*BY ORDER OF THE*
*SECRETARY OF THE AIR FORCE*

*AIR FORCE MANUAL 11-217, VOLUME 2*

*22 OCTOBER 2010*

*Flying Operations*

# *VISUAL FLIGHT PROCEDURES*

**COMPLIANCE WITH THIS PUBLICATION IS MANDATORY**

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This instruction implements AFPD 11-2, *Flight Rules and Procedures*, by providing guidance and procedures for standard Air Force flying under visual flight rules (VFR). Since aircraft flight instrumentation and mission objectives are so varied, this instruction is necessarily general regarding equipment and detailed accomplishment of maneuvers. Individual aircraft flight manuals, AFI 11-2*MDS* series publications, and AFTTP 3-3.*XX* series publications should provide detailed instructions required for particular aircraft instrumentation or characteristics. This manual provides both technique and procedures. ***Text in bold italic is procedure***. This manual, when used with related flight directives and publications, provides the best possible operating instructions under most circumstances, but it is not a substitute for sound judgment. Extreme situations may require the pilot to modify procedures for safety or high-priority mission accomplishment. While pilots are ultimately responsible for the proper conduct of flight, all aircrew must be knowledgeable of and comply with the guidance contained in this manual. When crew positions other than the pilot utilize this guidance, they do so as a subset of the pilot's overarching responsibility to ensure all tasks are accomplished in accordance with (IAW) this manual or, where authorized by the pilot in command, in a modified manner. This publication applies to the Air Force Reserve and the Air National Guard (ANG) when published in the ANGIND 2.

**NOTE:** This manual is designed to complement AFI 11-202, Volume 3 *General Flight Rules*. While AFI 11-202V3 instructs WHAT to do, AFMAN 11-217 instructs HOW to do it. In case of conflict between this manual and AFI 11-202V3, AFI 11-202V3 takes precedence.

**WAIVERS:** In general, waivers are not granted to AFMAN 11-217V2 as this manual describes procedures and techniques for complying with rules in AFI 11-202V3. Waivers are more appropriately granted to the rules in AFI 11-202V3. Waivers granted to AFI 11-202V3, also apply to corresponding applicable sections of AFMAN 11-217. A separate waiver is not required. If a MAJCOM desires a waiver to a bold italic procedure in AFMAN 11-217V2 that is not addressed in AFI 11-202V3, comply with the Waiver and Exemption guidance in AFI 11-202V3.

**NOTE:** The Aeronautical Information Manual (AIM) published by the Federal Aviation Administration (FAA) is not regulatory. However, it provides information that reflects examples of operating techniques and procedures that may be requirements in other regulations. The AIM is not binding on USAF pilots. Furthermore, it contains some techniques and procedures not consistent with USAF mission requirements, regulatory guidance, waivers, exemptions, and accepted techniques and procedures. However, the AIM is the accepted standard in the civil aviation community and reflects general techniques and procedures used by other pilots. Much information contained in this AFMAN is reproduced from AIM and adapted for USAF use. ***If a particular subject is not covered in this AFMAN, FLIP or other USAF regulations, follow guidance in the AIM (or appropriate host nation publication) unless mission requirements dictate otherwise***.

***SUMMARY OF CHANGES***

**This is a new publication and must be completely reviewed.** The former AFMAN 11-217V2 dated 6 August 1998, has been renamed AFMAN 11-217 Volume 3, *Supplemental Information.*

# Chapter 1

# BASIC VISUAL FLIGHT PROCEDURES

## 1.1. Applicability of AFI 11-202V3 to VFR Flight.

1.1.1. USAF flight operations are conducted under Instrument Flight Rules (IFR) to the maximum extent possible. However, there are many missions that require pilots to operate under Visual Flight Rules (VFR) including many OCONUS and most USAF rotary wing operations. AFI 11-202V3 details procedures for all flights, to include: preflight weather briefing requirements, fuel logs, checking Notices to Airmen (NOTAM), flight manual requirements, performance computations, and departure, enroute and arrival planning. Flight under VFR does not relieve the pilot of the responsibility to comply with requirements in AFI 11-202V3.

1.1.2. Definitions. The following definitions will aid in understanding VFR flight.

1.1.2.1. Visual Flight Rules (VFR). These are the rules that govern flight using visual references. The term "VFR" is also used in the United States to indicate weather conditions that are equal to or greater than minimum VFR requirements. In addition, it is used by pilots and controllers to indicate the type of flight plan. To conduct flight under VFR the weather must be equal to or better than the minimums specified in Table 7.1 of AFI 11-202V3.

1.1.2.2. Visual Meteorological Conditions (VMC). This is the description of flight conditions when flying in the clear. It includes flight on top of the clouds, under the clouds, or between cloud layers. These flight conditions are expressed in terms of visibility, distance from clouds, and ceiling equal to or better than specified minima.

1.1.2.3. Instrument Flight Rules (IFR). These are the rules that govern flight with reference to instruments. Also, a term used by pilots and controllers to indicate the type of flight plan.

1.1.2.4. Instrument Meteorological Conditions (IMC). This is the description of flight conditions when flying in the clouds. It does not include flight on top of the clouds, under the clouds, or between cloud layers. These flight conditions are expressed in terms of visibility, distance from cloud, and ceiling less than the minima specified for VMC.

1.1.2.5. VFR-on-top and VFR-over-the-top. VFR-on-top is ATC authorization for an aircraft on an IFR clearance to operate at VFR altitudes of their choice in VMC. VFR-over-the-top is an aircraft on a VFR flight plan that departs and climbs over the clouds in VMC, maintains VMC above the clouds, then descends in VMC and lands.

1.1.2.6. Special VFR (SVFR). (Ref. AIM Section 4) A set of modified visual flight rules that allow civil aircraft and USAF helicopters to enter, depart or operate in Class B/C/D/E airspace when weather is less than that required for VFR flight. SVFR procedural guidance is published in AFI 11-202V3**.**

1.1.3. It is important not to confuse any of these terms or use them inappropriately. Flight conditions do not always correspond to the type of flight plan filed. A large portion of USAF flying is conducted in VMC under IFR. When flying IFR, the aircraft may be in IMC or

VMC. However, ***when operating under VFR, it is mandatory to maintain VMC with visibility and cloud clearances appropriate to the type of airspace in which the aircraft is operating***.

1.1.4. It is also important to understand rules specific to different types of airspace. For instance, IFR flight is authorized in Class G (uncontrolled airspace). However, in Class G airspace, the pilot-in-command is the clearance authority and is solely responsible for terrain, obstacle, and traffic avoidance. See AFI 11-202V3 and AFMAN 11-217 Volume 1, *Instrument Flight Procedures*, for further explanation of IFR flight in uncontrolled airspace.

**1.2. Inadvertent Flight Into IMC While Operating Under VFR.** Despite the best planning, it is possible to inadvertently penetrate IMC while flying under VFR. This is especially true when flying at night wearing Night Vision Devices. It is a violation of Federal Aviation Regulations and Air Force policy to fly VFR with less than the required cloud clearances or visibility. If IMC is encountered while flying VFR, the situation requires immediate corrective action. ***Before flying under VFR, USAF pilots must brief actions to be taken in the event of inadvertent penetration of IMC.***

1.2.1. ***If IMC is encountered while flying under VFR, USAF pilots will make every effort to maintain VMC.***

1.2.2. If IMC is encountered, the pilot's actions will be dictated by the particular situation and the applicable AFI 11-2*MDS* or AFTTP 3-3.*XX* series publications. Factors to consider include terrain, obstacles, communication requirements or limitations, other air traffic, aircraft equipment limitations, crew complement and experience, theater or local procedures, flight manual procedures, threat, etc. In the absence of more specific MAJCOM guidance:

1.2.2.1. ***Immediately transition to instruments***. AFMAN 11-217V1 details unusual attitude recovery procedures.

1.2.2.2. ***Begin a climb to the emergency safe altitude (ESA) or an applicable minimum IFR altitude. Except in an emergency, do not climb into Class A airspace without an IFR clearance.***

1.2.2.3. If possible, exit IMC by changing altitude or heading. Use caution if exiting IMC requires a turn towards higher terrain to ensure the aircraft remains above the safe altitude for that flight segment.

1.2.2.4. ***If VMC cannot be regained, immediately obtain an IFR clearance to avoid conflicts with other traffic.***

1.2.2.4.1. When utilizing VFR Flight Following with an air traffic control (ATC) facility, contact that agency and inform them of the situation and your intentions.

1.2.2.4.2. If you are not utilizing VFR Flight Following, consult the enroute chart, instrument approach procedure (IAP) chart, sectional chart, enroute supplement, or other publication to determine an appropriate ATC frequency for the area. Attempt contact with a radar facility (air route traffic control center [ARTCC] or approach control). If contact with a radar facility is not possible, attempt to contact a control tower or Flight Service Station (FSS). A tower or FSS can relay to a radar facility and provide a frequency. If unable to contact a controlling agency, use the emergency frequencies of 121.5 MHz or 243.0 MHz, and consider squawking emergency.

1.2.2.5. Unless a greater emergency exists, theater procedures dictate otherwise, or the pilot is not instrument rated, do not squawk 7700. Continue to squawk the appropriate VFR code until an IFR squawk is assigned by ATC.

**1.3. Pilot Responsibilities.** When operating under VFR, the pilot-in-command is responsible for terrain, obstacle, wake turbulence, and traffic avoidance. The main principle to remember for flight under VFR is "see-and-avoid." Limited traffic separation services may be available from an ATC radar facility for VFR aircraft. See Chapters 4-6 for further information on radar services for VFR aircraft.

# Chapter 2

# NAVIGATION

**2.1. VFR Flight Planning.** VFR flight planning is especially important as there is little time for in-flight computations. An important part of good mission planning is proper chart preparation. The most commonly used charts for VFR operations are the Joint Operations Graphic (JOG), the Tactical Pilotage Chart (TPC), and Sectional Aeronautical Charts (commonly called sectionals). Sectionals may be preferable for VFR planning because they display critical information that may not be printed on other charts (e.g. airspace boundaries, special use airspace, ATC frequencies, IFR airways, etc.) Normally, radius of turn procedures are used (route is drawn taking into account the distance an aircraft covers while it is turning after passing over a turn point) when drawing the chart, but depending on tactics, airspeed and altitude, other options like point to point may be applicable. Time elapsed marks and distance remaining marks along the course line of each leg will aid in dead reckoning. Consult the applicable AFTTP 3-3.XX manual and MDS-specific directives for procedures specific to your aircraft.

**2.2. Dead Reckoning.** Dead Reckoning (DR) is the process of estimating position by calculating where the aircraft will be at a certain time if a planned ground speed and track are held. Prior to the advent of computerized flight planning and sophisticated on-board navigation systems, DR was accomplished largely using a DR computer, also known as an E6B flight computer (Figure 2.1) or "whiz wheel." For a quick reference guide to flight computer formulas, see Attachment 3. Consult your flight manual and/or MAJCOM guidance for specific procedures.

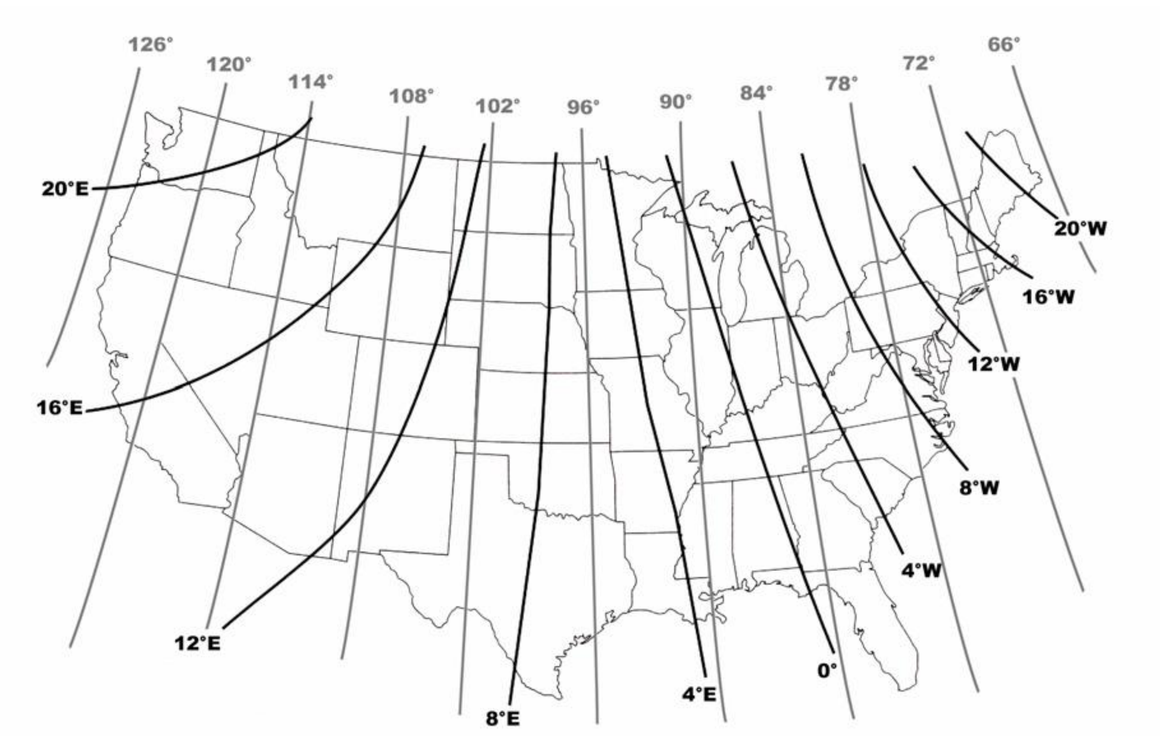
**Figure 2.1. E6B Flight Computer.**


2.2.1. Dead Reckoning Terms.

2.2.1.1. True Course (TC). The intended horizontal direction of travel over the surface of the earth, expressed as an angle measured clockwise from true north (000°) through 359°.

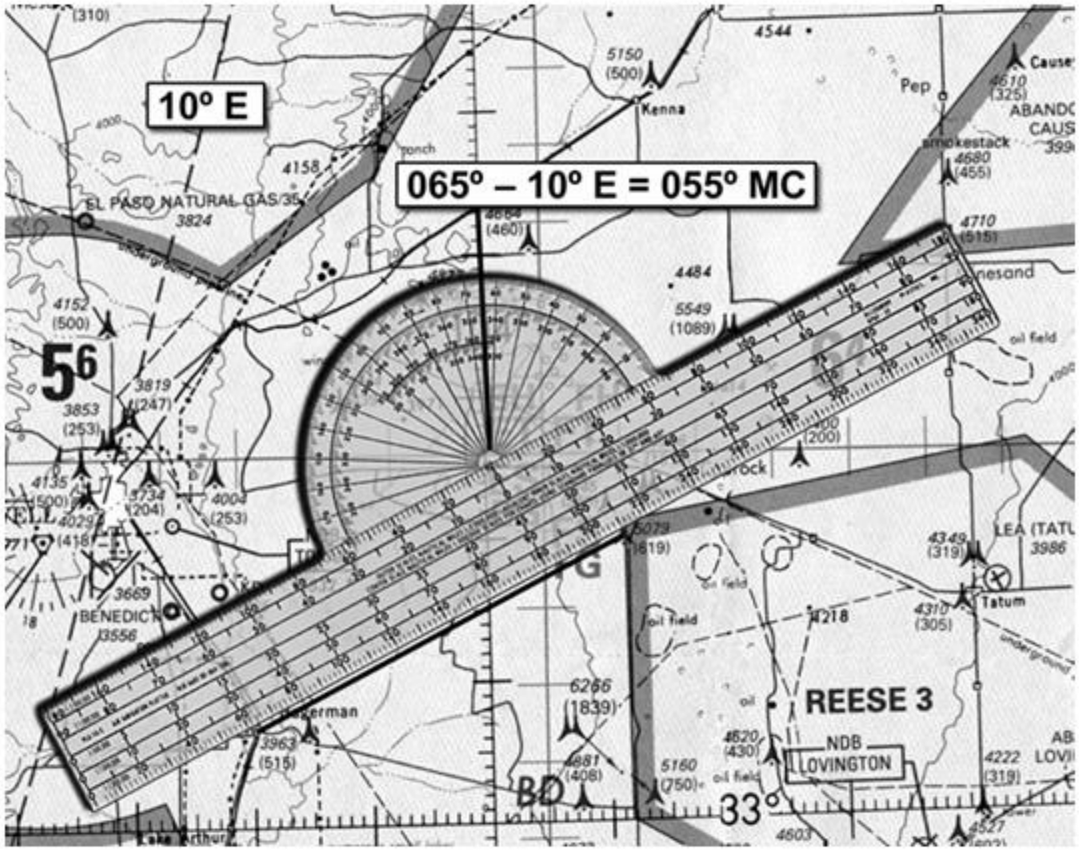
2.2.1.2. Magnetic Variation (VAR). The difference between true north and magnetic north. The magnetic variation is annotated on navigational charts, will be different from one position on the earth to another, and will vary slightly over time. Figure 2.2. gives an example of magnetic variation (isogonic) lines in the CONUS.

**Figure 2.2. Magnetic Variation in the CONUS.**




2.2.1.3. Magnetic Course (MC). True course corrected for magnetic variation. As shown in Figure 2.3. applying 10° east variation to a true course of 65° results in a magnetic course of 55°. (East variation is subtracted and west variation is added to the true course. The memory aid "east is least and west is best" helps in applying the correct variation.).

**Figure 2.3. Applying Magnetic Variation to Find MC.**




2.2.1.4. Course Line. A line between any two points on the route.

2.2.1.5. Track. The direction the aircraft moves over the ground. If the pilot fails to correct for wind, the aircraft's track will diverge from the course line.

2.2.1.6. True Heading (TH). The horizontal direction in which an aircraft is pointed in relation to true north. The difference between track and TH is caused by wind and is called drift.

2.2.1.7. Groundspeed (GS). The speed of the aircraft over the ground. Normally expressed in nautical miles per hour (knots). (Accounts for wind effect on aircraft speed across the ground.)

2.2.1.8. True Airspeed (TAS). The speed of an aircraft relative to the air surrounding it. Since the air mass is usually moving in relation to the ground, TAS and GS are seldom the same.

2.2.1.9. Dead Reckoning Position (DR Position). A point in relation to the earth established by keeping an accurate account of time, GS, and track since the last known position. It may also be defined as the position obtained by applying wind effect and VAR to TH and TAS.

2.2.2. Pilotage. Pilotage is the use of fixed visual references, normally with reference to a chart, to navigate. Air Force pilots combine dead reckoning and pilotage to precisely fly a specific course or route to an objective area. The objective area may be a target designated for attack, drop zone, landing zone, photo reconnaissance target, etc. A route is usually divided into several legs each beginning and ending with a turnpoint. In order to dead reckon successfully, skillful pilotage must be employed to accurately discern distance from different altitudes, account for differences in landscape appearance due to seasonal changes, and correct for variable wind effects on the aircraft flight path.

2.2.2.1. Estimating Distance. A landmark often falls right or left of course and the pilot must estimate the distance to it. While the ability to estimate distance from a landmark rests largely in skill and experience, the following methods may be of assistance:

2.2.2.1.1. Compare the distance to a landmark with the distance between two other points as measured on the chart.

2.2.2.1.2. Estimate the angle between the aircraft and the reference point on the ground. The distance in nautical miles from the landmark to the aircraft's position over the ground depends on the sighting angle:

2.2.2.1.2.1. (60°): horizontal distance = (AGL altitude) x 1.7

2.2.2.1.2.2. (45°): horizontal distance = AGL altitude.

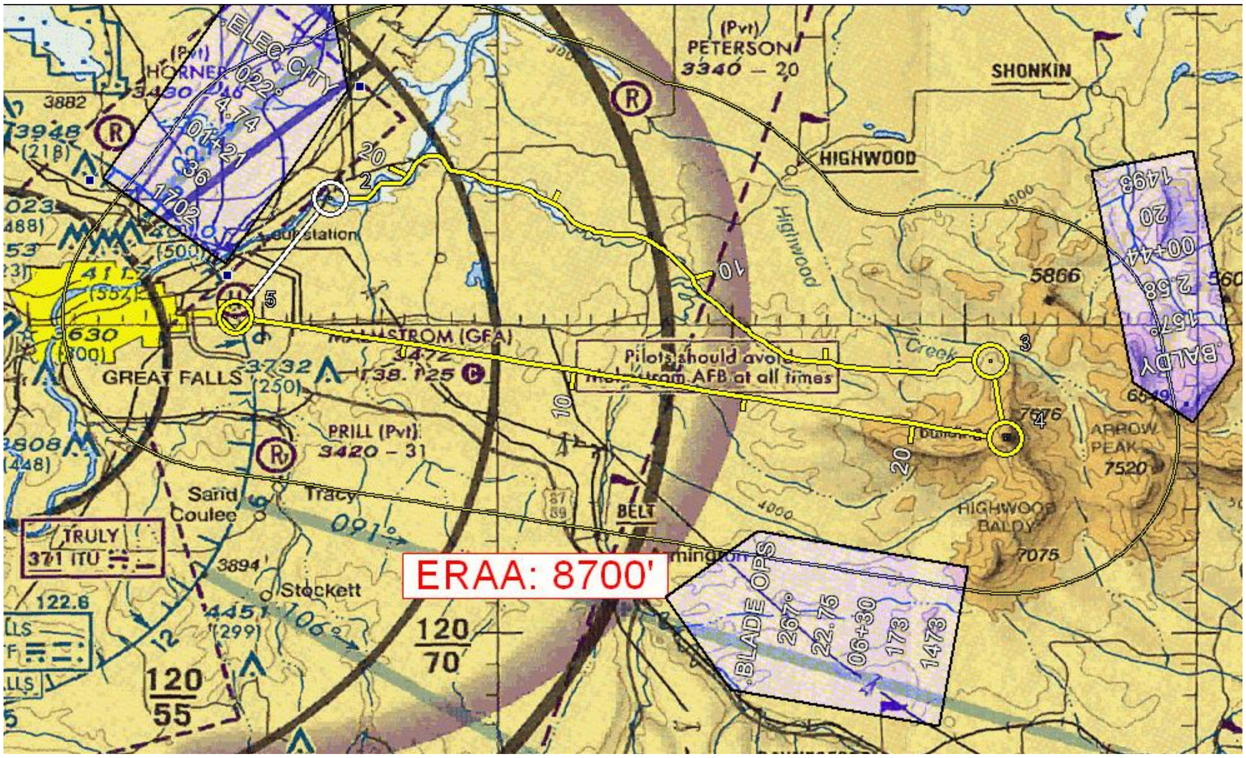
2.2.2.1.2.3. (30°): horizontal distance = (AGL altitude) x 0.6

2.2.2.2. Seasonal Changes. Seasonal changes can conceal landmarks or change their appearance. Small lakes and rivers may dry up during the summer. Their outlines may change considerably during the wet season. In many areas, the only indication that a river exists may be the presence of deciduous trees. Snow can cover up almost all of the normally used landmarks. When flying in the winter, it is often necessary to rely on more prominent checkpoints, such as river bends, hills, or larger towns. However, due to the size of these checkpoints, course control can be somewhat degraded.

2.2.2.3. Wind Direction. Many times during low level flight, the only way to read the wind is from indicators on the surface. On water, if downwind, the leeward side of the waves will appear choppy. (e.g. Wind speeds in excess of 20 knots will start to cause whitecaps on the surface of lakes.) If upwind, the windward side of the waves will have a smoother appearance. In a similar fashion, the leaves on deciduous trees are lighter on the underside which will show to windward. The shiny and normally darker side of the leaves will be present on the leeward side of the tree. Smoke and blowing dust also provide an easy indicator of wind direction.

