

# JETSTREAMS

## AHART AVIATION SERVICES

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October 2006

I cannot believe how fast this year is going by. We are already into the 10th month and before you know it we will be in the year 2007! As the days get shorter student pilots need to be careful to schedule solo flights that do not end after the end of evening civil twilight. Pilots need to be night current when flying with passengers. Also be sure to check weather at your destination airport and enroute prior to departing on a cross country trip.

I would like to welcome Randi Coon to our family of flight instructors. Randi is an experienced flight instructor from Minnesota and will be working at Ahart as a full time CFL, CFII and MEI. Be sure to say hello to her when you are in next.

Be sure to take a look at the list of seminars and flight schools being offered this month and November.

*Safe flying*

*Lysa Wollard*

## September Achievements

Jeff Erhart

Solo

Jerry Nemier

Jim Goetz

Private

James Hubbard

Les Gann

Private

Brian Dreger

Erik Nunn

Private

David Sawczwy

Jason Strickland

Private

Spencer Thomas

Brad Myers

Private

James Hubbard

Jeff Lambert

Private

James Hubbard

Lin Yi-Der

Instrument

Neal Beuerman

Ivan Szeto

ATP

Joerg Lamprecht

Instrument

Brian Dreger

Mike Peine

Instrument

Brian Dreger

Dave Witkowski

Instrument

Tim MacHugh

Mike Huang

Commercial Multi-engine

Brian Dreger

Derek Sellers

MEI

David Sawczyn

Bart Sier

MEI

Tim MacHugh

Bill Komanetsky

MEI

Tim MacHugh

Tom Irion

Private

Bill Komanetsky

## FALL AND WINTER HOURS

AS OF OCTOBER 1ST WE WILL BE OPEN

MONDAY THROUGH FRIDAY

8:00 AM TO 6:00 PM

AND

SATURDAYS AND SUNDAYS

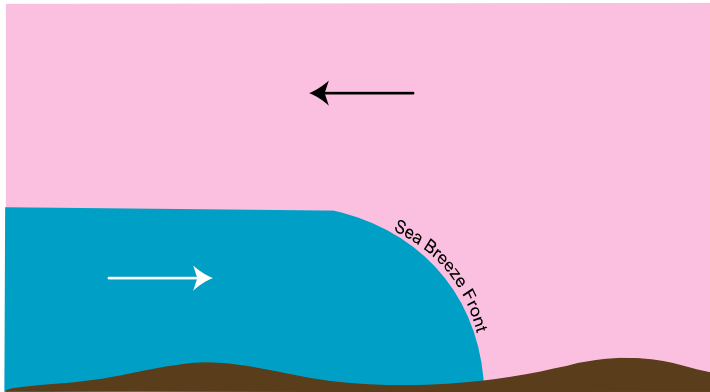
7:30 AM TO 7:00 PM

## Non-Convective Low-Level Wind Shear

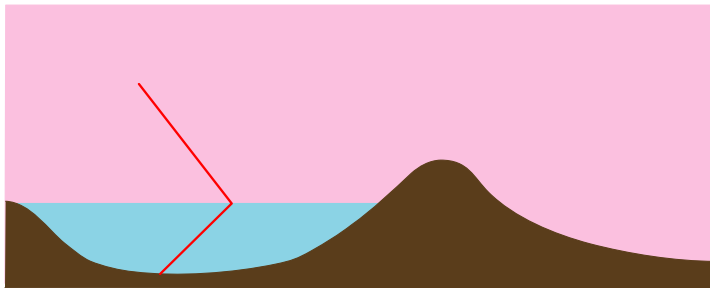
By Terry Lankford

Any rapid change, either vertically or horizontally, in wind direction, speed, or both creates wind shear. Low-level wind shear (LLWS) occurs within 2000 ft of the surface, which can be potentially hazardous to aircraft taking off or landing. Although difficult to quantify, LLWS can be *severe* when a rapid change in the wind causes deviations in airspeed greater than 15 knots or vertical speed greater than 500 ft per minute.

