide visual separation from it, promptly notify the controller if you lose sight of that aircraft, are unable to maintain continued visual contact with it, or cannot accept the responsibility for your own separation for any reason.

6.12.1.3 The pilot also accepts responsibility for wake turbulence separation under these conditions.

6.12.2 Controller

6.12.2.1 Applies visual separation only:

6.12.2.1.1 In conjunction with visual approaches.

6.12.2.1.2 Within the terminal area when a controller has both aircraft in sight or by instructing a pilot who sees the other aircraft to maintain visual separation from it.

6.12.2.1.3 Within en route airspace when aircraft are on opposite courses and one pilot reports having seen the other aircraft and that the aircraft have passed each other.

6.13 VFR-ON-TOP

6.13.1 Pilot

6.13.1.1 This clearance must be requested by the pilot on an IFR flight plan and if approved, permits the pilot to select an altitude or flight level of his choice (subject to any ATC restrictions) in lieu of an assigned altitude.

Note 1. — VFR-ON-TOP is not permitted in certain airspace areas, such as positive control airspace, certain restricted areas, etc. Consequently, IFR flights operating VFR-ON-TOP will avoid such airspace.

Note 2. — See related AIP paragraphs, RAC 3.4;3.2, Rules Pertaining to IFR Aircraft in Class A, B, C, D and E airspace; RAC 3.3;4, IFR Clearance VFR-ON-TOP; RAC 3.3;5.3, IFR Separation Standards; RAC 3.5;4, Position Reporting; and RAC 3.5;5, Additional Reports.

6.13.1.2 By requesting a VFR-ON-TOP clearance, the pilot indicates that he is assuming the sole responsibility to be vigilant so as to see and avoid other aircraft and that he will:

6.13.1.2.1 Fly at the appropriate VFR altitude as prescribed in FAR 91.159.

6.13.1.2.2 Comply with the VFR visibility and distance from criteria in FAR 91.155 (Basic VFR Weather Minimums).

6.13.1.2.3 Comply with instrument flight rules that are applicable to this flight; i.e., minimum IFR altitudes, position reporting, radio communications, course to be flown, adherence to ATC clearance, etc.

6.13.1.3 Should advise ATC prior to any altitude change to ensure the exchange of accurate traffic information.

6.13.2 Controller

6.13.2.1 May clear an aircraft to maintain VFR-ON-TOP if the pilot of an aircraft on an IFR flight plan requests the clearance.

6.13.2.2 Inform the pilot of an aircraft cleared to climb to VFR-ON-TOP: the reported height of the tops or that no top report is available, issues an alternate clearance if necessary, and once the aircraft reports reaching VFR-ON-TOP, reclears the aircraft to maintain VFR-ON-TOP.

6.13.2.3 Before issuing clearance, ascertains that the aircraft is not in or will not enter positive control airspace.

6.14 Instrument Departures

6.14.1 Pilot

6.14.1.1 Prior to Departure,: consider the type of terrain and other obstructions on or in the vicinity of the departure airport.

6.14.1.2 Determine if obstruction avoidance can be maintained visually or that the departure procedure should be followed.

6.14.1.3 Determine whether a departure procedure and/or Standard Instrument Departure (SID) is available for obstruction avoidance.

6.14.1.4 At airports where instrument approach procedures have not been published, hence no published departure procedure, determine what action will be necessary and take such action that will assure a safe departure.

6.14.2 Controller

6.14.2.1 At locations with airport traffic control service, when necessary, specifies direction of takeoff/turn or initial heading to be flown after takeoff.

6.14.2.2 At locations without airport traffic control service but within Class E surface area, when necessary to specify direction of takeoff/turn or initial heading to be flown, obtains pilot's concurrence that the procedure will allow him to comply with local traffic patterns, terrain, and obstruction avoidance.

6.14.2.3 Includes established departure procedures as part of the air traffic control clearance when pilot compliance is necessary to ensure separation.

6.15 Minimum Fuel Advisory.

6.15.1 Pilot

6.15.1.1 Advise ATC of your "minimum fuel" status when your fuel supply has reached a state where, upon reaching destination, you cannot accept any undue delay.

6.15.1.2 Be aware that this is not an emergency situation but merely an advisory that indicates an emergency situation is possible should any undue delay occur.

6.15.1.3 Be aware that a minimum fuel advisory does not imply a need for traffic priority.

6.15.1.4 If the remaining usable fuel supply suggests the need for traffic priority to ensure a safe landing, you should declare an emergency account low fuel, and report the fuel remaining in minutes.

6.15.2 Controller

6.15.2.1 When an aircraft declares a state of "minimum fuel," relay this information to the facility to whom control jurisdiction is transferred.

6.15.2.2 Be alert for any occurrence which might delay the aircraft.

7. TRAFFIC ALERT AND COLLISION AVOIDANCE SYSTEM (TCAS I & II)

7.1 TCAS I provides proximity warning only, to assist the pilot in the visual acquisition of intruder aircraft. No recommended avoidance maneuvers are provided nor authorized as a direct result of a TCAS I warning. It is intended for use by smaller commuter aircraft holding 10 to 30 passenger seats, and general aviation aircraft.

7.2 TCAS II provides traffic advisories (TA's) and resolution advisories (RA's). Resolution advisories provide recommended maneuvers in a vertical direction (climb or descend only) to avoid conflicting traffic. Airline aircraft, and larger commuter and business aircraft holding 31 passenger seats or more, use TCAS II equipment.

7.2.1 Each pilot who deviates from an ATC clearance in response to a TCAS II RA shall notify ATC of that deviation as soon as practicable and expeditiously return to the current ATC clearance when the traffic conflict is resolved.

7.2.2 Deviations from rules, policies, or clearances should be kept to the minimum necessary to satisfy a TCAS II RA.

7.2.3 The serving IFR air traffic facility is not responsible to provide approved standard IFR separation to an aircraft after a TCAS II RA maneuver until one of the following conditions exists:

7.2.3.1 The aircraft has returned to its assigned altitude and course.

7.2.3.2 Alternate ATC instructions have been issued.

7.3 TCAS does not alter or diminish the pilot's basic authority and responsibility to ensure safe flight. Since TCAS does not respond to aircraft which are not transponder equipped or aircraft with a transponder failure, TCAS alone does not ensure safe separation in every case.

7.4 At this time, no air traffic service nor handling is predicated on the availability of TCAS equipment in the aircraft.

AIRSPACE

1. GENERAL

1.1 General

There are two categories of airspace or airspace areas; regulatory and nonregulatory. Within these two categories, there are controlled, uncontrolled, special use, and other airspace area types. The categories and types of airspace are dictated by: (1) the complexity or density of aircraft movements; (2) the nature of the operations conducted within the airspace; and (3) the level of safety required; and (4) the national and public interest. It is important that pilots be familiar with the operational requirements for each of the various types or classes of airspace. Subsequent sections will cover each category and class in sufficient detail to facilitate understanding.

1.2 General Dimensions of Airspace Segments

Refer to Federal Aviation Regulations (FAR) for specific dimensions, exceptions, geographical areas covered, exclusions, specific transponder or equipment requirements, and flight operations.

1.3 Basic VFR Weather Minimums

No person may operate an aircraft under basic VFR when the flight visibility is less, or at a distance from clouds that is less, than that prescribed for the corresponding altitude and class of airspace. (See RAC 3.4, Appendix One for a tabular presentation of these rules).

Note. — Student pilots must comply with Part 61.89(a) (6) and (7).

1.4 VFR Cruising Altitudes and Flight Levels

VFR cruising altitudes and flight levels are presented in tabular form in RAC 3.4, Appendix Two.

2. CONTROLLED AIRSPACE

2.1 General

2.1.1 Controlled Airspace: A generic term that covers the different classification of airspace (Class A, Class B, Class C, Class D, and Class E airspace) and defined dimensions within which air traffic control service is provided to IFR flights and to VFR flights in accordance with the airspace classification. (See RAC 3.4, Appendix Three for Airspace Classes).

2.1.2 IFR Requirements: IFR operations in any class of controlled airspace requires that a pilot must file an IFR flight plan and receive an appropriate ATC clearance.

2.1.3 IFR Separation: Standard IFR separation is provided to all aircraft operating under IFR in controlled airspace.

2.1.4 Ultralight Vehicles: No person may operate an ultralight vehicle within Class A, Class B, Class C, or Class D airspace or within the lateral boundaries of the surface area of Class E airspace designated for an airport unless that person has prior authorization from the ATC facility having jurisdiction over that airspace. See FAR Part 103.

2.1.5 Parachute Jumps: No person may make a parachute jump, and no pilot in command may allow a parachute jump to be made from that aircraft, in or into Class A, Class B, Class C, or Class D airspace without, or in violation of, the terms of an ATC authorization issued by the ATC facility having jurisdiction over the airspace. See FAR Part 105.

2.1.6 Unmanned Free Balloons: Unless otherwise authorized by ATC, no person may operate an unmanned free balloon below 2,000 feet above the surface within the lateral boundaries of Class B, Class C, Class D, or Class E airspace designated for an airport. See FAR Part 101.

2.1.7 Safety Alerts: Safety Alerts are mandatory services and are provided to ALL aircraft. There are two types of Safety Alerts, Terrain/Obstruction Alert and Aircraft Conflict/Mode C Intruder Alert.

2.1.7.1 Terrain/Obstruction Alert. A Terrain/Obstruction Alert is issued when, in the controller's judgment, an aircraft's altitude places it in unsafe proximity to terrain and/or obstructions.

2.1.7.2 Aircraft Conflict/Mode C Intruder Alert. An Aircraft Conflict/Mode C Intruder Alert is issued if the controller observes another aircraft which places it in an unsafe proximity. When feasible, the controller will offer the pilot an alternative course of action.

2.1.8 Traffic Advisories: Traffic advisories are a mandatory additional service and will be provided to all aircraft as the controller's workload permits.

2.2 Class A Airspace

2.2.1 Definition: Generally, that airspace from 18,000 feet MSL up to and including FL600, including the airspace overlying the waters within 12 nautical miles of the coast of the 48 contiguous States and Alaska; and designated international airspace beyond 12 nautical miles of the coast of the 48 contiguous States and Alaska within areas of domestic radio navigational signal or ATC radar coverage, and within which domestic procedures are applied.

2.2.2 Operating Rules and Pilot/Equipment Requirements: Unless otherwise authorized, all persons must operate their aircraft under IFR. See FAR Part 71.33 and Part 91.167 through Part 91.193.

2.2.3 Charts: Class A airspace is not specifically charted.

2.3 Class B Airspace

2.3.1 Definition: Generally, that airspace from the surface to 10,000 feet MSL surrounding the nation's busiest airports in terms of IFR operations or passenger enplanements. The configuration of each Class B airspace area is individually tailored and consists of a surface area and two or more layers (some Class B airspace areas resemble upside-down wedding cakes), and is designed to contain all published instrument procedures once an aircraft enters the airspace. An ATC clearance is required for all aircraft to operate in the area, and all aircraft that are so cleared receive separation services within the airspace. The cloud clearance requirement for VFR operations is "clear of clouds."

2.3.2 Operating Rules and Pilot/Equipment Requirements for VFR Operations: Regardless of weather conditions, an ATC clearance is required prior to operating within Class B airspace. Pilots should not request a clearance to operate within Class B airspace unless the requirements of FAR Part 91.215 and Part 91.131 are met. Included among these requirements are:

2.3.2.1 Unless otherwise authorized by ATC, aircraft must be equipped with an operable two-way radio capable of communicating with ATC on appropriate frequencies for that Class B airspace.

2.3.2.2 No person may take off or land a civil aircraft at the following primary airports within Class B airspace unless the pilot in command holds at least a private pilot certificate:

Andrews Air Force Base, MD
Atlanta Hartsfield Airport, GA
Boston Logan Airport, MA
Chicago O'Hare Intl Arpt, IL
Los Angeles Intl Airport, CA
Miami Intl Airport, FL
Newark Intl Airport, NJ
New York Kennedy Airport, NY
New York La Guardia Arpt, NY
San Francisco Intl Airport, CA
Washington National Arpt, DC
Dallas/Fort Worth Intl Arpt, TX

2.3.2.3 No person may take off or land a civil aircraft at an airport within Class B airspace or operate a civil aircraft within Class B airspace unless:

2.3.2.3.1 The pilot in command holds at least a private pilot certificate; or,

2.3.2.3.2 The aircraft is operated by a student pilot or recreational pilot who seeks private pilot certification and has met the requirements of FAR Part 61.95.

2.3.2.4 Unless otherwise authorized by ATC, each person operating a large turbine engine-powered airplane to or from a primary airport shall operate at or above the designated floors while within the lateral limits of Class B airspace.

2.3.2.5 Unless otherwise authorized by ATC, each aircraft must be equipped as follows:

2.3.2.5.1 For IFR operations, an operable VOR or TACAN receiver; and

2.3.2.5.2 For all operations, a two-way radio capable of communications with ATC on appropriate frequencies for that area; and

2.3.2.5.3 Unless otherwise authorized by ATC, an operable radar beacon transponder with automatic altitude reporting equipment.

Note. — ATC may, upon notification, immediately authorize a deviation from the altitude reporting equipment requirement; however, a request for a deviation from the 4096 transponder equipment requirement must be submitted to the controlling ATC facility at least one hour before the proposed operation. (See RAC 1, Transponder Operation).

2.3.3 Charts: Class B airspace is charted on Sectional Charts, IFR En Route Low Altitude, and Terminal Area Charts.

2.3.4 Flight Procedures:

2.3.4.1 Flights: Aircraft within Class B airspace are required to operate in accordance with current IFR procedures. A clearance for a visual approach to a primary airport is not authorization for turbine powered airplanes to operate below the designated floors of the Class B airspace.

2.3.4.2 VFR Flights:

2.3.4.2.1 Arriving aircraft must obtain an ATC clearance prior to entering Class B airspace and must contact ATC on the appropriate frequency, and in relation to geographical fixes shown on local charts. Although a pilot may be operating beneath the floor of the Class B airspace on initial contact, communications with ATC should be established in relation to the points indicated for spacing and sequencing purposes.

2.3.4.2.2 Departing aircraft require a clearance to depart Class B airspace and should advise the clearance delivery position of their intended altitude and route of flight. ATC will normally advise VFR aircraft when leaving the geographical limits of the Class B airspace. Radar service is not automatically terminated with this advisory unless specifically stated by the controller.

2.3.4.2.3 Aircraft not landing or departing the primary airport may obtain an ATC clearance to transit the Class B airspace when traffic conditions permit and provided the requirements of FAR Part 91.131 are met. Such VFR aircraft are encouraged, to the extent possible, to operate at altitudes above or below the Class B airspace or transit through established VFR corridors. Pilots operating in VFR corridors are urged to use frequency 122.750 mHz for the exchange of aircraft position information.

2.3.5 ATC Clearances and Separation: An ATC clearance is required to enter and operate within Class B airspace. VFR pilots are provided sequencing and separation from other aircraft while operating within Class B airspace. (See RAC 1, Terminal VFR Radar Service).

Note 1. — Separation and sequencing of VFR aircraft will be suspended in the event of a radar outage as this service is dependent on radar. The pilot will be advised that the service is not available and issued wind, runway information and the time or place to contact the tower.

Note 2. — Separation of VFR aircraft will be suspended during CENRAP operations. Traffic advisories and sequencing to the primary airport will be provided on a workload permitting basis. The pilot will be advised when Center Radar Presentation (CENRAP) is in use.

2.3.5.1 VFR aircraft are separated from all VFR/IFR aircraft which weigh 19,000 pounds or less by a minimum of:

2.3.5.1.1 Target resolution, or

2.3.5.1.2 500 feet vertical separation, or

2.3.5.1.3 Visual separation

2.3.5.2 VFR aircraft are separated from all VFR/IFR aircraft which weigh more than 19,000 and turbojets by no less than:

2.3.5.2.1 1 1/2 miles lateral separation, or

2.3.5.2.2 500 feet vertical separation, or

2.3.5.2.3 Visual separation

2.3.5.3 This program is not to be interpreted as relieving pilots of their responsibilities to see and avoid other traffic operating in basic VFR weather conditions, to adjust their operations and flight path as necessary to preclude serious wake encounters, to maintain appropriate terrain and obstruction clearance or to remain in weather conditions equal to or better than the minimums required by FAR Part 91.155. Approach control should be advised and a revised clearance or instruction obtained when compliance with an assigned route, heading and/or altitude is likely to compromise pilot responsibility with respect to terrain and obstruction clearance, vortex exposure, and weather minimums.

2.3.5.4 ATC may assign altitudes to VFR aircraft that do not conform to FAR Part 91.159. **"RESUME APPROPRIATE VFR ALTITUDES"** will be broadcast when the altitude assignment is no longer needed for separation or when leaving Class B airspace. Pilots must return to an altitude that conforms to FAR Part 91.159.

2.3.6 Proximity operations: VFR aircraft operating in proximity to Class B airspace are cautioned against operating too closely to the boundaries, especially where the floor of the Class B airspace is 3,000 feet or less or where VFR cruise altitudes are at or near the floor of higher levels. Observance of this precaution will reduce the potential for encountering an aircraft operating at the altitudes of Class B floors. Additionally, VFR aircraft are encouraged to utilize the VFR Planning Chart as a tool for planning flight in proximity to Class B airspace. Charted VFR Flyway Planning charts are published on the back of the existing VFR Terminal Area Charts.

2.4 Class C Airspace

2.4.1 Definition: Generally, that airspace from the surface to 4,000 feet above the airport elevation (charted in MSL) surrounding those airports that have an operational control tower, are serviced by a radar approach control, and that have a certain number of IFR operations or passenger enplanements. Although the configuration of each Class C airspace area is individually tailored, the airspace usually consists of a surface area with a 5NM radius, and an outer area with a 10NM radius that extends from 1,200 feet to 4,000 feet above the airport elevation.

2.4.2 Outer Area: The normal radius will be 20NM, with some variations based on site specific requirements. The outer area extends outward from the primary 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 airspace and other airspace as appropriate.

2.4.3 Charts: Class C airspace is charted on Sectional Charts, IFR En Route Low Altitude, and Terminal Area Charts where appropriate.

2.4.4 Operating Rules and Pilot/Equipment Requirements:

2.4.4.1 Pilot Certification: No specific certification required.

2.4.4.2 Equipment:

2.4.4.2.1 Two-way radio, and

2.4.4.2.2 Unless otherwise authorized by ATC, an operable radar beacon transponder with automatic altitude reporting equipment.

2.4.4.3 Arrival or Through Flight Entry Requirements: Two-way radio communication must be established with the ATC facility providing ATC services prior to entry and thereafter maintain those communications while in Class C airspace. Pilots of arriving aircraft should contact the Class C airspace ATC facility on the publicized frequency and give their position, altitude, radar beacon code, destination, and request Class C service. Radio contact should be initiated far enough from the Class C airspace boundary to preclude entering Class C airspace before two-way radio communications are established.

Note 1. — If the controller responds to a radio call with, "(aircraft callsign) standby," radio communications have been established and the pilot can enter the Class C airspace.

Note 2. — If workload or traffic conditions prevent immediate provision of Class C services, the controller will inform the pilot to remain outside the Class C airspace until conditions permit the services to be provided.

Example:

[aircraft callsign] "Remain Outside the Class C Airspace and Standby."

Note 3. — It is important to understand that if the controller responds to the initial radio call WITHOUT using the aircraft identification, radio communications have not been established and the pilot may not enter the Class C airspace.

Example:

"Aircraft Calling Dulles Approach Control, Standby."

2.4.4.4 Departures from:

2.4.4.4.1 A primary or satellite airport with an operating control tower: Two-way radio communications must be established and maintained with the control tower, and thereafter as instructed by ATC while operating in Class C airspace.

2.4.4.4.2 A satellite airport without an operating control tower: Two-way radio communications must be established as soon as practicable after departing with the ATC facility having jurisdiction over the Class C airspace.

2.4.4.5 Aircraft Speed: Unless otherwise authorized or required by ATC, no person may operate an aircraft at or below 2,500 feet above the surface within 4 miles of a Class C surface area at an indicated airspeed of more than 200 knots (230 mph).

2.4.5 Air Traffic Services: When two-way radio communications and radar contact are established, all participating VFR aircraft are:

2.4.5.1 Sequenced to the primary airport

2.4.5.2 Provided Class C services within the Class C airspace and the Outer Area.

2.4.5.3 Provided basic radar services beyond the outer area on a workload permitting basis. This can be terminated by the controller if workload dictates.

2.4.6 Aircraft Separation: Separation is provided within the Class C airspace and the Outer Area after two-way radio communications and radar contact are established. VFR aircraft are separated from IFR aircraft within the Class C airspace by any of the following:

2.4.6.1 Visual separation.

2.4.6.2 500 feet vertical; except when operating beneath a heavy jet.

2.4.6.3 Target resolution.

Note 1. — Separation and sequencing of VFR aircraft will be suspended in the event of a radar outage as this service is dependent on radar. The pilot will be advised that the service is not available and issued wind, runway information and the time or place to contact the tower.

Note 2. — Separation of VFR aircraft will be suspended during CENRAP operations. Traffic advisories and sequencing to the primary airport will be provided on a workload permitting basis. The pilot will be advised when CENRAP is in use.

Note 3. — Pilot participation is voluntary within the outer area and can be discontinued, within the outer area, at the pilots request. Class C services will be provided in the outer area unless the pilot requests termination of the service.

2.4.7 Secondary Airports:

2.4.7.1 In some locations Class C airspace may overlie the Class D surface area of a secondary airport. In order to allow that control tower to provide service to aircraft, portions of the overlapping Class C airspace may be procedurally excluded when the secondary airport tower is in operation. Aircraft operating in these procedurally excluded areas will only be provided

airport traffic control services when in communication with the secondary airport tower.

2.4.7.2 Aircraft proceeding inbound to a satellite airport will be terminated at a sufficient distance to allow time to change to the appropriate tower or advisory frequency. Class C services to these aircraft will be discontinued when the aircraft is instructed to contact the tower or change to advisory frequency.

2.4.7.3 Aircraft departing secondary controlled airports will not receive Class C services until they have been radar identified and two-way communications have been established with the Class C airspace facility.

2.4.8 This program is not to be interpreted as relieving pilots of their responsibilities to see and avoid other traffic operating in basic VFR weather conditions, to adjust their operations and flight path as necessary to preclude serious wake encounters, to maintain appropriate terrain and obstruction clearance or to remain in weather conditions equal to or better than the minimums required by FAR Part 91.155. Approach control should be advised and a revised clearance or instruction obtained when compliance with an assigned route, heading and/or altitude is likely to compromise pilot responsibility with respect to terrain and obstruction clearance, vortex exposure, and weather minimums.

2.5 Class D Airspace

2.5.1 Definition: Generally, that airspace from the surface to 2,500 feet above the airport elevation (charted in MSL) surrounding those airports that have an operational control tower. The configuration of each Class D airspace area is individually tailored and when instrument procedures are published, the airspace will normally be designed to contain the procedures.

2.5.2 Operating Rules and Pilot/Equipment Requirements:

2.5.2.1 Pilot Certification: No specific certification required.

2.5.2.2 Equipment: Unless otherwise authorized by ATC, an operable two-way radio is required.

2.5.2.3 Arrival or Through Flight Entry Requirements: Two-way radio communication must be established with the ATC facility providing ATC services prior to entry and thereafter maintain those communications while in the Class D airspace. Pilots of arriving aircraft should contact the control tower on the publicized frequency and give their position, altitude, destination, and any request(s). Radio contact should be initiated far enough from the Class D airspace boundary to preclude entering the Class D airspace before two-way radio communications are established.

