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IFR

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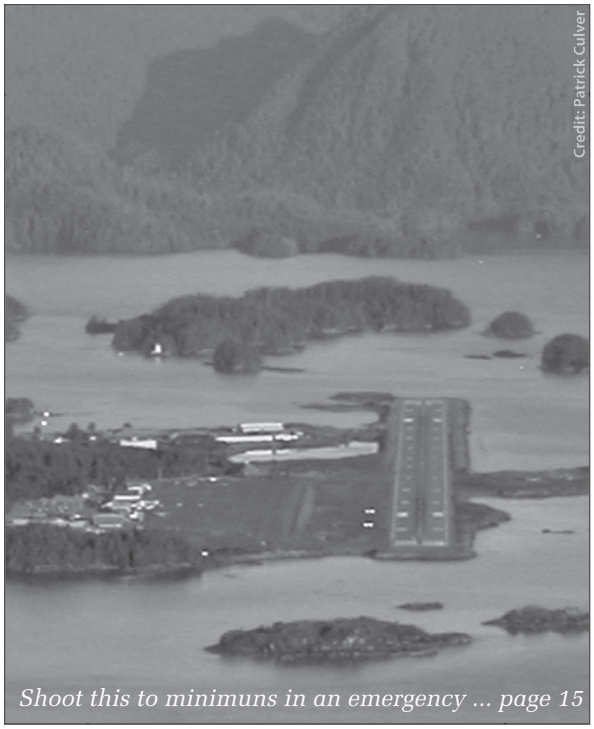
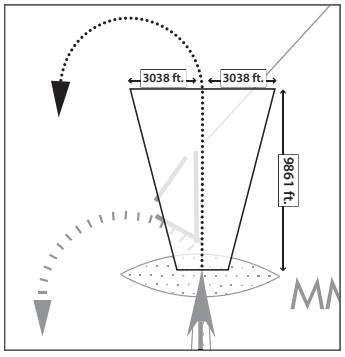


Shoot this to minimuns in an emergency ... page 15



Protected airspace ... page 9

Cheap gas ... page 6

ALSO INSIDE THIS ISSUE ...

appear, these are good places for the localizer's missed approach. Most localizer missed-approach points are really over the end of the runway, but if you are at localizer minimums on a short runway you may have problems on rollout. DME may also identify the localizer missed-approach point and of course the moving map on the smallest scale of your GPS is a "no-brainer."

Be wary of high rates of climb that can be disorienting. Leave switching radios or pushing GPS buttons for later. The missed is a comfortable maneuver — not a "yahoo goat rope." Although there may be other airspace protected for the localizer-only missed approach, the instructions you are reading are the same as for the ILS. You can still go to the end of Section One for the localizer's missed approach.

Theory and Practice

Let's fly to Great Bend, Kan., (KGBD) and use the ILS RWY 35. Following the procedure turn, we find ourselves inbound and start down from 3600. Our altimeter agrees with the published number at the LOM.

When it comes time for the missed approach — from the ILS, the LOC, or near the approach-end of the runway — we will perform a gentle, wings-level climb to a position near the departure end of Runway 35 and then begin our turn back to the LOM. We will see station passage over the localizer antenna and the DME will decrease to its smallest value of about 0.5 in a normal, comfortable, missed-approach climb prior to the turn.

You can also peek at the moving map that seems to grace every cockpit these days. When you're at approximately the end of the runway, you're near the end of Section One. Go ahead and turn. Remember, one peek is worth a thousand cross-checks.

Dog Brenneman is a TERPS consultant and advanced instrument instructor.

USING WINDS ALOFT

Winds aloft forecasts are one of your best tools for flight planning and fuel saving, but you need to know the whole story.

by Scott C. Dennstaedt

At almost every one of my aviation weather workshops I hear pilots complain that the winds aloft forecasts don't represent reality. Of course, they never seem to complain when the tailwind is stronger than forecast; but, I always hear about those stronger-than-forecast headwinds. Knowing how these forecasts are generated and their limitations is the first step to understanding why some pilots are not happy with the forecast.

The Winds and Temperatures Aloft Forecast — FB Winds — are provided as part of a standard briefing when you call an automated flight service station (AFSS). In the FAA's view, they are the "official" forecast of winds and temperatures above the surface. FB Winds are used when you plan a flight with DUATS or most flight planning software such as FliteStar.

A few of you are already typing an e-mail alerting the editor that he didn't catch a typographical error. Don't hit the send button yet. The Winds and Temperatures Aloft were once called FD Winds. Due to a change last year, the NWS and FAA now prefer to call these FB Winds.

