WSI InFlight
User Guide

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For Electronic Flight Bags
and other display devices
running under
Windows 98, 2000, NT, or XP

(trusted)
NOTE
This equipment has been tested and found to comply with the limits for a Class A digital service pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates and may cause harmful interference to radio communications.

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<th>Date</th>
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Preface

The corporation

WSI Corporation is the recognized leader in aviation weather. Serving airlines, airports, and pilots for more than 25 years, WSI provides weather and critical data delivery via satellite—online, on the ground, and in the air, from pre-flight planning through touchdown. WSI has received Professional Pilot magazine's Best Weather Service Award every year since 1998.

In addition to its aviation weather leadership, the corporation is also the world's most trusted provider of weather driven solutions for broadcast and cable television, energy trading and utility operations management, government, emergency management agencies, educational institutions, consumer markets, and marine applications.

Product offerings

WSI product lines include:

- WSI InFlight™ satellite-based cockpit aviation weather
- WSI Pilotbrief® weather briefing system
- WSI Pilotbrief Online® Internet-based aviation weather
- WSI Pilotbrief Pro™ weather briefing and flight decision support system
- FlightExplorer™ weather-enhanced Aircraft Situation Display application combining in-flight aircraft data with up-to-date weather information.
- The Weather Channel® Marine™ real-time, onboard marine weather
- Energycast, Internet-based, “all-in-one” weather source for the energy market
- Intellicast® online weather information service
- MapMaker Plus℠ tool to create detailed maps and map textures for use within the WeatherProducer and Showfx applications
• Mediacast® comprehensive ready-to-air weather programming and briefing service
• Showfx® 3D animation tool to generate captivating weather animations
• SkyAlert™ on-air severe weather warning system
• TrueView™ Interactive severe weather broadcasting system to display and interact with live, local weather data on-air
• TrueView™ Traffic reporting solution to display and interact with live, customized, local traffic information on-air
• WeatherNOW™, fully-automated system for playing broadcast-ready weather presentations utilizing WSI multimedia products
• WeatherProducer® distributed multi-user weather system for the broadcast media market
• WeatherWorkstation® distributed multi-user weather system for non-media markets

Clients can select from a suite of raw, unaltered data as well as WSI’s exclusive enhanced data and imagery products designed for easy interpretation and analysis. Offerings include NOWrad® mosaic radar imagery, worldwide satellite imagery, lightning graphics, DIFAX weather charts, NEXRAD images, gridded computer model data, and alphanumeric text data.

Sources of data

WSI collects real-time weather data from an extensive network of sources around the world including the National Oceanic and Atmospheric Administration (NOAA), the National Weather Service (NWS), the National Center for Environmental Prediction (NCEP), the Federal Aviation Administration (FAA), the Department of Defense (DOD), and Environment Canada.
Comments

Questions and comments concerning this document can be forwarded to WSI Technical Documentation via:

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WSI Corporation
400 Minuteman Road
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E-mail: techdoc@wsi.com

Phone: 978.983.6300

WSI Customer Service

In addition to this guide, support for the WSI InFlight system includes call-in and web-based support.

Call-in support

WSI Customer Services personnel are available 9 AM to 6 PM ET, Monday through Friday, and 9 AM to 12 Noon on Saturday at 1.800.USA.2.FLY (1.800.872.2359) and 1.978.983.6325.

All other hours, WSI Met Ops personnel are available to address data product questions and record trouble calls. Please call 1.800.USA.2.FLY (1.800.872.2359) or 1.978.983.6325 for recorded instructions.

If you are experiencing system disruption, see Chapter 4, “Troubleshooting” on page 73.
Web-based support

The WSI Customer Account Center is a convenient web-based service that enables you to manage your account online. As a registered user, you can download free copies of the latest software and documentation; check your account status; change your billing information and subscription plan; and more.

To take advantage of this service, go to: http://www.wsi.com/myaccount/ and log on.

