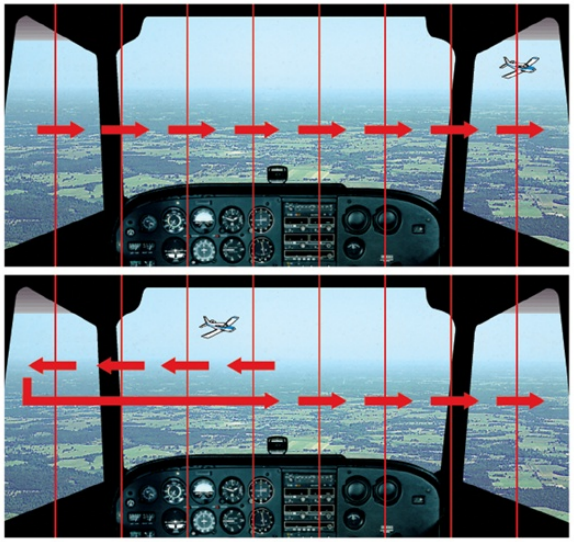
THE FLIGHT ENVIRONMENT - SAFETY OF FLIGHT

Safety must be **#1 governing mental set for pilot**. Not just for yourself but also for you passengers, other pilots and people on the ground.

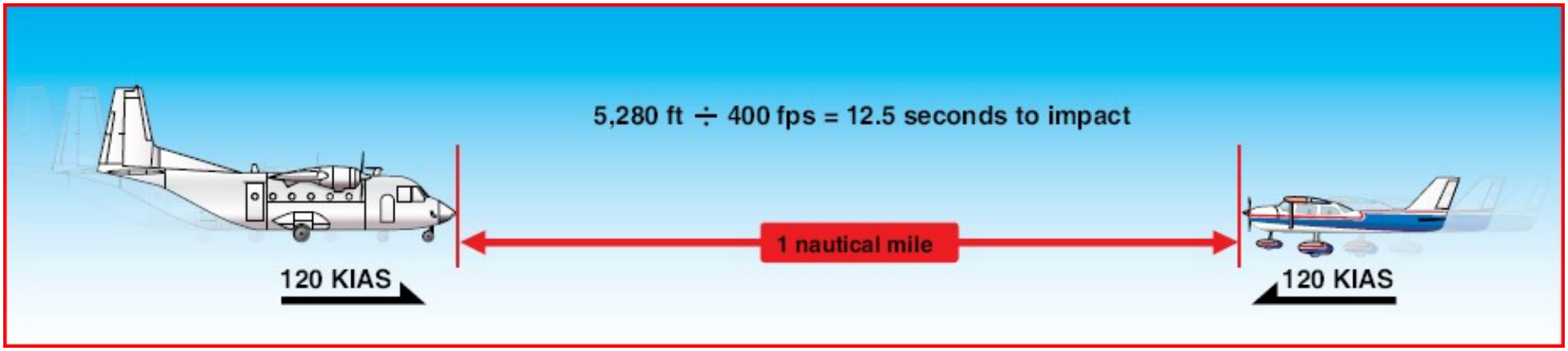
ISSUES: **Collision Avoidance, Right-of-Way, Safe Altitudes, Taxiing, and Control Exchange**

COLLISION AVOIDANCE

Scan for traffic. Flying by visual flight rules (VFR) and some are flying by instrument flight rules (IFR). Must avoid other airplanes. Scan patterns below help (full left->right, or Center-Left to full right) in 10 degree segments.



HOW CAN YOU DETERMINE IF ANOTHER AIRPLANE IS ON A DIRECT, COLLISION COURSE WITH YOU (DAY / NIGHT)?

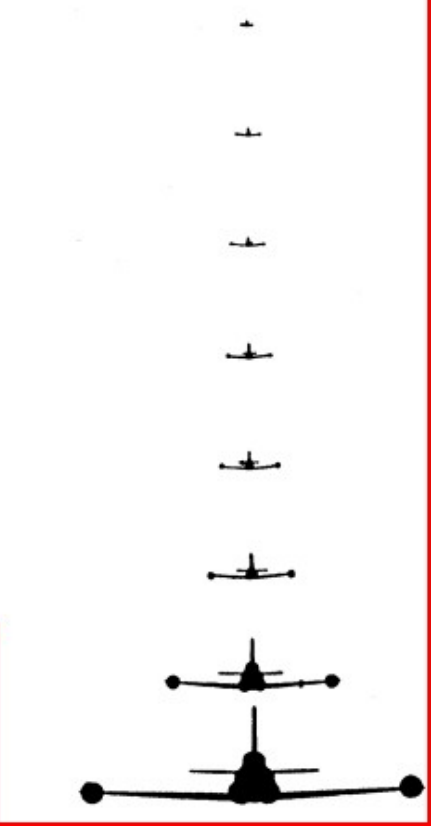


UNFORTUANTELY, it may take that period of time just to react (see below)

see object	0.1
recognize a/c	1.0
become aware of collision course	5.0
decision to turn left or right	4.0
muscular reaction	0.4
aircraft lag time	2.0
TOTAL	**12.5**

Standing 12 ft away the illustration on the right is how a T-33 jet would appear out of the windshield →

DISTANCE	SECONDS at: 600 MPH	360 MPH
10 miles	60	100
6 miles	36	60
5 miles	30	50
4 miles	24	40
3 miles	18	30
2 miles	12	20
1 mile	6	10
½ mile	3	5



THE FLIGHT ENVIRONMENT - SAFETY OF FLIGHT

Be vigilant not only for other airplanes but also for ***BIRDS***

Statistics collected between 1990 and 2007 indicated there were 17,972 “reported” bird strikes.

While more than ***70 percent of the nearly 80,000 bird strikes reported in the U.S. from 1990-2007 occurred below 500 feet AGL***, about 2,000 occurred above 5,000 feet. One, Ruppell's Vulture was once struck at an altitude of 37,000 feet.

More than 31,000 of the 79,972 strikes **(39%)** reported from 1990 to 2007 occurred in *August, September and October*, with each month collecting more than 10,000 reports.

Watch for birds in the pattern, and all phases of flight.

THE FLIGHT ENVIRONMENT - SAFETY OF FLIGHT

VISIBILITY CAN BE DIFFICULT

Empty Field Myopia – sky, devoid of contrast causes the eye to focus 30 feet ahead. Focus on windshield and not on distant traffic.

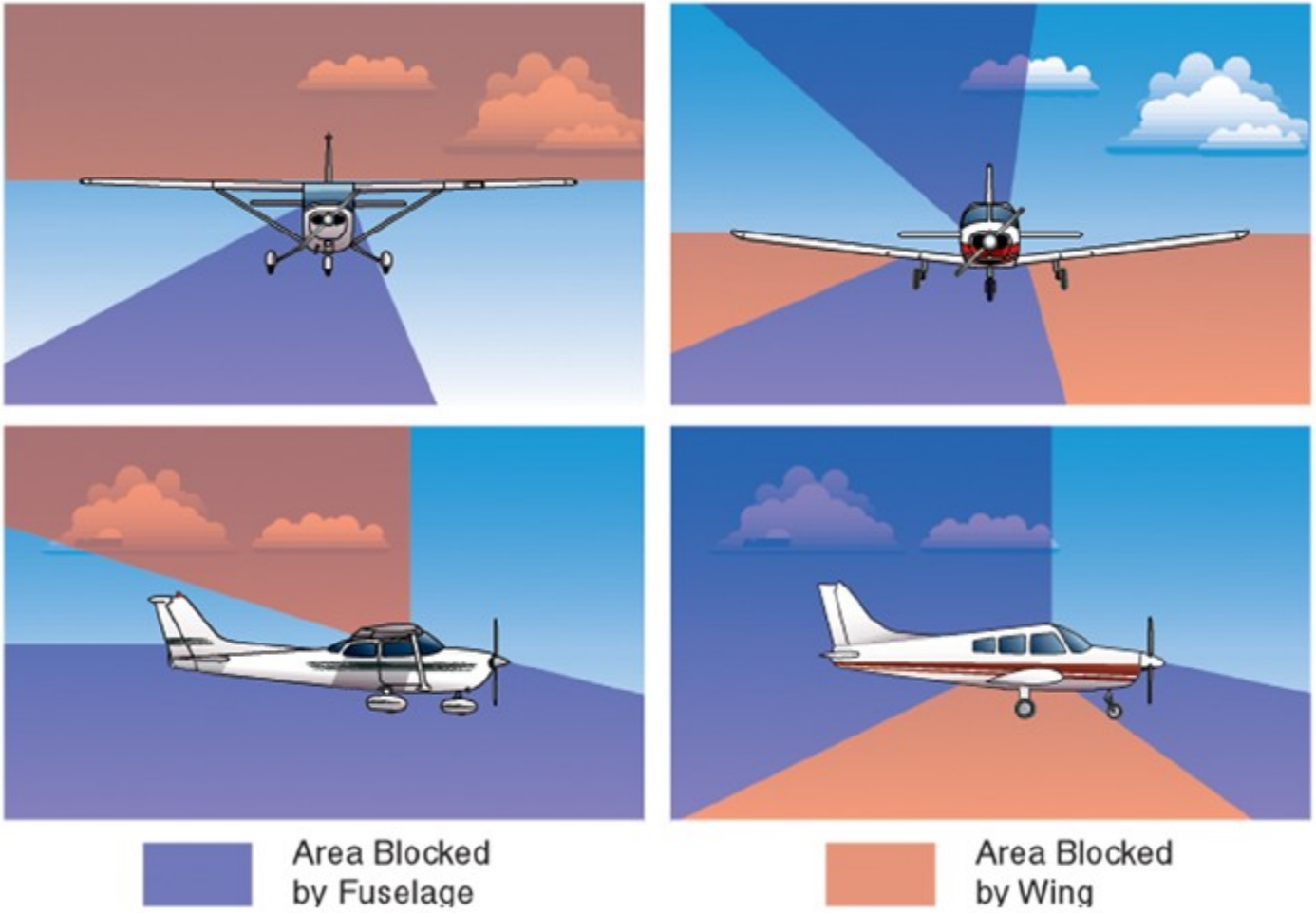
CONTRAST

← Bad

Good →

THE FLIGHT ENVIRONMENT - SAFETY OF FLIGHT

KNOW YOUR AIRCRAFT "**BLIND SPOTS**"

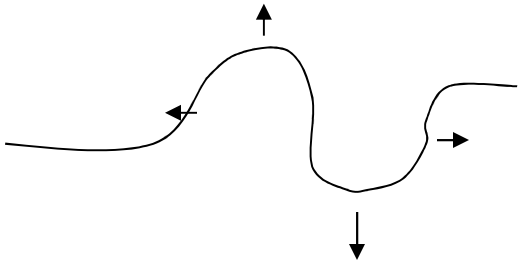


Cessna (lower) can not see Piper (above) & visa versa !!

THE FLIGHT ENVIRONMENT - SAFETY OF FLIGHT

WHAT CAN YOU DO TO MAKE SURE YOU ARE SEEN AND CAN SEE OTHER TRAFFIC IN A "PRACTICE – TRAINING AREA"?

You should always perform "CLEARING TURNS" to see and be seen by other aircraft.



View all directions

WHAT CAN TO DO TO BETTER BE SEEN AROUND AIRPORTS?

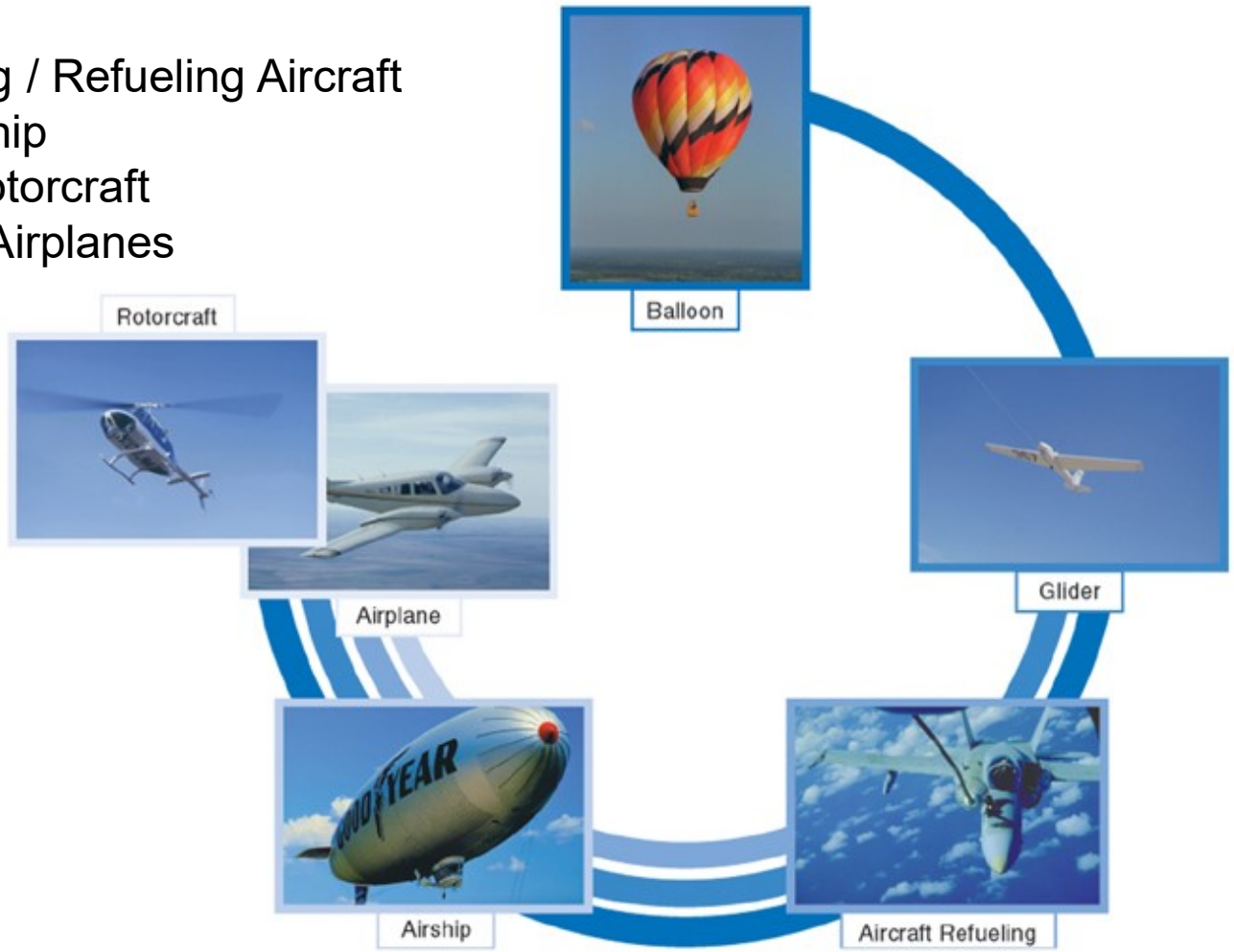
OPERATION "LIGHTS ON" - Especially around airports, TURN THE LANDING LIGHTS ON to be visible to other aircraft.

THE FLIGHT ENVIRONMENT - SAFETY OF FLIGHT

RIGHT-OF-WAY

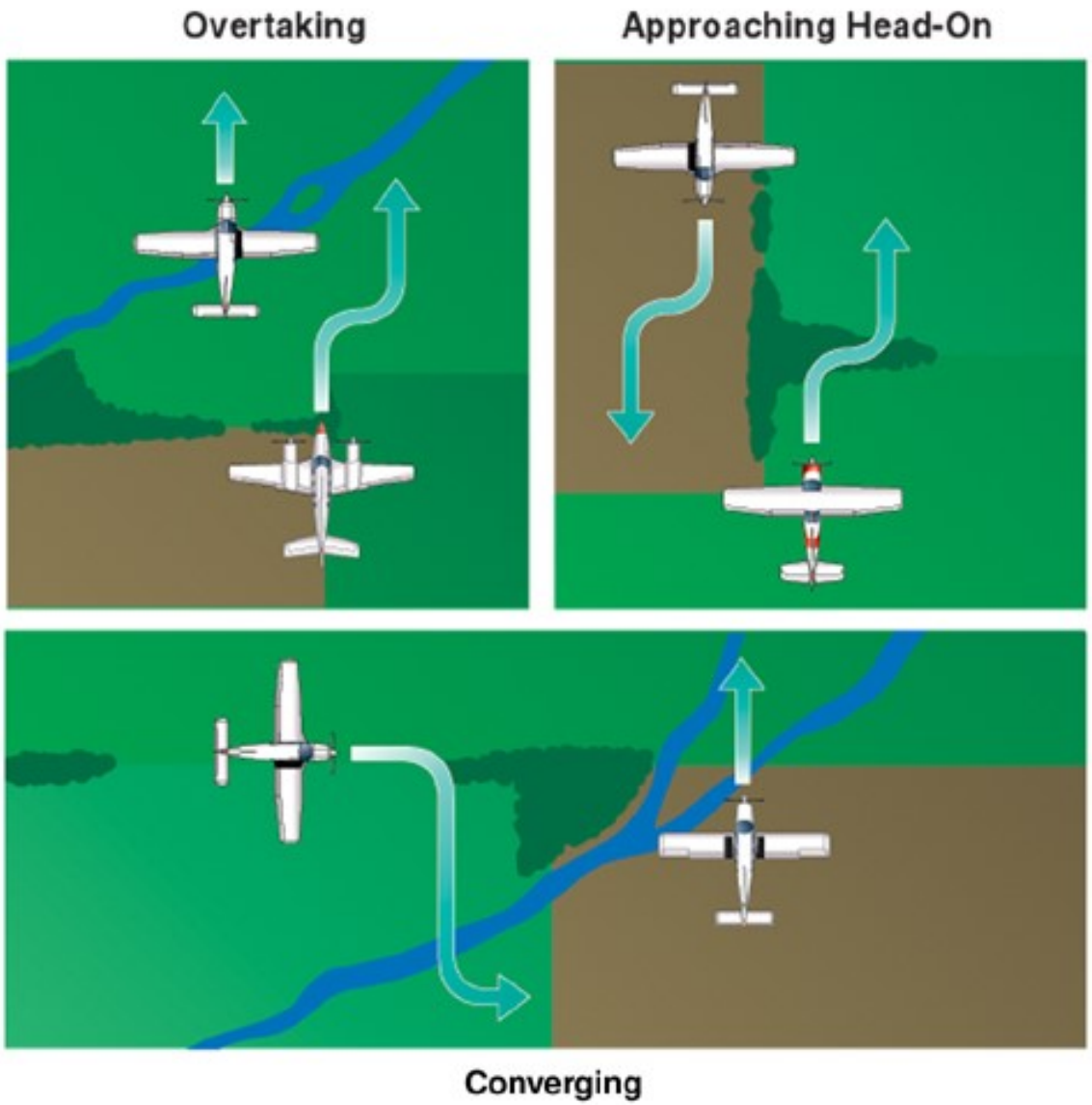
Right of way rules are based on “least” to most maneuverable.

- Balloons
- Gliders
- Towing / Refueling Aircraft
- Airship
- Rotorcraft
- Airplanes



THE FLIGHT ENVIRONMENT - SAFETY OF FLIGHT

RIGHT-OF-WAY



Overtaking aircraft fly to right

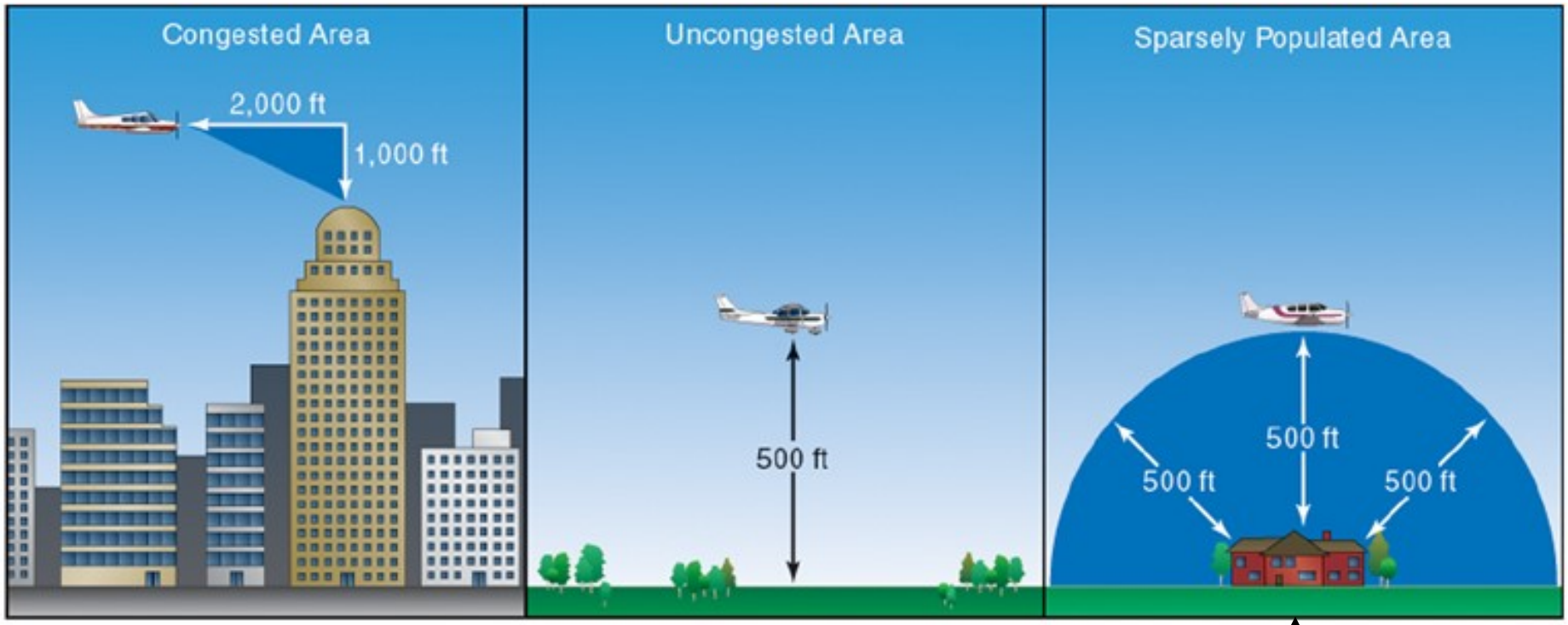
Head on both deviate right.

Converging (like “stop” signs) Aircraft to right has right of way

“In the pattern” – Lower and slower has right of way. NOT TO BE ABUSED. Cutting out other pilot is rude & unsafe.

THE FLIGHT ENVIRONMENT - SAFETY OF FLIGHT

MINIMUM ALTITUDES (SET BY FEDERAL AVIATION REGULATIONS)

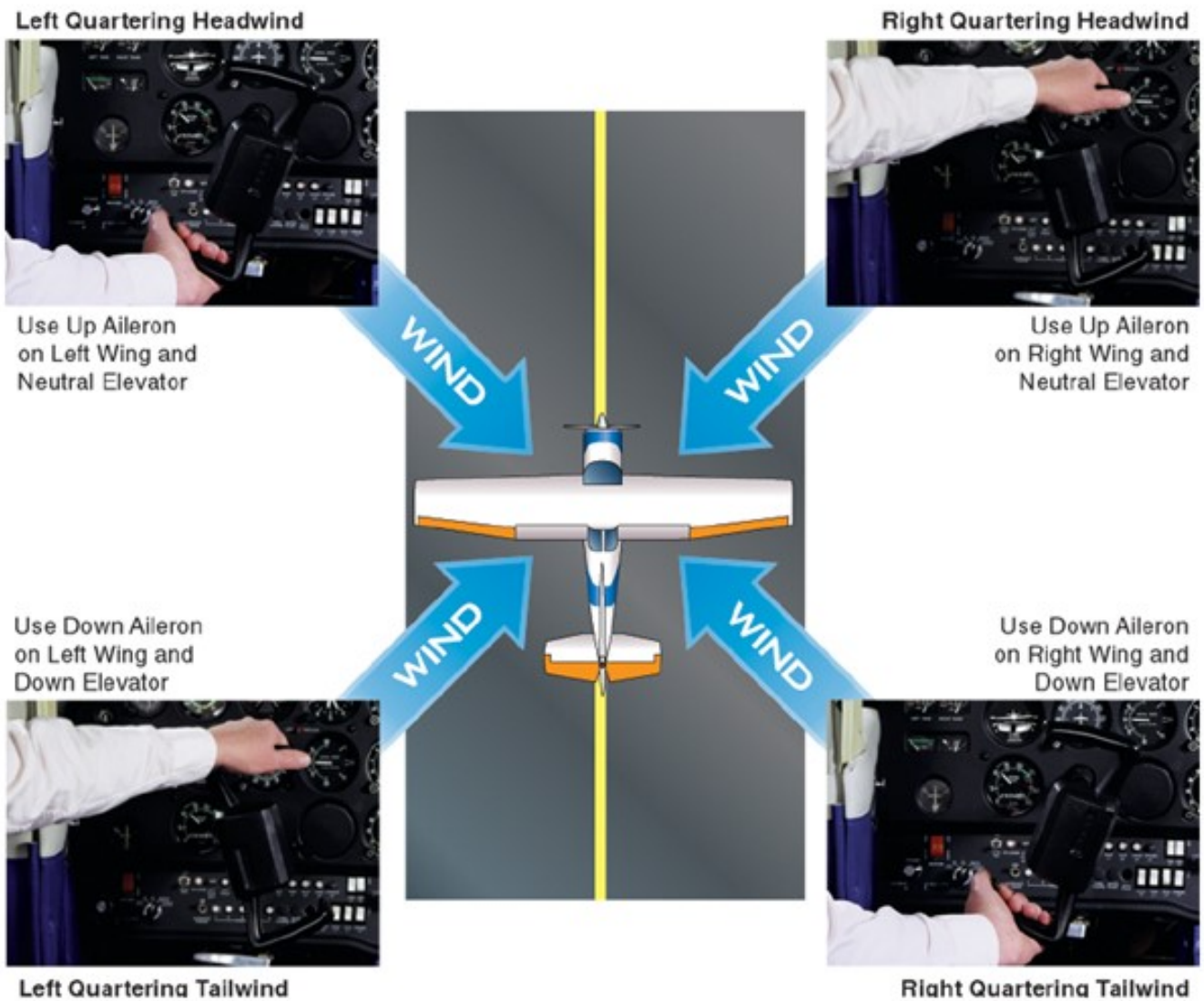


This include boats and seaplanes

HAZARDOUS TERRAINS: DO NOT FLY OVER OR AROUND MOUNTAINS, OR ACROSS LARGE BODIES OF WATER WITHOUT SPECIAL TRAINING.

THE FLIGHT ENVIRONMENT - SAFETY OF FLIGHT

TAXIING – CAREFUL OF WINDS – THE CAN FLIP AND AIRCRAFT IF YOU DO NOT PROPERLY ADJUST FOR HEAD/TAIL/CROSS WINDS



Tail draggers use UP elevators for headwinds and DOWN for tailwinds keeping tail "on-the-ground."

THE FLIGHT ENVIRONMENT - SAFETY OF FLIGHT

DUAL CONTROLS AND PASSING OF FLIGHT CONTROLS BETWEEN INSTRUCTOR/STUDENT OR BETWEEN PILOT/CO-PILOT. MAKE SURE EACH KNOW WHEN S/HE AS CONTROL IF TRANSFER OCCURS.

1. STUDENT OR PILOT PASSING CONTROL TO ANOTHER STATES:

   "You have the flight controls."

2. THE RECEIVING PILOT STATES:

   "I have the flight controls."

3. THE PASSING PILOT CONFIRMS EXCHANGE STATING

   "You have the flight controls."

AIRPORTS: Categories

- **Commercial Service Airports**—publicly owned airports that have at least 2,500 passenger boardings each calendar year and receive scheduled passenger service. Passenger boardings refer to revenue passenger boardings on an aircraft in service in air commerce whether or not in scheduled service. The definition also includes passengers who continue on an aircraft in international flight that stops at an airport in any of the 50 States for a non-traffic purpose, such as refueling or aircraft maintenance rather than passenger activity. Passenger boardings at airports that receive scheduled passenger service are also referred to as Enplanements.
- **Cargo Service Airports**—airports that, in addition to any other air transportation services that may be available, are served by aircraft providing air transportation of only cargo with a total annual landed weight of more than 100 million pounds. "Landed weight" means the weight of aircraft transporting only cargo in intrastate, interstate, and foreign air transportation. An airport may be both a commercial service and a cargo service airport.
- **Reliever Airports**—airports designated by the FAA to relieve congestion at Commercial Service Airports and to provide improved general aviation access to the overall community. These may be publicly or privately-owned.
- **General Aviation Airports** — the remaining airports are commonly described as General Aviation Airports. This airport type is the largest single group of airports in the U.S. system. The category also includes privately owned, public use airports that enplane 2500 or more passengers annually and receive scheduled airline service.

AIRPORTS: Types

There are two types of airports—towered and nontowered. These types can be further subdivided to:

Civil Airports—airports that are open to the general public.
Military/Federal Government airports—airports operated by the military, National Aeronautics and Space Administration (NASA), or other agencies of the Federal Government.
Private Airports—airports designated for private or restricted use only, not open to the general public

Towered Airport

A towered airport has an operating control tower. Air traffic control (ATC) is responsible for providing the safe, orderly, and expeditious flow of air traffic at airports where the type of operations and/or volume of traffic requires such a service. Pilots operating from a towered airport are required to maintain two-way radio communication with ATC and to acknowledge and comply with their instructions. Pilots must advise ATC if they cannot comply with the instructions issued and request amended instructions. A pilot may deviate from an air traffic instruction in an emergency, but must advise ATC of the deviation as soon as possible.

AIRPORTS: Types

Nontowered Airport

A nontowered airport does not have an operating control tower. Two-way radio communications are not required, although it is a good operating practice for pilots to transmit their intentions on the specified frequency for the benefit of other traffic in the area. The key to communicating at an airport without an operating control tower is selection of the correct common frequency. The acronym CTAF, which stands for Common Traffic Advisory Frequency, is synonymous with this program. A CTAF is a frequency designated for the purpose of carrying out airport advisory practices while operating to or from an airport without an operating control tower. The CTAF may be a Universal Integrated Community (UNICOM), MULTICOM, Flight Service Station (FSS), or tower frequency and is identified in appropriate aeronautical publications. UNICOM is a nongovernment air/ground radio communication station that may provide airport information at public use airports where there is no tower or FSS. On pilot request, UNICOM stations may provide pilots with weather information, wind direction, the recommended runway, or other necessary information. Nontowered airport traffic patterns are always entered at pattern altitude. How you enter the pattern depends upon the direction of arrival. *The preferred method for entering from the downwind side of the pattern is to approach the pattern on a course 45 degrees to the downwind leg and join the pattern at midfield.*

There are several ways to enter the pattern if you're coming from the upwind leg side of the airport. One method of entry from the opposite side of the pattern is to announce your intentions and cross over midfield at least 500 feet above pattern altitude (normally 1,500 feet AGL.) However, if large or turbine aircraft operate at your airport, it is best to remain 2,000 feet AGL so you are not in conflict with their traffic pattern. When well clear of the pattern—approximately 2 miles–scan carefully for traffic, descend to pattern altitude, then turn right to enter at 45° to the downwind leg at midfield. An alternate method is to enter on a midfield crosswind at pattern altitude, carefully scan for traffic, announce your intentions, and then turn downwind. *[Figure 14-3]* This technique should not be used if the pattern is busy. Always remember to give way to aircraft on the preferred 45° entry and to aircraft already established on downwind.

In either case, it is vital to announce your intentions, and remember to scan outside. Before joining the downwind leg, adjust your course or speed to blend into the traffic. Adjust power on the downwind leg, or sooner, to fit into the flow of traffic. Avoid flying too fast or too slow. Speeds recommended by the airplane manufacturer should be used. They will generally fall between 70 to 80 knots for fixed-gear singles and 80 to 90 knots for high-performance retractable.

