The Front

May 2007 | NOAA's National Weather Service | Volume 7, Number 1

Crosswind Information Available at Fort Worth CWSU Website

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Meteorologists at the Fort Worth Air Route Traffic Control Center (ARTCC) Center Weather Service Unit (ZFW CWSU) have developed a suite of products to obtain current and forecast crosswind and headwind information. This suite is available at: **http://www.srh.noaa.gov/zfw/** (Figure 1). You can find these tactical decision aids in the menu under the Crosswind Information section.

The first item listed is the *Java Tool*. This page uses a Java applet and requires a Java-enabled Web browser. The interface offers several pull-down menus that allow you to choose from the following options:

- Airport of interest
- Wind direction (with respect to degrees true north)
- Wind speed in knots.

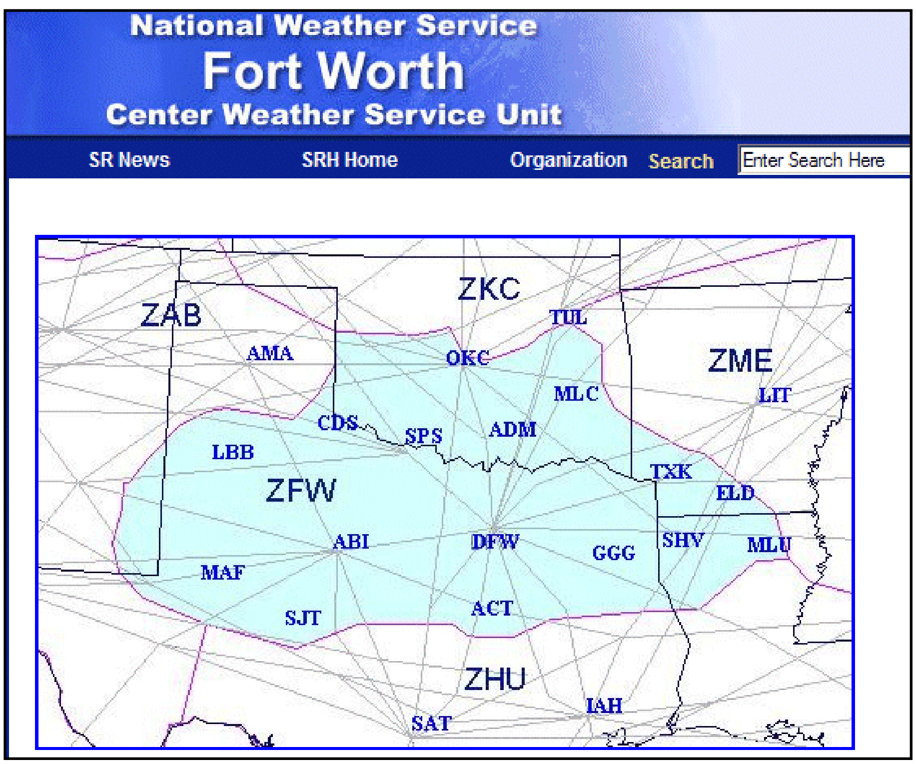

***Figure 1:** Meteorologists at the Fort Worth CWSU have developed a suite of products to obtain current and forecast crosswind and headwind information.*

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When's the Next ***Front?***

Would you like an email alert when a new edition of **The Front** *is published? Write melody.magnus@noaa.gov.*

The Front

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Mission Statement

To enhance aviation safety by increasing the pilot's knowledge of weather systems and processes and National Weather Service products and services.

After you double click the "Draw Map" button, the program calculates crosswind values for each usable runway on the airport, displayed in a text box at the bottom. The system also displays a color-coded map of the runways based on the corresponding crosswind values (Figure 2).

- Green indicates crosswinds less than 20 knots
- Yellow shows a value of 20-24 knots
- Red indicates a crosswind of 25 knots or greater

These threshold values were chosen based on the experience of the forecast staff and local Traffic Management Unit (TMU) personnel.