NOTE: You will use the WSI Customer Account Center to activate services for your WSI InFlight receiver. Instructions are provided in Chapter 2.

About this guide

This guide explains how to install/update, configure, and use the WSI InFlight software on Electronic Flight Bags and other Windows-based computers such as personal computers, laptops, and tablets. A separate guide for using WSI InFlight on Pocket PCs is available from WSI at http://www.wsi.com/myaccount/.

This guide can be a useful learning tool for all WSI InFlight users. Even if your cockpit system runs on an MFD, you can load the WSI InFlight software and sample weather data on a personal computer and explore the data products at leisure in your home or office. Go to the WSI Customer Account Center at http://www.wsi.com/myaccount/ and download the Windows-based software and sample data. Install and configure the system on your personal computer using the instructions in Chapter 2 (be sure to select “Use Sample Data” on the Configuration utility’s Wx Format tab). Then, explore the data product types by stepping through the descriptions in Chapter 3.
Chapter 1
Welcome

This chapter introduces the WSI InFlight™ system. It includes a discussion of device display options, how WSI InFlight receives data, and a description of available service plans.

What is WSI InFlight?

WSI InFlight is a comprehensive cockpit weather briefing system co-developed by WSI and NASA. It provides up-to-the-minute graphic and text weather information for pre-flight planning and in-flight use. A continuous stream of mission-critical weather information displays on your portable or panel-mounted display.

Automatic 5-minute updates are received at all altitudes anywhere in the continental United States. Brilliant, high resolution intuitive displays are designed to have a high “glance value” for in-flight use. This system can be used with a separate GPS receiver to lock the display to the aircraft’s current location.

With appropriate software, WSI InFlight can be used on any display that processes and stores RS-232 serial data including panel-mounted multi-function displays (MFDs), any Windows platform (98, NT, 2000, XP, XP w/ tablet, Pocket PC 2002, 2003), and various electronic flight bags (EFBs). Different display types require different versions of the WSI InFlight software.

For a complete list of supported display types, or to download free-of-charge the most recent software release for Windows platforms, go to: http://www.wsi.com/myaccount/.

MFD manufacturers develop their own software to support data services such as WSI InFlight. While new services are constantly being added, not all MFD manufacturers may support WSI InFlight data services. Please visit http://www.wsi.com for the most recent listing of MFDs supporting the WSI InFlight data services. User instructions for each MFD are available through the respective manufacturer.
The WSI InFlight client functions as a weather browser providing basic functionality for viewing the data products provided by WSI InFlight data services. This manual addresses the general use of WSI InFlight data in the context of the WSI InFlight client.

**Where the data comes from**

The WSI InFlight system receives its data on a continuous basis through an omni directional antenna from a satellite in geosynchronous (geostationary) orbit. The data passes to a MFD, EFB, laptop, or Pocket PC for processing and display. When new data is received, the system updates all products and displays automatically to ensure that the latest information is always available.

**Figure 1: How WSI InFlight receives data**

Welcome
WSI InFlight service plans and warranty

WSI offers unlimited weather usage with flat-fee subscription plans. Contact information for Customer Service is available on page 7. Visit http://www.wsi.com/myaccount/ for information about the latest available service plan offerings or to change your subscription.

WSI InFlight hardware is delivered with a comprehensive 1 year warranty. More information on this warranty is available by calling WSI Customer Service.
Welcome
Chapter 2
Installation and Configuration

This chapter describes the steps required to make your WSI InFlight system operational.

1. Installing the hardware.
2. Installing or updating the WSI InFlight software on an EFB (electronic flight bag) or other Windows-based system, or updating the software on an MFD (multi-function display).
3. Activating the subscription.
4. Configuring the client.

Each of these steps are described below. For an explanation of how to use the WSI InFlight system once it is installed and configured, see “Using WSI InFlight” on page 25.