THE FLIGHT ENVIRONMENT - AIRPORTS

THE TRAFFIC PATTERN

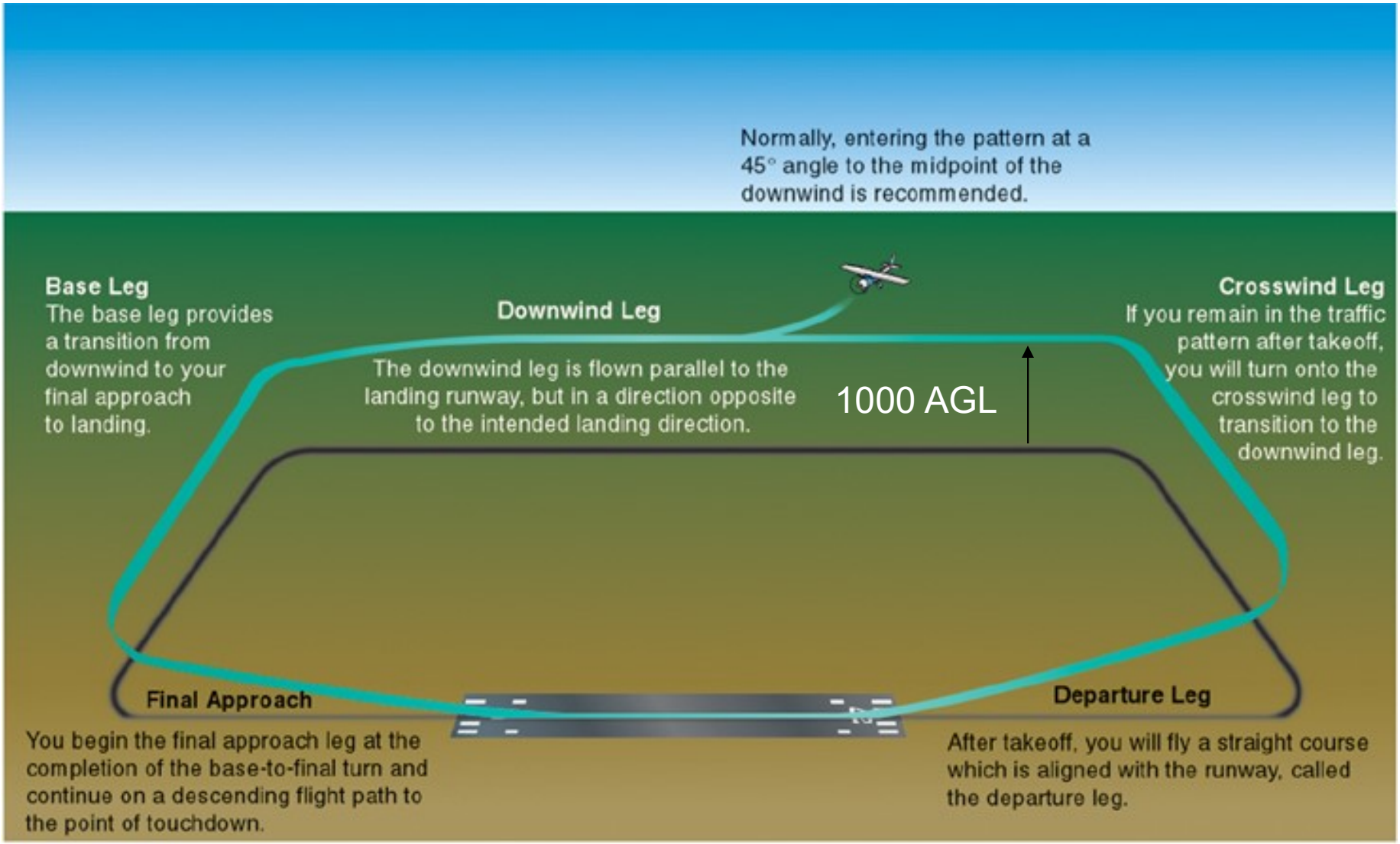


Figure 14-2. *Preferred Entry-Crossing Midfield.*

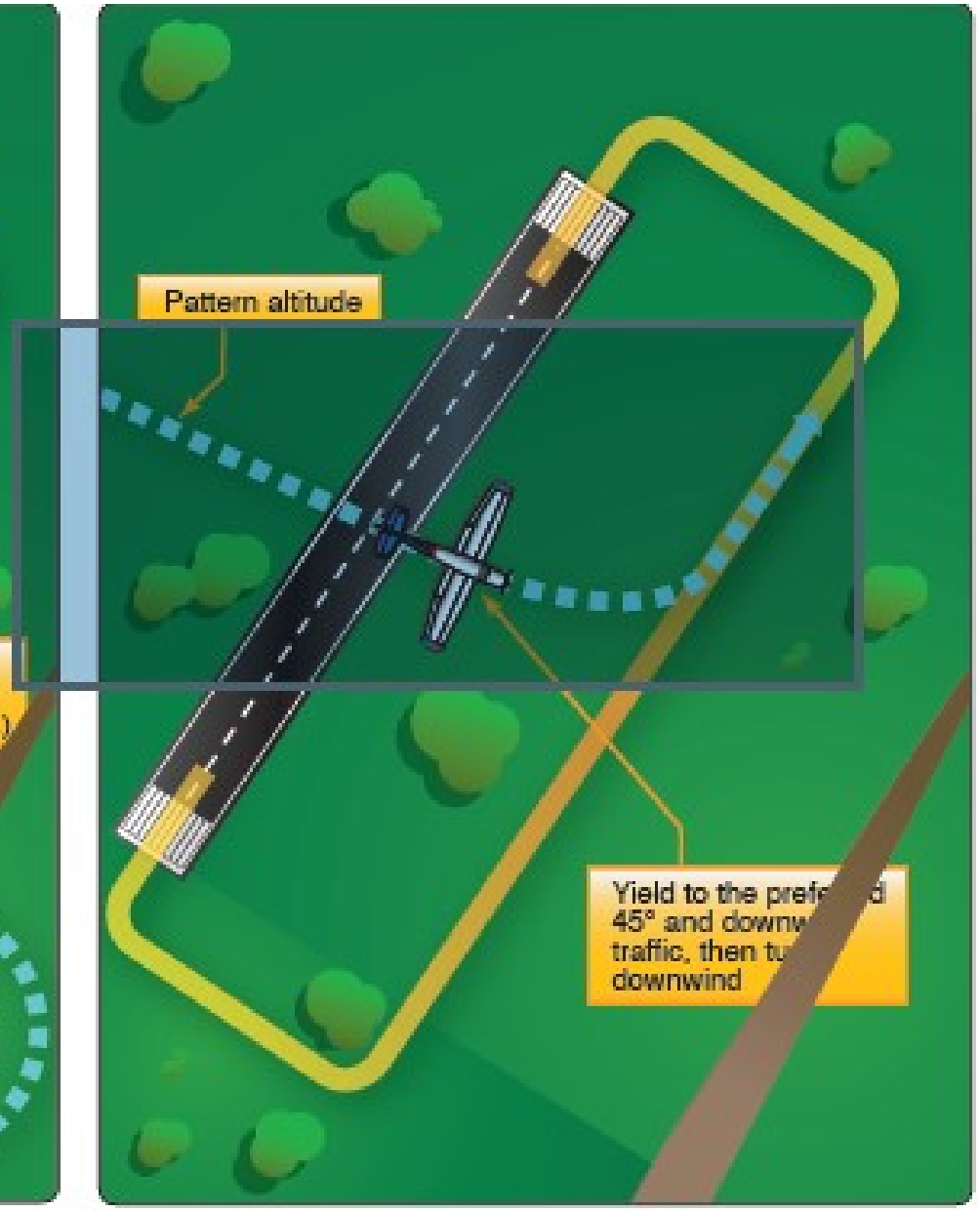
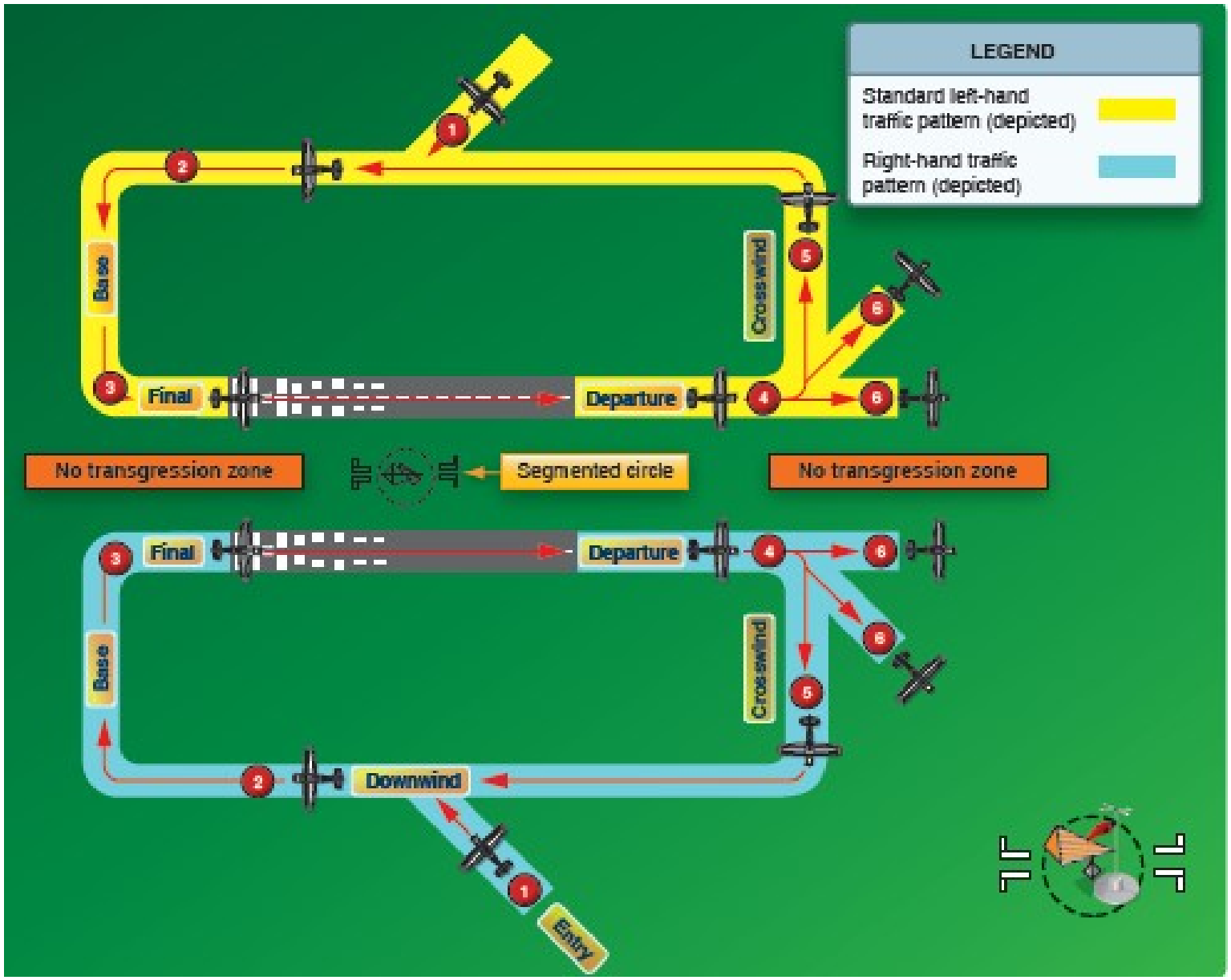


Figure 14-3. *Alternate Midfield Entry.*

What is the difference Between Standard and Non-Standard Patterns?

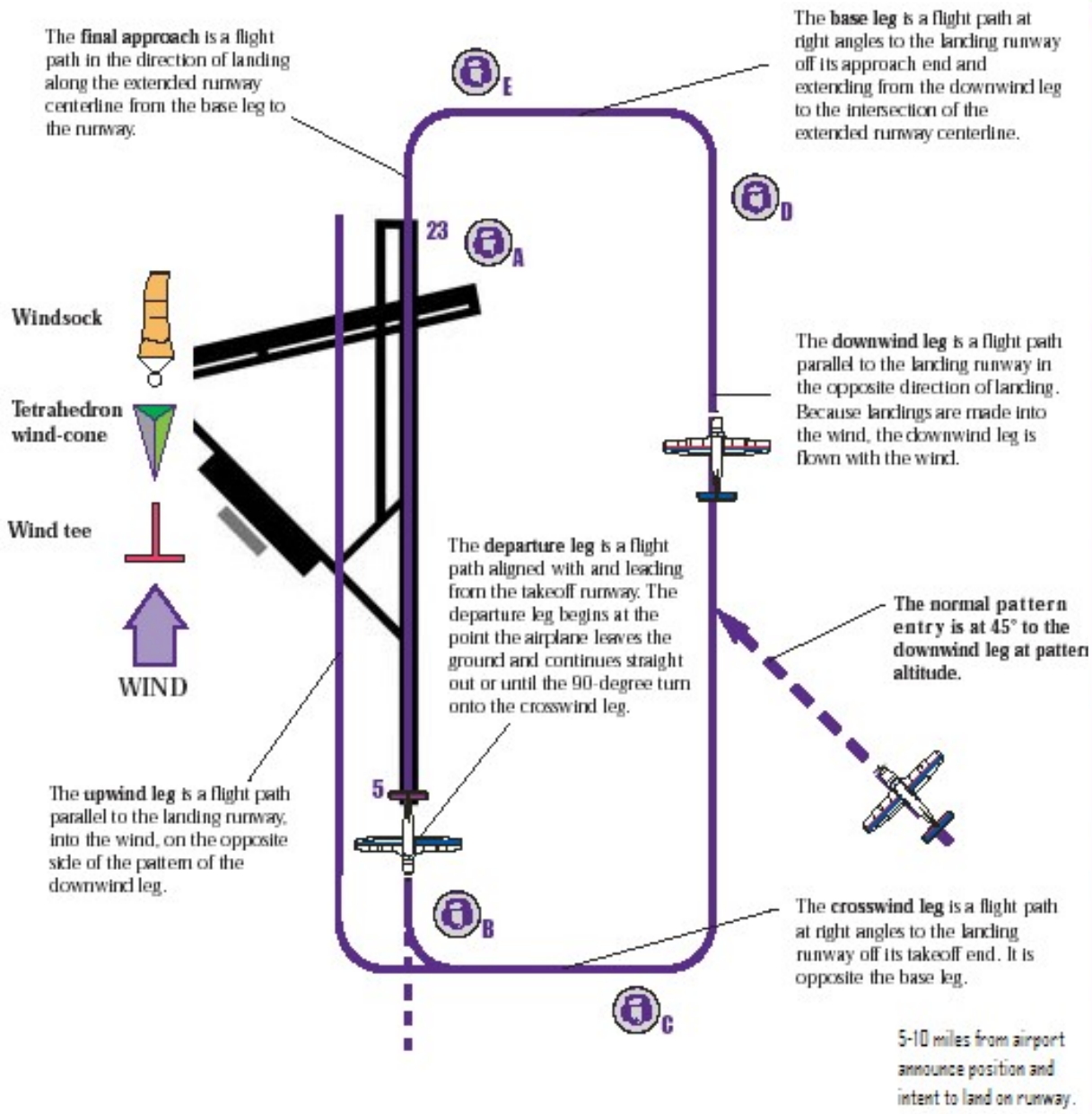
Standard Patterns are “TURNS TO THE LEFT” .
Non-Standard Patterns are “TURNS TO THE RIGHT”.



Communication

Facility at Airport	Frequency Use	Communication/Broadcast Procedures		
		Outbound	Inbound	Practice Instrument Approach
UNICOM (no tower or FSS)	Communicate with UNICOM station on published CTAF frequency (122.7, 122.8, 122.725, 122.975, or 123.0). If unable to contact UNICOM station, use self-announce procedures on CTAF.	Before taxiing and before taxiing on the runway for departure.	10 miles out. Entering downwind, base, and final. Leaving the runway.	
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.
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.
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.	
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.	

Uncontrolled Airport Best Practices and Communications



Summary

1. Look.
2. Know before you go.
3. Fly defensively.
4. Fly the appropriate pattern.
5. Use the CTAF.
6. Use landing lights.
7. Yield the right of way.
8. Be courteous.
9. Keep a sterile cockpit in the pattern.
10. Fly quietly.

The way to fly safely at nontowered airports is to REACT.

Radio - Listen to the automated weather observations, if available, and the common traffic advisory frequency (CTAF) for airport information and traffic advisories.

Eyes - Use them! Look for other traffic. This is the top priority when operating in the vicinity of a nontowered airport. Use landing lights so other pilots can see you more easily.

Announce - Report your position and intentions using standard phraseology.

Courtesy - A little courtesy will smooth out most problems. The "me first" attitude can be dangerous and rude.

Traffic Pattern - Follow the recommended procedures before you fly. Research the necessary information about your departure and destination airports.

WHAT IS WAKE TURBULENCE

WHAT IS IT'S EFFECT ON YOUR AIRCRAFT?

Wake Turbulence from heavy aircraft must be avoided during landings and take-offs

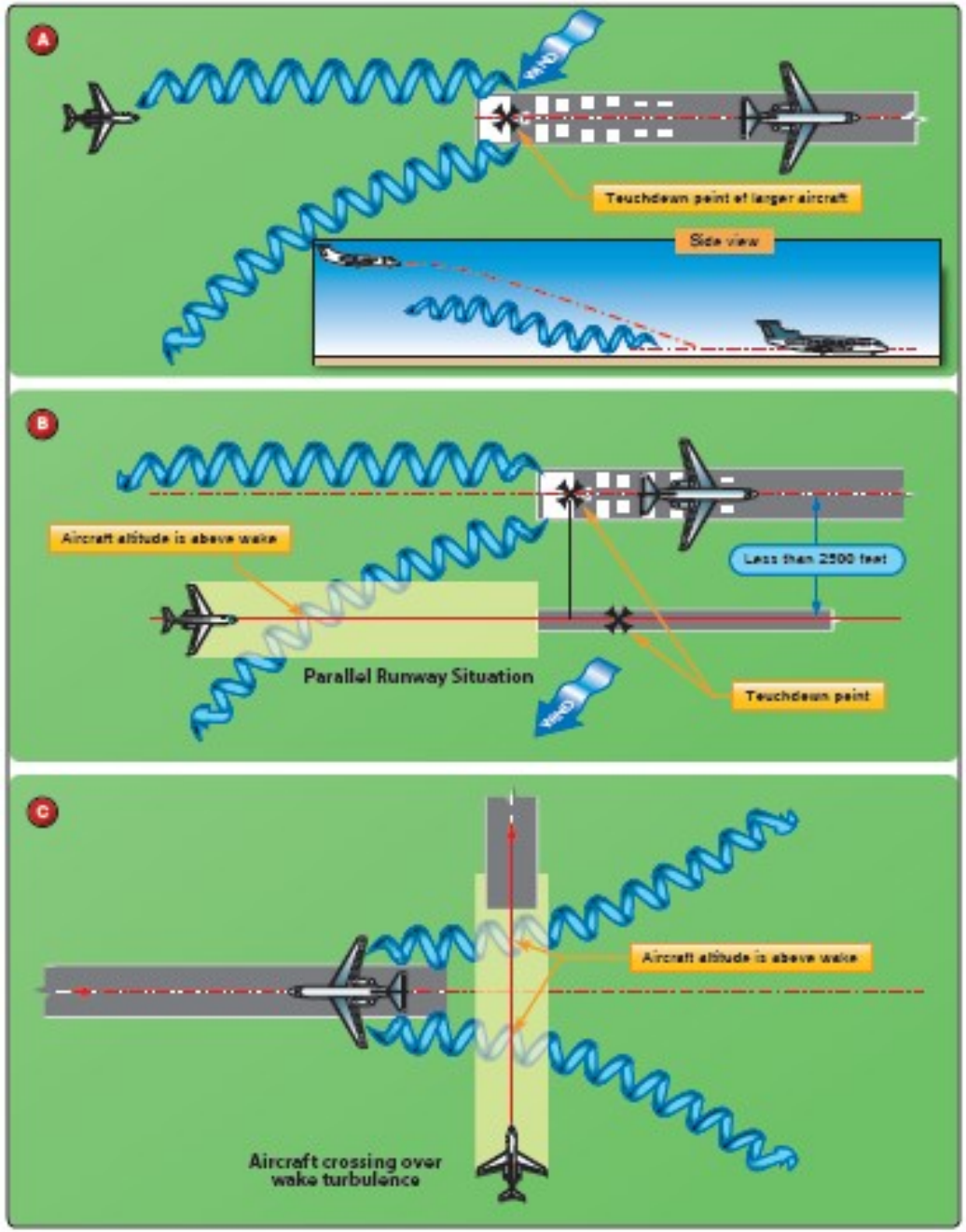
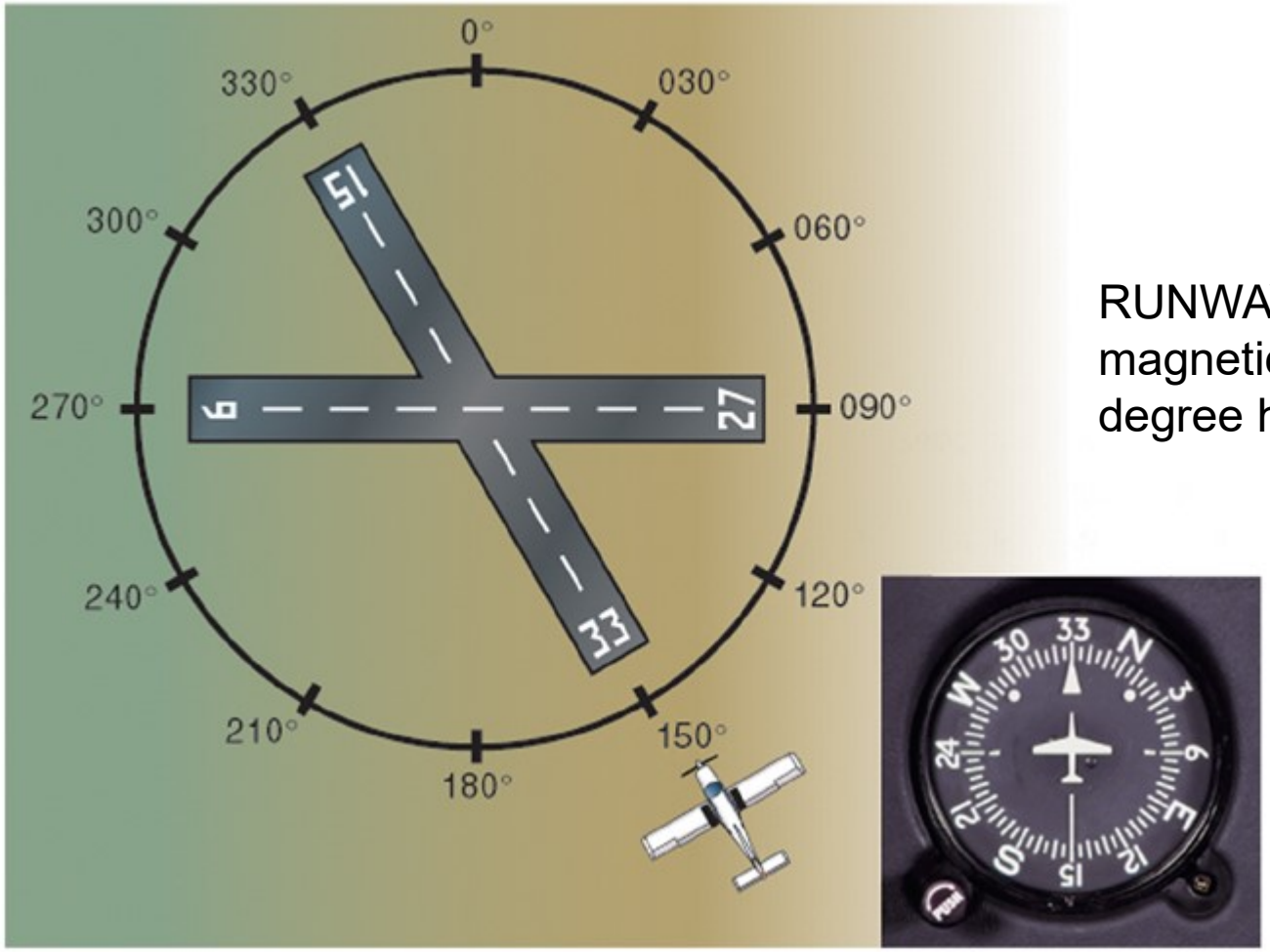


Figure 14-47. *Vortex avoidance procedures.*

THE FLIGHT ENVIRONMENT - AIRPORTS



RUNWAYS are marked by magnetic heading to nearest 10 degree heading.

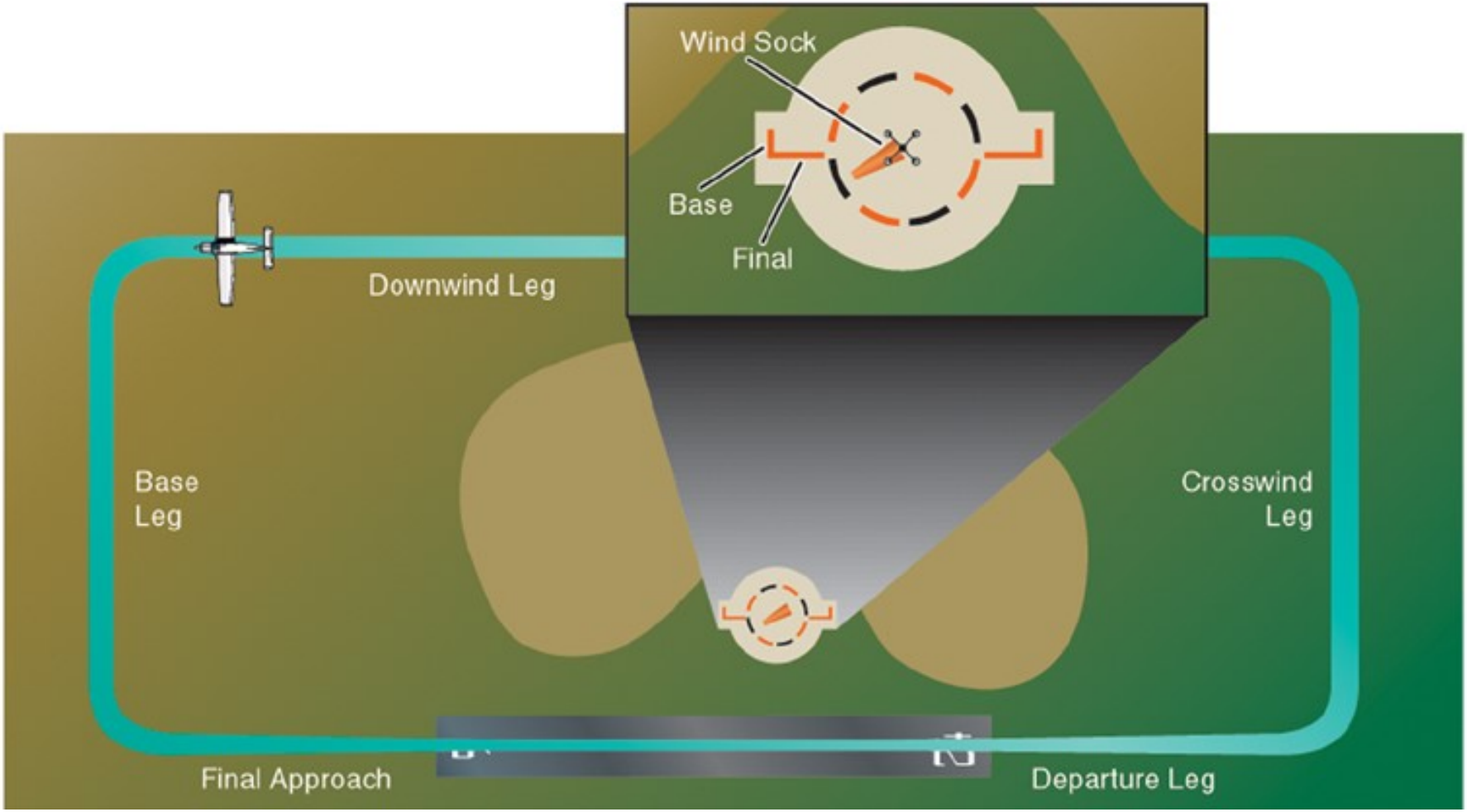
What direction do you want to land at an uncontrolled airport?

INTO THE WIND

How can you determine what runway to use at an uncontrolled airport?

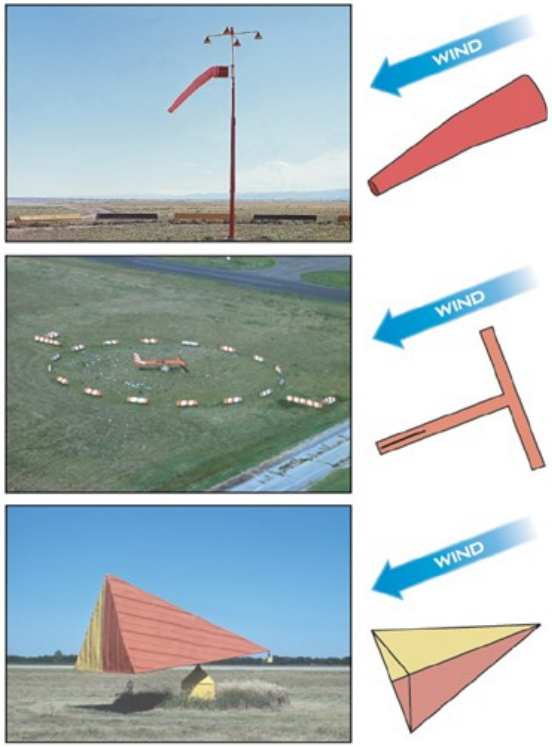
Aircraft communications (CTAF), Windsock, Wind Tee, or Tetrahedron

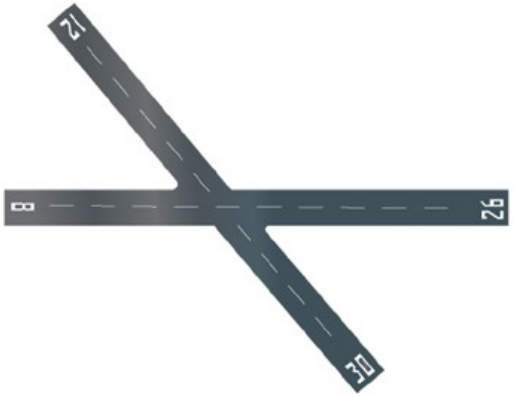
AN UNCONTROLLED AIRPORT WILL PROVIDE A WAY TO DETERMINE WINDS AND ALL YOU TO DETERMINE WHICH RUNWAY TO LAND AND TAKE OFF “THE SEGMENTED CIRCLE” TELLS YOU THE TRAFFIC PATTER FOR EACH RUNWAY.

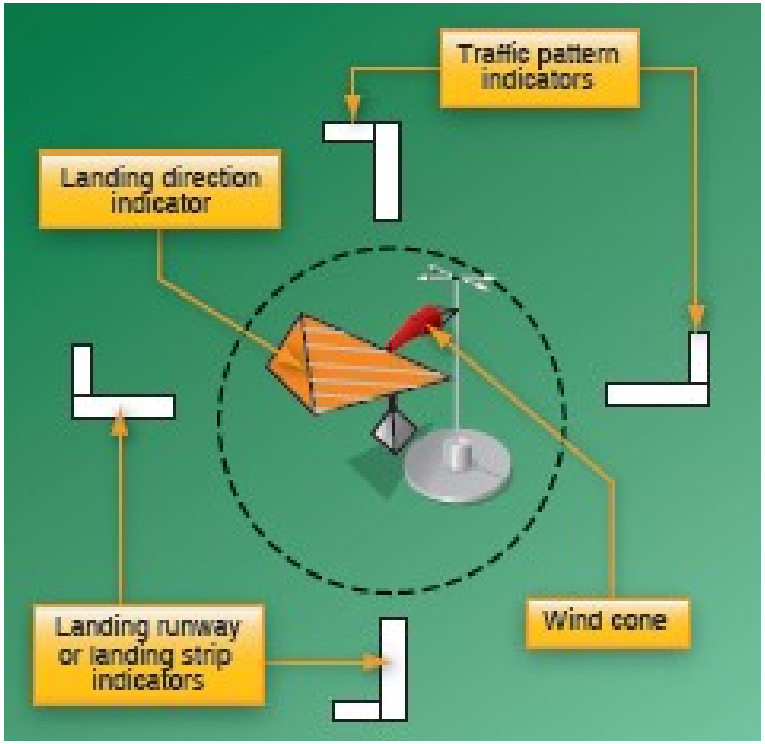


AIRPORTS

WHAT RUNWAY? Want to land into the wind. How can you tell?
CTAF, Unicom or EYEBALL The **Windsock**, The **Wind Tee**, or **Tetrahedron**







THE FLIGHT ENVIRONMENT - AIRPORT VISUAL GUIDES

LIGHTING – BEACONS TELL YOU NOT ONLY **WHERE** THE AIRPORT IS BUT ALSO THE "**TYPE**" OF AIRPORT (CIVILIAN, MILITARY, HELIPORT, WATER)

CIVILIAN LAND AIRPORT

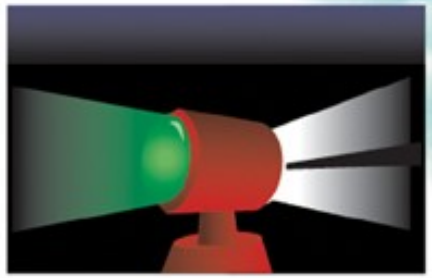
ALTERNATING
GREEN-WHITE

WATER AIRPORT

ALTERNATING
GREEN-YELLOW

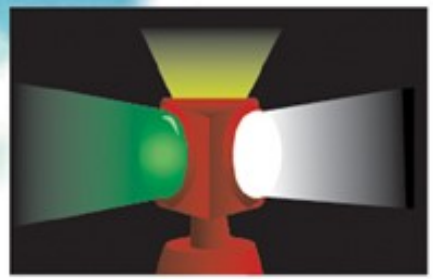
ALTERNATING
GREEN-WHITE-WHITE

MILITARY AIRPORT



ALTERNATING
GREEN-YELLOW-WHITE

HELIPORT



Pilot Controlled Runway Lighting Uncontrolled (non-tower) Airports

KEY MIKE	FUNCTION
7 times within 5 seconds	Highest intensity available
5 times within 5 seconds	Medium or lower intensity (Lower REIL or REIL off)
3 times within 5 seconds	Lowest intensity available (Lower REIL or REIL off)

THE FLIGHT ENVIRONMENT - AIRPORTS

CONTROLLED AIRPORTS – COMMUNICATIONS WITH ATC

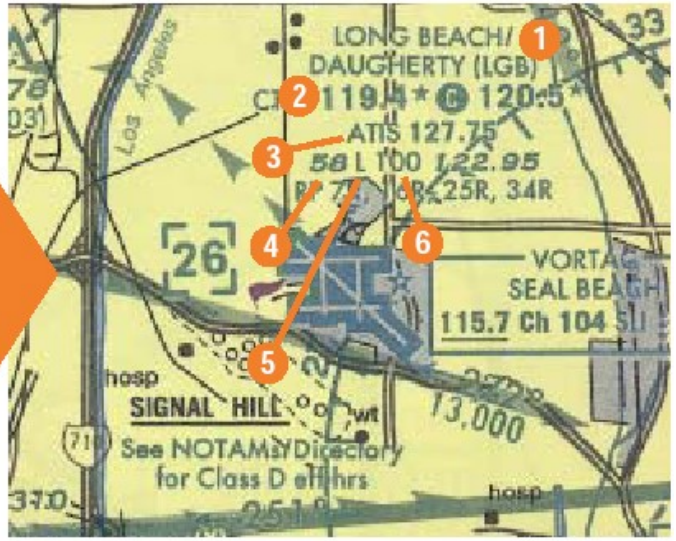
ATIS (AUTOMATED TERMINAL INFORMATION SERVICE)
CLEARANCE DELIVERY (IFR/VFR)
GROUND CONTROL
CONTROL TOWER
DEPARTURE CONTROL
APPROACH CONTROL

Color and Type of Signal	Movement of Vehicles, Equipment and Personnel	Aircraft on the Ground	Aircraft in Flight
Steady green	Cleared to cross, proceed or go	Cleared for takeoff	Cleared to land
Flashing green	Not applicable	Cleared for taxi	Return for landing (to be followed by steady green at the proper time)
Steady red	Stop	Stop	Give way to other aircraft and continue circling
Flashing red	Clear the taxiway/runway	Taxi clear of the runway in use	Airport unsafe, do not land
Flashing white	Return to starting point on airport	Return to starting point on airport	Not applicable
Alternating red and green	Exercise extreme caution!!!!	Exercise extreme caution!!!!	Exercise extreme caution!!!!

ATC can also use a "Light Gun" signal to direct you if you have radio failure →

Communication frequencies on charts and AFD

(1) The airport name and location identifier;
(2) Control tower frequency;
(3) ATIS (automated terminal information service), ASOS (automated surface observation system), or AWOS (automated weather observation system) frequency, whichever is applicable to the airport;
(4) Airport elevation in feet;
(5) Runway lighting; and
(6) Length of longest runway in hundreds of feet.

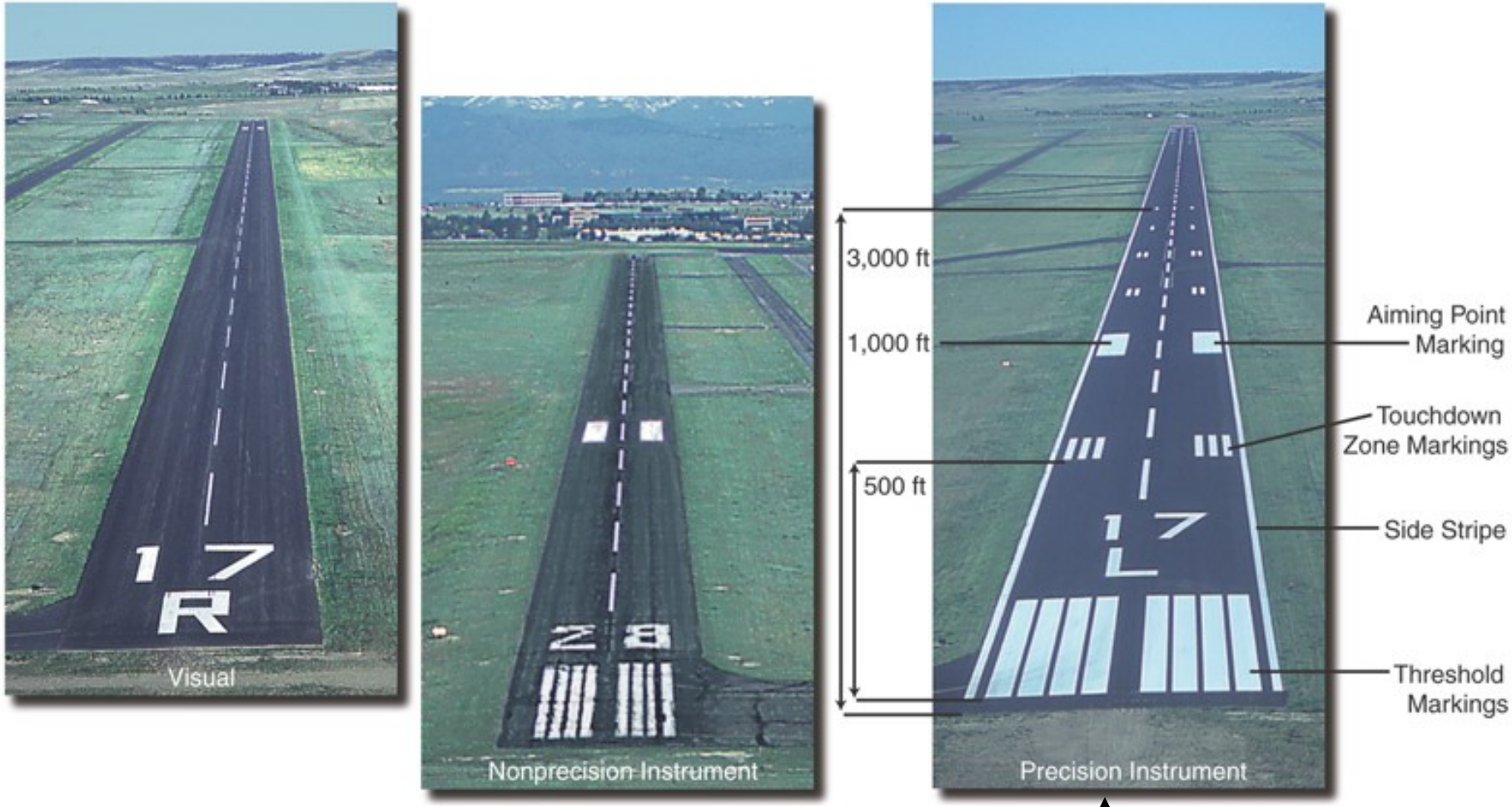


IF REQUIRED… USE "***NOISE ABATEMENT*** **PROCEDURES**" FOUND IN THE AFD.