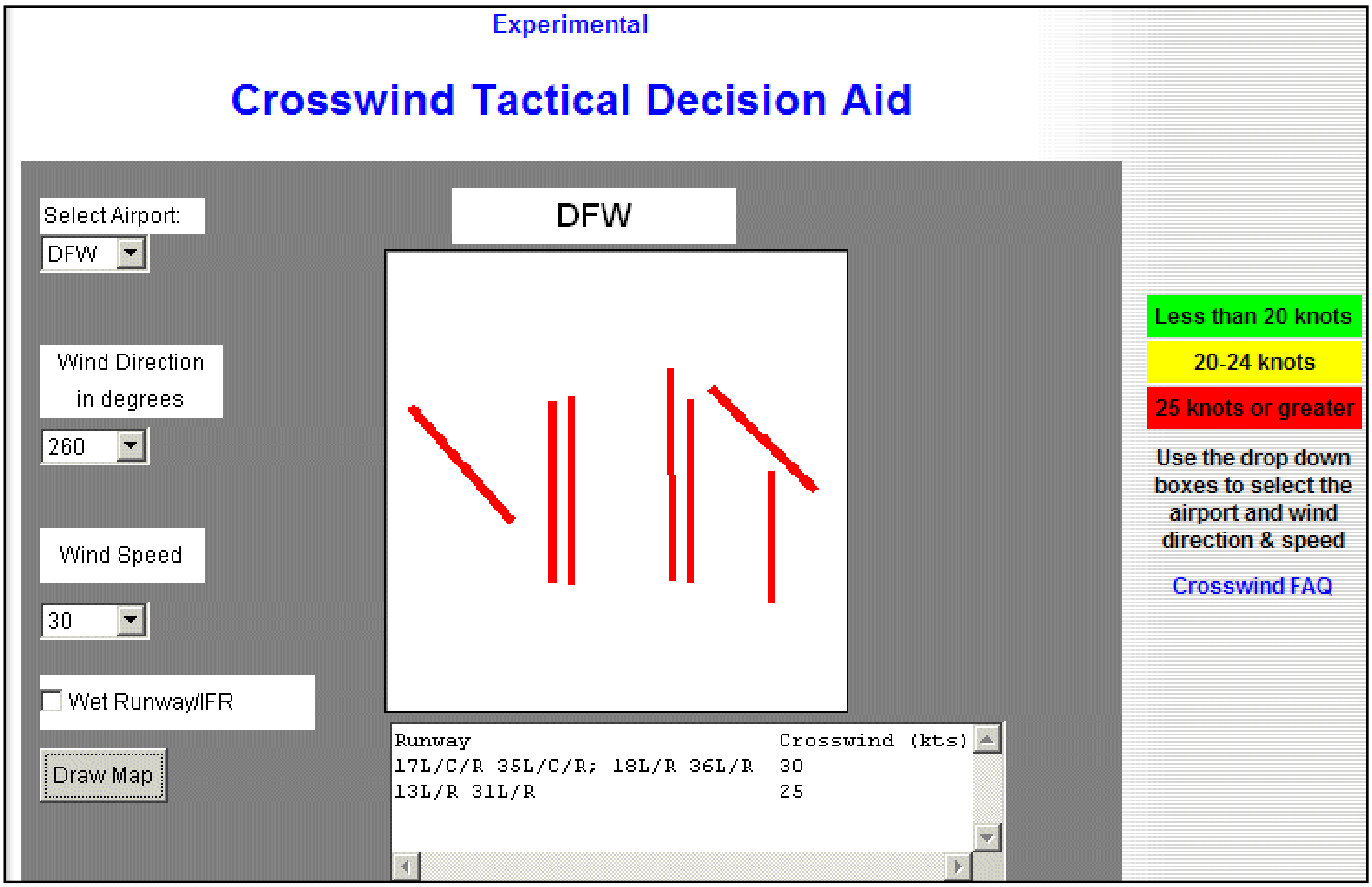
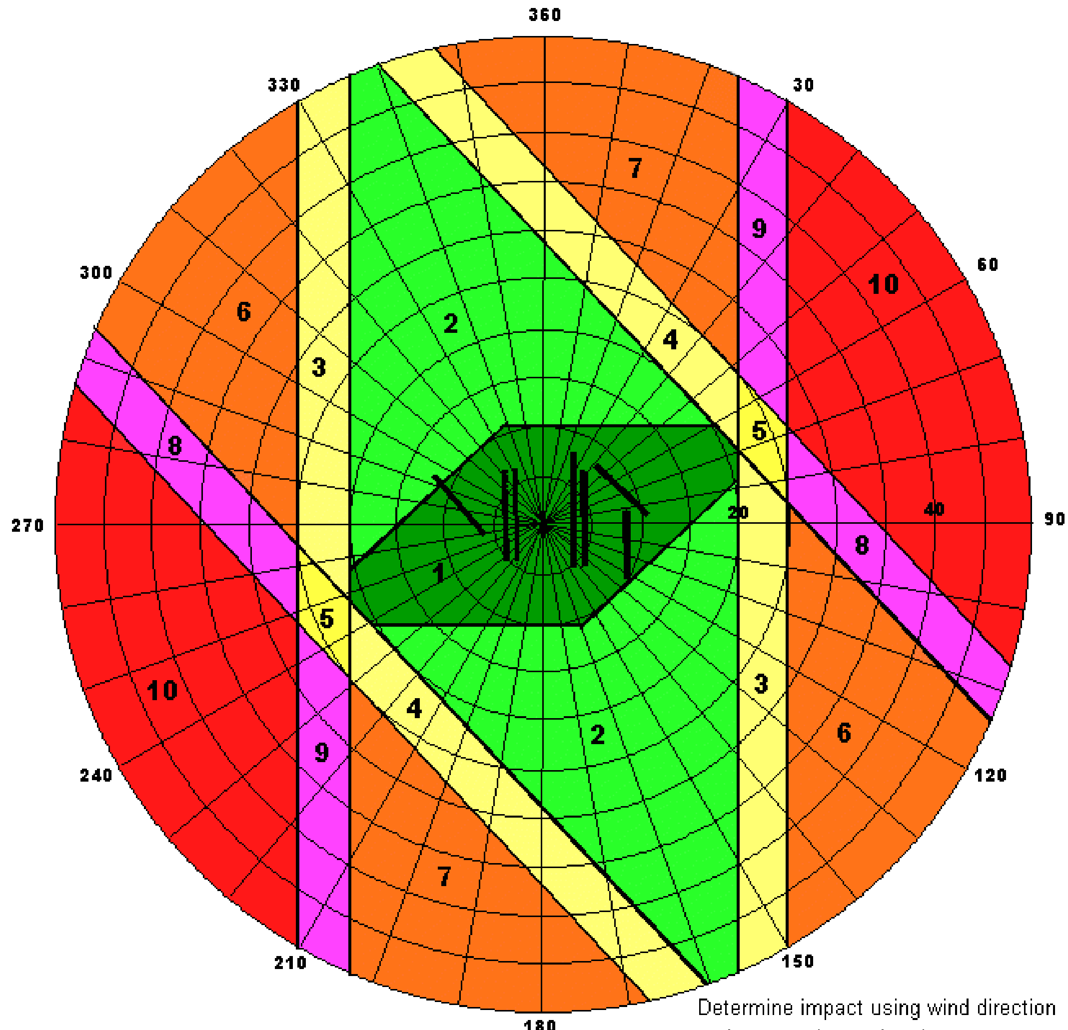


Figure 2: *The system displays a color-coded map of the runways based on the corresponding crosswind values.*

The thresholds are primarily for commercial aircraft. As of February 2007, there were 41 airports in the program, including all major U.S. hubs.