Note 1. — If the controller responds to a radio call with, [aircraft callsign] "STANDBY", radio communications have been established and the pilot can enter the Class D airspace.

Note 2. — If workload or traffic conditions prevent immediate entry into Class D airspace, the controller will inform the pilot to remain outside the Class D airspace until conditions permit entry.

Example:

[aircraft callsign] "Remain Outside The Class D Airspace And Standby."

Note 3. — It is important to understand that if the controller responds to the initial radio call without using the aircraft callsign, radio communications have not been established and the pilot may not enter the Class D airspace.

Example:

"Aircraft Calling Manassas Tower Standby."

2.5.2.4 Departures from:

2.5.2.4.1 A primary or satellite airport with an operating control tower: Two-way radio communications must be established and maintained with the control tower, and thereafter as instructed by ATC while operating in the Class D airspace.

2.5.2.4.2 A satellite airport without an operating control tower: Two-way radio communications must be established as soon as practicable after departing with the ATC facility having jurisdiction over the Class D airspace as soon as practicable after departing.

2.5.2.5 Aircraft Speed: Unless otherwise authorized or required by ATC, no person may operate an aircraft at or below 2,500 feet above the surface within 4 miles of a Class D surface area at an indicated airspeed of more than 200 knots (230 mph).

2.5.3 Class D airspace areas are depicted on Sectional and Terminal charts with blue segmented lines, and on IFR En Route Lows with a boxed [D].

2.5.4 Arrival extensions for instrument approach procedures may be Class D or Class E airspace. As a general rule, if all extensions are 2 miles or less, they remain part of the Class D surface area. However, if any one extension is greater than 2 miles, then all extensions become Class E.

2.5.5 Separation for VFR Aircraft: No separation services are provided to VFR aircraft.

2.6 Class E Airspace

2.6.1 Definition: Generally, if the airspace is not Class A, Class B, Class C, or Class D, and it is controlled airspace, it is Class E airspace.

2.6.2 Operating Rules and Pilot/Equipment Requirements:

2.6.2.1 Pilot Certification: No specific certification required.

2.6.2.2 Equipment: No specific equipment required by the airspace.

2.6.2.3 Arrival or Through Flight Entry Requirements: No specific requirements.

2.6.3 Charts: Class E airspace below 14,500 feet MSL is charted on Sectional, Terminal, World, and IFR En Route Low Altitude charts.

2.6.4 Vertical limits: Except for 18,000 feet MSL, Class E airspace has no defined vertical limit but rather it extends upward from either the surface or a designated altitude to the overlying or adjacent controlled airspace.

2.6.5 Types of Class E Airspace:

2.6.5.1 Surface area designated for an airport: When designated as a surface area for an airport, the airspace will be configured to contain all instrument procedures.

2.6.5.2 Extension to a surface area: There are Class E airspace areas that serve as extensions to Class B, Class C, and Class D surface areas designated for an airport. Such airspace provides controlled airspace to contain standard instrument approach procedures without imposing a communications requirement on pilots operating under VFR.

2.6.5.3 Airspace used for transition: There are Class E airspace beginning at either 700 or 1,200 feet AGL used to transition to/from the terminal or en route environment.

2.6.5.4 En Route Domestic Areas: There are Class E airspace areas that extend upward from a specified altitude and are en route domestic airspace areas that provide controlled airspace in

those areas where there is a requirement to provide IFR en route ATC services but the Federal airway system is inadequate.

2.6.5.5 Federal Airways: The Federal airways are Class E airspace areas and, unless otherwise specified, extend upward from 1,200 feet to, but not including, 18,000 feet MSL. The colored airways are Green, Red, Amber, and Blue. The VOR airways are classified as Domestic, Alaskan, and Hawaiian.

2.6.5.6 Offshore Airspace Areas: There are Class E airspace areas that extend upward from a specified altitude to, but not including, 18,000 feet MSL and are designated as offshore airspace areas. These areas provide controlled airspace beyond 12 miles from the coast of the United States in those areas where there is a requirement to provide IFR en route ATC services and within which the United States is applying domestic procedures.

2.6.5.7 Unless designated at a lower altitude, Class E airspace begins at 14,500 MSL over the United States, including that airspace overlying the waters within 12 nautical miles of the coast of the 48 contiguous States and Alaska excluding the Alaska peninsula west of long. 160°00'00''W; and the airspace less than 1,500 feet above the surface of the earth.

2.6.6 Separation for VFR Aircraft: No separation services are provided to VFR aircraft.

3. CLASS G AIRSPACE

3.1 General

Class G airspace is that portion of the airspace that has not been designated as Class A, Class B, Class C, Class D and Class E airspace (uncontrolled).

3.2 VFR Requirements

Rules governing VFR flight have been adopted to assist the pilot in meeting his responsibility to see and avoid other aircraft. Minimum flight visibility and distance from clouds required for VFR flight are contained in FAR Part 91.155. (See RAC 3.4, Appendix One for a tabular presentation of these rules).

3.3 IFR Requirements

3.3.1 The FARs specify the pilot and aircraft equipment requirements for IFR flight. Pilots are reminded that in addition to altitude or flight level requirements, FAR Part 91.177 includes a requirement to remain at least 1,000 feet (2,000 feet in designated mountainous terrain) above the highest obstacle within a horizontal distance of 4 nautical miles from the course to be flown.

3.3.2 IFR Altitudes and Flight Levels. (See RAC 3.4, Appendix Two for a tabular presentation of these rules).

4. OTHER AIRSPACE AREAS

4.1 Airport Advisory Area

4.1.1 The airport advisory area is the area within 10 statute miles of an airport where a control tower is not operating but where a FSS is located. At such locations, the FSS provides advisory service to arriving and departing aircraft. (See RAC 7, Traffic Advisory Practices at Airports Without Operating Control Towers).

4.1.2 It is not mandatory that pilots participate in the Local Airport Advisory program, but it is strongly recommended that they do.

4.2 Published VFR Routes

Published VFR routes for transitioning around, under and through complex airspace such as Class B airspace were developed through a number of FAA and industry initiatives. All of the following terms, i.e., "VFR Flyway", "VFR Corridor" "Class B Airspace VFR Transition Route" and "Terminal Area VFR Route" have been used when referring to the same or different types of routes or airspace. The following paragraphs identify and clarify the functionality of each type of route, and specify where and when an ATC clearance is required.

4.2.1 VFR Flyways

4.2.1.1 VFR Flyways and their associated Flyway Planning charts were developed from the recommendations of a National Airspace Review Task Group. A VFR Flyway is defined as a general flight path not defined as a specific course, for use by pilots in planning flights into, out of, through or near complex terminal airspace to avoid Class B airspace. An ATC clearance is NOT required to fly these routes.

4.2.1.2 VFR Flyways are depicted on the reverse side of some of the VFR Terminal Area Charts (TAC), commonly referred to as Class B airspace charts. (See RAC 3.4; Appendix Four). Eventually all TAC's will include a VFR Flyway Planning Chart. These charts identify VFR flyways designed to help VFR pilots avoid major controlled traffic flows. They may further depict multiple VFR routings throughout the area which may be used as an alternative to flight within Class B airspace. The ground references provide a guide for improved visual navigation. These routes are not intended to discourage requests for VFR operations within Class B airspace but are designed solely to assist pilots in planning for flights under and around busy Class B airspace without actually entering Class B airspace.

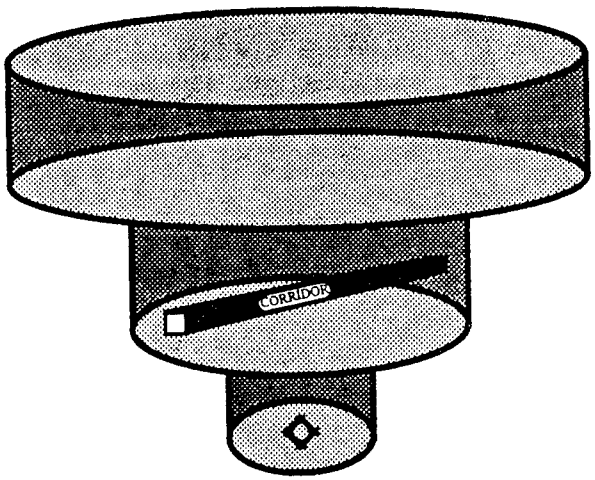
4.2.1.3 It is very important to remember that these suggested routes are not sterile of other traffic. The entire Class B airspace, and the airspace underneath it, may be heavily congested with many different types of aircraft. Pilot adherence to VFR rules must be exercised at all times. Further, when operating beneath Class B airspace, communications must be established and maintained between your aircraft and any control tower while transiting the Class B, Class C, and Class D surface areas of those airports under Class B Airspace.

4.2.2 VFR Corridors

4.2.2.1 The design of a few of the first Class B airspace areas provided a corridor for the passage of uncontrolled traffic. A VFR corridor is defined as Airspace through Class B airspace, with defined vertical and lateral boundaries, in which aircraft may operate without an ATC clearance or communication with air traffic control.

4.2.2.2 These corridors are, in effect, a "hole" through Class B airspace. (See Class B Airspace Illustration). A classic example would be the corridor through the Los Angeles Class B airspace, which has been subsequently changed to Special Flight Rules airspace (SFR). A corridor is surrounded on all sides by Class B airspace and does not extend down to the surface like a VFR Flyway. Because of their finite lateral and vertical limits, and the volume of VFR traffic using a corridor, extreme caution and vigilance must be exercised.

4.2.2.3 Because of the heavy traffic volume and the procedures necessary to efficiently manage the flow of traffic, it has not been possible to incorporate VFR corridors in the development or modifications of Class B airspace in recent years.



4.2.3 Class B airspace VFR Transition Routes

4.2.3.1 To accommodate VFR traffic through certain Class B airspace, such as Seattle, Phoenix and Los Angeles, Class B Airspace VFR Transition Routes were developed. A Class B Airspace VFR Transition Route is defined as a specific flight course depicted on a Terminal Area Chart (TAC) for transiting a specific Class B airspace. These routes include specific ATC-assigned altitudes, and pilots must obtain an ATC clearance prior to entering Class B airspace on the route.

4.2.3.2 These routes, as depicted in RAC 3.4; Appendix Five, are designed to show the pilot where to position his/her aircraft outside of, or clear of, the Class B airspace where an ATC clearance can normally be expected with minimal or no delay. Until ATC authorization is received, pilots must remain clear of Class B airspace. On initial contact, pilots should advise ATC of their position, altitude, route name desired, and direction of flight. After a clearance is received, pilot must fly the route as depicted and, most importantly, adhere to ATC instructions.

4.2.4 Terminal Area VFR Routes

4.2.4.1 Terminal Area VFR Routes were developed from a concept evaluated in the Los Angeles Basin area in 1988-89, and are being developed for other terminal areas around the country. Charts depicting these routes were developed in a joint effort between the FAA and industry to provide more specific navigation information than the VFR Flyway Planning Charts on the back of the Class B airspace charts. (See RAC 3.4; Appendix Six).

4.2.4.2 A Terminal Area VFR Route is defined as a specific flight course for optional use by pilots to avoid Class B, Class C, and Class D airspace areas while operating in complex terminal airspace. These routes are depicted on the chart(s), may include recommended altitudes, and are described by reference to electronic navigational aids and/or prominent visual landmarks. An ATC clearance is NOT required to fly these routes.

4.3 Terminal Radar Service Area (TRSA)

4.3.1 Background—The terminal radar service areas (TRSA's) were originally established as part of the Terminal Radar Program at selected airports. TRSA's were never controlled airspace from a regulatory standpoint because the establishment of TRSA's were never subject to the rulemaking process; consequently, TRSA's are not contained in FAR Part 71 nor are there any TRSA operating rules in Part 91. Part of the Airport Radar Service Area (ARSA) program was to eventually replace all TRSA's. However, the ARSA requirements became relatively stringent and it was subsequently decided that TRSA's would have to meet ARSA criteria before they would be converted. TRSA's do not fit into any of the U.S. Airspace Classes; therefore, they will continue to be non-Part 71 airspace areas where participating pilots can receive additional radar services which have been redefined as TRSA Service.

4.3.2 TRSA Areas—The primary airport(s) within the TRSA become Class D airspace. The remaining portion of the TRSA overlies other controlled airspace which is normally Class E airspace beginning at 700 or 1,200 feet and established to transition to/from the enroute/terminal environment.

4.3.3 Participation—Pilot's operating under VFR are encouraged to contact the radar approach control and avail themselves of the TRSA Services. However, participation is voluntary on the part of the pilot. See RAC 1 for details and procedures.

4.3.4 Charts—TRSA's are depicted on visual charts with a solid black line and altitudes for each segment. The Class D portion is charted with a blue segmented line.

4.4 Suspension Of The Transponder And Automatic Altitude Reporting Equipment Requirements For Operations In The Vicinity Of Designated Mode C Veil Airports

4.4.1 Pursuant to Special Federal Aviation Regulation (SFAR) No. 62, aircraft operating in the vicinity of the airports listed below are excluded from the Mode C transponder equipment requirements of Federal Aviation Regulation FAR Part 91.215(b)(2). The exclusion from the Mode C transponder equipment requirement only applies to those operations at or below the altitude specified for each airport that are: (1) within a 2-nautical mile radius of a listed airport: and (2) along a direct route between that airport and the outer boundary of the Mode C veil. The routing must be consistent with established traffic patterns, noise abatement procedures, and safety. The designation of altitudes for each airport is not intended to supersede the provisions of FAR Part 91.119, Minimum Safe Altitudes. Routings to and from each airport are intentionally unspecified to permit the pilot, complying with FAR Part 91.119, to avoid operating over obstructions, noisesensitive areas, etc. Further, should the pilot of an aircraft intending to operate into or out of an airport listed in the SFAR determine that the operation at or below the specified altitude is unsafe due to meteorological conditions, aircraft operating characteristics, or other factors, the pilot should seek relief from the Mode C transponder requirement via the ATC authorization process.

4.4.2 Airports at which the Mode C transponder equipment requirements of FAR Part 91.215(b)(2) do not apply.

1. Atlanta Class B Airspace Mode C veil.

Airport Name	Airport ID	Altitude (AGL)
Air Acres Airport, Woodstock, GA	5GA4	1,500
B & L Strip Airport, Hollonville, GA	GA29	1,500
Camfield Airport, McDonough, GA	GA36	1,500
Cobb County-McCollum Field Airport, Marietta, GA	RYY	1,500
Covington Municipal Airport, Covington, GA	9A1	1,500
Diamond R Ranch Airport, Villa Rica, GA	3GA5	1,500
Dresden Airport, Newnan, GA	GA79	1,500
Eagles Landing Airport, Williamson, GA	5GA3	1,500
Fagundes Field Airport, Haralson, GA	6GA1	1,500
Gable Branch Airport, Haralson, GA	5GA0	1,500
Georgia Lite Flite Ultralight Airport, Acworth, GA	31GA	1,500
Griffin-Spalding County Airport, Griffin, GA	6A2	1,500
Howard Private Airport, Jackson, GA	GA02	1,500
Newnan Coweta County Airport, Newnan, GA	CCO	1,500
Peach State Airport, Williamson, GA	3GA7	1,500
Poole Farm Airport, Oxford, GA	2GA1	1,500
Powers Airport, Hollonville, GA	GA31	1,500
S & S Landing Strip Airport, Griffin, GA	8GA6	1,500
Shade Tree Airport, Hollonville, GA	GA73	1,500

2. Boston Class B Airspace Mode C veil.

Airport Name	Airport ID	Altitude (AGL)
Berlin Landing Area Airport, Berlin, MA	MA19	2,500
Hopedale Industrial Park Airport, Hopedale, MA	1B6	2,500
Larson's SPB, Tyngsboro, MA	MA74	2,500
Moore AAF, Ayer/Fort Devens, MA	AYE	2,500
New England Gliderport, Salem, NH	NH29	2,500
Plum Island Airport, Newburyport, MA	2B2	2,500
Plymouth Municipal Airport, Plymouth, MA	PYM	2,500
Taunton Municipal Airport, Taunton, MA	TAN	2,500
Unknown Field Airport, Southborough, MA	1MA5	2,500

3. Charlotte Class B Airspace Mode C veil.

Airport Name	Airport ID	Altitude (AGL)
Arant Airport, Wingate, NC	1NC6	2,500
Bradley Outernational Airport, China Grove, NC	NC29	2,500
Chester Municipal Airport, Chester, SC	9A6	2,500
China Grove Airport, China Grove, NC	76A	2,500
Goodnight's Airport, Kannapolis, NC	2NC8	2,500
Knapp Airport, Marshville, NC	3NC4	2,500
Lake Norman Airport, Mooresville, NC	14A	2,500
Lancaster County Airport, Lancaster, SC	LKR	2,500
Little Mountain Airport, Denver, NC	66A	2,500
Long Island Airport, Long Island, NC	NC26	2,500
Miller Airport, Mooresville, NC	8A2	2,500
U S Heliport, Wingate, NC	NC56	2,500
Unity Aerodrome Airport, Lancaster, SC	SC76	2,500
Wilhelm Airport, Kannapolis, NC	6NC2	2,500

4. Chicago Class B Airspace Mode C veil.

Airport Name	Airport ID	Altitude (AGL)
Aurora Municipal Airport, Chicago/Aurora, IL	ARR	1,200
Donald Alfred Gade Airport, Antioch, IL	IL11	1,200
Dr. Joseph W. Esser Airport, Hampshire, IL	7IL6	1,200
Flying M. Farm Airport, Aurora, IL	IL20	1,200
Fox Lake SPB, Fox Lake, IL	IS03	1,200
Graham SPB, Crystal Lake, IL	IS79	1,200
Herbert C. Mass Airport, Zion, IL	IL02	1,200
Landings Condominium Airport, Romeoville, IL	C49	1,200
Lewis University Airport, Romeoville, IL	LOT	1,200
Mc Henry Farms Airport, Mc Henry, IL	44IL	1,200
Olson Airport, Plato Center, IL	LL53	1,200
Redeker Airport, Milford, IL	IL85	1,200
Reid RLA Airport, Gilberts, IL	6IL6	1,200
Shamrock Beef Cattle Farm Airport, Mc Henry, IL	49LL	1,200
Sky Soaring Airport, Union, IL	55LL	1,200
Waukegan Regional Airport, Waukegan, IL	UGN	1,200
Wormley Airport, Oswego, IL	85LL	1,200

5. Cleveland Class B Airspace Mode C veil.

Airport Name	Airport ID	Altitude (AGL)
Akron Fulton International Airport, Akron, OH	AKR	1,300
Bucks Airport, Newbury, OH	40OH	1,300
Derecsky Airport, Auburn Center, OH	6OI0	1,300
Hannum Airport, Streetsboro, OH	69OH	1,300
Kent State University Airport, Kent, OH	1G3	1,300
Lost Nation Airport, Willoughby, OH	LNN	1,300
Mills Airport, Mantua, OH	OH06	1,300
Portage County Airport, Ravenna, OH	29G	1,300
Stoney's Airport, Ravenna, OH	OI32	1,300
Wadsworth Municipal Airport, Wadsworth, OH	3G3	1,300

6. Dallas/Fort Worth Class B Airspace Mode C veil.

Airport Name	Airport ID	Altitude (AGL)
Beggs Ranch/Aledo Airport, Aledo, TX	TX15	1,800
Belcher Airport, Sanger, TX	TA25	1,800
Bird Dog Field Airport, Krum, TX	TA48	1,800
Boe-Wrinkle Airport, Azle, TX	28TS	1,800
Flying V Airport, Sanger, TX	71XS	1,800
Graham Ranch Airport, Celina, TX	TX44	1,800
Haire Airport, Bolivar, TX	TX33	1,800
Hartlee Field Airport, Denton, TX	1F3	1,800
Hawkin's Ranch Strip Airport, Rhome, TX	TA02	1,800
Horseshoe Lake Airport, Sanger, TX	TE24	1,800
Ironhead Airport, Sanger, TX	T58	1,800
Kezer Air Ranch Airport, Springtown, TX	61F	1,800
Lane Field Airport, Sanger, TX	58F	1,800
Log Cabin Airport, Aledo, TX	TX16	1,800
Lone Star Airpark Airport, Denton, TX	T32	1,800
Rhome Meadows Airport, Rhome, TX	TS72	1,800
Richards Airport, Krum, TX	TA47	1,800
Tallows Field Airport, Celina, TX	79TS	1,800

6. Dallas/Fort Worth Class B Airspace Mode C veil.—Continued

Airport Name	Airport ID	Altitude (AGL)
Triple S Airport, Aledo, TX	42XS	1,800
Warshun Ranch Airport, Denton, TX	4TA1	1,800
Windy Hill Airport, Denton, TX	46XS	1,800
Aero Country Airport, McKinney, TX	TX05	1,400
Bailey Airport, Midlothian, TX	7TX8	1,400
Bransom Farm Airport, Burleson, TX	TX42	1,400
Carroll Air Park Airport, De Soto, TX	F66	1,400
Carroll Lake-View Airport, Venus, TX	70TS	1,400
Eagle's Nest Estates Airport, Ovilla, TX	2T36	1,400
Flying B Ranch Airport, Ovilla, TX	TS71	1,400
Lancaster Airport, Lancaster, TX	LNC	1,400
Lewis Farm Airport, Lucas, TX	6TX1	1,400
Markum Ranch Airport, Fort Worth, TX	TX79	1,400
McKinney Municipal Airport, McKinney, TX	TKI	1,400
O'Brien Airpark Airport, Waxahachie, TX	F25	1,400
Phil L. Hudson Municipal Airport, Mesquite, TX	HQZ	1,400
Plover Heliport, Crowley, TX	82Q	1,400
Venus Airport, Venus, TX	75TS	1,400

7. Denver Class B Airspace Mode C veil.

Airport Name	Airport ID	Altitude (AGL)
Athanasiou Valley Airport, Blackhawk, CO	CO07	1,200
Boulder Municipal Airport, Boulder, CO	1V5	1,200
Bowen Farms No. 2 Airport, Strasburg, CO	3CO5	1,200
Carrera Airpark Airport, Mead, CO	93CO	1,200
Cartwheel Airport, Mead, CO	0CO8	1,200
Colorado Antique Field Airport, Niwot, CO	8CO7	1,200
Comanche Airfield Airport, Strasburg, CO	3CO6	1,200
Comanche Livestock Airport, Strasburg, CO	59CO	1,200
Flying J Ranch Airport, Evergreen, CO	27CO	1,200
Frederick-Firestone Air Strip Airport, Frederick, CO	CO58	1,200
Frontier Airstrip Airport, Mead, CO	84CO	1,200
Hoy Airstrip Airport, Bennett, CO	76CO	1,200
J & S Airport, Bennett, CO	CD14	1,200
Kugel-Strong Airport, Platteville, CO	27V	1,200
Land Airport, Keenesburg, CO	CO82	1,200
Lindys Airpark Airport, Hudson, CO	7CO3	1,200
Marshdale STOL, Evergreen, CO	CO52	1,200
Meyer Ranch Airport, Conifer, CO	5CO6	1,200
Parkland Airport, Erie, CO	7CO0	1,200
Pine View Airport, Elizabeth, CO	02V	1,200
Platte Valley Airport, Hudson, CO	18V	1,200
Rancho De Aereo Airport, Mead, CO	05CO	1,200
Spickard Farm Airport, Byers, CO	5CO4	1,200
Vance Brand Airport, Longmont, CO	2V2	1,200
Yoder Airstrip Airport, Bennett, CO	CD09	1,200

8. Detroit Class B Airspace Mode C veil.

Airport Name	Airport ID	Altitude (AGL)
Al Meyers Airport, Tecumseh, MI	3TE	1,400
Brighton Airport, Brighton, MI	45G	1,400