2.2.3. Checkpoints/Turnpoints and Course Lines. Checkpoints are landmarks or geographic coordinates on a VFR route used to fix the position of the aircraft. A turnpoint is a checkpoint at the beginning/end of a route segment. Figure 2.4. shows a typical VFR route plotted on a navigational chart. The yellow circles are turnpoints which are connected by course lines. In this figure, one of the course lines is not straight. In some situations, following certain terrain features will give an aircraft a tactical advantage. There are no checkpoints on this example. They are normally used on long course lines to give an intermediate position check during that leg of the route.

**Figure 2.4. VFR Navigational Chart.**




2.2.3.1. Before fixing each position, look for several related details around each checkpoint to make sure it is positively identified. For example, if the checkpoint is a small town, there may be a lake to the north, a road intersection to the south, and a bridge to the east. In Figure 2.4. the western-most turnpoint can be verified by the presence of the large town to the west, a small heliport just to the north, and a group of towers to the west-northwest.

2.2.3.2. Compare the aircraft position to that of the checkpoint to fix the aircraft's location. Arrival over checkpoints at planned times is a confirmation of the wind prediction and indicates reliability of the predicted track and groundspeed. If the aircraft passes near but not over a checkpoint, the planned track was not held. If checkpoints are crossed, but not at the predicted time, the planned ground speed was not flown. Prudent pilots are quick to observe and evaluate the difference between an anticipated position and an actual position. Corrections must be made to maintain the intended course as soon as possible. Small errors are cumulative and can quickly result in the pilot becoming lost.

2.2.4. Chart Reading.

2.2.4.1. Orient the chart so that the course line on the chart is aligned with the intended course of the aircraft and landmarks on the ground appear in the same relative position as the features on the chart.

2.2.4.2. Obtain the approximate position of the aircraft by pilotage. Select an identifiable landmark on the chart at or near the aircraft's estimated position. It is imperative to work from the chart to the ground. Identify the landmark selected and fix the position of the aircraft. The importance of good pilotage cannot be over emphasized.

2.2.4.3. Clock to Map to Ground. To navigate accurately, check the expected time on the route segment, select a feature on the chart, and then find it on the ground rather than working from the ground to the chart. The chart does not show all the detail that is on the ground and one could easily become confused. Checkpoints should be features or groups of features that stand out from the background and are easily identifiable. In open areas, any town or road intersection can be used; however, these same features in densely populated areas are difficult to distinguish.

2.2.4.3.1. Funneling Features. When possible, find a feature on the chart that leads to the turn point. A funneling feature can be a stream, road, power line, railroad, terrain feature, etc. that forms a visual boundary and aids in navigating to and identifying the turnpoint.

2.2.4.3.2. When a landmark cannot be seen or is not available at a turn point, make the turn at the estimated time of arrival (ETA). Extend the DR position to the next landmark and fix the position of the aircraft to make sure the desired course and GS are maintained. Remember, the desired magnetic course on any given leg corrected for drift is the magnetic heading which will parallel the course line. This will minimize departure from the intended track.

2.2.4.4. Low-level chart reading presents additional challenges. More attention must be committed to flight parameters for obstacle avoidance, the lower AGL altitude reduces the range of visibility and landmarks pass by rapidly.

2.2.4.5. Chart Reading at Night. Night navigation comes with certain inherent challenges including hazards due to visual illusions. Lighted reference points tend to look closer than they actually are at night, large objects in the background can mask closer obstacles, darkness adversely affects visual acuity requiring greater use of peripheral vision, colored lighting used for chart reading can mask features on the chart, etc. It is critical to understand that contrast can change the way landmarks look at night. Proper use of cockpit lighting and night vision devices (NVD) enhances night navigation. Special caution must be used when operating around ridgelines utilizing high moon illumination. Shadowing can make other ridgelines and obstructions extremely difficult to see. For a complete discussion on the use and effects of NVDs on night operations, reference AFMAN 11-217V3.

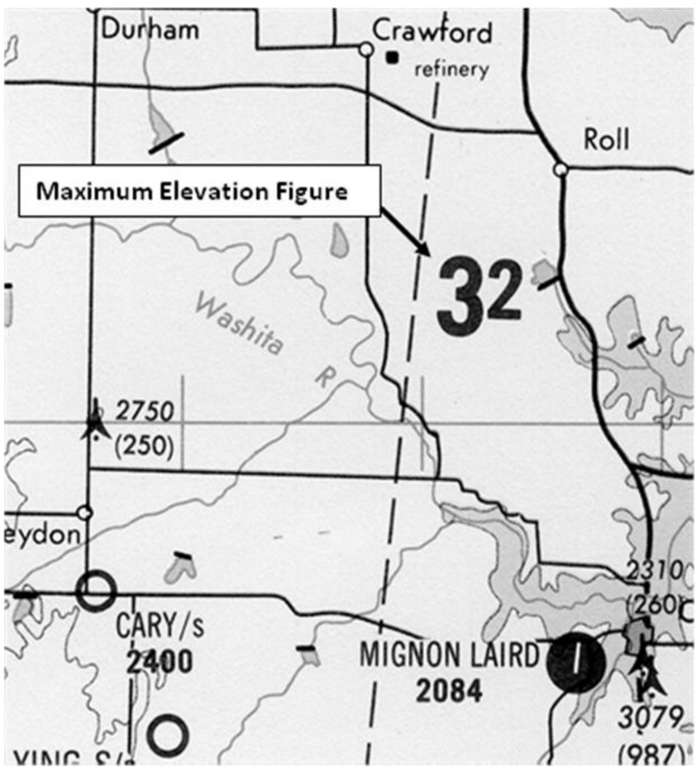
2.2.4.6. Contour Chart Reading. Contours are lines that connect points of equal elevation and are the most common method of showing relief features on a chart. Contour lines are closer together where the slope is steep and farther apart where the slope is gentle. Within the limits of the contour intervals, the height of points and the angle of slope can also be determined from the chart.

2.2.4.6.1. Contour intervals are determined by the scale of the chart, the amount of relief, and the accuracy of the survey. Contours may be annotated in feet or meters in the chart legend and are frequently labeled with figures of elevation. To further accentuate the terrain, a gradient system of coloring may also be employed. The lighter colors might be used to show lower areas while darker colors may portray higher terrain. (Some charts use an opposite coloring method. Check chart legend for an elevation depiction guide.)

2.2.4.6.2. Military operations usually require the analysis of contour-labeled charts to visualize the land. Operationally this is of the utmost importance, whether planning a route for a safe flight or determining the best escape from enemy territory.

2.2.4.7. Maximum Elevation Figure (MEF). The MEF (Figure 2.5.) can be found on many chart variations. It is based on the highest point, natural or man-made, within a given grid square. The MEF is determined by adding a 300 foot safety margin plus a vertical accuracy factor to the highest point in the grid square and then rounding up to the next 100 foot increment. This chart feature is particularly useful if maneuvering off course. If the position of the aircraft is known, the MEF for the grid square the aircraft is in (or will be in if transiting grid squares to a higher MEF) can be used to calculate a new MSA or ESA by simply adding the appropriate amount (i.e. 200 feet for an MSA) to the MEF.

**Figure 2.5. Maximum Elevation Figure.**




**2.3. Hazards to Low Altitude Navigation.** In low-level flight, one should be particularly alert for obstructions. Hills and mountains are easily avoided if the visibility is good but radio and television towers, which may extend as much as 2,000 feet or more into the air, often from elevated ground, are less conspicuous. Even more dangerous, the guy-wires supporting such towers are virtually invisible. For this reason, pilots should plan to avoid all towers by a horizontal distance equal to at least the AGL height of the tower. If flying at extremely low altitudes, power lines should be crossed at poles or towers as the line a pilot sees may not be the highest one.

2.3.1. **WARNING:** Some obstructions may not be shown on aeronautical charts. ***Update the location of obstructions by using the Chart Updating Manual (CHUM), or electronic***

***CHUM (E-CHUM) if using flight planning software.*** The CHUM lists important changes to all current navigation charts, but does not contain manmade obstacles less than 200 feet tall. The CHUM and E-CHUM are published twice a year with supplements published monthly. ***Charts will be updated with CHUM or E-CHUM at least once a month unless more restrictive MAJCOM guidance exists.***

2.3.2. **WARNING:** Aeronautical charts do not depict man-made obstacles less than 200 feet AGL or a change in terrain until it exceeds the chart contour interval. The worst situation would occur if a 199-foot obstacle sat on terrain with an elevation just below the next higher contour. For a TPC (1:500,000) with a contour interval of 500 feet, this results in an uncharted obstacle existing 698 feet above charted terrain. Additionally, the highest spot elevation on any given navigation leg may not be the highest terrain as in the case of gradually rising elevations. ***Planners will check both spot elevations and the contour levels to determine enroute and minimum safe altitudes***.

2.3.3. **CAUTION:** Some charts, such as JOG and topographic line maps (TLM) in some areas of the world, may depict terrain and obstacle heights in meters instead of feet.

2.3.4. Uncharted obstacles. If an obstacle is encountered while flying a route that is not charted properly, the following list of contacts will ensure future chart editions or CHUM/E-CHUM include the obstacle. For Sectionals, contact the FAA at 1 800 626-3677 or email them at **aerochart@faa.gov.** For NGA products, call the CHUM Help Desk at (636) 321-5608, DSN 369-5608 (leave message) or email **chum@nga.mil.**

2.3.5. **WARNING:** ***All charts used for low altitude navigation shall be full color.*** If making color copies, ensure that all colors come through, as some shades of blue and green may not transfer, causing some terrain features or obstacles to be deleted. Exception: MAJCOMs may approve the use of black and white copies of original mission planning charts to enhance navigational capabilities on night vision missions. However, ***all mission planning and chart annotations must be done on original full color charts prior to making copies of any type.***

**2.4. Chart Reading in High Latitudes.** Chart reading in high latitudes presents unique challenges. The nature of the terrain is significantly different, charts are less detailed and less precise, seasonal changes may alter the terrain appearance or hide it completely from view, and there are fewer cultural features.

2.4.1. In high latitudes, there are few distinguishable features from which to determine a position. Built-up features are practically nonexistent and the few that do exist are usually closely grouped, offering little help when flying long navigation legs. Natural features may be limited in variety and are difficult to distinguish from each other. Lakes can seem endless in number and identical in appearance. The countless coastal inlets are extremely difficult to identify. Recognizable, reliable checkpoints are few and far between.

2.4.2. Map reading in high latitudes is further complicated by inadequate charting. Some polar areas are yet to be thoroughly surveyed. The charts portray the appearance of general locales, but many individual terrain features are merely approximated or omitted entirely. In place of detailed outlines of lakes, for example, charts often carry the brief annotation, “Many lakes”. Pilotage is possible, but requires extended effort and keen judgment.

2.4.3. When snow blankets the terrain from horizon to horizon, pilotage becomes acutely difficult. Coastal ice becomes indistinguishable from the land, coastal contours can change dramatically, and many inlets, streams, and lakes disappear. Blowing snow may extend to heights of 200 to 300 feet and may continue for several days, but visibility is usually excellent. However, when snow obliterates surface features and the sky is covered with a uniform layer of clouds so that no shadows are cast, the horizon disappears, causing earth and sky to blend together. This forms an unbroken expanse of white called whiteout. In this complete lack of contrast, distance and height above ground are virtually impossible to estimate. Whiteout is particularly prevalent in northern Alaska during late winter and spring. The continuous darkness of night presents another hazard; nevertheless, surface features are often visible because the snow is an excellent reflector of light from the moon, the stars, and the aurora.

**2.5. On-Board Navigational Systems.**

2.5.1. Radio aids to navigation (NAVAIDS), inertial navigation systems (INS), flight management systems (FMS), global positioning systems (GPS), and other navigation systems are required in various combinations for IFR flight. The requirements for VFR flight are much less stringent. For a complete discussion on the characteristics and operational procedures of NAVAIDS, see AFMAN 11-217V1. For NAVAID requirements under VFR, see discussion under each airspace type.

2.5.2. Although not required for VFR flight in most types of airspace, it is highly recommended that pilots use their on-board navigation systems during flight under VFR when operational requirements allow. This will maximize situational awareness and enhance safety by facilitating the transition to IFR should it become necessary.

**2.6. Airspace.**

2.6.1. Airspace in most of the world is divided up into different types and categories, including controlled, uncontrolled, and special use.

2.6.1.1. Pilots must be familiar with the operational requirements for each of the various types or classes of airspace. When overlapping airspace designations apply to the same airspace, the operating rules associated with the more restrictive airspace designation apply.

2.6.1.2. When operating under IFR, transition from one type of airspace to another is generally transparent to the pilot. The IFR clearance is clearance to enter each type of airspace as it is encountered and typically no specific clearances will be issued. However, when operating under VFR, it is up to the pilot to determine the airspace type, operating rules, and equipment requirements, and comply accordingly. Under VFR, transitions from one type of airspace to another are not transparent to the pilot, and in many cases, require a specific clearance. A thorough understanding of airspace is required for VFR flight. ***During VFR mission planning, pilots must review the route and comply with the requirements for each type of airspace to be transited.***

2.6.2. The categories and types of airspace are dictated by:

2.6.2.1. The complexity or density of aircraft movements;

2.6.2.2. The nature of the operations conducted within the airspace;

2.6.2.3. The level of safety required; and

2.6.2.4. The national and public interest.

2.6.3. Generic Airspace Descriptions and Definitions.

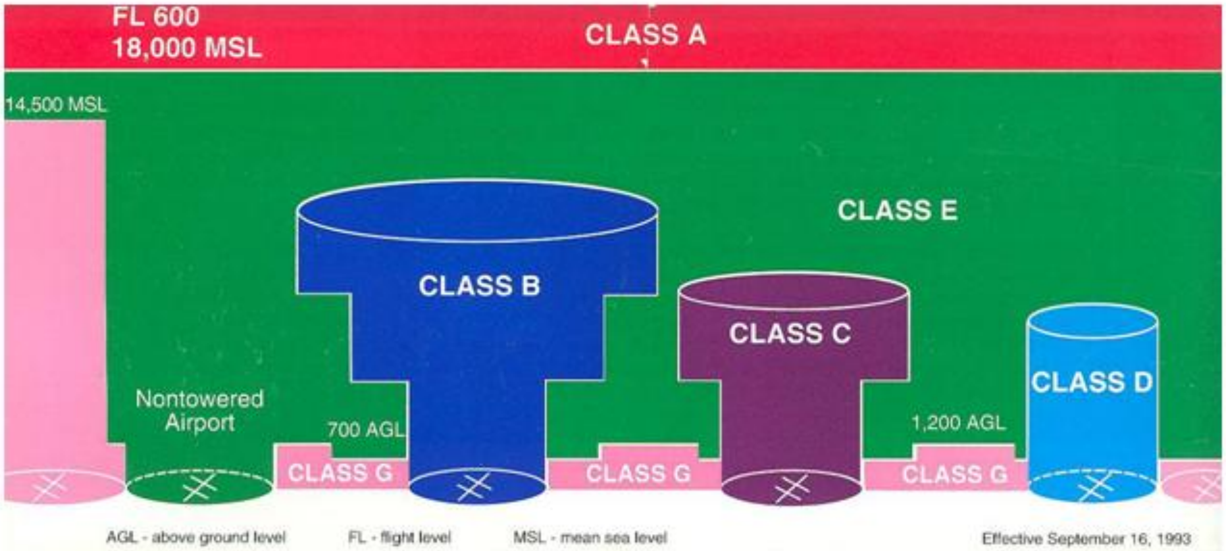
2.6.3.1. Controlled Airspace. A generic term that covers the different classification of airspace (Classes A-E) and defined dimensions within which air traffic control service is provided in accordance with the airspace classification. **NOTE:** Class F airspace does not exist in the US. Class F airspace is uncontrolled but aircraft operating under IFR will still be provided traffic separation. Consult FLIP and host nation aeronautical information publication (AIP).

2.6.3.2. Uncontrolled Airspace. A term that covers all airspace (Class G) not designated as controlled airspace.

2.6.4. Airspace Weather Minimums. Each type of airspace has specific weather minimums and cloud clearance requirements for VFR operations. ***If the weather is less than the airspace required weather minimums, pilots must alter route, altitude or destination to maintain VFR, fly under IFR or delay until the weather improves***. Where applicable, helicopter pilots may request SVFR. For rules governing VFR weather minimums, required visibilities and cloud clearances, reference AFI 11-202V3, Chapter 7.

2.6.5. Airspace Classifications and Procedures. This section details the classes of airspace (A-G), operational requirements for each, and charting details. (Figure 2.6.)

**Figure 2.6. Airspace Structure.**




| Airspace Type | Operations Allowed | Clearance Required | Two-Way Radio Communi-cation Required | Two-way Radio Required | Transpon-der with Mode C Required | Separation/Sequencing Services Provided to VFR Aircraft |
|---|---|---|---|---|---|---|
| Class A | IFR Only | Yes | Yes | Yes | Yes | VFR NA |
| Class B | IFR/VFR | Yes | Yes | Yes | Yes | VFR/VFR Separation<br>VFR/IFR Separation<br>Sequencing for All |
| Class C | IFR/VFR | No | Yes | Yes | Yes | VFR/VFR Separation<br>VFR/IFR Separation<br>Sequencing (Participating Aircraft Only) |
| Class D | IFR/VFR | No | Yes | Yes | No | None for VFR |
| Class E | IFR/VFR | No | No | No | No | Flight Following on Workload Permitting Basis |
| Class G | IFR/VFR | No | No | No | No | None |

2.6.5.1. Class A Airspace.

2.6.5.1.1. Location. In the National Airspace System (NAS), Class A airspace extends from 18,000 feet MSL up to and including FL600. This includes the airspace overlying the waters within 12 nautical miles (nm) of the coast of the CONUS and Alaska and designated international airspace beyond 12 nm of the coast and Alaska within range of domestic NAVAID or ATC radar coverage where domestic procedures are applied. O-CONUS, consult appropriate FLIP products (e.g. approach plates) for Class A airspace altitudes.

2.6.5.1.2. Operations Requirements. Except for specific military operations all flights in Class A airspace must be conducted under IFR.

2.6.5.1.2.1. VFR operations in Class A airspace will be specifically authorized in the Air Tasking Order (ATO), Airspace Control Order (ACO), Special Operating Instructions (SPINS), Memorandum, or equivalent document. ***Pilots shall not operate under VFR in Class A airspace without authorization from the appropriate airspace authority***.

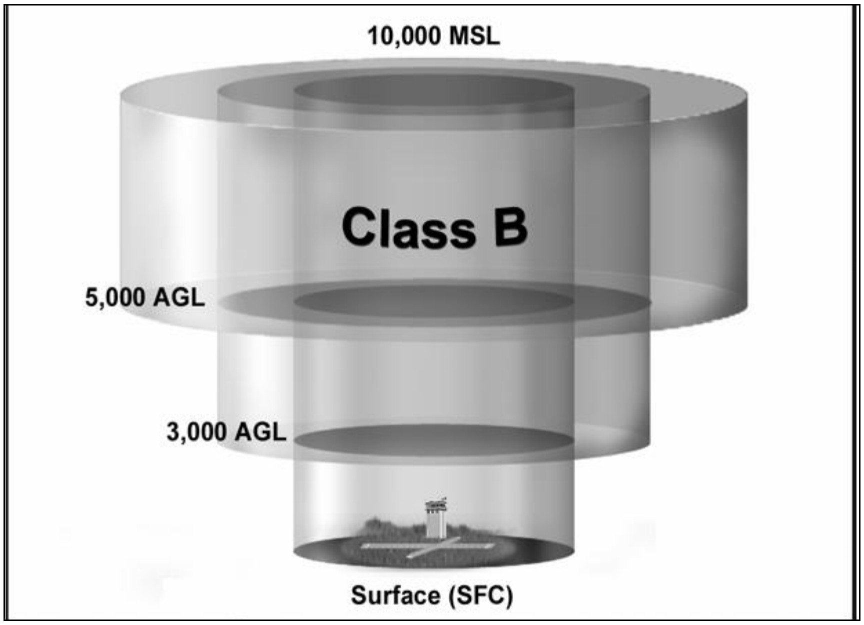
2.6.5.1.2.2. Since VFR flights are not permitted in Class A airspace except for unique military operations, there are no standard procedures for operations except for adherence to VFR cruising altitudes described in this chapter.

2.6.5.1.3. Equipment Requirements. Equipment requirements are in accordance with IFR.

2.6.5.1.4. Charting. Class A airspace is not specifically charted.

2.6.5.2. Class B Airspace.

**Figure 2.7. Class B Airspace.**




2.6.5.2.1. Location. Class B Airspace (Figure 2.7.) is generally from the surface to 10,000 feet MSL surrounding the busiest (primary) airports in the NAS. The configuration of each Class B area is individually tailored and consists of a surface area and two or more layers which are sometimes described as "an upside down wedding cake". Class B airspace contains all published instrument approach procedures for the primary airport as well as all secondary airports.

2.6.5.2.1.1. Operations Requirements. ***Pilots must obtain an ATC clearance to enter Class B airspace even when operating VFR.*** Unless otherwise authorized by ATC, all large turbine-engine powered aircraft operating to or from the primary airport must operate at or above the floor of the Class B airspace when operating within its lateral limits.

2.6.5.2.1.2. When flying VFR, ***before entering Class B airspace, contact ATC***

***on the appropriate frequency*** with reference to geographical fixes shown on sectional charts. For example, "SOCAL Approach, PROPS 74, VFR at 13,500 approaching Santa Anita Racetrack from the north, request clearance to proceed VFR to Santa Monica for landing."

2.6.5.2.1.3. ***When departing VFR from an airport within Class B airspace, obtain a VFR clearance from clearance delivery or ATC.*** Advise the controlling agency of the intended direction of flight and altitude. For example, "DULLES Clearance, MUSEL 08, VFR to Shenandoah Regional, request VFR departure to the southwest at 4,500 over Casanova."

2.6.5.2.1.4. ATC will normally advise VFR aircraft when leaving the geographical limits of the Class B airspace. Radar service is not automatically terminated when leaving Class B airspace unless the controller specifically states "Radar service terminated".

2.6.5.2.1.5. Aircraft transiting the Class B airspace and not landing at the primary airport may obtain a clearance to do so when traffic conditions permit. When transiting the lateral limits of Class B airspace it is encouraged to operate above or below the Class B airspace limits, or use published VFR corridors. VFR corridors are published on Terminal Area Charts. **NOTE:** When operating in a published VFR corridor, pilots are urged to exchange position information on VHF 122.75.

2.6.5.2.1.6. VFR aircraft are provided sequencing and separation from all other aircraft while operating in Class B airspace. These services are not available in the event of radar outage. This does not relieve pilots of their responsibilities to see and avoid other traffic, wake turbulence, terrain, obstacles, or IMC. ***If any change to route or altitude is required due to these conditions, inform ATC and obtain an amended clearance.***

2.6.5.2.1.7. ATC may assign altitudes to VFR aircraft that are not in accordance with the standard VFR cruising altitudes. "Resume appropriate VFR altitudes" will be broadcast when the altitude assignment is no longer needed for separation or when leaving Class B airspace.