Installing the hardware

A certified aviation technician must install the antenna and your WSI InFlight system even if the system is not certified\(^1\). Installation information is delivered to dealers when they receive the system. Be sure you receive your receiver target ID (TID) number from the dealer because you will need the TID number to register and activate your subscription.

Installing or updating the WSI InFlight software

MFDs. If your system is connected to a panel mounted multi-function display (MFD), your certified aviation technician will install the software and make the system operational. Information on using the MFD display comes from the MFD manufacturer. You may still refer to this manual for information on the various types of data displayed and how to interpret the information shown.

1. Unless you have an experimental category aircraft.

\(^1\) Unless you have an experimental category aircraft.
**EFB or other Windows-based system.** If you are using an electronic flight bag (EFB) or other Windows-based system, it may come with the WSI InFlight system preloaded, or you can download the most recent client software by visiting [http://www.wsi.com/myaccount/](http://www.wsi.com/myaccount/). After loading the client, you must configure the software for use in your particular installation. See instructions for configuring the client on page 16.

**Activating the subscription**

Once the hardware and software have been installed, you must activate your subscription online. *Because the activation process can take up to two business days to complete, WSI recommends that you submit your activation request immediately.*

**NOTE:** WSI cannot activate your system without a TID number. The TID label is on the outside of the receiver and is also included with information you receive from the dealer when you purchase the WSI InFlight system. If you do not have a TID number, contact the dealer from whom you purchased the system before continuing below. You must also have your credit card number and expiration date on hand.

To activate your WSI subscription:

2. Follow the onscreen instructions to activate a new receiver.
3. After supplying the required information, review your subscription and billing information. Read and accept the Terms and Conditions listed.
4. Follow the instructions to print the data services agreement. *You must sign and return the data services agreement to WSI before your subscription can be activated.*
5. Once WSI receives this signed document, data services will be activated for the specified receiver TID.

You can check the status of your service activation by logging onto the WSI Customer Account Center at [http://www.wsi.com/myaccount/](http://www.wsi.com/myaccount/).
The receiver must receive and process the activation signal to begin showing data. After data services have been activated, follow the steps below:

1. With the WSI InFlight hardware installed, locate the aircraft in an open area with a clear view of the sky in all directions.
2. Apply power to your WSI InFlight system.
3. Verify that the display computer’s clock is set to within five minutes of the correct time and date for the time zone selected in your computer. On a Windows-based system, you can verify these settings using the Windows Control Panel. (The exact steps for setting the clock depend upon your computer’s operating system.)
4. Open the WSI InFlight display by selecting the WSI InFlight Weather application (typically, Start>Programs>WSI InFlight 3.0> InFlight Weather).
5. When you first start the WSI InFlight system, the map display on the Current Conditions window is blank. Click the STAT button to open the Status Overview window. Click the Receiver button to open the Receiver Status window. Verify that the receiver has a signal lock; the message “LOCKED: BER NOMINAL” should appear in the Receiver Status Summary panel. (The receiver will collect the activation information broadcast through the satellite beam.)
6. Allow WSI InFlight to operate for at least 15 minutes.
7. Open the Authorized Product IDs window by clicking the PIDs button in the Receiver Status window. Verify that the list of products displayed matches the products you ordered when activating your WSI subscription.
8. After verifying that the receiver is collecting the product set you ordered, power off the WSI InFlight receiver, then power it on again. Recheck receiver status. When the receiver regains signal lock, allow the system to run for another 10 minutes.
9. Return to the Current Conditions window. If the map is displayed and weather data is shown, the full activation process is complete.

**Note to Windows users experiencing erratic cursor behavior.** A bug in Windows can cause the operating system to interpret the serial input from the satellite receiver as mouse commands. In that case, the cursor moves wildly about the display device screen. For a temporary workaround, you can start the display device and Windows before powering on the WSI InFlight receiver. For a permanent fix, consult the Technical Notes section of the WSI Customer Account Center at [http://www.wsi.com/myaccount/].
Configuring the client

The WSI InFlight software on your display device consists of two components: the client application ("InFlight Weather") which displays the weather data, and the configuration utility ("InFlight Configuration") which enables you to choose settings for the system according to your particular setup and personal preferences.

