

# Reading Sectional Charts

(information courtesy of USPPA.org)

This information is intended to provide a working knowledge of how to determine if the air above is legal. Barring a knowledgeable local pilot, the best way to learn the "where of legal air" is to purchase and become familiar with the Aeronautical Sectional Chart for that area. Big cities have more detailed versions covering just their vicinity called VFR Terminal Area Charts...and they more detailed.

Sectional and Terminal Area charts are available from the local airports, the [Internet](#), and pilot shops such as [Sporty's](#) for about \$8 each. New, updated ones come out every 6 months and must be used to avoid blundering into newly added restricted airspace (of which there is much lately).

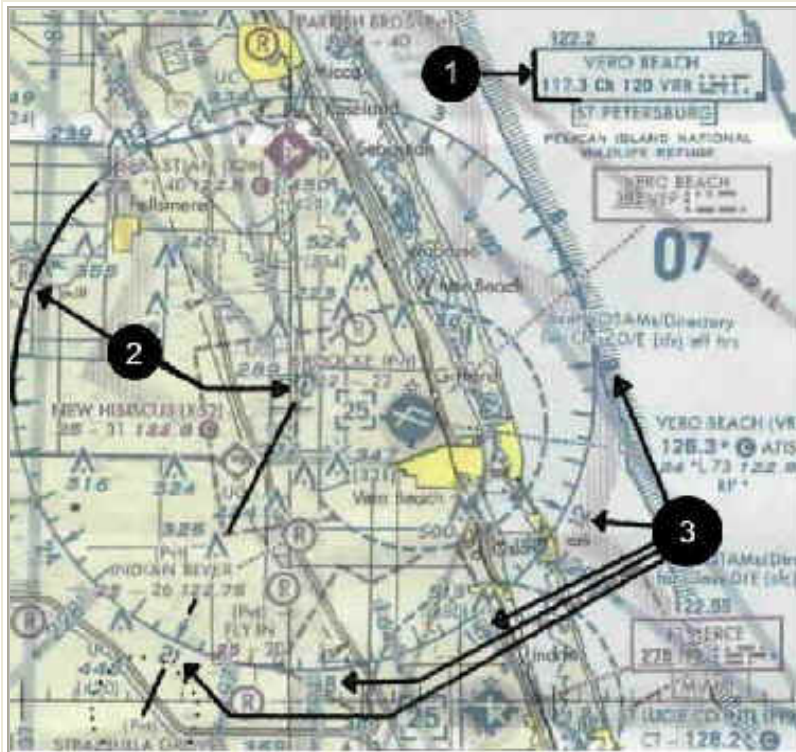
Excerpts from charts presented in this article are **NOT FOR NAVIGATION!** These charts will be long out of date by the time you read.

## FAR 103

Among other things, this short regulation says we must stay out of class A, B, C, D and some E airspace, prohibited and restricted areas, and other airspace as given by a notice to airman (NOTAM). There is also a recommendation (on the charts) to stay out of charted wildlife areas.

We can fly in any of these airspace classes by having prior permission granted by the controlling facility.

There are also visibility and cloud clearance requirements based on what kind of airspace we operate in.



### Value of VOR

A VOR station is used for aircraft navigation and by air traffic controllers to reference airspace such as that listing restricted areas. The reason why we might care about it is 1) to know that airplanes congregate overhead - it's good to avoid above about 800' AGL and 2) we can easily describe locations using distance and direction from it. Such reference can be useful when getting permission to fly in controlled airspace.

The the location of the station and it's compass rose are pointed at by (#2). The name of the VOR (VERO BEACH) and it's controlling agency (St Petersburg) are at (#1).

The degrees of the compass rose are in 5 degree increments and, space permitting, are labeled every 30 degrees. The (#3) above points to the 090, 120, 150, 180 and 210 degree lines of the VRB VOR.

If, for example, a NOTAM listed prohibited airspace on the 210 degree radial, at 7nm (nautical miles) with a radius of 2nm, that would be the area depicted by the black dotted circle out the 210° radial. The black dots were added here for clarity. These location won't be on the charts, that is why they use a radial/distance to mark them.

The best way to learn this information would be a session or two with a certified FAA flight instructor. Next best would be some good videos such as "The Complete Airspace Review" and "VFR Cross Country Flying"...both from the well known producer of such flicks, King Schools ([www.kingschools.com](http://www.kingschools.com)). They are about \$30 each.