2.6.5.2.1.8. There are several Special Federal Aviation Regulations (SFAR) in 14 CFR Part 91 that may be applicable to military VFR operations. Examples include operations around large airports in Class B airspace, special events, and specific locations like the Grand Canyon or Washington D.C. Federal Aviation Regulations are contained in Title 14 of the U.S. Government Code of Federal Regulations (14 CFR) and may be viewed and searched electronically at **http://www.faa.gov/regulations_policies**. ***Consult appropriate federal regulations for the latest SFAR provisions prior to flight in these areas***.

2.6.5.2.1.9. 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 VFR

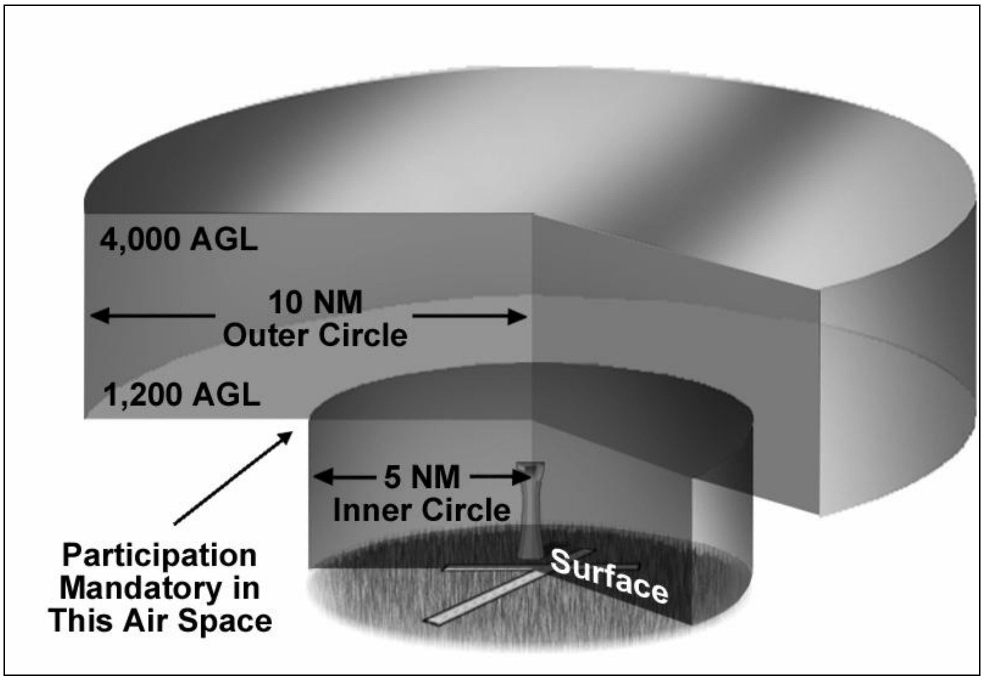
Planning Charts as a tool for planning flight in proximity to Class B airspace. Charted VFR Flyway Planning Charts are published on the back of VFR Terminal Area Charts.

2.6.5.2.2. Equipment Requirements. Aircraft must have an operable two-way radio and transponder with Mode C to operate in Class B airspace. Additionally, all aircraft operating within 30 nm of the airports listed in Appendix D, 14 CFR Part 91 between the surface and 10,000 feet must have an operable transponder with Mode C. ***Pilots will ensure their aircraft is properly equipped prior to entering Class B airspace.***

2.6.5.2.3. Charting. Class B Airspace is charted on Sectional and VFR Terminal Area Charts.

2.6.5.3. Class C Airspace

**Figure 2.8. Class C Airspace.**




2.6.5.3.1. Location. Generally, Class C airspace (Figure 2.8.) is from the surface to 4,000 feet (charted in MSL) above airports with an operating control tower and are serviced by a radar approach control. The airspace typically consists of two rings: A core with a 5nm radius from the surface to 4,000 feet above airport elevation, and a shelf area that extends to 10nm from 1,200 to 4,000 feet above airport elevation. An additional Class C outer area extends out to 20nm and extends from the lower limits of radio/radar coverage up to the ceiling of the approach control's designated airspace.

2.6.5.3.2. Operations Requirements. To enter Class C airspace, a clearance is not required, however ***pilots must be in two-way radio communication with ATC. Unless otherwise authorized, when within 4 nm of the primary airport at or below***

***2,500 feet AGL, do not exceed 200 KIAS.*** Exception: ***If the aircraft flight manual requires a higher speed for safe operation, fly the lowest practical speed.***

2.6.5.3.2.1. Contact the Class C airspace ATC facility on the published frequency and give 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. For example, "SOCAL Approach, CROME 91, 20 north of Burbank descending from 10,500 to 3000, squawking 4325, enroute to Van Nuys."

2.6.5.3.2.2. ***When departing from a primary or secondary 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.

2.6.5.3.2.3. ***When departing a secondary 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.*** For example, "SOCAL Approach, ARROW 12, departed Van Nuys VFR climbing to 4500 enroute to Long Beach."

2.6.5.3.2.4. In the event of radar outage, separation services are not provided in Class C airspace to VFR aircraft. Even when in radar coverage and under ATC control, VFR pilots are not relieved of the responsibility to see and avoid other traffic, wake turbulence, terrain, obstacles, or IMC. ***If any change to route or altitude is required due to these conditions, inform ATC and obtain an amended clearance.***

2.6.5.3.2.5. Pilot participation is voluntary within the 20 nm outer area and can be discontinued, within the outer area, at the pilot's request. Class C services will be provided in the outer area unless the pilot requests termination of the service. All participating VFR aircraft are provided basic radar services beyond the outer area on a workload-permitting basis. The controller can terminate this if workload dictates. USAF crews should continue to monitor the appropriate ATC frequency even if services are terminated.

2.6.5.3.2.6. Some facilities provide Class C services only during published hours. At other times, only terminal IFR radar service will be provided. It is important to note that the communications and transponder requirements are dependent on the class of airspace established outside of the published hours.

2.6.5.3.2.7. In some locations Class C airspace may overlay 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.

2.6.5.3.2.8. Aircraft proceeding inbound to a secondary 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.

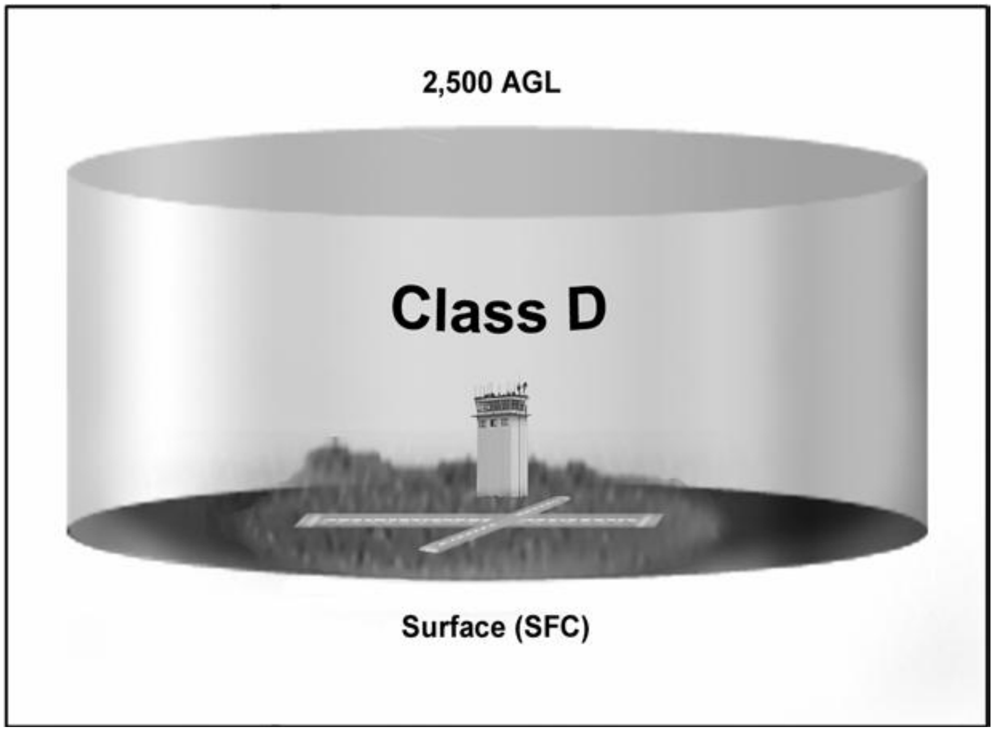
2.6.5.3.2.9. Aircraft departing secondary airports will not receive Class C services until they have been radar identified and two-way communications have been established with the Class C airspace facility.

2.6.5.3.3. Equipment Requirements. An operable two-way radio and transponder with Mode C are required in Class C airspace.

2.6.5.3.4. Charting. Class C airspace is charted on Sectional and VFR Terminal Area Charts. A complete listing of CONUS Class C airspace is also in Chapter 3 of the AIM and available electronically at **http://www.faa.gov**.

2.6.5.4. Class D Airspace.

**Figure 2.9. Class D Airspace.**




2.6.5.4.1. Location. Class D airspace (Figure 2.9.) is generally airspace from the surface to 2,500 feet above airport elevation around airports with an operating control tower. The lateral dimensions are tailored to the airspace and designed to contain published instrument procedures. ***Unless otherwise authorized, when within 4 nm of the airport at or below 2,500 feet AGL, do not exceed 200 KIAS.*** Exception: ***If the aircraft flight manual requires a higher speed for safe operation, fly the lowest practical speed.***

2.6.5.4.2. Operations Requirements. ***Two-way radio communication must be established and maintained with the ATC facility providing ATC services prior to entry into 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 airspace boundary to preclude entering Class D airspace before two-way radio communications are established. For example, “KINGSTON Tower, SABER 24, 10 miles north of the field at 3000 for landing with Charlie.”

2.6.5.4.2.1. At those airports where the control tower does not operate 24 hours a day, the operating hours of the tower will be listed on the appropriate charts and in the Enroute Supplement. During the hours the tower is not in operation, the Class E surface area rules or a combination of Class E rules to 700 feet above ground level and Class G rules to the surface will become applicable. See Enroute Supplement for specific operating hours and airspace information. Use caution when operating at military airfields when the control tower is closed. In most cases, consider the entire airfield closed if the tower is closed.

2.6.5.4.2.2. ***When departing from a primary or secondary 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.

2.6.5.4.2.3. When departing a secondary airport without an operating control tower, two-way radio communications should be established with ATC prior to departing. If unable to contact ATC on the ground, establish contact as soon as practicable after departure with the ATC facility having jurisdiction over the Class D airspace. For example, “HOLLOMAN Approach, RIPSAW 04, departed Alamogordo VFR climbing to 17,500 enroute to Albuquerque, request flight following.”

2.6.5.4.3. Equipment Requirements. Aircraft must have an operable two-way radio to operate in Class D airspace.

2.6.5.4.4. Charting. Class D airspace is charted on Sectional and VFR Terminal Area charts.

2.6.5.5. Class E Airspace.

2.6.5.5.1. Location. Class E airspace encompasses any other controlled airspace that is not designated as Class A, B, C, D or a TRSA. Class E airspace has no defined vertical limit. It extends to the lower limit of the overlying or adjacent controlled airspace. There are several different types of Class E airspace of varying dimensions.

2.6.5.5.1.1. Surface Area Designated for an Airport. Class E airspace that is configured to contain instrument approaches within controlled airspace. Extends down to the surface.

2.6.5.5.1.2. Extension to a Surface Area. There are Class E extensions to Class B, C, and D surface areas designated for an airport. These provide controlled airspace to contain instrument approach procedures without imposing additional communication requirements for pilots operating under VFR.

2.6.5.5.1.3. Airspace Used for Transition. Controlled airspace that extends from either 700 feet AGL or 1,200 feet AGL used to transition to/from the terminal or enroute environment.

2.6.5.5.1.4. Federal Airways. Controlled airspace that extends from 1,200 feet AGL up to, but not including 18,000 feet MSL along a published route. These are normally the "Victor Routes".

2.6.5.5.1.5. Enroute Domestic Areas. Areas that extend upward from a specified altitude that provide controlled airspace where there is a requirement for IFR enroute ATC services but the Federal Airway system is inadequate.

2.6.5.5.1.6. Offshore Airspace Areas. Areas located beyond 12 nm from the coast where there is a requirement to provide IFR enroute ATC services and where the US is applying domestic procedures. These areas begin at a specified altitude and extend up to, but not including, 18,000 feet MSL.

2.6.5.5.1.7. General Class E Airspace. Except where designated at a lower altitude, all airspace in the CONUS and Alaska (including the waters within 12 nm of Alaska) above 14,500 feet MSL, up to but not including 18,000 feet MSL is Class E airspace.

2.6.5.5.1.8. Alaska. All airspace above FL600 in Alaska is Class E airspace except Alaskan airspace west of 160W. All airspace in Alaska below 1,500 feet AGL is not Class E unless specifically designated.

2.6.5.5.2. Operations Requirements. There are no specific communication requirements for VFR aircraft operating in Class E airspace. No separation services are provided to VFR aircraft in Class E airspace.

2.6.5.5.3. Equipment Requirements. There are no specific equipment requirements for operating VFR in Class E airspace.

2.6.5.5.4. Charting. Class E Airspace is charted on Sectional and VFR Terminal Area Charts.

2.6.5.6. Class F Airspace. Class F airspace is not used in CONUS, Alaska, Hawaii, or other US possessions or territories. For more information on Class F airspace, consult the Area Planning (AP) series in FLIP or host nation AIP.

2.6.5.7. Class G Airspace.

2.6.5.7.1. Location. Class G, or uncontrolled airspace, is airspace that has not been designated as Class A, B, C, D, E, or F airspace.

2.6.5.7.2. Operations Requirements. There are no specific communication requirements for VFR aircraft operating in Class G airspace. No ATC services are provided to IFR or VFR aircraft in Class G airspace. IFR operations are permitted in Class G airspace and are largely autonomous. Therefore, pilots operating under VFR must exercise vigilance to insure separation from all aircraft, whether they are operating under IFR or VFR. AFI 11-202V3 outlines additional requirements for operations in Class G airspace. ***When operating VFR in Class G airspace, pilots must adhere to VFR cruising altitudes unless mission requirements dictate otherwise***.

2.6.5.7.3. Equipment Requirements. There are no specific equipment requirements for operations in Class G airspace.

2.6.5.7.4. Charting. Class G airspace is not specifically charted on VFR charts, other than it is airspace not otherwise designated. It is charted on IFR Enroute Low Altitude Charts in brown.

**2.7. VFR Cruising Altitudes and Flight Levels.** In the NAS, when flying under VFR, there is a great deal of latitude for choosing altitude. However, to aid in separation between aircraft, standard cruising altitudes for VFR flight exist. W***hen flying under VFR, unless mission requirements dictate otherwise, use the following table to determine an appropriate cruising altitude.*** VFR cruising altitudes only apply when flying above 3000 feet AGL. Outside the NAS, the pilot must consult the appropriate AP-series FLIP to determine the correct VFR flight rules and cruising altitudes.

**Table 2.1. VFR Cruising Altitudes and Flight Levels.**

| **Magnetic Course** | **More Than 3000 Feet AGL but Less Than 18,000 Feet MSL** | **Above 18,000 Feet MSL to FL 290*** | **Above FL 290*** |
|---|---|---|---|
| **0° to 179°** | Odd Thousands MSL, Plus 500 Feet (3500, 5500, etc.) | Odd Flight Levels Plus 500 Feet (FL 195, FL 215, etc.) | Beginning at FL 300, at 4000 foot intervals (FL 300, FL 340, etc.) |
| **180° to 359°** | Even Thousands MSL, Plus 500 Feet (4500, 6500, etc.) | Even Flight Levels Plus 500 Feet (FL 185, FL 205) | Beginning at FL 320, at 4000 foot intervals (FL 320, FL 360) |
| *Note: VFR flight is prohibited in FAA airspace above 18,000' MSL without special authorization. | | | |

**2.8. General Air Traffic Services for VFR Aircraft.** When operating under VFR, there is no requirement for pilots to talk to ATC except when operating in Classes A-D airspace. Generally, most operations under VFR are conducted in Class E airspace where communication is not required. ***USAF pilots will utilize VFR flight following to the maximum extent practical where available and mission requirements allow.***

2.8.1. Flight Following services for VFR aircraft are provided on a workload-permitting basis. Even when Flight Following is not available, it is recommended that pilots monitor the appropriate ATC frequency.

2.8.2. Traffic advisories will be provided to all aircraft as the controller's work situation permits. When operating under VFR, pilots are ultimately responsible for terrain, obstacle, wake turbulence, and traffic avoidance.

2.8.3. Safety Alerts are mandatory services provided to ALL aircraft. There are two types of Safety Alerts: Terrain/Obstruction and Aircraft Conflict/Mode C Intruder.

2.8.3.1. 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.

2.8.3.2. An Aircraft Conflict/Mode C Intruder Alert is issued if the controller observes aircraft in unsafe proximity to each other. When feasible, the controller will offer aircraft an alternative course of action.

2.8.4. Two-way Radio Contact vs. ATC Clearance. When flying into different types of airspace, there may be a requirement for an "ATC Clearance" to enter the airspace or only "Two-way radio contact". It is important to understand these terms to prevent entering airspace without a clearance.

2.8.4.1. An ATC clearance allows the aircraft to proceed into the controller's airspace. For example, "BULL 32, Cleared to enter Class B airspace, maintain 4500."

2.8.4.2. Two-way radio contact means you are talking to ATC but may or may not have been cleared for anything. In order to be in two-way radio contact, the controller must refer to the aircraft by call sign. For example, if a controlling agency responds, "RAVEN 66 Stand by", this IS two-way radio contact because the controller used the aircraft call sign. If the controller responds, "Aircraft calling Potomac Approach, standby", then two-way radio contact has NOT been established.

2.8.5. Inoperative Equipment. ATC has some latitude in granting VFR aircraft on-the-spot access to airspace without meeting all equipment requirements. This is granted primarily to aircraft whose transponders become inoperative during flight on a traffic and workload-permitting basis. ***Pilots shall not plan to transit airspace without the minimum equipment requirements unless they acquire advance permission from ATC.***

2.8.5.1. **NOTE:** One-time ferry flights or long-term requirements for operations in airspace without meeting minimum equipment requirements should be addressed through the one-time ferry flight waiver and/or exemption processes outlined in FLIP GP and AP 1, AFI 11-202V3 and MAJCOM directives.

2.8.5.2. **WARNING:** Loss of a transponder or two-way radio communications in an Air Defense Identification Zone (ADIZ), Special Flight Rules Area (SFRA), or Temporary Flight Restriction (TFR) are taken very seriously by air traffic control and air defense. Consult NOTAMS or the Flight Information Handbook for transponder/radio failure procedures in these types of airspace. Failure to comply with transponder/radio failure procedures can result in your aircraft being intercepted.

**2.9. Special Use Airspace.** Special use airspace confines certain aerial activities due to their nature and/or imposes restrictions on aircraft operations that are not a part of those activities. Except for controlled firing areas, special use airspace areas are depicted on Sectional and VFR Terminal Area Charts. Charted descriptions include the hours of operation, altitudes, and the controlling agency. Definitions of the types of Special Use Airspace are in FLIP GP Chapter 2. FLIP AP volumes contain the specific locations and dimensions of all Special Use Airspace in the US and other countries.

2.9.1. Prohibited Areas (Figure 2.10.)

2.9.1.1. Prohibited areas contain airspace of defined dimensions where flight by aircraft is prohibited. Such areas are established for security or other reasons associated with the national welfare. These areas are depicted on Sectional and VFR Terminal Area Charts and the Sectional and VFR Terminal Area Chart Legends.

2.9.1.2. **WARNING:** The dimensions of prohibited areas are frequently changed with little notice due to security requirements. Most notably are the prohibited areas in the Washington DC area. ***Pilots must check the NOTAMS carefully prior to each flight to***

***ensure they have accurate prohibited area dimensions.*** Aircraft that penetrate prohibited areas without authorization are generally intercepted and may be forced to land or fired upon.

2.9.1.3. Since flight within prohibited areas is not permitted at any time, there is no specific "controlling agency". Therefore, the charts will show "No A/G" in the communications area since no air-to-ground communications are available unless the owner of the prohibited area specifically requests otherwise.

2.9.1.4. There are specialized military flight operations allowed in prohibited areas, however, these are extremely restricted, regulated and confined to specific units and/or missions. If specifically tasked for one of these specialized missions, flight within the prohibited area is permitted IAW procedures specified in the mission documentation or local procedures.

**Figure 2.10. Prohibited Area.**


2.9.2. Restricted Areas (Figure 2.11.)

2.9.2.1. Restricted areas contain airspace identified by an area 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 by non-participating aircraft without authorization from the using or controlling agency may be extremely hazardous to the aircraft and its occupants. These areas are depicted on Sectional and VFR Terminal Area Charts and the Sectional and VFR Terminal Area Chart Legends.

2.9.2.2. When operating VFR in the vicinity of a Restricted Area, pilots must be cognizant of the location of Restricted Areas to avoid penetration. However, if the Restricted Area is not active and has been released to the FAA controlling agency, ATC will allow IFR and VFR-on-top aircraft to operate along a route in the Restricted Area without issuing a specific clearance to do so. If operating VFR in the vicinity of a Restricted Area, if in doubt as to the status of the Restricted Area, contact the appropriate

ATC facility to clarify its status prior to entering the airspace. ***If the Restricted Area is active, non-participating aircraft must remain clear of the area.***

**Figure 2.11. Restricted Area.**


2.9.3. Warning Areas (Figure 2.12.)

2.9.3.1. Warning Areas extend outward from three nautical miles from the coast of the U.S. They contain activity that may be hazardous to nonparticipating aircraft. The purpose of such warning areas is to warn nonparticipating aircraft of the potential danger. A warning area may be located over domestic or international waters or both. VFR aircraft are not specifically prohibited from entering active Warning Areas, however, to do so could be extremely hazardous to the aircraft or its occupants. Warning Areas are depicted on Sectional Charts and the VFR Terminal Area Chart Legends.

2.9.3.2. When operating VFR in the vicinity of a Warning Area, pilots must be cognizant of the location of the Warning Area to avoid penetrating it. When a Warning Area is active, non-participating aircraft are not prohibited from penetrating it since Warning Areas are largely in International Airspace. ***Unless the mission warrants, non-participating VFR USAF aircraft will not penetrate an active Warning Area unless in contact with the controlling agency.***

**Figure 2.12. Warning Area.**


2.9.4. Military Operations Areas (MOA) (Figure 2.13.)

2.9.4.1. MOAs consist of airspace of defined vertical and lateral limits established for the purpose of separating certain military training activities from IFR traffic. Examples of activities conducted in MOAs include, but are not limited to: air combat tactics, air intercepts, aerobatics, formation training, and low-altitude tactics.

2.9.4.2. VFR aircraft are not prohibited from entering an active MOA, however, to do so may be hazardous to the aircraft or its occupants. ***Non-participating VFR USAF aircraft will not penetrate an active MOA unless in contact with the controlling agency.***

2.9.4.3. The activity status (active/inactive) of MOAs may change frequently. Therefore, pilots should contact any FSS within 100 miles of the area to obtain accurate real-time information concerning the MOA hours of operation. Prior to entering an active MOA, pilots will contact the controlling agency for traffic advisories.