You must configure the system settings when your first install or upgrade the WSI InFlight software. You can also modify the settings at any time; for example, you might wish to change the US radar color palette or choose to use the demonstration data.

To open the Configuration display:
1. Select the WSI InFlight Configuration utility.

   **NOTE:** The exact steps you take to open the Configuration utility vary depending on whether the software is installed on an EFB or other Windows-based system, or on a MFD. For example, if using a Windows-based system, select Start>Programs>WSI InFlight 3.0>InFlight Configuration.

   2. There are five tabs in the Configuration display. Adjust the parameters and settings as necessary for your system.

Configuring the display

Use the Display tab (shown in Figure 2) to customize the appearance of the WSI InFlight display.

- **Window Size:** Specify the height and width of the WSI InFlight window display size. WSI recommends that you do not use a display size smaller than 550 x 550 or the images may be distorted.
• **United States NOWrad colors**: Choose between two color palettes for displaying NOWrad radar imagery over the continental US:

  • **DO-267, 7 level**: The FAA color palette (the default) uses fewer colors than the alternative and is more conservative in areas of medium intensity. This palette attempts to approximate on-board radar displays.

  • **WSI NOWrad, 13 level**: The color scheme employed by WSI's pre-flight planning and briefing systems. This expanded palette provides finer distinction between intensity levels and is less conservative than the alternative.

• **Use darker control area backgrounds**: Selecting this option applies a warm color to the title bar and button panel background for easier night viewing.

If you change any of the display options, you must click OK and restart the InFlight Weather application to put the changes into effect. A change to the radar palette selection is not visible until the next radar product is received.

**Figure 2: Display tab**
Configuring the weather display format

Use the Wx Format tab (shown in Figure 3) to adjust the weather display on your system.

- Link Type must be “InFlight Receiver”.
- “HDLC Quality Logging” is for troubleshooting purposes only and should only be checked when you are advised to by WSI Customer Service.
- “Live Data Path” indicates where live data will be stored. Enter the path where you want data to be stored on your system.
- “Sample Data Path” indicates which sample data the system will use when the “Use Sample Data” box is checked.
- Checking the “Use Sample Data” box forces WSI InFlight to run in demonstration mode. In demonstration mode, WSI InFlight presents demonstration data instead of live data.
- Press the “Clear Live Data” button to erase stored live data in the directory indicated by the “Live Data Path”.
- “Weather Data Ingestion Log Level” is for troubleshooting purposes only and should be set to “1” unless advised otherwise by WSI Customer Service.

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**NOTE:** If you configure your WSI InFlight system to run in demonstration mode, remember to uncheck the “Use Sample Data” box when you are ready for your system to use live data.
Figure 3: Wx Format tab
Configuring the weather port settings

Use the Wx Port tab (shown in Figure 4) to configure the settings of the port that receives the weather data.

When you are connected to a receiver, the “Serial” radio button should be selected. Serial connections should be made as follows:

- Select a COM port appropriate for the serial port on your computer. If you do not know which port, use the Port Search tab described on page 24.
- Baud Rate should be set to 38400, unless advised otherwise by WSI Customer Service.
- Input and Output buffers should be set to 8192.
- RTS CTS Flow Control SHOULD be checked for all display types capable of hardware flow control. If in doubt, leave this box checked.

TCP/IP connections are for WSI Customer Service and diagnostic use only. TCP/IP information will be blank unless you are advised otherwise by WSI Customer Service.

Figure 4: Wx Port tab
Configuring GPS

Use the GPS tab (shown in Figure 5) to configure settings for a GPS system.