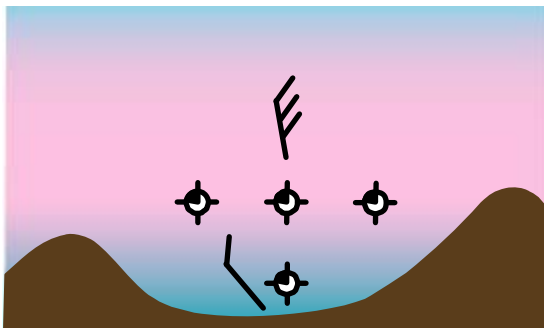
Non-convective LLWS is often associated with air mass density boundaries and can result from sea breezes, inversions, lee side effect or down slope winds, low-level jet streams, and fronts. Shear strength depends on the difference between wind direction and speed in the adjacent air masses. Often a combination of these phenomena produce the most significant shear.



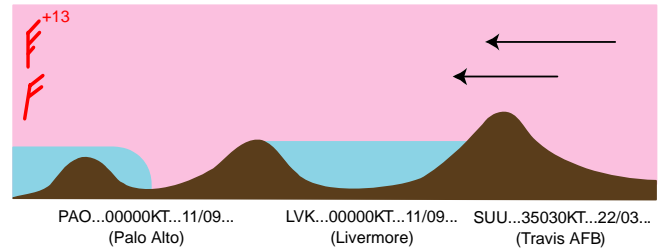
Sea breezes produce a shear boundary between cooler, denser sea air and warm, dry land air. When associated with lee side effect or down slope winds, the boundary—a "sea breeze front"—can produce moderate or greater turbulence.



An inversion is a temperature increases with altitude. Shear develops along the boundary between cool air trapped near the surface and warm air aloft. With lee side effect or down slope winds, shear can result in moderate or greater turbulence at the boundary.



A low-level jet stream is a band of strong winds in the lower troposphere. A shear zone develops between the strong winds aloft and weaker winds near the surface, shear can result in moderate or greater turbulence. Low-level jets can develop in the springtime in California's Central valley and the mid West.



Down slope and mountain winds can become quite strong and hazardous when flowing through canyons and passes. Shear develops along the density boundary of the strong, warm down slope winds and the light winds and cool temperatures in valleys, plains, and coastal sections. This can result in moderate or greater turbulence.

A front is the boundary between air masses of different properties: temperature and moisture—density, and wind. Shear develops along the boundary. The intensity of non-convective frontal LLWS is rarely, if ever, severe. But, like other types of LLWS near the surface can present a hazard to aircraft taking off or landing.

Because of their significance, pilot reports (PIREP) of wind shear are extremely important. Wind shear appears in the REMARKS element of the PIREP. These reports should include the location, altitudes, and airspeed and vertical speed changes.

Studies show that the majority of non-convective LLWS reports have in fact been triggered by low-level turbulence. Many pilots lump any turbulence below 2000 ft AGL into the category of wind shear, probably because of FAA and media emphasis. Both can be severe. So what's the difference? Low-level turbulence is characterized by fluctuations in airspeed (*both plus and minus*) with no appreciable, or only a momentary change in vertical speed (*both plus and minus*). With a wind shear event a pilot can expect a sudden change in airspeed (*plus or minus, but not both*) accompanied by a rapid change in vertical speed (*plus or minus, but not both*). Forecast for significant non-convective LLWS are contained in ARIMET TANGO, TWEB Route Forecast, and TAFs.

The occurrence, exact location, and intensity of LLWS is difficult to predict. However, with an understanding of the causes of non-convective LLWS, pilots can diagnose the potential for shear. As well as reports and forecasts, LLWS potential can be determined from a comparison of surface winds and temperatures, winds and temperatures aloft, and terrain. Look for changes in wind speed and direction—both vertically and horizontally, and air mass density differences.

John 3:8. "The wind bloweth where it listeth, and thou hearest the sound thereof, but canst not tell whence it cometh, and whither it goeth:..."