Created by Steve Reisser

THE FLIGHT ENVIRONMENT - AIRPORT VISUAL GUIDES

RUNWAY MARKINGS

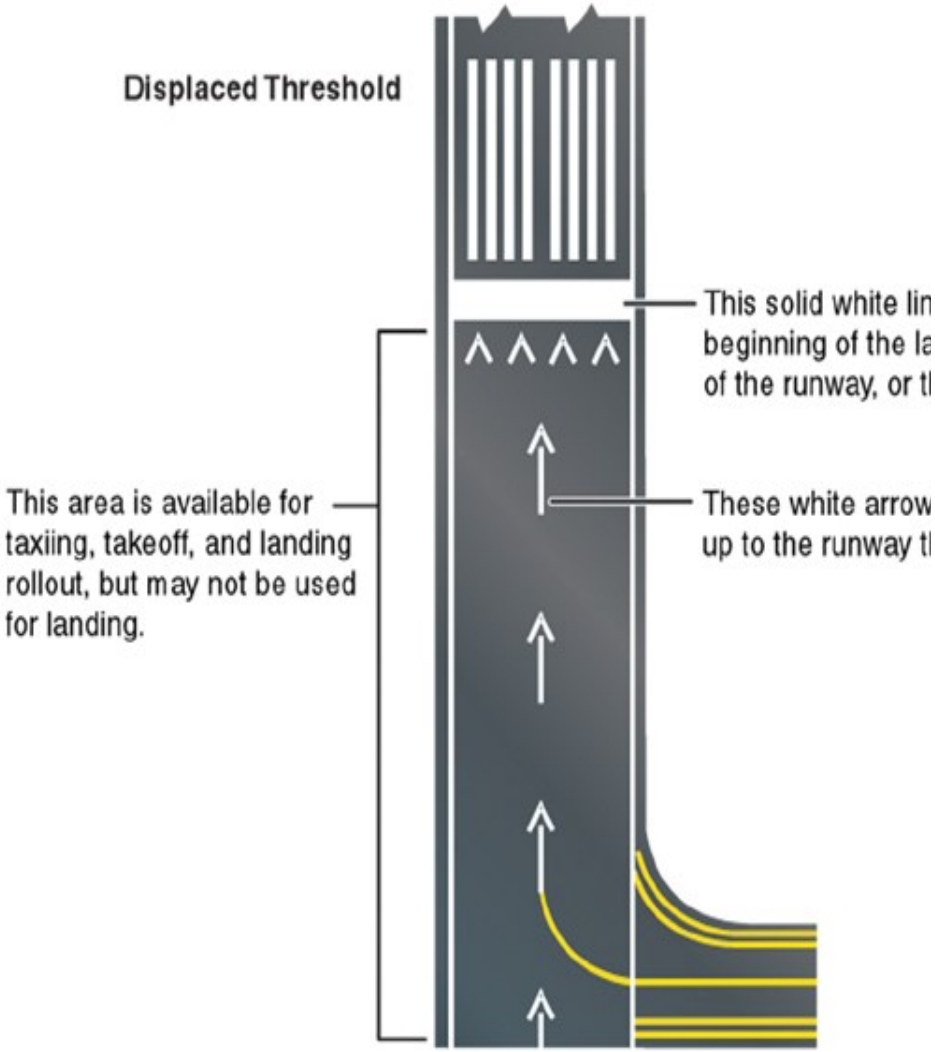


PRECISION RUNWAYS HAVE IFR GLIDESLOPES

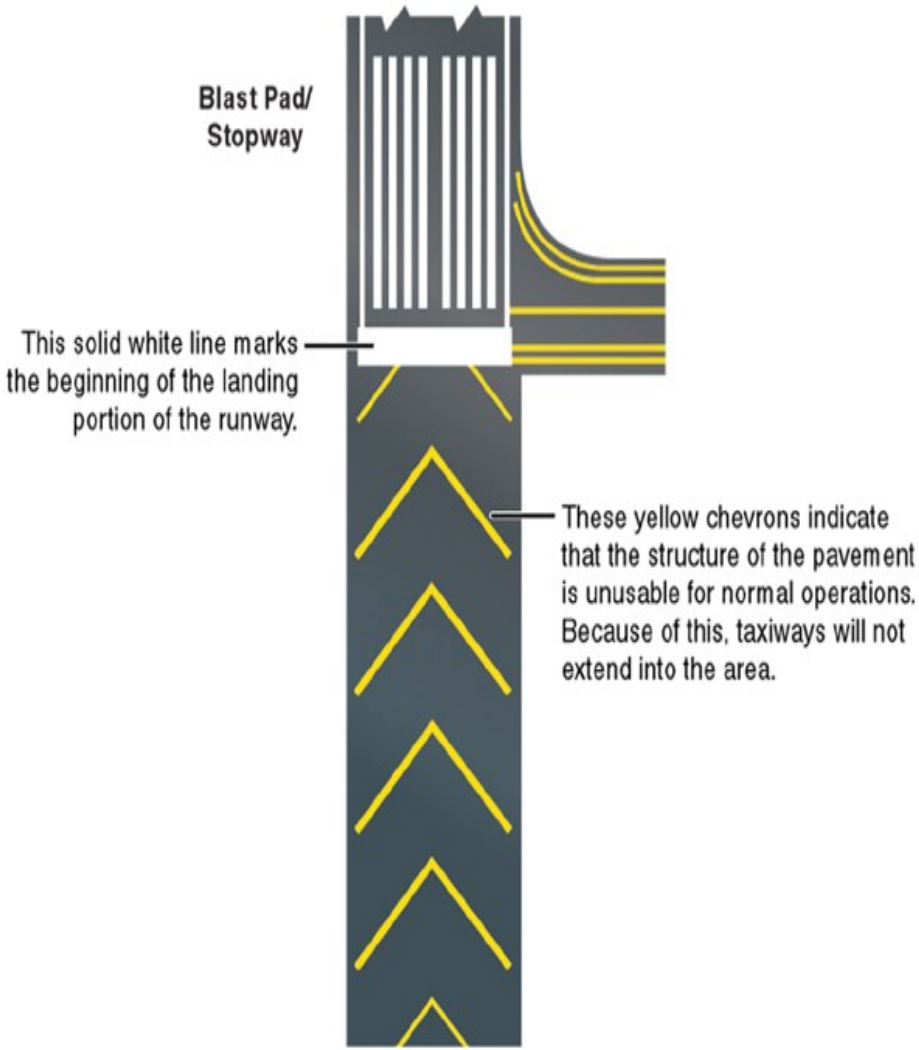
THE FLIGHT ENVIRONMENT - AIRPORT VISUAL GUIDES

Number of Runway Threshold Stripes	
Runway Width	**Number of Stripes**
60 feet (18 m)	4
75 feet (23 m)	6
100 feet (30 m)	8
150 feet (45 m)	12
200 feet (60 m)	16

DISPLACEMENT THRESHOLD



BLAST PAD/STOPWAY



THE FLIGHT ENVIRONMENT - AIRPORT VISUAL GUIDES

CLOSED
RUNWAYS

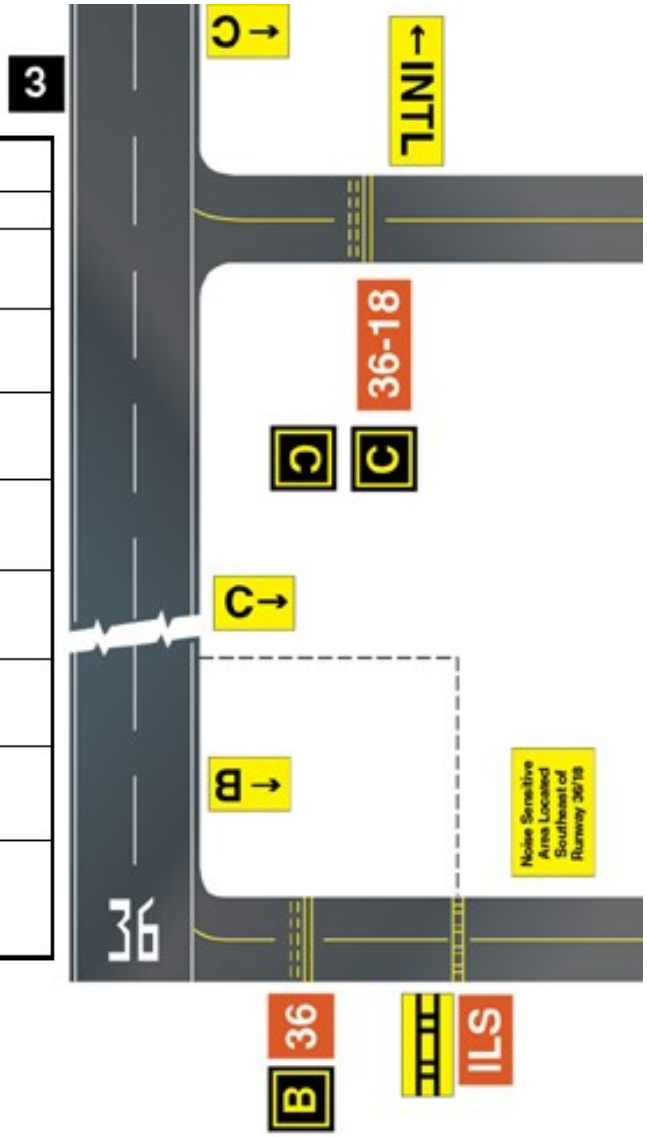
Marked with
"X"

THE FLIGHT ENVIRONMENT - AIRPORT VISUAL GUIDES

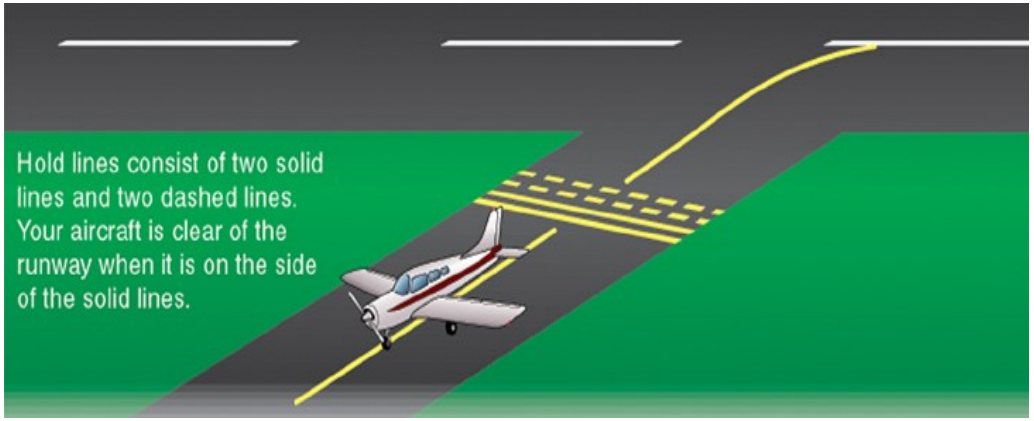
AIRPORT SIGNS

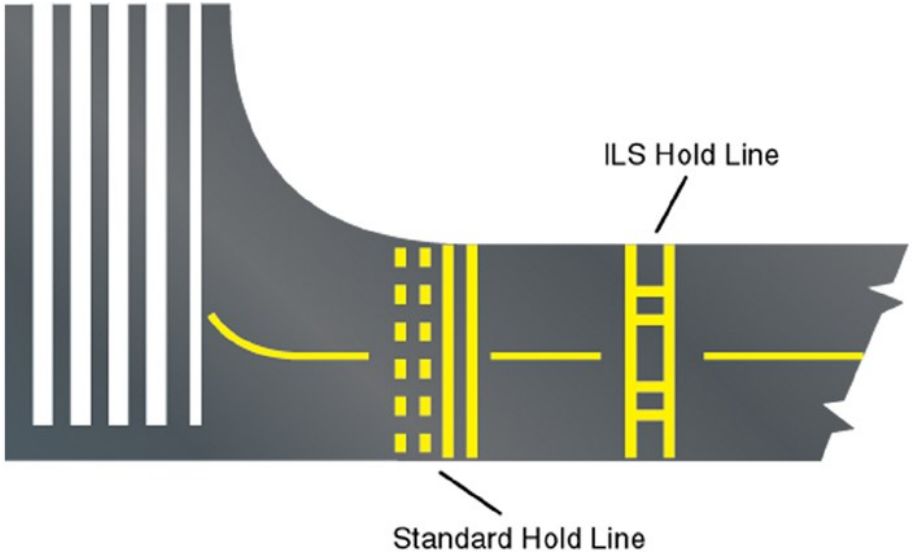
AIRPORT SIGN SYSTEMS

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



THE FLIGHT ENVIRONMENT - AIRPORT VISUAL GUIDES





Runway Holding Position Marking

Noncompliance with a runway holding position marking may result in the FAA filing a Pilot Deviation against you. Runway holding position markings consist of four yellow lines, two solid and two dashed, that are painted on the surface and extend across the width of the taxiway to indicate where the aircraft should stop when approaching a runway. These markings are painted across the entire taxiway pavement, are in alignment, and are collocated with the holding position sign.

WHEN “ILS” OPERATIONS IN PROGRESS, HOLD LINE FURTHER AWAY FROM ACTIVE RUNWAY

Know where to taxi by signage: Deviation from taxi instructions will get you “violated”.

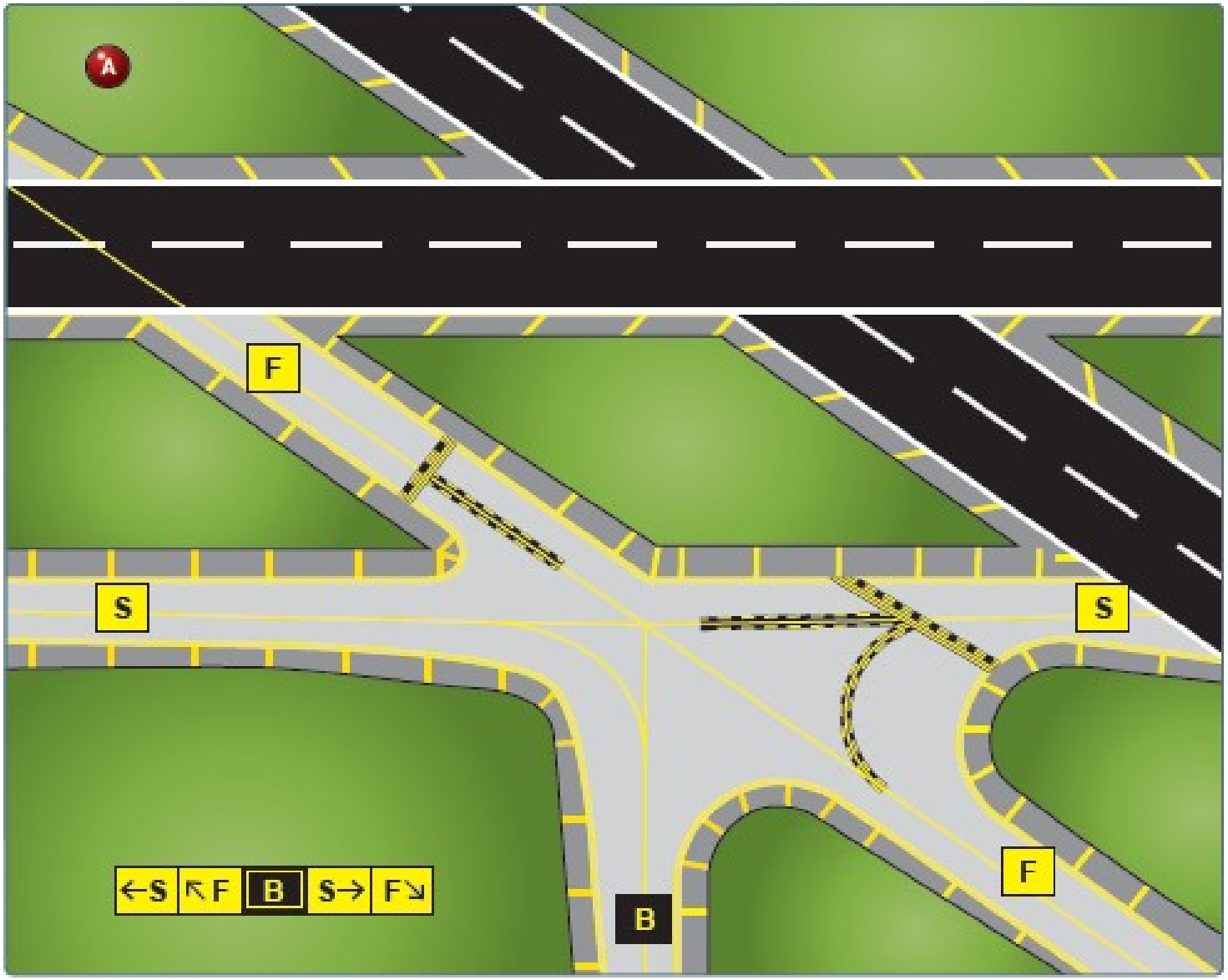
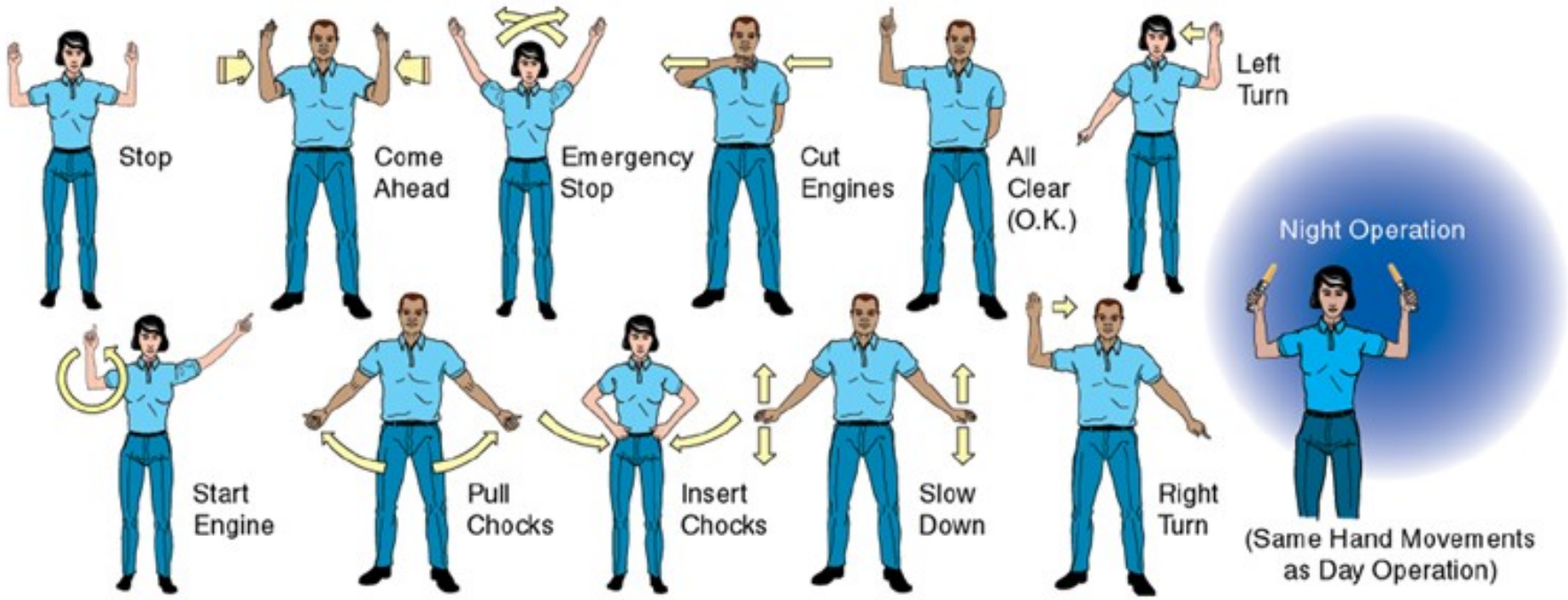


Figure 14-20. *Orientation of signs is from left to right in a clockwise manner. Left turn signs are on the left and right turn on the right. In this view, the pilot is on Taxiway Bravo.*

THE FLIGHT ENVIRONMENT - AIRPORT VISUAL GUIDES

THE “RAMP” – PARKING. OFTEN AIRCRAFT PARKED BY HAND SIGNALS



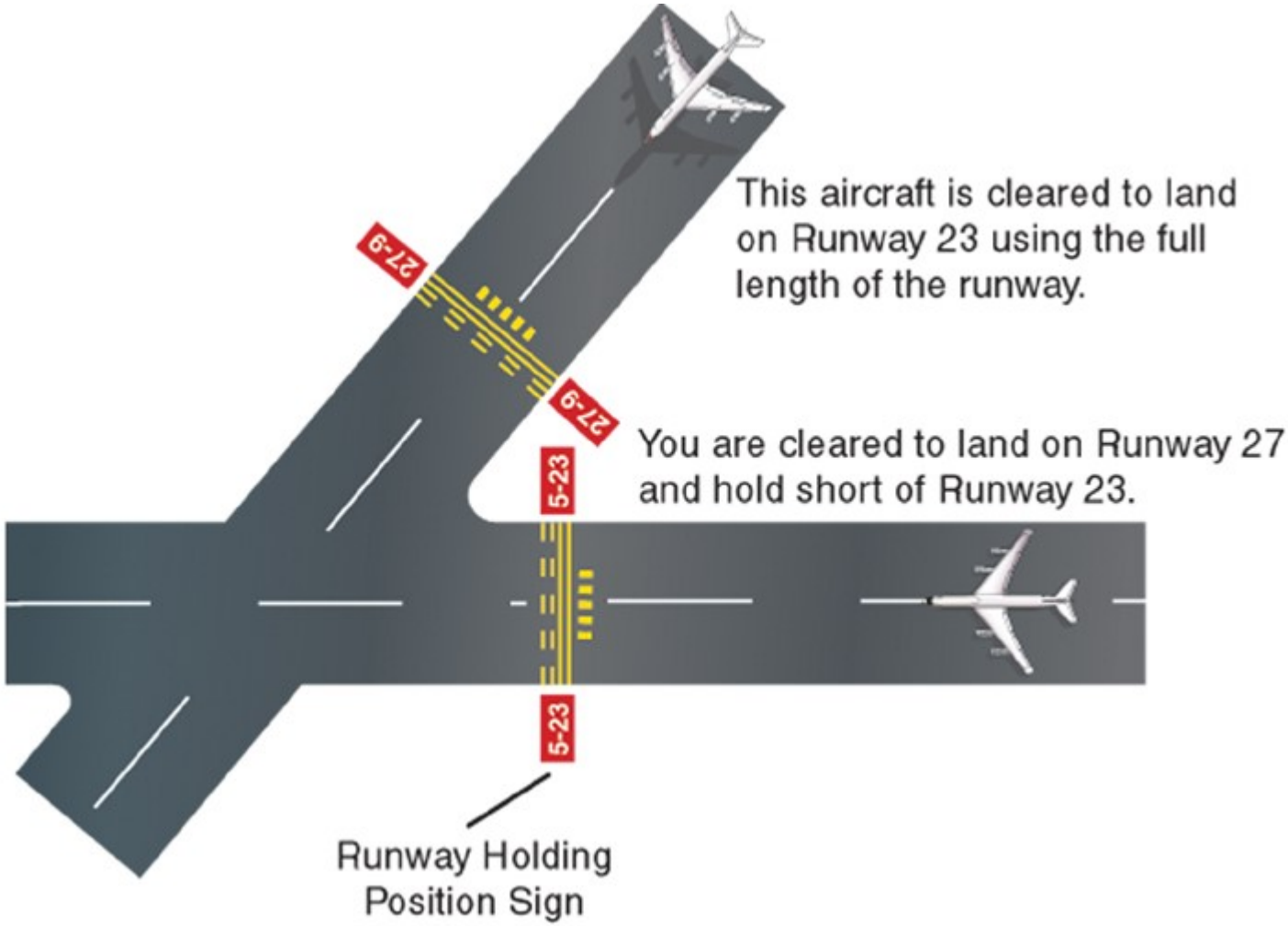
THE FLIGHT ENVIRONMENT - AIRPORT VISUAL GUIDES

RUNWAY INCURSION AVOIDANCE – “Any occurrence at an airport involving an aircraft, vehicle, person, or object on the ground that creates a collision hazard or results in loss of separation with an aircraft taking off or intending to take off, landing or intending to land”.

AVOIDANCE

1. Know the airports (study AFD) before you fly.
2. Complete as many checklists as possible before taxi.
3. Use clear communications (use read back to verify).
4. While taxiing, know where you are and pay attention.
5. Ask for assistance if you are unsure of anything.
6. At run-up, position to see landing aircraft (avoid pulling out in front of aircraft).
7. Monitor appropriate frequencies.
8. After landing, stay on tower frequency until instructed to change
9. Use taxi/landing lights to be visible to the traffic.
10. Report deteriorating or hard to read signs so operators can repair.
11. Make sure you understand “land and hold short operations” (LAHSO) if in effect.

THE FLIGHT ENVIRONMENT - AIRPORT VISUAL GUIDES



LAHSO means you may not use the entire runway because of other traffic that is Likely to cross your active runway as shown above.

Airport HOT SPOTS: Areas prone to conflict are marked on AFD airport diagrams

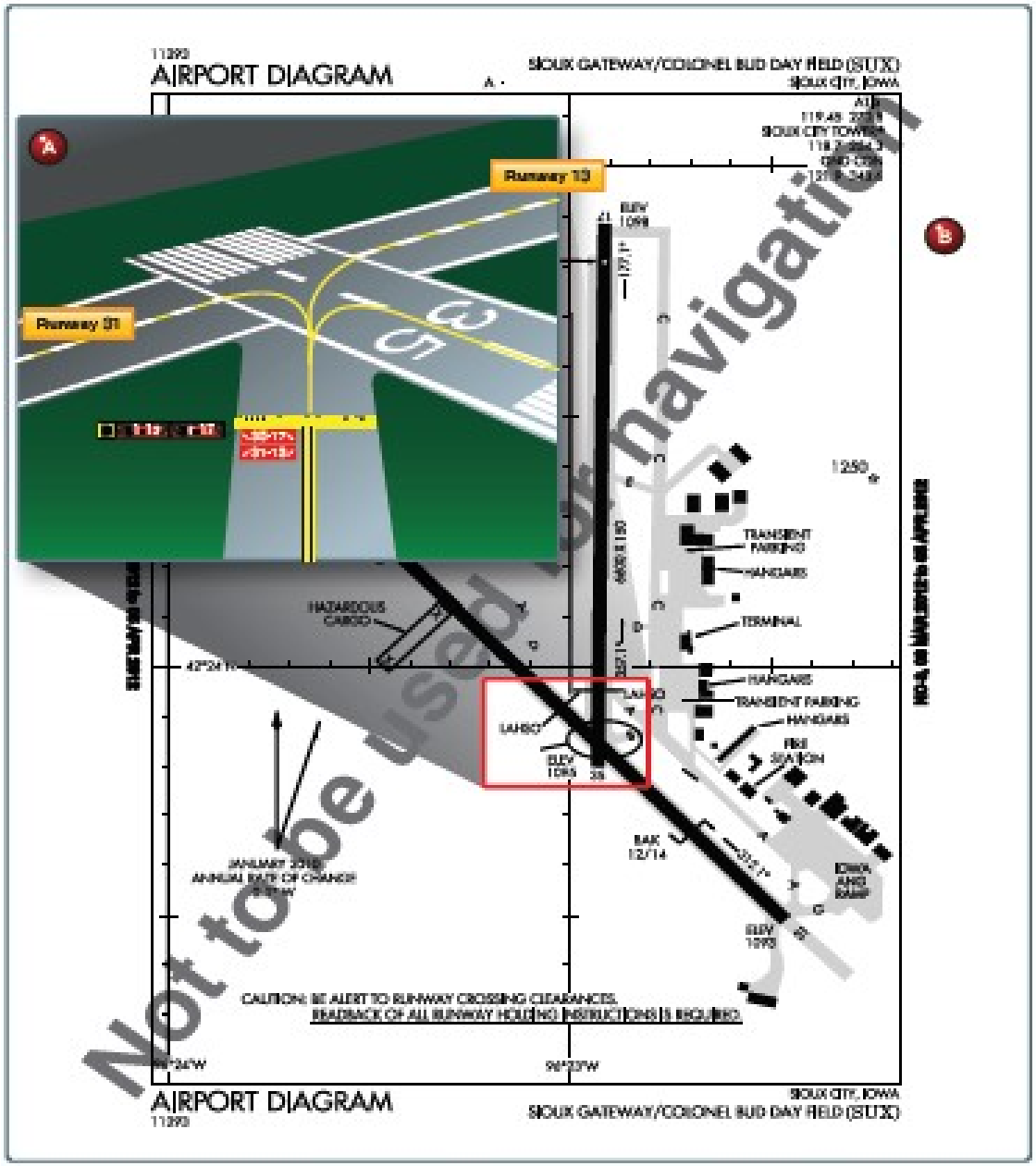


Figure 14-11. *(A) Taxiway Bravo location sign collocated with runway/runway intersection holding signs at Sioux Gateway Airport (SUX) (B) Airport diagram of Sioux Gateway Airport (SUX), Sioux City, Iowa. The area outlined in red is a designated "hot spot" (HSI).*

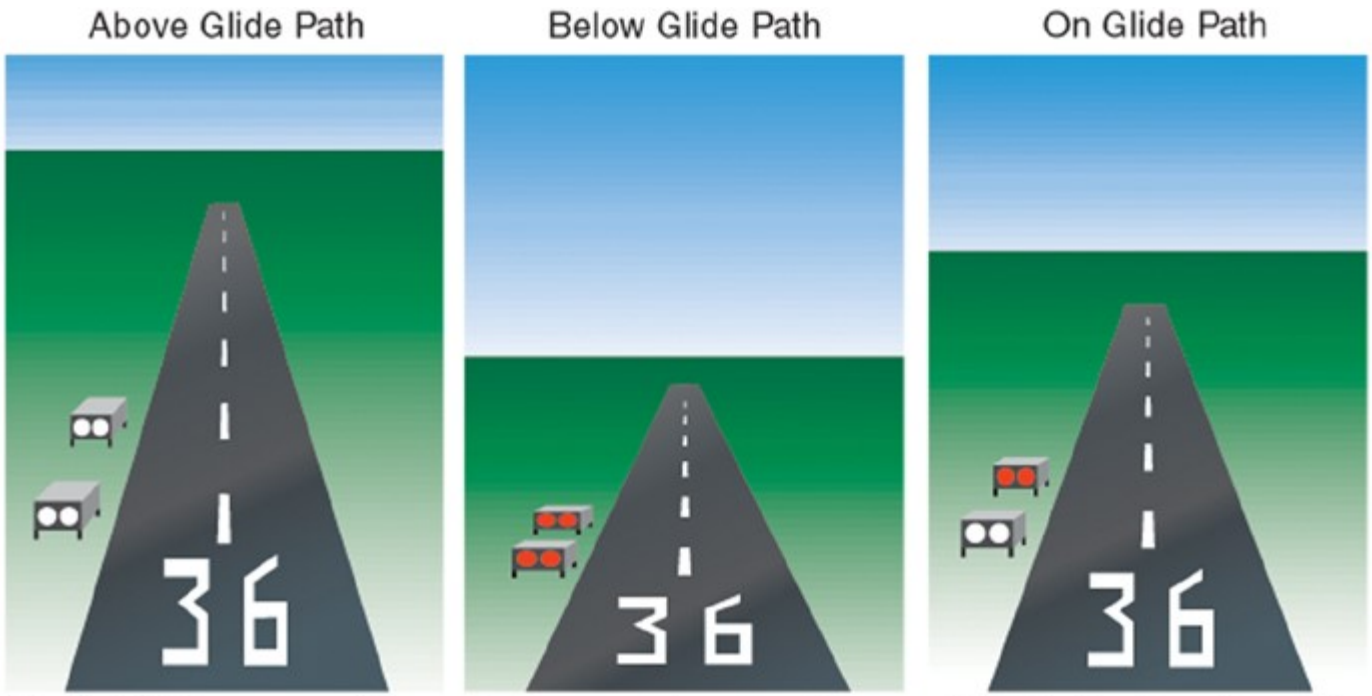
GREAT INTERNET REVIEW AND ILLUSTRATIONS ON ALL AIRPORT OPS ☺

http://flash.aopa.org/asf/runwaySafety/html/index/runwaySafety_expanding.htm

THE FLIGHT ENVIRONMENT - AIRPORT VISUAL GUIDES

VISUAL APPROACH SLOPE INDICATORS

VASI

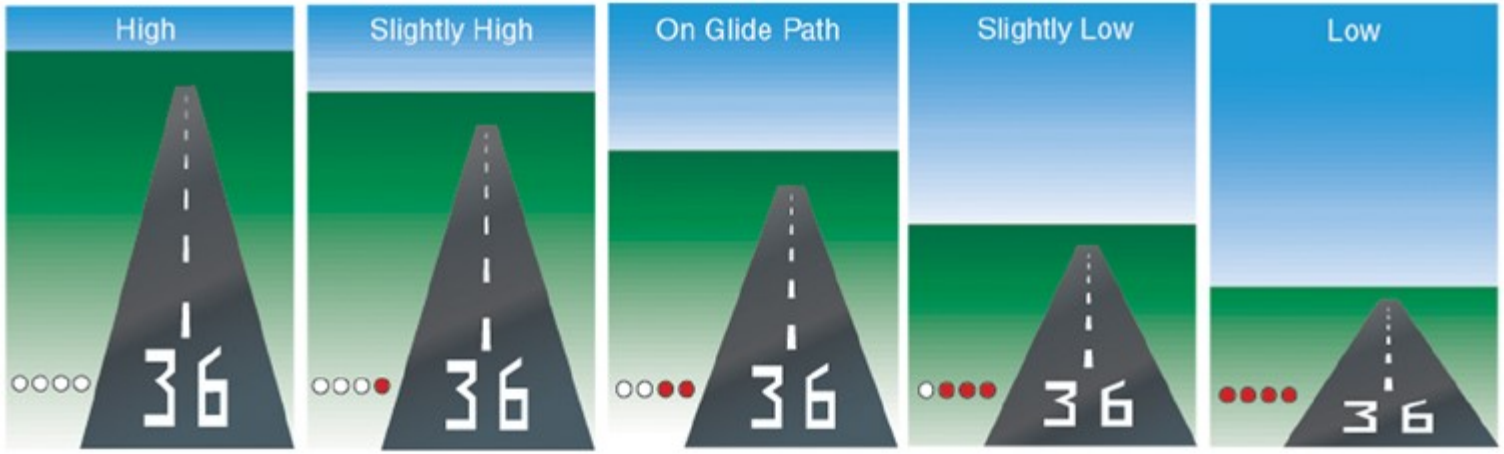


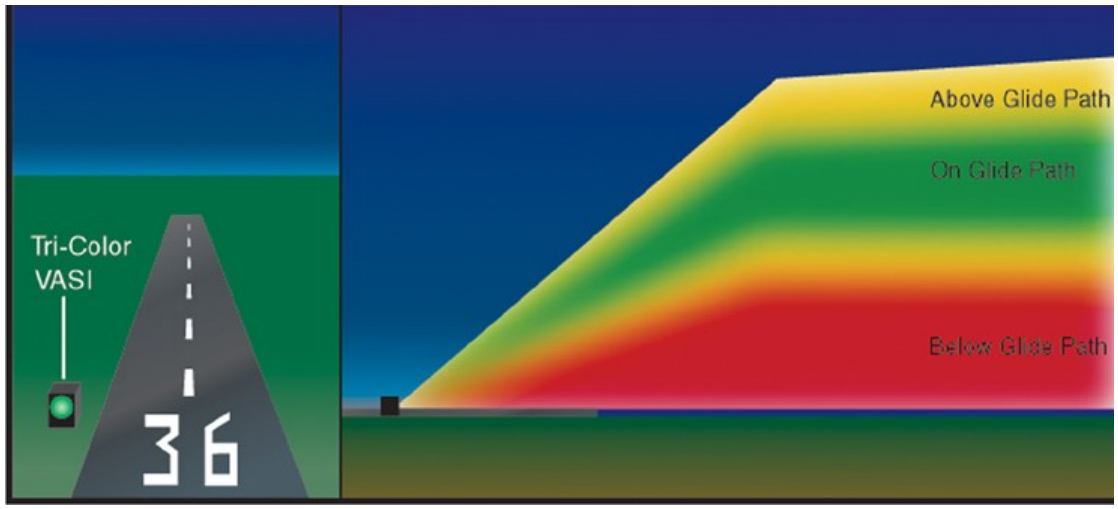
If both light bars are white, you are too high.

If you see red over red, you are below the glide path.

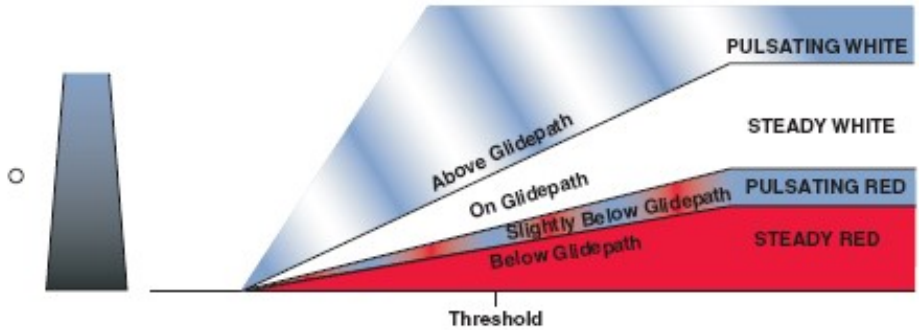
If the far bar is red and the near bar is white, you are on the glide path. The memory aid "red over white you're all right," is helpful in recalling the correct sequence of lights.