8. Detroit Class B Airspace Mode C veil.—Continued

Airport Name	Airport ID	Altitude (AGL)
Cackleberry Airport, Dexter, MI	2MI9	1,400
Erie Aerodome Airport, Erie, MI	05MI	1,400
Ham-A-Lot Field Airport, Petersburg, MI	MI48	1,400
Merillat Airport, Tecumseh, MI	34G	1,400
Rossettie Airport, Manchester, MI	75G	1,400
Tecumseh Products Airport, Tecumseh, MI	0D2	1,400

9. Honolulu Class B Airspace Mode C veil.

Airport Name	Airport ID	Altitude (AGL)
Dillingham Airfield Airport, Mokuleia, HI	HDH	2,500

10. Houston Class B Airspace Mode C veil.

Airport Name	Airport ID	Altitude (AGL)
Ainsworth Airport, Cleveland, TX	0T6	1,200
Biggin Hill Airport, Hockley, TX	0TA3	1,200
Cleveland Municipal Airport, Cleveland, TX	6R3	1,200
Fay Ranch Airport, Cedar Lane, TX	0T2	1,200
Freeman Property Airport, Katy, TX	61T	1,200
Gum Island Airport, Dayton, TX	3T6	1,200
Harbican Airpark Airport, Katy, TX	9XS9	1,200
Harold Freeman Farm Airport, Katy, TX	8XS1	1,200
Hoffpauir Airport, Katy, TX	59T	1,200
Horn-Katy Hawk International Airport, Katy, TX	57T	1,200
Houston-Hull Airport, Houston, TX	SGR	1,200
Houston-Southwest Airport, Houston, TX	AXH	1,200
King Air Airport, Katy, TX	55T	1,200
Lake Bay Gall Airport, Cleveland, TX	0T5	1,200
Lake Bonanza Airport, Montgomery, TX	33TA	1,200
R W J Airpark Airport, Baytown, TX	54TX	1,200
Westheimer Air Park Airport, Houston, TX	5TA4	1,200

11. Kansas City Class B Airspace Mode C veil.

Airport Name	Airport ID	Altitude (AGL)
Amelia Earhart Airport, Atchison, KS	K59	1,000
Booze Island Airport, St. Joseph,MO	64MO	1,000
Cedar Air Park Airport, Olathe, KS	51K	1,000
D'Field Airport, McLouth, KS	KS90	1,000
Dorei Airport, McLouth, KS	K69	1,000
East Kansas City Airport, Grain Valley, MO	3GV	1,000
Excelsior Springs Memorial Airport, Excelsior Springs, MO	3EX	1,000
Flying T Airport, Oskaloosa, KS	7KS0	1,000
Hermon Farm Airport, Gardner, KS	KS59	1,000
Hillside Airport, Stilwell, KS	63K	1,000
Independence Memorial Airport, Independence, MO	3IP	1,000
Johnson County Executive Airport, Olathe, KS	OJC	1,000
Johnson County Industrial Airport, Olathe, KS	IXD	1,000
Kimray Airport, Plattsburg, MO	7MO7	1,000

11. Kansas City Class B Airspace Mode C veil.—Continued

Airport Name	Airport ID	Altitude (AGL)
Lawrence Municipal Airport, Lawrence, KS	LWC	1,000
Martins Airport, Lawson, MO	21MO	1,000
Mayes Homestead Airport, Polo, MO	37MO	1,000
McComas-Lee's Summit Municipal Airport, Lee's Summit, MO	K84	1,000
Mission Road Airport, Stilwell, KS	64K	1,000
Northwood Airport, Holt, MO	2MO2	1,000
Plattsburg Airpark Airport, Plattsburg, MO	MO28	1,000
Richards-Gebaur Airport, Kansas City, MO	GVW	1,000
Rosecrans Memorial Airport, St. Joseph, MO	STJ	1,000
Runway Ranch Airport, Kansas City, MO	2MO9	1,000
Sheller's Airport, Tonganoxie, KS	11KS	1,000
Shomin Airport, Oskaloosa, KS	0KS1	1,000
Stonehenge Airport, Williamstown, KS	71KS	1,000
Threshing Bee Airport, McLouth, KS	41K	1,000

12. Las Vegas Class B Airspace Mode C veil.

Airport Name	Airport ID	Altitude (AGL)
Sky Ranch Estates Airport, Sandy Valley, NV	3L2	2,500

13. Memphis Class B Airspace Mode C veil.

Airport Name	Airport ID	Altitude (AGL)
Bernard Manor Airport, Earle, AR	65M	2,500
Holly Springs-Marshall County Airport, Holly Springs, MS	M41	2,500
Mc Neely Airport, Earle, AR	M63	2,500
Price Field Airport, Joiner, AR	80M	2,500
Tucker Field Airport, Hughes, AR	78M	2,500
Tunica Airport, Tunica, MS	30M	2,500
Tunica Municipal Airport, Tunica, MS	M97	2,500

14. Minneapolis Class B Airspace Mode C veil.

Airport Name	Airport ID	Altitude (AGL)
Belle Plaine Airport, Belle Plaine, MN	7Y7	1,200
Carleton Airport, Stanton, MN	SYN	1,200
Empire Farm Strip Airport, Bongards, MN	MN15	1,200
Flying M Ranch Airport, Roberts, WI	78WI	1,200
Johnson Airport, Rockford, MN	MY86	1,200
River Falls Airport, River Falls, WI	Y53	1,200
Rusmar Farms Airport, Roberts, WI	WS41	1,200
Waldref SPB, Forest Lake, MN	9Y6	1,200
Ziermann Airport, Mayer, MN	MN71	1,200

15. New Orleans Class B Airspace Mode C veil.

Airport Name	Airport ID	Altitude (AGL)
Bollinger SPB, Larose, LA	L38	1,500
Clovelly Airport, Cut Off, LA	LA09	1,500

16. New York Class B Airspace Mode C veil.

Airport Name	Airport ID	Altitude (AGL)
Allaire Airport, Belmar/Farmingdale, NJ	BLM	2,000
Cuddihy Landing Strip Airport, Freehold, NJ	NJ60	2,000
Ekdahl Airport, Freehold, NJ	NJ59	2,000
Fla-Net Airport, Netcong, NJ	0NJ5	2,000
Forrestal Airport, Princeton, NJ	N21	2,000
Greenwood Lake Airport, West Milford, NJ	4N1	2,000
Greenwood Lake SPB, West Milford, NJ	6NJ7	2,000
Lance Airport, Whitehouse Station, NJ	6NJ8	2,000
Mar Bar L Farms, Englishtown, NJ	NJ46	2,000
Peekskill SPB, Peekskill, NY	7N2	2,000
Peters Airport, Somerville, NJ	4NJ8	2,000
Princeton Airport, Princeton/Rocky Hill, NJ	39N	2,000
Solberg-Hunterdon Airport, Readington, NJ	N51	2,000

17. Orlando Class B Airspace Mode C veil.

Airport Name	Airport ID	Altitude (AGL)
Arthur Dunn Air Park Airport, Titusville, FL	X21	1,400
Space Center Executive Airport, Titusville, FL	TIX	1,400

18. Philadelphia Class B Airspace Mode C veil.

Airport Name	Airport ID	Altitude (AGL)
Ginns Airport, West Grove, PA	78N	1,000
Hammonton Municipal Airport, Hammonton, NJ	N81	1,000
Li Calzi Airport, Bridgeton, NJ	N50	1,000
New London Airport, New London, PA	N01	1,000
Wide Sky Airpark Airport, Bridgeton, NJ	N39	1,000

19. Phoenix Class B Airspace Mode C veil.

Airport Name	Airport ID	Altitude (AGL)
Ak Chin Community Airfield Airport, Maricopa, AZ	E31	2,500
Boulais Ranch Airport, Maricopa, AZ	9E7	2,500
Estrella Sailport, Maricopa, AZ	E68	2,500
Hidden Valley Ranch Airport, Maricopa, AZ	AZ17	2,500
Millar Airport, Maricopa, AZ	2AZ4	2,500
Pleasant Valley Airport, New River, AZ	AZ05	2,500
Serene Field Airport, Maricopa, AZ	AZ31	2,500
Sky Ranch Carefree Airport, Carefree, AZ	E18	2,500

19. Phoenix Class B Airspace Mode C veil.—Continued

Airport Name	Airport ID	Altitude (AGL)
Sycamore Creek Airport, Fountain Hills, AZ	0AS0	2,500
University of Arizona, Maricopa Agricultural Center Airport, Maricopa, AZ	3AZ2	2,500

20. St. Louis Class B Airspace Mode C veil.

Airport Name	Airport ID	Altitude (AGL)
Blackhawk Airport, Old Monroe, MO	6MO0	1,000
Lebert Flying L Airport, Lebanon, IL	3H5	1,000
Shafer Metro East Airport, St. Jacob, IL	3K6	1,000
Sloan's Airport, Elsberry, MO	0MO8	1,000
Wentzville Airport, Wentzville, MO	MO50	1,000
Woodliff Airpark Airport, Foristell, MO	98MO	1,000

21. Salt Lake City Class B Airspace Mode C veil.

Airport Name	Airport ID	Altitude (AGL)
Bolinder Field-Tooele Valley Airport, Tooele, UT	TVY	2,500
Cedar Valley Airport, Cedar Fort, UT	UT10	2,500
Morgan County Airport, Morgan, UT	42U	2,500
Tooele Municipal Airport, Tooele, UT	U26	2,500

22. Seattle Class B Airspace Mode C veil.

Airport Name	Airport ID	Altitude (AGL)
Firstair Field Airport, Monroe, WA	WA38	1,500
Gower Field Airport, Olympia, WA	6WA2	1,500
Harvey Field Airport, Snohomish, WA	S43	1,500

23. Tampa Class B Airspace Mode C veil.

Airport Name	Airport ID	Altitude (AGL)
Hernando County Airport, Brooksville, FL	BKV	1,500
Lakeland Municipal Airport, Lakeland, FL	LAL	1,500
Zephyrhills Municipal Airport, Zephyrhills, FL	ZPH	1,500

24. Washington Tri-Area Mode C veil.

Airport Name	Airport ID	Altitude (AGL)
Albrecht Airstrip Airport, Long Green, MD	MD48	2,000
Armacost Farms Airport, Hampstead, MD	MD38	2,000
Barnes Airport, Lisbon, MD	MD47	2,000
Bay Bridge Airport, Stevensville, MD	W29	2,000
Carroll County Airport, Westminster, MD	W54	2,000
Castle Marina Airport, Chester, MD	0W6	2,000
Clearview Airpark Airport, Westminster, MD	2W2	2,000

24. Washington Tri-Area Mode C veil.—Continued

Airport Name	Airport ID	Altitude (AGL)
Davis Airport, Laytonsville, MD	W50	2,000
Fallston Airport, Fallston, MD	W42	2,000
Faux-Burhans Airport, Frederick, MD	3MD0	2,000
Forest Hill Airport, Forest Hill, MD	MD31	2,000
Fort Detrick Helipad Heliport, Fort Detrick (Frederick), MD	MD32	2,000
Frederick Municipal Airport, Frederick, MD	FDK	2,000
Fremont Airport, Kemptown, MD	MD41	2,000
Good Neighbor Farm Airport, Unionville, MD	MD74	2,000
Happy Landings Farm Airport, Unionville, MD	MD73	2,000
Harris Airport, Still Pond, MD	MD69	2,000
Hybarc Farm Airport, Chestertown, MD	MD19	2,000
Kennersley Airport, Church Hill, MD	MD23	2,000
Kentmorr Airpark Airport, Stevensville, MD	3W3	2,000
Montgomery County Airpark Airport, Gaithersburg, MD	GAI	2,000
Phillips AAF, Aberdeen, MD	APG	2,000
Pond View Private Airport, Chestertown, MD	0MD4	2,000
Reservoir Airport, Finksburg, MD	1W8	2,000
Scheeler Field Airport, Chestertown, MD	0W7	2,000
Stolcrest STOL, Urbana, MD	MD75	2,000
Tinsley Airstrip Airport, Butler, MD	MD17	2,000
Walters Airport, Mount Airy, MD	0MD6	2,000
Waredaca Farm Airport, Brookeville, MD	MD16	2,000
Weide AAF, Edgewood Arsenal, MD	EDG	2,000
Woodbine Gliderport, Woodbine, MD	MD78	2,000
Wright Field Airport, Chestertown, MD	MD11	2,000
.		
Aviacres Airport, Warrenton, VA	3VA2	1,500
Birch Hollow Airport, Hillsboro, VA	W60	1,500
Flying Circus Aerodrome Airport, Warrenton, VA	3VA3	1,500
Fox Acres Airport, Warrenton, VA	15VA	1,500
Hartwood Airport, Somerville, VA	8W8	1,500
Horse Feathers Airport, Midland, VA	53VA	1,500
Krens Farm Airport, Hillsboro, VA	14VA	1,500
Scott Airpark Airport, Lovettsville, VA	VA61	1,500
The Grass Patch Airport, Lovettsville, VA	VA62	1,500
Walnut Hill Airport, Calverton, VA	58VA	1,500
Warrenton Air Park Airport, Warrenton, VA	9W0	1,500
Warrenton-Fauquier Airport, Warrenton, VA	W66	1,500
Whitman Strip Airport, Manassas, VA	0V5	1,500
.		
Aqua-Land/Cliffton Skypark Airport, Newburg, MD	2W8	1,000
Buds Ferry Airport, Indian Head, MD	MD39	1,000
Burgess Field Airport, Riverside, MD	3W1	1,000
Chimney View Airport, Fredericksburg, VA	5VA5	1,000
Holly Springs Farm Airport, Nanjemoy, MD	MD55	1,000
Lanseair Farms Airport, La Plata, MD	MD97	1,000
Nyce Airport, Mount Victoria, MD	MD84	1,000
Parks Airpark Airport, Nanjemoy, MD	MD54	1,000
Pilots Cove Airport, Tompkinsville, MD	MD06	1,000
Quantico MCAF, Quantico, VA	NYG	1,000
Stewart Airport, St. Michaels, MD	MD64	1,000
U S Naval Weapons Center, Dahlgren Lab Airport, Dahlgren, VA	NDY	1,000

APPENDIX ONE

BASIC VFR WEATHER MINIMUMS		
Airspace	Flight Visibility	Distance from Clouds
Class A	Not Applicable	Not Applicable
Class B	3 statue miles	Clear of Clouds
Class C	3 statue miles	500 feet below 1,000 feet above 2,000 feet horizontal
Class D	3 statue miles	500 feet below 1,000 feet above 2,000 feet horizontal
Class E. Less than 10,000 feet MSL	3 statute miles	500 feet below 1,000 feet above 2,000 feet horizontal
At or above 10,000 feet MSL	5 statue miles	1,000 feet below 1,000 feet above 1 statute mile horizontal
Class G. 1,200 feet or less above the surface (regardless of MSL altitude)..		
Day, except as provided in section 91.155(b).	1 statute mile	Clear of clouds
Night, except as provided in section 91.155(b).	3 statute miles	500 feet below 1,000 feet above 2,000 feet horizontal
More than 1,200 feet above the surface but less than 10,000 feet MSL..		
Day	1 statute mile	500 feet below 1,000 feet above 2,000 feet horizontal
Night	3 statute mile	500 feet below 1,000 feet above 2,000 feet horizontal
More than 1,200 feet above the surface and at or above 10,000 feet MSL..	5 statute miles	1000 feet below 1,000 feet above 1 statute mile horizontal

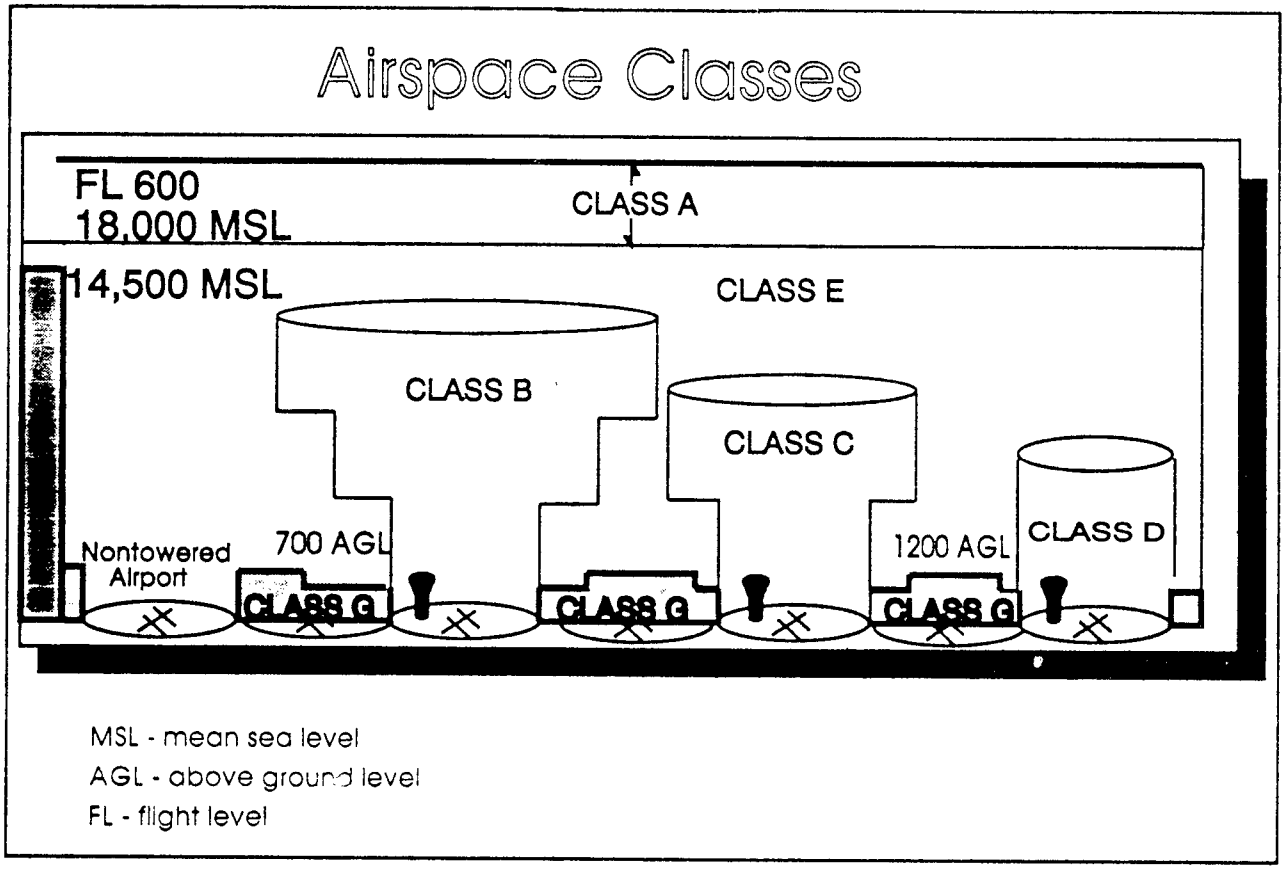
APPENDIX TWO

ALTITUDES AND FLIGHT LEVELS

VFR CRUISING ALTITUDES AND FLIGHT LEVELS		
If your magnetic course (ground track) is:	*And you are more than 3,000 feet above the surface but below 18,000 feet MSL, fly:*	*And you are above 18,000 feet MSL to FL 290 (except within CLASS A AIR-SPACE (FAR Part 71.33)), fly:*
0° to 179°	Odd thousands MSL, plus 500 feet (3,500, 5,500, 7,500, etc.).	Odd Flight Levels plus 500 feet (FL 195, FL 215, FL 235, etc.).
180° to 359°	Even thousands MSL, plus 500 feet (4,500, 6,500, 8,500, etc.).	Even Flight Levels plus 500 feet (FL 185, FL 205, FL 225, etc.).

IFR ALTITUDES AND FLIGHT LEVELS—CLASS G AIRSPACE			
If your magnetic course (ground track) is:	*And you are below 18,000 feet MSL, fly:*	*And you are at or above 18,000 feet MSL but below FL 290, fly:*	*And you are at or above FL 290, fly 4,000 foot intervals:*
0° to 179°	Odd thousands MSL, (3,000, 5,000, 7,000, etc.).	Odd Flight Levels, FL 190, 210, 230, etc.).	Beginning at FL 290, (FL 290, 330, 370, etc.).
180° to 359°	Even thousands MSL, (2,000, 4,000, 6,000, etc.).	Even Flight Levels (FL 180, 200, 220, etc.).	Beginning at FL 310, (FL 310, 350, 390, etc.).