## The Flying Gourmet

By Jim Jellison

When I was first learning to fly my instructor took me to Columbia on a dual cross country because, she said, that would be a place I would want to go back to time and time again. She was correct and for a while my wife and I were regulars at the City Hotel dining room. In fact I was so impressed by the old hotel that my very first "Flying Gourmet", six years ago, featured it. It never seemed to change; the bartender, headwaiter, and most of the waitresses seemed like old friends. Even when we arrived one evening after closing they still accommodated us with a wonderful no rush dinner.

Well, everything changes with time and I should have known that the City Hotel would be no exception. One evening a few weeks ago my wife and I decided to go once again as it had been six months since our last visit. The first thing that we noticed was that the staff was completely different and the menu had changed. After regaining our composure we decided to keep an open mind and give it a try. It was a good thing that we did because we were very pleased with the menu selections, the service, and the meal. There may be new owners but the quality and class of the old establishment has been preserved.

The story that we got from the waiter was that back in early December there was a small kitchen fire, which necessitated a costly modification. The fire department was gracious enough to allow the restaurant to continue to operate during the Christmas season on a

temporary permit, but then there was a three-month shut down for repairs and remodeling of the kitchen. Most of us couldn't do without a paycheck for three months and the staff at the City Hotel couldn't either. Most took other jobs, management of the hotel changed, and the new owner Forever Resorts formed what is now known as Columbia City Hotel, LLC. The new owner recognizes that the City Hotel is an institution with a reputation for excellence and they intend to maintain and enhance that reputation.

My wife and I went all out and ordered the Chateau Briand for two with the City Hotel's signature Caesar salad served tableside for two. What would a great meal be without a great dessert? We just had to order soufflés to complete the perfect meal, (they come in chocolate or lemon). The City Hotel continues to be a four star restaurant and is really a hotel with comfortable rooms upstairs decorated in the period but with modern conveniences such as bathrooms.

Columbia (O22) is located approximately 69 nm NE of Livermore and has a 4,700 ft runway. Make sure everyone in your party has a flashlight as it gets very dark up there after sunset and town is a mile or so from the airport accessed by a nature trail. Women should wear comfortable shoes since the trail is rocky in places. The meal is well worth the trip and the hike.

## What's Coming Up at Ahart Aviation

The month's of October and November are full of interesting events. We have several ground schools and safety seminars being offered at Ahart. Please take a look at the various opportunities. Customers may register for any event either by logging onto [schedule-pointe.com](http://schedule-pointe.com) and going to the EVENTS page or by calling the front desk at 925-449-2142. Also please call if you have questions about any of the programs.

### **Meteorology Course and Single Pilot IFR Course—Saturday October 28th and Sunday October 29th 8:00 AM to 5:00 PM**

- Terry Lankford will be teaching a special course entitled the One Day Meteorology Seminar. The seminar will include weather theory and how to utilize weather reports to make your flights safe and enjoyable. The cost is only \$225
- You may also register for Fred Abrams' Single Pilot IFR Seminar the following day. Fred has taught this course several times and every pilot walks away with better equipped for instrument flying. The cost is only \$225
- If you register for both the total cost is only \$400 (a \$50 savings).

### **Flight Companion Seminar—Hosted by the 99s, November 4th 8:30 AM to 4:30 PM Cost \$45**

### **Flight Review Ground School—Taught by Terry Lankford, November 5th 9:00 AM to 12:00 Noon Cost \$45**

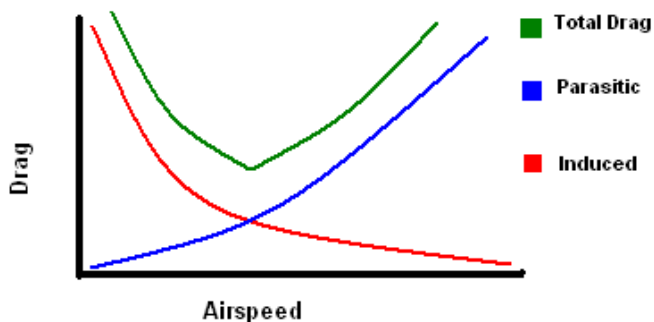
# Instructor's Corner—Total Drag

By Jordan Miller

It is a beautiful day in California and you are three quarters of the way down to LA when the fuel needle starts dancing on empty. You know there should be enough fuel according to your pre-flight planning and that fuel gauges are notoriously inaccurate. But, you still cannot get rid of the thought that you are not going to have enough fuel. Maybe the airplane is burning more fuel than planned, there is a fuel leak, or there was not as much fuel to start as planned. You make the decision to land and get some more fuel, but the closest airport is still a distance away. Do you know what speed to fly to burn the least amount of your remaining fuel to get there?