2.9.4.4. ***If military aircraft utilizing the MOA become aware of non-participating traffic transiting the MOA, the pilot/flight lead will keep the aircraft/formation well clear of the traffic.***

2.9.4.5. MOAs are depicted on Sectional and VFR Terminal Area Charts.

2.9.4.6. MOAs extend only to 18,000 MSL. In many areas, military operations are conducted in the Class A airspace over the lateral limits of the MOA, sometimes to FL 600. These areas are called Air Traffic Control Assigned Airspace (ATCAA) and can contain the same types of activities conducted in the MOA underneath. ATCAA airspace is not charted except in directives and agreements between the ATC facility and the local unit(s). When authorized to operate VFR in Class A airspace, use caution when operating over the lateral limits of an active MOA. ATC and the FSS can be an excellent source of information for non-participating aircraft on activity within the ATCAA.

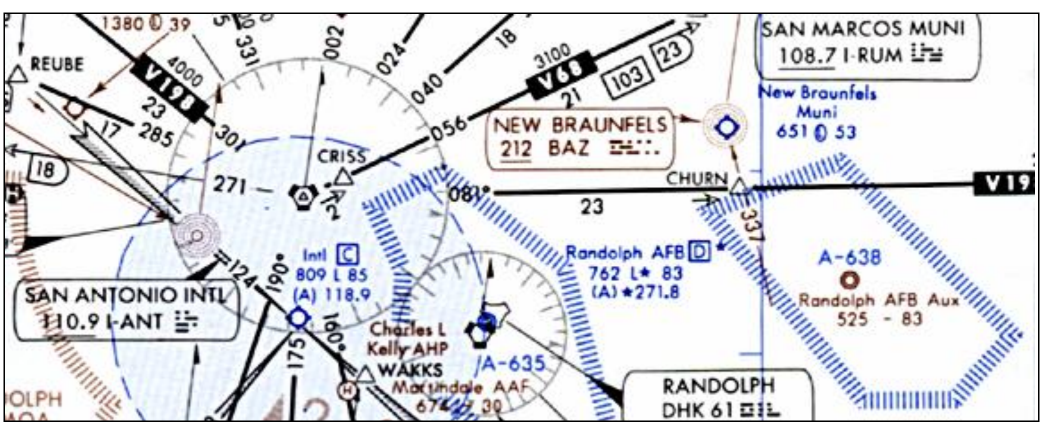
**Figure 2.13. Military Operating Area (MOA).**


2.9.5. Alert Areas (Figure 2.14.)

2.9.5.1. Alert areas are depicted on Sectional and VFR Terminal Area Charts to inform non-participating pilots of areas that may contain a high volume of pilot training or an unusual type of aerial activity. The depiction of an Alert Area is the same as a Prohibited or Restricted Area but will be prefaced with an A rather than a P or an R. Pilots should be particularly alert when flying in these areas.

2.9.5.2. Although there are no specific special procedures for flight in an Alert Area, pilots of participating aircraft as well as pilots transiting the area are equally responsible for collision avoidance. ***IAW AFI 11-202V3, when operating under VFR, pilots will utilize Flight Following or other radar services to the max extent practical.***

**Figure 2.14. Alert Areas.**



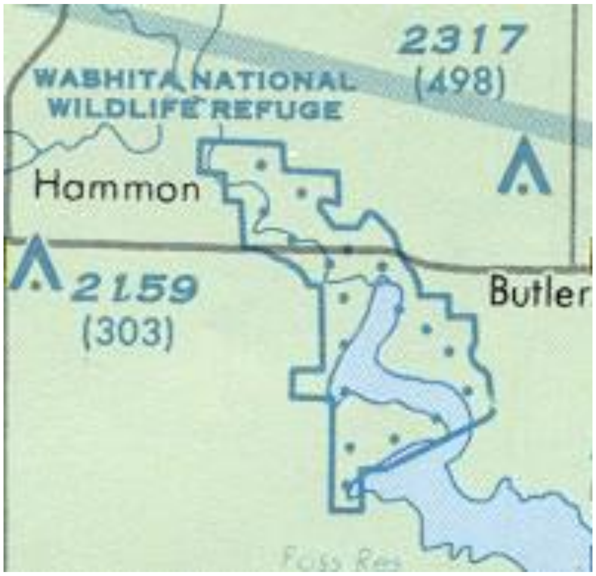

2.9.6. Controlled Firing Areas (CFA).

2.9.6.1. CFAs contain activities that, if not conducted in a controlled environment, could be hazardous to non-participating aircraft.

2.9.6.2. The distinguishing feature of the CFA, 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 CFAs since they do not cause a non-participating aircraft to change its flight path.

2.9.7. Wildlife and Recreation Areas (Figure 2.15.) While not necessarily "special use airspace" VFR pilots need to be aware of areas designated as Wildlife or Recreational Areas. Depicted on Sectionals and Tactical Pilotage Charts as a solid blue line surrounding a string of blue dots, these areas require a minimum AGL altitude of 2000 feet. These areas prevent disturbance to wildlife in noise sensitive areas. Avoid flight within these areas unless necessitated by an emergency.

**Figure 2.15. Wildlife or Recreation Area.**




## 2.10. Military Training Routes (MTR) (Figure 2.16)

2.10.1. The MTR program is a joint venture by the FAA and the Department of Defense (DOD). MTRs are developed for use by the military to conduct low-altitude, high-speed training. In general, routes above 1,500 feet AGL are developed for flight under IFR to the maximum extent possible. Routes at 1,500 feet AGL and below are generally developed for flight under VFR. NOTE: Slow Routes (SR) are not part of the MTR program. Great caution should be used in planning and flying SRs. Further information on SRs can be found in FLIP AP1/B. ***USAF pilots utilizing MTRs will follow coordination procedures found in AP/1B.***

2.10.2. In general, 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, climb-out, and mountainous terrain. IFR and VFR routes are designated as follows:

2.10.2.1. IFR Military Training Routes (IR). Operations on these routes are conducted in accordance with IFR regardless of weather conditions, unless otherwise specified in the route description. See AP/1B page 2-1 for further details on IR routes.

2.10.2.2. VFR Training Routes (VR). ***Operations on these routes are conducted in accordance with VFR 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.***

2.10.3. Charting. Military training routes are identified and charted as follows:

2.10.3.1. Route identification.

2.10.3.1.1. MTRs with no segment above 1,500 feet AGL are identified by four number characters; e.g., IR1206, VR1207.

2.10.3.1.2. MTRs that include one or more segments above 1,500 feet AGL are identified by three number characters; e.g., IR206, VR207.

2.10.3.1.3. 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.

**Figure 2.16. Military Training Route.**


2.10.3.2. Route charting.

2.10.3.2.1. IFR Low Altitude En Route Chart. This chart depicts all IR routes and all VR routes that accommodate operations above 1,500 feet AGL.

2.10.3.2.2. Sectional Charts. These charts will depict military training activities such as IR, VR, MOA, Restricted Area, Warning Area, and Alert Area information.

2.10.3.2.3. Area Planning (AP/1B) Chart (DOD FLIP). This chart is published by the DOD primarily for military users and contains detailed information on both IR and VR routes. DOD FLIP contains charts and narrative descriptions of these routes.

2.10.4. 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 any FSS within 100 nm of a particular MTR to obtain current information about route usage. 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 MTRs is also available in the FLIP AP/1B along with slow route/air refueling route 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 MTRs which could be a factor. NOTE: Information on slow routes and air refueling routes will not be available from the FSS.

**2.11. Airport Advisory Services.**

2.11.1. There are three advisory type services available at selected airports.

2.11.1.1. Local Airport Advisory (LAA) service is operated within 10 statute miles of an airport where a control tower is not operating but where a FSS is located on the airport. At such locations, the FSS provides a complete local airport advisory service to arriving and departing aircraft. During periods of fast changing weather the FSS will automatically provide Final Guard as part of the service from the time the aircraft reports "on-final" or "taking-the-active-runway" until the aircraft reports "on-the-ground" or "airborne." **NOTE:** Current policy, when requesting remote ATC services, requires that a pilot monitor the automated weather broadcast at the landing airport prior to requesting ATC services. The FSS automatically provides Final Guard, when appropriate, during LAA/Remote Airport Advisory (RAA) operations. Final Guard is a value added wind/altimeter monitoring service, which provides an automatic wind and altimeter check during active weather situations when the pilot reports on final or taking the active runway. During landing or take-off operations, when the winds or altimeter are actively changing, the FSS will broadcast significant changes in the blind if the specialist determines the change might affect the operation. Pilots should acknowledge the first wind/altimeter check but due to cockpit activity no acknowledgement is expected for the blind broadcasts. It is prudent for a pilot to report on-the-ground or airborne to end the service.

2.11.1.2. RAA service operates within 10 statute miles of specified high activity general aviation airports where a control tower is not operating. Airports offering this service are listed in the Enroute Supplement and the published service hours may be changed by NOTAM. Final Guard is automatically provided with RAA.

2.11.1.3. Remote Airport Information Service (RAIS) is provided in support of short term special events like small to medium fly-ins. The service is advertised by NOTAM only. The FSS will not have access to a continuous readout of the current winds and altimeter; therefore, RAIS does not include weather and/or Final Guard service. However, known traffic, special event instructions, and all other FSS services are provided.

2.11.2. USAF pilots are not required to participate in Airport Advisory Services, however, participation is highly recommended unless mission requirements dictate otherwise.

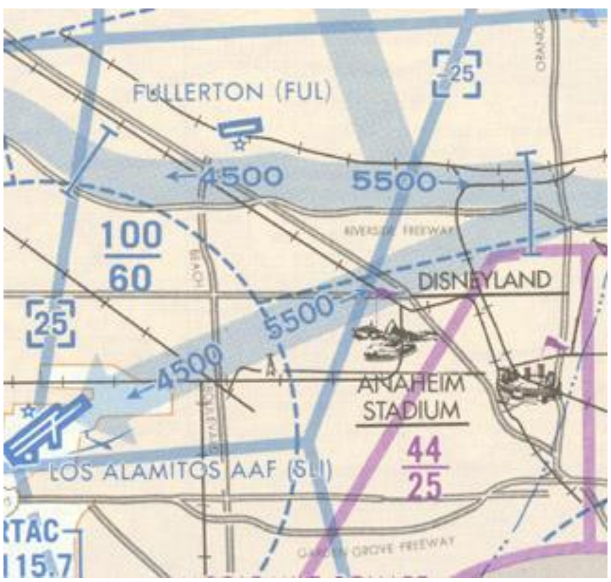
**2.12. Published VFR Routes.** Published VFR routes are designed for transitioning around, under and through complex airspace such as Class B airspace. All of the following terms, i.e., "VFR Flyway" "VFR Corridor" and "Class B Airspace VFR Transition Route" have been used when referring to the same or different types of routes or airspace. The following paragraphs clarify the functionality of each type of route and specify where and when an ATC clearance is required.

2.12.1. VFR Flyways. A VFR Flyway (Figure 2.17.) is a general flight path, not 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.

2.12.1.1. VFR Flyways are depicted on the reverse side of some of the VFR Terminal Area Charts. Eventually all Terminal Area Charts will include a VFR Flyway Planning Chart. These charts identify VFR flyways designed to help VFR pilots avoid major controlled traffic flows. For charting of VFR Flyways, see the Sectional and VFR Terminal Area Chart Legends. 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.

2.12.1.2. 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. Pilots must comply withVFR at all times while on a VFR flyway. Further, ***when operating beneath Class B airspace, communications must be established and maintained with all control towers while transiting the Class B, C, and D surface areas of those airports under Class B Airspace.***

**Figure 2.17. VFR Flyway.**

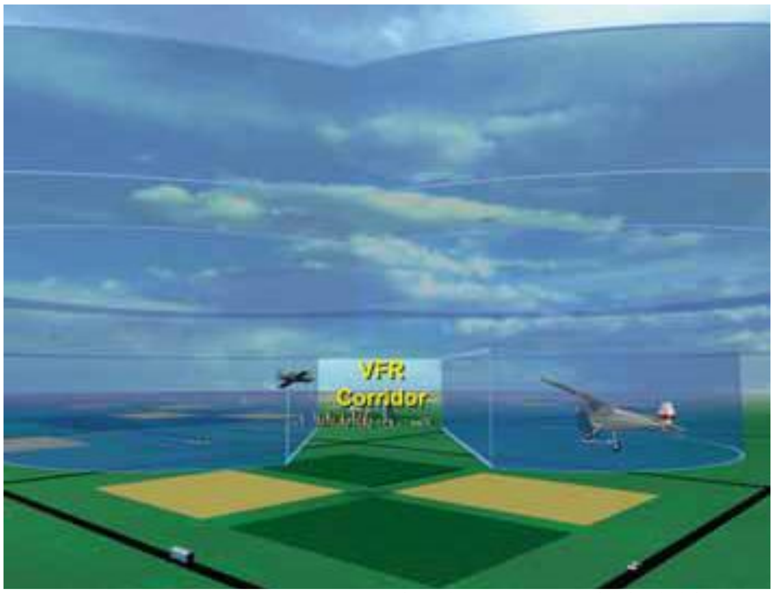



2.12.2. VFR Corridors (Figure 2.18.) The design of a few of the first Class B airspace areas provided a corridor for the passage of uncontrolled traffic. A VFR corridor is defined as airspace through Class B airspace, with defined vertical and lateral boundaries, in which aircraft may operate without an ATC clearance or communication with air traffic control. Charting of VFR Corridors is shown in the Sectional and VFR Terminal Area Chart Legends.

2.12.2.1. These corridors are, in effect, a "hole" through Class B airspace. 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.

2.12.2.2. 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.

**Figure 2.18. VFR Corridor.**



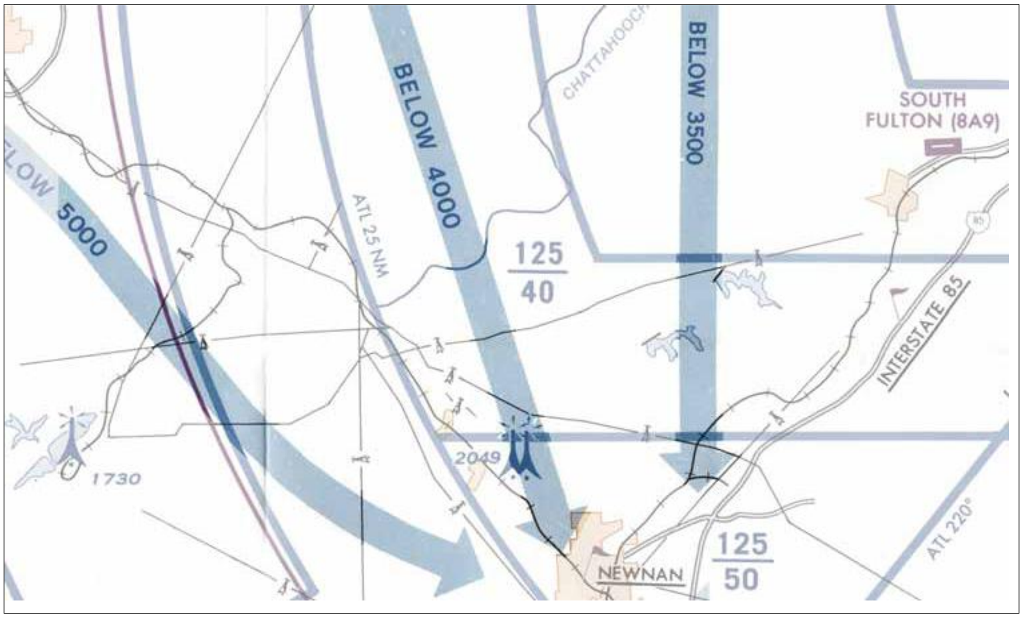

Graphic courtesy of AOPA ASF www.asf.org

2.12.3. Class B Airspace VFR Transition Routes. (Figure 2.19.)

2.12.3.1. To accommodate VFR traffic through certain Class B airspace, such as Seattle, Phoenix and Los Angeles, Class B Airspace VFR Transition Routes exist. A Class B Airspace VFR Transition Route is defined as a specific flight course depicted on a Terminal Area Chart for transiting 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.***

2.12.3.2. These routes, as depicted in the Sectional and VFR Terminal Area Chart Legends, are designed to show the pilot where to position the aircraft outside of, or clear of, the Class B airspace where an ATC clearance can normally be acquired 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, pilots must fly the route as depicted and, most importantly, adhere to ATC instructions.***

**Figure 2.19. Class B Airspace VFR Transition Routes.**



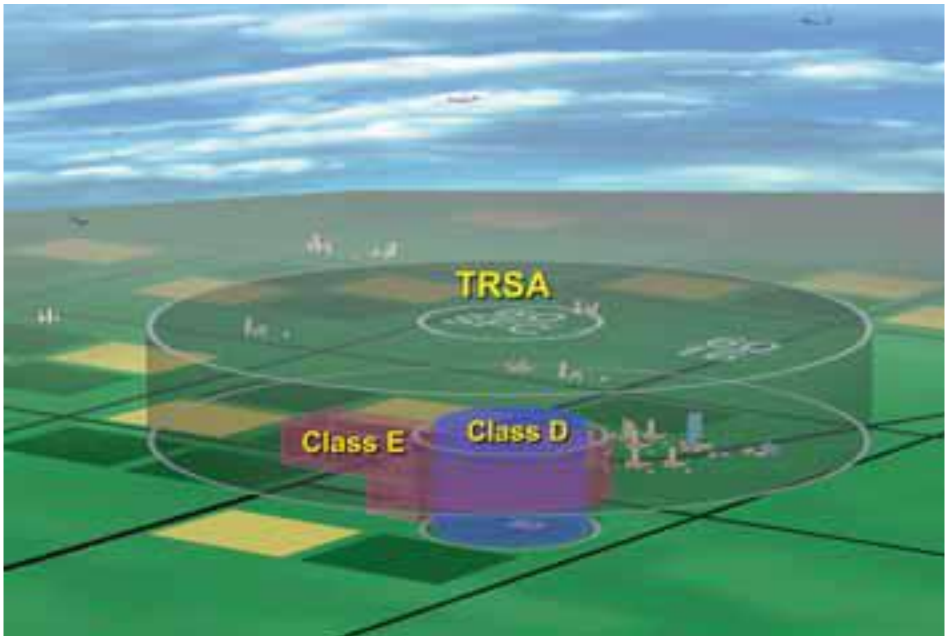

## 2.13. Terminal Radar Service Area (TRSA) (Figure 2.20).

2.13.1. TRSAs were originally established as part of the Terminal Radar Program at selected airports. TRSAs were never controlled airspace from a regulatory standpoint because the establishment of TRSAs was never subject to the rulemaking process; consequently, TRSAs are not contained in, nor are there any TRSA operating rules in the CFRs. Part of the Airport Radar Service Area (ARSA) program was to eventually replace all TRSAs with ARSAs (now designated Class C airspace). However, Class C requirements are relatively stringent and not all TRSAs met the traffic flow or passenger enplanement requirements to convert to an ARSA or Class C airspace, but still had sufficient traffic volume to justify radar services. Therefore, TRSAs do not fit into any of the U.S. airspace classes and TRSA services are voluntary. TRSAs are charted in the Sectional and VFR Terminal Area Chart Legends.

2.13.2. ***USAF pilots will use TRSA services when operating under VFR (when available) unless mission requirements dictate otherwise***.

2.13.3. No clearance is required to enter a TRSA. However, if the TRSA contains an airport with an operating control tower (normally the primary airport and possibly some secondary airports as well) then normal Class D procedures apply regardless of whether you choose to participate in TRSA services.

**Figure 2.20. Terminal Radar Service Area.**




Graphic courtesy of AOPA ASF www.asf.org

**2.14. Temporary Flight Restrictions (TFR).** TFRs can be established for a variety of reasons. Long-term TFRs may be charted on Sectional or VFR Terminal Area Charts however their dimensions frequently change. Some TFRs apply only to civil aircraft and others apply to all aircraft. Unauthorized aircraft penetrating TFRs are subject to being intercepted, forced to land, or may be fired upon. When operating IFR, ATC will generally keep aircraft from penetrating a TFR unless they are authorized to route non-participating aircraft through the area. ***When operating VFR, pilots will ensure the aircraft remains clear of the TFR unless authorized to enter.*** A thorough review of NOTAMs prior to each flight is essential to avoid inadvertent penetration of a TFR.

2.14.1. Some of the reasons for establishing a TFR include:

2.14.1.1. Protect persons and property on the surface or in the air from a hazard associated with an incident on the surface.

2.14.1.2. Provide a safe environment for the operation of disaster relief aircraft.

2.14.1.3. Prevent an unsafe congestion of sightseeing aircraft above an incident or event that may generate a high degree of public interest.

2.14.1.4. Protect inhabitants in a declared national disaster area for humanitarian reasons in the State of Hawaii.

2.14.1.5. Protect the President, Vice President, or other public figures.

2.14.1.6. Provide a safe environment for space agency operations.

2.14.2. Sample TFR

!FDC 7/5480 ZAU IL. FLIGHT RESTRICTIONS ARCOLA, IL. EFFECTIVE IMMEDIATELY UNTIL FURTHER NOTICE.

PURSUANT TO 14 CFR SECTION 91.137(A)(1) TEMPORARY FLIGHT RESTRICTIONS ARE IN EFFECT FOR HOSTAGE CRISIS.

ONLY RELIEF AIRCRAFT OPERATIONS UNDER DIRECTION OF ILLINOIS STATE POLICE ARE AUTHORIZED IN THE AIRSPACE AT AND BELOW 3000 FEET MSL WITHIN A 3 NAUTICAL MILE RADIUS OF 394103N/0881857W OR THE CHAMPAIGN /CMI/ VORTAC 182.0 DEGREE RADIAL AT 21.0 NAUTICAL MILES

ILLINOIS STATE POLICE, TELEPHONE 217-306-3527, IS IN CHARGE OF ON SCENE EMERGENCY RESPONSE ACTIVITY.

CHICAGO /ZAU/ ARTCC, TELEPHONE 630-906-8341, IS THE FAA COORDINATION FACILITY.

2.14.3. The NOTAM establishing the TFR will include the reason for establishing it.

2.14.3.1. When the reason for establishing the TFR is covered under 2.14.1.1., 2.14.1.2 or 2.14.1.4, only participating hazard relief aircraft under the direction of the official in charge of the on-scene emergency may fly in this area.

2.14.4. **NOTE:** If the aircraft is operating on an ATC approved IFR flight plan and receives an ATC clearance through the TFR then flight is permitted IAW the ATC clearance.

2.14.5. **NOTE:** If weather or terrain preclude avoidance of the area when operating under VFR directly to or from an airport in the TFR, and notification is given to the FSS or ATC facility designated in the NOTAM, then flight is permitted provided it does not interfere with relief operations and is not for sightseeing.

2.14.6. Except as noted in paragraph 2.14.3.1., aircraft must have a specific authorization to fly in a TFR. ***USAF aircraft shall have authorization from the appropriate authority prior to flight in a TFR.***

2.14.7. 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 3-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 a TFR NOTAM. Temporary flight restrictions affecting airspace outside of the U.S. and its territories and possessions are issued with verbiage excluding that airspace outside of the 12-mile coastal limits.

2.14.8. The FSS nearest an 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 on-scene emergency response official in cases where news media aircraft operations are approved at the altitudes used by relief aircraft.

2.14.9. ATC may authorize operations in a temporary flight restrictions area under its own authority only when flight restrictions are established for the reasons listed in 2.14.1.1. through 2.14.1.3. The appropriate ARTCC/airport 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.