THE FLIGHT ENVIRONMENT - AIRPORT VISUAL GUIDES





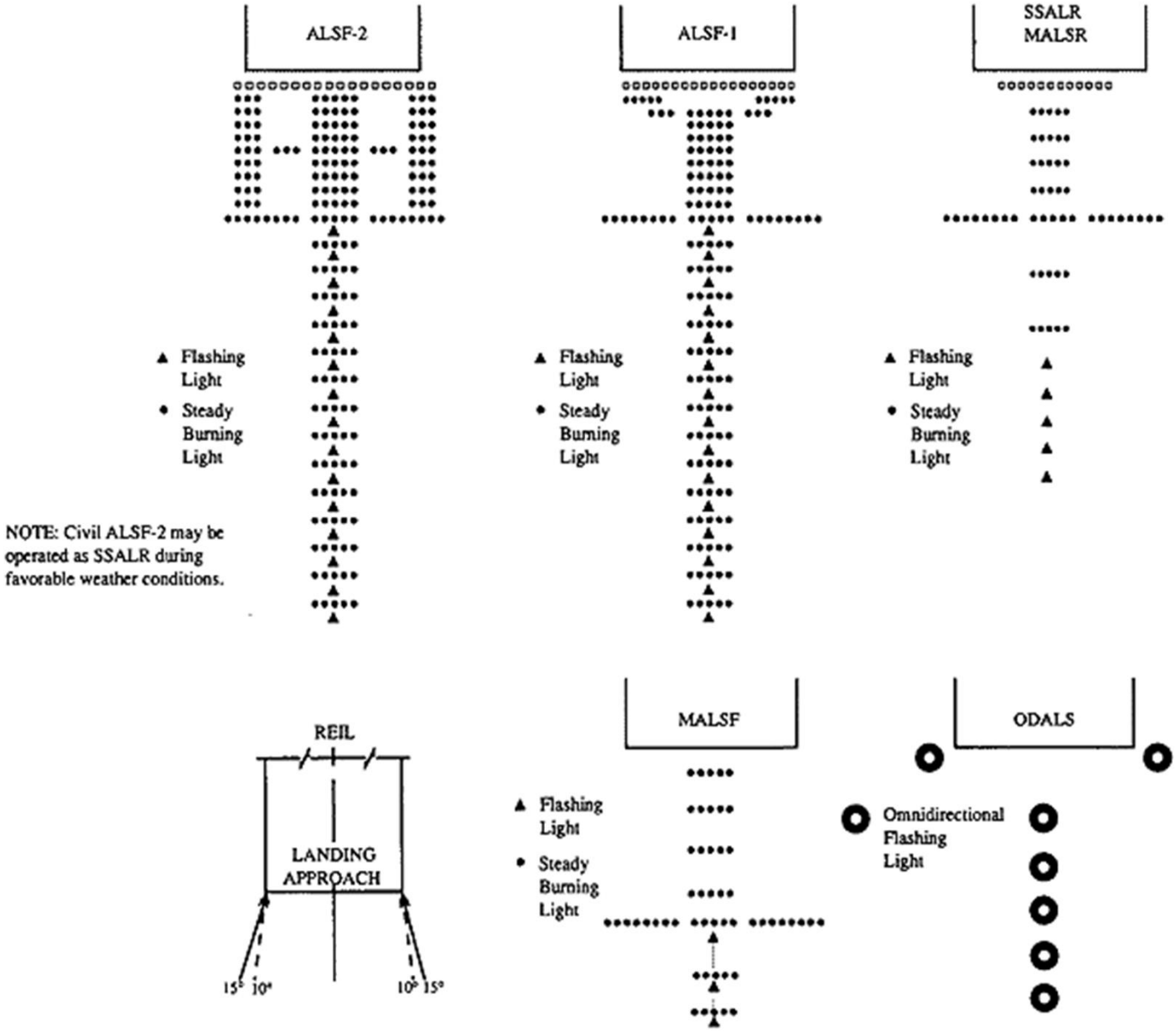
Pulsating visual approach slope indicator.



THE FLIGHT ENVIRONMENT - AIRPORT VISUAL GUIDES

APPROACH LIGHTING SYSTEMS

APPROACH LIGHTING SYSTEMS

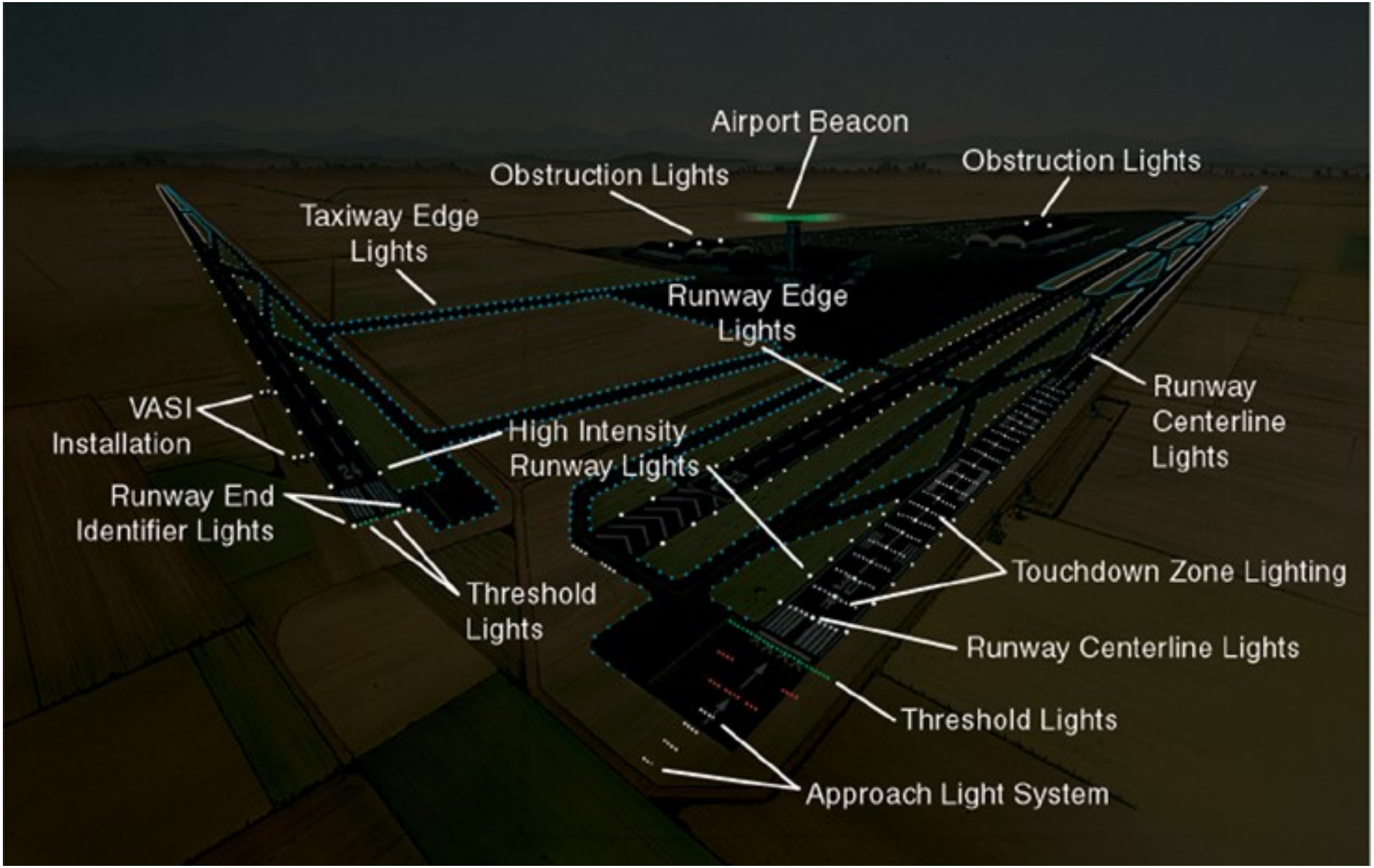


Runway Status Lights integrates airport lighting equipment with approach and surface surveillance systems to provide a visual signal to pilots and vehicle operators indicating that it is unsafe to enter/cross or begin takeoff on runway. The system is fully automated based on inputs from surface and terminal surveillance systems. Airport surveillance sensor inputs are processed through light control logic that commands in-pavement lights to illuminate red when there is traffic on or approaching the runway. This system is now active at Orlando International Airport (KMCO)

Runway Entrance Lights (REL) provide signal to aircraft crossing entering runway from intersecting taxiway.
Takeoff Hold Lights (THL) provide signal to aircraft in position for takeoff'.

VIDEO **http://www.faa.gov/tv/?mediaId=349**

THE FLIGHT ENVIRONMENT - AIRPORT VISUAL GUIDES



Sources of Airport Data

Aeronautical Charts

Aeronautical charts provide specific information on airports. Chapter 16, “Navigation,” contains an excerpt from an aeronautical chart and an aeronautical chart legend, which provides guidance on interpreting the information on the chart.

Chart Supplement U.S. (formerly Airport/Facility Directory)

The Chart Supplement U.S. (formerly Airport/Facility Directory) provides the most comprehensive information on a given airport. It contains information on airports, heliports, and seaplane bases that are open to the public. The Chart Supplement U.S. is published in seven books, which are organized by regions and are revised every 56 days. The Chart Supplement U.S. is also available digitally at www.faa.gov/air_traffic/flight_info/aeronav. We will go into detail later in the course.

Notices to Airmen (NOTAM)

Time-critical aeronautical information, which is of a temporary nature or not sufficiently known in advance to permit publication, on aeronautical charts or in other operational publications receives immediate dissemination by the NOTAM system. The NOTAM information could affect your decision to make the flight. It includes such information as taxiway and runway closures, construction, communications, changes in status of navigational aids, and other information essential to planned en route, terminal, or landing operations. Exercise good judgment and common sense by carefully regarding the information readily available in NOTAMs. Prior to any flight, pilots should check for any NOTAMs that could affect their intended flight.

Automated Terminal Information Service (ATIS)

The Automated Terminal Information Service (ATIS) is a recording of the local weather conditions and other pertinent non-control information broadcast on a local frequency in a looped format. It is normally updated once per hour but is updated more often when changing local conditions warrant.

AERONAUTICAL CHARTS

Created by Steve Reisser

Charts

Types used by Sport/Private Pilots

Sectional Chart 1:500,000 inches PRIMARY VFR (detailed)

World Aeronautical Chart: 1: 1,000,000

(the larger the coverage-the less the detail)

Terminal Area Chart (TAC) 1:250,000 inches

May also have VFR Flyway Planning Chart printed on back of the TAC.

Low Enroute Charts: Radio Navigation – no ground details other than transmitters. Will review in radio navigation section. Primary chart for instrument rated pilots. PRIMARY IFR (Radio Navigation/Altitudes)

Latitudes and Longitudes

You must learn to identify airports and your current position using Lat/Long

THE FLIGHT ENVIRONMENT - AERONAUTICAL CHARTS
LATITUDE & LONGITUDE

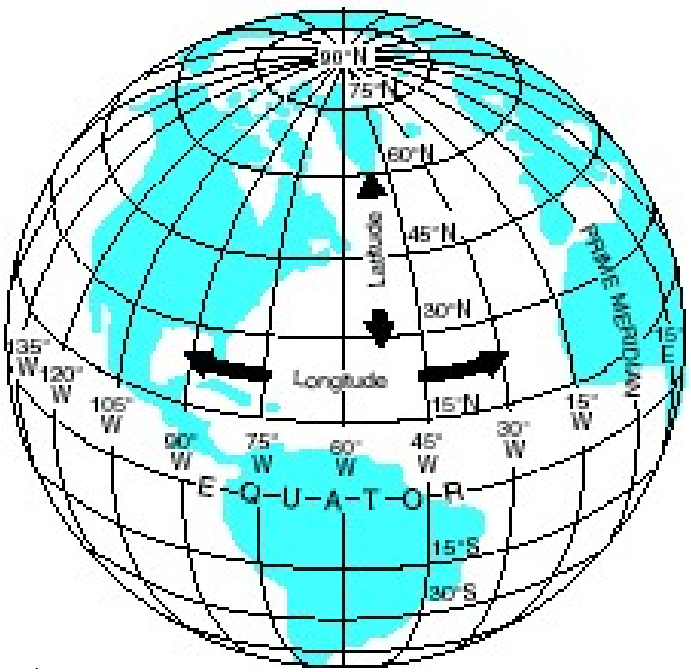
North Pole = 90 N Latitude

/\

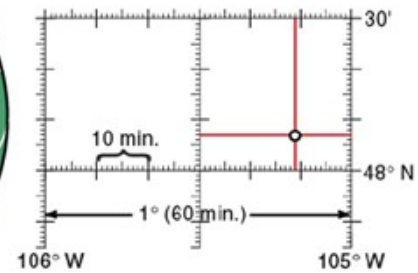
Equator = 0 Latitude

\/

South Pole = 90 S Latitude



Prime Meridian=0 Longitude



180 W← →180 E

Greenwich England

180W<->180E Longitude intersect on International Date Line

Created by Steve Reisser

The TYPE of Aeronautical chart used depends on whether you are flying in accordance with regulations for VFR of IFR.

What is VFR and IFR?

TYPES OF CHART

VFR CHARTS

Sectional Charts: Primary emphasis of this course. FAA Tutorial can be found at http://www.faa.gov/air_traffic/flight_info/aeronav/digital_products/aero_guide/

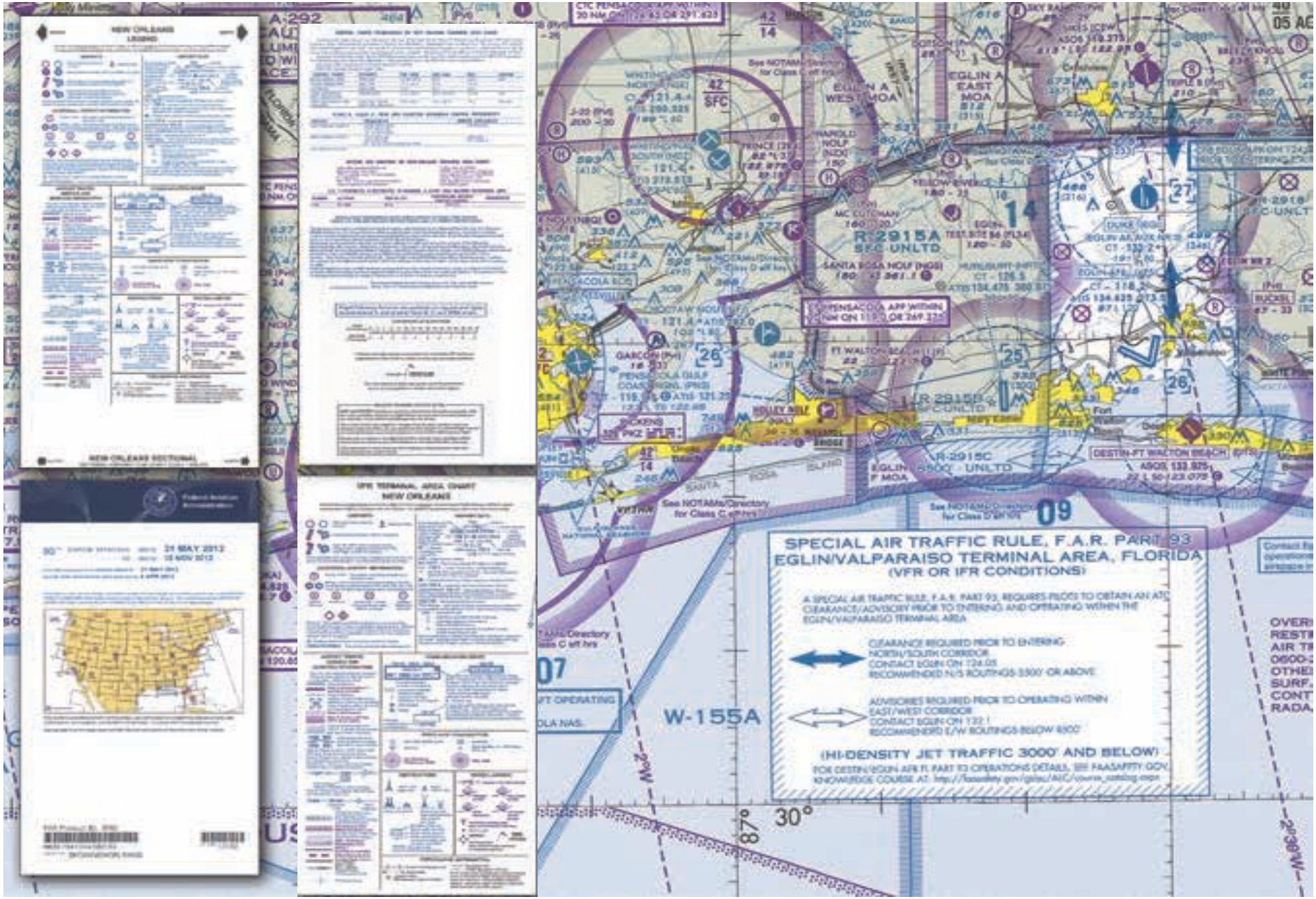
Terminal Area Charts: Enlarged region of Class B airspaces

World Aeronautical Charts: Twice the scale of Sectional Charts used for planning.

IFR Charts

Low Enroute Charts
High Enroute Charts
U.S. Terminal Procedural Charts

SECTIONAL CHARTS



THE FLIGHT ENVIRONMENT - AERONAUTICAL CHART

KEEP YOUR CHARTS CURRENT

Aeronautical information changes rapidly, so it is important that pilots check the effective dates on each aeronautical chart and publication. To avoid danger, it is important to always use current editions and discard obsolete charts and publications. To confirm that a chart or publication is current, refer to the next scheduled edition date printed on the cover. Pilots should also check Aeronautical Chart Bulletins and NOTAMs for important updates between chart and publication cycles that are essential for safe flight.

THE FLIGHT ENVIRONMENT - AERONAUTICAL CHART

AIRPORTS

Other than hard-surfaced runways

Seaplane Base

Hard-surfaced runways 1500 ft. to 8069 ft. in length.

Hard-surfaced runways greater than 8069 ft. or some multiple runways less than 8069 ft.

Open dot within hard-surfaced runway configuration indicates approximate VOR, VOR-DME, or VORTAC location.

All recognizable hard-surfaced runways, including those closed, are shown for visual identification. Airports may be public or private.

ADDITIONAL AIRPORT INFORMATION

R — Private "(Pvt)" - Non-public use having emergency or landmark value.

Military - Other than hard-surfaced. All military airports are identified by abbreviations AFB, NAS, AAF, etc. For complete airport information consult DOD FLIP.

H — Heliport Selected

U — Unverified

Abandoned - paved having landmark value, 3000 ft. or greater

F — Ultralight Flight Park Selected

Services-fuel available and field tended during normal working hours depicted by use of ticks around basic airport symbol. (Normal working hours are Mon thru Fri 10:00 A.M. to 4:00 P.M. local time.) Consult A/FD for service availability at airports with hard-surfaced runways greater than 8069 ft.

☆ Rotating airport beacon in operation Sunset to Sunrise.

AIRPORT DATA

Box indicates F.A.R. 93 Special Air Traffic Rules & Airport Traffic Patterns

Airport Surveillance Radar

Runways with Right Traffic Patterns (public use)

RP ★ (See Airport/ Facility Directory)

FSS

NO SVFR

F.A.R. 91

NAME (NAM)

Location Identifier

CT -118.3 ★ Ⓒ ATIS 123.8

285 L 72 122.95

UNICOM

RP 23,34

VFR Advsy 125.0

Airport of Entry

FSS - Flight Service Station

NO SVFR - Fixed-wing special VFR flight is prohibited.

CT -118.3 - Control Tower (CT) - primary frequency

★ - Star indicates operation part-time. See tower frequencies tabulation for hours of operation.

Ⓒ - Indicates Common Traffic Advisory Frequencies (CTAF)

ATIS 123.8 - Automatic Terminal Information Service

ASOS/ AWOS 135.42 - Automated Surface Weather Observing Systems. Some ASOS/AWOS facilities may not be located at airports.

UNICOM - Aeronautical advisory station

VFR Advsy - VFR Advisory Service shown where ATIS not available and frequency is other than primary CT frequency.

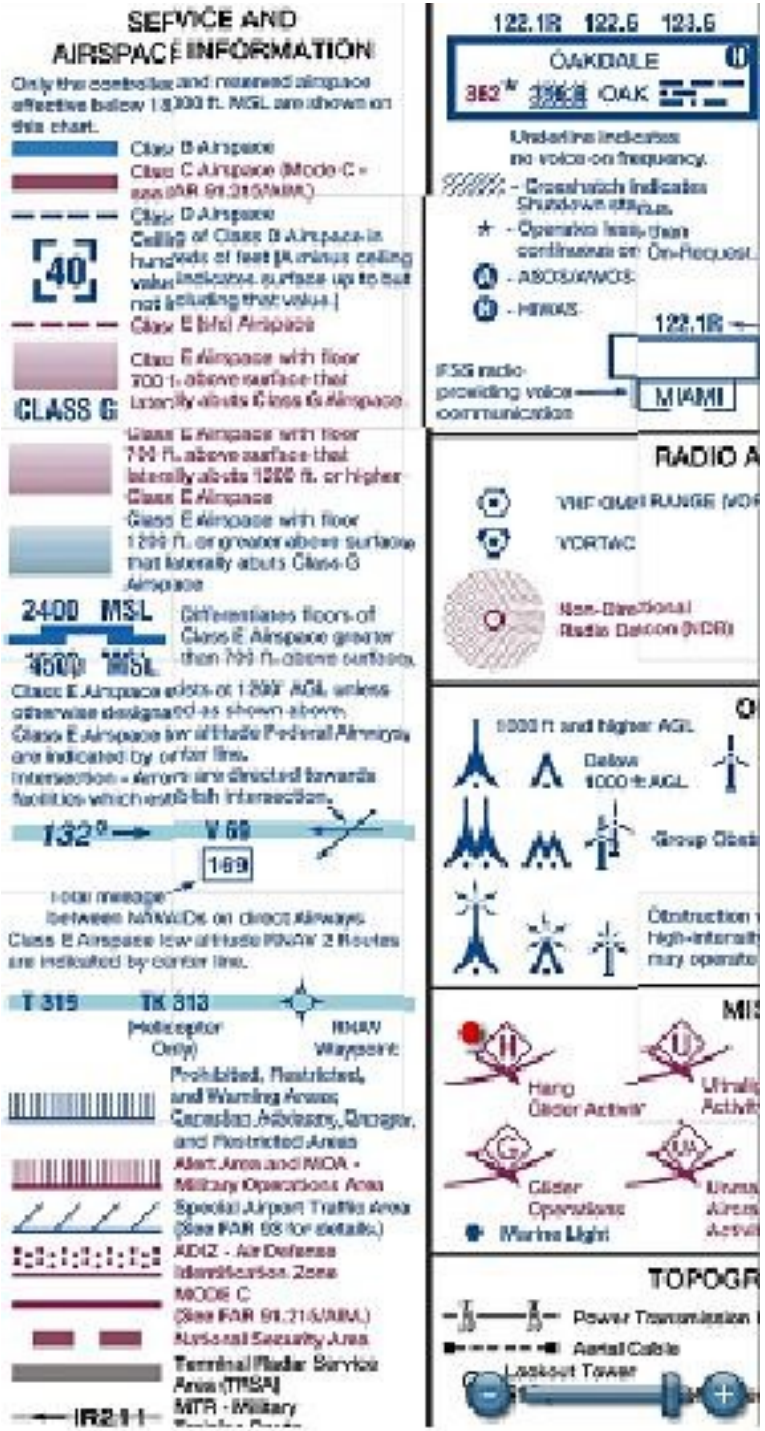
285 - Elevation in feet

L - Lighting in operation Sunset to Sunrise

*L - Lighting limitations exist, refer to Airport/Facility Directory.

72 - Length of longest runway in hundreds of feet; usable length may be less.

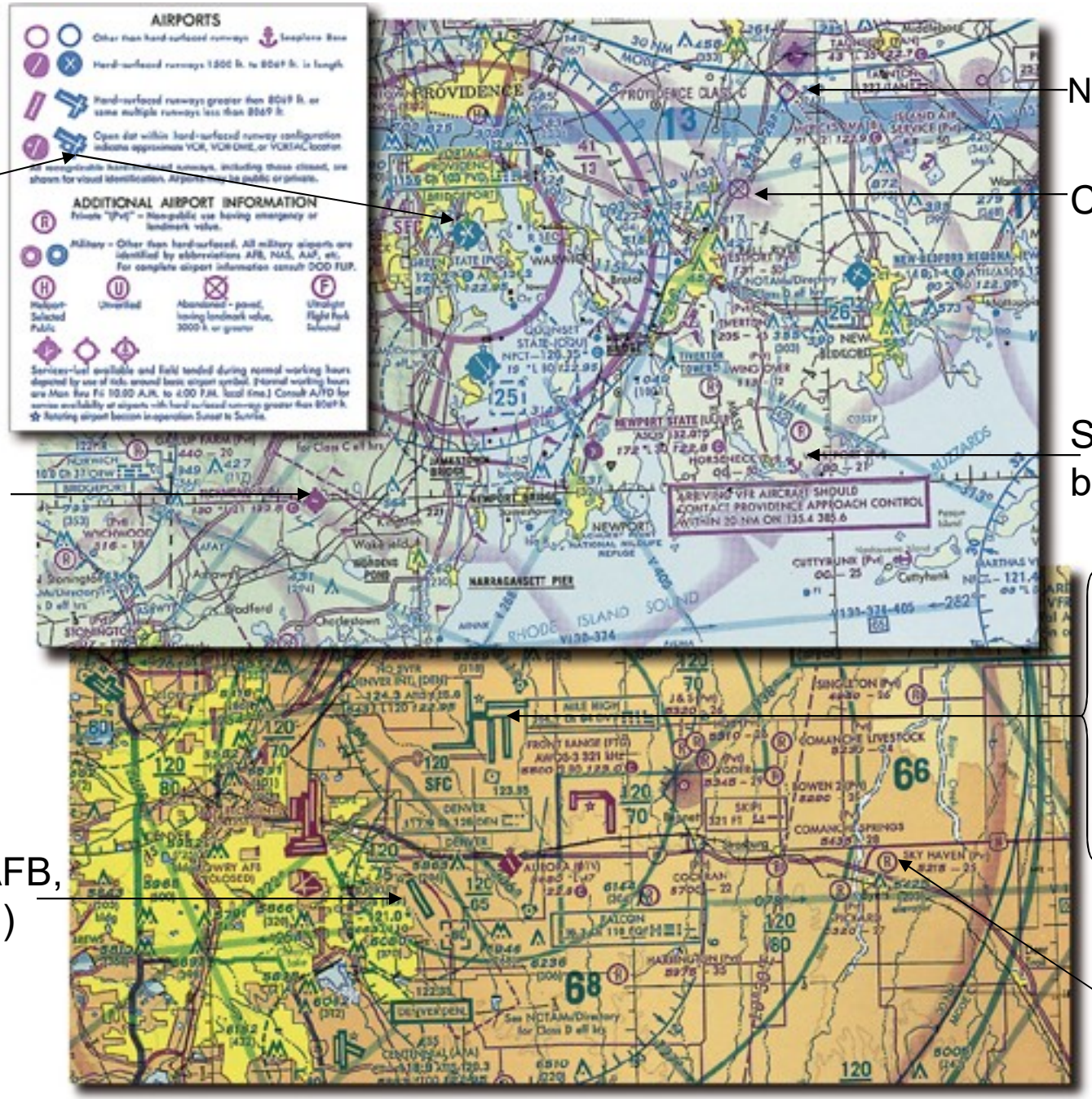
When facility or information is lacking, the respective character is replaced by a dash. All lighting codes refer to runway lights. Lighted runway may not be the longest or lighted full length. All times are local.



For detail examples, see the Jewel box
Filename: VFR_Symbols.pdf

VFR AERONAUTICAL CHART SYMBOLS

THE FLIGHT ENVIRONMENT - AERONAUTICAL CHART



Control Towers "Blue" (Airspace Types "B", "C", "D")

Not-hard surface

Closed

Seaplane base

Ticks=Fuel

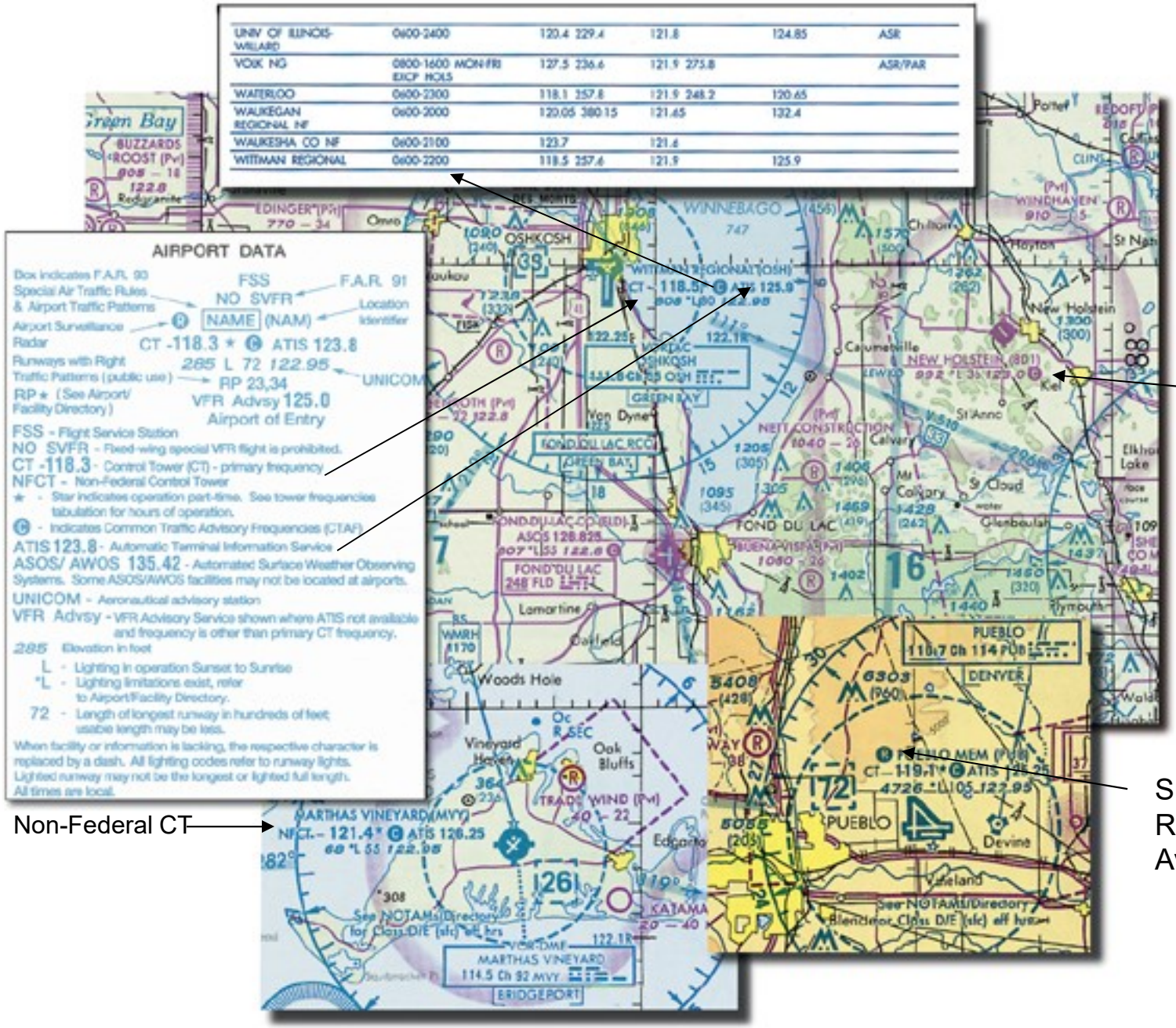
Exact runway layouts for airports with 1 rwy >8,069 ft.

Military (AFB, NAS, AFF)

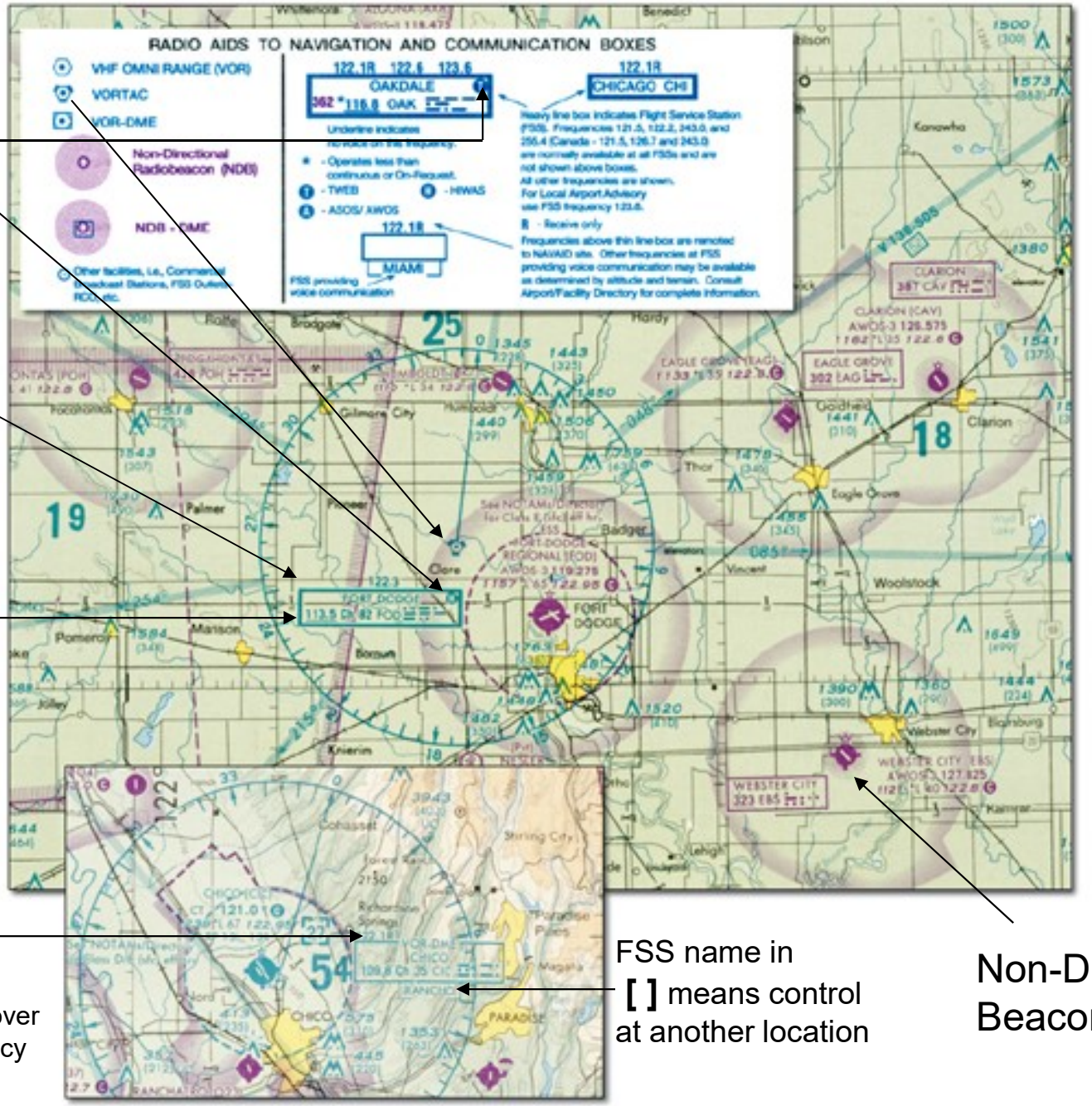
Private Airports ®

Created by Steve Reisser

THE FLIGHT ENVIRONMENT - AERONAUTICAL CHART



THE FLIGHT ENVIRONMENT - AERONAUTICAL CHART



TWEB

HIWAS

Bold Box = FSS on field

Underlined = no voice

"R" indicate FSS doesn't send & receive. Just receives – sends over navigation frequency

FSS name in **[ ]** means control at another location

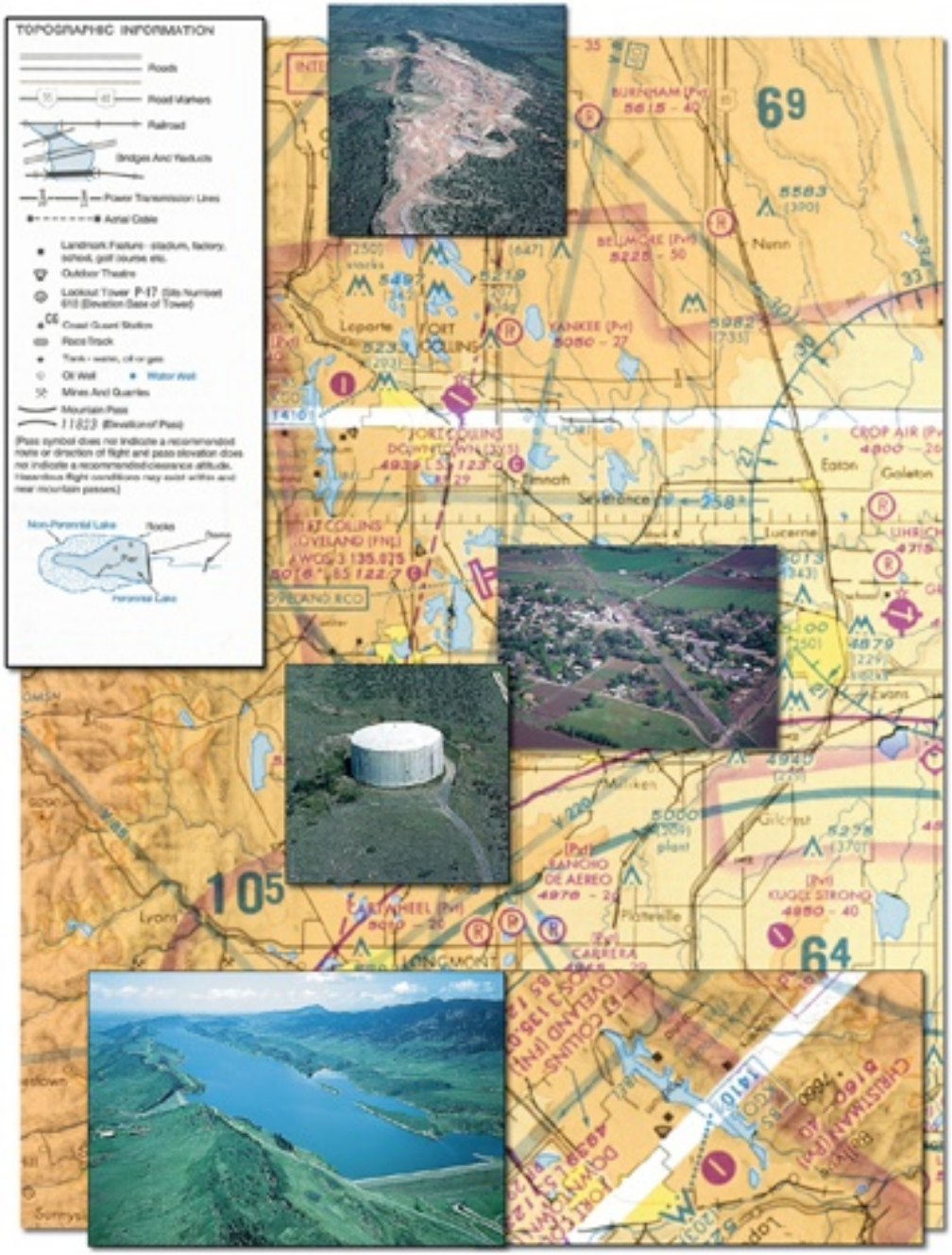
Non-Directional Beacon (NDB)

121.5 **EMERGENCY**

FSS 122.2 and EFAS 122.0 always Available even though It is not listed.