The next menu item on this Website is the *Airport Diagrams* link, which currently lists 22 major airports. Each diagram depicts impacts of wind on the runways based on wind direction and speed. Below the diagram is a legend indicating runways impacted and to what degree (Figures 3 and 4).

DFW Headwind/Crosswind Diagram



Determine impact using wind direction and averaged speed and gust

Impact

	Headwind (kts)		Crosswind (kts)*	
	< 10	10-20	20-25	>25
1	All Rwys			
2		All Rwys		
3			18-36 (L/R);17-35 (L/C/R)	
4			13-31 (L/R)	
5			All Rwys	
6				18-36 (L/R);17-35 (L/C/R)
7				13-31 (L/R)
8			13-31 (L/R)	18-36 (L/R);17-35 (L/C/R)
9			18-36 (L/R);17-35 (L/C/R)	13-31 (L/R)
10				All Rwys

20-25 kt crosswind may approach limits of aircraft/pilot

25 kt crosswind will exceed limits of aircraft/pilot

* Crosswind thresholds are valid for large ga/ac type of aircraft

Figure 3: *Impacts of wind on the runways based on wind direction and speed.*
Figure 4: *Legend indicating runways impacted and to what degree.*

Following the *Airport Diagrams* link is the *Current* link (Figure 5). In this figure, you can view crosswind/headwind values for each of 401 U.S. airports based on the latest observation. This now includes airports in Alaska and Hawaii. Included are both hub/pacing airports as well as airports that serve regional airlines and air taxis. A program developed at the Fort Worth CWSU extracts wind direction (with respect to true north), speed and gust speed (if applicable) from each METAR (or SPECI). The program then calculates crosswind and headwind values based on the true orientation of the runways for that particular airport.

Program output lists runways with respect to magnetic north. Crosswinds are calculated based on the sustained speed. If a gust exists, the report includes the average of the sustained and gust speeds, as well as gust alone. Headwind values are calculated using the sustained speed. If the wind direction is variable (VRB), and consequently no crosswind value can be determined, the program assigns a value of 0 to the speed.