APPENDIX THREE



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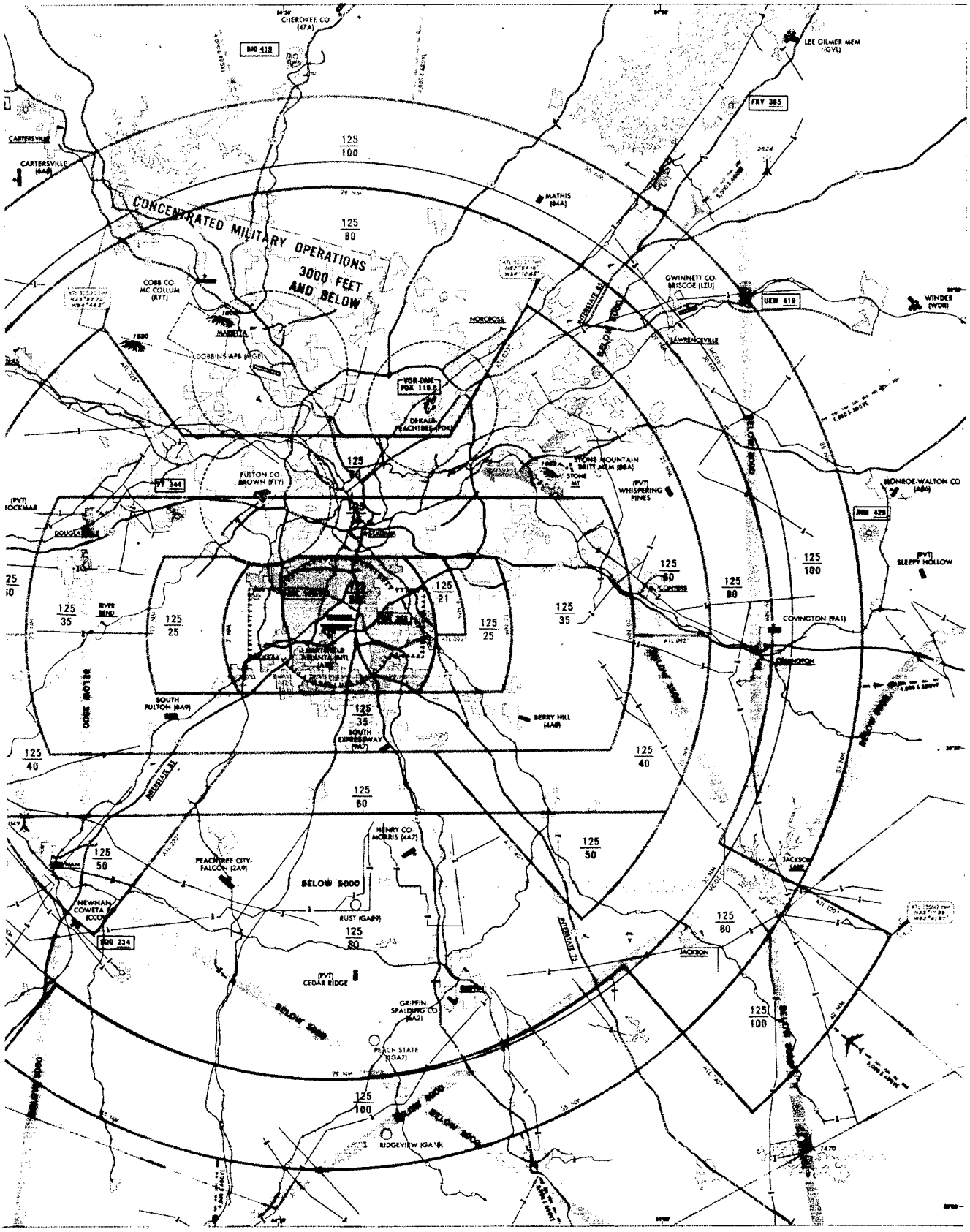
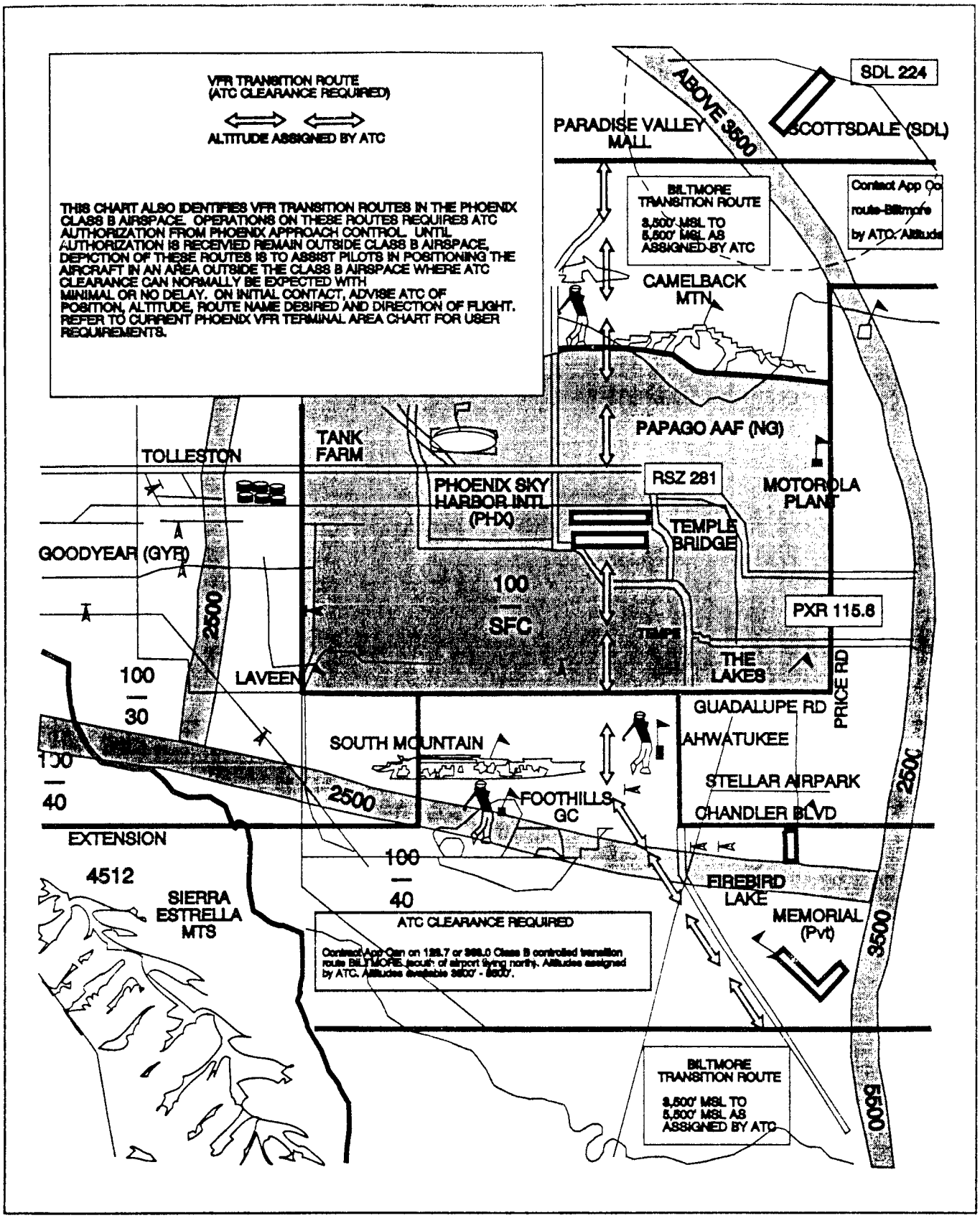
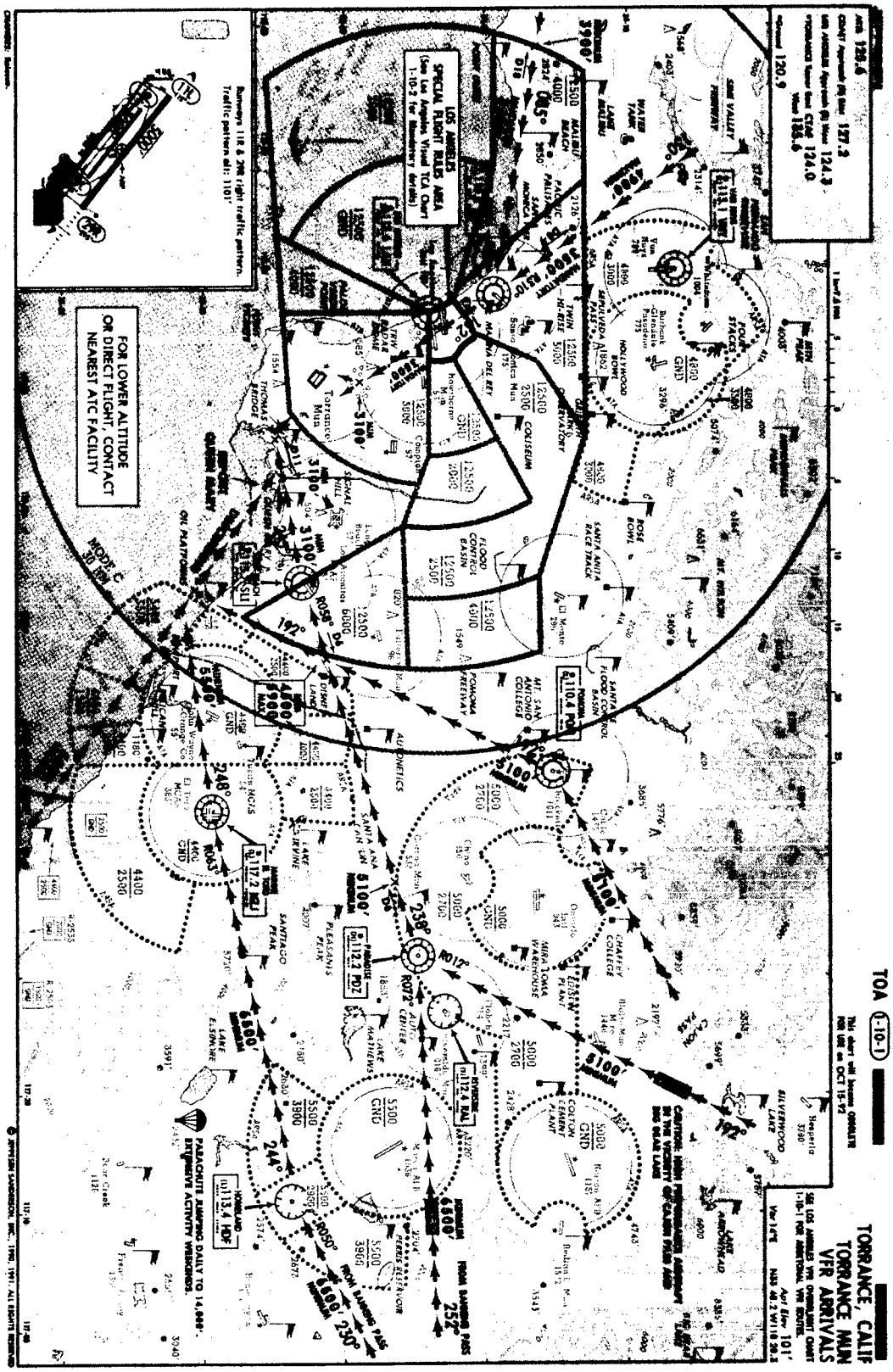


APPENDIX FIVE



APPENDIX SIX



ATS REGIONS, ROUTES, CLASS B, C, D AND E SURFACE AREAS, TERMINAL AND OTHER AIRSPACE AREAS

1. GENERAL

1.1 Tabular information concerning the locations, boundaries and limits, vertical and lateral of these areas is not available for presentation in this publication. This information can be made available, upon special request, from the National Flight Data Center (See GEN-1).

1.2 This information if depicted on aeronautical charts (See AIP section MAP).

ments and facilities exist but they are printed in tabular form in appropriate U.S. Government Flight Information Publications.

3.10.1.1.3 A pilot adhering to the altitudes, flight paths, and weather minimums depicted on the IAP chart or vectors and altitudes issued by the radar controller, is assured of terrain and obstruction clearance and runway/airport alignment during approach for landing.

3.10.1.1.4 IAP's are designed to provide an IFR descent from the en route environment to a point where a safe landing can be made. They are prescribed and approved by appropriate civil or military authority to ensure a safe descent during instrument flight conditions at a specific airport. It is important that pilots understand these procedures and their use prior to attempting to fly instrument approaches.

3.10.1.1.5 TERP's criteria are provided for the following types of instrument approach procedures:

(1) Precision approaches where an electronic glide slope is provided (PAR and ILS) and,

(2) Nonprecision approaches where glide slope information is not provided (all approaches except PAR and ILS).

3.10.1.2 A limited number of VOR Instrument Approach Procedures, based on a VORTAC facility, have been approved for use by TACAN-equipped aircraft. These procedures are identified by the term "(TAC)" printed adjacent to the name of the procedure; e.g., VOR RWY 3 (TAC). This added information does not change the name of the procedure. It merely tells both pilot and controller that a "VOR RWY 3" instrument approach may be executed by aircraft using TACAN. Air traffic controllers will not refer to the term "TAC" in their air traffic control communications.

3.10.2 Minimums are specified for various aircraft approach categories based upon a value 1.3 times the stalling speed of the aircraft in the landing configuration at maximum certificated gross landing weight. See FAR 97.3(b). If it is necessary, while circling to land, to maneuver at speeds in excess of the upper limit of the speed range for each category, due to the possibility of extending the circling maneuver beyond the area for which obstruction clearance is provided, the circling minimum for the next higher approach category should be used. For example, an aircraft which falls in Category C, but is circling to land at a speed of 141 knots or higher, should use approach category 'D' minimums when circling to land.

3.10.3 When operating on an unpublished route or while being radar vectored, the pilot, when an approach clearance is received, shall, in addition to complying with the minimum altitudes for IFR operations (FAR 91.177), maintain his last assigned altitude (1) unless a different altitude is assigned by ATC, or (2) until the aircraft is established on a segment of a published route or instrument approach procedure. After the aircraft is so established, published altitudes apply to descent within each succeeding route or approach segment unless a different altitude is assigned by ATC. Notwithstanding this pilot responsibility, for aircraft operating on unpublished routes or while being radar vectored, ATC will, except when conducting a radar approach, issue an IFR approach clearance only after the aircraft is (1) established on a segment of a published route or instrument approach procedure, or (2) assigned an altitude to maintain until the aircraft is established on a segment of a published route or instrument approach procedure. For this purpose, the procedure turn of a published IAP shall not be considered a segment of that IAP until the aircraft reaches the initial fix or navigation facility upon which the procedure turn is predicated. Example—"Cross Redding V-O-R at or above five thousand, cleared V-O-R Runway Three Four approach," or "5 miles from outer marker, turn right heading three three zero, maintain two thousand until established on the localizer, cleared I-L-S Runway Three Six approach." The altitude assigned will assure IFR obstruction clearance from the point at which the approach clearance is issued until established on a segment of a published route or instrument approach procedure. If a pilot is uncertain of the meaning of his clearance, he shall immediately request clarification from ATC.

3.10.4 Several instrument approach procedures using various navigation/approach aids may be authorized for an airport. ATC may advise that a particular approach procedure is being used, primarily to expedite traffic. If a pilot is issued a clearance that specifies a particular approach procedure, he is expected to notify ATC immediately if he desires a different one. In this event it may be necessary for ATC to withhold clearance for the different approach until such time as traffic conditions permit. However, if the pilot is involved in an emergency situation he will be given priority. If the pilot is not familiar with the specific approach procedure, ATC should be advised and they will provide detailed information on the execution of the procedure.

3.10.5 At times ATC may not specify a particular approach procedure in the clearance, but will state "CLEARED APPROACH." Such clearance indicates that the pilot may execute any one of the authorized instrument approach procedures for that airport. This clearance does not constitute approval for the pilot to execute a contract approach or a visual approach.

3.10.6 When cleared for a specifically prescribed instrument approach procedure; i.e., "cleared ILS Runway One Niner approach" or when "cleared approach" execution of any procedure prescribed for the airport, pilots shall execute the entire procedure as described on the Instrument Approach Procedure Chart unless an appropriate new or revised ATC clearance is received, or the IFR flight plan is canceled.

3.10.7 Pilots planning flights to locations served by special instrument approach procedures should obtain advance approval from the owner of the procedure. Approval by the owner is necessary because special procedures are for the exclusive use of a single interest unless otherwise authorized by the owner. Additionally, some special approach procedures require certain crew qualifications, training, or other special considerations in order to execute the approach. Also, some of these approach procedures are based on privately owned navigational aids. Owners of aids that are not for public use may elect to turn off the aid for whatever reason they may have; i.e., maintenance, conservation, etc. Air traffic controllers are not required to question pilots to determine if they have permission to use the procedure. Controllers presume a pilot has obtained approval and is aware of any details of the procedure if he files an IFR flight plan to that airport.

3.10.8 When executing an instrument approach and in radio contact with an FAA facility, unless in "radar contact," report passing the final approach fix inbound (non precision approach) or the outer marker or fix used in lieu of the outer marker inbound (precision approach).

3.10.9 If a missed approach is required, advise ATC and include the reason (unless initiated by ATC). Comply with the missed

approach instructions for the instrument approach procedure being executed, unless otherwise directed by ATC.

3.10.10 The method used to depict prescribed altitudes on instrument approach charts differs according to techniques employed by different chart publishers. Prescribed altitudes may be depicted in three different configurations: Minimum, maximum, and mandatory. The U.S. Government distributes charts produced by Defense Mapping Agency (DMA) and National Ocean Survey (NOS). Altitudes are depicted on these charts in the profile view with underline, overline, or both to identify them as minimum, maximum, or mandatory.

(1) Minimum Altitude will be depicted with the altitude value underlined. Aircraft are required to maintain altitude at or above the depicted value.

(2) Maximum Altitude will be depicted with the altitude value overscored. Aircraft are required to maintain altitude at or below the depicted value.

(3) Mandatory Altitude will be depicted with the altitude value both underscored and overscored. Aircraft are required to maintain altitude at the depicted value.

Note—The underscore and overscore to identity mandatory altitudes and the overscore to identify maximum altitudes are used almost exclusively by DMA for military charts. With very few exception, civil approach charts produced by NOS utilize only the underscore to identify minimum altitudes. Pilots are cautioned to adhere to altitudes as prescribed because, in certain instances, they may be used as the basis for vertical separation of aircraft by ATC. When a depicted altitude is specified in the ATC clearance, that altitude becomes mandatory as defined above.

3.10.11 Minimum Safe Altitudes (MSA's) are published for emergency use on instrument approach procedure (IAP) charts except RNAV IAPs. The MSA is defined using NDB or VOR type facilities within 25 NM (normally) or 30 NM (maximum) of the airport. The MSA has a 25 NM (normally) or 30 NM (maximum) radius. If there is no NDB or VOR facility within 30 NM of the airport, there will be no MSA. The altitude shown provides at least 1,000 feet of clearance above the highest obstacle in the defined sector. As many as four sectors may be depicted with different altitudes for each sector displayed in rectangular boxes in the plan view of the chart. A single altitude for the entire area may be shown in the lower right portion of the plan view. Navigational course guidance is not assured at the MSA within these sectors.

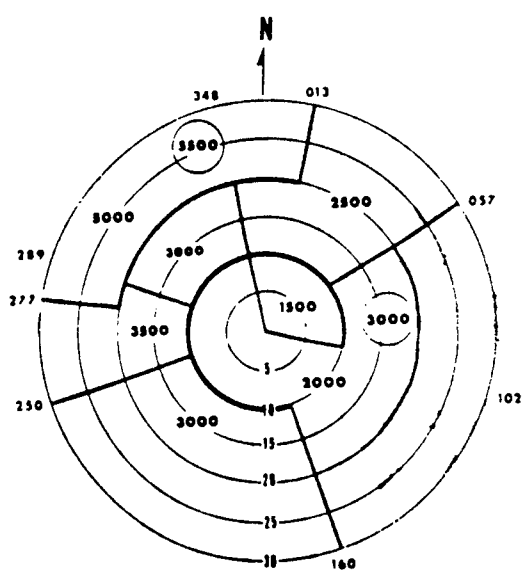
3.10.12 Minimum Vectoring Altitudes (MVA's) are established for use by ATC when radar air traffic control is exercised. MVA charts are prepared by air traffic facilities at locations where there are numerous different minimum IFR altitudes. Each MVA chart has sectors large enough to accommodate vectoring of aircraft within the sector at the MVA. Each sector boundary is at least 3 miles from the obstruction determining the MVA. To avoid a large sector with an excessively high MVA due to an isolated prominent obstruction, the obstruction may be enclosed in a buffer area whose boundaries are at least 3 miles from the obstruction. This is done to facilitate vectoring around the obstruction.

3.10.12.1 The minimum vectoring altitude in each sector provides 1,000 feet above the highest obstacle in non-mountainous areas and 2,000 feet above the highest obstacle in designated mountainous areas. Where lower MVA's are required in designated mountainous areas to achieve compatibility with terminal routes or to permit vectoring to an instrument approach procedure, 1,000 feet of obstacle clearance may be authorized with the use of airport surveillance radar (ASR). The minimum vectoring altitude will provide at least 300 feet above the floor of Class B, C, D and E Airspace.

3.10.12.2 Because of differences in the areas considered for MVA, and those applied to other minimum altitudes, and the ability to isolate specific obstacles, some MVA's may be lower than the nonradar Minimum En route Altitudes (MEA's), Minimum Obstruction Clearance Altitudes (MOCA's), or other minimum altitudes depicted on charts for a given location. While being radar vectored, IFR altitude assignments by ATC will be at or above MVA.

3.10.13 Visual Descent Points (VDP's) are being incorporated in selected nonprecision approach procedures. The VDP is a defined point on the final approach course of a nonprecision straight-in approach procedure from which normal descent from the MDA to the runway touchdown point may be commenced, provided visual reference required by FAR 91.175(c)(3) is established. The VDP will normally be identified by DME on VOR and LOC procedures. The VDP is identified on the profile view of the approach chart by the symbol: V.

3.10.13.1 VDP's are intended to provide additional guidance where they are implemented. No special technique is required to fly a procedure with a VDP. The pilot should not descend below the MDA prior to reaching VDP and acquiring the necessary visual reference.



TYPICAL MVA CHART

3.13.4.1 ATC may conduct instrument approaches simultaneously to converging runways; i.e., runways having an included angle from 15 to 100 degrees, at airports where a program has been specifically approved to do so.

3.13.4.2 The basic concept requires that dedicated, separate standard instrument approach procedures be developed for each converging runway included. Missed approach points must be as least 3 miles apart and missed approach procedures ensure that missed approach protected airspace does not overlap.

3.13.4.3 Other requirements are: radar availability, nonintersecting final approach courses, precision (ILS/MLS) approach systems on each runway, and if runways intersect, controllers must be able to apply visual separation as well as intersecting runway separation criteria. Intersecting runways also require minimums of at least 700 and 2. Straight in approaches and landings must be made.

3.13.4.4 Whenever simultaneous converging approaches are in progress, aircraft will be informed by the controller as soon as feasible after initial contact or via ATIS. Additionally, the radar controller will have direct communications capability with the tower controller where separation responsibility has not been delegated to the tower.

3.14 Timed Approaches From a Holding Fix

3.14.1 Timed approaches may be conducted when the following conditions are met:

(1) A control tower is in operation at the airport where the approaches are conducted.

(2) Direct communications is maintained between the pilot and the center/approach controller until the pilot is instructed to contact the tower.

(3) If more than one missed approach procedure is available, none require a course reversal.

(4) If only one missed approach procedure is available, the following conditions are met:

(a) Course reversal is not required; and,

(b) Reported ceiling and visibility are equal to or greater than the highest prescribed circling minimums for the instrument approach procedure.

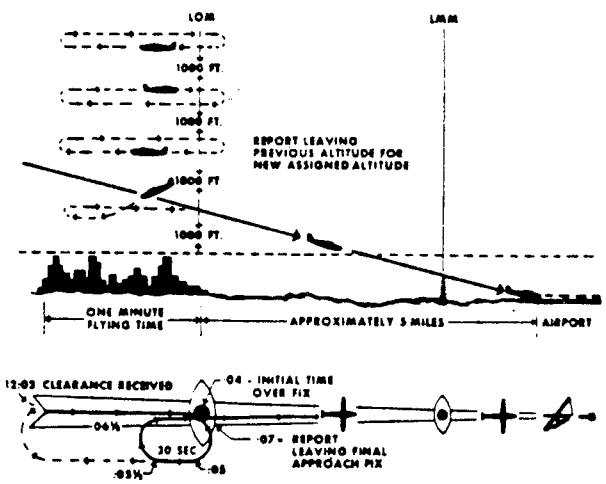
(5) When cleared for the approach, pilots shall not execute a procedure turn. (Ref: FAR 91.175j)

3.14.2 Although the controller will not specifically state that "timed approaches are in progress," his assigning a time to depart the final approach fix inbound (non-precision approach) or the outer marker or the fix used in lieu of the outer marker inbound (precision approach) is indicative that timed approach procedures are being utilized, or in lieu of holding, he may use radar vectors to the final approach course to establish a mileage interval between aircraft that will insure the appropriate time sequence between the final approach fix/outer marker or the fix used in lieu of the outer marker and the airport.

3.14.3 Each pilot in an approach sequence will be given advance notice as to the time he should leave the holding point on approach to the airport. When a time to leave the holding point has been received, the pilot should adjust his flight path to leave the fix as closely as possible to the designated time.

3.14.4 Timed Approach Example

The following figure depicts a final approach procedure from a holding pattern at a final approach fix (FAF). At 12:03 local time, in the example shown, a pilot holding, receives instructions to leave the fix inbound at 12:07. These instructions are received just as the pilot has completed turn at the outbound end of the holding pattern and is proceeding inbound towards the fix. Arriving back over the fix, the pilot notes that the time is 12:04 and that he has three minutes to lose in order to leave the fix at the assigned time. Since the time remaining is more than two minutes, the pilot plans to fly a race track pattern rather than a 360° turn, which would use up two minutes. The turns at the ends of the race track pattern will consume approximately two minutes. Three minutes to go, minus two minutes required for turns, leaves one minute for level flight. Since two portions of level flight will be required to get back to the fix inbound, the pilot halves the one minute remaining and plans to fly level for 30 seconds outbound before starting his turn back toward the fix on final approach. If the winds were negligible at flight altitude, this procedure would bring the pilot inbound across the fix precisely at the specified time of 12:07. However, if the pilot expected a headwind on final approach, he should shorten his 30 seconds outbound course somewhat, knowing that the wind will carry him away from the fix faster while outbound and decrease his ground speed while returning to the fix. On the other hand, if the pilot knew he would have a tailwind on final approach, should length his calculated 30-second outbound heading somewhat, knowing the wind would tend to hold him closer to the fix while outbound and increase his ground speed while returning to the fix.