**NOTE:** GPS location input is not an integral part of the WSI InFlight system. Full continental US weather data is available and usable without GPS input. The WSI InFlight client will, however, take GPS input to add some functionality to the display. **At no point should moving map or position information provided through the WSI InFlight client be used for navigational purposes.**

- Select the Data Type:
  - If you are not using a GPS system, set the Data Type to “None”.
  - If you are using a standard portable GPS system, set the Data Type to “NMEA-0183”.
  - If you are using a standard aviation panel-mounted GPS system, set the Data Type to “AV Type 1”.
- Set the COM port as appropriate for your computer-based system. If you do not know which port, use the Port Search tab described on page 24.
- Set Bits Per Second as appropriate for your GPS model. The default values are set based on the Data Type selection and should be accepted in most situations.
- Set Input and Output Buffers to 8192.
- RTS CTS Flow Control should NOT be checked.
Using the NMEA-0183 data type. The WSI InFlight software for EFBs and Windows-based systems supports NMEA-0183 GPS input over RS-232. The “GLL”, “VTG”, “HDG”, and “HDT” sentence types are supported (shown in Table 1). A GPS which outputs NMEA-0183 “VTG” sentences allows WSI InFlight to show track direction. A GPS which outputs HDG or HDT (but not NMEA-0183 “VTG”) allows WSI InFlight to show heading direction instead of track direction.

Table 1: NMEA-0183 Supported Sentence Types

<table>
<thead>
<tr>
<th>Sentence Type</th>
<th>Description</th>
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<tr>
<td>GLL</td>
<td>Geographic position, latitude / longitude</td>
</tr>
<tr>
<td>VTG</td>
<td>Track made good and ground speed</td>
</tr>
<tr>
<td>HDG</td>
<td>Heading</td>
</tr>
<tr>
<td>HDT</td>
<td>Heading, true</td>
</tr>
</tbody>
</table>
Using the AV Type 1 data type. The AV Type 1 data type will read many popular aviation GPS outputs (shown in Table 2). Refer to the product information supplied with your specific GPS unit to complete an installation using GPS. The GPS unit must output RS-232 serial data in a format recognized by the WSI InFlight Weather client. Depending on the GPS manufacture, the data item format may be referred to as “R0”, “K0”, “ARNAV 1”, “Aviation Type I”, or Bendix King/Garmin.

Table 2: AV Type 1 Data Type

<table>
<thead>
<tr>
<th>Data Item</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Latitude</td>
</tr>
<tr>
<td>B</td>
<td>Longitude</td>
</tr>
<tr>
<td>C</td>
<td>Track</td>
</tr>
<tr>
<td>Q</td>
<td>Magnetic variation</td>
</tr>
</tbody>
</table>

NOTE: The WSI InFlight Weather client has been designed to work with the output specified by the majority of aviation GPS manufacturers. There have been reported discrepancies between the specification and actual output. WSI is compiling a list of units confirmed to work with the WSI InFlight Weather client. Please refer to http://www.wsi.com for the most current list.
Using the port search feature

Use the Port Search tab (shown in Figure 6) to identify which COM ports are being used by serial devices attached to the display computer, such as the weather data receiver and GPS. This is intended to help you make correct entries in the WX Port and GPS tabs.

To use the port search feature:

1. Connect the WSI InFlight receiver and optional GPS feed to the display computer and power them on.

2. Optional. Select “Analyze Protocols” to identify the types of devices connected; e.g., GPS. This can take several minutes. Otherwise, the available ports will be identified but the Type will be listed as “Unknown.”

3. Click the “Begin Search” button. The window lists each COM port recognized by the display computer. You can use this information to complete the COM Port # field on the WX Port (page 20) and GPS (page 21) tabs.