Quick Review

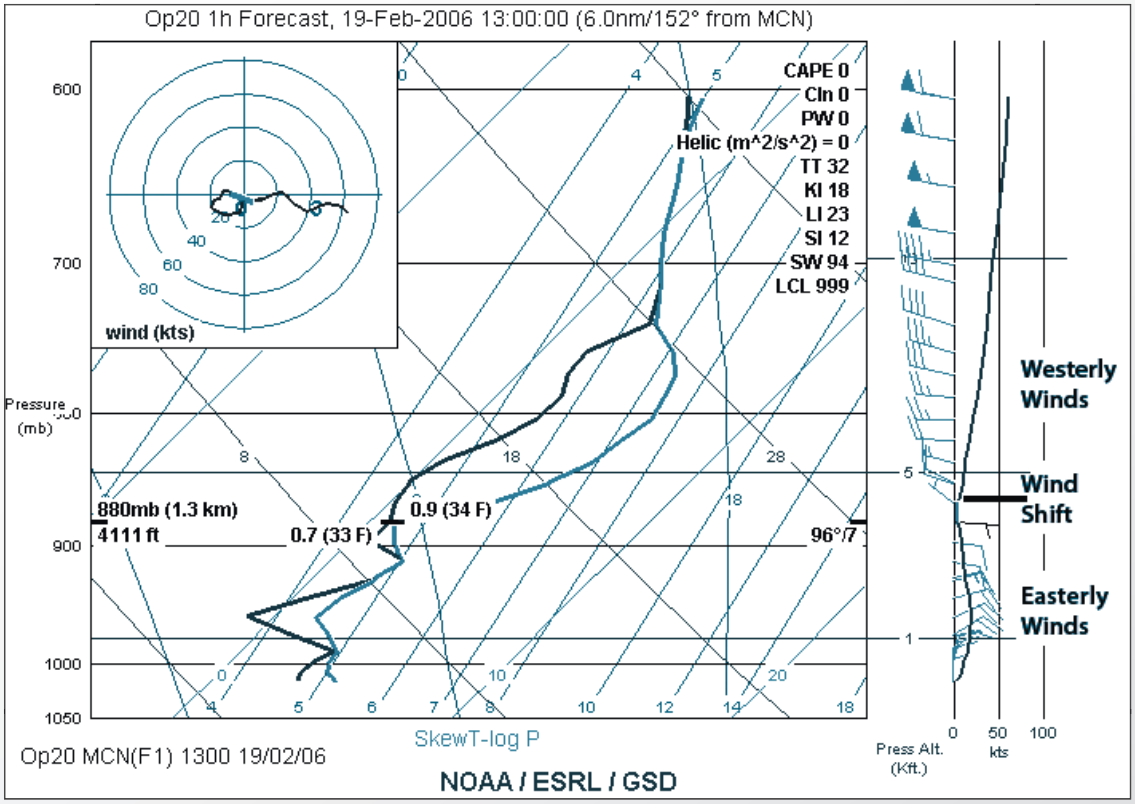
The FB Winds are provided to pilots at true altitudes every 3000 feet through 12,000 feet and pressure altitudes every 6000 feet at or above 18,000 feet. Wind direction is depicted from true North.

No winds are forecast when a given level is within 1500 feet of the station elevation (i.e., the ground) and temperatures are not forecast for any station within 2500 feet of the station elevation. Temperature is in whole degrees Celsius and assumed to be negative above 24,000 feet.

The FB Winds are generated four times a day by the National

Belaw: *The network of FB Winds stations for the U.S. is quite coarse.*

BETTER WINDS FORECASTING THROUGH WEB JAVA



With respect to the winds, what can you do to plan a more accurate flight? First, understand the limitations of the FB Winds product. Second, use any new, observed data from pilot reports that might provide you with a more recent, accurate estimation of the winds. Third, take note of changing weather conditions and factor those into your flight plan. Fourth, use a different forecast model.

FB Winds forecasts are based on the output of the North American Mesoscale (NAM) model, which is run every six hours.

The Rapid Update Cycle (RUC2) model, on the other hand, is run hourly and will provide an hourly analysis (current conditions) as well as one-, two-, three-, six-, nine-, and 12-hour forecasts.

Keeping With the Times

As weather conditions change, the RUC model will incorporate new data into a new forecast once every hour. Moreover, you are not limited to just the FB Winds stations; you can choose any airport with a three-letter identifier and determine the winds and temperatures aloft at nearly 50 different altitudes from the surface through FL600.