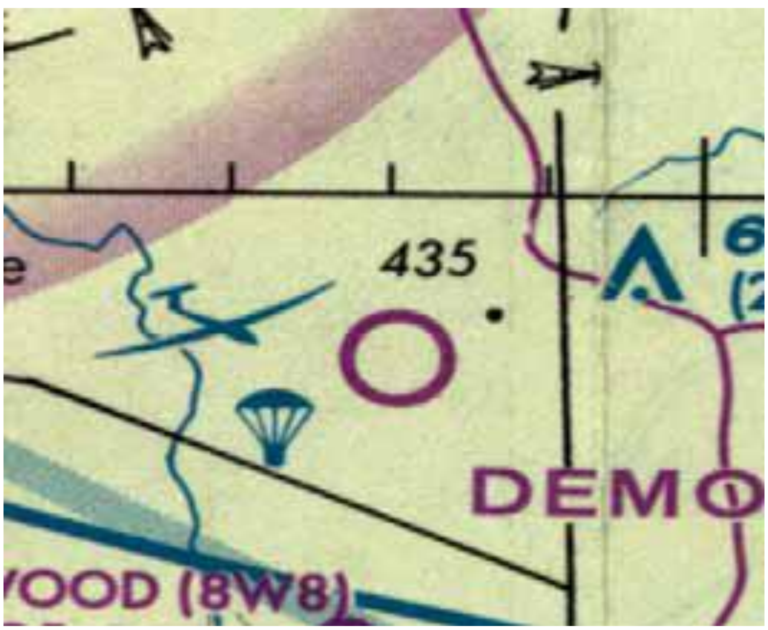
2.14.10. To preclude misunderstanding, the implementing NOTAM will contain specific and formatted information. The facility establishing a temporary flight restrictions area will format a NOTAM beginning with the phrase "FLIGHT RESTRICTIONS" followed by: the location of the temporary flight restrictions 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.

**2.15. National Security Areas (NSA).** National Security Areas consist of airspace of defined vertical and lateral dimensions established at locations where there is a requirement for increased security and safety of ground facilities. Pilots are requested to voluntarily avoid flying through the depicted NSA. When it is necessary to provide a greater level of security and safety, flight in NSAs may be temporarily prohibited. Regulatory prohibitions will be disseminated via NOTAM.

**2.16. Parachute Jumping Operations (Figure 2.21)**

2.16.1. Civil parachute jump areas are in the FAA Airport Facility Directory. They are also sometimes annotated on Sectional and VFR Terminal Area Charts as shown in the Sectional and VFR Terminal Area Chart Legends.

**Figure 2.21. Parachute/Glider Operations Area Depiction.**



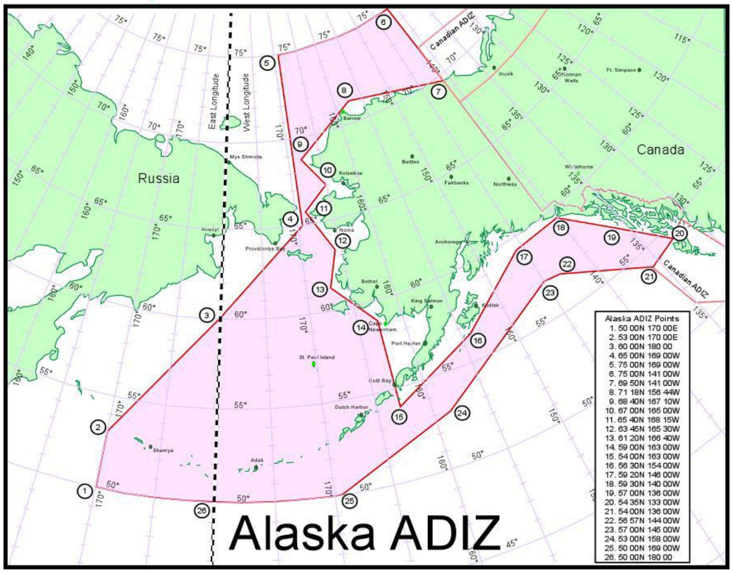

2.16.2. It is recommended that pilots of parachute jump aircraft avoid releasing parachutists while aircraft are in the traffic pattern and make broadcasts on the appropriate ATC frequencies. Prior to commencing a jump operation, the pilot should broadcast the aircraft's altitude and position in relation 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.

These calls are not mandatory. Pilots must exercise caution when operating in the vicinity of parachute jumping areas.

## 2.17. Air Defense Identification Zone (ADIZ) (Figure 2.22)

2.17.1. The ADIZ is an area of airspace over land or water in which the ready identification, location, and control of civil aircraft is required in the interest of national security. VFR operations are permitted in the ADIZ and are referred to as Defense Visual Flight Rules (DVFR).

**Figure 2.22. Air Defense Identification Zone (ADIZ).**




2.17.1.1. Although this definition states "civil aircraft", in reality all aircraft, whether civil or military must be positively identified. Consequently, civil DVFR procedures also apply to most military VFR operations as well. Specific exceptions are made for certain missions. These exceptions will be specifically authorized in the Air Tasking Order (ATO), Airspace Control Order (ACO), Special Operating Instructions (SPINS), Memorandum, or equivalent document.

2.17.1.2. ***Pilots will not deviate from normal DVFR procedures without authorization from a competent authority or risk interception***.

2.17.2. Operating Requirements.

2.17.2.1. ***A functioning two-way radio is required. Pilots must maintain at least a listening watch on the appropriate aeronautical facility frequency unless mission requirements dictate otherwise.***

2.17.2.2. ***For departures from an airport in the ADIZ, pilots must file a DVFR flight plan IAW FLIP GP and the aircraft must depart within five minutes of the estimated departure time in the flight plan unless mission requirements dictate otherwise.***

2.17.2.2.1. Unless otherwise authorized by ATC or mission requirements dictate, do not operate an aircraft into, within, or cross an ADIZ unless you file, activate, and close a flight plan with the appropriate aeronautical facility.

2.17.2.2.2. If the departure airport is within the Alaskan ADIZ and there is no facility for filing a flight plan, then immediately after takeoff, when within range of an appropriate aeronautical facility, comply with the above directions as appropriate, or proceed according to the instructions issued by the appropriate aeronautical facility.

2.17.2.3. ***Unless otherwise authorized by ATC or mission requirements, a functioning transponder with Mode C is required for flight in an ADIZ.*** **NOTE:** This does not apply to aircraft originally certificated without an engine driven electrical system and which has not subsequently been certified with such a system. This includes balloons and gliders.

2.17.3. DVFR Flight Procedures.

2.17.3.1. ***The pilot in command of an aircraft for which a DVFR flight plan has been filed shall file an arrival or completion notice with an appropriate aeronautical facility, unless the flight plan states that no notice will be filed or mission requirements dictate otherwise.***

2.17.3.2. Position reports for DVFR flights.

2.17.3.2.1. ***Prior to penetrating the ADIZ boundary, report to the appropriate aeronautical facility the following: Time, position, altitude at the last reporting point prior to penetration of the ADIZ, and next appropriate reporting point along the route.***

2.17.3.2.2. ***If there is no appropriate reporting point along the flight route, report the following 15 minutes prior to ADIZ penetration: estimated time, position, and altitude crossing the ADIZ boundary.***

2.17.3.2.3. ***If the airport is within the ADIZ or so close to the ADIZ boundary that it prevents compliance with the above paragraphs, report the following immediately after takeoff: the time of departure, altitude, and estimated time of arrival over the first reporting point along the flight route.*** **NOTE:** When mission requirements dictate and are authorized by appropriate authority, position reporting is not required when operating VFR in an ADIZ.

2.17.3.2.4. Position reporting tolerances. Position reports should be made within five minutes or less of the estimated time over each reporting point or point of penetration of an ADIZ or, in the case of a flight originating within an ADIZ, depart within five minutes of the proposed time of departure specified in the flight plan unless the actual time of departure is reported to an appropriate aeronautical facility.

2.17.3.3. Navigation tolerances. Maintain a distance of no more than ten nautical miles from the centerline of the route of flight if the flight is entering or operating within an ADIZ, or 20 nautical miles from the centerline of the route of flight if the flight is entering or operating within a coastal ADIZ or the Alaska ADIZ.

2.17.3.3.1. Aircraft flights that are operated in excess of specific tolerances are subject to interception to confirm their identity. The unnecessary dispatch of manned interceptors is costly to the United States and can be avoided by adhering to established DVFR procedures.

2.17.3.3.2. ***Do not deviate from the filed DVFR flight plan without notifying the appropriate aeronautical facility unless mission requirements dictate otherwise.***

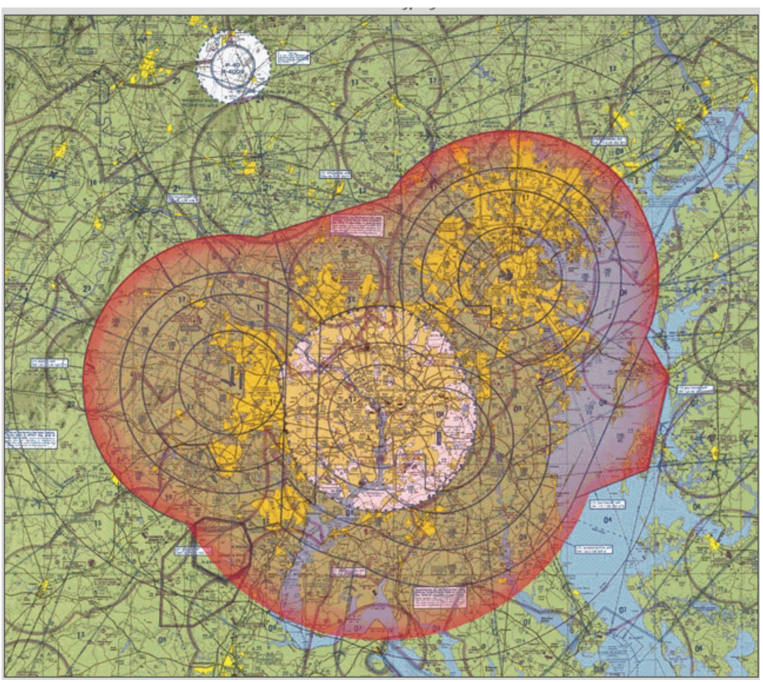
2.17.3.4. For radio failure when operating VFR in an ADIZ, consult the Flight Information Handbook (FIH). ***When operating under DVFR, proceed with the original DVFR flight plan OR land as soon as practicable. The pilot shall report the radio failure to an appropriate aeronautical facility as soon as possible.***

**2.18. Special Operating Procedures in the Vicinity of Washington DC.** The area surrounding Washington DC is designated as an SFRA and ADIZ (Figure 2.23.) where unique procedures apply. These procedures change frequently and are disseminated by NOTAM. All aircraft must comply with the special operating procedures or risk interception. ***Consult NOTAMS for "KZDC" prior to each flight in the vicinity of Washington DC for complete text of current flight restrictions.***

2.18.1. Military aircraft are not exempt from the requirements of the Washington DC ADIZ. It is essential that a thorough NOTAM review be conducted prior to any VFR flight inside or in the vicinity of the Washington DC ADIZ.

2.18.2. The Washington DC SFRA/ADIZ is charted on the Washington DC Sectional and VFR Terminal Area Charts. However, ***pilots must still consult the NOTAMS to verify the dimensions.*** Sectional and VFR Terminal Area Charts are only updated on a six-month cycle and dimensions could be outdated.

**Figure 2.23. Air Defense Identification Zone (ADIZ) (DC Area).**



# Chapter 3

# PLANNING A VFR FLIGHT

## 3.1. Altimeter Setting Procedures.

3.1.1. All altimeter setting procedures and information in AFMAN 11-217V1, as well as the FIH, apply to VFR flight.

3.1.2. When operating at uncontrolled or austere locations, ***use all means available to obtain a local altimeter setting prior to departure***. Some uncontrolled airports have automated weather reporting capability that includes altimeter setting.

3.1.2.1. At certain locations it may be possible to obtain a nearby altimeter setting. However, use caution as bodies of water, terrain, or meteorological phenomenon can cause significant local differences in altimeter settings over a short distance.

3.1.2.2. If no other means are available to obtain a local altimeter setting, set the airport elevation in the altimeter.

## 3.2. Route Development.

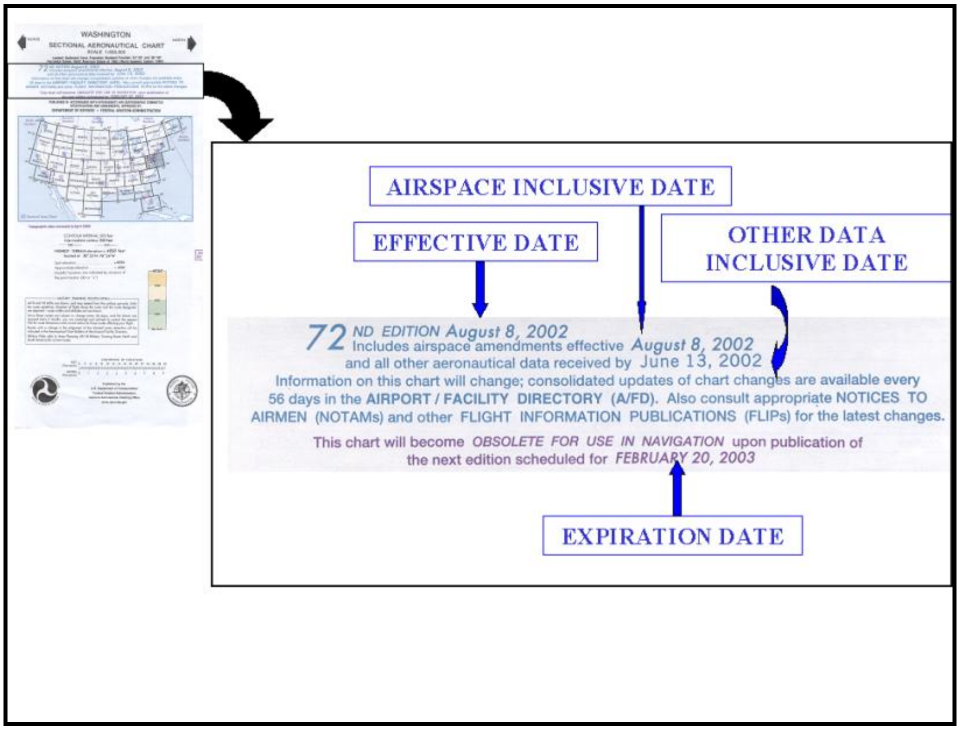
3.2.1. Chart Types and Their Use: ***Pilots flying VFR away from home station will have a properly annotated VFR chart, appropriate to the mission, readily available in the cockpit.***

3.2.1.1. Sectional Charts and VFR Terminal Area Charts. Sectional Charts and VFR Terminal Area Charts are published by the National Aeronautical Charting Office (NACO) and are approved by both DoD and the FAA for use during VFR navigation. Both are published on a six month cycle (12 months for selected Alaskan Sectional Charts). Expiration dates are staggered so not all charts expire on the same day.

3.2.1.1.1. Effective dates and expiration dates are shown on the front of the chart. (Figure 3.1.) Data on the front of sectional/VFR terminal area charts will include the latest airspace changes through the date annotated. Generally this date is the same as the effective date. Other data (obstacles, terrain, etc.) will be included through another date, generally about 2 months prior to the effective date. For this reason, ***pilots must review NOTAMs, the FAA Airfield Facility Directory, and the Chart Updating Manual (CHUM) for the latest aeronautical data prior to VFR flights.***

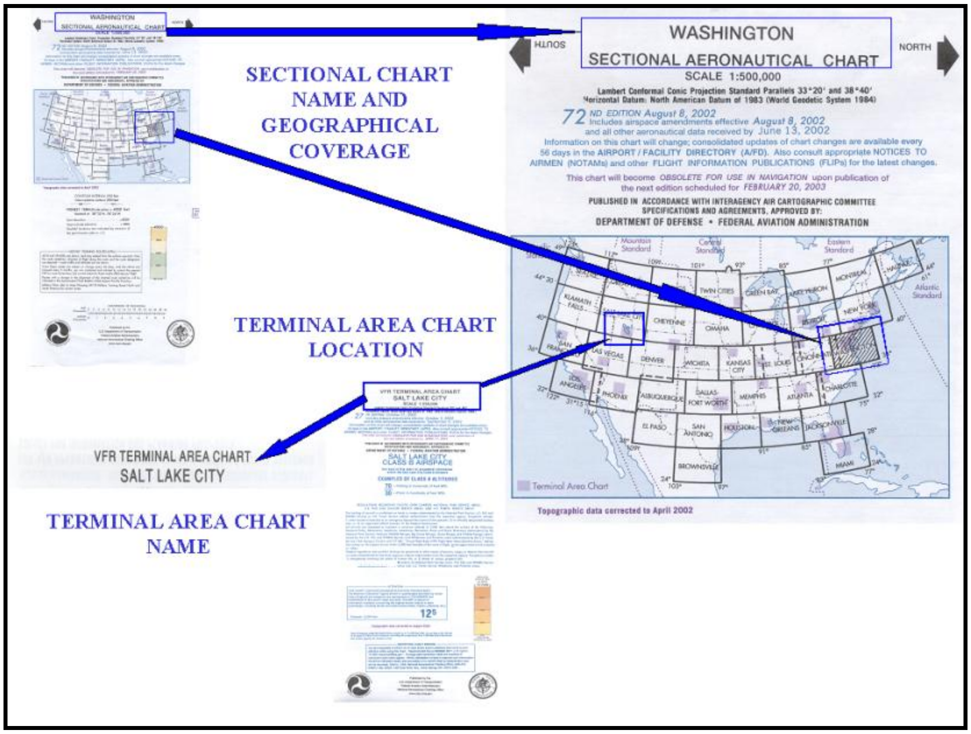
3.2.1.1.2. Most sectional charts are printed every six months; however, if a chart is more than eight weeks old, it probably isn't current. Aeronautical information changes frequently. ***All charts necessary for the mission will be updated with the most current information available***. To update sectionals, NACO publishes the Aeronautical Chart Bulletin in the back of each Airport/Facility Directory (AFD) every 56 days (also available online at **http://www.naco.faa.gov** under Aeronautical Charting/Free Downloads/VFR Chart Bulletins). Additionally, NACO maintains a comprehensive guide of aeronautical chart information (Aeronautical Chart User's Guide) available as a free download under the Aeronautical Charting/Freedownloads tab.

**Figure 3.1. Sectional/ VFR Terminal Area Chart Effective and Expiration Dates.**




3.2.1.1.3. The geographic area covered by a particular Sectional Chart (Figure 3.2.) is annotated on the front cover of the chart. Hash marks denote on the map the approximate area covered by a particular Sectional Chart. Terminal Area Charts are published for each Class B airspace area in the US. Terminal Area Charts are denoted by purple hash marks on the overall map of the US on the front cover of all Sectional Charts. Terminal Area Charts do not have this overall map of the US, only the name of the Terminal Area Chart.

**Figure 3.2. Sectional/VFR Terminal Area Chart Titles and Geographic Coverage.**

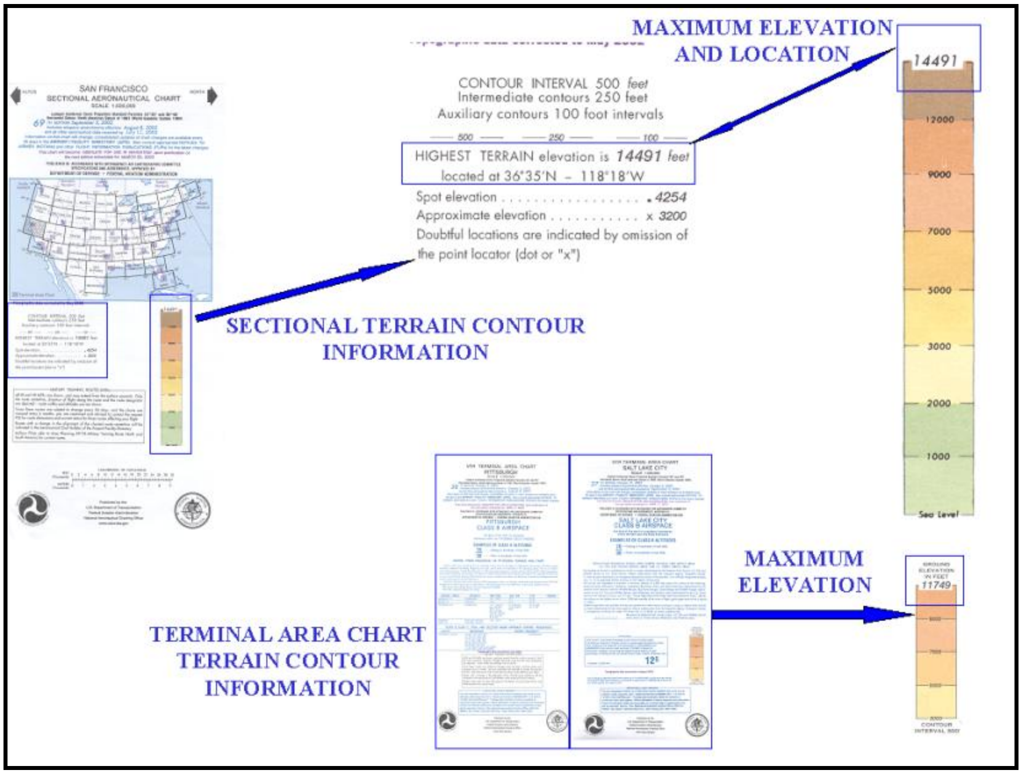



3.2.1.1.4. The front cover of the Sectional Charts shows the coloring of terrain contours (Figure 3.3.) depicted on that particular chart, along with the highest elevation on the chart with its geographic coordinates.

3.2.1.1.4.1. VFR Terminal Area Charts (TAC) provide greater detail and clarity of information than a sectional covering the same area.

3.2.1.1.4.1.1. The front of a TAC will show the area in great detail, including terrain features. The back of the TAC will exclude the terrain features and only show the airspace boundaries, navaids and prominent landmarks.