Also note that for complete details, each chart has a legend on the back of the folded cover that explains most of its contents. This article is intended to help understand how it's used in the context of our sport without trying to dredge up every little nuance of VFR charts.

## Getting the Info

While the sectional chart is a great source of information, it is also the least current. They are printed every six months and new airspace frequently pops up or changes frequently. A necessary source of info for some of these tips is the Flight Service Station (FSS).

## NOTAM's

There are times when prohibited airspace is created temporarily. That is when a Notice to Airmen (NOTAM) is issued restricting overflight during the affected time for listed locations and altitudes. In the current security environment, adherence to these are critical.

NOTAM information can be obtained by calling a Flight Service Station (FSS) at 1.800.wx-brief. Tell them you're an ultralight, where and when you want to fly and they'll give you any pertinent info. A bonus of this call is that you'll also be able to get weather around your area if desired (just ask for an abbreviated briefing with local weather, forecast and NOTAMS).

One example of when airspace will become off-limits by NOTAM is whenever the president or other dignitary comes to town: they don't want private planes or ultralights (us) buzzing about for obvious reasons. They will specify a bunch of areas and times that will cover the expected route, including alternate routes they will travel. Nowadays these are taken extremely seriously; blundering into one might be a one-time mistake.

Another time airspace is NOTAM'd off-limits is after a natural disaster. This is an effort to keep the area clear for rescue or relief traffic. These cases are usually going to be obvious because the disaster creating the airspace will be all over the news.

The boundaries will frequently be in the form of a radial and distance from a VOR (see offset above).

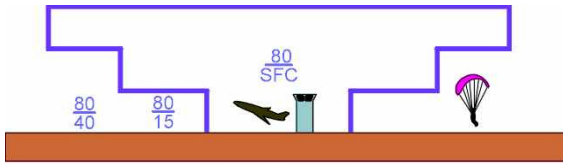
Here's an example (reference the excerpt): a truck carrying propane explodes on the highway southwest of Vero Beach. The highway is closed and a rescue/firefighting operation gets underway. FAA managers, at the request of local officials, will close the airspace over the area by issuing a NOTAM - prohibiting overflight below 2000' and within 2nm (nautical miles) of an area defined by the 210° radial at 7nm. Flying there would be particularly dangerous due to disaster related air traffic and would guarantee yourself special attention: *everybody* in officialdom knows you're not supposed to be there.

Basically if there has been such a disaster you'll likely know about it and can expect the area to be off limits. Since there's likely to be cameras rolling from the various news outlets it would be good to find out about any possible restricted areas.

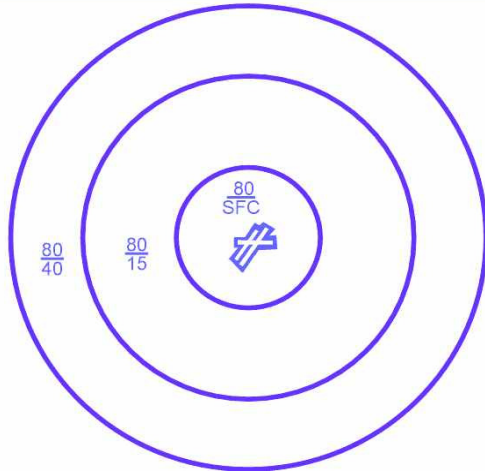
## The ABC's of Keeping Clear

The most relevant piece of knowledge regarding airspace is that almost anywhere you go, you're probably launching in G airspace at the surface with E airspace overlying it 700' (or 1200') overhead. Minimum for that airspace require remaining clear of clouds and having at least a mile visibility. When you pop into E airspace, airplanes are more likely to be found there and you must maintain at least 3 mile visibility and stay 500' below, 2000' to the side and 1000' above any cloud.

Class A airspace is above 18000'...no problem staying clear of that. Class B is where the big airplanes land. There are only a handful of these around the country surrounding the largest airports and generally we wouldn't want to go anywhere near them. Unfortunately they do usually block out otherwise usable launches that are indeed far enough away, so we must go to the chart.



The usual analogy of the three dimensional chunk of air carved out by a "B" is the upside down wedding cake (diagramed left). Near the airport it goes right down to the surface, as you get further away from the primary airport the floor goes above ground level, allowing us to fly in that area. That would be flying beneath "B" airspace and is perfectly legal.



for launching (or flying into at any altitude).