3.15 Contact Approaches

3.15.1 Pilots operating in accordance with an IFR flight plan, provided they are clear of clouds and have at least 1 mile flight visibility and can reasonably expect to continue to the destination airport in those conditions, may request ATC authorization for a "contact approach."

3.15.2 Controllers may authorize a "contact approach" provided:

(1) The Contact Approach is specifically requested by the pilot. ATC cannot initiate this approach.

Example:

REQUEST CONTACT APPROACH

(2) The reported ground visibility at the destination airport is at least 1 statute mile.

(3) The contact approach will be made to an airport having a standard or special instrument approach procedure.

(4) Approved separation is applied between aircraft so cleared and between these aircraft and other IFR or special VFR aircraft.

Example:

CLEARED CONTACT APPROACH (and if required) AT OR BELOW (altitude) (routing) IF NOT POSSIBLE (alternative procedures) AND ADVISE.

3.15.3 A Contact Approach is an approach procedure that may be used by a pilot (with prior authorization from ATC) in lieu of conducting a standard or special instrument approach procedure to an airport. It is not intended for use by a pilot on an IFR flight clearance to operate to an airport not having an authorized instrument approach procedure. Nor is it intended for an aircraft to conduct an instrument approach to one airport and then, when "in the clear," to discontinue that approach and proceed to another airport. In the execution of a contact approach, the pilot assumes the responsibility for obstruction clearance. If radar service is received, it will automatically terminate when the pilot is told to contact the tower.

3.16 Visual Approaches

3.16.1 When it will be operationally beneficial, ATC may authorize an aircraft to conduct a "visual approach" to an airport or to follow another aircraft when flight to and landing at the airport can be accomplished in VFR weather. The aircraft must have the airport or the identified preceding aircraft in sight before the clearance is issued. If the aircraft has the airport in sight but cannot see the aircraft he is following, ATC may still clear the aircraft for a visual approach; however, ATC retains both separation and wake vortex separation responsibility. When visually following a preceding aircraft, acceptance of a visual approach clearance, constitutes acceptance of a responsibility for maintaining a safe approach interval and adequate wake turbulence separation.

3.16.2 When operating to an airport with an operating control tower, aircraft may be authorized to conduct a "visual approach" to one runway while other aircraft are conducting IFR or VFR approaches to another parallel, intersecting, or converging runway. When operating to airports with parallel runways separated by less than 2,500 feet, the succeeding aircraft must report sighting the preceding aircraft unless standard separation is being provided by ATC. When operating to parallel runways separated by at least 2,500 feet but less than 4,300 feet, controllers will clear/vector aircraft to the final at an angle not greater than 30-degrees unless radar, vertical, or visual separation is provided during the turn-on. The purpose of the 30-degree intercept angle is to reduce the potential for overshoots of the final and to preclude side-by-side operations with one or both aircraft in a "belly-up" configuration during the turn-on. Once the aircraft are established within 30-degrees of final, or on the final, these operations may be conducted simultaneously. When the parallel runways are separated by 4,300 feet or more, or intersecting/converging runways are in use, ATC may authorize a visual approach after advising all aircraft involved that other aircraft are conducting operations to the other runway. This may be accomplished through use of the ATIS.

3.16.3 When operating to an airport without weather reporting service, ATC may initiate a visual approach provided area weather reports indicate that VFR conditions exist at the airport and there is reasonable assurance that descent and flight to the airport can be made in VFR conditions. Pilot acceptance if a visual approach clearance or a pilot's request for a visual approach will indicate to ATC that the pilot can comply with FAR 91.155. ATC will advise the pilot when weather is not available at the destination airport.

3.16.4 Authorization to conduct a "visual approach" is an IFR authorization and does not alter IFR flight plan cancellation responsibility. (See RAC-3.1; 5.2 CANCELING IFR FLIGHT PLAN.)

3.16.5 A visual approach is not an instrument approach procedure and therefore has no missed approach segment. If a go around is necessary for any reason, aircraft operating at controlled airports will be issued an appropriate advisory/clearance/instruction by the tower. At uncontrolled airports, aircraft are expected to remain in VFR conditions and complete a landing as soon as possible. If a landing cannot be accomplished, the aircraft is expected to remain in VFR conditions and contact ATC as soon as possible for further clearance. Separation from other IFR aircraft will be maintained under these circumstances.

3.16.6 Visual approaches are initiated by ATC to reduce pilot/controller workload and expedite traffic by shortening flight paths to the airport. It is the pilot's responsibility to advise ATC as soon as possible if a visual approach is not desired.

3.16.7 Radar service is automatically terminated, without advising the pilot, when the aircraft is instructed to change to advisory frequency.

3.17 Charted Visual Flight Procedures (CVFP's)

3.17.1 CVFP's are charted visual approaches established at locations with jet operations for noise abatement purposes. The approach charts depict prominent landmarks, courses, and recommended altitudes to specific runways.

3.17.2 These procedures will be used only in a radar environment at airports with an operating control tower.

3.17.3 Most approach charts will depict some NAVAID information which is for supplemental navigational guidance only.

3.17.4 Unless indicating a Class B Airspace floor, all depicted altitudes are for noise abatement purposes and are recommended only. Pilots are not prohibited from flying other than recommended altitudes if operational requirements dictate.

3.17.5 When landmarks used for navigation are not visible at night, the approach will be annotated "PROCEDURE NOT AUTHORIZED AT NIGHT."

3.17.6 CVFP's usually begin within 15 flying miles from the airport.

3.17.7 Published weather minimums for CVFP's are based on minimum vectoring altitudes rather than the recommended altitudes depicted on charts.

3.17.8 CVFP's are not instrument approaches and do not have missed approach segments.

3.17.9 ATC will not issue clearances for CVFP's when the weather is less than the published minimum.

3.17.10 ATC will clear aircraft for a CVFP after the pilot reports siting a charted landmark or a preceding aircraft. If instructed to follow a preceding aircraft, pilots are responsible for maintaining a safe approach interval and wake turbulence separation.

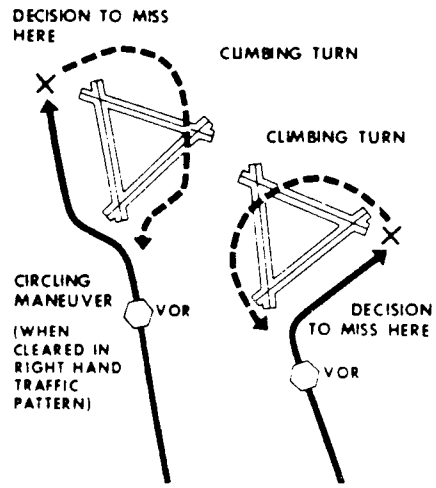
3.17.11 Pilots should advise ATC if at any point they are unable to continue an approach or lose sight of a preceding aircraft. Missed approaches will be handled as a go-around.

3.18 Missed Approach

3.18.1 When a landing cannot be accomplished, advise ATC and, upon reaching the missed approach point defined on the approach procedure chart, the pilot must comply with the missed approach instructions for the procedure being used or with an alternate missed approach procedure specified by Air Traffic Control.

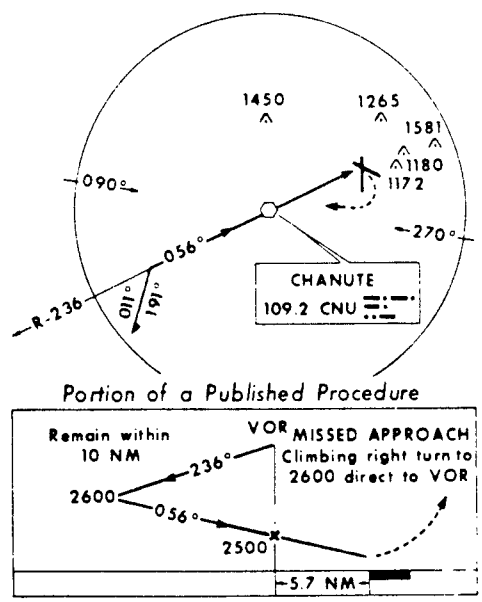
3.18.2 Protected obstacle clearance areas for missed approach are predicated on the assumption that the abort is initiated at the missed approach point not lower than the Minimum Descent Altitude (MDA) or Decision Height maneuvers. However, no consideration is given to an abnormally early turn. Therefore, when an early missed approach is executed, pilots should, unless otherwise cleared by ATC, fly the instrument approach procedure as specified on the approach plate to the missed approach point at or above the MDA or DH before executing a turning maneuver.

3.18.3 If visual reference is lost while circling to land from an instrument approach, the missed approach specified for that particular procedure must be followed (unless an alternate missed approach procedure is specified by Air Traffic control). To become established on the prescribed missed approach course, the pilot should make an initial climbing turn toward the landing runway and continue the turn until he is established on the missed approach course. Inasmuch as the circling maneuver may be accomplished in more than one direction, different patters will be required to become established on the prescribed missed approach course depending on the aircraft position at the time visual reference is lost. Adherence to the procedure, illustrated below, will assure that an aircraft will remain within the circling and missed approach obstruction clearance areas.



3.18.4 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.

3.18.5 Missed Approach Procedure Example



3.18.6 When the approach has been missed, request a clearance for specific action; i.e., to alternative airport, another approach, etc.

3.19 Overhead Approach Maneuver

3.19.1 Pilots operating in accordance with an instrument flight rules (IFR) flight plan in visual meteorological conditions (VMC) may request Air Traffic Control (ATC) authorization for an overhead maneuver. An overhead maneuver is not an instrument approach procedure. Overhead maneuver patterns are developed at airports where aircraft have an operational need to conduct the maneuver. An aircraft conducting an overhead maneuver is considered to be visual flight rules (VFR) and the IFR flight plan is cancelled when the aircraft crosses the landing threshold on the initial approach portion of the maneuver. The existence of a standard overhead maneuver pattern does not eliminate the possible requirement for an aircraft to conform to conventional rectangular patterns if an overhead maneuver cannot be approved. Aircraft operating to an airport without a functioning control tower must initiate cancellation of an IFR flight plan prior to executing the overhead maneuver. Cancellation of the IFR flight plan must be accomplished after crossing the landing threshold on the initial portion of the maneuver or after landing. Controllers may authorize an overhead maneuver and issue the following to arriving aircraft:

3.19.1.1 Pattern altitude and direction of traffic. This information may be omitted if either is standard.

PHRASEOLOGY:

PATTERN ALTITUDE (altitude). RIGHT TURNS.

3.19.1.2 Request for a report on initial approach.

PHRASEOLOGY:

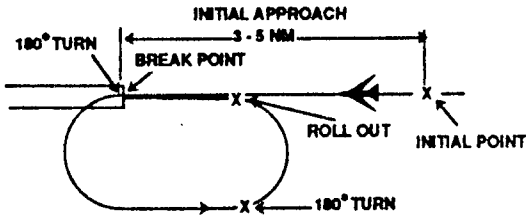
REPORT INITIAL.

3.19.1.3 "Break" information and a request for the pilot to report. The "Break Point" will be specified if non-standard. Pilots may be requested to report "break" if required for traffic or other reasons.

PHRASEOLOGY:

BREAK AT (Specified point).

REPORT BREAK.



4. DEPARTURE PROCEDURES

4.1 Pre-Taxi Clearance Procedures

4.1.1 Certain airports have established programs whereby pilots of departing IFR aircraft may elect to receive their IFR clearances before they start taxiing for takeoff. The following provisions are included in such procedures:

(1) Pilot participation is not mandatory.

(2) Participating pilots call clearance delivery/ground control not more than 10 minutes before proposed taxi time.

(3) IFR clearance (or delay information, if clearance cannot be obtained) is issued at the time of this initial call-up.

(4) When the IFR clearance is received on clearance delivery frequency, pilots call ground control when ready to taxi.

(5) Normally, pilots need not inform ground control that they have received IFR clearance on clearance delivery frequency. Certain locations may, however, require that the pilot inform ground control of a portion of his routing or that he has received his IFR clearance.

(6) If a pilot cannot establish contact on clearance delivery frequency or has not received his IFR clearance before he is ready to taxi, he contacts ground control and informs the controller accordingly.

4.1.2 Locations where these procedures are in effect are indicated in the Airport/Facility Directory.

4.2 Taxi Clearance

Pilots on IFR flight plans should communicate with the control tower on the appropriate ground control/clearance delivery frequency prior to starting engines to receive engine start time, taxi, and/or clearance information.

4.3 Departure Restrictions, Clearance Void Times, Hold for Release, and Release Times

4.3.1 ATC may assign departure restrictions, clearance void times, hold for release, and release times, when necessary, to separate departures from other traffic or to restrict or regulate the departure flow.

4.3.1.1 Clearance Void Times—A pilot may receive a clearance, when operating from an airport without a control tower, which contains a provision for the clearance to be void if not airborne by a specific time. A pilot who does not depart prior to the clearance void time must advise ATC as soon as possible of his or her intentions. ATC will normally advise the pilot of the time allotted to notify ATC that the aircraft did not depart prior to the clearance void time. This time cannot exceed 30 minutes. Failure of an aircraft to contact ATC within 30 minutes after the clearance void time will result in the aircraft being considered overdue and search and rescue procedures initiated.

NOTE 1.-Other IFR traffic for the airport where the clearance is issued is suspended until the aircraft has contacted ATC or until 30 minutes after the clearance void time or 30 minutes after the clearance release time if no clearance void time is issued.

NOTE 2.—Pilots who depart at or after their clearance void time are not afforded IFR separation and may be in violation of FAR 91.173 which requires that pilots receive an appropriate ATC clearance before operating IFR in Class A, B, C, D and E Airspace.

EXAMPLE:

CLEARANCE VOID IF NOT OFF BY (clearance void time) and, if required, IF NOT OFF BY (clearance void time) ADVISE (facility) NOT LATER THAN (time) OF INTENTIONS.

4.3.1.2 Hold for Release—ATC may issue "hold for release" instructions in a clearance to delay an aircraft's departure for traffic management reasons; i.e., weather, traffic volume, etc. When ATC states in the clearance, "hold for release," the pilot may not depart utilizing that instrument flight rules (IFR) clearance until a release time or additional instructions are issued by ATC. This does not preclude the pilot from departing under visual flight rules (VFR); but an IFR clearance may not be available after departure. In addition, ATC will include departure delay information in conjunction with "hold for release" instructions.

PROHIBITED, RESTRICTED AND DANGER AREAS

1. SPECIAL USE AIRSPACE

1.1 General

1.1.1 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.

1.1.2 Prohibited and Restricted Areas are regulatory special use airspace and are established in FAR Part 73 through the rulemaking process.

1.1.3 Warning Areas, Military Operations Areas, Alert Areas, and Controlled Firing Areas are nonregulatory special use airspace.

1.1.4 All special use airspace descriptions are contained in FAA Order 7400.8.

1.1.5 Special use airspace (except CFA's) are charted on IFR and Visual charts and includes the hours of operation, altitudes, and the controlling agency.

2. PROHIBITED AREA

Prohibited Areas contain airspace of defined dimensions identified by an area on the surface of the earth within which the flight of aircraft is prohibited. Such areas are established for security or other reasons associated with the national welfare. These areas are published in the Federal Register and are depicted on aeronautical charts.

3. RESTRICTED AREA

3.1 Restricted Areas contain airspace identified by an area on the surface of the earth within which the flight of aircraft, while not wholly prohibited, is subject to restrictions. Activities within these areas must be confined because of their nature or limitations imposed upon aircraft operations that are not a part of those activities or both. Restricted areas denote the existence of unusual, often invisible, hazards to aircraft such as artillery firing, aerial gunnery, or guided missiles. Penetration of Restricted Areas without authorization from the using or controlling agency may be extremely hazardous to the aircraft and its occupants. Restricted Areas are published in the Federal Register and constitute FAR Part 73.

3.2 ATC facilities apply the following procedures when aircraft are operating on an IFR clearance (including those cleared by ATC to maintain VFRONTOP) via a route which lies within jointuse restricted airspace.

3.2.1 If the restricted area is not active and has been released to the controlling agency (FAA), the ATC facility will allow the aircraft to operate in the restricted airspace without issuing specific clearance for it to do so.

3.2.2 If the restricted area is active and has not been released to the controlling agency (FAA), the ATC facility will issue a clearance which will ensure the aircraft avoids the restricted airspace unless it is on an approved altitude reservation mission or has obtained its own permission to operate in the airspace and so informs the controlling facility.

> Note. — The above apply only to jointuse restricted airspace and not to prohibited and nonjointuse airspace. For the latter categories, the ATC facility will issue a clearance so the aircraft will avoid the restricted airspace unless it is on an approved altitude reservation mission or has obtained its own permission to operate in the airspace and so informs the controlling facility.

3.2.3 Restricted airspace is depicted on the En Route Chart appropriate for use at the altitude or flight level being flown. For jointuse restricted areas, the name of the controlling agency is shown on these charts. For all prohibited areas and nonjointuse restricted areas, unless otherwise requested by the using agency, the phrase "NO A/G" is shown.

4. WARNING AREA

Warning Areas are airspace which may contain hazards to nonparticipating aircraft in international airspace. Warning Areas are established beyond the 3 mile limit. Though the activities conducted within Warning Areas may be as hazardous as those in Restricted Areas, Warning Areas cannot be legally designated as Restricted Areas because they are over international waters. Penetration of Warning Areas during periods of activity may be hazardous to the aircraft and its occupants. Official descriptions of Warning Areas may be obtained on request to the FAA, Washington, D.C.

5. MILITARY OPERATIONS AREA (MOA)

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

5.2 Most training activities necessitate acrobatic or abrupt flight maneuvers. Military pilots conducting flight in Department of Defense aircraft within a designated and active military operations area (MOA) are exempted from the provisions of FAR Part 91.303(c) and (d) which prohibit acrobatic flight within Federal airways and Class B, Class C, Class D, and Class E surface areas.

5.3 Pilots operating under VFR should exercise extreme caution while flying within a MOA when military activity is being conducted. The activity status (active/inactive) of MOA's may change frequently. Therefore, pilots should contact any FSS within 100 miles of the area to obtain accurate realtime information concerning the MOA hours of operation. Prior to entering an active MOA, pilots should contact the controlling agency for traffic advisories.

5.4 MOA's are depicted on Sectional, VFR Terminal Area, and En Route Low Altitude Charts.

6. 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. Pilots should be particularly alert when flying in these areas. All activity within an Alert Area shall be conducted in accordance with FARs, without waiver, and pilots of participating aircraft as well as pilots transiting the area shall be equally responsible for collision avoidance. Information concerning these areas may be obtained upon request to the FAA, Washington, D.C.

7. CONTROLLED FIRING AREAS

Controlled Firing Areas contain activities which, if not conducted in a controlled environment, could be hazardous to nonparticipating aircraft. The distinguishing feature of the Controlled Firing Area, as compared to other special use airspace, is that its activities are suspended immediately when spotter aircraft, radar, or ground lookout positions indicate an aircraft might be 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.

8. MILITARY TRAINING ROUTES (MTR)

8.1 National security depends largely on the deterrent effect of our airborne military forces. To be proficient, the military services must train in a wide range of airborne tactics. One phase of this training involves "low level" combat tactics. The required maneuvers and high speeds are such that they may occasionally make the seeandavoid aspect of VFR flight more difficult without increased vigilance in areas containing such operations. In an effort to ensure the greatest practical level of safety for all flight operations, the MTR program was conceived.

8.2 The MTRs program is a joint venture by the FAA and the Department of Defense (DOD). MTR routes are mutually developed for use by the military for the purpose of conducting lowaltitude, highspeed training. The routes above 1,500 feet above ground level (AGL) are developed to be flown, to the maximum extent possible, under IFR. The routes at 1,500 feet AGL and below are generally developed to be flown under Visual Flight Rules (VFR).

8.3 Generally, MTRs are established below 10,000 feet MSL for operations at speeds in excess of 250 knots. However, route segments may be defined at higher altitudes for purposes of route continuity. For example, route segments may be defined for descent, climbout, and mountainous terrain. There are IFR and VFR routes as follows:

8.3.1 IFR Military Training Routes—IR: Operations on these routes are conducted in accordance with IFRs regardless of weather conditions.

8.3.2 VFR Military Training Routes—VR: Operations on these routes are conducted in accordance with VFRs except, flight visibility shall be 5 miles or more; and flights shall not be conducted below a ceiling of less than 3,000 feet AGL.

8.4 Military training routes will be identified and charted as follows:

8.4.1 Route identification.

8.4.1.1 MTRs with no segment above 1,500 feet AGL shall be identified by four number characters; e.g., IR1206, VR1207.

8.4.1.2 MTRs that include one or more segments above 1,500 feet AGL shall be identified by three number characters; e.g., IR206, VR207.

8.4.1.3 Alternate IR/VR routes or route segments are identified by using the basic/principal route designation followed by a letter suffix, e.g., IR008A, VR1007B, etc.

8.4.2 Route charting.

8.4.2.1 IFR Low Altitude En Route Chart—This chart will depict all IR routes and all VR routes that accommodate operations above 1,500 feet AGL.

8.4.2.2 VFR Planning Chart—This chart will depict routes (military training activities such as IR and VR regardless of altitude), MOAs, and restricted, warning and alert areas.

8.4.2.3 Area Planning (AP/1B) Chart (DOD Flight Information Publication—FLIP). This chart is published by the DOD primarily for military users and contains detailed information on both IR and VR routes. (See MAP 1, Auxiliary Charts).

8.5 The FLIP contains charts and narrative descriptions of these routes. This publication is available to the general public by single copy or annual subscription from the DIRECTOR, DMACSC, Attention: DOCP, Washington, DC 20315-0020. This DOD FLIP is available for pilot briefings at FSS and many airports.

8.6 Nonparticipating aircraft are not prohibited from flying within an MTR; however, extreme vigilance should be exercised when conducting flight through or near these routes. Pilots should contact FSSs within 100 NM of a particular MTR to obtain current information or route usage in their vicinity. Information available includes times of scheduled activity, altitudes in use on each route segment, and actual route width. Route width varies for each MTR and can extend several miles on either side of the charted MTR centerline. Route width information for IR and VR MTR's is also available in the FLIP AP/1B along with additional MTR (SR/AR) information. When requesting MTR information, pilots should give the FSS their position, route of flight, and destination in order to reduce frequency congestion and permit the FSS specialist to identify the MTR routes which could be a factor.

9. TEMPORARY FLIGHT RESTRICTIONS

9.1 General—This paragraph describes the types of conditions under which the FAA may impose temporary flight restrictions. It also explains which FAA elements have been delegated authority to issue a temporary flight restrictions NOTAM and lists the types of responsible agencies/offices from which the FAA will accept requests to establish temporary flight restrictions. The FAR is explicit as to what operations are prohibited, restricted, or allowed in a temporary flight restrictions area. Pilots are responsible to comply with FAR Part 91.137 when conducting flight in an area where a temporary flight restrictions area is in effect, and should check appropriate NOTAMs during flight planning.

9.2 The purpose for establishing a temporary flight restrictions area is to:

9.2.1 Protect persons and property in the air or on the surface from an existing or imminent hazard associated with an incident on the surface when the presence of low flying aircraft would magnify, alter, spread, or compound that hazard (FAR Part 91.137(a)(1));

9.2.2 Provide a safe environment for the operation of disaster relief aircraft (FAR Part 91.137(a)(2));

9.2.3 Or prevent an unsafe congestion of sightseeing aircraft above an incident or event which may generate a high degree of public interest (FAR Part 91.137(a)(3)).