Figure 6: Port Search tab
Chapter 3
Using WSI InFlight

This chapter describes how to use the WSI InFlight system. It covers:

- WSI InFlight overview
- Starting up
- Using the Current Conditions window
- Displaying graphical METARs
- Displaying SIGMETs, AIRMETs, and TFRs
- Displaying radar imagery
- Displaying echo tops
- Animating historical data
- Viewing winds/temperatures aloft
- Viewing navigation aids (NAVAIDs)
- Using map lookup
- Drawing a flight route
- Using GPS lock and flight tracking
- Displaying status information

Demonstration/training mode

You should be comfortable with WSI InFlight operation before attempting to use the system during flight. You can explore WSI InFlight without a connection to the weather data receiver and away from the airplane by running the software in demonstration mode. Open the Configuration utility (typically, Start>Programs>WSI InFlight 3.0>InFlight Configuration) and select “Use Sample Data” on the Wx Format tab. Remember to uncheck the “Use Sample Data” box when you are ready to use your system with live data.

WSI InFlight overview

The Current Conditions window (Figure 9 on page 28) is the primary display for WSI InFlight weather products. It consists of a base map on which you can overlay US and Canadian weather radar; echo tops; graphical METARs, SIGMETs, AIRMETs, TFRs; and navigation aids (VORs and NDBs). Other
features you can view in the Current Conditions window include the legend, graphical TAFs (included in the Trend display), historical loops, winds/temperatures aloft, and textual METARs, TAFs, SIGMETs, AIRMETs, and TFRs. The set of weather products available on your system is determined by your WSI subscription.

NOTE: Your WSI InFlight system continuously receives data from the satellite. As long as the receiver and display device remain on and the WSI InFlight software is running, your WSI InFlight system continues to receive weather updates. Your system will not receive new information if the system is off or if the antenna does not have a clear view of the sky.

Starting up

Open the WSI InFlight display by selecting the WSI InFlight Weather application.

NOTE: The exact steps you take to open WSI InFlight vary with the display device. For example, on a Windows-based EFB, select Start>Programs>WSI InFlight 3.0>InFlight Weather.

When you start the WSI InFlight system, the first window to appear is the Usage Agreement (see Figure 7), which describes the limits WSI has established for system use. It is important to understand that WSI weather data is advisory only. It is not a substitute for a legal FAA briefing. These terms must be agreed to upon each startup.

Once you click Agree, the Usage Agreement window closes and the Initializing window briefly appears (see Figure 8). The Initializing window summarizes the data port configuration settings that are currently active and shows which initialization tasks are in progress. Wait for the system to load and all connections to be properly established. The Current Conditions window (Figure 9) then appears.

1. WSI InFlight can run in the background while another program is running.

Using WSI InFlight
Figure 7:  Usage Agreement window

Figure 8:  Initializing window
Using the Current Conditions window

The WSI InFlight initialization sequence automatically displays the Current Conditions window (Figure 9) once the system is loaded and communication with the receiver is established. On initial startup, the window displays graphical METARs, NOWrad radar, and the legend. Subsequent startups display the weather products, legend, and map position and zoom level selections in effect at the previous shutdown.

The Current Conditions window includes a data freshness bar and a scale for your reference, as well as a panel of buttons you click to overlay weather products, display/hide the legends, pan/zoom the map, and access other WSI InFlight features such as animation loops and airport ID lookup.

Figure 9: Current Conditions window
Understanding data freshness

The data freshness bar at the top of the Current Conditions window uses color codes to show the currency of the last-received weather products.

ZULU is the current time according to your computer’s clock. The product times show when each weather product was assembled and time-stamped on the ground. WSI InFlight compares each product’s time-stamp to the computer’s clock to determine the data’s “age,” and indicates the age using color codes. The color is updated as current products age or are replaced with new transmissions. See Figure 10 for a description of the fields in the data freshness bar and Table 3 for an explanation of the color codes.