While these are not the official FB Winds, a Skew-T log-P diagram such as the one from the Earth Systems Research Lab/Global Systems Division (ESRL/GSD) depicts forecast data (temperature, winds, and dewpoint temperature) from the RUC model.

Mouse Left, Look Right

Note the wind barbs on the right side of the diagram. As the mouse cursor is moved up and down in the center of this interactive diagram, each wind barb to the right will be highlighted in black, representing the wind speed and direction forecast at the selected pressure altitude.

The graphical wind speed diagram to the far right will allow you to choose the altitude that has the least head wind or the greatest tailwind. In this sample, a one-hour forecast valid at 1300 UTC for Macon, Ga., (KMCN), the cursor was placed at 4111 feet (880 mb) of pressure altitude where the winds are forecast to be 096 (true) at seven knots. The temperature at this altitude is forecast to be 0.9 degrees C.

This forecast clearly shows a wind shift just above 4000 feet of pressure altitude; easterly winds are forecast below 4000 feet and westerly winds are forecast above 4000 feet. If you are headed westbound and wanted to maximize your tailwind component, choosing a lower altitude of 4000 feet will get you a 10-knot tailwind flying through a broken cloud layer. At 6000 feet, you will be faced with a 20-knot headwind, but will likely be between cloud decks. Pick your poison.

This kind of product provides you with a much more visual picture of the forecast winds along your route of flight. A lot can occur within a 3000-foot slice of the atmosphere that may make or break a maximum-endurance flight.

Don't punt the FB Winds forecast. However, with the RUC model forecast you can get a much more recent forecast with a finer resolution in the horizontal and the vertical. Go to http://rucsoundings.noaa.gov and give it a try. If you still can't figure it out, send me an e-mail. — *S.D.*

Centers for Environmental Prediction (NCEP) in Camp Springs, Md. Forecasts for six, 12 and 24 hours are generated every six hours, or four times a day. These forecasts are based on the output from the North American Mesoscale (NAM) model (formally known as the Eta model), which replaced the Nested Grid Model (NGM) several years ago as the model of choice.

The NAM offers four forecast runs a day at 0000 UTC, 0600 UTC, 1200 UTC, and 1800 UTC, which is a huge improvement over the NGM that only ran twice a day at 0000 UTC and 1200 UTC. Regardless of the model used, several important limitations remain with the FB Winds product.

The resolution for the FB Winds network is very coarse as compared to the resolution of the model that generates them. The NAM model has a 12 kilometer horizontal resolution and 50 layers of resolution in the vertical. Forecast winds and temperatures are essentially derived from the closest model grid point (spaced at 12 kilometers apart) to the actual FB Winds station and are interpolated from the nearest model layer to the FB Winds forecast level.

The six-hour FB Winds forecast is only valid at 1200 UTC even though it is for use between 0800 and 1500 UTC.

There's a good chance that the forecasts are fairly accurate at the actual FB Winds forecast levels and at the FB Winds station at the valid time of the forecast. However, errors will exist when: (1) flying between forecast levels; (2) flying between FB Winds stations; (3) flying before or after the valid time of the forecast. These errors can be substantial, especially if there's a significant wind shift in any one of the conditions above.

The FB Winds forecast for temperature is not a reliable indicator of the lowest freezing level. With only 3,000 feet of vertical resolution at best, it is possible to have temperatures reported (forecast) above zero from the surface through 10,000 feet with the potential for icing below 10,000 feet.

Surface-based nocturnal temperature inversions play an important role in U.S. weather, but are rarely apparent in the FB Winds forecast. Shallow features such as this or inversions associated with warm frontal freezing rain are often masked by the coarse nature of the product. The moral is not to rely too heavily on just the temperatures supplied by the FB Winds product.