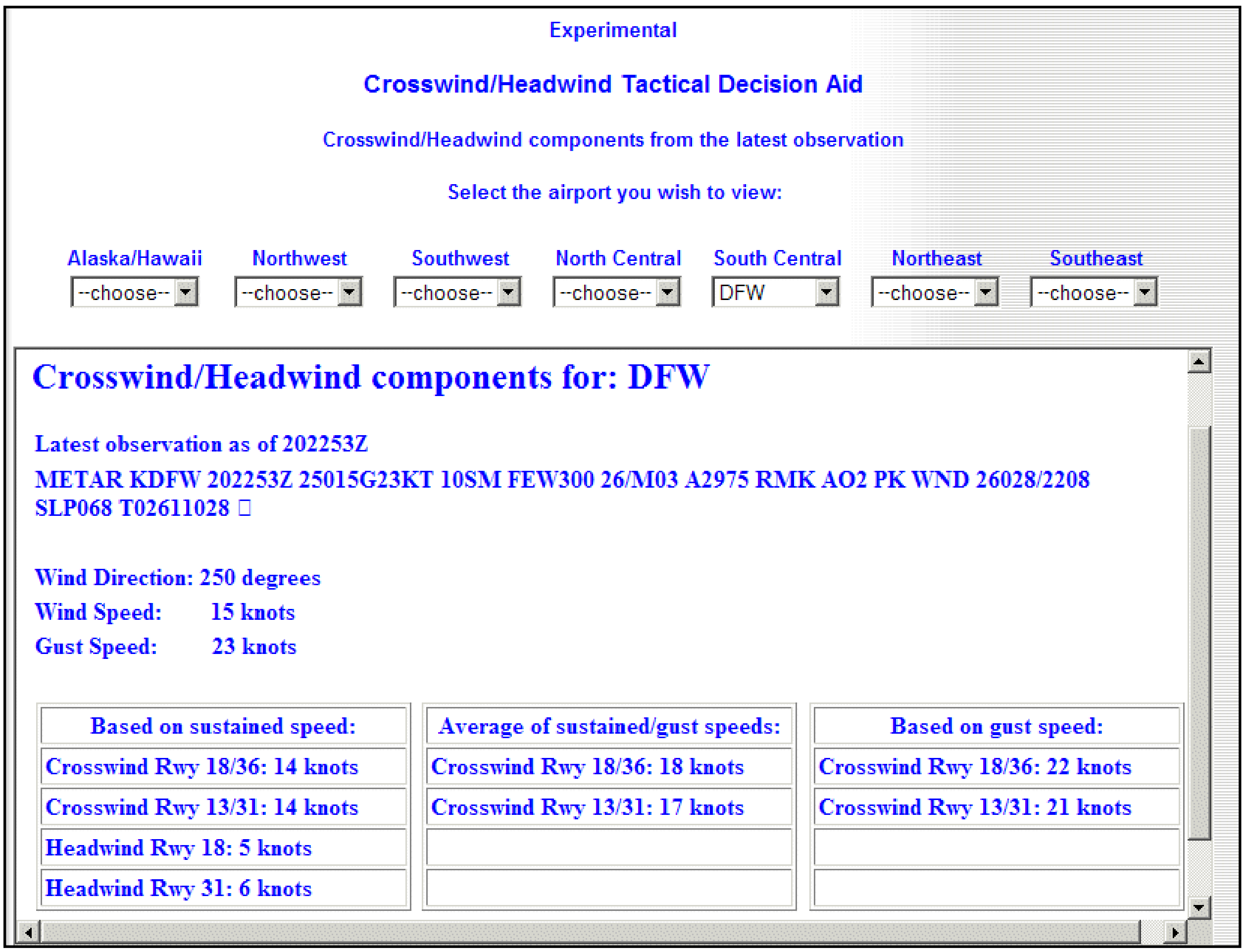
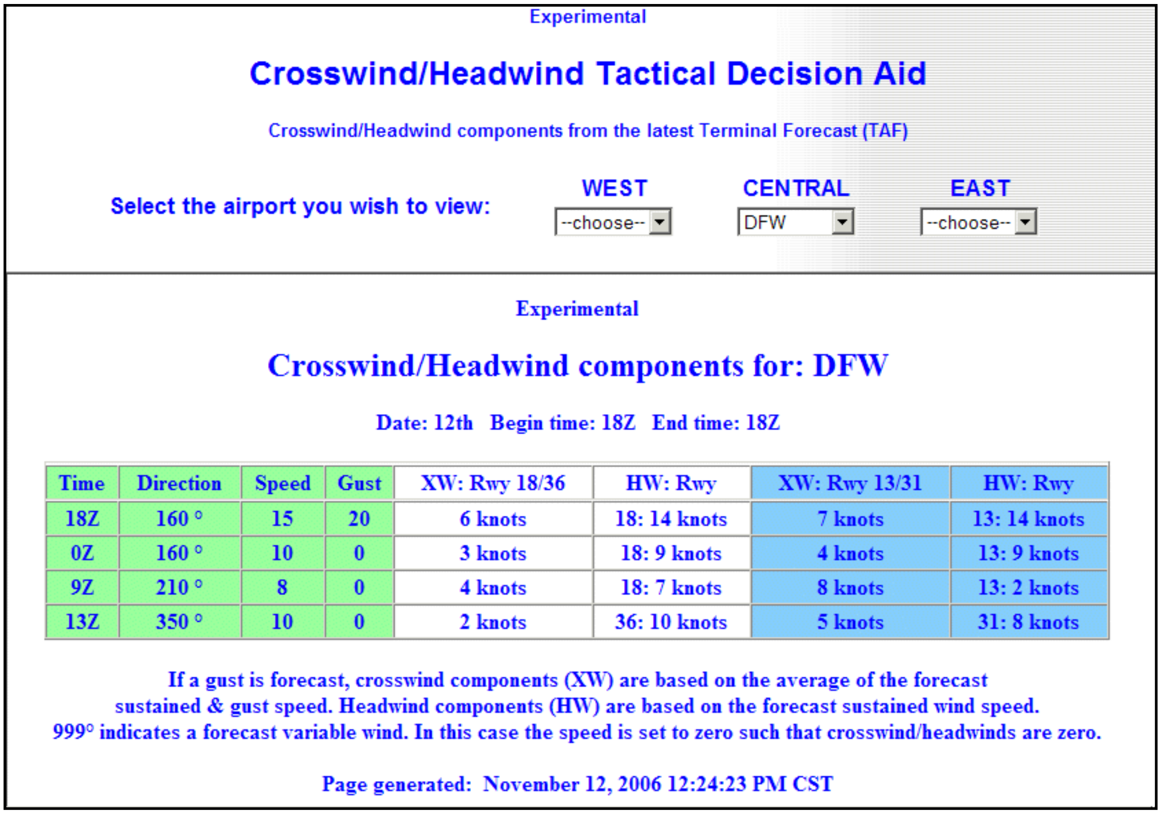


Figure 5: *Crosswind/headwind values for each of 401 U.S. airports based on the latest observation.*

Forecast is next on the menu of choices. Similar to the *Current* page, output of crosswind/ headwind values is based on the TAF (Figure 6). The list includes all hub/pacing and reliever airports. This section accounts for winds in the initial and subsequent FM groups but does not account for TEMPO groups. The program, which calculates the forecast values, runs every 15 minutes but can be run more frequently.