For example, in the above depiction there is a ring with 80 over 40. That means the B airspace goes from 4000' above sea level (ASL) to 8000' ASL. So in the area of that ring you could fly up to 4000'. Keep in mind all those little airplane guys know that and will frequently squeeze around these rings just below those altitudes.

The area where it has 80 over SFC means from the surface up to 8000'. That is the off-limits area

Most "B" areas don't have completely circular shapes, they follow beaches, prominent roads, terrain and such so the pilots who are flying visually can stay out of them. The Miami chart pictured is quite circular with some of the inner sections following parts of the beach.

### Class C and Terminal Radar Service Areas

Class C is designated just like class B but with a magenta line instead of blue. It has altitudes depicted in the same way with a floor and ceiling and is just as prohibited

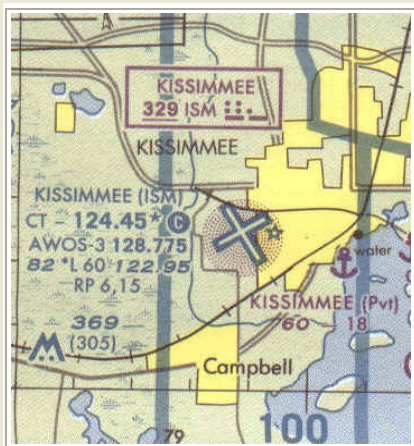
These airports, like the their larger "B" brethren have an approach control facility associated with them.



Before airspace was designated into the alphabetic descriptions (for compliance with world standards) there were distinct names for each type. One that remains is the Terminal Radar Service Area (TRSA).

To the left is the Rockford, IL TRSA. There is not quite enough traffic to be a class "C" and It is designated with a dark gray line. It is permissible to fly in this airspace without talking to anyone although there will be a control tower and class D airspace near the center (dashed blue lines) which is prohibited (unless you have permission, of course).

The primary purpose is to point out to airplane pilots that radar service is available but participation is not mandatory.



*The DuPage airport (top) has Class D around it topping out at 3300' above sea level (ASL). Although Kissimmee airport (bottom) has a control tower it does not have class D airspace around it since there is no dashed line. You could legally fly only a mile away from this airport although that should be done carefully as it is obviously busy enough to have a tower. Also note this can change at any time so consult the NOTAMs or, better yet, call the tower before flying nearby.*

Airports with control towers are blue and those with no tower are magenta (purple). Furthermore an airport with a control tower will generally have a blue dashed line around it. That line designates "class D" airspace which prohibits our operations (unless we talk to them).

The class D airspace typically goes up 2500' above ground level (AGL) and the above-sea-level (ASL) altitude is depicted in the box. The DPA airport (left) shows 33 which is 3300' ASL. The airport elevation is 758.

When aviation charts use italics it usually is to indicate elevations referencing mean sea level (MSL and ASL are the same thing). This includes airports, mountains and obstructions.

Legally you could fly right above the DPA airport at 3400' ASL. While legal this would be complete folly because airplanes will be taking off and landing at the airport and many will be overflying for the same reason...they don't have to talk to anyone. It is some very crowded airspace and they're not looking for essentially stationary ppg's.

Note also in the DPA example the 100/40 near the top of the picture. This airport underlies Chicago's very busy O'Hare airport, the floor of who's B airspace is at 4000'. So everyone not talking to either the DPA tower or O'Hare approach is squeezing between 3300' and 4000' MSL.

Interestingly there are a few "control towered fields that do not have this "D" airspace (no dashed line) and you can legally fly near these. It would obviously be wise to check with the tower because they may have just obtained the necessary

traffic counts to receive their "D" designation.

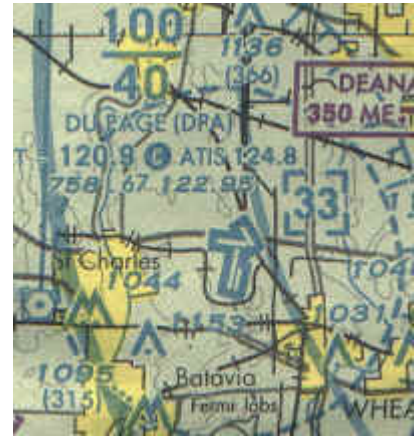
### Military Airspace

There are many flavors of airspace where the military stakes a claim. Most of it is actually not forbidden zone but given the nature of their use it would best be avoided. All military airspace is designated the same way with rows of parallel lines in either blue or red (see MARIAN MOA below for an example).