THE FLIGHT ENVIRONMENT - AERONAUTICAL CHART

TOPOGRAPHY

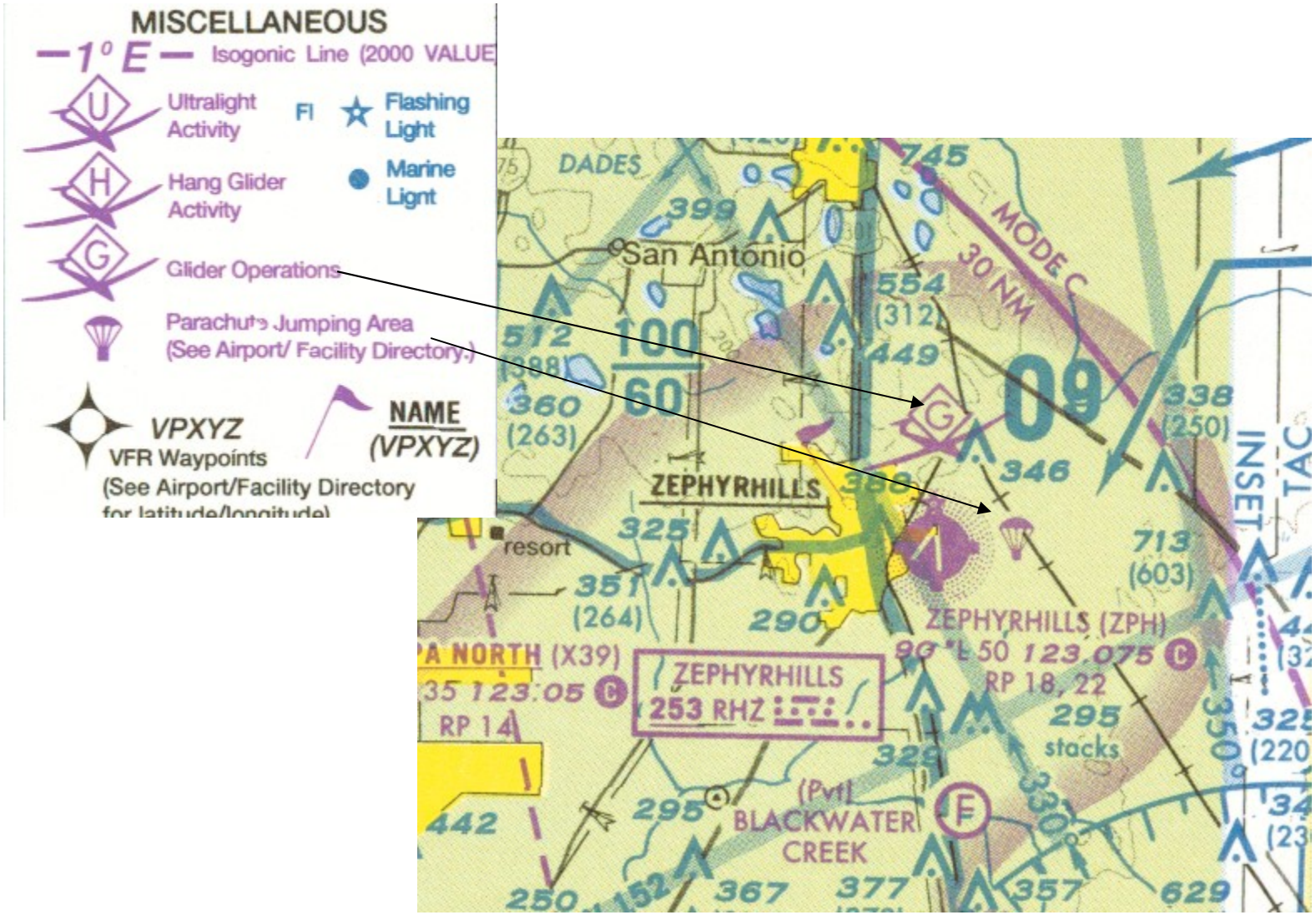


THE FLIGHT ENVIRONMENT - AERONAUTICAL CHART

MSL
vs
(AGL)

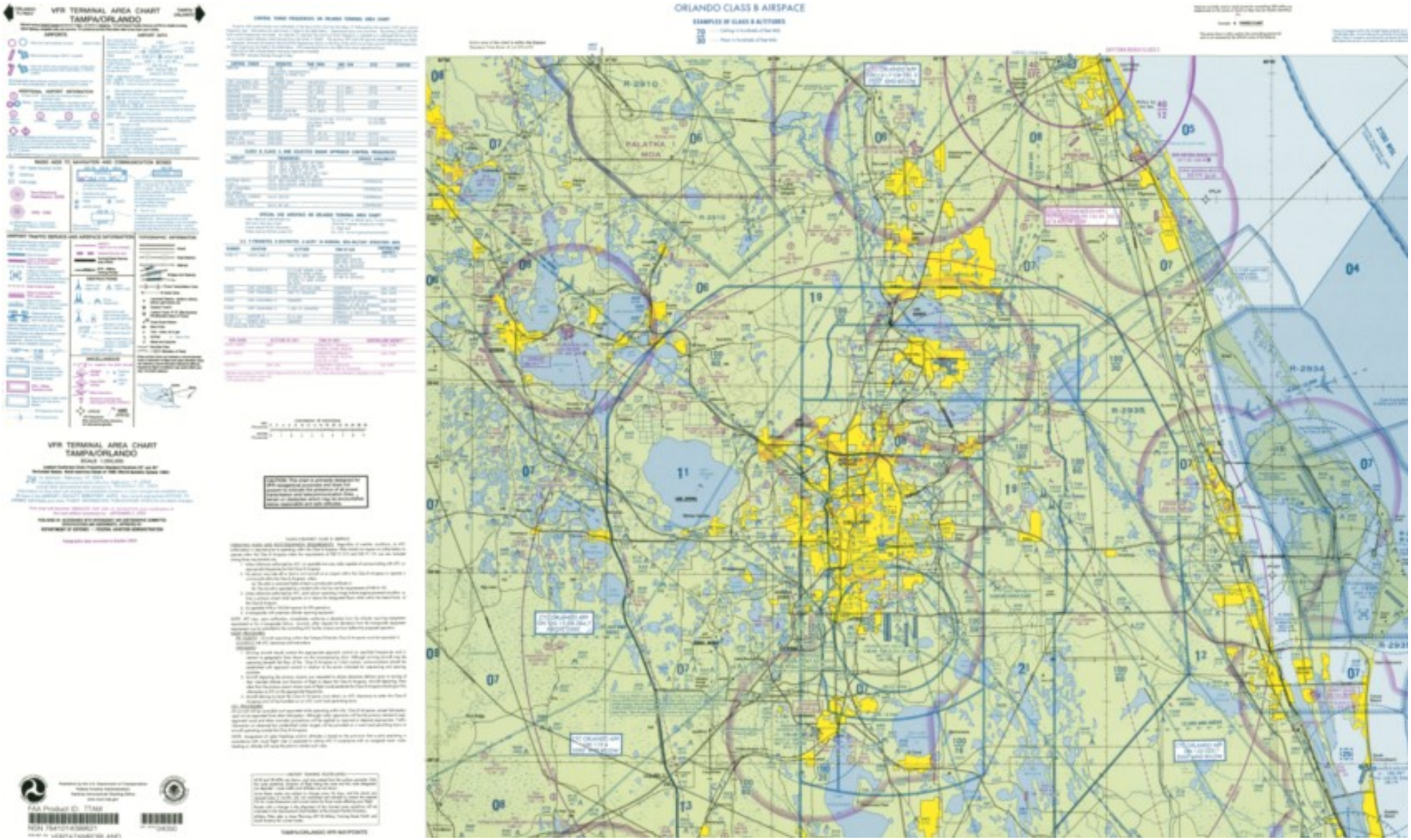
CAUTION

THE FLIGHT ENVIRONMENT - AERONAUTICAL CHART



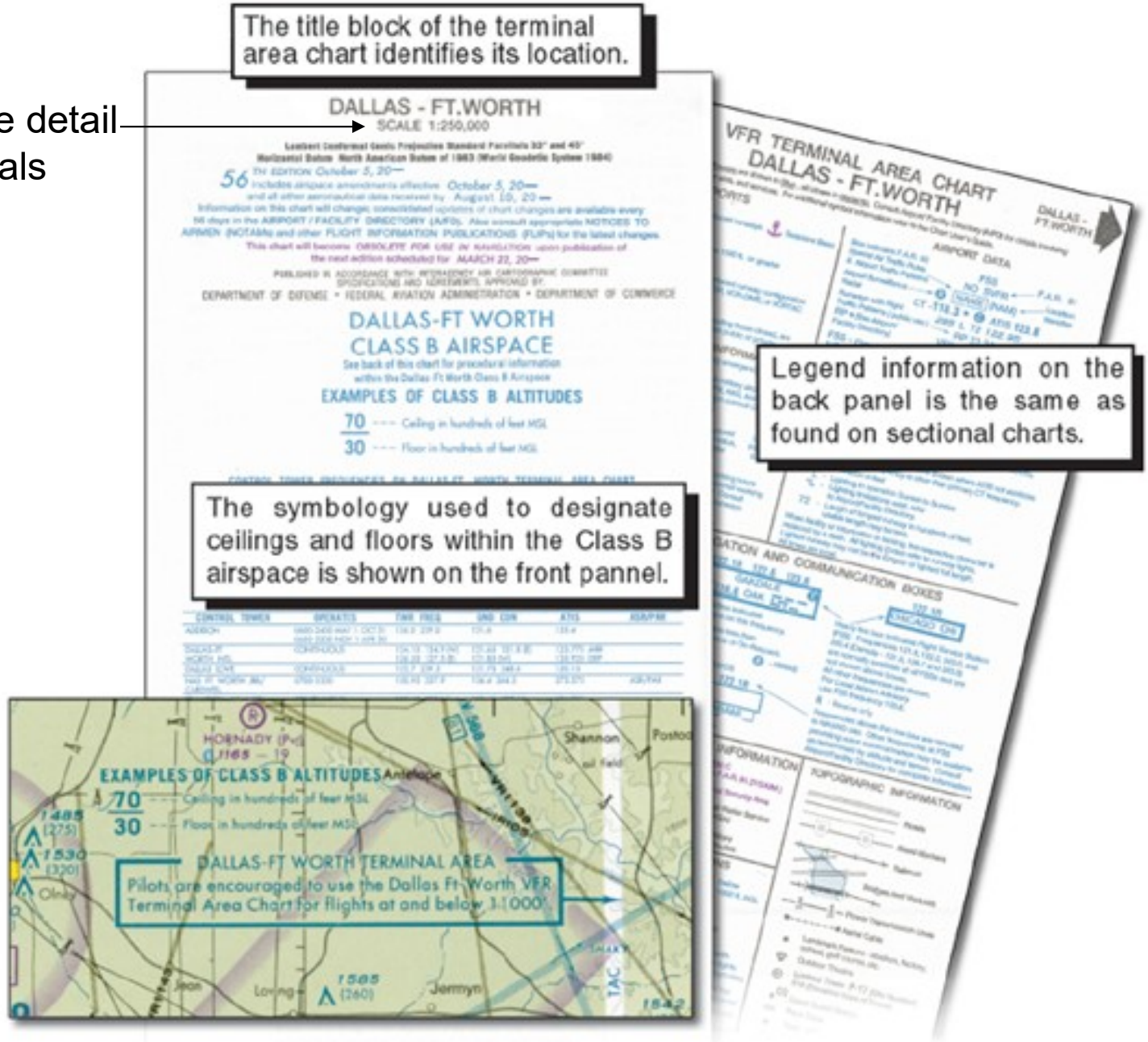
THE FLIGHT ENVIRONMENT - AERONAUTICAL CHART

<u>TERMINAL AREA CHARTS</u> (Class B Airspaces) 2x detail of Sectional chart



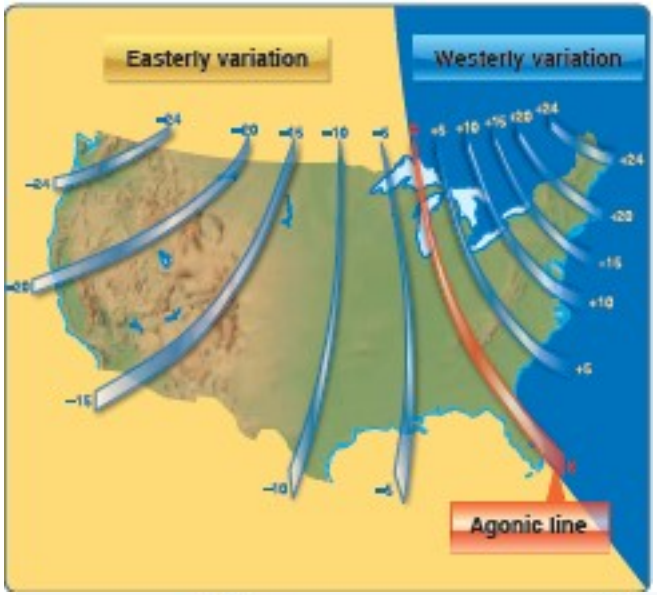
THE FLIGHT ENVIRONMENT - VFR AREA CHARTS

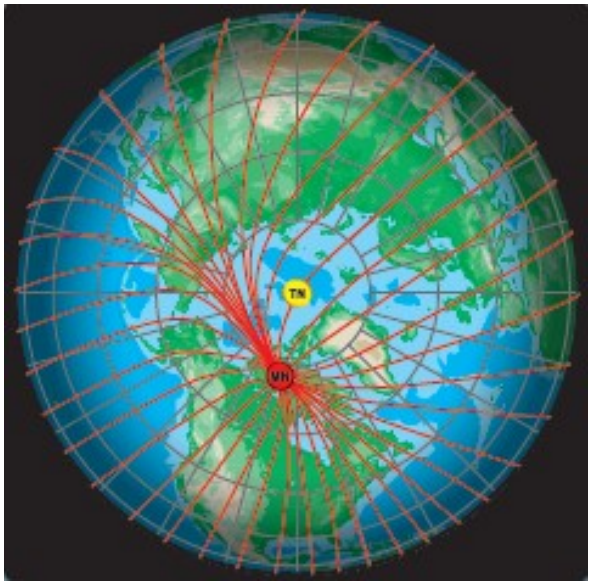
TWICE the detail of Sectionals

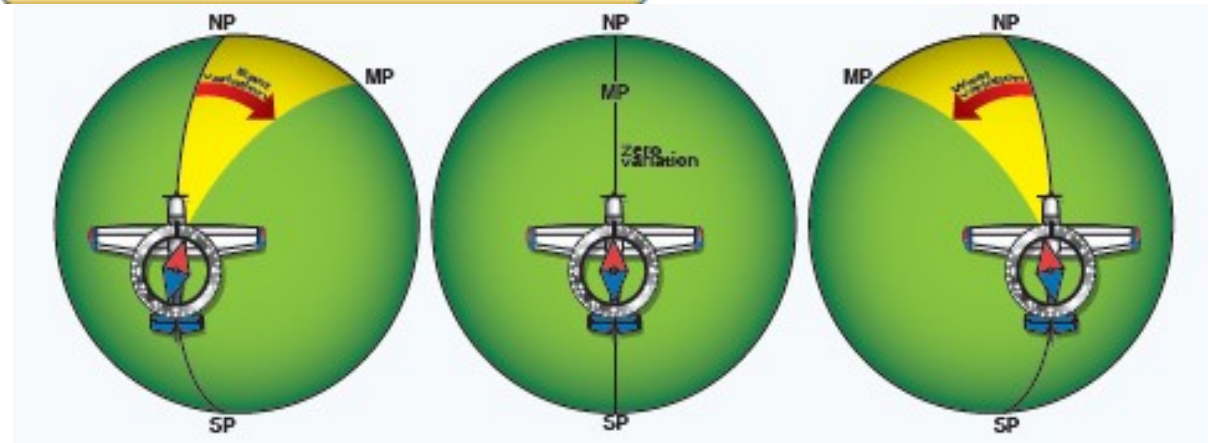


ARGONIC LINES: SEGMENTED RED

These are important to navigation as they indicate a value added (W) or subtracted (E) from course due to magnetic variation. They are shown on the sectional as vertical red segmented lines.







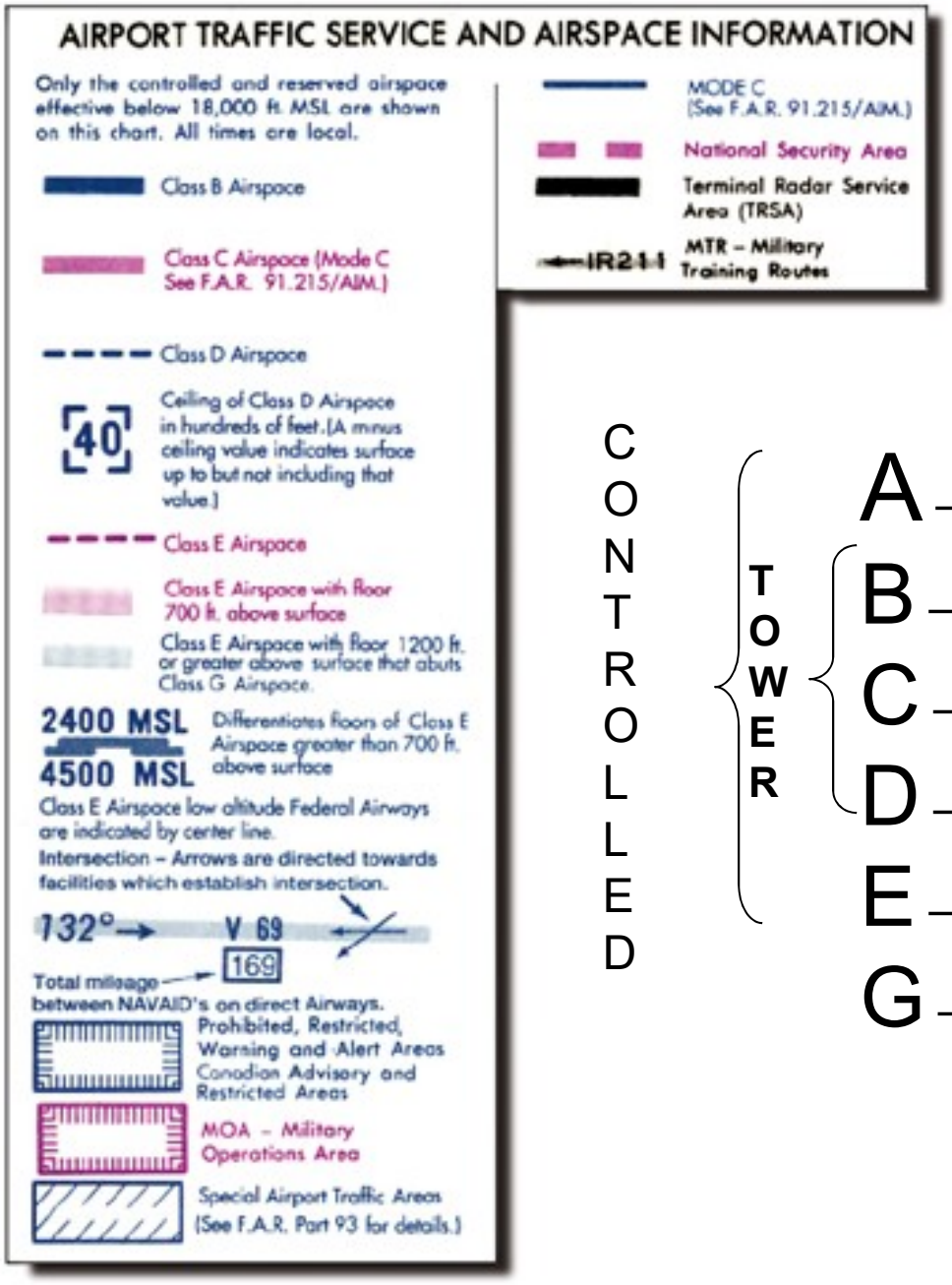
Chapter 15

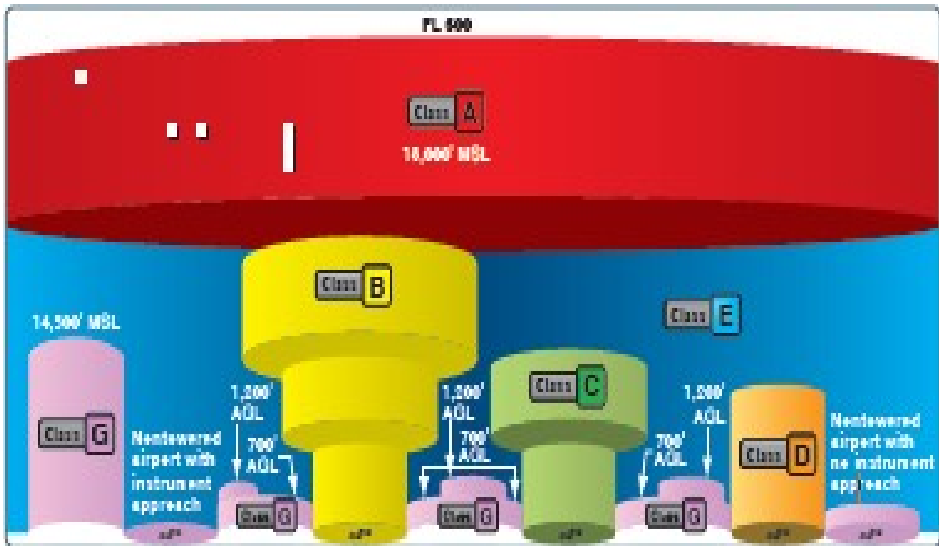
Airspace

Introduction

The two categories of airspace are: regulatory and nonregulatory. Within these two categories, there are four types: controlled, uncontrolled, special use, and other airspace. The categories and types of airspace are dictated by the complexity or density of aircraft movements, nature of the operations conducted within the airspace, the level of safety required, and national and public interest. *Figure 15-1* presents a profile view of the dimensions of various classes of airspace. Also, there are excerpts from sectional charts that are discussed in Chapter 16, Navigation, that are used to illustrate how airspace is depicted.

AIRSPACE





CONTROLLED

TOWER

A – At and Above 18000 (IFR)

B – Busiest airports

C – Congested

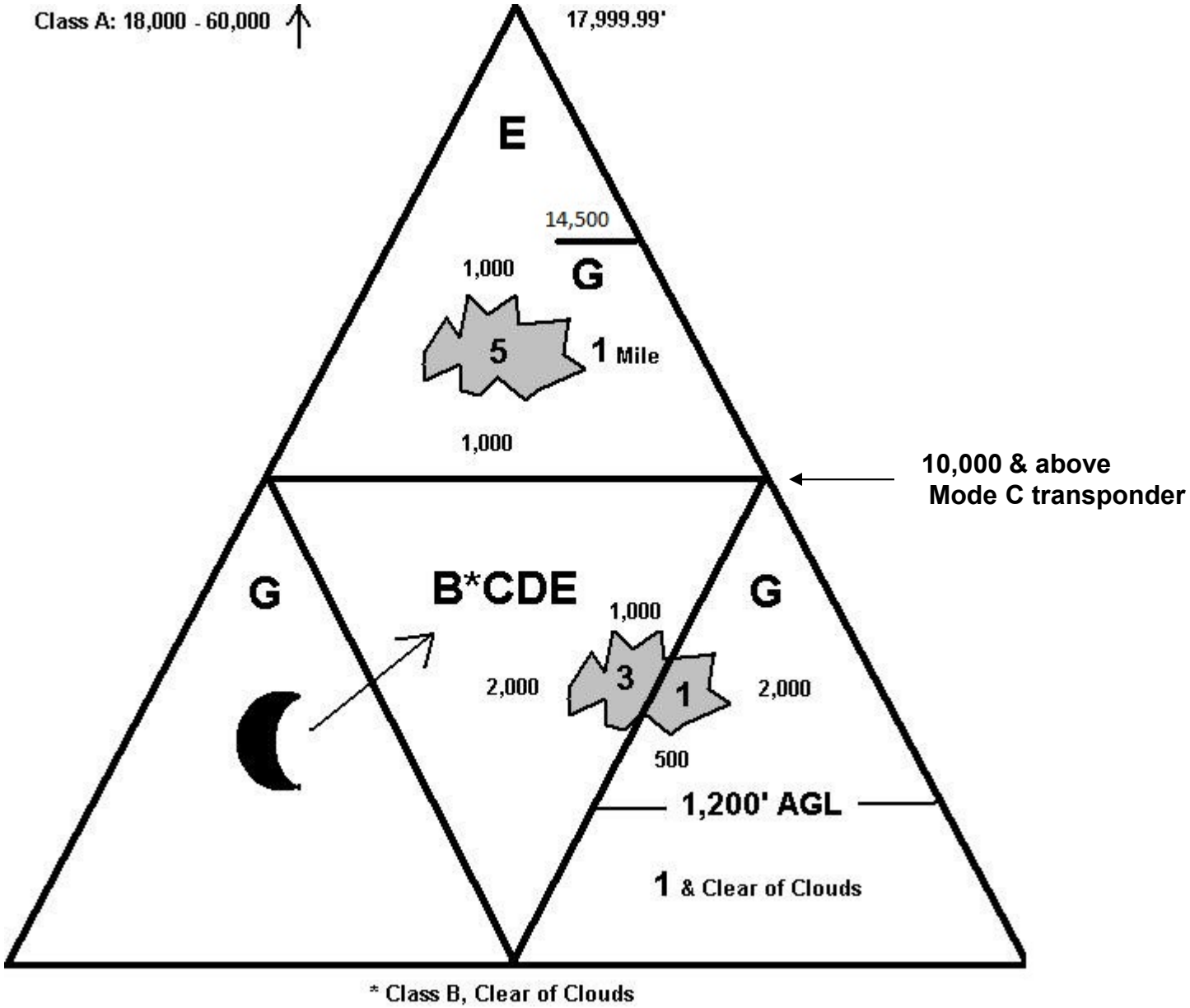
D – Direct Communications

E – Just about everywhere

G – UNCONTROLLED (below 700-1200 AGL)

Created by Steve Reisser

Basic VFR Weather Minimums				
Airspace			Flight Visibility	Distance from Clouds
Class A			Not applicable	Not applicable
Class B			3 statute miles	Clear of clouds
Class C			3 statute miles	1,000 feet above 500 feet below 2,000 feet horizontal
Class D			3 statute miles	1,000 feet above 500 feet below 2,000 feet horizontal
Class E	At or above 10,000 feet MSL		5 statute miles	1,000 feet above 1,000 feet below 1 statute mile horizontal
	Less than 10,000 feet MSL		3 statute miles	1,000 feet above 500 feet below 2,000 feet horizontal
Class G	1,200 feet or less above the surface (regardless of MSL altitude).	Day, except as provided in section 91.155(b)	1 statute mile	Clear of clouds
		Night, except as provided in section 91.155(b)	3 statute miles	1,000 feet above 500 feet below 2,000 feet horizontal
	More than 1,200 feet above the surface but less than 10,000 feet MSL	Day	1 statute mile	1,000 feet above 500 feet below 2,000 feet horizontal
		Night	3 statute miles	1,000 feet above 500 feet below 2,000 feet horizontal
	More than 1,200 feet above the surface and at or above 10,000 feet MSL		5 statute miles	1,000 feet above 1,000 feet below 1 statute mile horizontal

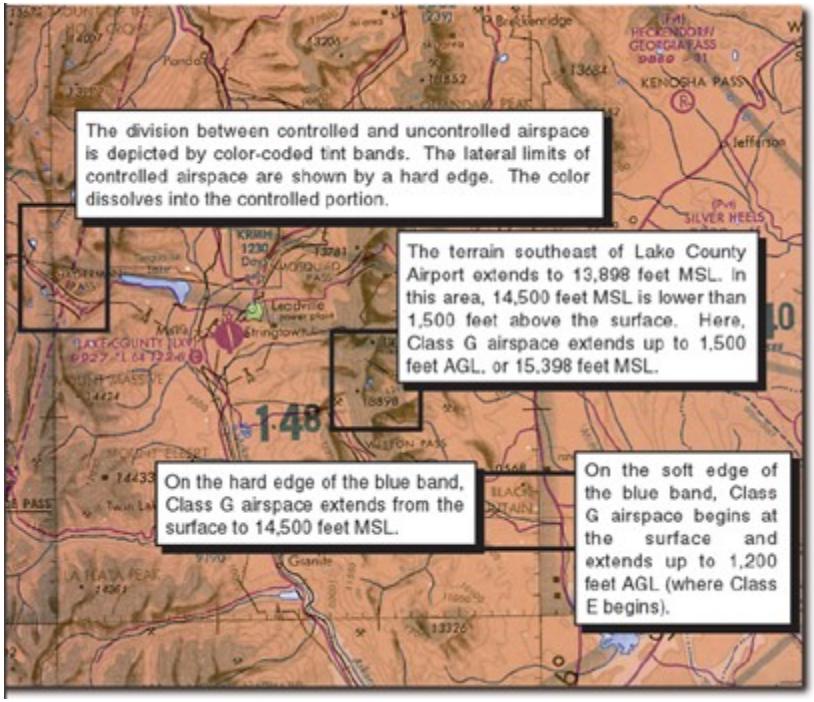

Class A: 18,000 - 60,000
17,999.99'
E
14,500
1,000
G
5
1 Mile
1,000
10,000 & above
Mode C transponder
G
B*CDE
G
1,000
2,000
3
1
2,000
500
1,200' AGL
1 & Clear of Clouds
* Class B, Clear of Clouds

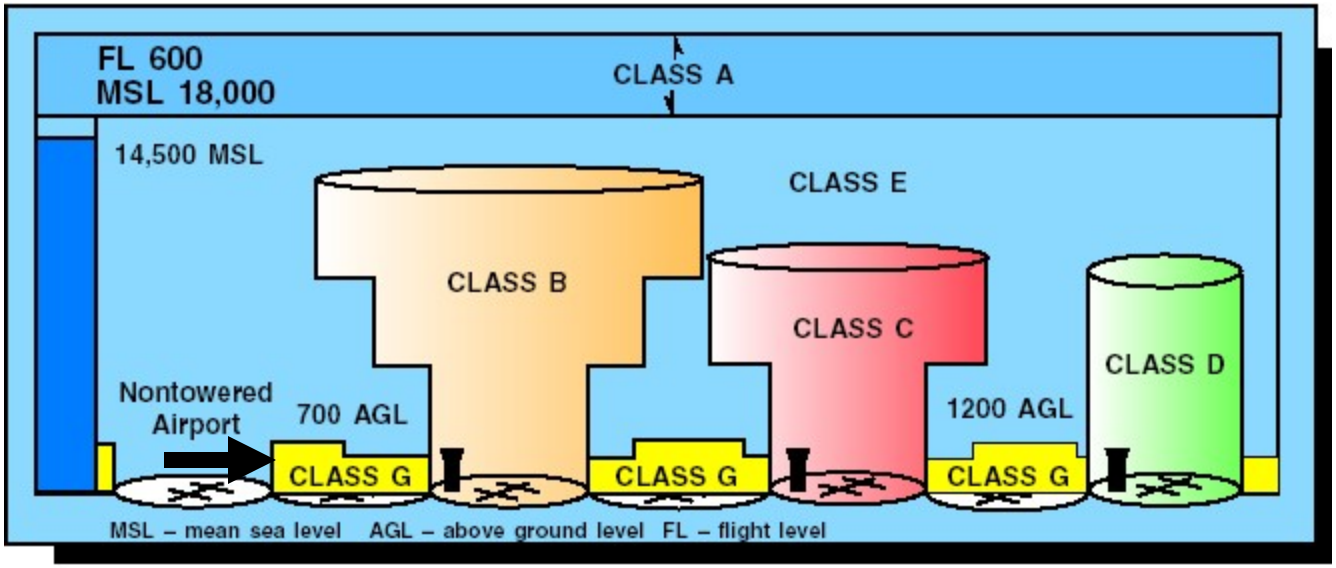
THE FLIGHT ENVIRONMENT - AIRSPACE

G

UNCONTROLLED

Airspace Features	Class G
VFR Min. Vis. and Distance from Clouds 1,200 ft AGL or less (Regardless of MSL Altitude)	Day 1 s.m. Clear of Clouds Night 3 s.m. 500 ft Below 1,000 ft Above 2,000 ft Horizontal
VFR Minimum Visibility	**Below 10,000 ft MSL –** Day 1 s.m. Night 3 s.m. **At or Above 10,000 ft MSL –** 5 s.m. (above 1,200 ft AGL)
VFR Minimum Distance from Clouds	**Below 10,000 ft MSL –** 500 ft Below 1,000 ft Above 2,000 ft Horizontal (above 1,200 ft AGL) **At or Above 10,000 ft MSL –** 1,000 ft Below 1,000 ft Above 1 s.m. Horizontal (above 1,200 ft AGL)
Minimum Pilot Qualifications	Student Pilot Certificate
VFR Entry and Equipment Requirements	None
ATC Services	VFR Traffic Advisories on Request (workload permitting)