By understanding the drag acting on an airplane, pilots will make better decisions. The total drag on an airplane is made up of induced drag and parasitic drag. Induced drag is caused by wingtip vortices modifying the relative wind, thus angling lift backwards. Induced drag is greatest at slow airspeeds. Parasitic drag is a byproduct of the airplane moving through the air and increases as speeds increase (consult the previous articles on the particulars of induced and parasitic drag). The total drag on an airplane can be found by adding parasitic and induced drag. Drag is typically graphed relative to airspeed as shown above.

In un-accelerated flight, drag must be equal to thrust. Therefore the total drag curve is also the thrust required curve. In piston powered airplanes power is referred to more than thrust. Power is simply thrust times speed. The thrust required graph can then be changed into a power required graph by multiplying each point by the speed. To keep things simple in this article, only the total drag curve will be used. It is important to keep in mind the correlation between drag and power.



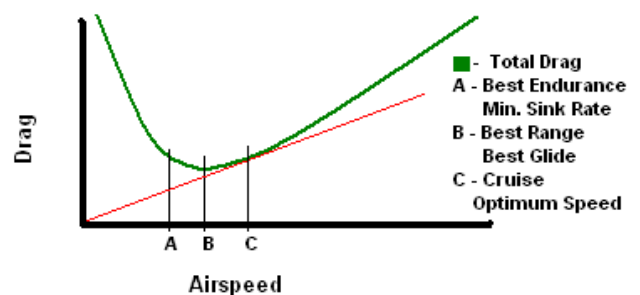
The most significant point in the drag curve is the point of minimum drag. The minimum drag point is the best glide airspeed because there is the least amount of drag for lift. Also, this point is the speed for maximum range. Range is the distance that can be traveled on a specific amount of fuel. Therefore, since the least amount of thrust (power) is required to counteract drag, the further one can travel. In the scenario used to open the article, the pilot should slow to best range in order to burn the least amount of fuel until reaching an airport. Also, with sky high fuel prices, best range speed is the most efficient use of fuel.

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Unfortunately, best range speed is excruciatingly slow. In a Cessna 172 it is only 65 knots. Most people don't fly just to watch trucks on I-5 beat them down to LA. Because of this, another speed can be used for cruise planning called cruise optimum speed. Cruise optimum speed is the best ratio of airspeed to drag. In contrast, best range is the best ratio of distance to drag. Cruise optimum speed will result in the highest airspeed per unit of fuel flow. For example, at cruise optimum speed each gallon of fuel burned per hour might result in nine knots of airspeed, at a slower or faster speed, each gallon of fuel burn per hour will result in less airspeed. Cruise optimum speed can be found by drawing a line from the origin of the graph to the drag curve. Most of us do not have drag curves lying around, so it can also be found by multiplying best glide by 1.316. In a Cessna 172, this is about 86 knots.

Let's look at another scenario. This time you are coming into land after a long cross country trip. As you call up tower, they inform you that a truck has broken down right on the runway and the runway is going to be closed until it is towed. In this scenario the prudent pilot would slow to best endurance speed to burn the least amount of fuel. Endurance is the amount of time an airplane can fly for a given amount of fuel. The best endurance speed occurs at the minimum power required. This speed is below best glide speed because less power is required just to maintain sufficient airspeed to fly than to travel a distance. This speed is also the speed for minimum sink rate.



The total drag curve gives pilots insight into how an airplane performs. The least drag is experienced at best glide speed. As airspeed increases, drag increases due to the large increase in parasitic drag. As airspeed decreases, drag also increases because of the increase in induced drag. Combined, the total drag on an airplane dictates best glide, best range, best endurance and many other limitations. Next time you are out flying, take a second and ask, "Where am I on the drag curve?"