There are also VR and IR's which are visual routes and instrument routes. These thin gray lines are not restricted legally but be aware they frequently fly very low and fast along them (up to 270 mph!).

Prohibited and Restricted areas generally are no-no's. Flying in one of these while it's in use would be utter folly. But even these *may* allow flight...they are in effect from different altitudes (sometimes only high up) and different times or days. This information is usually located on the chart. If planning on flying in one of these areas you must call the Flight Service Station (FSS) at 800 WX-BRIEF to verify the times though. The sectionals come out every 6 months and these times are updated every 56 days so the chart's info could be old. Tell the FSS briefer you're an ultralight pilot and he will find out whether it's "hot". He has a direct line usually to the controlling agency (usually the enroute "center") and will relay the information to you...and the call is free!

Alert areas, Controlled Firing areas and MOA's do not actually prohibit flight...they are there as a warning that military operations will be conducted and pilots should "look out".



Keep in mind some military training involves low-altitude helicopter or jet training where they do various "nap-of-the-earth" type work. That would put them smack in the middle of our favorite altitudes.

Technically the military pilots in these areas comply with FAA regs but these military folks probably aren't going to be looking for stray ppg's!

### Wildlife Areas



These are not actually prohibited but the admonishment on the charts requests pilots to remain at least 2000' AGL when overflying them. They are designated in blue with a solid line that has dots running along just inside the line.

In the example to the left, the Verde River Bald Eagle Breeding Area roughly follows a river. This area is about 2 miles wide. Note that it overlaps another, rectangular shaped, wildlife area south of it (whose name is not shown).

Note the "PXR 025°". It is part of the PHX class B airspace depiction and is the 25 degree radial from the PXR (Phoenix) VOR. It aids airplane pilots who have the special VOR receiver equipment to identify the outlines of the B airspace although most of this is now done with GPS.

### Class E & G Airspace

United States is covered by G (the least restrictive) and then E on top of that...meaning that our freedom to fly is indeed bountiful.

Generally all of our flying is going to be in this airspace. We can legally take-off, fly around in, and land in both E & G airspace. The difference between the two is only in the required cloud clearance and visibility requirements. The vast majority of the



In most areas of the country the G airspace goes from the surface up to 1200' AGL. If there's a nearby airport that sometimes gets lowered to 700' AGL. Above the G airspace is E which has more restrictive visibility requirements but we can certainly fly in it.

Near airports where airplanes are likely to be letting down on an instrument approach, the floor of E airspace lowers to 700 feet. That is depicted by a shaded magenta outline. In the example around Pontiac airport it is a circle but sometimes it has weird shapes with extensions that stick out.

In the example of Pontiac, the area within 5 miles of the airport up to 700' AGL is class G airspace (requiring only a mile visibility). Above 700' is class E airspace requiring 3 mile visibility. You could launch from the airport with visibility as low as a mile but couldn't go over 700' unless the visibility was at least 3 miles.

### Mode C

Around most of the busy class B airspace areas there is a 30 mile ring that says "Mode C". This has no bearing on our ability to fly inside that ring.

The mode C "veil" pertains to certified aircraft with an electrical system and stipulates that they must have a transponder with altitude encoding. That equipment transmits to the radar controllers their altitude along with some other information. We, as ultralights, are exempt from this requirement. Obviously we do have to stay out of the various layers of the class B airspace.

### Surveying

Sometimes you will find yourself in a new area and one of the first tasks is to buy a chart if you don't have one. Then by comparing what's on the chart with the road map you can make sure you're legal from an airspace perspective.

Hopefully this information will help in your own effort to beware of legal air.