9.3 Except for hijacking situations, when the provisions of FAR Part 91.137(a)(1) or (a)(2) are necessary, a temporary flight restrictions area will only be established by or through the area manager at the Air Route Traffic Control Center (ARTCC) having jurisdiction over the area concerned. A temporary flight restrictions NOTAM involving the conditions of FAR Part 91.137(a)(3) will be issued at the direction of the regional air traffic division manager having oversight of the airspace concerned. When hijacking situations are involved, a temporary flight restrictions area will be implemented through the FAA Washington Headquarters Office of Civil Aviation Security. The appropriate FAA air traffic element, upon receipt of such a request, will establish a temporary flight restrictions area under FAR Part 91.137(a)(1).

9.4 The FAA accepts recommendations for the establishment of a temporary flight restrictions area under FAR Part 91.137(a)(1) from military major command headquarters, regional directors of the Office of Emergency Planning, Civil Defense State Directors, State Governors, or other similar authority. For the situations involving FAR Part 91.137(a)(2), the FAA accepts recommendations from military commanders serving as regional, subregional, or Search and Rescue (SAR) coordinators; by military commanders directing or coordinating air operations associated with disaster relief; or by civil authorities directing or coordinating organized relief air operations (includes representatives of the Office of Emergency Planning, U.S. Forest Service, and State aeronautical agencies). Appropriate authorities for a temporary flight restrictions establishment under FAR Part 91.137(a)(3) are any of those listed above or by State, county, or city government entities.

9.5 The type of restrictions issued will be kept to a minimum by the FAA consistent with achievement of the necessary objective. Situations which warrant the extreme restrictions of FAR Part 91.137(a)(1) include, but are not limited to: toxic gas leaks or spills, flammable agents, or fumes which if fanned by rotor or propeller wash could endanger persons or property on the surface, or if entered by an aircraft could endanger persons or property in the air; imminent volcano eruptions which could endanger airborne aircraft and occupants; nuclear accident or incident; and hijackings. Situations which warrant the restrictions associated with FAR Part 91.137(a)(2) include: forest fires which are being fought by releasing fire retardants from aircraft; and aircraft relief activities following a disaster (earthquake, tidal wave, flood, etc.). FAR Part 91.137(a)(3) restrictions are established for events and incidents that would attract an unsafe congestion of sightseeing aircraft.

9.6 The amount of airspace needed to protect persons and property or provide a safe environment for rescue/relief aircraft operations is normally limited to within 2,000 feet above the surface and within a two nautical mile radius. Incidents occurring within Class B, Class C, or Class D airspace will normally be handled through existing procedures and should not require the issuance of temporary flight restrictions NOTAM.

9.7 The FSS nearest the incident site is normally the "coordination facility." When FAA communications assistance is required, the designated FSS will function as the primary communications facility for coordination between emergency control authorities and affected aircraft. The ARTCC may act as liaison for the emergency control authorities if adequate communications cannot be established between the designated FSS and the relief organization. For example, the coordination facility may relay authorizations from the onscene emergency response official in cases where news media aircraft operations are approved at the altitudes used by relief aircraft.

9.8 ATC may authorize operations in a temporary flight restrictions area under its own authority only when flight restrictions are established under FAR Part 91.137(a)(2) and (a)(3) and only when such operations are conducted under instrument flight rules (IFR). The appropriate ARTCC/air traffic control tower manager will, however, ensure that such authorized flights do not hamper activities or interfere with the event for which restrictions were implemented. However, ATC will not authorize local IFR flights into the temporary flight restrictions area.

9.9 To preclude misunderstanding, the implementing NOTAM will contain specific and formatted information. The facility establishing a temporary flight restrictions area will format a NOTAM beginning with the phrase "FLIGHT RESTRICTIONS" followed by: the location of the temporary flight restrictions area; the effective period; the area defined in statute miles; the altitudes affected; the FAA coordination facility and commercial telephone number; the reason for the temporary flight restrictions; the agency directing any relief activities and its commercial telephone number; and other information considered appropriate by the issuing authority.

Example: FAR Part 91.137(a)(1):

The following NOTAM prohibits all aircraft operations except those specified in the NOTAM.

FLIGHT RESTRICTIONS MATTHEWS, VIRGINIA, EFFECTIVE IMMEDIATELY UNTIL 1200 GMT JANUARY 20, 1987. PURSUANT TO FAR 91.137(a)(1) TEMPORARY FLIGHT RESTRICTIONS ARE IN EFFECT. RESCUE OPERATIONS IN PROGRESS. ONLY RELIEF AIRCRAFT OPERATIONS UNDER THE DIRECTION OF THE DEPARTMENT OF DEFENSE ARE AUTHORIZED IN THE AIRSPACE AT AND BELOW 5,000 FEET MSL WITHIN A TWO MILE RADIUS OF LASER AFB, MATTHEWS, VIRGINIA. COMMANDER, LASER AFB, IN CHARGE (897) 946-5543. STEENSON FSS IS THE FAA COORDINATION FACILITY (792) 555-6141.

Example: FAR Part 91.137(a)(2):

The following NOTAM permits the onsite emergency response official to authorize media aircraft operations below the altitudes used by the relief aircraft.

FLIGHT RESTRICTIONS 25 MILES EAST OF BRANSOME, IDAHO, EFFECTIVE IMMEDIATELY UNTIL 2359 JANUARY 20, 1987. PURSUANT TO FAR 91.137(a)(2) TEMPORARY FLIGHT RESTRICTIONS ARE IN EFFECT WITHIN A FOUR MILE RADIUS OF THE INTERSECTION OF COUNTY ROADS 564 and 315 AT AND BELOW 3,500 FEET MSL TO PROVIDE A SAFE ENVIRONMENT FOR FIRE FIGHTING AIRCRAFT OPERATIONS. DAVIS COUNTY SHERIFF'S DEPARTMENT (792) 555-8122 IS IN CHARGE OF ONSCENE EMERGENCY RESPONSE ACTIVITIES. GLIVINGS FSS (792) 555-1618 IS THE FAA COORDINATION FACILITY.

Example: FAR Part 91.137(a)(3):

The following NOTAM prohibits sightseeing aircraft operations.

FLIGHT RESTRICTIONS BROWN, TENNESSEE, DUE TO OLYMPIC ACTIVITY. EFFECTIVE 1100 GMT JUNE 18, 1987, UNTIL 0200 GMT JULY 19, 1987. PURSUANT TO FAR 91.137(a)(3) TEMPORARY FLIGHT RESTRICTIONS ARE IN EFFECT WITHIN A THREE MILE RADIUS OF THE BASSETT SPORTS COMPLEX AT AND BELOW 2,500 FEET MSL. NORTON FSS (423) 555-6742 IS THE FAA COORDINATION FACILITY.

10. FLIGHT LIMITATIONS/PROHIBITIONS

10.1 Flight Limitations in the proximity of Space Flight Operations are designated in a Notice to Airman (NOTAM). FAR Part 91.143 provides protection from potentially hazardous situations for pilots and space flight crews and costly delays of shuttle operations.

10.2 Flight Restrictions in the proximity of Presidential and Other Parties are put into effect because numerous aircraft and large assemblies of persons may be attracted to areas to be visited or traveled by the President or Vice President, heads of foreign states, and other public figures. Such conditions may create a hazard to aircraft engaged in air commerce and to persons and property on the ground. In addition, responsible agencies of the United States Government may determine that certain regulatory actions should be taken in the interest of providing protection for these public figures. FAR Part 91.141 provides for the issuance of a regulatory NOTAM to establish flight restrictions where required in such cases.

11. PARACHUTE JUMP AIRCRAFT OPERATIONS

11.1 Procedures relating to parachute jump areas are contained in FAR Part 105. Tabulations of parachute jump areas in the U.S. are contained in the Airport/Facility Directory.

11.2 Pilots of aircraft engaged in parachute jump operations are reminded that all reported altitudes must be with reference to mean sea level, or flight level, as appropriate, to enable ATC to provide meaningful traffic information.

11.3 Parachute operations in the vicinity of an airport without an operating control tower—There is no substitute for alertness while in the vicinity of an airport. It is essential that pilots conducting parachute operations be alert, look for other traffic, and exchange traffic information as recommended in paragraph RAC-7;2.1 *TRAFFIC ADVISORY PRACTICES AT AIRPORTS WITHOUT OPERATING CONTROL TOWERS.* In addition, pilots should avoid releasing parachutes while in an airport traffic pattern when there are other aircraft in that pattern. Pilots should make appropriate broadcasts on the designated Common Traffic Advisory Frequency (CTAF), and monitor that CTAF until all parachute activity has terminated or the aircraft has left the area. Prior to commencing a jump operation, the pilot should broadcast the aircraft's altitude and position in relation to the airport, the approximate relative time when the jump will commence and terminate, and listen to the position reports of other aircraft in the area.

traffic demand (e.g., the Indianapolis 500, the Super Bowl) or reduced airport capacity (e.g., airport runway/taxiway closures for airport construction). The special procedures may remain in effect until the problem has been resolved or until local traffic management procedures can handle the situation and a need for special handling no longer exists.

7.2 The Airport Reservations Office (ARO) has been established to monitor the operation of the high density rule required by FAR 93, Subpart K. The ARO receives and processes all IFR requests for operations at designated high density traffic airports and allots reservations on a "first come, first serve" basis determined at the time the request is received at the office. Standby lists are not maintained. The toll free number to obtain a slot is 1-800-322-1212. For telephones without TouchTone service, the number is (202) 267-5312.

7.3 The high density airports are: John F. Kennedy International Airport, La Guardia Airport, Chicago O'Hare International Airport, and Washington National Airport.

7.3.1 Reservations for John F. Kennedy International Airport are required between 3 p.m. and 7:59 p.m. local time.

7.3.2 Reservations at Chicago O'Hare International Airport are required between 6:45 a.m. and 9:15 p.m. local time.

7.3.3 Reservations for La Guardia Airport and Washington National Airport are required between 6 a.m. and 11:59 p.m. local time.

7.4 Requests for IFR reservations will be accepted 48 hours prior to the proposed time of operation at the affected airport. An exception to the 48-hour limitation is made for holidays.

8. HEAVY TRAFFIC AROUND MILITARY FIELDS

8.1 Pilots are advised to exercise vigilance when in close proximity to most military airports. These airports may have jet aircraft traffic patterns extending up to 2,500 feet above the surface. In addition, they may have an unusually heavy concentration of jet aircraft operating within a 25 nautical mile radius and from the surface to all altitudes. The precautionary note also applies to the larger civil airports.

NATIONAL SECURITY AND INTERCEPTION PROCEDURES

1. NATIONAL SECURITY

1.1 National security in the control of air traffic is governed by Federal Aviation Regulation (FAR) Part 99.

1.2 All aircraft entering domestic U.S. airspace from points outside, must provide for identification prior to entry. To facilitate early aircraft identification of all aircraft in the vicinity of U.S. — International airspace boundaries, Air Defense Identification Zones (ADIZ) have been established.

1.3 ADIZ boundaries for the U.S. and its Territories are graphically represented in RAC-8 Appendixes one through four.

1.4 Operational requirements for aircraft operations associated with an ADIZ are as follows:

1.4.1 Flight Plan — Except as specified in paragraphs 1.5 and 1.6 below, an IFR or DVFR flight plan must be filed with an appropriate aeronautical facility as follows:

1.4.1.1 Generally, for all operations that enter an ADIZ.

1.4.1.2 For operations that will enter or exit the United States and which will operate into, within or across the Contiguous U.S. ADIZ regardless of true airspeed.

1.4.1.3 The flight plan must be filed before departure except for operations associated with the Alaskan ADIZ when the airport of departure has no facility for filing a flight plan, in which case the flight plan may be filed immediately after takeoff or when within range of the aeronautical facility.

1.4.2 Two-way Radio — For the majority of operations associated with an ADIZ, an operating two-way radio is required. See FAR 99.1 for exceptions.

1.4.3 Transponder Requirements — Unless otherwise authorized by ATC, each aircraft conducting operations into, within, or across the Contiguous U.S. ADIZ must be equipped with an operable radar beacon transponder having altitude reporting capability (Mode C), and that transponder must be turned on and set to reply on the appropriate code or as assigned by ATC.

1.4.4 Position Reporting:

1.4.4.1 For IFR flight — Normal IFR position reporting.

1.4.4.2 For DVFR flights — The estimated time of ADIZ penetration must be filed with the aeronautical facility at least 15 minutes prior to penetration except for flight in the Alaskan ADIZ, in which case report prior to penetration.

1.4.4.3 For inbound aircraft of foreign registry — The pilot must report to the aeronautical facility at least one hour prior to ADIZ penetration.

1.4.5 Aircraft Position Tolerances:

1.4.5.1 Over land, the tolerance is within plus or minus five minutes from the estimated time over a reporting point or point of penetration and within 10 NM from the centerline of an intended track over an estimated reporting point or penetration point.

1.4.5.2 Over water, the tolerance is plus or minus five minutes from the estimated time over a reporting point or point of penetration and within 20 NM from the centerline of the intended track over an estimated reporting point or point of penetration (to include the Aleutian Islands).

1.5 Except when applicable under FAR 99.7, FAR 99 does not apply to aircraft operations:

1.5.1 Within the 48 contiguous states and the District of Columbia, or within the State of Alaska, and remains within 10 miles of the point of departure;

1.5.2 Over any island, or within three nautical miles of the coastline of any island, in the Hawaii ADIZ; or

1.5.3 Associated with any ADIZ other than the Contiguous U.S. ADIZ, when the aircraft true airspeed is less than 180 knots.

1.6 Authorizations to deviate from the requirements of Part 99 may also be granted by the ARTCC, on a local basis, for some operations associated with an ADIZ.

1.7 An Airfiled VFR Flight Plan makes an aircraft subject to interception for positive identification when entering an ADIZ. Pilots are therefore urged to file the required DVFR flight plan either in person or by telephone prior to departure.

1.8 Special Security Instructions

1.8.1 During defense emergency or air defense emergency conditions, additional special security instructions may be issued in accordance with the Security Control of Air Traffic and Air Navigation Aids (SCATANA) Plan.

1.8.2 Under the provisions of the SCATANA Plan, the military will direct the action to be taken — in regard to landing, grounding, diversion, or dispersal of aircraft and the control of air navigation aids — in the defense of the United States during emergency conditions.

1.8.3 At the time a portion or all of SCATANA is implemented, ATC facilities will broadcast appropriate instructions received from the military over available ATC frequencies. Depending on instructions received from the military, VFR flights may be directed to land at the nearest available airport, and IFR flights will be expected to proceed as directed by ATC.

1.8.4 Pilots on the ground may be required to file a flight plan and obtain an approval (through FAA) prior to conducting flight operation.

1.8.5 In view of the above, all pilots should guard an ATC or FSS frequency at all times while conducting flight operations.

2. INTERCEPTION PROCEDURES

2.1 GENERAL

Identification intercepts during peacetime operations are vastly different than those conducted under increased states of readiness. Unless otherwise directed by the control agency, intercepted aircraft will be identified by type only. When specific in-

formation is required (i.e. markings, serial numbers, etc.) the interceptor aircrew will respond only if the request can be conducted in a safe manner. During hours of darkness or Instrument Meteorological Conditions (IMC), identification of unknown aircraft will be by type only. The interception pattern described below is the typical peacetime method used by air interceptor aircrews. In all situations, the interceptor aircrew will use caution to avoid startling the intercepted aircrew and/or passengers.

2.2 Intercept Phases

2.2.1 *Phase One —Approach Phase*

During peacetime, intercepted aircraft will be approached from the stern. Generally two interceptor aircraft will be employed to accomplish the identification. The flight leader and his wingman will coordinate their individual positions in conjunction with the ground controlling agency. Their relationship will resemble a line abreast formation. At night or in IMC, a comfortable radar trail tactic will be used. Safe vertical separation between interceptor aircraft and unknown aircraft will be maintained at all times.

2.2.2 *Phase Two —Identification Phase*

The intercepted aircraft should expect to visually acquire the lead interceptor and possibly the wingman during this phase in visual meteorological conditions (VMC). The wingman will assume a surveillance position while the flight leader approaches the unknown aircraft. Intercepted aircraft personnel may observe the use of different drag devices to allow for speed and position stabilization during this phase. The flight leader will then initiate a gentle closure toward the intercepted aircraft, stopping at a distance no closer than absolutely necessary to obtain the information needed. The interceptor aircraft will use every possible precaution to avoid startling intercepted aircrew or passengers. Additionally, the interceptor aircrews will constantly keep in mind that maneuvers considered normal to a fighter aircraft may be considered hazardous to passengers and crews of nonfighter aircraft. When interceptor aircrews know or believe that an unsafe condition exists, the identification phase will be terminated. As previously stated, during darkness or IMC identification of unknown aircraft will be type only. Positive vertical separation will be maintained by interceptor aircraft throughout this phase.

2.2.3 *Phase Three —Post —Intercept Phase*

Upon identification phase completion, the flight leader will turn away from the intercepted aircraft. The wingman will remain well clear and accomplish a rejoin with his leader.

2.2.4 *Interception Pattern Graphic —See Appendix Six*

2.3 Communication interface between interceptor aircrews and the ground controlling agency is essential to ensure successful intercepted completion. Flight Safety is paramount. An aircraft which is intercepted by another aircraft shall immediately:

2.3.1 follow the instructions given by the intercepting aircraft, interpreting and responding to the visual signals;

2.3.2 notify, if possible the appropriate air traffic services unit;

2.3.3 attempt to establish radio communication with the intercepting aircraft or with the appropriate intercept control unit, by making a general call on the emergency frequency 243.0. MHz and repeating this call on the emergency frequency 121.5 MHz, if practicable, giving the identity and position of the aircraft and the nature of the flight;

2.3.4 if equipped with SSR transponder, select mode 3/A Code 7700, unless otherwise instructed by the appropriate air traffic services unit.

2.4 If any instructions received by radio from any sources conflict with those given by the intercepting aircraft by visual or radio signal, the intercepted aircraft shall request immediate clarification while continuing to comply with the instructions given by the intercepting aircraft.

2.5 *Signals Initiated by Intercepting Aircraft and Responses by Intercepted Aircraft*

See Appendix Five.

2.6 *Signals Initiated by Intercepted Aircraft and Responses by Intercepting Aircraft*

See Appendix Five.

3. LAW ENFORCEMENT OPERATIONS BY CIVIL AND MILITARY ORGANIZATIONS

3.1 Special law enforcement operations.

3.1.1 Special law enforcement operations include in-flight identification, surveillance, interdiction, and pursuit activities performed in accordance with official civil and/or military mission responsibilities.

3.1.2 To facilitate accomplishment of these special missions, exemptions from specified sections of the FAR have been granted to designated departments and agencies. However, it is each organization's responsibility to apprise air traffic control (ATC) of their intent to operate under an authorized exemption before initiating actual operations.

3.1.3 Additionally, some departments and agencies that perform special missions have been assigned coded identifiers to permit them to apprise ATC of ongoing mission activities and solicit special air traffic assistance.

TWO-WAY RADIO COMMUNICATIONS FAILURE

1. TWO-WAY RADIO COMMUNICATIONS FAILURE

1.1. It is virtually impossible to provide regulations and procedures applicable to all possible situations associated with two-way radio communications failure. During two-way radio communications failure when confronted by a situation not covered in the regulation, pilots are expected to exercise good judgment in whatever action they elect to take. Should the situation so dictate, they should not be reluctant to use the emergency action contained in FAR 91.3(b).

1.2. Whether two-way communications failure constitutes an emergency depends on the circumstances, and in any event is a determination made by the pilot. FAR 91.3 authorizes a pilot to deviate from any rule to the extent required to meet an emergency.

1.3. In the event of two-way radio communications failure, ATC service will be provided on the basis that the pilot is operating in accordance with FAR 91.185. A pilot experiencing two-way communications failure should (unless emergency authority is exercised) comply with FAR 91.185 as indicated below.

1.4 Unless otherwise authorized by ATC, each pilot who has two-way radio communications failure when operating under IFR shall comply with the following conditions.

1.4.1 If the failure occurs in VFR conditions, or if VFR conditions are encountered after the failure, each pilot shall continue the flight under VFR and land as soon as practicable. This procedure also applies when two-way radio failure occurs while operating in Class A Airspace. The primary objective of this provision in FAR 91.185 is to preclude extended IFR operations in the air traffic control system in VFR weather conditions. Pilots should recognize that operation under these conditions may unnecessarily as well as adversely affect other users of the airspace, since ATC may be required to reroute or delay other users in order to protect the failure aircraft. However, it is not intended that the requirement to "land as soon as practicable" be construed to mean "as soon as possible." The pilot retains his prerogative of exercising his best judgment and is not required to land at an unauthorized airport, at an airport unsuitable for the type of aircraft flown, or to land only minutes short of his destination.

1.4.2 If the failure occurs in IFR conditions, or if VFR conditions cannot be complied with, each pilot shall continue the flight according to the following requirements.

1.4.2.1 Route requirements;

(a) By the route assigned in the last ATC clearance received;

(b) If being radar vectored, by the direct route from the point of radio failure to the fix, route, or airway specified in the vector clearance;

(c) In the absence of an assigned route, by the route that ATC has advised may be expected in a further clearance; or

(d) In the absence of an assigned route or a route that ATC has advised may be expected in a further clearance, by the route filed in the flight plan.

1.4.2.2 Altitude requirements. At the HIGHEST of the following altitudes or flight levels FOR THE ROUTE SEGMENT BEING FLOWN:

(a) The altitude or flight level assigned in the last ATC clearance received;

(b) The minimum altitude (converted, if appropriate, to minimum flight level as prescribed in 91.121(c)) for IFR operations; or

(c) The altitude or flight level ATC has advised may be expected in a further clearance.

NOTE– The intent of the rule is that a pilot who has experienced two-way radio failure should select the appropriate altitude for the particular route segment being flown and make the necessary altitude adjustments for subsequent route segments. If the pilot received an "expect further clearance" containing a higher altitude to expect at a specified time or fix, he/she should maintain the highest of the following altitudes until that time/fix: (1) His/her last assigned altitude, or (2) The minimum altitude/flight level for IFR operations.

Upon reaching the time/fix specified, the pilot should commence his/her climb to the altitude he/she was advised to expect. If the radio failure occurs after the time/fix specified, the altitude to be expected is not applicable and the pilot should maintain an altitude consistent with 1 or 2 above.

If the pilot receives an "expect further clearance" containing a lower altitude, the pilot should maintain the highest of 1 or 2 above until that time/fix specified in SAR-3, paragraph 1.4.2.3.

Example:

A pilot experiencing two-way radio failure at an assigned altitude of 7,000 feet is cleared along a direct route which will require a climb to a minimum IFR altitude of 9,000 feet, should climb to reach 9,000 feet at the time or place where it becomes necessary (see FAR 91.177(b)). Later while proceeding along an airway with an MEA of 5,000 feet, the pilot would descend to *7,000 feet* (the last assigned altitude), because that altitude is *higher* than the MEA.

Example:

A pilot experiencing two-way radio failure while being progressively descended to lower altitudes to begin an approach is assigned 2,700 feet until crossing the VOR and then cleared for the approach. The MOCA along the airway is 2,700 feet and MEA is 4,000 feet. The aircraft is within 22 NM of the VOR. The pilot should remain at 2,700 feet until crossing the VOR because that altitude is the minimum IFR altitude for the route segment being flown.