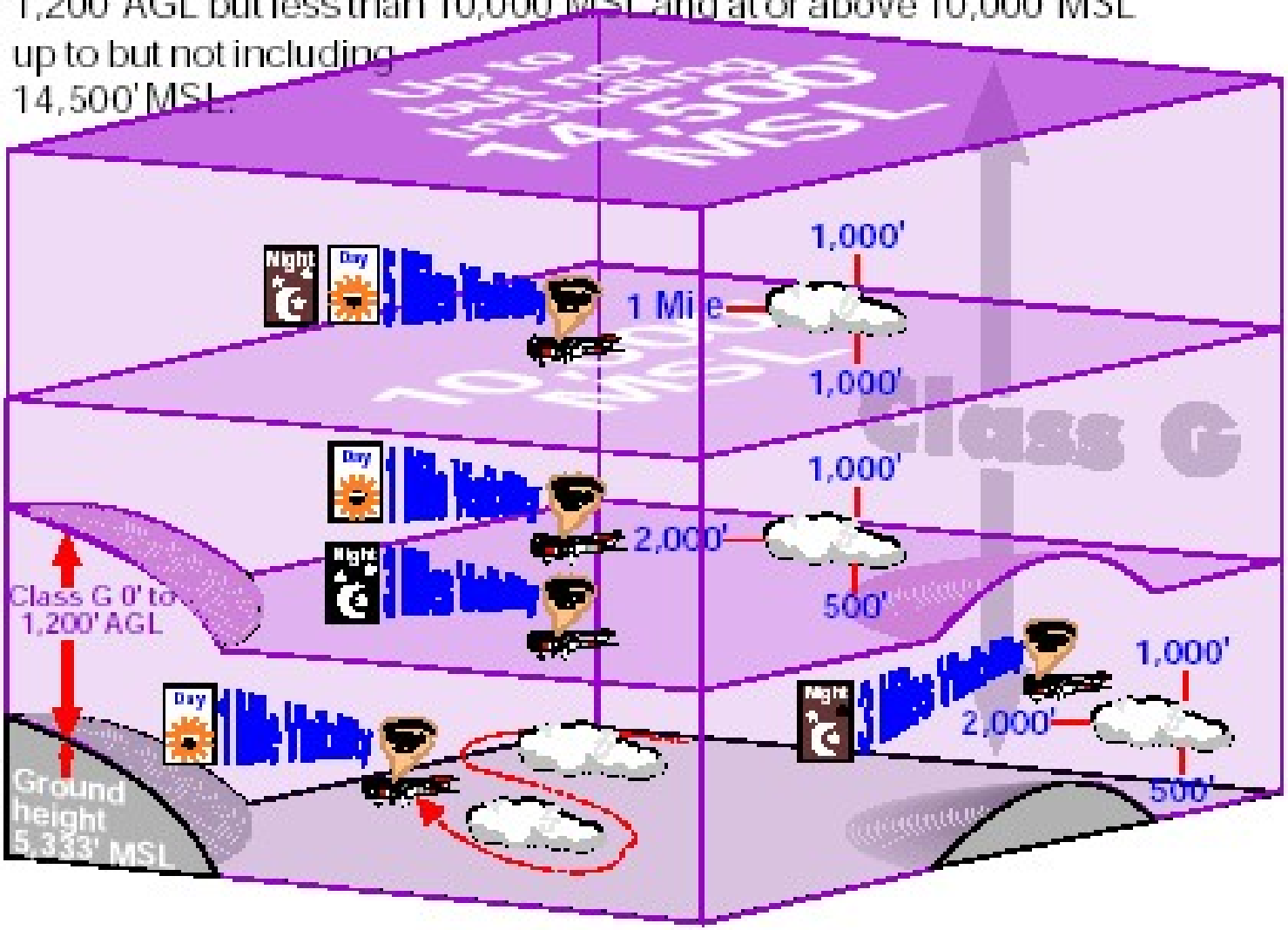




G

BASIC VFR MINIMUMS IN CLASS G AIRSPACE

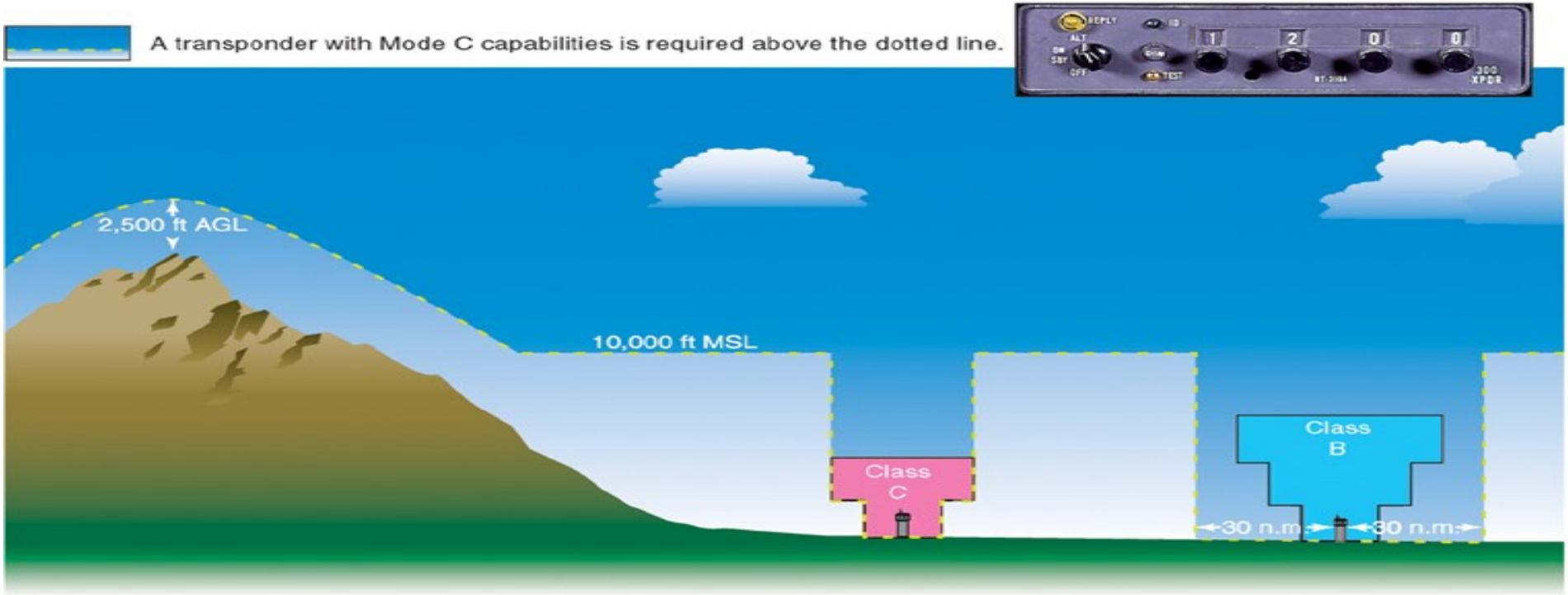
Shown below are the basic VFR weather minimums within Class G (uncontrolled) airspace for three altitude levels: from the surface up to and including 1,200' AGL, more than 1,200' AGL but less than 10,000' MSL and at or above 10,000' MSL up to but not including 14,500' MSL.



Controlled Airspace

Controlled airspace is a generic term that covers the different classifications of airspace and defined dimensions within which air traffic control (ATC) service is provided in accordance with the airspace classification. Controlled airspace consists of:

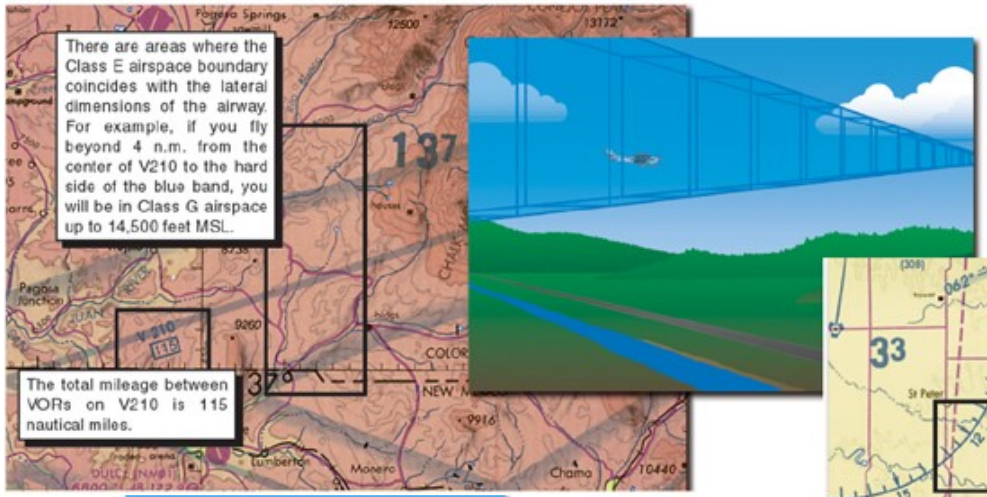
Class A
Class B
Class C
Class D
Class E

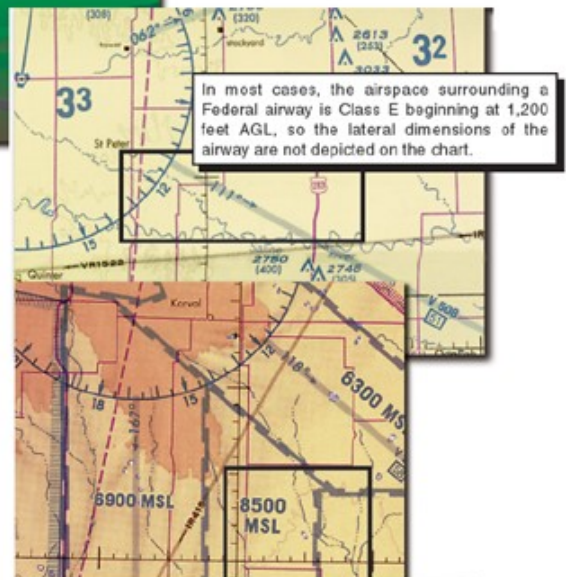


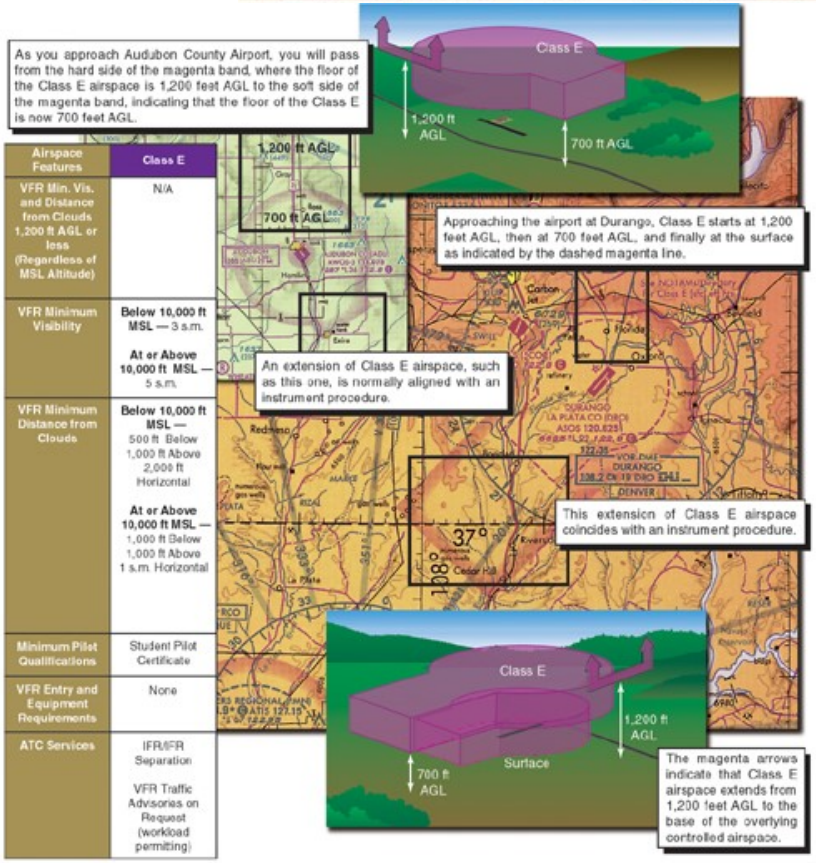
THE FLIGHT ENVIRONMENT - CONTROLLED AIRSPACE E=MAGENTA

E

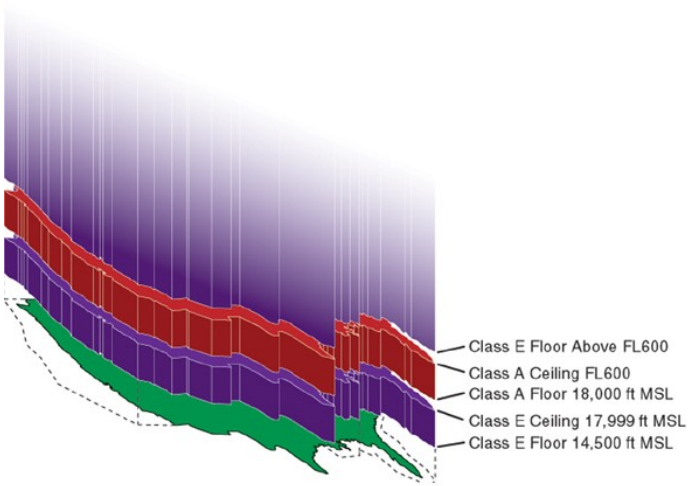
No CT



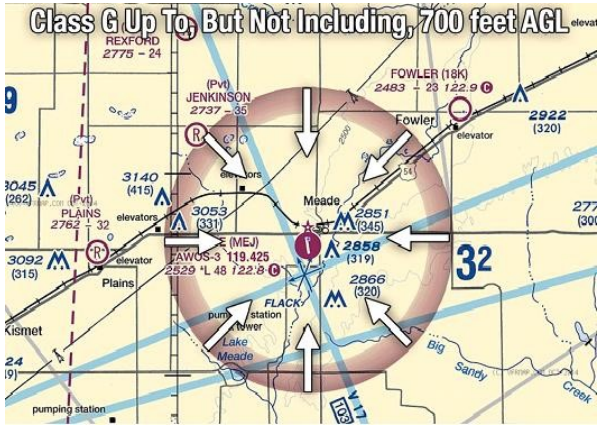




Airspace Features	Class E
VFR Min. Vis. and Distance from Clouds 1,200 ft AGL or less (Regardless of MSL Altitude)	N/A
VFR Minimum Visibility	Below 10,000 ft MSL — 3 s.m. At or Above 10,000 ft MSL — 5 s.m.
VFR Minimum Distance from Clouds	Below 10,000 ft MSL — 500 ft Below 1,000 ft Above 2,000 ft Horizontal At or Above 10,000 ft MSL — 1,000 ft Below 1,000 ft Above 1 s.m. Horizontal
Minimum Pilot Qualifications	Student Pilot Certificate
VFR Entry and Equipment Requirements	None
ATC Services	IFR/IFR Separation VFR Traffic Advisories on Request (workload permiting)

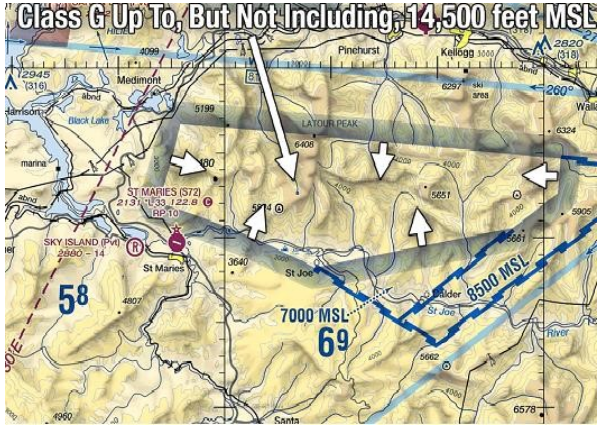


In this example…
E sits atop G-Airspace at this airport to 700ft (Fuzzy side)



E ends on the
But G may continue
on the outside
(Hard side)
Stops at 1,200 on
Victory Highways
Blue lines represent
radio navigation routes.

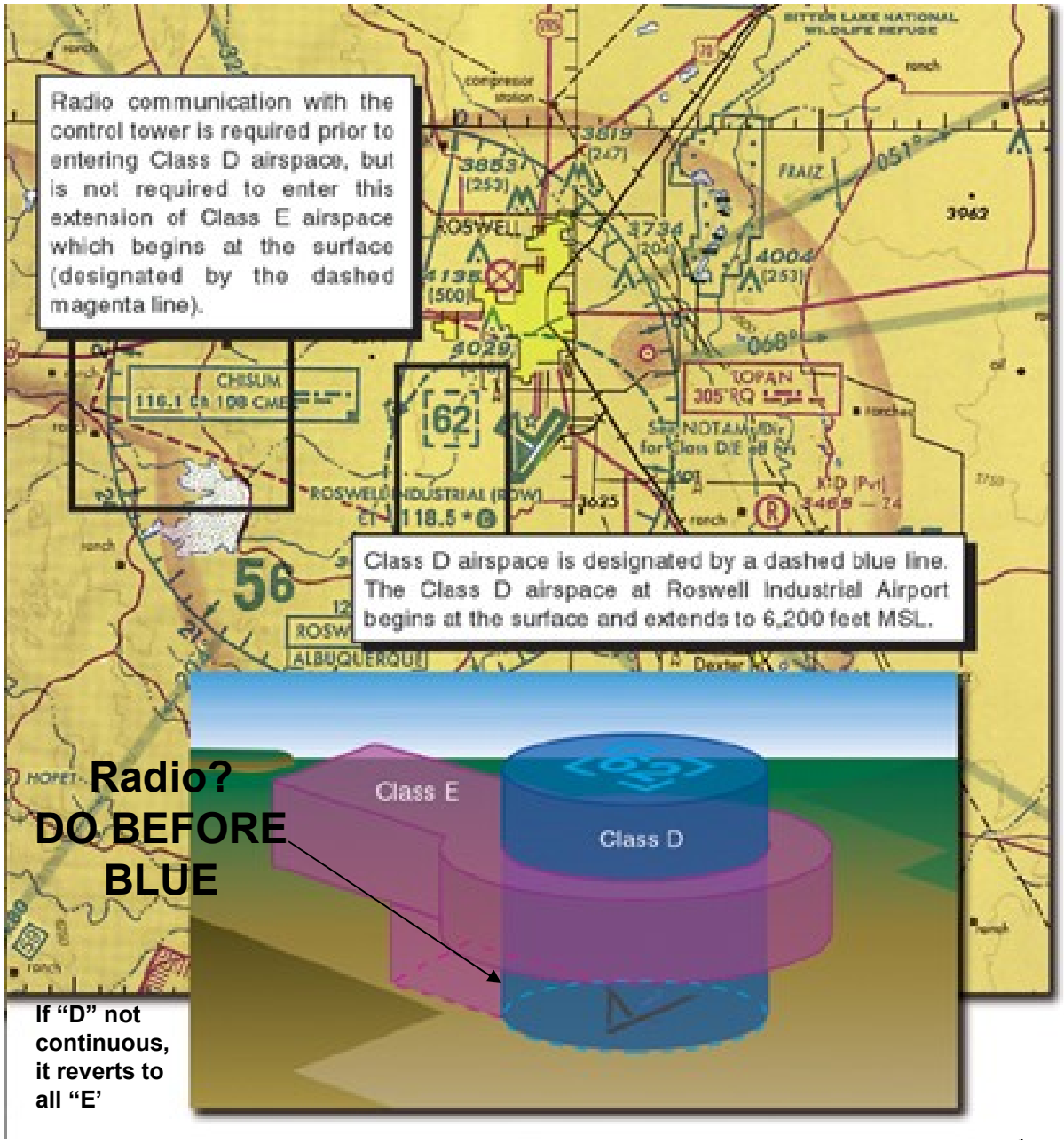
In mountainous areas E and G intermingle. Note in this case the lateral airspace of E is not magenta but blue



THE FLIGHT ENVIRONMENT - CONTROLLED AIRSPACE

D

Airspace Features	Class D
VFR Min. Vis. and Distance from Clouds 1,200 ft AGL or less (Regardless of MSL Altitude)	N/A
VFR Minimum Visibility	3 Statute Miles
VFR Minimum Distance from Clouds	500 ft Below 1,000 ft Above 2,000 ft Horizontal
Minimum Pilot Qualifications	Student Pilot Certificate
VFR Entry and Equipment Requirements	Establish Radio Communication
ATC Services	IFR/IFR Separation VFR Traffic Advisories (workload permitting)



THE FLIGHT ENVIRONMENT - CONTROLLED AIRSPACE

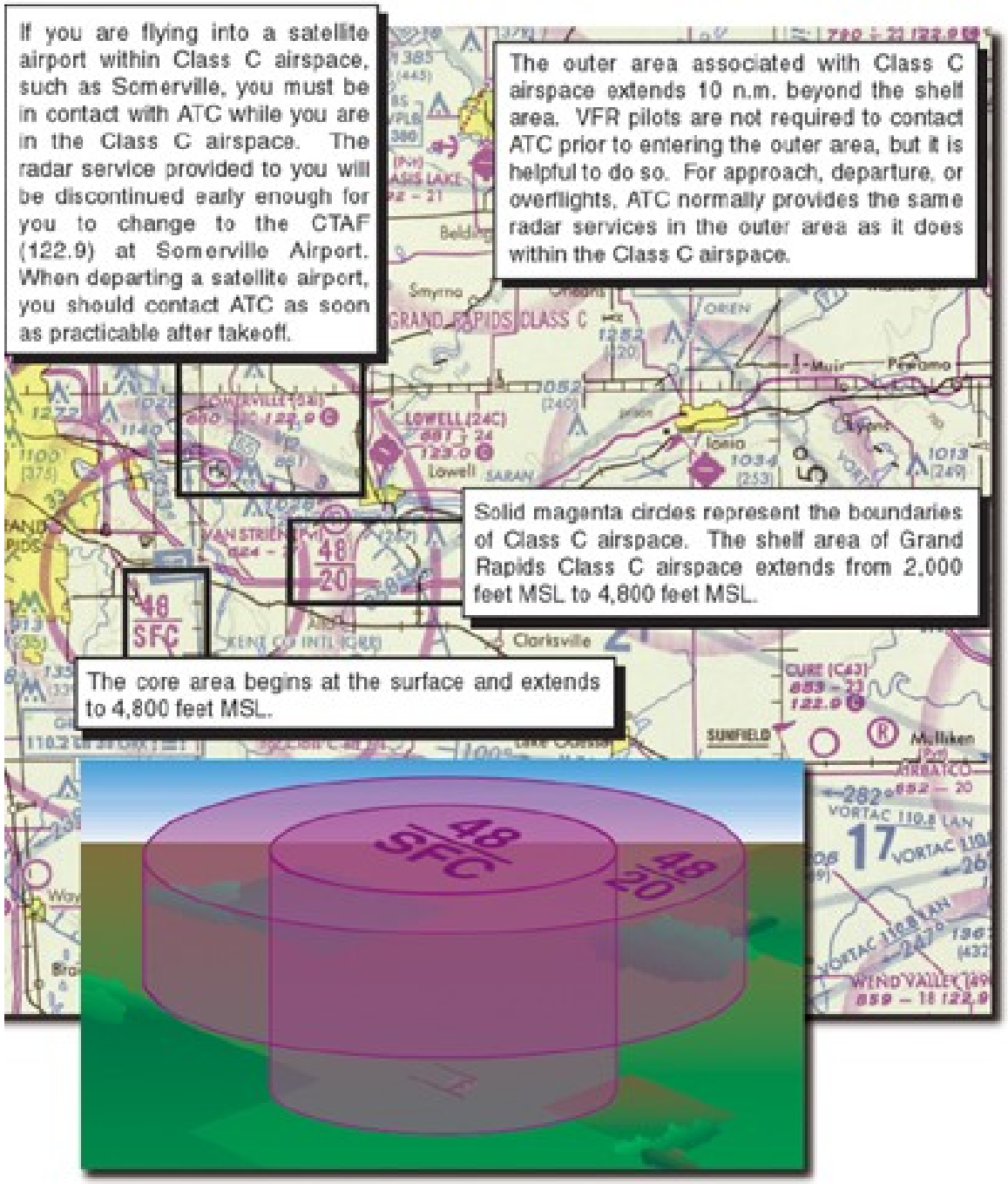
C

T

SRC

If you see above it Is rises to The floor of the type airspace above it. Usually B

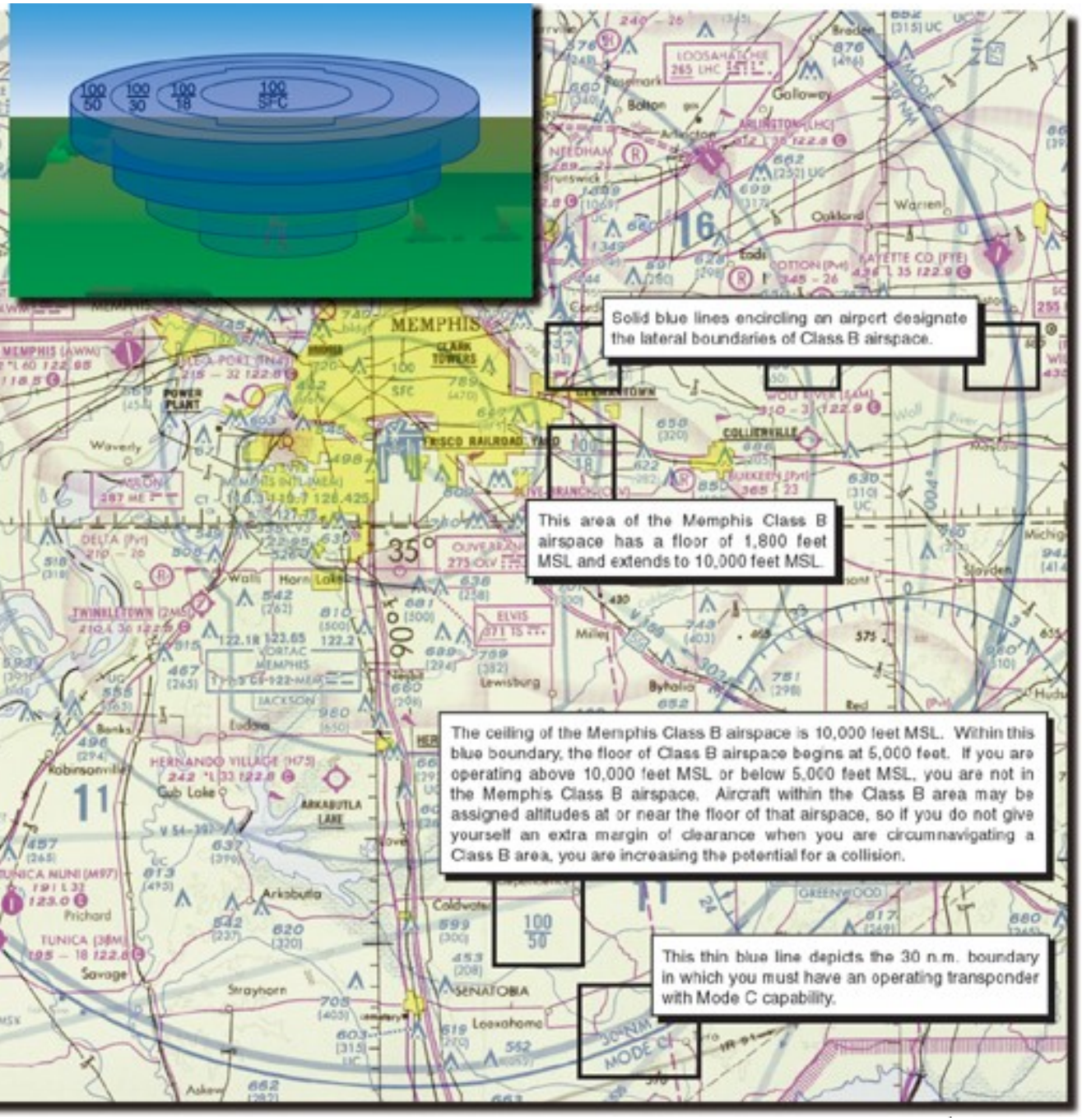
Airspace Features	Class C
VFR Min. Vis. and Distance from Clouds 1,200 ft AGL or less (Regardless of MSL Altitude)	N/A
VFR Minimum Visibility	3 Statute Miles
VFR Minimum Distance from Clouds	500 ft Below 1,000 ft Above 2,000 ft Horizontal
Minimum Pilot Qualifications	Student Pilot Certificate
VFR Entry and Equipment Requirements	Establish Radio Communication Transponder with Mode C
ATC Services	IFR/IFR Separation IFR/VFR Separation VFR Traffic Advisories (workload permitting)



THE FLIGHT ENVIRONMENT - CONTROLLED AIRSPACE

B

Airspace Features	Class B
VFR Min. Vis. and Distance from Clouds 1,200 ft AGL or less (Regardless of MSL Altitude)	N/A
VFR Minimum Visibility	3 Statute Miles
VFR Minimum Distance from Clouds	Clear of Clouds
Minimum Pilot Qualifications	Private Pilot Certificate Student Pilot Certificate Endorsement
VFR Entry and Equipment Requirements	ATC Clearance Transponder with Mode C
ATC Services	All Aircraft Separation



THE FLIGHT ENVIRONMENT - CONTROLLED AIRSPACE

Published VFR Routes Approaching and Thru Class B

On the reverse side of some. eventually all, Terminal Area Charts (TAC) are Special Airspace Rules to facilitate approach and transition VFR traffic into our through Class B airspace.

They include:

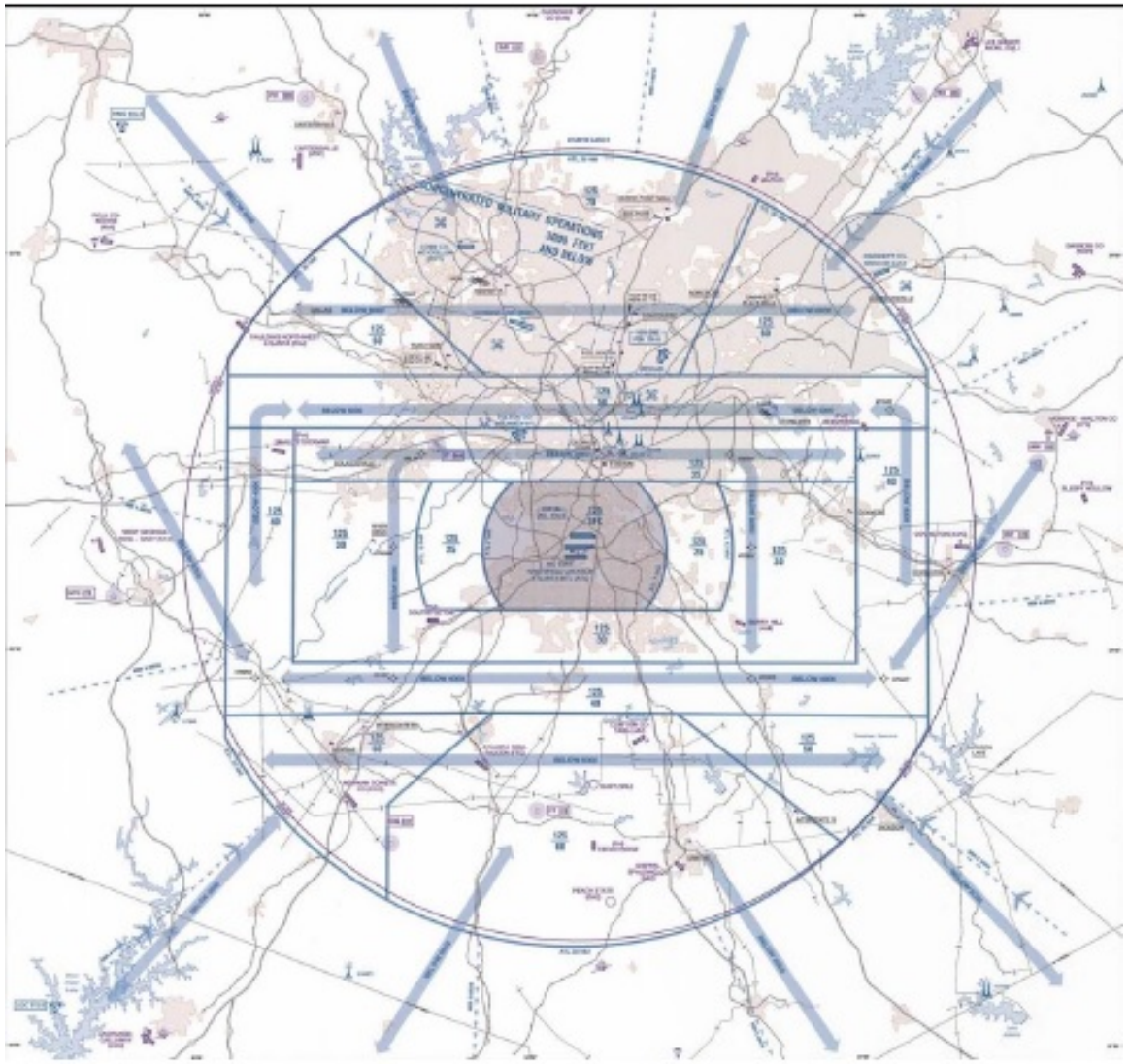
VFR Flyway Planning Charts,

VFR Corridors, and

VFR Transitions Routes

THE FLIGHT ENVIRONMENT - CONTROLLED AIRSPACE

VFR Flyway Planning Charts



ATLANTA

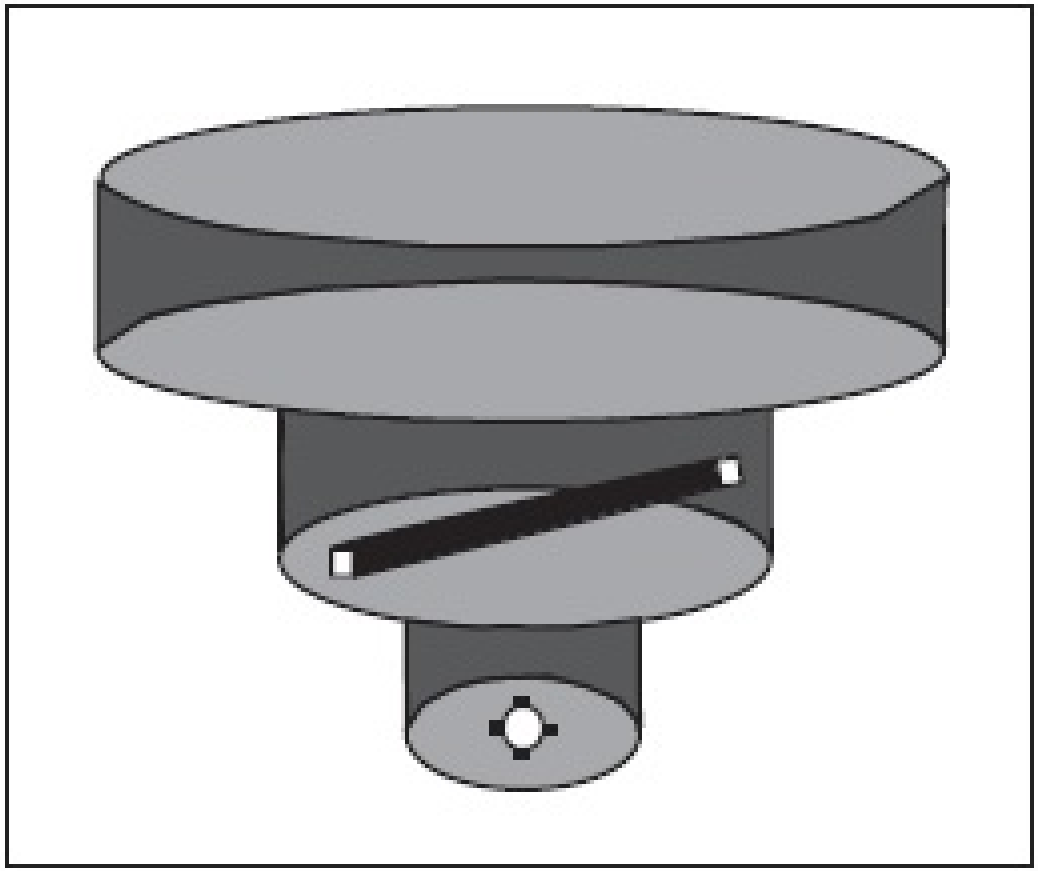
These airways are designed to help VFR pilots avoid major controlled traffic flows.

Per the AIM, “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.” UNLESS IT ENTERS CLASS B AIRSPACE.