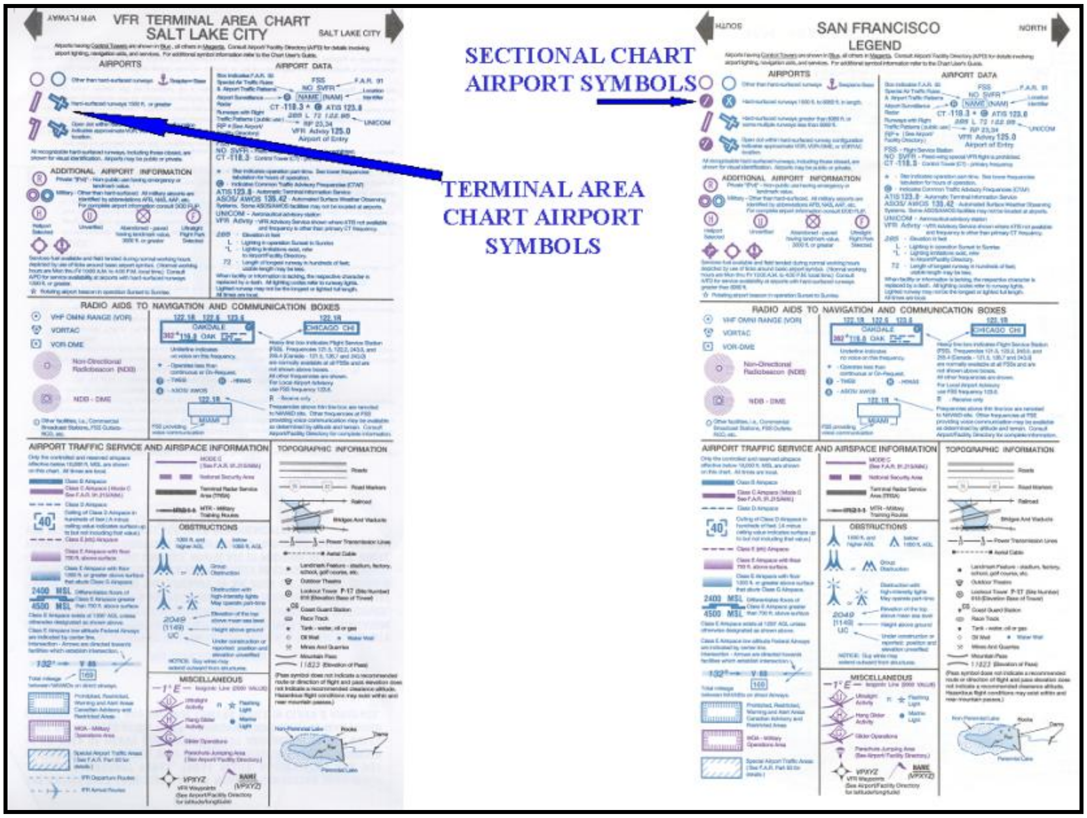
**Figure 3.3. Sectional/VFR Terminal Area Chart Terrain Contour and Maximum Elevation.**




3.2.1.1.5. The rear cover of Sectional Charts has a legend that depicts symbols used in Sectional Charts (Figure 3.4.) The rear cover of VFR Terminal Area Charts may depict symbols used on VFR Terminal Area Charts.

3.2.1.1.5.1. The legends are identical with one exception. Sectional Charts have additional symbology to differentiate airports with different runway lengths.

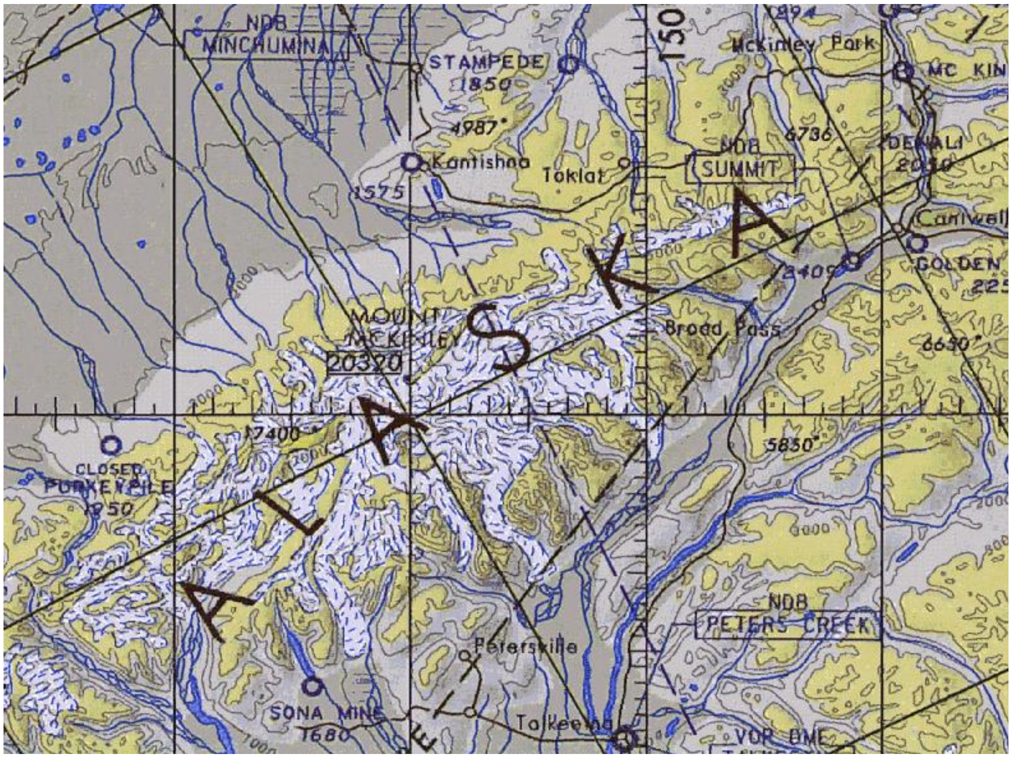
**Figure 3.4. VFR Terminal Area and Sectional Chart Legends.**




3.2.1.2. Chart Selection. Select charts (JNC, ONC, TPC, JOG, etc.) that satisfy navigational requirements and provide the desired detail commensurate with planned altitude and speed. Charts with a scale of 1:250,000 or greater detail are desired for low-level operations. Use a larger scale (i.e. 1:50,000) or greater to locate the objective. Use a prominent ground feature when changing between charts.

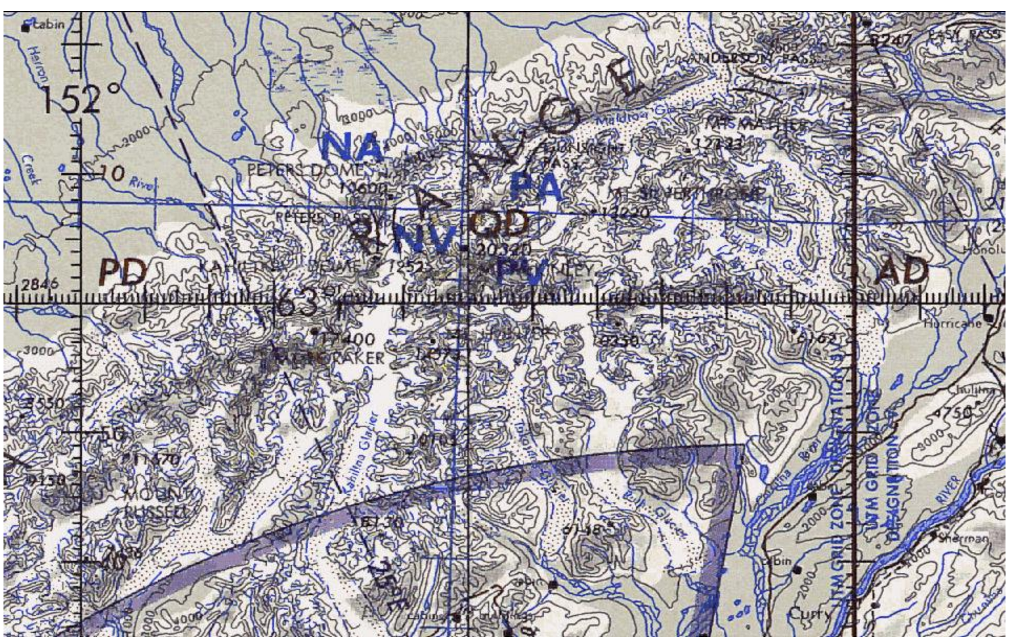
3.2.1.2.1. Jet Navigation Chart (JNC) (Figure 3.5.) A worldwide small-scale (1:2,000,000) aeronautical chart series. Used for high-altitude, high-speed, long-range navigation and planning.

**Figure 3.5. Jet Navigation Chart.**



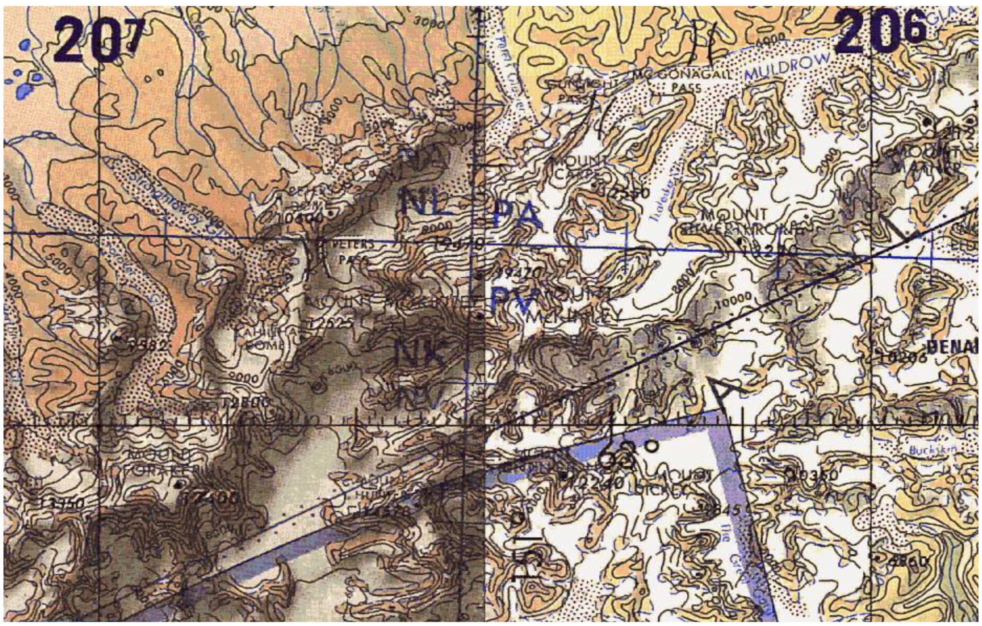

3.2.1.2.2. Operational Navigation Chart (ONC) (Figure 3.6.) The standard worldwide small-scale (1:1,000,000) aeronautical chart series. Contains cartographic data with an aeronautical overprint depicting obstructions, aerodromes, special use airspace, navigational aids, maximum elevation figures (MEFs), and related data. Designed for medium altitude high-speed visual and radar navigation.

**Figure 3.6. Operational Navigation Chart.**



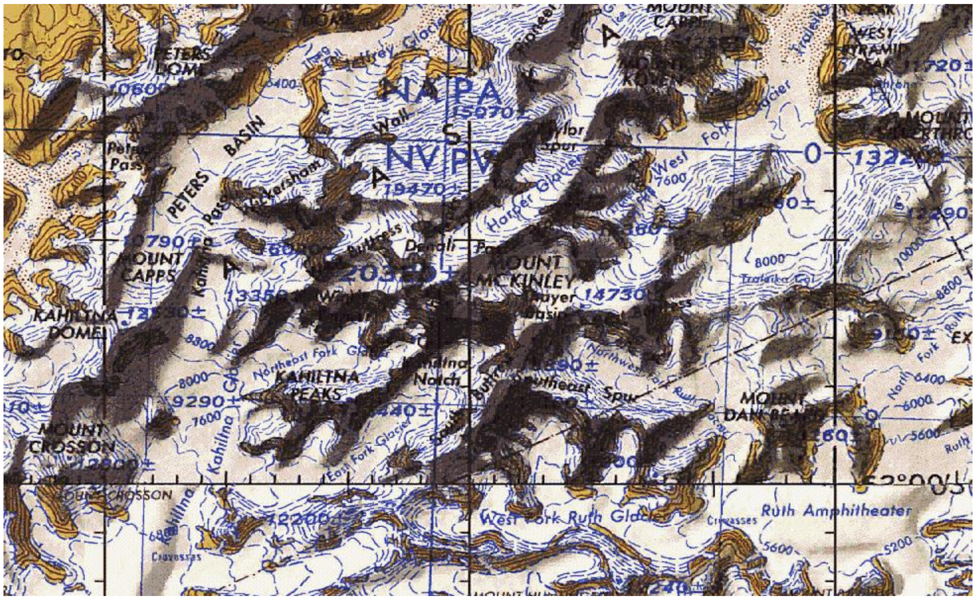
3.2.1.2.3. Tactical Pilotage Chart (TPC) (Figure 3.7.) The standard worldwide medium-scale aeronautical chart series (1:500,000). TPCs provide essential cartographic data appropriate to scale, and are overprinted with stable aeronautical information such as obstructions, aerodromes, special use airspace, navigational aids, MEFs, and related data. Overprint depicts obstructions, aerodromes, special use airspace, navigational aids and related data. A Military Grid is overprinted for joint interoperability. Designed for very low-altitude through medium-altitude high speed visual and radar navigation.

**Figure 3.7. Tactical Pilotage Chart.**



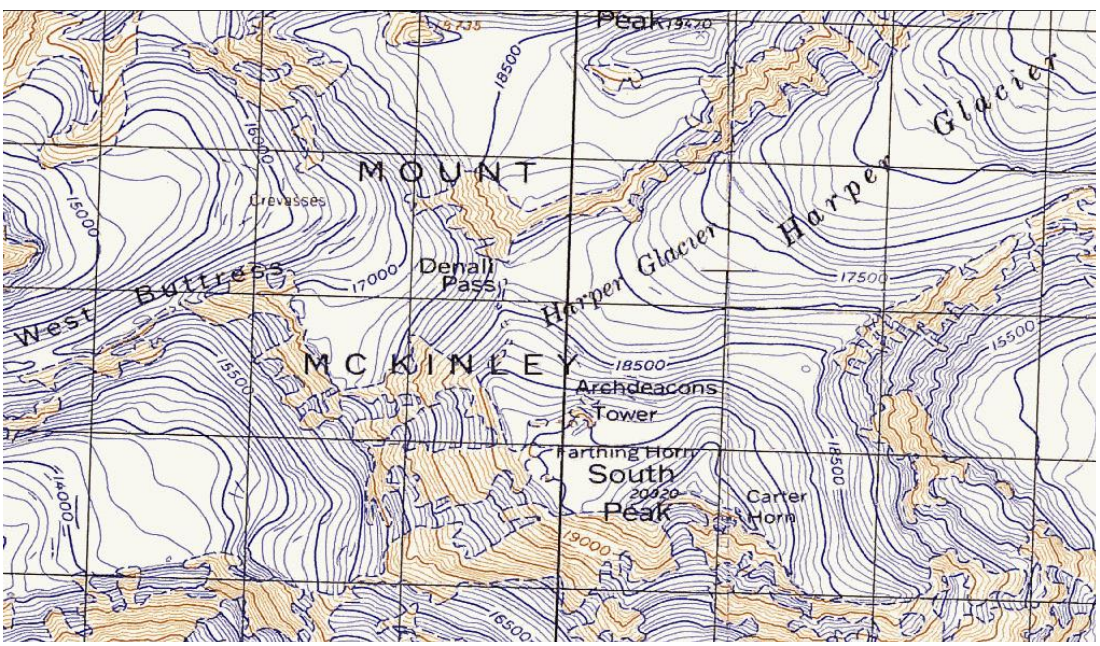

3.2.1.2.4. Joint Operations Graphic – Air (JOG-A) (Figure 3.8.) The standard DoD medium scale (1:250,000) chart. The JOG-A is a standard series modified for aeronautical use. The JOG-A displays topographic data such as: relief, drainage, vegetation, populated places, cultural features, coastal hydrography, aeronautical overprint depicting obstructions, aerodromes, special use airspace, navigational aids and related data. The JOG-A supports tactical and other air activities including low altitude visual navigation.

**Figure 3.8. Joint Operations Graphics.**




3.2.1.2.5. The 1:50,000 Topographic Line map (TLM) (Figure 3.9.) is a lithographic map that portrays the greater detail of topographic and cultural information. Relief is shown by contours and spot elevations measured in meters, feet or yards. The map is a true representation of terrain detail. Features are plotted to correct orientation and true location. The map depicts the level of detail required for detailed route and objective area study as well as foot navigation in the case of a survival or evasion situation.

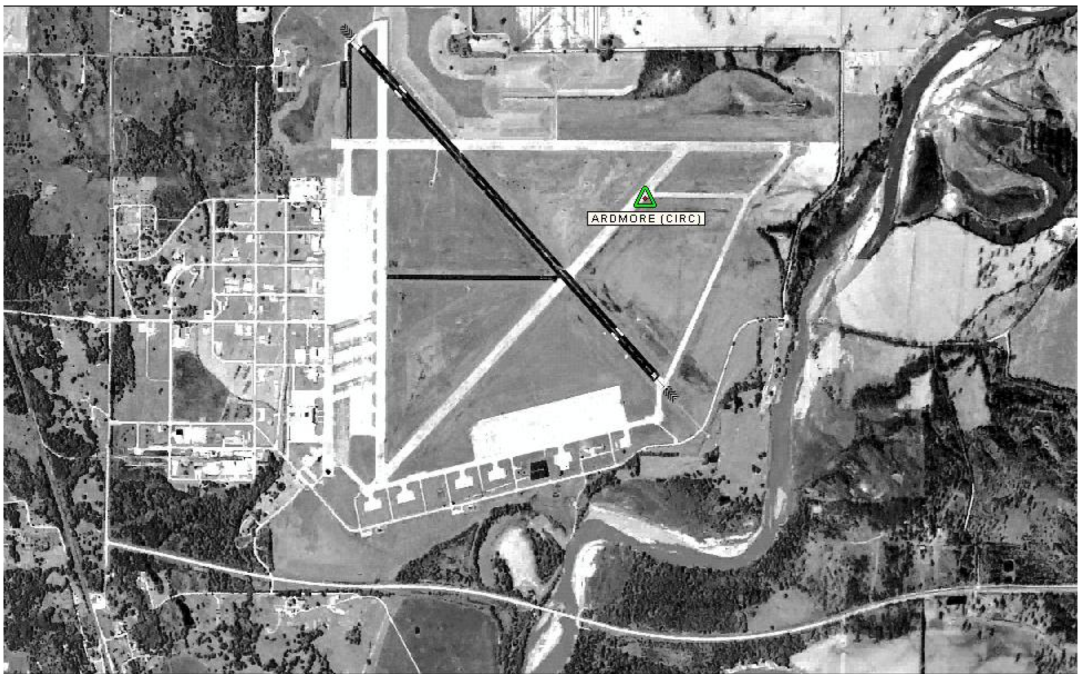
**Figure 3.9. Topographic Line Map.**



3.2.1.2.6. Modern computer flight planning software suites may be able to generate charts with even smaller scales, or digital/satellite-acquired images of ground features, and are useful for selecting specific identifiable features like the western edge of a dam, or a certain building along a road.

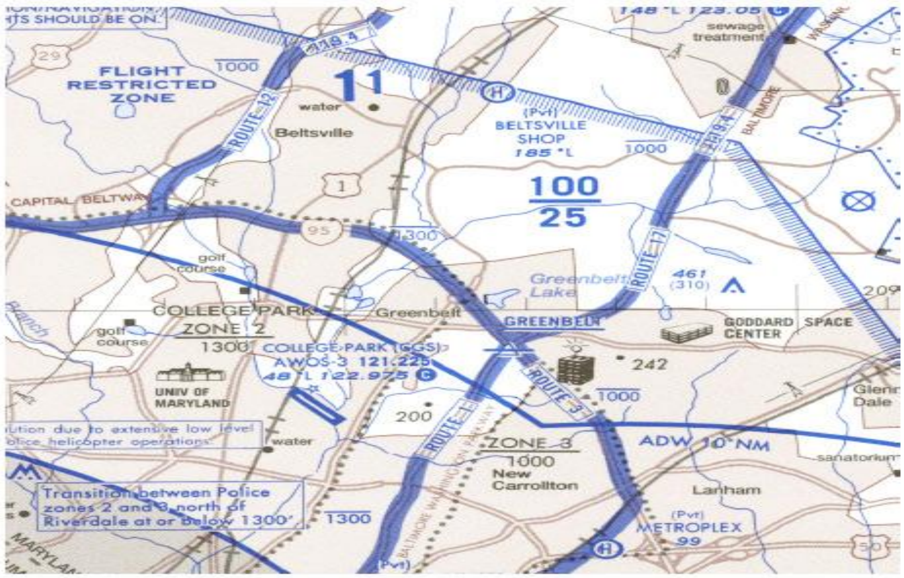
3.2.1.2.7. Satellite imagery provides the most accurate depiction of an objective area, allowing easier identification of terrain feature and natural and man-made landmarks. In Figure 3.10. a drop zone located at an airport includes an overlay of the planned point of impact.

**Figure 3.10. Satellite Drop Zone Imagery.**




3.2.1.2.8. VFR Helicopter Charts (Figure 3.11.) NACO publishes VFR Helicopter Charts for navigation in major cities with a high concentration of helicopter activity. Helicopter Charts are four-color charts depicting current aeronautical information (heliports, frequencies, lighting, NAVAIDs and obstructions) and items to aid VFR navigation (pictorial symbols, roads and easily identifiable geographical features).

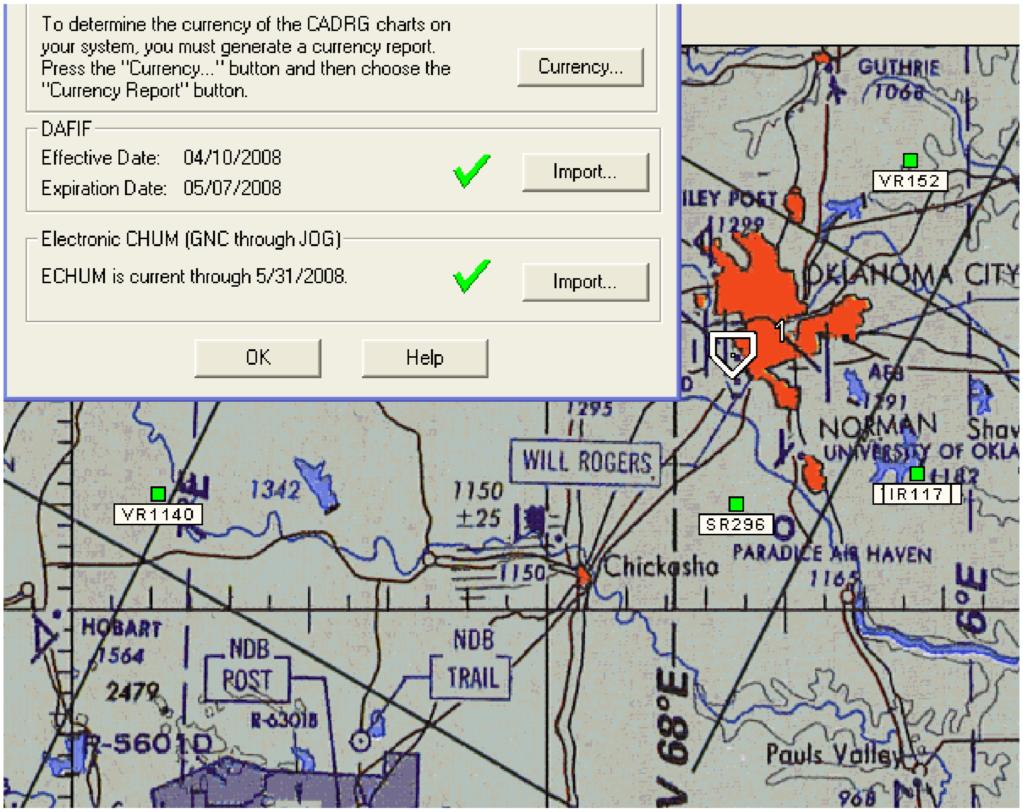
**Figure 3.11. VFR Helicopter Chart.**




3.2.2. Electronic Systems

3.2.2.1. Electronic Chart Updating Manual (E-CHUM) (Figure 3.12.) is an update to navigational charts that shows changes after the chart is released. Possible changes include new towers, lakes, roads, towns, etc. E-CHUM is available online by registering at **https://www.extranet.nga.mil** and selecting AERO Products on the Products and Services page. Follow online instructions to update the charts.