FB Winds do not forecast the moisture content or the relative hu-

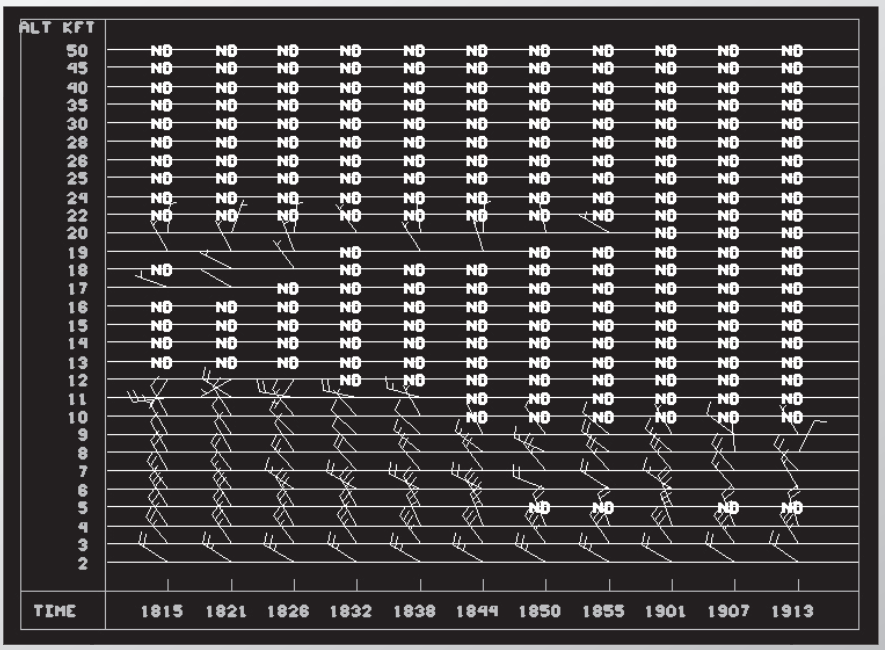
RADAR WINDS CAN REVEAL LAYERS

The VAD (Velocity-Azimuth Display) Wind Profile of the NEXRAD Radar shows horizontal wind velocity near the radar site as a function of time and altitude. The wind velocity is described by barbs at each altitude and time. The direction of the barb indicates wind direction and flags on the barbs indicate wind speed.

What's interesting here is that cloud layer information is displayed on this plot because the radar signals are only reflected from clouds and precipitation. When no clouds or precipitation are present, there is No Data (ND) on the graph. This time of year it can help to find a comfortable altitude between layers or on top. In winter, it can help in avoiding potential icing conditions or planning an escape strategy when icing is a risk.

This information is only available at NEXRAD sites, but it can supplement pilot reports, especially on days of extended stratus. Wind shear and turbulence in clouds can also be obtained from this profile by noting rapid velocity changes with altitude or with time.

The National Weather Service doesn't yet offer the VAD Wind Profile. It is available to Flight Service briefers and you can request it. The University of Albany Department of Earth and Atmospheric Sciences provides VAD Wind profiles for the Albany radar site at http://www.atmos.albany.edu/weather/radar/vad/ENX/latest.html. —*Jeffrey B. Burl*



midity of the air. Large values of relative humidity or small temperature-dewpoint spreads are indicative of clouds and the potential of precipitation.

Crank down the temperature a bit and the combination of saturated conditions and temperatures below freezing are indicative of the potential for structural icing. Don't depend on the FB Winds to help you to determine the icing potential.

All FB Winds forecasts have both a valid time and a for-use period. Depending on the actual forecast product, the FB Winds are only valid at 0000, 0600, 1200, or 1800 UTC.

Let's say you are planning a departure at 1400 UTC. The most current FB Winds is from the 0600 UTC model run. This forecast is available for use between 0800 UTC and 1500 UTC. The six-hour FB Winds product from the more recent 1200 UTC model run hasn't quite hit the wire by 1400 UTC.

There's the catch. The six-hour FB Winds forecast is only valid at 1200 UTC even though it is for use between 0800 UTC and 1500 UTC. Let's say a frontal system is forecast to pass through your planned route around 1300 UTC. Let's also assume that your route takes you right over one of the FB Winds stations at one of the FB Winds altitudes. Will the FB Winds and temperatures be accurate for your planned route? Since the forecast is valid at 1200 UTC, before the front has passed, there's a good chance that the winds at 1400 UTC will be off quite a bit. This is the main issue that drives pilot frustration with the forecast.

Taking the example a bit further, let's say the winds at 6000 feet are forecast to be 180 at 17 knots, with a temperature of 12 degrees C. Remember this forecast is valid at exactly 1200 UTC. Due to the frontal passage at 1300 UTC, the observed winds at 6000 feet shift around to 275 degrees at 33 knots and the temperature drops to 6 degrees C. Is the original forecast a bad one? Not really. Remember it was valid at 1200 UTC, not at 1400 UTC.

Garbage in ...

Will your flight plan be accurate? Not if you relied on this most recent FB Winds forecast. On a long trip, you could easily have inadequate fuel reserves in situations like the one described. Temperature forecasts for icing potential are likewise limited and may lead to some bad planning if not understood.

Don't expect the NWS to amend the FB Winds in a case like this, either. The forecast elements are model-derived and there isn't an amendment criterion. It's up to you to watch the actual winds and temperatures and adjust your plan accordingly.

Scott Dennstaedt is a meteorologist and CFI. Information about his classes can be found at www.chesavtraining.com