THE FLIGHT ENVIRONMENT - CONTROLLED AIRSPACE

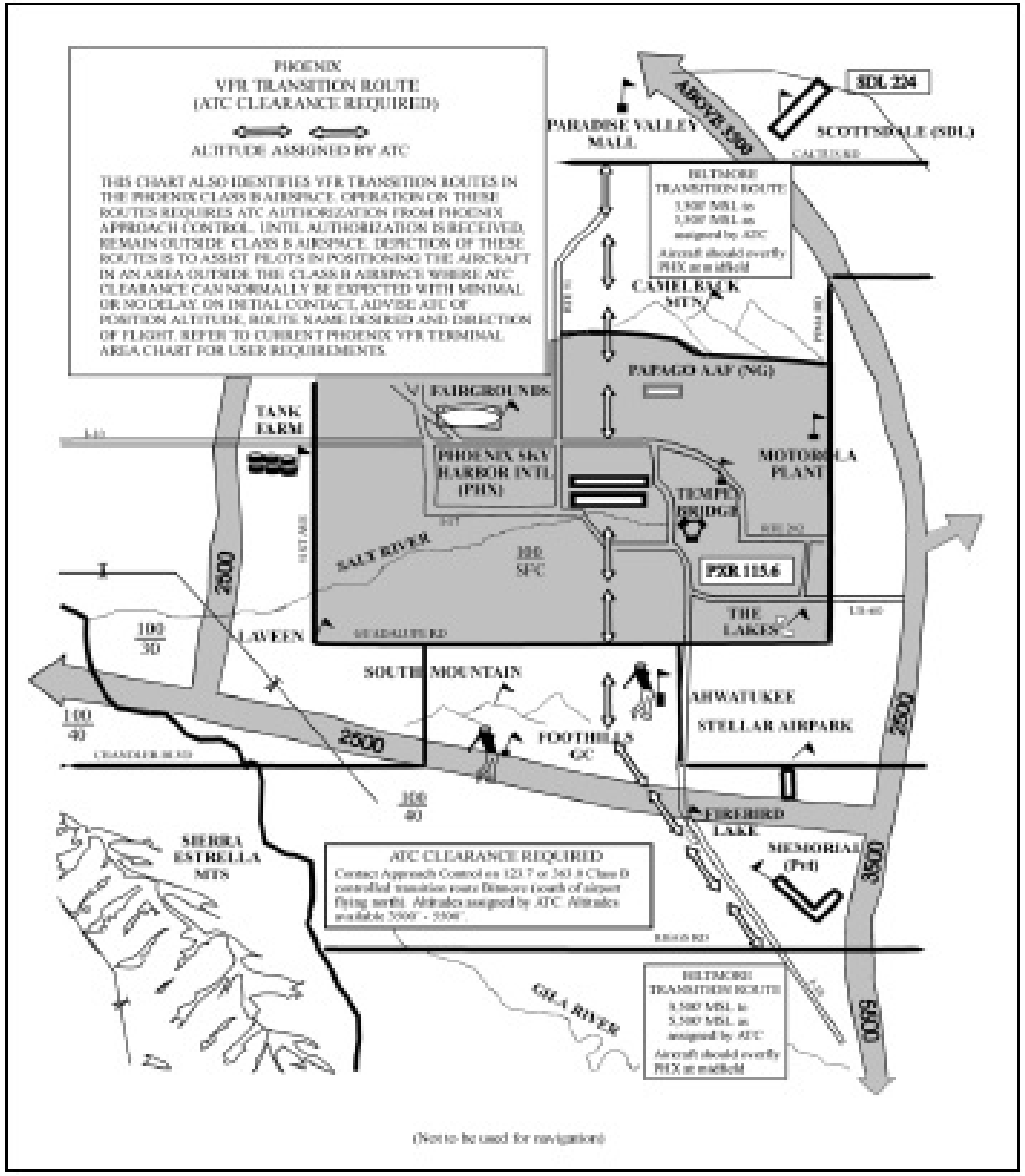
VFR Corridors

A VFR Corridor is defined as airspace through Class B airspace, with defined vertical and lateral boundaries, in which aircraft my operate without an ATC clearance or communication with air traffic control.. This type of structure is rare do to ever increasing volume of air traffic in Class B airspace.



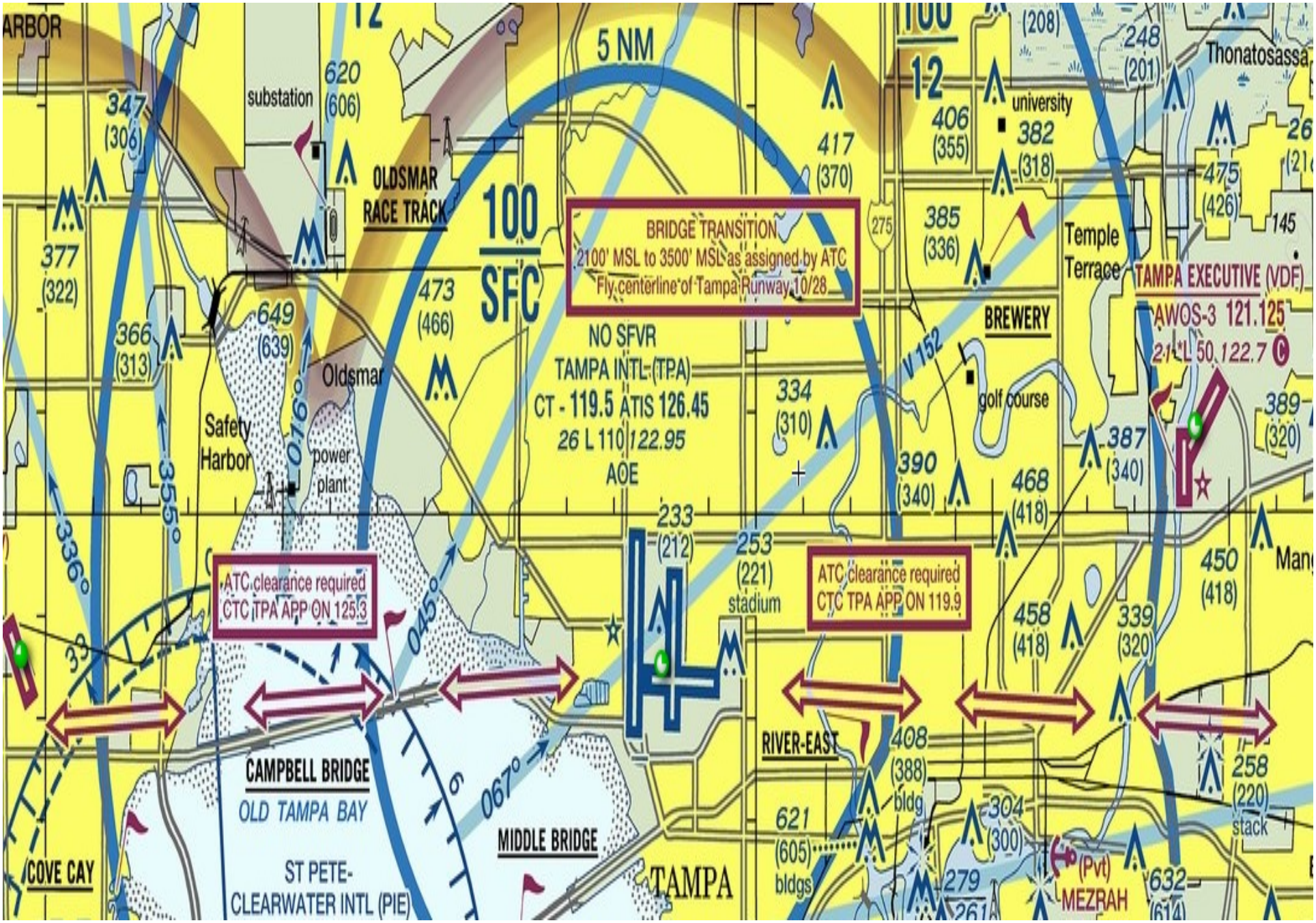
THE FLIGHT ENVIRONMENT - CONTROLLED AIRSPACE

VFR Transition Routes



A VFR Transition Route is defined as a specific course depicted on the TAC for transitioning a specific Class B Airspace. These routes include specific ATC assigned altitudes, and pilots must obtain an ATC clearance prior to entering Class B airspace on the route.

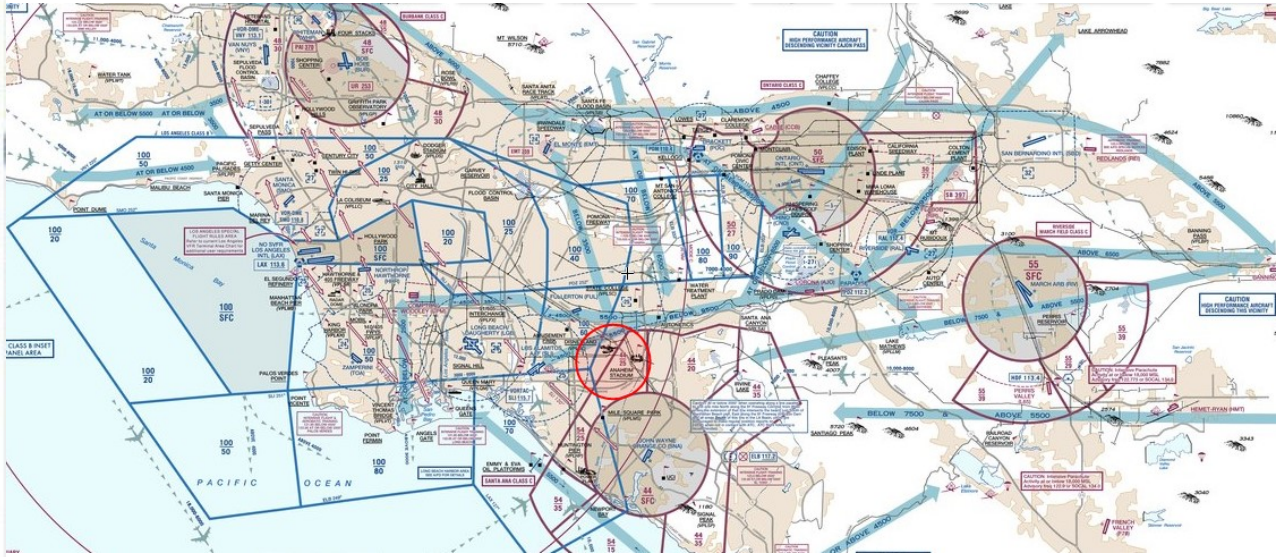
An example of the TAMPA TAC "*Bridge Transition*" is shown on the following frame.


5 NM
100
SFC
BRIDGE TRANSITION
2100' MSL to 3500' MSL as assigned by ATC
Fly centerline of Tampa Runway 10/28
NO SFVR
TAMPA INTL (TPA)
CT - 119.5 ATIS 126.45
26 L 110 122.95
AOE
ATC clearance required
CTC TPA APP ON 125.3
ATC clearance required
CTC TPA APP ON 119.9
OLDSMAR RACE TRACK
substation
Oldsmar
Safety Harbor
power plant
BREWERY
golf course
university
Temple Terrace
Thonatosassa
TAMPA EXECUTIVE (VDF)
AWOS-3 121.125
21 L 50 122.7
V 152
275
stadium
RIVER-EAST
bldg
bldgs
stack
(Pvt) MEZRAH
CAMPBELL BRIDGE
OLD TAMPA BAY
MIDDLE BRIDGE
COVE CAY
ST PETE-CLEARWATER INTL (PIE)
TAMPA
336°
355°
016°
045°
067°

LAX VFR Corridor has been replaced by 5 Transition Routes

Forum Advertise

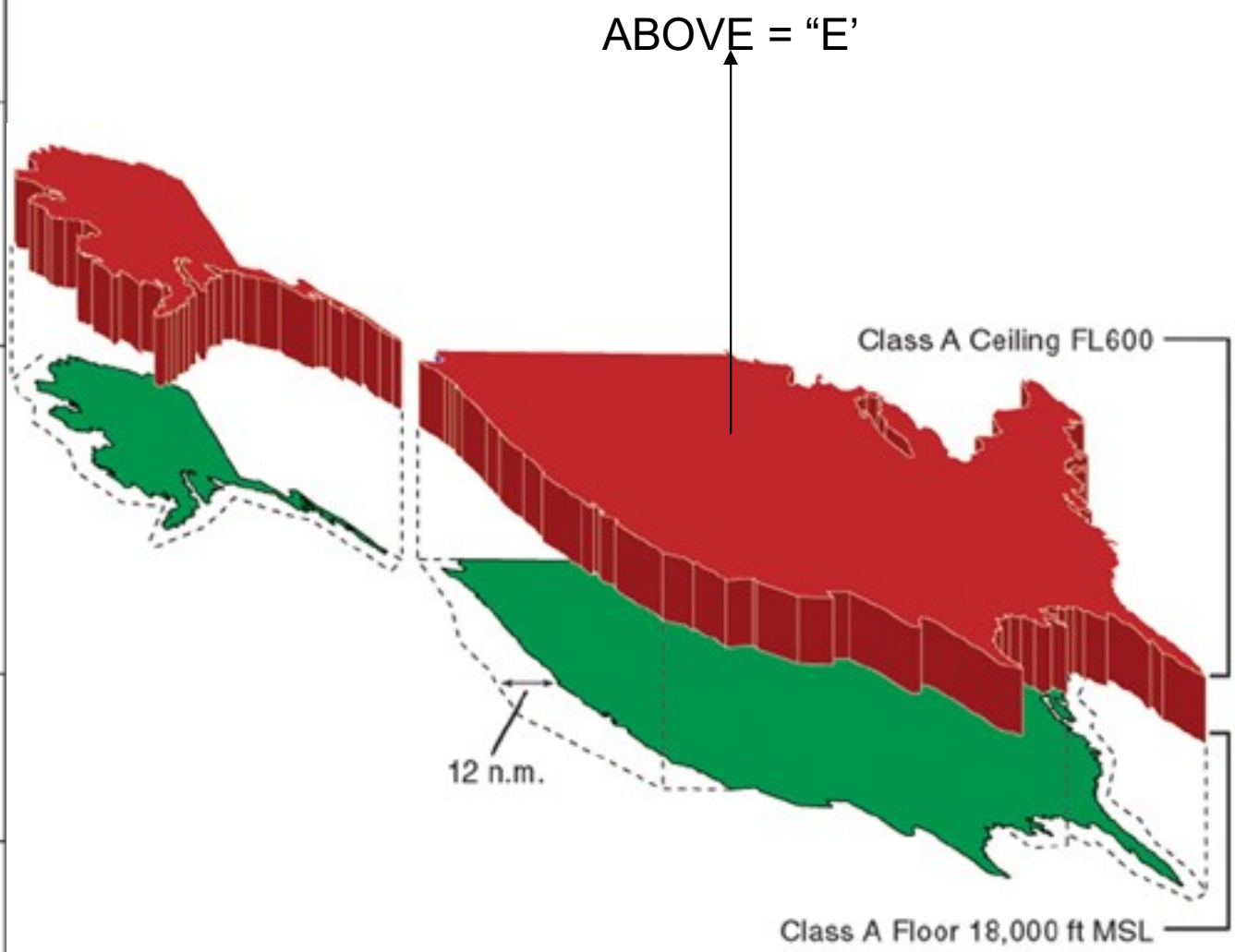
LAX VFR Flyway Planning Routes



THE FLIGHT ENVIRONMENT - CONTROLLED AIRSPACE

A

Airspace Features	Class A
VFR Min. Vis. and Distance from Clouds 1,200 ft AGL or less (Regardless of MSL Altitude)	N/A
VFR Minimum Visibility	N/A
VFR Minimum Distance from Clouds	N/A
Minimum Pilot Qualifications	Instrument Rating
VFR Entry and Equipment Requirements	IFR Flight Plan and IFR Clearance Required
ATC Services	All Aircraft Separation



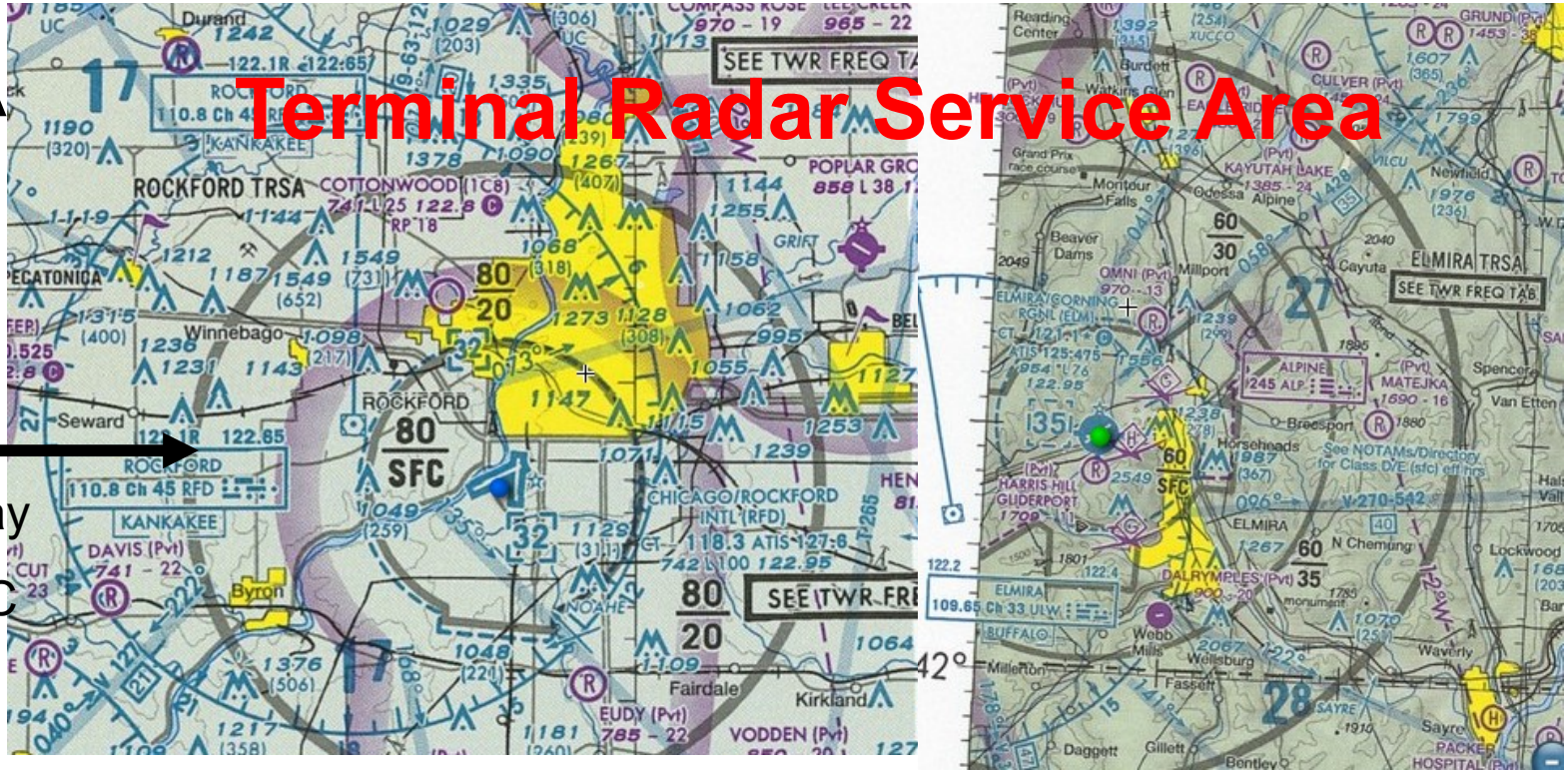
TRSA

Terminal Radar Service Area

Dark Rings

Think half-way

between D&C



Airspace in which radar and air traffic control services are made available to pilots flying under instrument flight rules or (optionally) visual flight rules for the purposes of maintaining aircraft separation. TRSAs are most often encountered surrounding busy U.S. airports. In recent years many of them have gradually been replaced by Class B or Class C airspace. Terminal Radar Service Area was established as part of a program to create Terminal Radar stations at selected airports. Because these were never subject to the rulemaking process of 14 CFR Part 91, they do not actually fit into any of the existing U.S. classifications of airspace and have been classified as non-part 71 airspaces. While **operating in these airspaces a pilot who choses to participate will receive radar services, but participation is not required.**

TRSAs will encompass a primary airport with a class "D" designation and the TRSA will be above other controlled airspace (Typically Class E Airspace) with a typical floor of 700 feet or 1,200 feet AGL (Above Ground Level).

TRSAs are shown on VFR (Visual Flight Rules) "Sectional" charts as a solid black/gray

Do Aircraft have to obey Speed limits?

YES

THE FLIGHT ENVIRONMENT - CONTROLLED AIRSPACE

<u>SPEED LIMITS</u>?
Below 250 knots (288 mph)

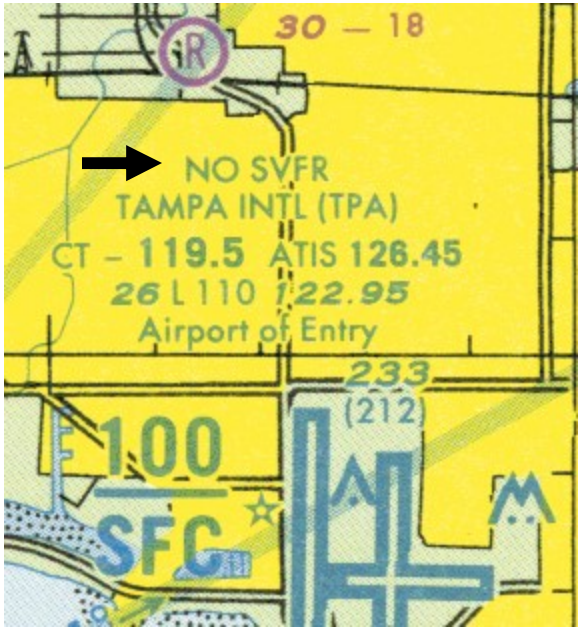
Within airspace types C / D, or
below 2,500 within 4 nm of airport, or
any area under type B = 200 knots (230)

<u>VFR or "Special VFR</u>"

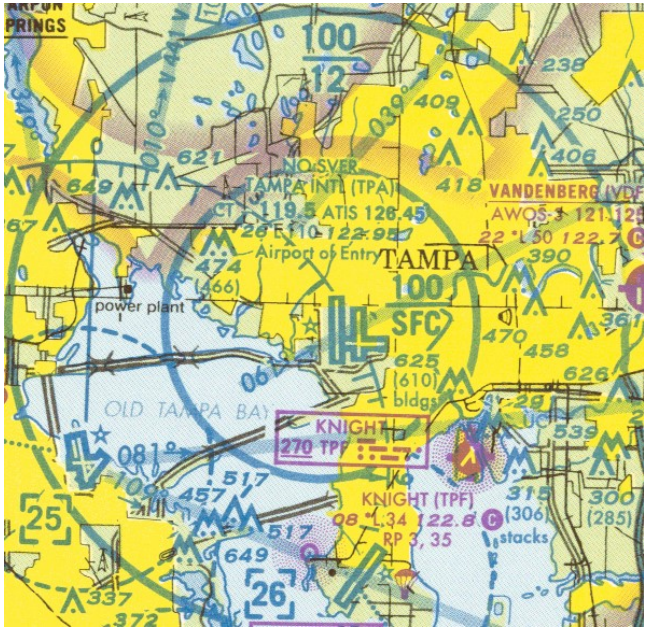
What are visibility and ceiling restrictions for VFR and SVFR?

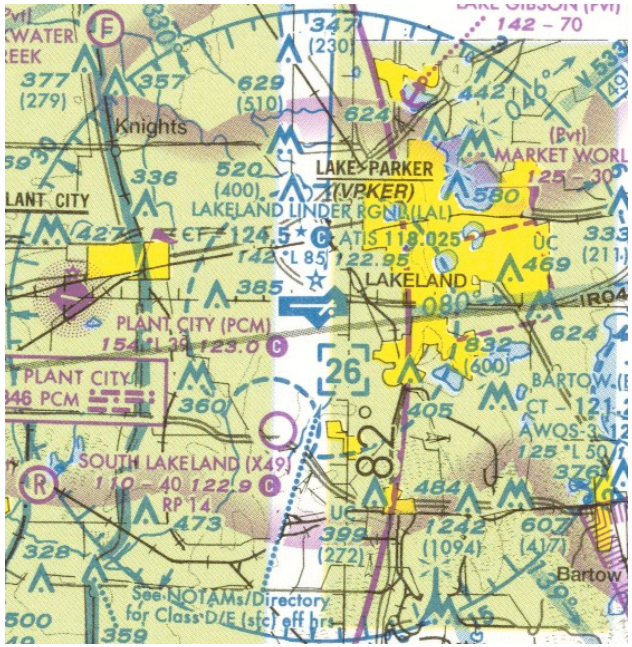
VFR: 3sm & 1000 AGL ceiling
SVFR: visibility dropped to 1sm

How do you determine if it is allowed?



THE FLIGHT ENVIRONMENT - CONTROLLED AIRSPACE



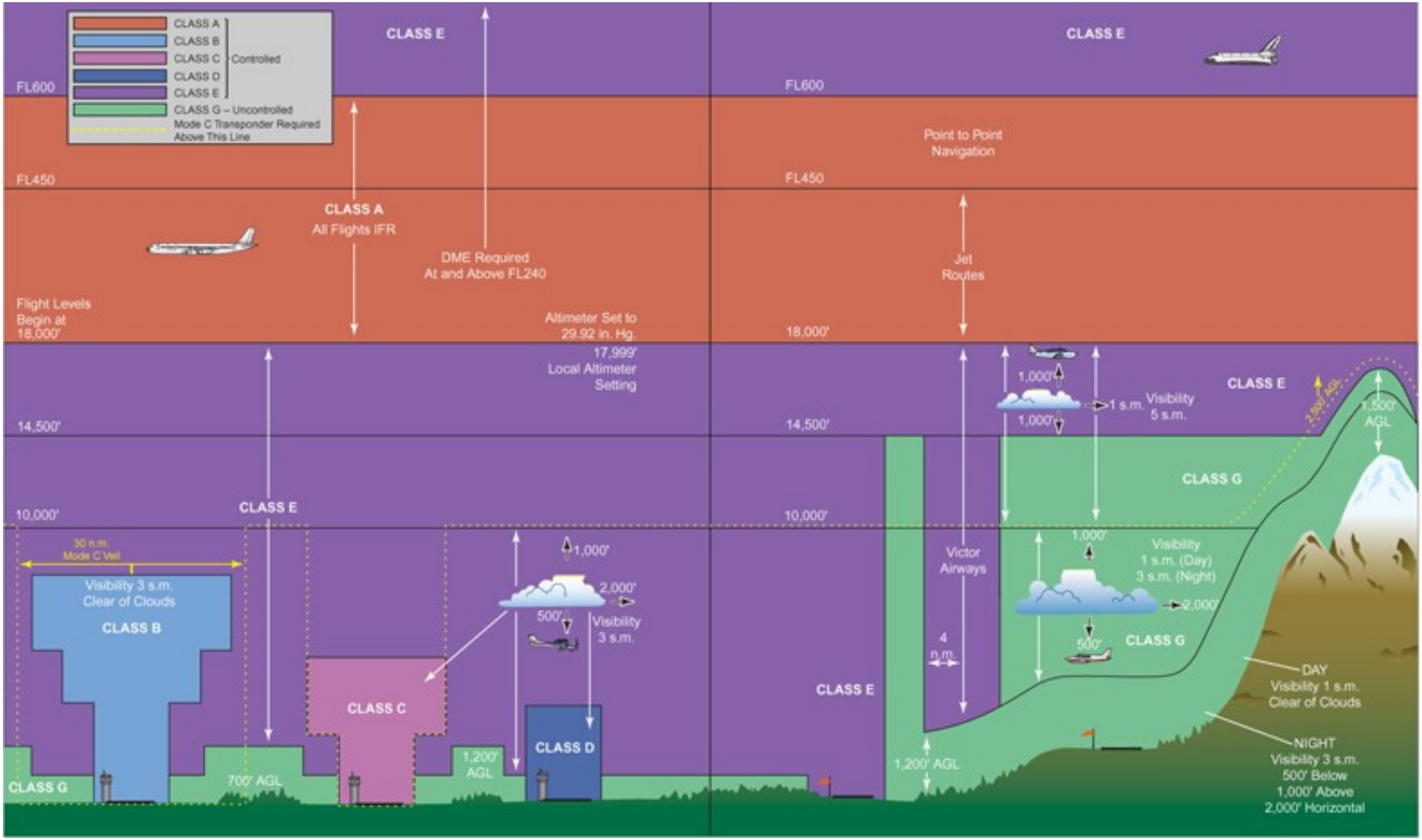


Identify type, base-ceiling of each.

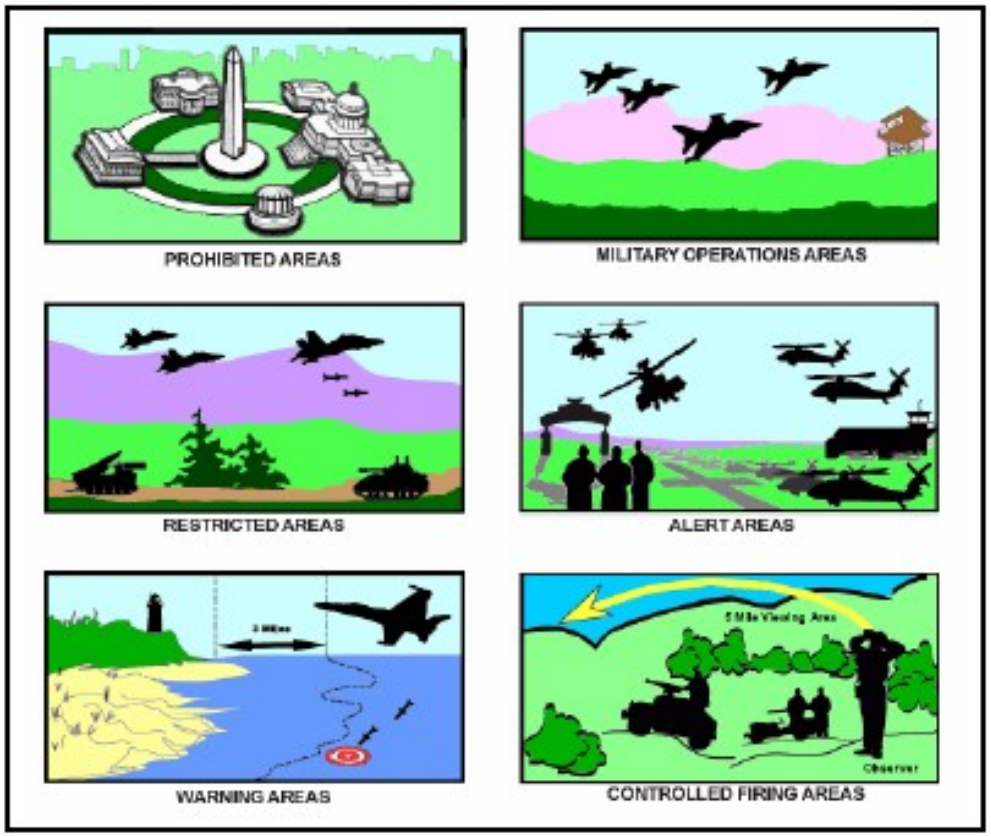
What is above, How high?

Rwy 04 & 22 ceiling

THE FLIGHT ENVIRONMENT – AIRSPACE SUMMARY



THE FLIGHT ENVIRONMENT - SPECIAL USE AIRSPACE



†Other time by NOTAM contact FSS NO A/G – No air to ground communications

U.S. P–PROHIBITED, R–RESTRICTED, A–ALERT, W–WARNING, MOA–MILITARY OPERATIONS AREA

NUMBER	LOCATION	ALTITUDE	TIME OF USE	CONTROLLING AGENCY**
R-7001A	GUERNSEY, WY	TO BUT NOT INCL 8000	INTERMITTENT, 24 HRS IN ADVANCE BY NOTAM	ZDV CNTR
R-7001B	GUERNSEY, WY	8000 TO 23,500	INTERMITTENT, 24 HRS IN ADVANCE BY NOTAM	ZDV CNTR

**ZDV-Denver

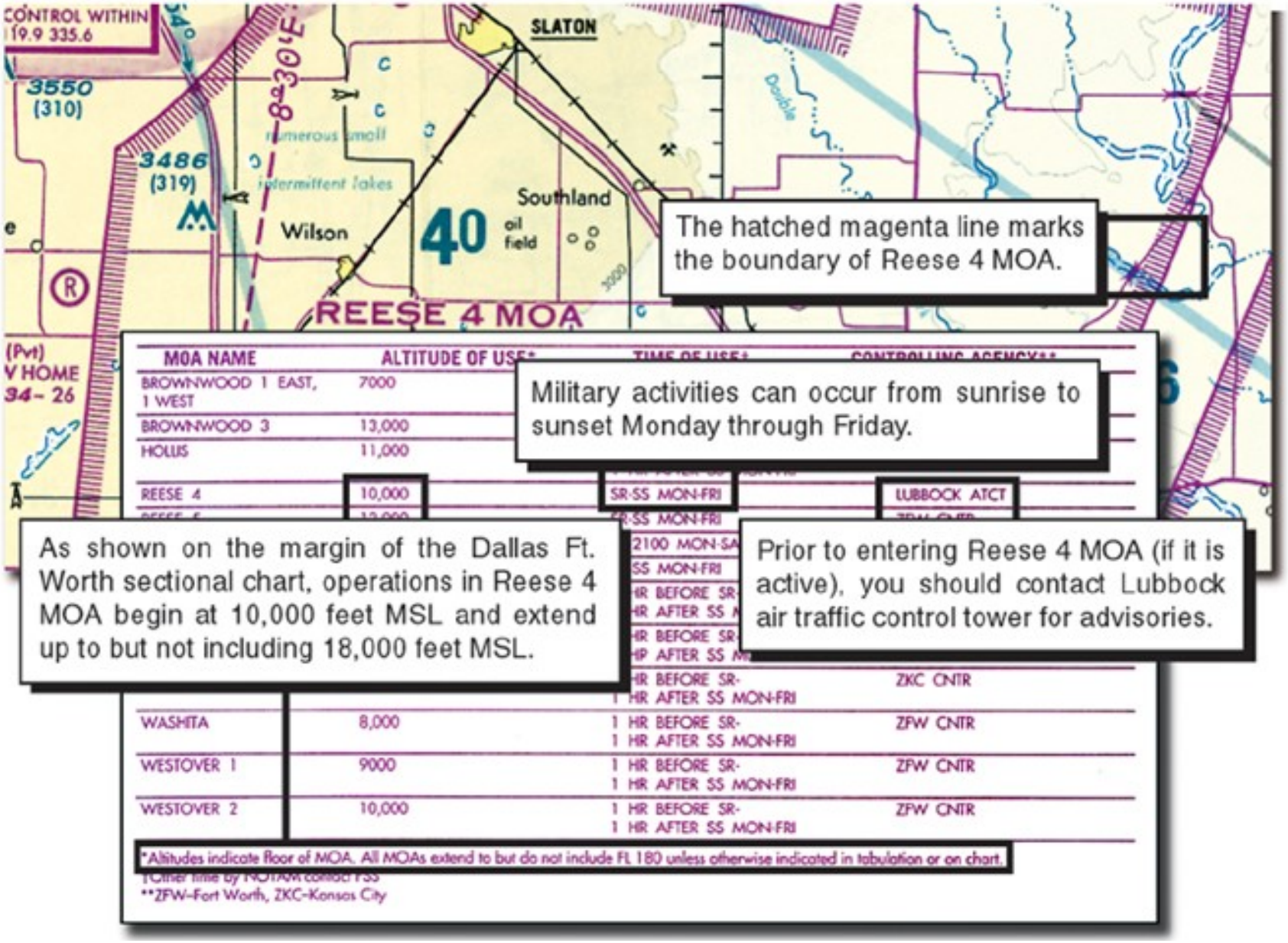
MOA NAME	ALTITUDE OF USE*	TIME OF USE†	CONTROLLING AGENCY**
COUGAR A	100' AGL	0900-1600 TUE-SAT	ZDV CNTR
COUGAR B	10,000	0900-1600 TUE-SAT	ZDV CNTR
EDGEMONT A, B & C	12,000	INTERMITTENT BY NOTAM	ZDV CNTR
POWDER RIVER B	1000 AGL	INTERMITTENT BY NOTAM	ZDV CNTR
TILFORD	12,000	INTERMITTENT BY NOTAM	ZDV CNTR

*Altitudes indicate floor of MOA. All MOAs extend to but do not include FL 180 unless otherwise indicated in tabulation or on chart.
†Other time by NOTAM contact FSS
**ZDV-Denver