**Figure 3.12. E-CHUM.**




3.2.2.2. Portable Flight Planning Software (PFPS). A multifaceted software system designed for combat mission planning. As a stand-alone tool it can produce all materials (charts, flight plans, etc.) necessary to accomplish missions in any environment. The software supports air-to-air, air-to-ground, air refueling, electronic combat, reconnaissance, special operations, bombing missions from all altitudes and weapon release types, airlift, and rescue missions. PFPS is Microsoft Windows based and can operate from commercially available notebook computers.

3.2.2.3. The Air Force Mission Support System (AFMSS). A robust modular software and computer hardware suite that allows Air Force mission planners to go from the Air Tasking Order (ATO) to mission debrief in one all-inclusive process. The main tools available to the Air Force mission planner utilizing AFMSS are:

3.2.2.3.1. The Mission Planning System (MPS). Expands the capability of PFPS to integrate with theater battle management systems such as the ATO, threat analysis, intelligence and imagery updates, mission folder production, terrain based radar predictions, and terrain based perspective views.

3.2.2.4. Joint Mission Planning System (JMPS). The next generation of mission planning tools that will replace PFPS. Already in use by a limited number of weapon systems, JMPS includes a core software suite called the Joint Mission Planning Environment (JMPE) which combines with Unique Planning Component (UPC) software that supports a particular weapon system or user. JMPS will eventually support most of the aircraft in the DoD inventory as well as DoD sensor assets.

3.2.3. Sources of Airport Information (For departure/arrival/emergency airport information.)

3.2.3.1. FLIP

3.2.3.1.1. IFR Supplement. Contains reference data and flight procedures for airdromes across the United States. Information includes runway dimensions and capabilities, available aircraft services, communications, navigational aids, and various other airdrome details. All airports listed in the IFR Supplement will have at least one DoD published IAP and/or ASR/PAR minima.

3.2.3.1.2. VFR Supplement. Directory consisting of an airport sketch with supporting text of military and general aviation VFR airports (landplanes, seaplanes and heliports) selected by the respective military departments. Airports listed in the VFR supplement generally do not have instrument approach procedures available.

3.2.3.1.3. Instrument Approach Procedures. DoD instrument approach plate books contain airport diagrams that include useful information about the airport, its facilities, and the surrounding features. In general, the information in the IAPs should be a secondary or backup source of flight planning information.

3.2.3.1.4. The AP-1 series includes information about military low level routes (SR, VR and IR), airfield information (not available in the IFR Supplement) and information about nearby airspace (ranges and hazards).

3.2.3.2. Other Sources

3.2.3.2.1. Jeppesen publishes an Airport Information Directory (J-AID) that covers the entire US in a two-column format with detailed airport operation information, expanded airport remarks on FBO services, rental cars, lodging and restaurants. VFR airport diagrams are included.

3.2.3.2.2. The Airport Facility Directory (AF/D), published by the National Aeronautical Charting Office (NACO) is available online at **http://naco.faa.gov**. The AF/D may be useful in VFR flight planning if DoD materials don't contain the desired information.

3.2.4. Chart Building. Units may establish low-level surveyed routes or Low Altitude Tactical Navigation (LATN) areas IAW AFI 13-201, *Air Force Airspace Management.* MAJCOMS will publish standardized guidance on required chart information. ***All charts, including the master chart, will be updated with current DAFIF/E-CHUM and the date of the information will be annotated clearly on the charts. In the absence of MAJCOM guidance, VFR charts utilized by fixed wing aircraft will include, at a minimum: Course lines, magnetic heading, leg distance, and time for any segments flown below 1000' AGL.*** Helicopters may fly in an annually surveyed low level area with a current CHUM/E-CHUM above 200' AGL without the above chart requirements. ***Below 200' AGL on non-published routes, helicopters will comply with fixed wing chart requirements. MAJCOMs may approve use of AF Form 70 or equivalent navigation log when required. Note: If helicopter mission requirements dictate unplanned and uncharted routing, comply with AFI 11-2MDS-V3 chart requirements.***

**Figure 3.13. Sample Low Level Navigation Chart with Route.**


3.2.4.1. Turn Points. In tactical situations, avoid direct routes. Select turn points based on a balance between their ease of identification and the tactical situation. Label each turn point with the same identifier used in the flight plan.

3.2.4.2. Course Lines. Normally straight lines between points but may be “spaghetti” routing to take advantage of terrain masking. Different tactical situations will dictate different transitions from one course to another at the turn points. Examples of transitions include: Radius of Turn, Curved Path, or simple Point to Point.

3.2.4.3. Time, Distance, Fuel. Can be annotated in various ways on the chart and may show information just for the leg being flown or for the remainder of the route. Ensure that information does not cover up important map features. PFPS allows the user to set the transparency level of the “dog-houses” so chart details can still be seen through them.

3.2.4.4. Safe Altitudes. ***All charts must have Minimum Safe Altitudes (MSA) and at least one ESA (Also known as Emergency Route Abort Altitude or ERAA).*** An MSA is an initial VFR altitude that provides increased clearance from terrain or obstacles when dealing with minor circumstances that do not require an overall route abort. In the absence of more restrictive MAJCOM guidance, ***an MSA will be computed for each leg of the route by adding 500 feet to the highest obstruction to flight within 5 nm of route centerline to include the aircraft turn radius.*** ESA/ERAA is designed to provide positive IMC terrain clearance during emergency situations that require leaving the low-level structure. Planners may compute several ESAs for route segments transiting significant terrain differentials, or a single ESA for the entire low-level route. In the absence of more restrictive MAJCOM guidance, ***compute ESA by adding 1,000 feet (2,000 feet in mountainous terrain as defined in AFI 11-202V3) to the elevation of the highest obstruction to flight within 22 nm either side of the entire planned route. The ESA(s) will be computed for the route and conspicuously annotated on the chart.***

3.2.4.5. Emergency Diverts. When available and applicable, each route should include clearly highlighted airfields that may be used if an immediate landing situation occurs on the route.

3.2.4.6. Military Training Routes. To enhance scanning while flying the route, ***mission planners/pilots will annotate areas where IFR, VFR and slow speed low altitude routes (IR, VR, and SR) cross the planned route.***

**3.3. NOTAMS.**

3.3.1. Applicability of NOTAMs to VFR Flight. The FAA publishes NOTAMs IAW FAA Order 7930.2 (available under the Regulations & Policies tab at **http://www.faa.gov**). D NOTAMs are widely disseminated and available from any FSS. These NOTAMs include information pertinent to IFR and VFR operations. Examples of useful information to the VFR pilot include: taxiway closures, VASI outages, temporary obstructions on the airfield, etc. (L NOTAMS have been phased out and no longer exist as part of the FAA NOTAM system.)

3.3.2. Special Interest Items for VFR Flight

3.3.2.1. Tethered Balloons exist in various parts of the United States on cables that extend to altitudes greater than 10,000' AGL. Locations of these balloons are depicted as restricted areas on DoD IFR Enroute Low Altitude charts as well as FAA Sectional charts.

3.3.2.2. Glider and Parachute Operations are depicted with symbols on FAA Sectional charts. Glider or parachute activity may also be discussed in the IFR or VFR supplement or may be announced by NOTAM. If the airport where the activity originates is not in a supplement, a nearby listed airport may mention the activity. (e.g. Under El Paso Intl remarks: Sailplane and ultralight opr in vcnty of Horizon Arpt 8 nmNE of twy K1.)

3.3.2.3. Temporary Flight Restrictions (TFRs) are a type of NOTAM that defines an area restricted to air travel due to a hazardous condition (forest fire fighting area), a special event (Olympic Torch path), a national security area (Disneyland), or an FAA airspace general warning. A current list of TFRs can be found at **http://tfr.faa.gov**. This site lists the TFRs and provides links to charts, text descriptions of the TFRs, and other useful information.

**3.4. VFR Flight Plans.**

3.4.1. Transition from VFR-IFR and IFR-VFR. Information on how to file a composite (contains both IFR and VFR portions) flight plan is in FLIP GP Chapter 4. The main item of emphasis when transitioning between IFR and VFR is communication with ATC. If going from VFR to IFR, prior to the IFR segment, maintain VFR and contact the nearest FSS and request an IFR clearance. Once cleared by ATC to operate under IFR, cancel the VFR portion of the flight plan with a FSS. Conversely, if going from IFR to VFR, simply cancel IFR with ATC, then radio FSS and activate the VFR portion of the flight plan.

3.4.2. VFR-on-Top. IAW AFI 11-202V3, MAJCOMs may authorize VFR on Top operations if a specific mission dictates. VFR-on-Top is ATC authorization for an aircraft on an IFR clearance to operate at VFR altitudes while maintaining required VFR cloud clearances and continuing to comply with applicable instrument flight rules. VFR-on-Top does not necessarily require the existence of clouds below the aircraft. It is just another way of operating IFR, allows the pilot a wider choice of altitudes to fly, and puts the responsibility on the pilot to see and avoid other aircraft. VFR-on-Top operations will not be authorized in Class A airspace.

3.4.3. Defense VFR (DVFR). Allows aircraft to operate under VFR in the ADIZ. DVFR differs from VFR in that ***while operating DVFR in the ADIZ, the pilot must fly the flight-planned route unless otherwise cleared by ATC. Two way radio communications must be maintained and aircraft must have an operable transponder unless specifically cleared otherwise by ATC. No pilot may deviate from the filed DVFR flight plan unless that pilot notifies an appropriate aeronautical facility before deviating.***

## 3.5. Navigation.

3.5.1. Low Level Navigation. What constitutes "low level" will vary from one aircraft/mission to another. In general, consider any route flown below 1000' AGL as low level. Flight in this environment requires increased preflight preparation, route study, chart complexity and attention while flying. Terrain, man-made obstacles, birds, enemy activity and reduced time to deal with aircraft emergencies, all make the low-level environment a more intense place to operate. The ability to operate undetected by the enemy or defeat enemy weapon systems mitigates the increased risk and validates low level navigation as a viable Air Force tactic.

3.5.2. Terrain Masking/Contour Navigation. Aircraft operating in the low altitude environment may elect to enhance their threat avoidance capabilities by hiding their physical, radar, and heat signatures in the available terrain features. Along the low level route there may be vegetation or changes in elevation that can hide an aircraft from the enemy. Pilots should attempt to include terrain masking in their pre-flight route study so that off-course maneuvering does not negatively impact time over target (TOT) control. In some cases however, opportunities to terrain mask will not be evident until flying the route. Aggressive clearing and chart reading are essential to ensure that the benefits of terrain masking are not negated by unnecessarily increasing the overall risk factor of the mission.

3.5.3. Time Control. Various techniques are used to control arrival time over the objective area. These techniques can be as simple as changing airspeed or more complicated applications of off-route maneuvering. Use caution when departing the planned route of flight, especially at night, to avoid encountering obstacles or flying into known areas of enemy activity when employing off-route time control techniques. ***If the off-course maneuvering exits the MSA corridor, a new MSA must be computed.*** This can be done quickly by adding 500 feet to the charted maximum sector elevation(s) in the off-course maneuvering area.

# Chapter 4

# VFR DEPARTURE PROCEDURES

## 4.1. Communications Procedures.

4.1.1. ATC Clearances. ***Even when flying VFR, pilots will comply with ATC instructions when in controlled airspace.*** When able, activate the VFR flight plan and obtain flight following prior to departure. In some instances, radio contact with ATC will not be possible on the ground and the flight plan must be activated through a FSS once airborne. The FSS will notify the destination airport or servicing FSS of the ETA.

4.1.2. Transponder Operations. ***Pilots operating VFR in the NAS will squawk 1200 or an ATC assigned flight following code.***

4.1.3. Uncontrolled Airport Procedures It is very important when operating VFR from uncontrolled airports for pilots to be extremely vigilant for other aircraft both on the ground and in the air as well as other hazards to aircraft. When ready to depart, utilize the airport CTAF/UNICOM frequency to announce aircraft location, departure runway, intentions, and direction of flight after departure.

**4.2. Climb Gradients and Obstacle Clearance.** It is important to understand that even when operating under VFR, if departing an airfield with a published instrument procedure, unless specifically waived by the MAJCOM/A3, ***fixed-wing multi-engine aircraft must be able to meet, OEI, any published IFR climb gradient for the planned departure path, IAW AFI 11-202V3.*** Remember, flying under VFR in VMC does not bring your departure a level of safety equivalent to an instrument procedure or TERPS review. Adhering to instrument standards as reviewed by TERPS will produce quantifiable aircraft performance requirements that can be evaluated by the pilot during mission planning. Under VMC, there is no assurance obstacles can be avoided once identified in flight. If the airport has no published instrument procedure and weather conditions allow a VFR departure, MAJCOM guidance, aircraft flight manuals, operational risk management, and PIC discretion dictate whether aircraft performance and obstacles will permit a safe departure.

## 4.3. Contingency Procedures.

4.3.1. Aircraft Emergencies. ***Air Force pilots operating VFR must familiarize themselves with their departure airport in order to effectively deal with aircraft emergencies.*** Availability of emergency return runways (consider length, winds, barrier equipment, etc.), existence of hazardous obstructions, radio and ground based services, hot brake areas, arm/de-arm areas, etc. are all important items to know about the airfield prior to departure in case of an emergency return.

4.3.2. Encounter with IMC. Anticipate IMC and alter route of flight to maintain VFR unless safety dictates otherwise. ***If unable to maintain VFR the pilot must immediately coordinate an IFR clearance and cancel the VFR flight plan with ATC or a FSS.*** (Refer to paragraph 1.2.) Helicopters may request SVFR, where applicable, when the weather is below that required for the given airspace but above MDS-specific weather requirements. Limit the use of SVFR to mission essential as these procedures limit the traffic tower can allow in its airspace.

# Chapter 5

# VFR ENROUTE PROCEDURES

## 5.1. Communications Procedures.

5.1.1. ATC Clearances. When in controlled airspace, VFR pilots will comply with ATC instructions. ***If ATC clearances will cause an unsafe situation or cause the aircraft to enter IMC, notify ATC and request new instructions.***

5.1.2. Transponder Operations. ***VFR aircraft operating in the NAS (including SRs) will squawk either 1200 or an ATC assigned flight following code. VFR aircraft must still comply with TCAS RAs. Exception: Aircraft on a VR squawk 4000 (or ATC assigned code.)*** Aircraft operating in or near the Washington D.C. ADIZ/Special Flight Rules Area/Flight Restricted Area refer to appropriate publications for transponder procedures to prevent intercept.

5.1.3. ATC Services

5.1.3.1. Radar Assistance to VFR Aircraft. ATC may provide vectoring service to VFR aircraft. USAF pilots are encouraged to accept such assistance. Some ATCs have limited vectoring capability for weather avoidance, but the responsibility to remain in VFR conditions while on a VFR flight plan always belongs to the pilot.

5.1.3.2. Flight Following. If requested by the pilot and ATC workload and equipment capability permits, flight following services will be provided. ATC should provide separation from IFR traffic and participating VFR traffic. Even while participating in flight following, the ultimate responsibility for traffic separation rests with the pilot.

5.1.3.3. Flight Service Station. A Flight Service Station provides preflight briefings, NOTAMS, weather, flight plan filing, flight plan opening and closing, navaid monitoring, collection and dissemination of PIREPS, relay of information from ATC, traffic advisories (very general information, no radar capability), and emergency assistance. Flight Service Stations can be reached via land line at 1 800 WX BRIEF and by radio on frequencies published on FAA Sectionals and DoD Enroute charts.

5.1.3.3.1. Enroute Flight Advisory Services (EFAS), also called Flight Watch, provide enroute weather updates. They can be contacted on 122.0 MHz anywhere in the United States. Because some EFAS areas overlap, specify an EFAS on initial contact. EFAS, unlike ATC, can usually provide very good weather radar information. When calling Flight Watch, state the name of the Flight Watch station (normally the same name as the FSS), aircraft call sign, and aircraft location in relation to a navaid, airport, or town.

5.1.3.3.2. Hazardous Inflight Weather Advisory Service (HIWAS) is continuous weather information broadcast over selected VOR frequencies. VORs with HIWAS service are identified by a small solid square inside the VOR's frequency identification box. To listen to HIWAS information, turn up the volume on the VOR receiver just as if monitoring the VOR for identification.

5.1.3.3.3. Emergency Frequencies. If VFR and not in radio contact with ATC, emergency contact can be attempted on UHF Guard, 243.0 MHz or VHF Guard, 121.5 MHz. These frequencies should only be used for emergencies or to contact ATC when no other contact method is available.

5.1.3.3.4. Other Frequencies. For various reasons while flying under VFR, it may be necessary to contact a FSS or ATC facility (weather, change in destination, update an ETA, etc.) Carrying charts and other FLIP materials normally used for flight under IFR will prove very useful in such situations. Become familiar with the chart legends on Sectionals, VFR Terminal Area Charts, IFR Enroute Charts, as well as the VFR and IFR Enroute Supplements. Doing so will make locating required frequencies simple and fast. VHF 123.6 is a common airport advisory frequency.

5.1.3.3.5. Remote Communications Outlets (RCOs). Many FSSs are equipped with RCOs and can transmit and receive on more than one frequency at more than one location. To enable the FSS specialist to utilize the correct transmitter, broadcast "Any radio," aircraft call sign and the nearest navaid. RSOs use frequencies 121.5 and 255.4 as well as UHF and VHF Guard.

5.1.4. Uncontrolled Airspace Procedures. No ATC services are provided in Class G (uncontrolled) airspace. ***VFR pilots must maintain cloud clearances IAW AFI 11-202V3.*** Clear aggressively, listen for position reports of other aircraft, and monitor TCAS for traffic information.

**5.2. Enroute Navigation.**

5.2.1. Pilotage is the use of visual, radio, radar, GPS, etc. to navigate from one point to another while maintaining situational awareness. For VFR operations, Air Force crews typically navigate by referencing a route drawn on a chart, comparing it to landmarks on the ground while flying a precise heading and airspeed to stay on the route centerline. For a complete discussion on pilotage and clock-to-map-to-ground navigation, refer to Chapter 2 of this manual.

5.2.2. Terrain and Obstacle Avoidance. One of the single most important tasks for pilots flying VFR routes, especially at night or in marginal weather conditions, is to maintain situational awareness in relation to terrain and obstacles. A thorough preflight route study coupled with aggressive chart reading and clearing techniques will minimize the possibility of contacting terrain or obstacles. One technique that is very effective involves looking ahead on the chart as the aircraft joins a new leg of the route. Once on the leg and clear ahead, the pilot or crew should spend a brief period studying the chart for potential hazards and discuss plans to avoid them if necessary. If training or the tactical situation do not require flight at lower altitudes, flying the route at or above a computed MSA will negate most terrain and obstacles.

5.2.3. Military Training Routes (MTR) MTRs allow flight below 10,000 feet MSL at speeds greater than 250 KIAS. A description of the Military Training Route program can be found in AIM Chapter 3 *Military Training Routes*. Procedures for utilizing MTRs are found in *FLIP AP/1B Chapters 1 and 2*. A more detailed discussion of MTRs can be found in Chapter 2 of this manual.

**5.3. Contingency Procedures.**

5.3.1. Aircraft Emergencies. As with any aircraft emergency, the primary task of the pilot operating VFR is to maintain aircraft control and avoid terrain and obstacles. ***If an aircraft emergency occurs while operating in the low level environment, unless specific MDS procedures (i.e. helicopter precautionary landing) dictate otherwise, a climb to the MSA or higher will be initiated as soon as possible.*** The pilot must maintain situational awareness while dealing with the emergency. Clearing for other aircraft and knowing where the aircraft is in relation to obstacles, various types of airspace, and emergency divert airfields are critical to a successful recovery.

5.3.2. Lost Aircraft. If flying VFR using dead reckoning and you think you are lost, continue to navigate clock to map to ground and turn on time. Many times a slight off-course condition can be quickly corrected once on a new leg of the course with more prominent ground references. While doing this, climb to a higher altitude (weather permitting), being careful to maintain airspeed to preserve dead reckoning accuracy. This will conserve fuel while improving navaid and radio reception. Attempt to tune and identify navaids that can provide positional information and do not delay declaring your condition to ATC. If you find visual references that you recognize, make sure to use more than one thing to verify the reference for what it is. (e.g. airports, towers, lakes, etc.)

5.3.3. Route Abort. Various situations may make abandoning the route necessary (e.g. low fuel, aircraft emergency, bad weather, etc.) No abort will be the same and pilots must exercise good judgment when choosing a new altitude and route of flight. In most emergency situations, climbing to the ESA is the best course of action. Flying at the ESA will ensure that the aircraft is clear of obstructions and will minimize hazards to flight while abort procedures are applied. Aborting the route itself does not constitute an emergency and pilots must take all factors into consideration when deciding how to proceed after the abort.

5.3.4. Encounter with IMC. The key to dealing with IMC when flying VFR is early recognition and aggressive decision making. Pilots must remember that flying into IMC is not only prohibited while VFR, it immediately and dramatically increases the risk factor of the flight. At the first sign that the weather may prevent continued flight under VFR, unless safety dictates otherwise, alter the route to maintain VFR, decide what options remain for a destination, and, if required, coordinate an IFR clearance with ATC. ***If flying into IMC cannot be safely avoided before a safe landing can be made or gaining a clearance from ATC, climb immediately to the appropriate minimum safe altitude for the type of airspace***, utilize all tools available to keep clear of obstacles and other traffic (i.e. TCAS, radar, etc.) and continue to attempt contact with ATC for a clearance. If a landing is made off-airport (e.g. VTOL aircraft) without the permission of the property owner, note GPS position and notify your chain of command as soon as possible.

## 5.4. Low Level Time to Impact (TTI).

5.4.1. Time to Impact- Wings Level (Table 3.1.) At low altitudes, loss of situational awareness can lead to an insidious descent rate. As the following charts show, even a minor nose-low attitude can result in terrain impact in a very short time. With wings level, the time differences based on pitch, altitude, and airspeed are all linear. (e.g. Cutting the altitude in half or doubling the nose-low pitch angle will both cut the time to impact in half.) Historical data shows that while 90% of low level operations are straight and level, only 9% of low level accidents occur during straight and level flight. Conversely, turning and looking accounts for only 5% of low level flight but 52% of accidents. This demonstrates that clearing ahead for terrain must be a priority while maneuvering at low altitudes.

**Table 5.1. Time to Impact – Wings Level.**

| **Flight Path Angle = -1 Degree** | | | | |
|---|---|---|---|---|
| **Altitude** | **480 Knots** | **360 Knots** | **240 Knots** | **120 Knots** |
| | | | | |
| 100’ AGL | 7 Sec | 10.5 Sec | 14 Sec | 28 Sec |
| 300’ AGL | 21 Sec | 32 Sec | 42 Sec | 84 Sec |
| 500’ AGL | 35 Sec | 53 Sec | 70 Sec | 140 Sec |
| **Flight Path Angle = -2 Degrees** | | | | |
| **Altitude** | **480 Knots** | **360 Knots** | **240 Knots** | **120 Knots** |
| | | | | |
| 100’ AGL | 3.5 Sec | 5 Sec | 7 Sec | 14 Sec |
| 300’ AGL | 10.5 Sec | 16 Sec | 21 Sec | 42 Sec |
| 500’ AGL | 18 Sec | 25 Sec | 35 Sec | 70 Sec |

5.4.2. Time to Impact – Banked. The majority of low level accidents occur while the aircraft is in a bank. Even the smallest distraction or inattention to the proximity of terrain while maneuvering the aircraft can result in a loss of situational awareness and a fatal accident. The more bank used, the more Gs needed to maintain level flight. For instance, in 30° of bank, 1.15 Gs must be maintained in order to prevent a descent. In 60° of bank, 2 Gs are required. Above 60° the amount of Gs required to maintain altitude increases dramatically and it follows therefore that the descent generated by overbanking without holding the required Gs will be significant. At low altitudes this means a very short time to impact. The following chart (Table 3.2.) shows just how little time there is from 500’ if a pilot holds the Gs for one bank angle but flies in an overbanked condition. Considering that many aircraft fly low levels at 300’ AGL and normally use a 60° bank angle to turn from one course to another (or even higher bank angles during simulated threat avoidance), a 20° overbank error could result in less than 3 seconds time-to-impact. This demonstrates how critical it is for pilots to prioritize attention to flight parameters, terrain and cockpit duties. (Helicopters have additional flight characteristics to consider in banked flight. Refer to MDS specific flight manuals for cautions and warnings specific to banked flight at low altitudes.)