Example:

The MEA between **A** and **B** -5,000 feet. The MEA between **B** and **C** -5,000 feet. The MEA between **C** and **D** -11,000 feet. The MEA between **D** and **E** -7,000 feet. A pilot had been cleared via **A, B, C, D,** to **E.** While flying between A and B his assigned altitude was 6,000 feet and he was told to expect a clearance to 8,000 feet at **B.** Prior to receiving the higher altitude assignment, he experienced two-way failure. The pilot would maintain 6,000 to **B,** then climb to 8,000 feet (the altitude he was advised to expect.) He would maintain 8,000 feet, then climb to 11,000 at **C,** or prior to **C** if necessary to comply with an MCA at **C.** FAR 91.177(b). Upon reaching **D,** the pilot

would descend to *8,000 feet* (even though the MEA was 7,000 feet), as 8,000 was the highest of the altitude situations stated in the rule FAR 91.185.

1.4.2.3 *Leave Clearance Limit*

1.4.2.3.1 When the clearance limit is a fix from which an approach begins, commence descent or descent and approach as close as possible to the expect further clearance time if one has been received, or if one has not been received, as close as possible to the estimated time of arrival as calculated from the filed or amended (with ATC) estimated time en route.

1.4.2.3.2 If the clearance limit is not a fix from which an approach begins, leave the clearance limit at the expect further clearance time if one has been received, or if none has been received, upon arrival over the clearance limit, and proceed to a fix from which an approach begins and commence descent or descent and approach as close as possible to the estimated time of arrival as calculated from the filed or amended (with ATC) estimated time en route.

2. TRANSPONDER OPERATION DURING TWO — WAY COMMUNICATIONS FAILURE

2.1 If an aircraft with a coded radar beacon transponder experiences a loss of two—way radio capability, the pilot should adjust the transponder to reply on Mode 3/A, Code 7600.

2.2 The pilot should understand that he may not be in an area of radar coverage.

3. REESTABLISHING RADIO CONTACT

3.1 In addition to monitoring the NAVAID voice feature, the pilot should attempt to reestablish communications by attempting contact:

a. on the previously assigned frequency

b. with an FSS or ARINC.

3.2 If communications are established with an FSS or ARINC, the pilot should advise the aircraft's position, altitude, last assigned frequency and then request further clearance from the controlling facility. The preceding does not preclude the use of 121.5 MHz. There is no priority on which action should be attempted first. If the capability exists, do all at the same time.

Note — AERONAUTICAL RADIO/INCORPORATED (ARINC) is a commercial communications corporation which designs, constructs, operates, leases or otherwise engages in radio activities serving the aviation community. ARINC has the capability of relaying information to/from ATC facilities throughout the country.

AERONAUTICAL CHARTS

1. GENERAL

Aeronautical charts for the United States and its territories and possessions are produced by the National Ocean Service, a part of the Department of Commerce, from information furnished by the Federal Aviation Administration.

1.2 Obtaining Civil Aeronautical Charts

Enroute Aeronautical Charts, Terminal Procedure Publication Charts, Regional Airport/Facility Directories and other publications described in this Section are available upon subscription and one time sales from:

National Ocean Service
NOAA Distribution Branch (N/CG33)
Riverdale, Maryland 20737
Phone: (301) 436-6990

2. APPLICABLE ICAO DOCUMENTS

The aeronautical charts are produced as far as possible in accordance with the specifications contained in the following ICAO documents:

Annex 4, Aeronautical Charts
Doc 8168-OPS/611, Aircraft Operations (Holding Patterns, OCL and Instrument Approach Procedures)

3. DIFFERENCES FROM ICAO STANDARDS AND RECOMMENDED PRACTICES

See AIP section DIF.

4. TYPES OF CHARTS AVAILABLE

Sectional and VFR Terminal Area Charts
World Aeronautical Charts (U.S.)
En route Low Altitude Charts
En route High Altitude Charts
Alaska En route Charts (Low and High)
Planning Charts
Terminal Procedures Publication (TPP)
Alaska Terminal Publication
Helicopter Route Charts

5. GENERAL DESCRIPTION OF EACH SERIES

5.1 Sectional and VFR Terminal Area Charts

These charts are designed for visual navigation of slow and medium speed aircraft. They are produced to the following scales:

Sectional Charts—1:500,000 (1 in=6.86 NM)
VFR Terminal Area Charts—1:250,000 (1 in=3.43 NM)

Topographic information features the portrayal of relief and a judicious selection of visual check points for VFR flight (Terminal Area Charts include populated places, drainage, roads, railroads, and other distinctive landmarks). Aeronautical information includes visual and radio aids to navigation, aerodromes, Class B, C, D, and E Airspace, restricted areas, obstructions and related data. The VFR Terminal Area Charts also depict the airspace designated as "Class B Airspace" which provides for the control or segregation of all aircraft within the Class B Airspace. The Puerto Rico-Virgin Islands Terminal Area Chart contains basically the same information as that shown on the Sectional and Terminal Area Chart. It includes the Gulf of Mexico and Caribbean Planning Chart on the reverse side (See PLANNING CHARTS). Charts are revised semi-annually except several Alaskan Sectionals and the Puerto Rico-Virgin Islands Terminal Area which are revised annually.

5.2 World Aeronautical Charts

These charts are designed to provide a standard series of aeronautical charts, covering land areas of the world, at a size and scale convenient for navigation by moderate speed aircraft. They are produced at a scale of 1:1,000,000 (1 in=13.7 NM). Topographic information includes cities and towns, principal roads, railroads, distinctive landmarks, drainage and relief. The latter is shown by spot elevations, contours, and gradient tints. Aeronautical information includes visual and radio aids to navigation, aerodromes, airways, restricted areas, obstructions and other pertinent data. These charts are revised annually except several Alaskan charts and the Mexican/Caribbean charts, which are revised every two years.

5.3 En route Low Altitude Charts

These charts are designed to provide aeronautical information for en route navigation under Instrument Flight Rules (IFR) in the low altitude stratum. This series includes en route Area Charts which furnish terminal data at a large scale in congested areas, and is included with the subscription to the series. Information includes the portrayal of L/MF and VHF airways; limits of Class B, C, D, and E Airspace; position, identification and frequencies of radio aids; selected aerodromes; minimum en route and obstruction clearance altitudes; airway distances; reporting points; special use airspace areas; Military Training Routes and related information. Charts are printed back to back. Charts are revised every 56 days effective with the date of airspace changes. An En route Change Notice may be issued as required.

5.4 En route High Altitude Charts

These charts are designed to provide aeronautical information for en route navigation under Instrument Flight Rules (IFR) in the high altitude stratum. Information includes the portrayal of jet routes; position, identification and frequencies of radio aids; selected aerodromes; distances; time zones; special use airspace areas and related information. Charts are revised every 56 days effective with the date of airspace changes. An En route Change Notice may be issued as required.

5.5 Alaska En route Charts (Low and High)

These charts are produced in a low altitude and high altitude series with purpose and makeup identical to Low and High altitude charts described above. Charts are revised every 56 days effective with the date of airspace changes. An En route Change Notice may be issued as required.

5.6 Charted VFR Flyway Planning Chart

These charts are designed to identify flight paths clear of the major controlled traffic flows. The program is intended to provide charts showing multiple VFR routings through high density traffic areas which may be used as an alternative to flight within Class B Airspace. Ground references are provided as guides for improved visual navigation. These charts are not intended to discourage VFR operations within the Class B Airspace, but are designed for information and planning purposes. They are produced at a scale of 1:250,000 (1 in = 3.43 NM). These charts are revised semi-annually and are published on the back of the existing VFR Terminal Area Charts.

5.7 Planning Charts

5.7.1 *VFR/IFR Planning Chart*

These charts are designed to fulfill the requirements of preflight planning for flights under Visual or Instrument Flight Rules (VFR/IFR). They are produced at a scale of 1:2,333,232 (1 in=32 NM). The chart is printed in two parts in such a manner that, when assembled, it forms a composite VFR Planning Chart on one side and IFR Planning Chart on the other. Information on the IFR chart depicts low altitude airways and mileages, navigational facilities, special use airspace areas, time zones, airports, isogonic lines, and related data. Information on the VFR chart includes selected populated places, large bodies of water, major drainage, shaded relief, navigational facilities, airports, special use airspace areas, Military Training Routes and related data.

5.7.2 *Flight Case Planning Chart*

This chart is designed for preflight and en route flight planning for VFR flights. It is produced at a scale of 1:4,374,803 (1 in=60 NM). This chart contains basically the same information as the VFR/IFR Planning Chart with the addition of selected FSS and Weather Service Offices located at airport sites, parachute jumping areas, a tabulation of special use airspace areas, a mileage table listing distances between 174 major airports and a city/aerodrome location index.

5.7.3 *Gulf of Mexico and Caribbean Planning Chart*

This chart is designed for preflight planning for VFR flights. It is produced at a scale of 1:6,270,551 (1 in=86 NM). This chart is on the reverse of the Puerto Rico-Virgin Islands Terminal Area Chart. Information includes mileage between Airports of Entry, a selection of special use airspace areas and a Directory of Aerodromes with their available facilities and servicing.

5.7.4 *North Atlantic Route Chart*

This five-color chart is designed for use of Air Traffic Controllers in monitoring transatlantic flights and for FAA planners. Oceanic controlled airspace, coastal navigation aids, major coastal airports, and oceanic reporting points are depicted. Geographic coordinates for NAVIDS and reporting points are included. The chart may be used for preflight and in-flight planning. This chart is revised each 24 weeks. Chart available in two sizes, scale: full size 1:5,500,000, 58 by 41 inches/half size 1:11,000,000, 29 by 20 1/2 inches.

5.7.5 *North Pacific Oceanic Route Chart*

This chart series, like the North Atlantic Route Chart series, is designed for FAA Air Traffic Controllers' use in monitoring transoceanic air traffic. Charts are available in two scales: 1:12,000,000 composite small scale planning chart, which covers the entire North Pacific and four 1:7,000,000 Area Charts. They are revised every 24 weeks. The charts are available unfoled, flat only and contain esrtablished intercontinental air routes including all reporting points with geographic positions.

5.8 Terminal Procedures Publication (TPP)

This publication contains charts depicting Instrument Approach Procedures (IAP), Standard Terminal Arrivals (STAR), and Standard Instrument Departures (SID).

5.8.1 *Instrument Approach Procedure (IAP) Charts*

IAP charts portray the aeronautical data which is required to execute instrument approaches to airports. Each chart depicts the IAP, all related navigation data, communications information, and an airport sketch. Each procedure is designated for use with a specific electronic navigational aid, such as ILS, VOR, NDB, RNAV, etc. Airport Diagram Charts, where published, are included.

5.8.2 *Standard Instrument Departure (SID) Charts*

These charts are designed to expedite clearance delivery and to facilitate transition between takeoff and en route operations. They furnish pilots departure routing clearance information in graphic and textual form.

5.8.3 *Standard Terminal Arrival (STAR) Charts*

These charts are designed to expedite ATC arrival procedures and to facilitate transition between en route and instrument approach operations. They present to the pilot preplanned IFR ATC arrival procedures in graphic and textual form. Each STAR procedure is presented as a separate chart and may serve a single airport or more than one airport in a given geographic location.

These charts are published in 16 bound volumes covering the conterminous U.S. and the Puerto Rico-Virgin Islands. Each volume is superseded by a new volume each 56 days. Changes to procedures occurring between the 56-day publication cycle is reflected in a Change Notice volume, issued on the 28-day midcycle. These changes are in the form of a new chart. The publication of a new 56-day volume incorporates all the changes and replaces the preceding volume and the change notice. The volumes are 5⅜ x 8¼ inches and are bound on the top edge.

5.9 Alaska Terminal Publication

This publication contains charts depicting all terminal flight procedures in the State of Alaska for civil and military aviation. They are:

- Instrument Approach Procedure (IAP) Charts.
- Standard Instrument Departure (SID) Charts
- Standard Terminal Arrival Route (STAR) Charts
- Airport Diagram Charts
- Radar Minimums

All supplementary supporting data, i.e.; IFR Takeoff and Departure Procedures, IFR Alternate Minimums, Rate of Descent Table, Inoperative Components Table, etc., is also included.

The Alaska Terminal is published in a bound book 5¼'' x 8¼''. The publication is issued every 56 days with provisions for an as required "Terminal Change" on the 28 day midpoint.

5.10 Helicopter Route Charts

5.10.1 Prepared under the auspices of the FAA Helicopter Route Chart Program, these charts enhance helicopter operator access into, egress from, and operations within selected high density traffic areas. The scale is 1:125,000; however, some include smaller scale insets. Graphic information includes urban tint, principal roads, pictorial symbols, and spot elevations. Aeronautical information includes routes, operating zones, altitudes or flight ceilings/bases, heliports, helipads, NAVAID's, special use airspace, selected obstacles, ATC and traffic advisory radio communications frequencies, Class B surface area tint, and other important flight aids. These charts are revised when significant aeronautical information changes and/or safety related events occur. Historically, new editions are published about every 2 years. See the "Dates of Latest Editions" for current editions.

5.10.2 Air traffic facility managers are responsible for determining the need for new chart development or existing chart revision. Therefore, requests for new charts or revisions to existing charts should be directed to these managers. Guidance pertinent to mandatory chart features and managerial evaluation of requests is contained in FAA Order 7210.3, Facility Operation and Administration.

6. RELATED PUBLICATIONS

6.1 The Airport Facility Directory

This directory is issued in seven volumes with each volume covering a specific geographic area of the conterminous U.S., including Puerto Rico and the U.S. Virgin Islands. The directory is 5⅜ x 8¼ inches and is bound on the side. Each volume is reissued in its entirety each 56 days. Each volume is indexed alphabetically by state, airport, navigational aid, and ATC facility for the area of coverage. All pertinent information concerning each entry is included.

6.2 Alaska Supplement

This supplement is a joint Civil/Military Flight Information Publication (FLIP), published and distributed every 56 days by the National Ocean Service. It is designed for use with the Flight Information Publication En route Charts, Alaska Terminal, WAC and Sectional Aeronautical Charts. This Supplement contains an Aerodrome/Facility Directory of all aerodromes shown on En route Charts, and those requested by appropriate agencies, communications data, navigational facilities, special notices and procedures applicable to the area of chart coverage.

6.3 Pacific Supplement

This Chart Supplement is a Civil Flight Information Publication, published and distributed every 56 days by the National Ocean Service. It is designed for use with the Flight Information En route Publication Charts and the Sectional Aeronautical Chart covering the State of Hawaii and that area of the Pacific served by U.S. facilities. An Amendment Notice is published 4 weeks after each issue of the Supplement. This chart Supplement contains an Aerodrome/Facility Directory of all aerodromes open to the public, and those requested by appropriate agencies, communications data, navigational facilites, special notices and procedures applicable to the Pacific area.

6.4 Digital Aeronautical Chart Supplement (DACS)

DACS is a subset of the data NOAA provides to FAA controllers every 56 days. The DACS is designed to assist with flight planning and should not be considered a subsitute for a chart. The supplement is divided into nine individual sections. They are

- Section 1: High Altitude Airways—Conterminous U.S.
- Section 2: Low Altitude Airways—Conterminous U.S.
- Section 3: Selected Instrument Approach Procedure NAVAID and FIX Data
- Section 4: Military Training Routes
- Section 5: Alaska, Hawaii, Puerto Rico, Bahama and Selected Oceanic Routes
- Section 6: STAR's-Standard Terminal Arrivals and Profile Descent Procedures
- Section 7: SID's-Standard Instrument Departures
- Section 8: Preferred IFR Routes (Low and High Altitudes)
- Section 9: Air Route and Airport Surveillance Radar Facilities (updated yearly)
- Section 3 has a Change Notice that will be issued at the mid-28 day point. Contains changes that occured after the 56 day publication. Sections 8 and 9 are not digital products, but contain pertinent air route data associated with the other sections.

6.5 NOAA Aeronautical Chart User's Guide

This guide is designed to be used as a teaching aid, reference document, and an introduction to the wealth of information provided on NOAA's aeronautical charts and publications. The guide includes the complete contents of the VFR Chart User's Guide, and a new discussion of IFR chart terms and symbols. This guide also includes a comprehensive index of symbols used on NOAA's VFR, IFR, and Planning charts.

6.6 Defense Mapping Agency Aerospace Center (DMAAC) Publications

Defense Mapping Agency Aeronautical Charts and Products are available prepaid from:

DIRECTOR
DMA Combat Support Center
Attention: PMSR
Washington, DC 20315-0010
Phone: CONUS Toll free telephone number 1-800-826-0342

Pilotage Charts (PC/TPC)—Sacle 1:500,000 used for detail preflight planning and mission analysis. Emphasis in design is on ground features significant in visual and radar, low-level high speed navigation.

Jet Navigation Charts (JNC-A)—Scale 1:3,000,000. Designed to provide greater coverage than the 1:2,000,000 scale Jet Navigation Charts described below. Uses include preflight planning and en route navigation by long range jet aircraft with dead reckoning, radar, celestial and grid navigation capabilities.

LORAN Navigation & Consol LORAN Navigation Charts (LJC/CJC)—Scale 1:2,000,000. Used for preflight planning and inflight navigation on long- range flights in the Polar areas and adjacent regions utilizing LORAN and CONSOL navigation aids.

Continental Entry Chart (CEC)—Scale 1:2,000,000. Used for CONSOLAN and LORAN navigation for entry into the United States when a high degree of accuracy is required to comply

with Air Defense identification and reporting procedures. Also suitable as a basic dead reckoning sheet and for celestial navigation.

Aerospace Planning Chart (ASC)—Scales 1:9,000,000 and 1:18,000,000. Six charts at each scale and with various projections cover the world. Charts are useful for general planning, briefings and studies.

Air Distance/Geography Chart (GH-2, 2a)—Scales 1:25,000,000 and 1:50,000,000. This chart shows great circle distances between major airports. It also shows major cities, international boundaries, shaded relief and gradient tints.

LORAN C Navigation Chart (LCC)—Scale 1:3,000,000. Primarily designed for preflight and in-flight long-range navigation where LORAN C is used as the basic navigation aid.

DOD Weather Plotting Chart (WPC)—Various scales. Designed as nonnavigational outline charts which depict locations and identifications of meteorological observing stations. Primarily used to forecast and monitor weather and atmospheric conditions throughout the world.

Flight Information Publications (FLIP)—These include Enroute Low Altitude and High Altitude Charts, Enroute Supplements, Terminal (Instrument Approach) Charts, and other information publications for various areas of the world.

"Note: FLIP. Terminal publications do not necessarily include all instrument approach procedures for all airports. They include only those required for military operations."

World Aeronautical (WAC) and Operational Navigation Charts (ONC)—The Operational Navigation Charts (ONC) have the same purpose and contain essentially the same information as the WAC series except the terrain is portrayed by shaded relief as well as contours. The ONC series is replacing the WAC series and the WAC's will be available only where the ONC's have not been issued. ONC's are 42 x 57½ inches, WAC's are 22 x 30 inches. These charts are revised on a regular schedule.

Jet Navigation Charts—These charts are designed to provide charts suitable for long range, high altitude, high speed navigation. They are produced at a scale of 1:2,000,000 (1 in=27.4 NM). Topographic features include large cities, roads, railroads, drainage, and relief. The latter is indicated by contours, spot elevations, and gradient tints. All aeronautical information necessary to conform to the purpose of the chart is shown. This includes restricted areas, L/MF and VOR ranges, radiobeacons, and a selection of standard broadcasting stations and aerodromes. The runway patterns of the aerodromes are shown to exaggerated scale in order that they may be readily identified as visual landmarks. Universal Jet Navigation Charts are used as plotting charts in training and practice of celestial and dead reckoning navigation. They may also be used for grid navigational training.

Global Navigational Charts—These charts are designed to provide charts suitable for aeronautical planning, operations over long distances, and en route navigation in long range, high altitude, high speed aircraft. They are produced at a scale of 1:5,000,000 (1 in=68.58 NM). Global Navigation Charts (GNC) are 42 by 57½ inches. They show principal cities, towns and drainage, primary roads and railroads, prominent culture and shadient relief augmented with tints and spot elevations. Aeronautical data includes radio aids to navigation, aerodrome and restricted areas. Charts 1 and 26 have a polar navigation grid and charts 2 and 6 have sub-polar navigation grids. Global LORAN Navigation Charts (GLC) are the same size and scale and cover the same area as the GNC charts. They contain major cities only, coast lines, major lakes and rivers, and land tint. No relief or vegetation. Aeronautical Data includes radio aids to navigation and LORAN lines of position.

7. AUXILIARY CHARTS

7.1 *Airport Obstruction Charts (OC):*

The Airport Obstruction Chart is a 1:12,000 scale graphic depicting Federal Aviation Regulations Part 77 (FAR—77) surfaces, a representation of objects that penetrate these surfaces, aircraft movement and apron areas, navigational aids, prominent airport buildings, and a selection of roads and other planimetric detail in the airport vicinity. Also included are tabulations of runway and other operational data.

7.2 *Military Training Routes:*

Charts and Booklet: The Defense Mapping Agency Aerospace Center (DMAAC) publishes a narrative description in booklet form and charts depicting the Military Training Routes.

The charts and booklet are published every 8 weeks. Both the charts and narrative route description booklet are available to the general public as a brochure by single copy or annual subscription. Subscription and single-copy requests should be for the "DOD Area Planning AP/1B, Military Training Routes". (See RAC-5;7.5 - MILITARY TRAINING ROUTES (MTR).)

Note: The Department of Defense provides these booklets and charts to each Flight Service Station for use in preflight pilot briefings. Pilots should review this information to acquaint themselves with those routes that are located along their route of flight and in the vicintiy of the airports from which they operate.

ANNEX 2 — RULES OF THE AIR

ICAO REF:	
Chapter 1	Definitions
Surface Area	The airspace contained by the lateral boundry of the Class B, C, D or E airspace designated for an airport that begins at the surface and extends upward..
Danger Area	The term **Danger Area** is not used within the U.S. or any of its possessions or territories.
Estimated Off-Block Time	The U.S. uses the term **Estimated Departure Time** for domestic operations.
Expected Approach Time	The U.S. uses the term **Expect Further Clearance** the time a pilot can expect to receive clearance beyond a clearance limit.
Instrument Meteorological Conditions	The U.S. air traffic service units use the phrase **IFR Conditions.**
Repetitive Flight Plan (RPL)	The U.S. uses the term **Stored Flight Flan** for domestic operations.
Total Estimated Elapsed Time	The U.S. uses the term **Estimated Time En Route** for domestic operations.
Visual Meteorological Conditions	U.S. air traffic service units use the phrase **VFR Conditions.**
Chapter 2	Applicability Of The Rules Of The Air
2.5	Except in an emergency, no pilot of a civil aircraft may allow a person who appears to be intoxicated or who demonstrates by manner or physical indications that the individual is under the influence of drugs (except a medical patient under proper care), to be carried in that aircraft.
Chapter 3	General Rules
3.1.1	**In addition,** aircraft operations other than for the purpose of air navigation. No person may operate an aircraft other than for the purpose of air navigation, on any part of the surface of an airport used by aircraft for air commerce (including areas used by those aircraft for receiving or discharging persons or cargo), in a careless or reckless manner as to endanger the life or property of another.
3.2.1.2	**In addition,** aircraft shall not be flown in formation flights when passengers are carried for hire.