Figure 6: *Similar to the* Current *page, output of crosswind/ headwind values is based on the TAF.*



Experimental

Crosswind/Headwind Tactical Decision Aid

Crosswind/Headwind components from the latest Terminal Forecast (TAF)

Select the airport you wish to view: WEST --choose-- CENTRAL DFW EAST --choose--

Experimental

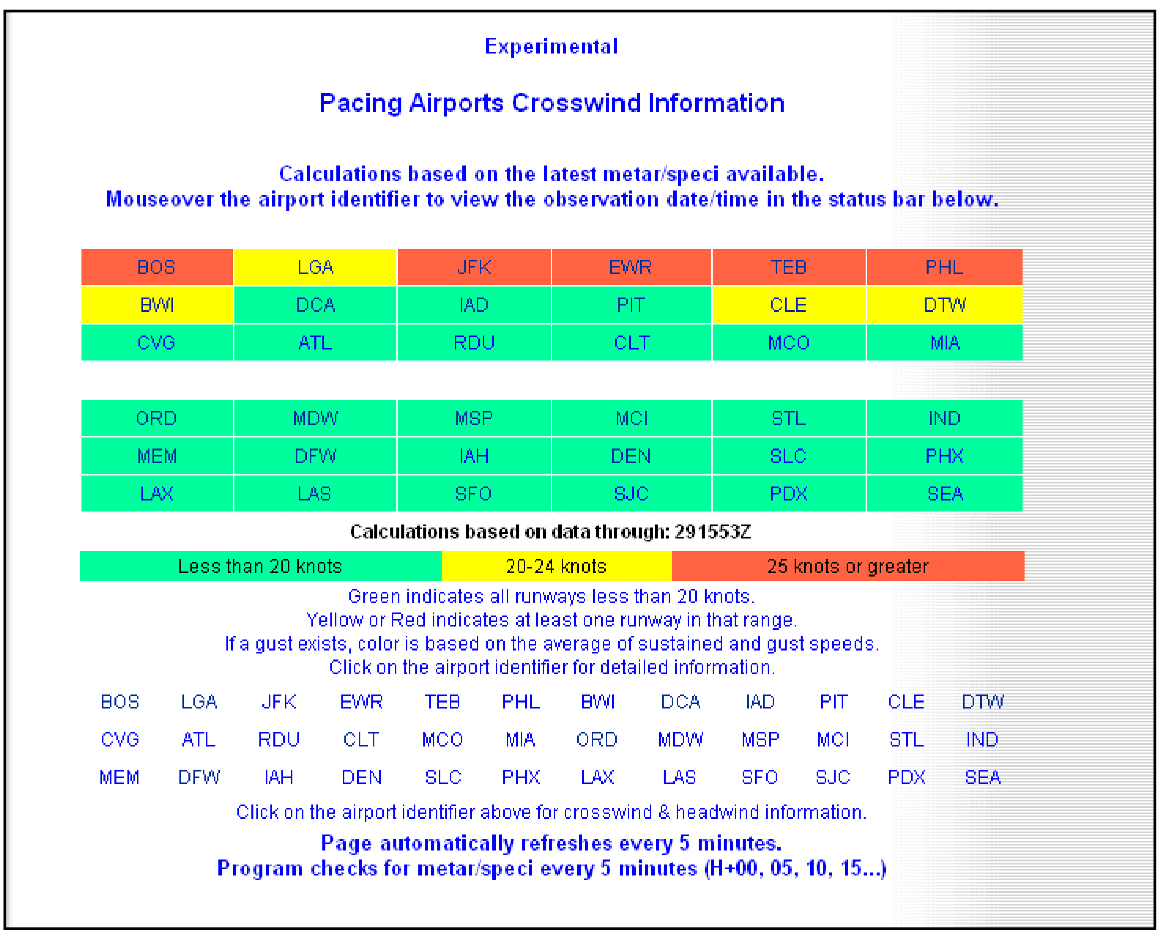
Crosswind/Headwind components for: DFW

Date: 12th Begin time: 18Z End time: 18Z

Time	Direction	Speed	Gust	XW: Rwy 18/36	HW: Rwy	XW: Rwy 13/31	HW: Rwy
18Z	160 °	15	20	6 knots	18: 14 knots	7 knots	13: 14 knots
0Z	160 °	10	0	3 knots	18: 9 knots	4 knots	13: 9 knots
9Z	210 °	8	0	4 knots	18: 7 knots	8 knots	13: 2 knots
13Z	350 °	10	0	2 knots	36: 10 knots	5 knots	31: 8 knots

If a gust is forecast, crosswind components (XW) are based on the average of the forecast sustained & gust speed. Headwind components (HW) are based on the forecast sustained wind speed. 999° indicates a forecast variable wind. In this case the speed is set to zero such that crosswind/headwinds are zero.

Page generated: November 12, 2006 12:24:23 PM CST



Experimental

Pacing Airports Crosswind Information

Calculations based on the latest metar/speci available.
Mouseover the airport identifier to view the observation date/time in the status bar below.

BOS	LGA	JFK	EWR	TEB	PHL
BWI	DCA	IAD	PIT	CLE	DTW
CVG	ATL	RDU	CLT	MCO	MIA

ORD	MDW	MSP	MCI	STL	IND
MEM	DFW	IAH	DEN	SLC	PHX
LAX	LAS	SFO	SJC	PDX	SEA

Calculations based on data through: 291553Z

Less than 20 knots	20-24 knots	25 knots or greater

Green indicates all runways less than 20 knots.
Yellow or Red indicates at least one runway in that range.
If a gust exists, color is based on the average of sustained and gust speeds.
Click on the airport identifier for detailed information.

BOS LGA JFK EWR TEB PHL BWI DCA IAD PIT CLE DTW
CVG ATL RDU CLT MCO MIA ORD MDW MSP MCI STL IND
MEM DFW IAH DEN SLC PHX LAX LAS SFO SJC PDX SEA

Click on the airport identifier above for crosswind & headwind information.

Page automatically refreshes every 5 minutes.
Program checks for metar/speci every 5 minutes (H+00, 05, 10, 15...)