### A Legend

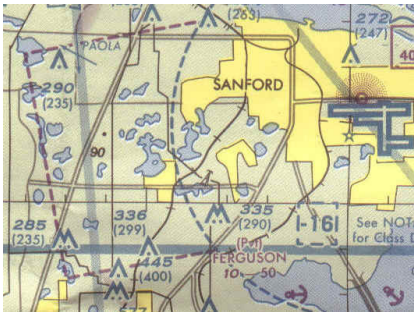
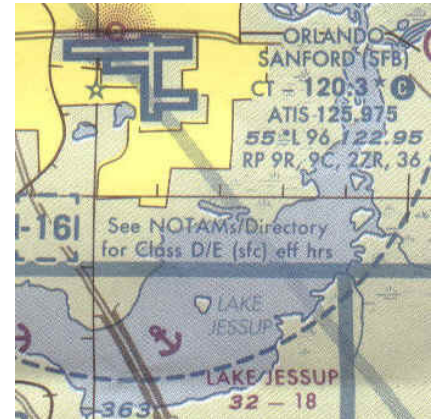
There are several useful areas on the chart besides their maps. The legend defines most of the symbols, there's a section that lists all the restricted/prohibited areas along with altitudes, times of operation and the controlling agency that can tell you whether they are in use ("hot").

### Getting Permission

If you live in restricted airspace of any kind, it is possible you still may be able to fly there. Contact the controlling facility to find out. If it is a Class D with a control tower, ask to talk with the tower chief. If you'll be flying regularly out of the same area you may be able to arrange a "letter of agreement" detailing the conditions under which you can fly. Usually it's best have a route that exits their airspace below a certain altitude. Telephone numbers will usually appear under "US Government, Department of Transportation, FAA Control tower." Failing that, contact flight service at **800 WX-BRIEF** to ask for the number.

### Airport Info

That it's drawn in blue means it has a control tower (see below). The blue dashed line around it is the class D where we cannot fly and the top of the Class D airspace goes to 1600 feet Above Sea Level (ASL). The Orlando Sanford control tower frequency is 120.3 Mhz, operates part-time (the \*), is at 55' elevation and has right traffic patterns for runway 9R, 9C, 22R and 36...the other runways use standard left patterns. Fortunately, how to decode this information is described on the chart's legend.



### Class E Surface Area

The dashed blue lines encircling the tower controlled (blue) Sanford airport denote its class D airspace. The magenta dashed line in a rectangle shape off the left is the "class E airspace designated for an airport". It's also called the surface area of class E and it requires permission. It is the only case of class E where you must have permission from the controlling facility.

### Private and Sod

Airports without a hard surfaced runway are not filled in...they're just an airport-sized ring. Usually they have an R in them indicating they are restricted in some way. That is generally because they are private airports.

Note that if you can get permission these frequently make great launch sites. Those that do not have the R are public and frequently are ultralight-friendly fields. Airports that are specifically ultralight fields will have a symbol of an ultralight above them.



### Uncontrolled Field

Sebastian airport (X26) is magenta meaning it is uncontrolled (no tower). You could go fly out of there provided the owner didn't mind. There is no requirement to talk to anyone.

**Can I fly here?**

You want to fly Melbourne beach, launching from where the "B" is on "Palm Bay". This is legal but almost immediately north of the launch you get into the magenta dashed lines that denote the "surface area of class E designated for an airport". That airspace is off-limits without permission from Melbourne tower.



How about the airport near the bottom, can I fly there? Yup, that airport has class G airspace up to 700'. You could legally take off from there with as little as a mile visibility and staying clear of clouds. If you wanted to go above 700' you must have 3 mile visibility and follow the cloud clearances listed below in the table.

**Can I Fly Here?**

You want to fly at the western tip of Lake Mendota. The Blue airport on the right is Madison's Dane County, an airline airport with Class C airspace around it (the magenta solid rings). The first ring around Dane Co. says 49/SFC meaning the class C goes from the surface up to 4900' MSL. But the outer ring shows 49/23 meaning the class C goes from 2300' up to 4900' MSL. That means that your launch from the western tip of the lake is in class G airspace (up to 700' AGL) and is perfectly legal. You can fly up to 2300' MSL (well ok, 2299'). The magenta airports are also in class G airspace so you are not restricted by them.



**Can I Fly Here?**

You want to fly from the 2239 foot hill (near the middle of the picture below). There's a magenta airport SE of the launch and the outer ring (PXR 25 NM) of the PHX class B airspace is to the North. The 30 nautical mile Mode C ring has no bearing on us. The shaded magenta ring that describes a 5 mile ring around the magenta airport denotes the floor of E airspace as 700'...outside of that ring the floor is 1200'. You are legal to launch from there and only need 1 statute mile visibility as this is class G airspace. If you climb up above 700' you get into E airspace. That requires 3 sm visibility and the more restrictive cloud clearance limits specified in the table below.