ICAO REF:	
3.2.3.2 (d)	All aircraft on the movement area of an aerodrome whose engines are running shall display lights which indicate that fact from sunrise to sunset.
3.2.5	Unless otherwise authorized or required by ATC, no person may operate an aircraft within a Class B, C or D surface area except for the purpose of landing at, or taking off, from an airport within that area **In addition,** in the case of a helicopter approaching to land, avoid the flow of fixed-wing aircraft. **In addition,** no person may, within a Class B, C or D surface area operate an aircraft to, from, or on an airport having a control tower operated by the United States unless two-way radio communications are maintained between that aircraft and the control tower.
3.3.1.2.1 (d)	Requirements pertaining to filing flight plans for flights operating across United States borders and for identification purposes are described in FAR 91 and Part 99 of the Federal Aviation Regulation.
3.3.1.2.2	The United States requires that domestic flight plans be submitted at least thirty minutes before departure. For international flights, the United States recommends that they be transmitted so that they are received by ATC authorities in each FIR to be entered, at least two hours prior to entry, unless otherwise provided in that State's requirements.
3.6.2.4	When meteorological conditions fall below the minimum specified for enroute VFR flights, the pilot of the aircraft shall not continue his flight in such conditions, except in emergency, beyond the extent necessary to return to his departure point or to the nearest suitable landing point.

ICAO REF:

Chapter 4 Visual Flight Rules

4.1 (a) Except as otherwise authorized by the appropriate air traffic control unit for special VFR flights within Class B, C, D or E surface areas, no person may operate an aircraft under VFR when the flight visibility is less, or at a distance from clouds that is less than that prescribed for the corresponding altitude and class of airspace in the following table:

BASIC VFR WEATHER MINIMUMS

Airspace	Flight Visibility	Distance from Clouds
Class A	Not Applicable	Not Applicable
Class B	3 statue miles	Clear of Clouds
Class C	3 statue miles	500 feet below 1,000 feet above 2,000 feet horizontal
Class D	3 statue miles	500 feet below 1,000 feet above 2,000 feet horizontal
Class E.		
Less than 10,000 feet MSL	3 statute miles	500 feet below 1,000 feet above 2,000 feet horizontal
At or above 10,000 feet MSL	5 statue miles	1,000 feet below 1,000 feet above 1 statute mile horizontal
Class G.		
1,200 feet or less above the surface (regardless of MSL altitude)..		
Day, except as provided in section 91.155(b)..	1 statute mile	Clear of clouds
Night, except as provided in section 91.155(b)..	3 statute miles	500 feet below 1,000 feet above 2,000 feet horizontal
More than 1,200 feet above the surface but less than 10,000 feet MSL..		
Day	1 statute mile	500 feet below 1,000 feet above 2,000 feet horizontal
Night	3 statute mile	500 feet below 1,000 feet above 2,000 feet horizontal
More than 1,200 feet above the surface and at or above 10,000 feet MSL..	5 statute miles	1000 feet below 1,000 feet above 1 statute mile horizontal

ICAO REF:

4.1 (b) **Class G Airspace:** Notwithstanding the provisions of paragraph (a) of this section, the following operations may be conducted in class G airspace below 1,200 feet above the surface:

(1) **Helicopter.** A helicopter may be operated clear of clouds if operated at a speed that allows the pilot adequate opportunity to see any air traffic or obstruction in time to avoid collision.

ICAO REF:

(2) **Airplane.** When the visibility is less than 3 statute miles but not less than 1 statue mile during night hours, an airplane may be operated clear of clouds if operated in an airport traffic pattern within one-half mile of the runway.

4.1 (c) Except as provided in 4.2, no person may operate an aircraft under VFR within the later boundaries of the surface areas of Class B, Class C, Class D, or Class E airspace designated for an airport when the ceiling is less than 1,000 feet.

4.1 (d) Except as provided in 4.2, no person may take off or land an aircraft, or enter the traffic pattern area of an airport under VFR, within the lateral boundaries of the surface area of Class B, Class C, Class D, or Class E airspace designed for an airport -

(1) unless ground visibility at that airport is at least 3 statue miles; or

(2) if ground visibility is not reported at that airport, unless flight visibility during landing or takeoff, or while operating in the traffic pattern is at least 3 statue miles.

4.2 (a) When an appropriate ATC clearance has been received, the special weather minimums in this section apply to the operation of an aircraft in a Class B, C, D or E surface area under VFR.

(1) No person may operate an aircraft in a Class B, C, D or E surface area under VFR except clear of clouds;

(2) No person may operate an aircraft (other than a helicopter) in a Class B, C, D or E surface area under VFR unless flight visibility is at least 1 statute mile;

(3) No person may take off or land an aircraft (other than a helicopter) at any airport in a Class B, C, D or E surface area under VFR -

(i) unless ground visibility at that airport is at least 1 statute mile; or

(ii) if ground visibility is not reported at that airport, unless flight visibility during landing or takeoff is at least 1 statute mile.

4.4 In the United States VFR flight is not permitted within Class A airspace designated in FAR Part 71 unless otherwise authorized by ATC.

4.5 **In addition:** anywhere, an altitude allowing, if a power unit fails, an emergency landing without due hazard to persons or property on the surface.

ICAO REF:

4.6 **In addition,** grid tracks are not used to determine cruising altitudes in polar areas. True tracks are used to determine cruising levels above FL 230 in the area north of Alaska bounded by the true North Pole to 72-00-00N, 141-00-00W to 72-00-00N, 158-00-00W to 68-00-00N, 168-58-23W to point of beginning. The United States has named this area the Anchorage Arctic CTA/FIR for national reference purposes.

Chapter 5 Instrument Flight Rules

5.2.2 See difference under paragraph 4.6

5.3.1 See difference under paragraph 4.6

Further differences which exist by virtue of the fact that the Annex contains no comparable standards for the undermentioned national regulations.

1.0 The regulations covering the selection and use of alternate airports in respect to ceiling and visibility minima, require that:

1.1 Unless otherwise authorized by the Administrator, no person may include an alternate airport in an IFR flight plan unless current weather forecasts indicate that, at the estimated time of arrival at the alternate airport, the ceiling and visibility at that airport will be at or above the alternate airport weather minima;

2.0 **Operation under IFR in Class A, B, C, D or E airspace; malfunction reports.**

2.1 The pilot in command of each aircraft operated in Class A, B, C, D or E airspace under IFR shall report as soon as practical to ATC any malfunctions of navigational, approach, or communication equipment occurring in flight;

2.2 In each report the pilot in command shall include:

(1) Aircraft Identification;

(2) Equipment affected;

(3) Degree to which the capability of the pilot to operate under IFR in the ATC system is impaired; and

(4) Nature and extent of assistance desired from ATC.

ICAO REF:

3.0 When an aircraft has been cleared to maintain "VFR conditions On Top", the pilot is responsible to fly at an appropriate VFR altitude, comply with VFR visibility and distance from cloud criteria, and to be vigilant so as to see and avoid other aircraft.

4.0 Aircraft Speed

4.1 Unless otherwise authorized by the Administrator, no person may operate an aircraft below 10,000 feet MSL at an indicated airspeed of more than 250 knots (288 m.p.h.).

4.2 Unless otherwise authorized or required by ATC, no person may operate an aircraft within Class B, C or D surface area at an indicated airspeed of more than 200 knots (230 m.p.h.). This paragraph (4.2) does not apply to operations within Class B airspace. Such operations shall comply with paragraph (4.1) of this section.

4.3 No person may operate an aircraft in the airspace underlying Class B airspace, or in a VFR corridor designated through Class B airspace, at an indicated airspeed of mole than 200 knots (230 m.p.h.).

4.4 If the minimum safe airspeed for any operation is greater than the maximum speed prescribed in this section, the aircraft may be operated at that minimum speed.

5.0 Operating Rules and pilot and equipment requirements for flight in Class B airspace.

5.1 Operating Rules. No person may operate an aircraft within Class B airspace except in compliance with the following rules:

(a) No person may operate an aircraft within Class B airspace unless that person has received an appropriate authorization from ATC prior to operation of that aircraft in that area;

(b) Unless otherwise authorized by ATC, each person operating a large turbine engine-powered airplane to or from a primary airport shall operate at or above the designated floors while within the lateral limits of the Class B airspace.

(c) Any person conducting pilot training operations at an airport within Class B airspace shall comply with any procedures established by ATC for such operations in Class B airspace.

ICAO REF:

5.2 Pilot Requirements. No person may take off or land a civil aircraft at an airport within Class B airspace or operate a civil aircraft within Class B airspace unless:

(a) The pilot in command holds at least a private pilot certificate; or

(b) the aircraft is operated by a student pilot who has met the requirements (FAR 61.95).

5.3 Communications and navigation requirements. Unless otherwise authorized by ATC, no person may operate an aircraft within Class B airspace unless that aircraft is equipped with -

(a) For **IFR** operations. An operable VOR or TACAN receiver, and

(b) For **all** operations. An operable two-way radio capable of communications with ATC on appropriate frequencies for that Class B airspace.

5.4 Transponder Requirements. No person may operate an aircraft in Class B airspace unless the aircraft is equipped with the applicable operating transponder and automatic altitude reporting equipment.

6.0 Operating Rules and pilot and equipment requirements for in Class C airspace.

6.1 General. For the purpose of this section, the primary airport is the airport designated in FAR Part 71, for which the Class C airspace is designated. A satellite airport is any other airport within the Class C airspace.

6.2 Deviations. An operator may deviate from any provisions of this section under the provisions of an ATC authorization issued by the ATC facility giving jurisdiction of the Class C airspace. ATC may authorize a deviation on a continuing basis or for an individual flight, as appropriate.

6.3 Arrivals and Overflights. No person may operate an aircraft in Class C airspace unless two-way radio communication is established with the ATC facility having jurisdiction over the Class C airspace prior to entering that area and is thereafter maintained with the ATC facility having jurisdiction over the Class C airspace while within that area.

6.4 Departures. No person may operate an aircraft within Class C airspace except as follows:

ICAO REF:

(a) From the primary airport or satellite airport with an operating control tower, unless two-way radio communications is established and maintained with the control tower, and thereafter as instructed by ATC while operating in the Class C airspace.

(b) From a satellite airport without an operating control tower, unless two way radio communication is established as soon as practical after departing and thereafter maintained with the ATC facility having jurisdiction over the Class C airspace.

6.5 Traffic patterns. No person may take off or land an aircraft at a satellite airport within Class C airspace except in compliance with FAA arrival and departure traffic patterns.

6.6 Equipment requirements. Unless otherwise authorized by the ATC facility having jurisdiction over the Class C airspace, no person may operate an aircraft within Class C airspace unless that aircraft is equipped with the applicable equipment specified in FAR Part 91.215.

7.0 Except for persons operating gliders below the floor of Class A airspace, no person may operate an aircraft in Class B, C, D or E airspace of the 48 contiguous States and the District of Columbia above 10,000 ft MSL, excluding that airspace at and below 2,500 feet AGL, unless that aircraft is equipped with an operable radar beacon transponder having at least a Mode 3/A 4096-code capability, replying to Mode 3/A interrogation with the code specified by ATC, and automatic altitude reporting equipment having a Mode C capability that automatically replies to Mode C interrogations by transmitting pressure altitude information in 100-foot increments.

8.0 Compliance with ATC clearances and instructions

(a) When an ATC clearance has been obtained, no pilot in command may deviate from that clearance, except in an emergency, unless an amended clearance is obtained. A pilot in command may cancel an IFR flight plan if that pilot is operating in VFR weather conditions outside of Class A airspace. If a pilot is uncertain of the meaning of an ATC clearance, the pilot shall immediately request clarification from ATC.

ICAO REF:

(b) Except in an emergency, no person may operate an aircraft contrary to an ATC instruction in an area in which air traffic control is exercised.

(c) Each pilot in command who, in an emergency, deviates from an ATC clearance or instruction shall notify ATC of that deviation as soon as possible.

(d) Each pilot in command who is given priority by ATC in an emergency, shall submit a detailed report of that emergency within 48 hours to the manager of that ATC facility, if requested by ATC.

ICAO REF:

(e) Unless otherwise authorized by ATC, no person operating an aircraft may operate that aircraft according to any clearance or instruction that has been issued to the pilot of another aircraft for radar air traffic control purposes.

Appendix 1

4.1.1 The flashing white signal to aircraft in flight, meaning "Land at this aerodrome and proceed to apron" is not used in the States.

In addition, the alternating red and green signal to aircraft on the ground or in flight means: Exercise extreme caution.

ANNEX 4 — AERONAUTICAL CHARTS

UNITED STATES

Chapter 1	Definitions
Air Taxiway	The U.S. does not depict defined surfaces for air taxiing of helicopters.
Danger Area	The term "Danger area" will not be used in reference to areas within the United States or in any of its possessions or territories.
FATO (Final Approach and Takeoff Area)	The U.S. does not depict Final Approach and Takeoff Areas (FATOs).
Helicopter Stand	The U.S. does not use this term.
Prohibited Area Restricted Area	The United States will employ the terms "Restricted area" and "Prohibited area" substantially in accordance with the definitions established and, additionally, will use the following terms: "Alert area" — Airspace which may contain a high volume of pilot training activities or an unusual type of aerial activity — neither of which is hazardous to aircraft. "Controlled firing area" — Airspace wherein activities are conducted under conditions so controlled as to eliminate the hazards to nonparticipating aircraft and to ensure the safety of persons and property on the ground. "Warning area" — Airspace which may contain hazards to nonparticipating aircraft in international airspace. "Maneuvering area" — This term is not used by the United States. "Military Operations Area (MOA)" — An MOA is an airspace assignment of defined vertical and lateral dimensions established outside Class A Airspace to separate/segregate certain military activities from IFR traffic and to identify for VFR traffic where these activities are conducted. "Movement area" — Movement area is defined by the United States as "The runways, taxiways, and other areas of an airport which are utilized for taxiing, take-off and landing of aircraft, exclusive of loading ramp and parking areas."
TLOF (Touchdown And Lift-off Area)	The U.S. does not use this term.

UNITED STATES—Continued

Chapter 2	
2.1	The title of charts produced by the United States are not those provided for in Annex 4
2.2.1	The marginal note layouts, in some cases, differ from those set forth in Appendices 1, 5 and 6.
2.4.1	Visibility distances are expressed in statute miles and fractions thereof.
2.4.4	Conversion scale (meters/feet) is not shown on Radio Navigation Charts.
Chapter 3	
3.1	The United States produces an Aerodrome Obstruction Chart which covers the basic requirements called for by Aerodrome Obstruction Chart — ICAO Type A.
Chapter 4	
4.1	The United States produces an Aerodrome Obstruction Chart which covers the basic requirements called for by Aerodrome Obstruction Chart — ICAO Type B.
Chapter 5	
5.8.1	The navigation grid on United States Aircraft Position Chart 3097 comprises lines parallel to 54° West Meridian and the navigation grid on United States Aircraft Position Chart 3096 comprises lines parallel to 92° West Meridian. These changes to the ICAO Standard were made to provide navigation grid lines vertical to a great circle projection base.
Chapter 6	
6.9.1.1	Only outbound magnetic bearings from VOR facilities and inbound magnetic bearings to low/medium frequency radio navigation facilities are shown.
Chapter 9	
9.3.1	Charts covering continental United States between latitudes 24° and 52° North are based on standard parallels at 33° and 45° and between latitudes 52° and 72° North on standard parallels at 55° and 65°.

UNITED STATES—Continued

9.4.1	The United States uses a sheet numbering system which differs from the index in Appendix 7.
9.8.3.2*	The elevation of the highest point on any sheet is not always cleared of hypsometric tinting.
9.10.1	Heliports are not shown.
Chapter 10	
10.8.3.2*	The elevation of the highest point on any sheet is not always cleared of hypsometric tinting.
Chapter 12	
12.2.1	Stopways are not indicated.
12.5.5.2.1	The datum (MSL) is stated in the Instrument Approach Chart legend, not on the chart.
12.6.2	Runway threshold elevations are not shown.
Chapter 13	
13.6.1.d Surface type for heliports.	The U.S. does not show "type of surface for heliports".
13.6.2 Elevated helidecks etc.	The U.S. does not show "surface level, elevated or helidecks".
Appendix 2	
No. 21	Tidal flats are shown in brown stipple over the blue open water tint.
No. 45	Rocks awash are shown by a six-armed symbol as adopted by the International Hydrographic Bureau.
No. 54, 61	Spaces between sides of bridge and road or railroad symbols are filled solid.
No. 70	Oil or gas fields are shown with an oil well derrick symbol.
No. 77	Ruins are shown by a solid square, properly annotated.

UNITED STATES—Continued

No. 94	The runway surface indicator (letter H) and the lighting indicator (letter L) are not normally used on high altitude Radio Navigation Charts. Only those aerodromes with a minimum of 5,000 feet hard-surfaced runways are shown. The letter H is not used on low altitude Radio Navigation Charts. All aerodromes depicted have hard-surfaced runways, excepting that where the letter "S" follows the runway length, the runway surface is soft. On Visual Navigation Charts of the 1:500 000 scale, a miniature runway layout depiction indicates aerodromes with hard-surfaced runways at least 1,500 feet long.
No. 110	Aerodrome traffic zones are termed "SURFACE AREAS" in United States usage. These are all of standard dimensions. Limits are not shown, but aerodromes at which SURFACE AREAS have been established are indicated by a colour coded aerodrome symbol.
No. 113	Limits of advisory areas are shown on Radio Navigation Charts with a crenellated line. This depiction is indicated in the legend as the border of an Air Route Traffic Control Center (ARTCC).
No. 116	The nomenclature "non compulsory" is used instead of "on request" for appropriate position reporting points.
No. 127	Isogonic lines are shown on Radio Navigation Charts only as short sections of continuous lines extending inward from the neat lines.

*Recommended Practice.

ANNEX 11 — AIR TRAFFIC SERVICES

ICAO REF:	
Chapter 2	
2.6	The term Class F airspace is not used in the designation of U.S. Airspace.
2.9 2.11 Appendix 1 Appendix 2	Converting the present United States system for identifying ATS routes and significant points to conform to the provisions of amended paragraphs 2.9 — 2.9.2, 2.11 — 2.11.3, Appendix 1 and Appendix 2 is an effort of considerable magnitude and complexity. The United States has an ongoing program to accomplish the conversion but it is estimated that a period of two to five years will be required for full compliance. (It should be noted that the term "Class B airspace" as used in the U.S. is more restrictive than that specified by ICAO. Flights within Class B Airspace in the U.S. must be operated in accord with the provisions of U.S. FAR 91.90.)
Chapter 3	
3.3.3 Exception Clause	Clearances may be issued to conduct flight in VFR conditions without a pilot request if the clearance would result in noise abatement benefits or when a pilot conducts a practice instrument approach.

ICAO REF:	
Chapter 4	
4.2.2(b),	No provision is made for the issuance of collision hazard information to flights operating in Class G airspace.
4.3.4.4(h) 4.3.4.8	The U.S. requires that the current altimeter setting be included in the ATIS broadcast. Information contained in a current ATIS broadcast, the receipt of which has been acknowledge by an aircraft, is not included in a directed transmission to the aircraft unless requested by the pilot.
4.3.5 4.3.6 4.3.7 Appendix 1	The order in which information is listed in ATIS broadcast messages is not mandated and certain elements are regarded as optional.
2.2.1	Routes designated to serve aircraft operating from 18,000 MSL up to and including FL450 are referred to as "Jet Routes" and are designated with the letter "J" followed by a number of up to three digits.

ANNEX 15 — AERONAUTICAL INFORMATION SERVICES

Chapter 2

Danger Area — The term "Danger Area" will not be used in reference to areas within the United States or in any of its possessions or territories.

Prohibited Area / Restricted Area — The term "Restricted Area" and "Prohibited Area" will be employed substantially in accordance with the definitions established and, additionally, the following terms will be used:

Alert Area — Airspace which may contain a high volume of pilot training activities or an unusual type of aerial activity, neither of which is hazardous to aircraft. Alert Areas are depicted on aeronautical charts for the information of nonparticipating pilots. All activities within an Alert Area are conducted in accordance with Federal Aviation Regulations, and pilots of participating aircraft as well as pilots transiting the area are equally responsible for collision avoidance.

Controlled Firing Area — Airspace wherein activities are conducted under conditions so controlled as to eliminate hazards to nonparticipating aircraft and to ensure the safety of persons and property on the ground.

Warning Area — Airspace which may contain hazards to nonparticipating aircraft in international airspace.

Maneuvering Area — This term is not used by the United States.

Military Operations Area (MOA) — An MOA is an airspace assignment of defined vertical and lateral dimensions established outside Class A Airspace to separate/segregate certain military activities from IFR traffic and to identify for VFR traffic where these activities are conducted.

Movement Area — The runways, taxiways, and other areas of an airport/heliport which are utilized for taxiing/hover taxiing, air taxiing, takeoff, and landing of aircraft, exclusive of loading ramps and parking areas. At those airports/heliports with a tower, specific approval for entry onto the movement area must be obtained from ATC.

Chapter 4

4.2.8.2 — The U.S. does not issue AIP Supplements. Corrections or changes from the latest amendments to the AIP are carried as NOTAMS.

Remarks — Aeronautical Information Publication (AIP).

4.5 — The U.S. does not issue an AIP Supplement.

Chapter 5

5.1.1.2 — The U.S. does not routinely issue "trigger NOTAMS" referencing published material, when an AIP amendment or supplement is issued.

5.2.1 — The current U.S. system numbers international NOTAMS consecutively by the location in the A) field. The U.S. routinely issues over 70,000 out-going international NOTAMS each year. Only one series, "A" is used for international distribution.

This precludes numbering the NOTAMS by the originator.

Remarks — AIP GEN-1.6.2.2

5.2.3 — The U.S. periodically issues multi-part NOTAMS which are transmitted as multiple telecommunication messages. The nature of the NOTAM material is such that it will not always fit in one message.

5.2.8.1 — The monthly check-list of NOTAMs does not specifically reference printed publications, such as AIP Amendments.

5.2.8.3 — A monthly printed plain language summary of NOTAMs in force is not issued. The International NOTAM publication, issued bi weekly, is not inclusive of all U.S. international NOTAMs

5.3.2 — The U.S. does not use the System NOTAM format at this time. The format used is based on the previous ICAO Class I format. See notes on Appendix 5 for details.

Chapter 8

8.1.2.1.f — NOTAMs relating to bird hazards are relayed as local NOTAM information and are not disseminated internationally. The information is available from the local Flight Service Station during preflight briefing.

Remarks — Notices to Airmen (NOTAM's) Handbook 7930.2.

Appendix 2

SNOWTAM Format — The U.S. does not use the SNOWTAM for issuance of winter weather information. Snow conditions are reported using our current international NOTAM format (Class I).

Appendix 5

NOTAM Format	The U.S. is not prepared to transition to the System NOTAM format. NOTAMs are processed in the previous ICAO Class I format
1.2 General	Multiple conditions, for a single location, may be reported in a NOTAM.
2 NOTAM numbering	The U.S. numbers NOTAMs consecutively by location, not by country of origin. Due to the volume of international NOTAMs generated by the U.S., the current U.S. numbering scheme is expected to continue.
3 Qualifiers	The current software will not accept the Item Q qualifiers line.
5 Item B	Item B is currently issued as an eight digit date/time group
	The U.S. also uses the initials "WIE" (With Immediate Effect) for NOTAMs that take effect immediately upon issuance.
	The U.S. does not include an Item B in NOTAMCs. The assumption is that all cancellations take effect immediately when issued. While this time could be added to NOTAMCs, the U.S. position is that this is unnecessary.
6 Item C	Item C, like item B, is currently issued as an eight digit date/time group
	The U.S. also uses the initials "UFN" (Until Further Notice) for NOTAMs that have an uncertain duration.
8 Item E	U.S. NOTAMs do not contain Item E information for NOTAMCs.
Remarks	Item E contains the NOTAM Code (Q-code) in addition to plain language and ICAO abbreviations.