Figure 7: *The Hub/Pacing Airports Web page offers a color-coded table of crosswind information using the same thresholds described in the Java Tool.*

The *Hub/Pacing Airports* Web page offers a color-coded table (Figure 7, previous page) of crosswind information using the same thresholds described in the *Java Tool*. Since December 2006, threshold values less than 20 knots have been divided into two additional color codes. This legend now matches the one on the regional airports tables. Click on an airport identifier in the table and a window will show a color-coded airport diagram depicting runway impacts. (Figure 8). The program that generates the table refreshes every 5 minutes allowing it to use the latest METAR/SPECI in its calculations.

Below this table is one showing airport identifiers. Click on an identifier and you'll see current observation and crosswind/headwind values.

The final table lists the same airport identifiers. Click on one of these identifiers to see forecast crosswind/headwind values (Figure 9).

Figures 7 and 8 were from a particularly windy day in the northeast at Boston and New York airports.

The *Airports: Color-Coded Tables* link (Figure 10) offers for current observations options for seven U.S. regions: Northwest, North Central, Northeast, Southwest, South Central, Southeast and Alaska/Hawaii. (Figure 11).

Clicking on one of the airport identifiers will display a page of crosswind and headwind information based on the latest observation. ✈

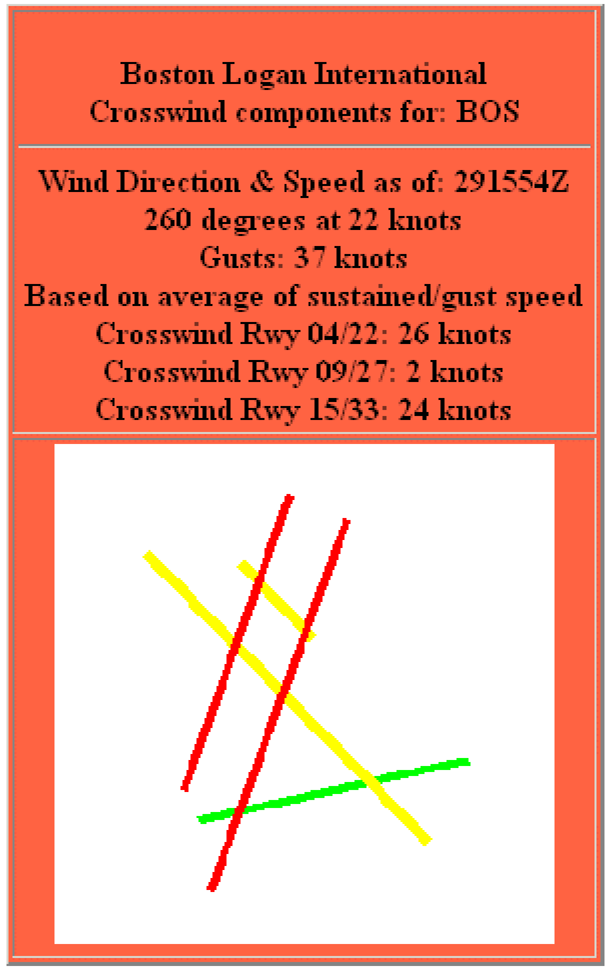


Figure 8: *Airport diagram in pop-up window is the same as that used in the Java Tool.*

http://www.srh.noaa.gov - NWS Fort Worth CWSU--Crosswind & Headwind components for BOS - Microsoft Internet Explorer

Experimental

Crosswind/Headwind components for: BOS

Date: 29th Begin time: 12Z End time: 12Z

Time	Direction	Speed	Gust	XW: Rwy 04/22	HW: Rwy	XW: Rwy 09/27	HW: Rwy	XW: Rwy 15/33	HW: Rwy
12Z	240 °	20	30	16 knots	22: 15 knots	7 knots	27: 19 knots	24 knots	33: 5 knots
13Z	240 °	26	40	21 knots	22: 20 knots	10 knots	27: 25 knots	32 knots	33: 7 knots
16Z	240 °	28	45	23 knots	22: 21 knots	11 knots	27: 27 knots	35 knots	33: 7 knots
1Z	260 °	23	35	25 knots	22: 12 knots	2 knots	27: 23 knots	24 knots	33: 13 knots