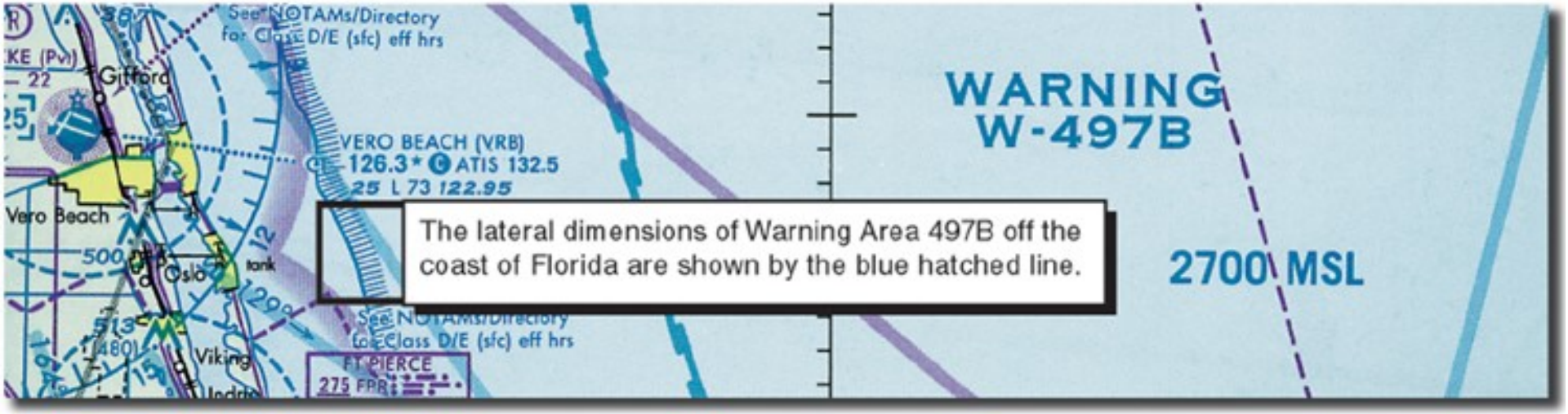
ALERTS, MOA, WARNINGS, RESTRICTED, PROHIBITED, CONTROLLED-FIRING, NSA, TFR AREAS LISTED IN LEGENDS (EXCEPT TFR)

THE FLIGHT ENVIRONMENT - SPECIAL USE AIRSPACE

THE FLIGHT ENVIRONMENT - SPECIAL USE AIRSPACE



THE FLIGHT ENVIRONMENT - SPECIAL USE AIRSPACE

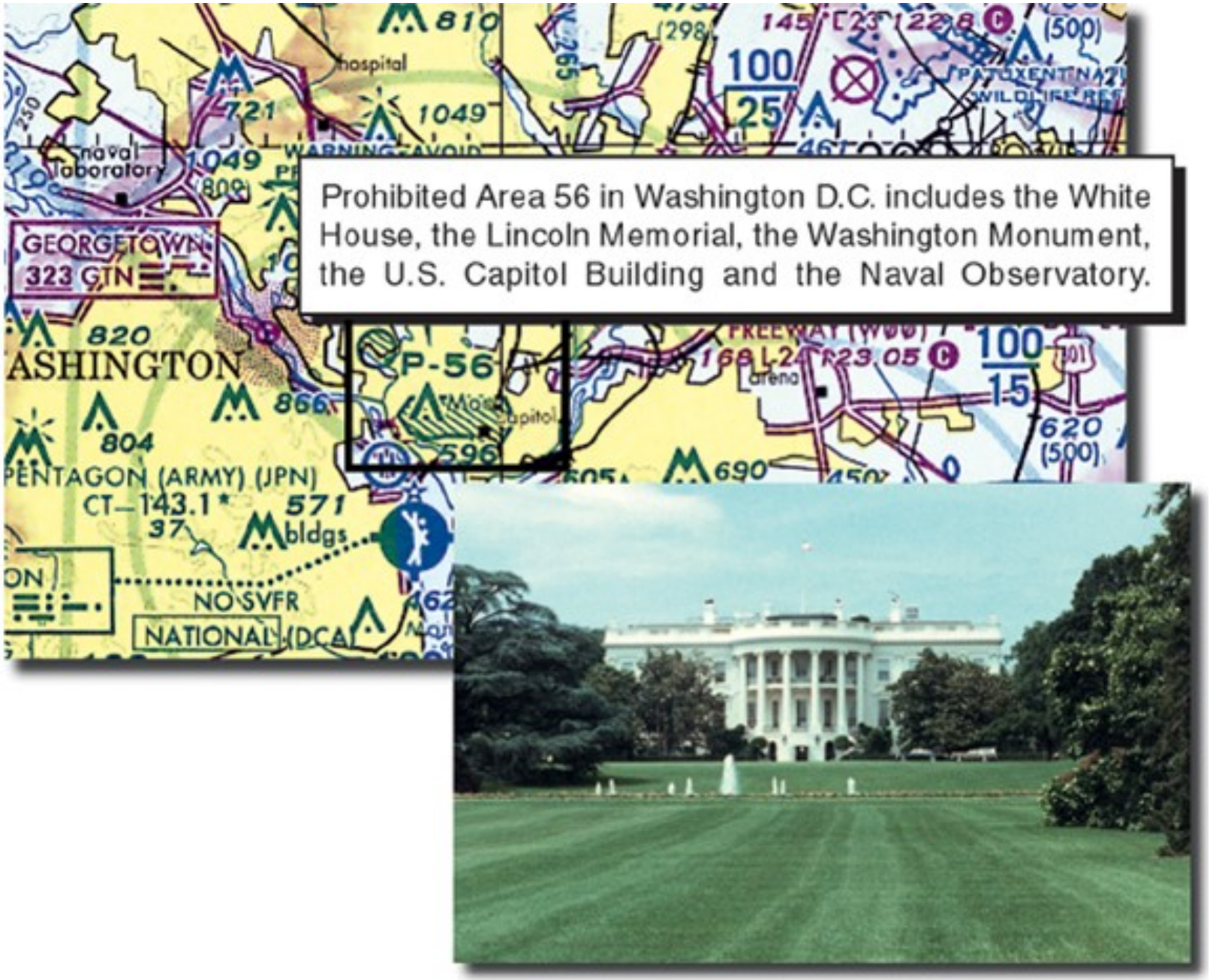


THE FLIGHT ENVIRONMENT - SPECIAL USE AIRSPACE

R-6611 A	DAHLGREN COMPLEX, VA	TO 40,000	0800-1700 MON-FRI †48 HRS IN ADVANCE	ZDC CNTR
R-6612	DAHLGREN COMPLEX, VA	TO 7000	0800-1700 MON-FRI †48 HRS IN ADVANCE	ZDC CNTR
R-6613 A	DAHLGREN COMPLEX, VA	TO 40,000	0800-1700 MON-FRI †48 HRS IN ADVANCE	ZDC CNTR
A-220	MC GUIRE AFB,			
W-50 A, B, C	DAM NECK, VA			

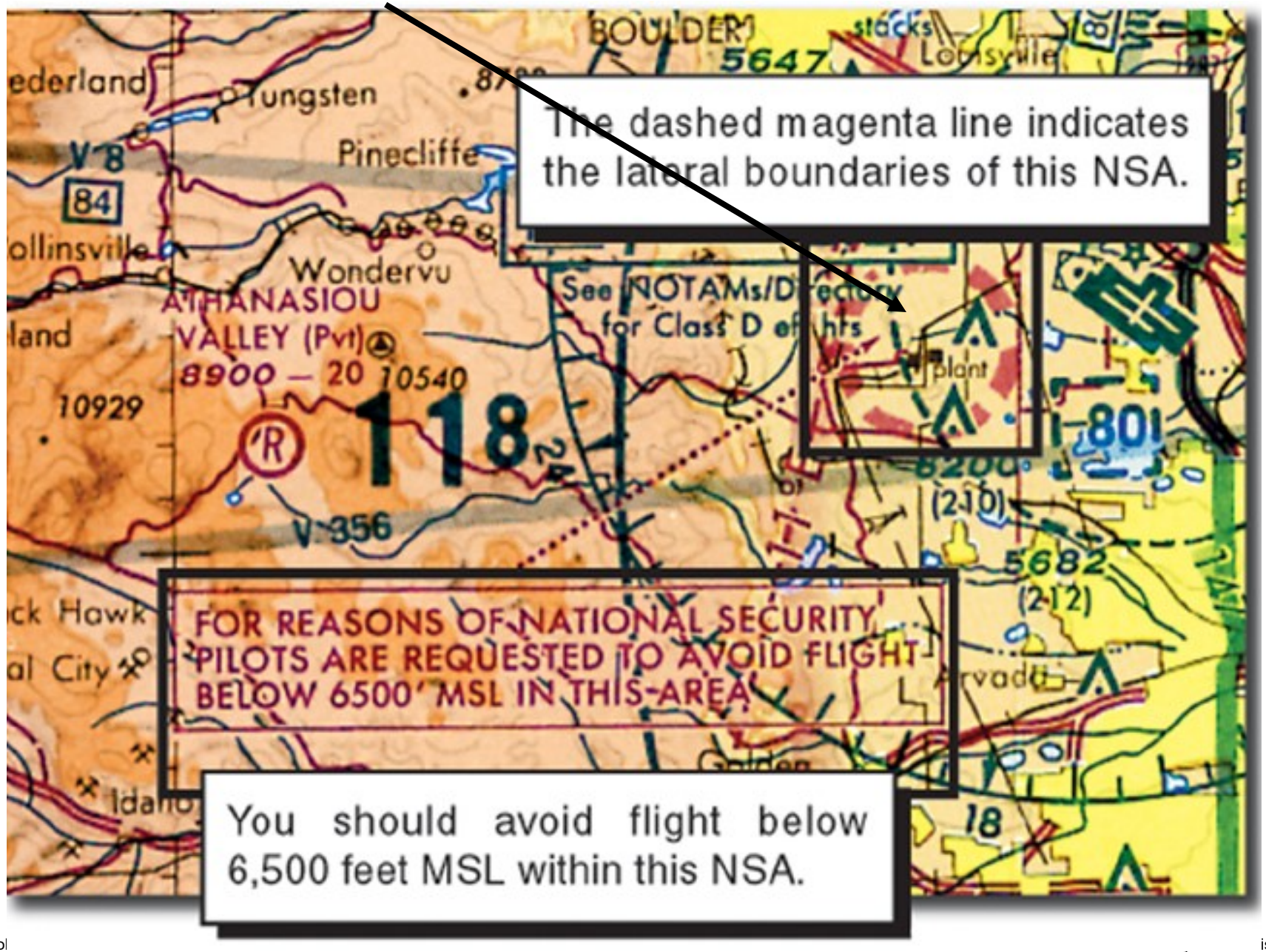
The vertical height of these three restricted areas varies. Restricted Area 6612 extends from the surface to only 7,000 feet MSL while R-6611A and R-6613A begin at the surface and continue to 40,000 feet MSL.

THE FLIGHT ENVIRONMENT - SPECIAL USE AIRSPACE

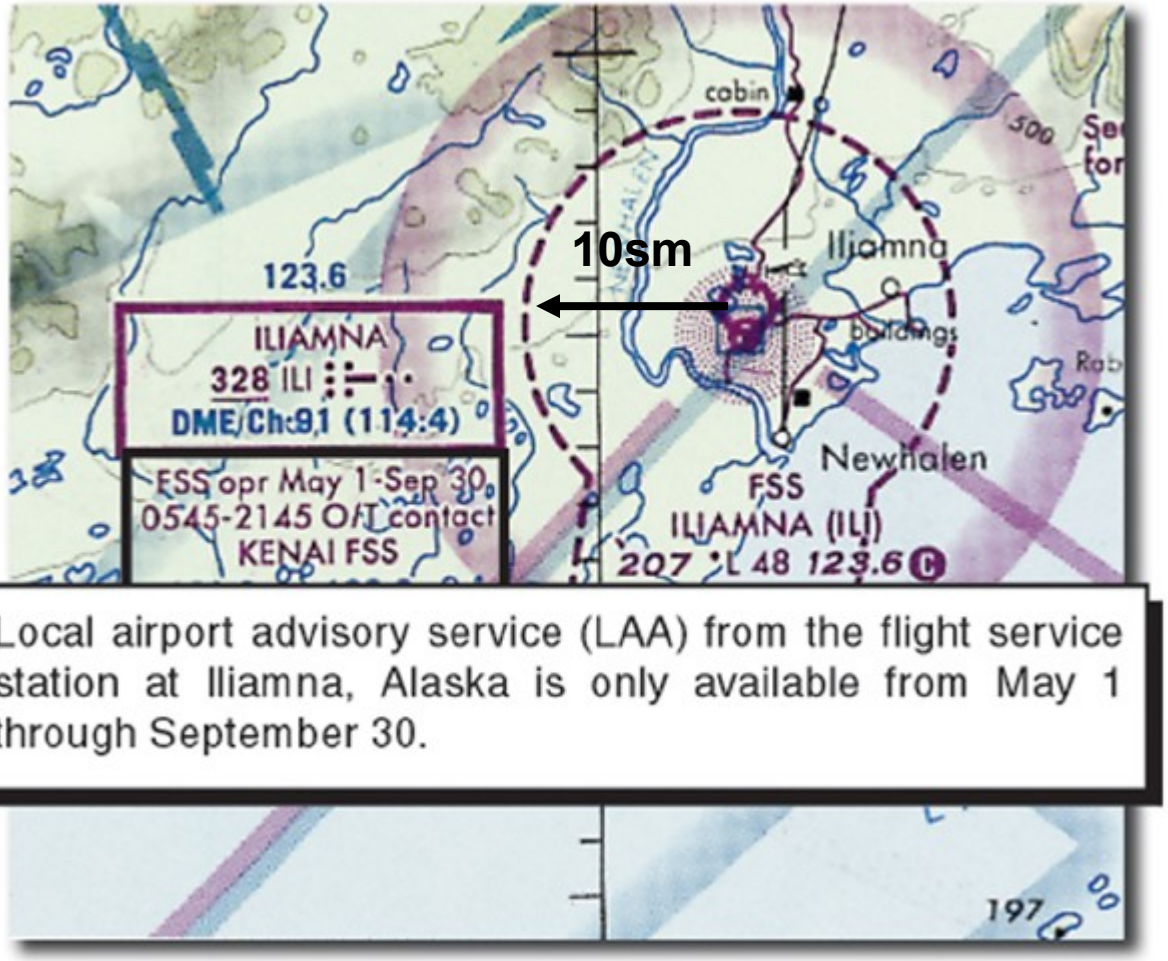


THE FLIGHT ENVIRONMENT - SPECIAL USE AIRSPACE

NATIONAL SECURITY AREA

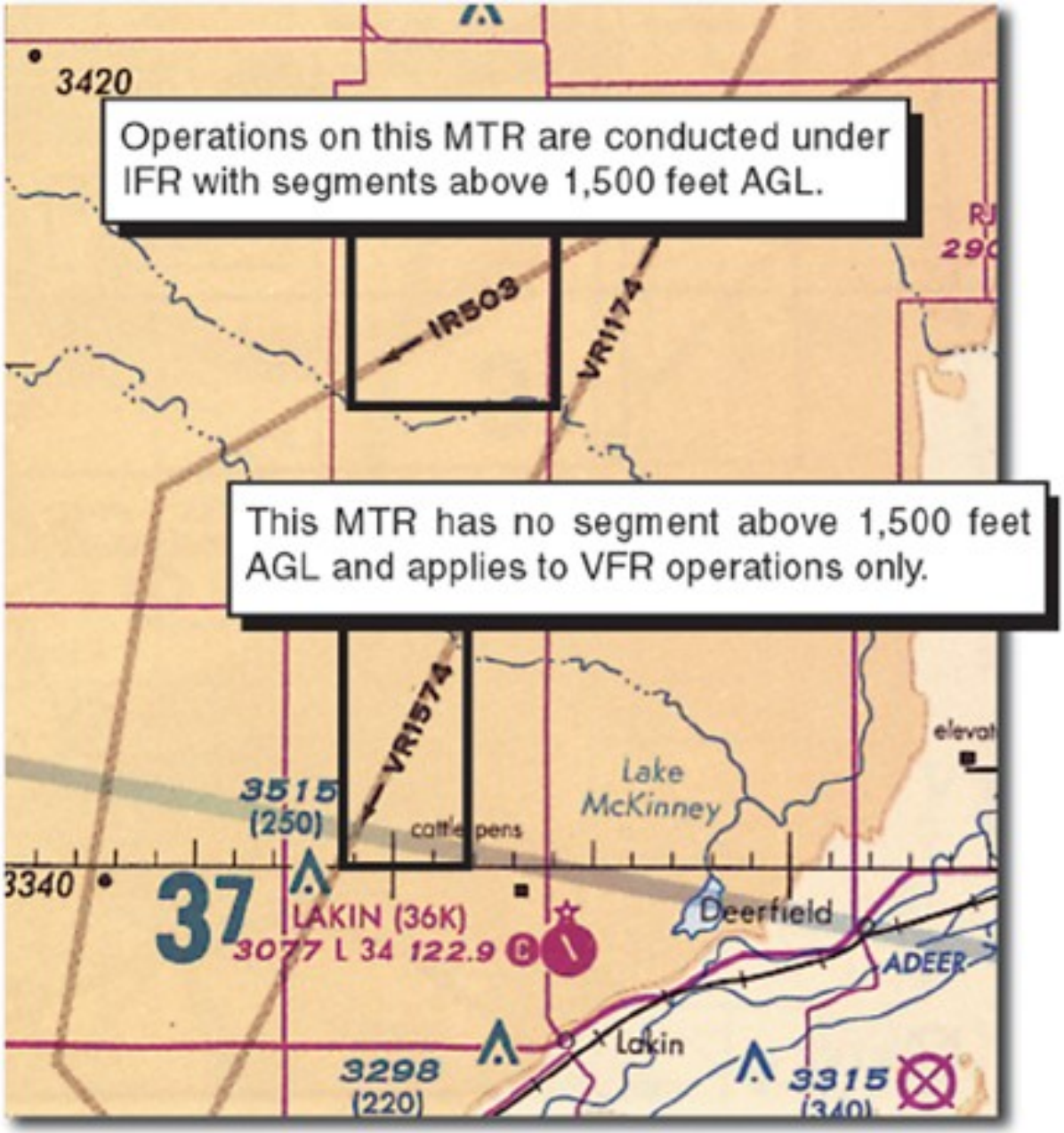


THE FLIGHT ENVIRONMENT - SPECIAL USE AIRSPACE



Local airport advisory service (LAA) from the flight service station at Iliamna, Alaska is only available from May 1 through September 30.

THE FLIGHT ENVIRONMENT - SPECIAL USE AIRSPACE

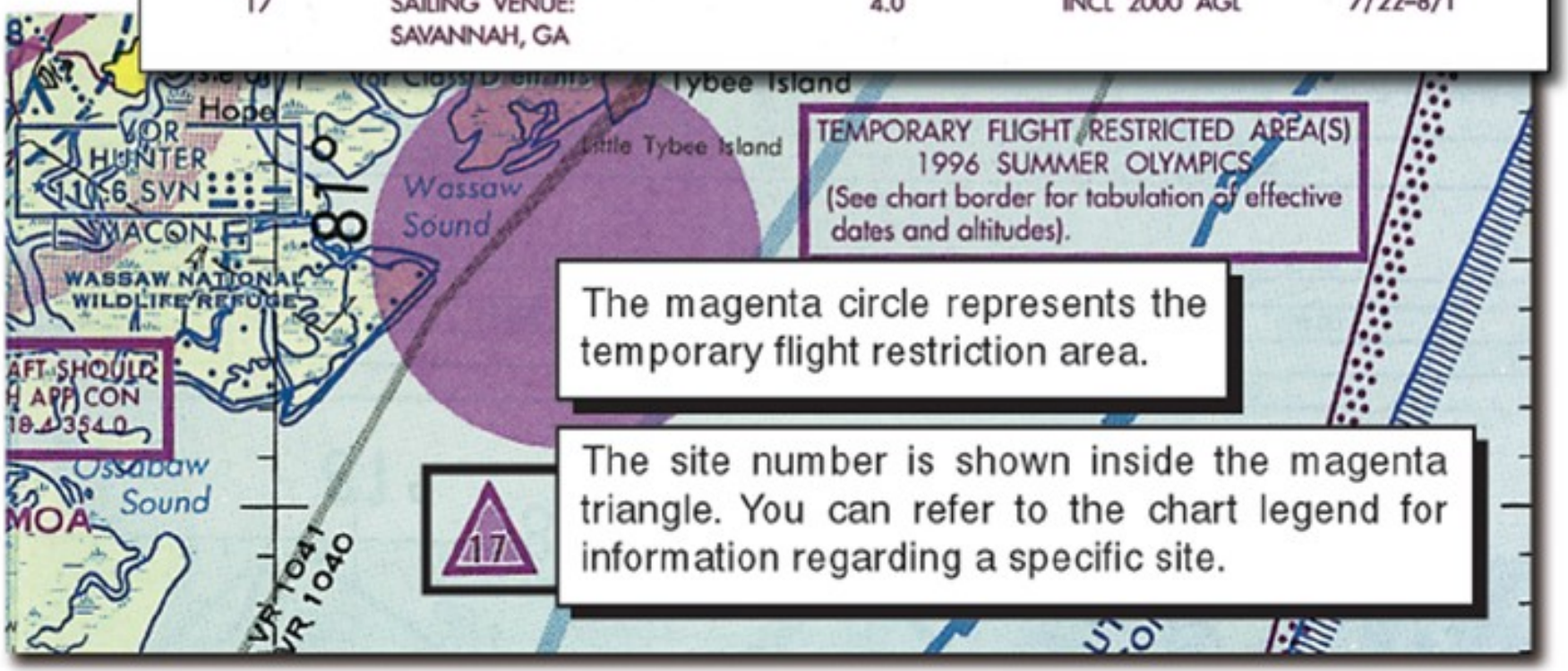


THE FLIGHT ENVIRONMENT - SPECIAL USE AIRSPACE

TFR –Short term are not published. Get notices from AOPA or check NOTAMS.

1996 OLYMPIC GAMES
AREAS OF FLIGHT RESTRICTIONS

SITE NUMBER	LOCATION	AREA RADIUS (NM)	ALTITUDE– SURFACE TO	DATE
17	SAILING VENUE: SAVANNAH, GA	4.0	INCL 2000 AGL	7/22–8/1

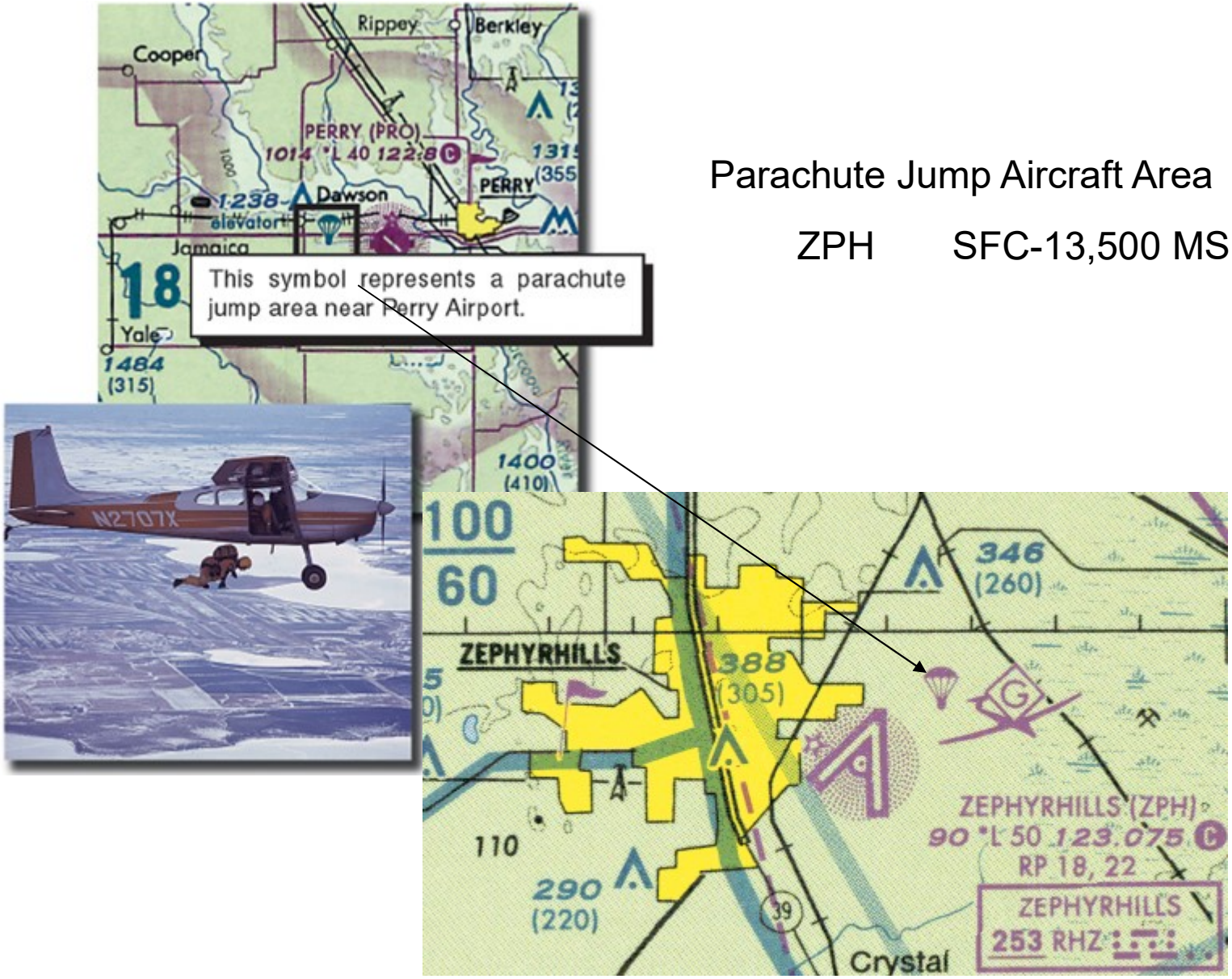


The magenta circle represents the temporary flight restriction area.

The site number is shown inside the magenta triangle. You can refer to the chart legend for information regarding a specific site.

THE FLIGHT ENVIRONMENT - SPECIAL USE AIRSPACE

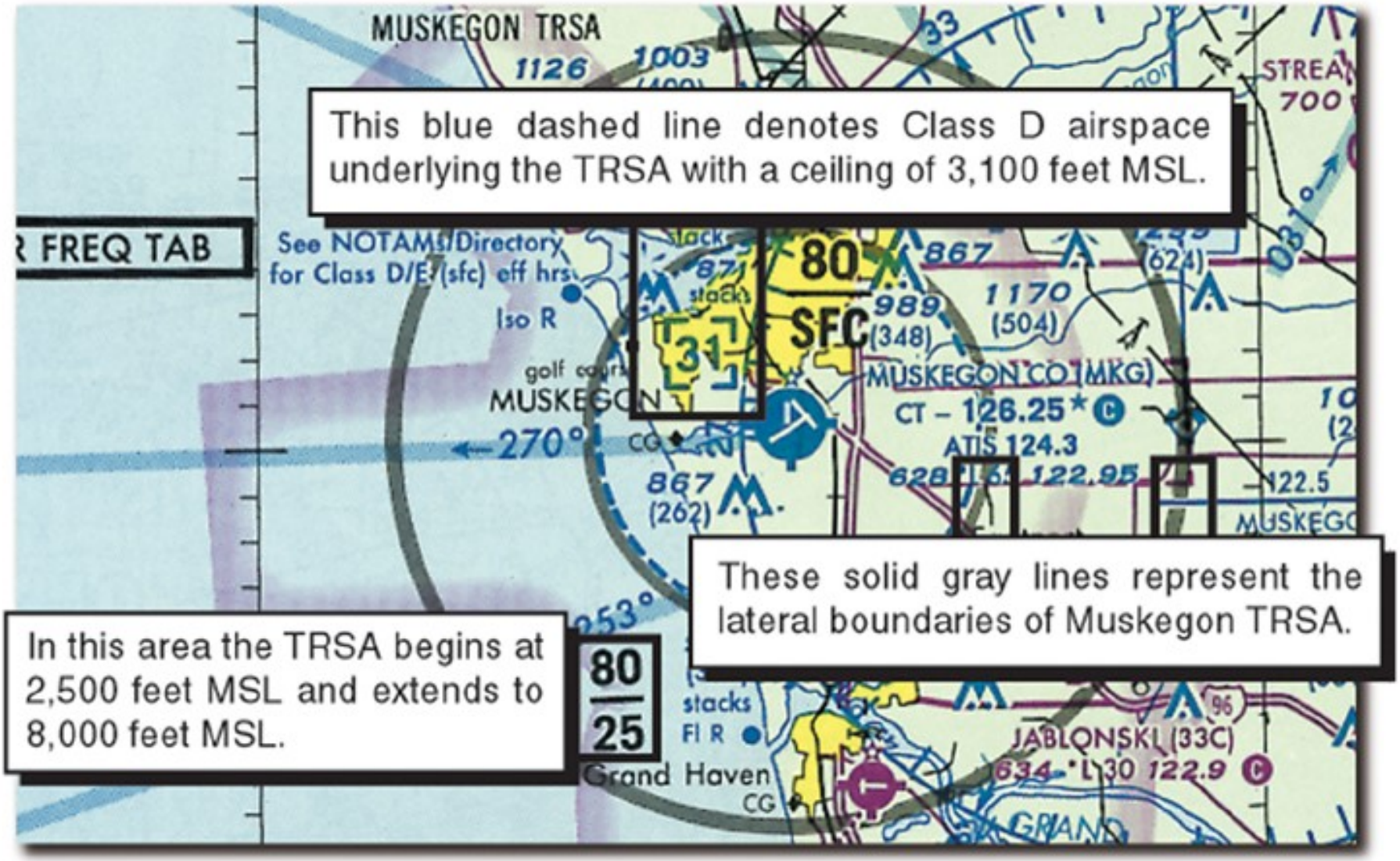
THE FLIGHT ENVIRONMENT - SPECIAL USE AIRSPACE



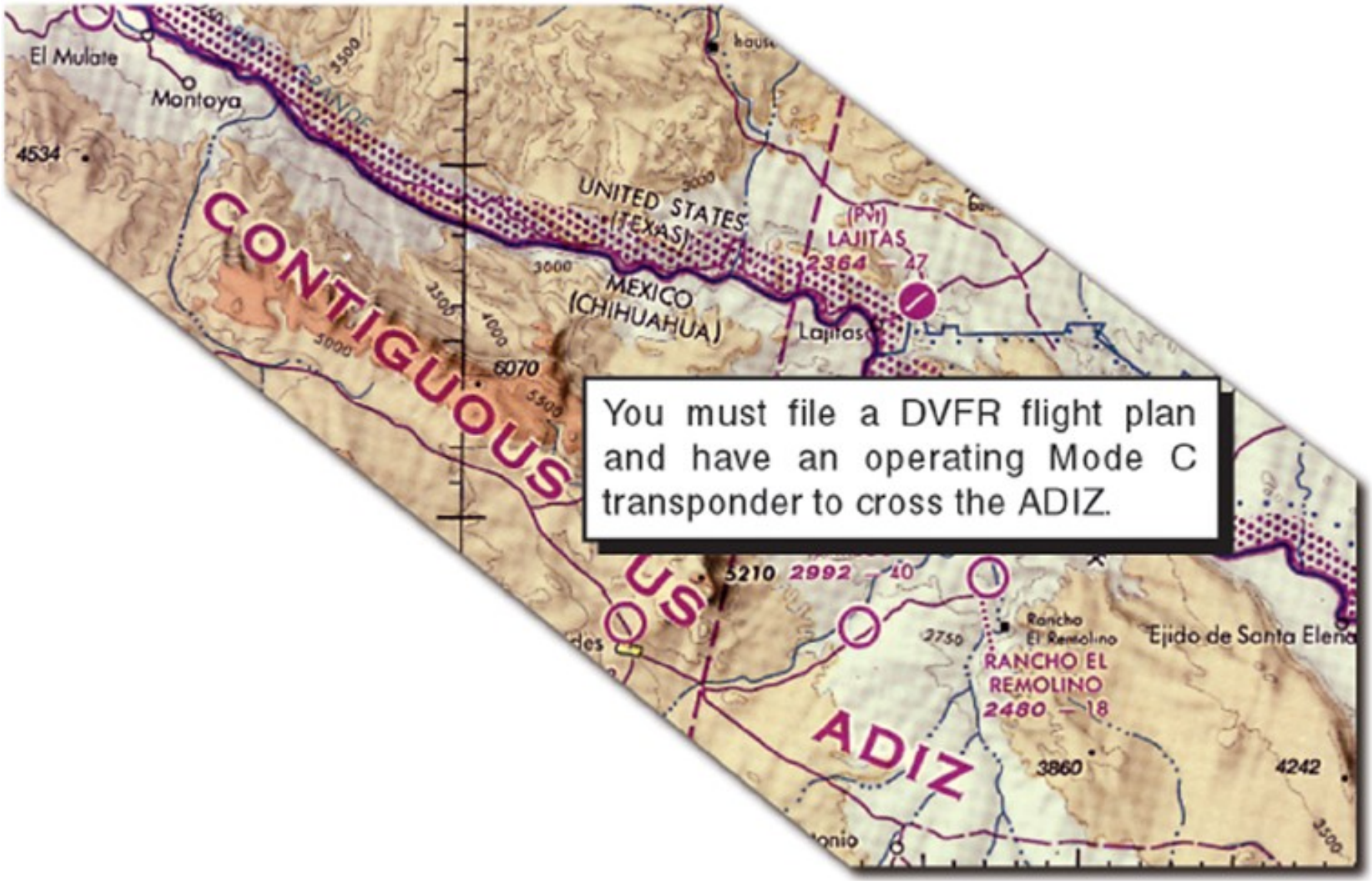
Parachute Jump Aircraft Area

ZPH SFC-13,500 MSL

THE FLIGHT ENVIRONMENT - SPECIAL USE AIRSPACE



THE FLIGHT ENVIRONMENT - SPECIAL USE AIRSPACE



You must file a DVFR flight plan and have an operating Mode C transponder to cross the ADIZ.

THE FLIGHT ENVIRONMENT - SPECIAL USE AIRSPACE

Land-Based ADIZ

A Land-Based ADIZ is established to control air traffic in the interest of national security. Unlike the Contiguous ADIZ, a Land-Based ADIZ:

- Is created and disseminated by notam, which includes dimensions, activation dates, and other relevant information
- Can be activated and deactivated over U.S. metropolitan areas as needed
- Does not require 12" tall registration numbers

THE FLIGHT ENVIRONMENT - SPECIAL USE AIRSPACE

What used to be a temporary ADIZ (Air Defense Identification Zone) is now a permanent **FRZ (Flight Restricted Zone) surrounded by an SFRA (Special Flight Rules Area).** An FAA final rule has established the new airspace configuration around the nation's capital. The FRZ is a 15-nautical-mile-radius ring emanating from Washington National Airport. Flights within the FRZ are restricted to those authorized by the FAA and the Transportation Security Administration (TSA).

Complex, with many embedded types of airspace. Significant requirements for both uncontrolled and controlled airspaces – even pattern work (T&Gs) have ATC, and special transponder requirements.

Laser Warning: Red, Red, Green
Multiple locations-won’t damage eyes or equipment
You will see it day or night !!

Intercept Procedures

In the unfortunate event that you stray into a TFR, or fly unannounced into an ADIZ, you may be intercepted by a military or Coast Guard aircraft. If you are intercepted:

- Monitor 121.5 for instructions
- Comply with any instructions given by the intercepting aircraft
- Squawk 7700 unless told otherwise
- If possible, notify ATC that you have been intercepted
- If you are given conflicting instructions by ATC, always comply with the intercepting aircraft

IN-FLIGHT INTERCEPT PROCEDURES

If you are intercepted by a U.S. Military or law enforcement aircraft, immediately:

1. Follow the instructions given by the intercepting aircraft. *(See chart at right.)*
2. Notify ATC, if possible.
3. Attempt to communicate with ATC on the emergency frequency **121.5 MHz**, giving the identity and position of your aircraft and the nature of the flight.
4. If equipped with a transponder, squawk 7700, unless otherwise instructed by ATC. If any instructions received by radio from any sources conflict with those given by the intercepting aircraft by visual or radio signals, request clarification while continuing to comply with the instructions given by the intercepting aircraft.

Intercepting aircraft signal	Meaning	Intercepted aircraft response	Meaning
Rocks wings. After acknowledgement initiates a slow level turn, normally to the left, into the desired heading. (Also, at night flash the navigational lights.)	You have been intercepted.	Rocks wings and follows. (Also, at night flash navigational lights.)	I understand and will comply.
Performs an abrupt breakaway maneuver consisting of a climbing 90 degree turn, or more, without crossing the intercepted aircraft's flight path.	You may proceed.	Rocks wings.	I understand and will comply.
Circles airport, lowers landing gear, and overflies runway in the direction of landing. (Also, at night turn the landing lights on.)	Land at this airport.	Lowers landing gear, follows the intercepting aircraft and lands if the runway is considered safe (Also, at night turn the landing lights on.)	I understand and will comply.

Section Map Review

Next Session – The Flight Computer/Navigation Plotter

Study for exam on The Flight Environment

BRING YOUR E6B AND PN-1

"That's All Folks"