**Table 5.2. Effect of Overbank on Time to Impact.**

| | | **Intended Degrees of Bank** | | | |
|---|---|---|---|---|---|
| | | 30° | 45° | 60° | |
| **Degrees of** | 10° | **16.2 sec** | **12.7 sec** | **9.9 sec** | **Gnd TTI From** |
| | 15° | **12.9 sec** | **10.3 sec** | **8.0 sec** | |

| | | | | | |
|---|---|---|---|---|---|
| **Overbank** | 20° | **10.9 sec** | **8.8 sec** | **6.9 sec** | **500' AGL** |

# Chapter 6

# VFR ARRIVAL PROCEDURES

**6.1. Pilot Responsibilities.** ***Prior to descending into the airport area obtain an update to the weather forecast (if available).*** Ensure the field conditions will still permit a VFR arrival and consider a descent profile that will conserve fuel and allow for a stable approach to the intended landing surface.

**6.2. Communications Procedures.**

6.2.1. ATC Clearances. ***Class C, D and E (when in an airport traffic area) airspace procedures require pilots operating under VFR to maintain two-way radio communications with ATC.*** Two-way communication includes ATC using the VFR aircraft's call sign in the radio call. "Calling LUBBOCK Approach, stand by." for instance, does not qualify as two-way communications. ***Pilots must obtain a clearance into Class B airspace from ATC prior to entering Class B airspace.*** Sectionals and VFR Terminal Area Charts include flag symbols designating geographical points familiar to ATC around some Class B, C, and D airspace that allow VFR aircraft to make accurate initial position reports.

6.2.2. Transponder Operations. ***In the NAS, VFR aircraft will squawk 1200 unless assigned a transponder code by ATC. Aircraft operating in the Washington D.C. area must follow specific transponder procedures or risk intercept.***

6.2.3. Controlled Airport Procedures. When arriving at a controlled airport, contact ATC (Approach Control or the Tower) and advise them of call sign, position and intentions. Traffic permitting, ATC will normally allow a VFR aircraft to self-navigate to the landing runway. However, if traffic dictates otherwise, VFR aircraft can expect ATC to provide vectors and altitudes to maintain separation.

6.2.4. Uncontrolled Airport Procedures. Communication and clearing are paramount when operating into uncontrolled airfields. If unfamiliar with the airfield and preflight information is minimal, it may be prudent to fly over the airport and check the airfield for potential hazards prior to flying the approach and landing. Runway construction, vehicles, animals and various other obstacles and hazards may not be visible from the final approach point of view. See also Figure 6.1. for recommended communication at uncontrolled airports. When maneuvering in the VFR traffic pattern or taxiing, frequently broadcast position and intentions on the appropriate frequency (usually UNICOM or Common Traffic Advisory Frequency (CTAF).) For example, "Potosi traffic, TRACK 10, left base, runway 17 right, touch and go."

**Figure 6.1. Summary of Recommended Communication.**

| Communication/Broadcast Actions | | | | | |
|---|---|---|---|---|---|
| | **Facility at Airport** | **Frequency Use** | **Outbound** | **Inbound** | **Practice Instrument Approach** |
| 1. | UNICOM (No Tower or FSS) | Communicate with UNICOM station on published CTAF frequency (122.7; 122.8; | Before taxiing and before taxiing on the | 10 miles out. Entering downwind, | |

| | | | | | |
|---|---|---|---|---|---|
| | | 122.725; 122.975; or 123.0). If unable to contact UNICOM station, use self-announce on CTAF. | runway for departure. | base, and final. Leaving the runway. | |
| 2. | No Tower, FSS, or UNICOM | Self-announce on MULTICOM frequency 122.9. | Before taxiing and before taxiing on the runway for departure. | 10 miles out. Entering downwind, base, and final. Leaving the runway. | Departing final approach fix (name) or on final approach segment inbound. |
| 3. | No Tower in operation, FSS open | Communicate with FSS on CTAF frequency. | Before taxiing and before taxiing on the runway for departure. | 10 miles out. Entering downwind, base, and final. Leaving the runway. | Approach completed/terminated. |
| 4. | FSS Closed (No Tower) | Self-announce on CTAF. | Before taxiing and before taxiing on the runway for departure. | 10 miles out. Entering downwind, base, and final. Leaving the runway. | |
| 5. | Tower or FSS not in operation | Self-announce on CTAF. | Before taxiing and before taxiing on the runway for departure. | 10 miles out. Entering downwind, base, and final. Leaving the runway. | |

6.2.5. Closing VFR Flight Plans. VFR flight plans are not automatically closed. ***USAF pilots will notify ATC by any means available to ensure their VFR flight plan is closed.*** Failure to ensure a VFR flight plan is closed within ½ hour of the ETA will cause initiation of search and rescue efforts.

**6.3. VFR Helicopter Operations at Controlled Airports.** Helicopters should avoid the flow of fixed-wing aircraft traffic patterns unless they can maintain a compatible speed.

**6.4. Landing.**

6.4.1. Day. Use all available information (navaids, runway diagrams, terrain features, etc.) to ensure you are at the correct airport. There are many instances of very similar airports being located close to one-another resulting in aircraft landing at the wrong destination. (e.g. El Paso International and Biggs Army Air Field.) Use appropriate visual and instrument references (e.g. VASI, ILS) to help fly the approach. Many airports have visual illusions associated with certain runways that can be overcome by using these assets.

6.4.2. Night. Along with the techniques and recommended practices in the above paragraph, night VFR approaches require a thorough study of the final approach area. Darkness can mask terrain features and obstacles that may become a factor when flying a final approach at night. Pilots should also be aware of the “black hole” effect when flying a final turn type of approach to a runway with minimal surrounding cultural lighting. Because the runway will appear to rest in a black featureless plain, pilots tend to fly the final turn high and end up very steep once on final approach. This can result in high descent rates on final and potentially hard landings. Combat this effect by monitoring descent rates throughout the final turn and cross checking against visual glidepath guidance, if available. It is possible, especially at night, for IMC to become a factor without warning. ***If at any time visual conditions deteriorate and make a safe approach questionable, immediately perform a go-around and climb in the safest direction for obstacle and traffic avoidance. Contact ATC for an IFR clearance and instructions.***

# Chapter 7

# ICAO VFR PROCEDURES

## 7.1. Introduction.

7.1.1. Conventions. Variations to standard US VFR operations are published in the appropriate FLIP Area Planning (AP/1, 2, etc.) product. Variations include non-standard VFR cloud clearances, restrictions to VFR traffic in certain types of controlled airspace, VFR enroute altitudes, etc.

7.1.2. Compliance. ***In the absence of theater MAJCOM guidance, USAF pilots will review and comply with the applicable Area Planning product or host nation AIP for ICAO VFR.*** During contingency operations, theater MAJCOMs may produce variations to the VFR procedures in the SPINS, ACO, etc. (See Chapter 8)

**7.2. Operations in International Airspace.** ***Unless MAJCOM or contingency guidance specifies otherwise, pilots operating in international airspace will file an IFR flight plan (DD Form 1801) and comply with ATC instructions and procedures.*** The following discussion on Due Regard procedures covers the rare instances where IFR flight procedures conflict with the parameters of US Air Force missions.

7.2.1. Operating due regard can only be accomplished in international airspace. Full explanation of due regard operations can be found in DoD FLIP GP Chapter 8. Aircraft should normally adhere to ICAO procedures and control when operating in international airspace but if certain specific conditions are met, due regard may be utilized to accomplish the mission.

7.2.2. International airspace exists over the high seas at any point greater than 12 miles offshore of a coastal state. Some nations claim more than 12 miles offshore. Refer to diplomatic clearances and the Foreign Clearance Guide (FCG) for specific guidance on sovereign territory avoidance procedures.

7.2.3. Examples of situations where due regard is appropriate are: Military contingencies, classified missions, politically sensitive missions, routine aircraft carrier operations or other training activities. These are not all inclusive but give the general idea of the types of situations where due regard can be utilized. Due regard should not be used, for instance, because you are not happy with the routing you receive from air traffic control.

7.2.4. According to DoD FLIP GP 8-8, operations not conducted under ICAO flight procedures are conducted under the “Due Regard” or “operational” prerogative of military aircraft and are subject to one or more of the following conditions:

7.2.4.1. ***Aircraft shall be operated in Visual Meteorological Conditions; or***

7.2.4.2. ***Aircraft shall be operated within radar surveillance and radio communications of a surface radar facility; or***

7.2.4.3. ***Aircraft shall be equipped with airborne radar sufficient to provide separation between themselves, aircraft they control, and other aircraft; or***

7.2.4.4. ***Aircraft shall be operated outside controlled airspace.***

7.2.5. ***Flight under above provisions shall be regarded as deviations from normally accepted operating procedures and practices, and shall not be undertaken routinely. Except for missions preplanned to operate under due regard, pilots or Commanders exercising "Due Regard" authority shall record the details in writing, and upon request from higher authority, furnish a detailed report. (IAW AFI 11-202V3 1.7.2)***

**7.3. Altimeter Setting Procedures.** ATC terminology and procedures vary widely in ICAO nations regarding altitudes and altimeter setting procedures. Many nations give altitudes in meters instead of feet. Many give altimeter settings in millibars instead of inches. Additionally, the transition level where the standard altimeter setting is used varies widely from one country to another. In some cases the transition level/transition altitude may be below 3000 feet. Pilots must be aware of the altimeter procedures used by the country they will be operating in and if their instruments do not automatically convert between one convention and the other, they must have access to a method to make the conversion manually. Most importantly, pilots operating between countries that have significantly different altimeter procedures must be extremely vigilant for mistakes that might put the aircraft at risk.

7.3.1. QNE. Refers to operations where the altimeter is set to standard conditions of either 29.92 inches of mercury or 1013.2 hectopascals or millibars. This setting is normally used at and above the transition level and normally applies to IFR flight. However, in some countries the transition level is low enough that VFR flight may need to set QNE.

7.3.2. QNH. Local station pressure causes the altimeter to show the aircraft's height above Mean Sea Level. When on the ground, the altimeter should show the airport MSL elevation.

7.3.3. QFE. Local station pressure causes the altimeter to show the aircraft's height above airport elevation. When on the ground, the altimeter should read zero. Only used in a few countries but making a mistake flying VFR at night could result in less than desirable obstacle clearance.

**7.4. Airspeed Procedures.** As with other ICAO procedures, airspeed limitations for VFR aircraft vary widely from one country to the next. ***Pilots will refer to and comply with the FCG, appropriate FLIP Area Planning publications and/or any theater MAJCOM guidance to determine appropriate/maximum VFR airspeeds.***

**7.5. Communications Procedures.**

7.5.1. ATC Services. As indicated by the preceding information, VFR procedures in ICAO airspace can vary dramatically from one area to another. In general, aircraft can expect that ATC involvement under VFR will be much more prevalent in ICAO airspace than in FAA airspace. Just as in FAA airspace, aircraft operating under VFR in ICAO airspace are still required to comply with ATC instructions.

7.5.2. Uncontrolled Airspace. ATC separation is not provided but traffic information may be given if practical. Class G airspace exists where ATC does not have radar or radio coverage. Therefore, pilots operating under VFR in Class G airspace must be particularly vigilant and use all available resources to see and avoid other air traffic.

7.5.3. Transponder Operations. The VFR squawk in ICAO airspace is 7000. In general, this is only used in uncontrolled airspace. While under VFR in any ICAO controlled airspace, aircraft will normally be in contact with ATC on an ATC assigned squawk.

# Chapter 8

## THEATER AND CONTINGENCY OPERATIONS

**8.1. Contingency Operations.** Due to wartime or contingency conditions, flight under VFR in foreign airspace may be altered by theater commanders in order to enhance mission capability, improve flexibility, or deconflict various weapon systems operating in confined airspace. ***Pilots must have a thorough knowledge of all theater-specific rules governing VFR flight and must frequently review the SPINS, ATO, ACO, FCIF, and other MAJCOM guidance to ensure safe and effective mission accomplishment.***

**8.2. Special Instructions (SPINS).** Similar to Rules of Engagement (ROE), SPINS define the theater-specific guidance. With respect to flight under VFR, the SPINS may alter the normal VFR procedures that exist in a country during non-contingency operations. Failure to study and apply the information found in the SPINS may result in unsafe or illegal conduct punishable by the UCMJ.

**8.3. Local Directives.** Despite contingency guidance for VFR flight, pilots must still be aware of local directives governing VFR flight that are not covered or changed by MAJCOM publications. Avoiding noise or culturally sensitive areas and complying with host nation rules when they don't conflict with approved MAJCOM deviations will foster good will between nations and further enhance the US Air Force mission.

**8.4. Air Tasking Order (ATO).** The Air Tasking Order contains individual aircraft mission taskings listed chronologically for a single day. Each item on the ATO will have various details depending on the mission. In the following example, the listings are for several four-ship flights of A-10s and F-15s. Figure 8.1 is notional and exists purely as an example. Working with the mission planning cell or tactics office to learn how to read or "break out" an ATO is an important operational skill that can enhance flexibility, mission effectiveness and ability to interact with other theater assets.

**Figure 8.1. Sample ATO.**

```
FAA000 UNCLAS EXER//
MSGID/ATOCONF/SOUTHAF/AOC//
PERID/OOOOOOZ/TO:OOOOOOZ//
AIRTASK/BREAKING THE ATO//
 TASKUNIT/353TFS//
MSNDAT/AF003/-/GMAN11/4XA10A/GCAS/15M/A1/-/31511-//
TGTLOC/-/-/-/-//
AMPN/SEE UNIT REMARKS 1,2,3 ACEMAKER//
MSNDAT/AF004/-/GMAN15/4XA1OA/GCAS/15M/A1/-/31515/-//
TGTLOC/-/-/-/-//
AMPN/SEE UNIT REMARKS 1,2,3, ACEMAKER//
MSNDAT/AF005/-/GMAN21/4XA10A/GCAS/30M/A1/-/31521/-//
TGTLOC/-/-/-/-//
AMPN/SEE UNIT REMARKS1,2,3, ACEMAKER//
MSNDAT/AF001/-/GMAN01/4XA1OA/CAS/-/A1/-/31501/-//
TGTLOC/121330Z/121350Z/B1234-12345/FTAFLD/303645.7N1202739.1W/123B/BOMB DUMP//
AMPN/SEE UNIT REMARKS 1,2,3, ACEMAKER//
MSNDAT/AF002/-/GMAN05/4XA1OA/CAS/-/A1/-/31505/-//
TGTLOC/121530Z/121550Z/B123412345/FTAFLD/303645.7N1202739.IW/124B/BOMB DUMP//
AMPN/SEE UNIT REMARKS 1,2,3, ACEMAKER//
TASKUNIT/59TFS//
MSNDAT/FT0011/-/GLIDER01/4XF15/DCA/-/D5/-/31401/-//
TGTLOC/-/-/-/-//
AMPN/SEE UNIT REMARKS 1,2,3 ACEMAKER//
MSNDAT/FT0015/-/GLIDER05/4XF15/DCA/-/D5/-/31405/-//
TGTLOC/-/-/-/-//
AMPN SEE UNIT REMARKS 1,2,3, ACEMAKER//
RMKS//
```

**8.5. Airspace Control Orders (ACO).** The Airspace Control Order (Figure 8.2.) is published either as a separate document or as part of the ATO and is the primary means of the airspace control authority in various theaters to disseminate approved airspace control measures. The ACO complements the ATO cycle and may be published several times daily. The ACO is developed by the airspace control center of the TACC. With respect to VFR, it is important to realize that ACO operations may resemble IFR and VFR simultaneously. The routing through portions of the airspace may be very structured like an IFR airway. Yet the pilot may be operating autonomously with some flexibility in altitude, maneuvering and need to employ see-and-avoid. Pilots must be very familiar with the rules of the airspace they are utilizing (which may differ from the rules that applied to that same airspace on previous editions of the ACO) as well as the times they are authorized to use the airspace and the times it is authorized for missions ahead of and behind them.

**Figure 8.2. Airspace Control Order Format.**

| | |
|---|---|
| **LINE 1** -- DATE AND TIME______________________________ | (DTG) |
| **LINE 2** -- UNIT______________________________ | (Unit Making Report) |
| **LINE 3** -- AIRSPACE______________________________ | (Type of Airspace) |
| **LINE 4** -- NUMBER ______________________________ | (Name or Serial Number of Area) |
| **LINE 5** -- FROM______________________________ | (DTG Area to be Established) |
| **LINE 6** -- UNTIL______________________________ | (DTG Area to be Disestablished) |
| **LINE 7** -- ACTION______________________________ | (Type Action: ESTABLISH or CANCEL) |
| **LINE 8** -- SERIAL NUMBER______________________________ | (ACO Serial Number) |
| **LINE 9** -- AREA______________________________ | (Description of the Area to be Defined (Boundary or Circle)) |
| **LINE 10** -- COORDINATES______________________________ | (UTM or Six-Digit Grid Coordinate With MGRS Grid Zone Designator) |
| **LINE 11** -- WIDTH/RADIUS______________________________ | (Width or Radius) |
| **LINE 12** -- LOWER______________________________ | (Lower Altitude of Designated Area to Nearest 100 Feet or Ground Level) |
| **LINE 13** -- UPPER______________________________ | (Upper Altitude of Designated Area to Nearest 100 Feet) |
| **LINE 14** -- CONTACT______________________________ | (Call Sign of Control Agency) |
| **LINE 15** -- PRIMARY______________________________ | (Primary Frequency or Frequency Designator) |
| **LINE 16** -- SECONDARY______________________________ | (Secondary Frequency or Frequency Designator) |
| **LINE 17** -- NARRATIVE______________________________ | (Free Text for Additional Information Required for Clarification of Report) |
| **LINE 18** -- AUTHENTICATION______________________________ | (Report Authentication) |

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DCS, Operations, Plans and Requirements

## Attachment 1

## GLOSSARY OF REFERENCES AND SUPPORTING INFORMATION

***References***

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***Abbreviations and Acronyms***

**AC**—Advisory Circular

**ACO**—Airspace Control Order

**ADIZ**—Air Defense Identification Zone

**AFB**—Air Force Base

**AFD**—Airport Facility Directory

**AFI**—Air Force Instruction

**AFMAN**—Air Force Manual

**AFMSS**—Air Force Mission Support System

**AFPD**—Air Force Policy Directive

**AFTTP**—Air Force Tactics, Techniques and Procedures

**AGL**—Above Ground Level

**AIM**—Aeronautical Information Manual

**AIP**—Aeronautical Information Publication

**AP**—Area Planning

**ARSA**—Airport Radar Service Area

**ARTCC**—Air Route Traffic Control Center

**ASR**—Airport Surveillance Radar

**ATC**—Air Traffic Control

**ATCAA**—Air Traffic Control Assigned Airspace

**ATIS**—Automatic Terminal Information Service

**ATO**—Air Tasking Order

**AWOS**—Automated Weather Observing System

**CFA**—Controlled Firing Area

**CFR**—Code of Federal Regulations

**CHUM**—Chart Update Manual

**CONUS**—Continental United States

**CTAF**—Common Traffic Advisory Frequency

**DAFIF**—Digital Aeronautical Flight Information File

**DoD/DD**—Department of Defense

**DR**—Dead Reckoning

**DVFR**—Defense Visual Flight Rules

**E-CHUM**—Electronic Chart Update Manual

**EFAS**—Enroute Flight Advisory Service

**ERAA**—Emergency Route Abort Altitude

**ESA**—Emergency Safe Altitude

**ETA**—Estimated Time of Arrival

**FAA**—Federal Aviation Administration

**FBO**—Fixed Base Operator

**FCIF**—Flight Crew Information File

**FCG**—Foreign Clearance Guide

**FIH**—Flight Information Handbook

**FLIP**—Flight Information Publication

**FMS**—Flight Management System

**FSS**—Flight Service Station

**GP**—General Planning

**GPS**—Global Positioning System

**GS**—Ground Speed

**HIWAS**—Hazardous Inflight Weather Advisory Service

**IAP**—Instrument Approach Procedure

**IAW**—In Accordance With

**ICAO**—International Civil Aeronautical Organization

**IFR**—Instrument Flight Regulations

**ILS**—Instrument Landing System

**IMC**—Instrument Meteorological Conditions

**INS**—Inertial Navigation System

**IR**—IFR Military Training Routes

**J-AID**—Jeppesen Airport Information Directory

**JNC**—Jet Navigation Chart

**JOG**—Joint Operations Graphics

**JOG-A**—Joint Operations Graphics-Air

**KIAS**—Knots Indicated Airspeed

**LAA**—Local Airport Advisory

**LATN**—Low Altitude Tactical Navigation

**MAJCOM**—Major Air Command

**MEA**—Minimum Enroute Altitude

**MHz**—Megahertz

**MOA**—Military Operations Area

**MOCA**—Minimum Obstacle Clearance Altitude

**MPS**—Mission Planning System

**MSA**—Minimum Safe Altitude

**MSL**—Mean Sea Level

**MTR**—Military Training Route

**NACO**—National Aeronautical Charting Office

**NAS**—National Airspace System

**NAVAID**—Navigational Aid

**nm**—Nautical Miles

**NOTAM**—Notice to Airmen

**NSA**—National Security Area

**ONC**—Operational Navigation Chart

**OROCA**—Off Route Obstacle Clearance Altitude

**PAR**—Precision Approach Radar

**PFPS**—Portable Flight Planning Software

**PIREP**—Pilot Report

**PMSV**—Pilot to Metro Service

**QNE/H/FE**—Q-Code for different altimeter settings

**RA**—Resolution Advisory

**RAA**—Remote Airport Advisory

**RAIS**—Remote Airport Information Service

**SFAR**—Special Federal Aviation Regulations

**SPINS**—Special Operating Instructions

**SR**—Slow Route

**SVFR**—Special Visual Flight Rules

**TA**—Traffic Advisory

**TAC**—Terminal Area Chart

**TACC**—Tactical Air Control Center

**TC**—True Course

**TCAS**—Traffic Collision Avoidance System

**TFR**—Temporary Flight Restriction

**TH**—True Heading

**TLM**—Topographic Line Map

**TN**—True North

**TOT**—Time Over Target

**TPC**—Tactical Pilotage Chart

**TRSA**—Terminal Radar Service Area

**UHF**—Ultra High Frequency

**UNICOM**—Not an abbreviation. A non-government communication facility.

**USAF**—United States Air Force

**VASI**—Visual Approach Slope Indicator

**VFR**—Visual Flight Rules

**VHF**—Very High Frequency

**VMC**—Visual Meteorological Conditions

**VOR**—VHF Omnidirectional Range

## Attachment 2

## FLIGHT COMPUTER FORMULAS (QUICK REFERENCE)

**Flight Computer Formulas (Quick Reference)**