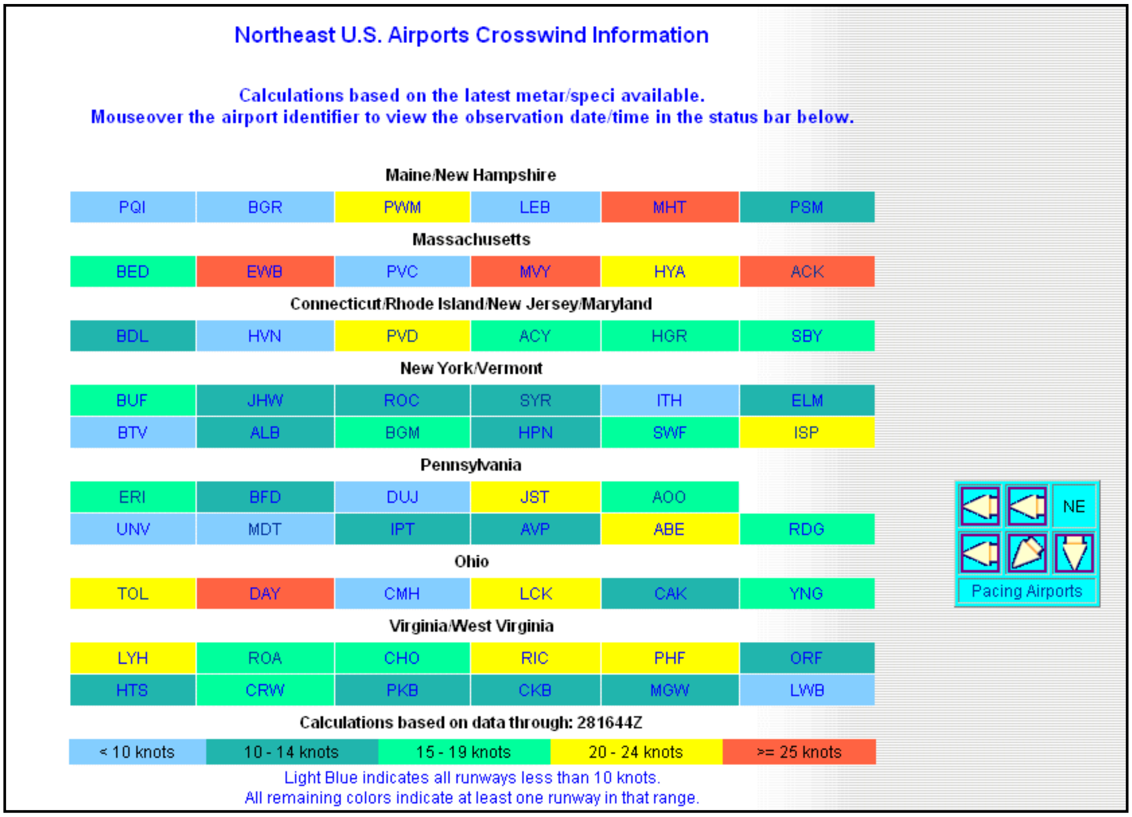
If a gust is forecast, crosswind components (XW) are based on the average of the forecast sustained & gust speed. Headwind components (HW) are based on the forecast sustained wind speed. 999° indicates a forecast variable wind. In this case the speed is set to zero such that crosswind/headwinds are zero.

Page generated: October 29, 2006 8:50:15 AM CST

Experimental

Figure 9: *The final table of the Hub/Pacing Airports link lists the same airport identifiers.*

__Figure 10:__ The Airports—Color-coded Tables link for the Northeast.



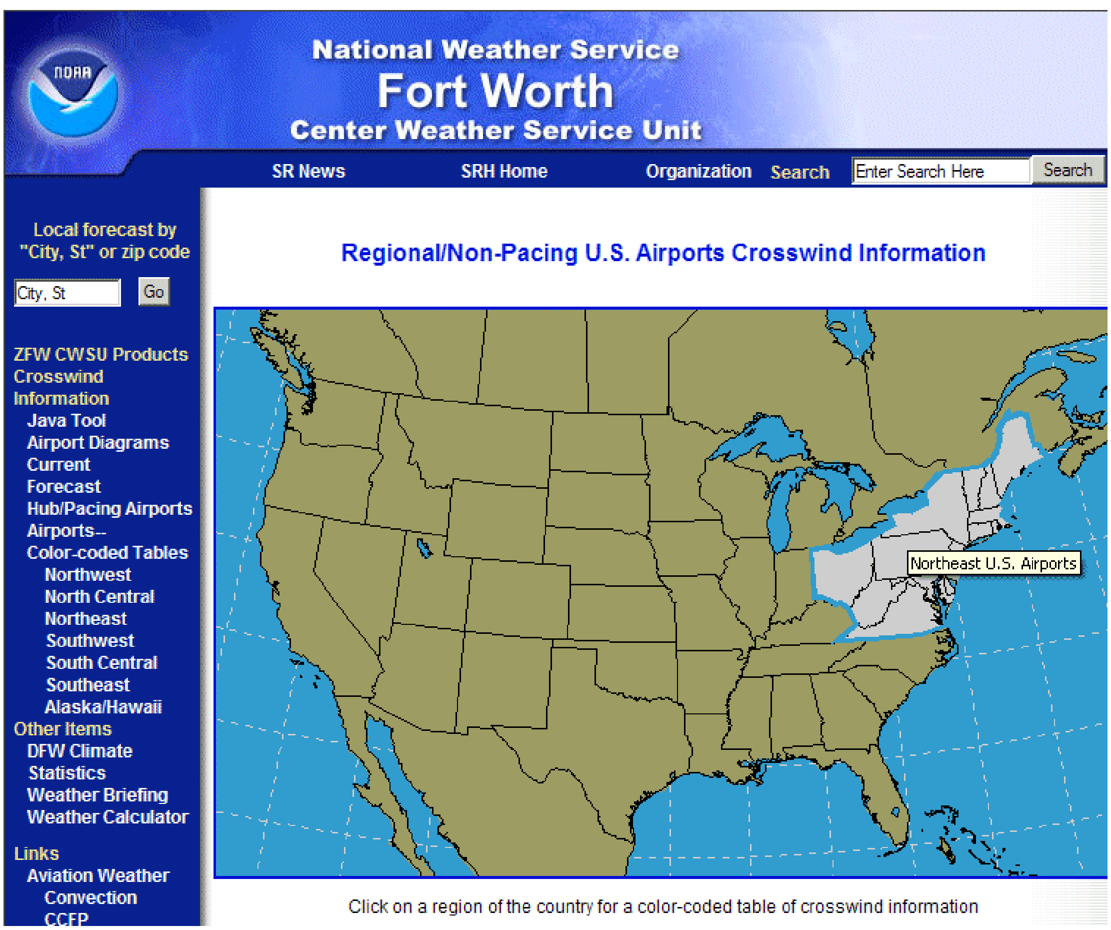


__Figure 11:__ The Airports link offers current observations options for seven U.S. regions: Northwest, North Central, Northeast, Southwest, South Central, Southeast and Alaska/Hawaii.