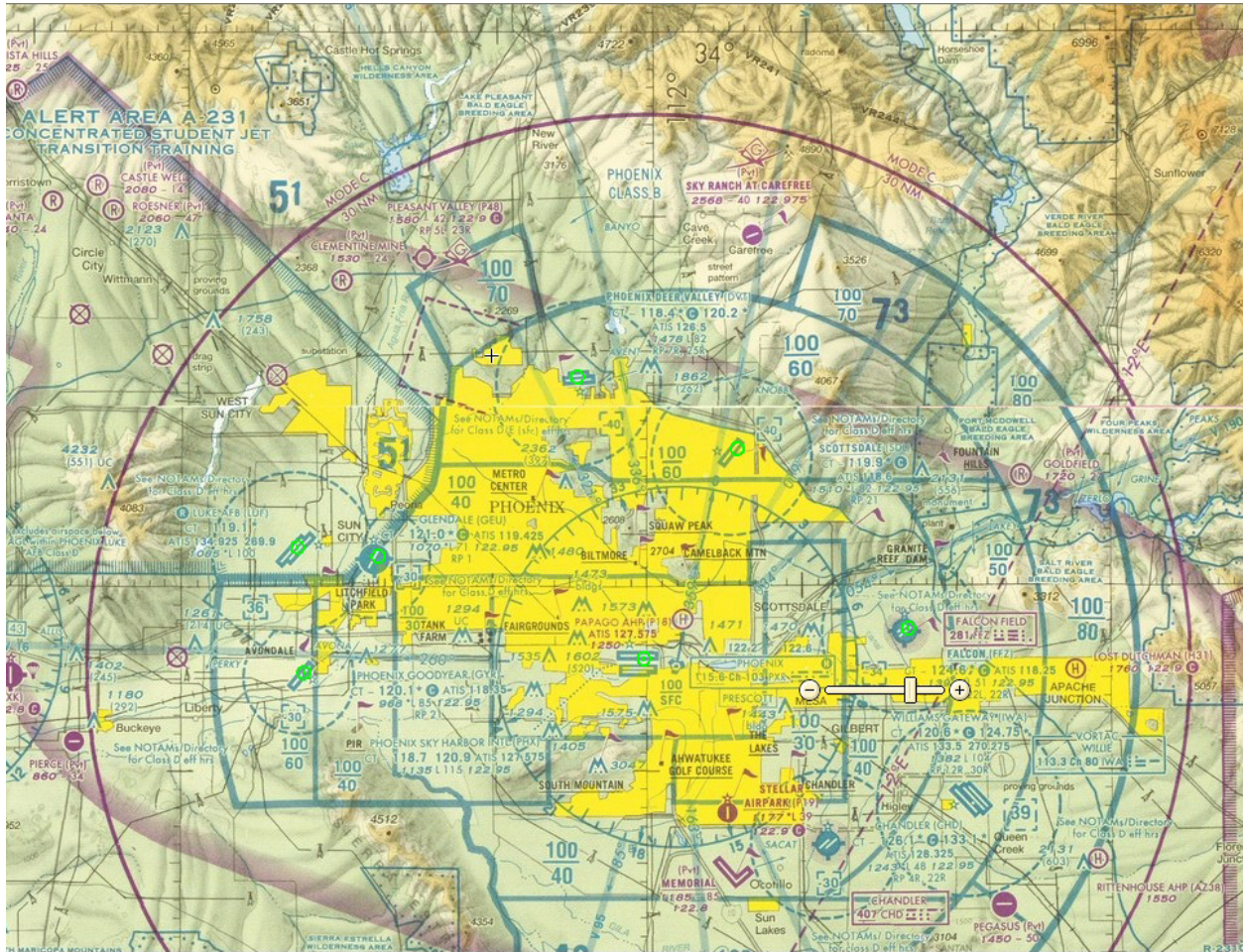
**Cloud Clearance & Visibility Table**

*If you are flying below 10,000 feet and out of the busy controlled airspace areas (B, C, and D) then the following abbreviated table contains all the required FAR 103 Cloud Clearance and visibility minimums you'll need. Visibilities are listed in statute miles.*

Airspace	Dist From Clouds	Visibility
G: up to 1200' AGL	Clear of clouds	1 mile
G: above 1200' AGL	500' below 1000' above 2000' beside	
E:		3 miles

www.PARADRENALIN.com  
Example Sectional for Phoenix

(always check you have a current chart)



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