Getting to Know Your Automated Observing Station

By George Wetzel, OPL, NWS Grand Rapids, MI
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Before 1990, it was common to see weather observers performing manual observations around most airports in the country. Once an hour, more often during inclement weather, the observer would be outside gathering cloud heights, wind direction and speed, and temperatures before moving indoors to record barometric pressure. Once submitted locally, it was manually entered into a computer where it was sent to the rest of the country. This was the standard method of recording the weather. But automation and improved technology paved the road for a new weather observing capability, the advent of the modern day Automated Surface Observing System (ASOS).

ASOS began through a joint effort of NWS, the FAA and the Department of Defense. These agencies realized the need to automate sampling of atmospheric conditions. The benefits of automation include more frequent weather observations and the ability to access 24/7 observations at airports without a human observer. In addition, ASOS can provide computer-generated voice observations directly to nearby aircraft via radio. Users also can request current conditions via telephone through a dial-in port. Below is the surface data that ASOS provides.

- **Sky Condition sensor:** cloud height and amount (few, clear, scattered, broken, overcast) up to 12,000 feet, visibility (to at least 10 statute miles)
- **Present Weather sensor:** intensity and type for rain, snow, and freezing rain, and obstructions to vision such as fog and haze

ASOS array from left: precipitation gage, temperature/dewpoint sensor, present weather, data collection package, ceilometer, freezing rain sensor, wind tower, visibility. Photo by NWS Grand Rapids, MI, Electronics Techs Eric Repaal and Thomas Williams.

- **Thunderstorm Detection:** inputs Automated Lightning Detection and Reporting System(ALDARS)
- **Temperature and Dew-point sensor:** ambient temperature, dew point temperatures
- **Pressure sensor:** sea-level pressure and altimeter setting
- **Wind sensor:** direction, speed and character (gusts, squalls)
- **Precipitation Accumulation**
- **Selected Significant Remarks** such as:
  - Variable cloud height
  - Variable visibility
  - Precipitation beginning/ending times
  - Rapid pressure changes
  - Pressure change tendency
  - Wind shift
  - Peak wind

About 1,000 ASOS units are in operation. These automated systems evaluate and report weather that passes through the sampling volume of the sensor array or the area of the atmosphere directly above or around the sensor. An automated system may include multiple weather sensors measuring weather at several locations at the same airport. For instance, visibility sensors on two different active runways can provide more accurate conditions than just one. ASOS also can provide conditions from multiple sensors. ASOS includes three pressure sensors, then uses the lowest reading.

What if one or sensor malfunctions? NWS electronics technicians maintain and repair NWS and FAA ASOS equipment. Technicians work at all times of the day and night in all kinds of weather to keep the sensors operational. NWS has specific standards for repair time.

Priority 1. Safety-related failures. For Service Level A, B, and C airports, the ASOS equipment below will be fully operational within 24 hours at least 95 percent of the time and for Service Level D Airports, within 36 hours. Priority 1 includes the following sensors and components:

- Pressure
- Wind speed/direction
- Temp/Dewpoint
- Visibility
- Ceilometers
- Data collection package
- Acquisition control unit
- Freezing rain occurrence 1

Priority 2. Failures affecting flight operations and forecasting. For Service Level A, B, and C Airports, the ASOS equipment below will be fully operational within 36 hours, at least 95 percent of the time and for Service Level D Airports, within 48 hours. They involve the following sensors and components:

- Liquid precipitation accumulation
- Snow depth 2
- Other forms of present weather
- Operator interface devices (OID)3
- Video display units
- Controller video displays (CVD)4

Shown above are a frozen temperature sensor, dewpoint sensor and heated tipping bucket on an ASOS unit. In the past, during periods of icing or freezing precipitation an entire array of ASOS weather equipment could freeze up or malfunction. ASOS now includes an Ice Free Wind Sensor as well as improved freezing rain sensors. Photo by NWS Grand Rapids, MI, Electronics Technicians Eric Repaal and Thomas Williams.

- At critical aviation sites like larger commercial airports, human weather observers augment the automated systems. Keep in mind ASOS is not designed to report the following elements: Snowfall and snow depth, clouds above 12,000 feet, virga, tornadoes, funnel clouds, ice crystals, snow pellets, ice pellets, blowing and drifting obstructions such as dust, or sand, snow fall **accumulation** and snow depth.

All observations, whether automated or taken by human observers, should be used with care. Always be aware of when the observation was taken, under what conditions, and whether there are "special" observations.

ASOS systems are objective and offer uniformity among all sites. The way an ASOS judges visibility and Ceiling in Charleston West Virginia is the same as in Phoenix Arizona.

Since ASOS collects weather conditions from sensors connected to a computer, it can measure, process, and generate surface observations every minute, every 5 minutes, and hourly. This is beneficial when conditions are rapidly changing and special observations are generated as needed. In addition to the value of automation to aviation operations, the current conditions and accurate observations are necessary for high quality marine, public, fire-weather and aviation TAFs.

As long as airports need current weather information and people want to know the temperature and wind speeds, there will be automated sensors providing it. For more information on ASOS, go to http://www.weather.gov/asos/index.html. ✈