Figure 10: Data freshness bar

<table>
<thead>
<tr>
<th>Current Time</th>
<th>Graphical Metars</th>
<th>Radar (US or Canadian)</th>
<th>Echo Tops</th>
<th>Watch Boxes</th>
</tr>
</thead>
<tbody>
<tr>
<td>ZULU 19:49</td>
<td>GM 19:45</td>
<td>USRD 19:45</td>
<td>ETP 19:43</td>
<td>WB 19:45</td>
</tr>
</tbody>
</table>

Table 3: Data freshness color codes

<table>
<thead>
<tr>
<th>Color</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Green</td>
<td>Data is less than 5 minutes old</td>
</tr>
<tr>
<td>Yellow</td>
<td>Data is between 5 and 10 minutes old</td>
</tr>
<tr>
<td>Red</td>
<td>Data is older than 10 minutes</td>
</tr>
</tbody>
</table>

**NOTE:** WSI InFlight uses the current time from the display computer’s clock as a quality check on incoming data. For WSI InFlight to function properly, your computer’s clock must be set to within five minutes of the correct time and date for the time zone selected on your computer. You can verify these settings in the Windows Control Panel. (The exact steps for setting the clock depend upon your computer’s operating system.)
The radar time is for either the US or Canadian radar weather product, depending upon which is selected in the button panel (either USRD or CRD). If neither product is selected, the radar time defaults to US radar.

**Understanding scale**

The scale box in the lower left corner of the map shows the horizontal and vertical scale for the current zoom level in nautical miles.

*Figure 11: Map scale box*

![Scale box](image)

**Using the button panel**

The buttons at the bottom of the Current Conditions window (see Figure 12) move/zoom the map in the display window; overlay selected weather products; turn on/off the display of navigation aids, labels, and the legend; and open other windows for additional functions. Clicking some product buttons in the center panel multiple times cycles through a series of overlays – for example, the GM button provides access to different types of graphical METARs. Other buttons toggle off/on. Grey buttons indicate the product or feature is turned off.
**Figure 12: WSI InFlight button panel**

**Left panel buttons:** move/zoom map display

**Center panel buttons:** Overlay weather products and labels on map. Green buttons are on; grey buttons are off.

**Right panel buttons:** Open other windows for more functions

**Legend:**
- **GM-FR**: Flight rules
- **GM-WX**: Weather conditions
- **GM-WD**: Wind direction
- **GM**: Display off
- **USRD**: US weather radar (NOWRad)
- **CRD**: Canadian weather radar
- **RAD**: Display off
- **Graphical METARS**: USRd.
- **Weather Radar**: EchO Tops.
- **SMET**: Convective SIGMETs.
- **Z-AMET**: Icing AIRMETs.
- **T-AMET**: Surface/Altof Turbulence AIRMETs.
- **S-AMET**: IFR conditions/mountain obstruction.
- **TFR**: Find airports/NAVAIDs by IDs; draw flight route.
- **Watch Boxes**: Display off.
- **Map Lookup**: Display off.
- **Receiver Status**: Display off.
- **GPSL**: VORs and NDBs.
- **NAV**: Airports and NAVAIDs.
- **LBL**: Legend.
- **LGND**: Page 1
- **TRK**: Page 2
- **HIST**: Page 3
- **ALFT**: Page 3

**Move (pan) map**
- **Lock On Position**: Center map on aircraft position; available if GPS activated

**Zoom map**
- **Lock On Position**: Center map on aircraft position; available if GPS activated
**Zooming and moving the Current Conditions map**

The Current Conditions window provides buttons to help you navigate through the display.

**Zooming.** Use the zooming buttons to zoom in or out of the map. Click on the (–) button to zoom out for a view over a wider area. Click on the (+) button to zoom in to get a closer view.

---

**NOTE:** As you zoom into the map, additional graphical METAR icons representing regional airports appear. As you zoom out of the map, the map display is uncluttered and only major airport icons are displayed. Display of VORs begins at the 25 nautical mile zoom level. NDBs begin to appear at the 10 nautical mile zoom level.

---

**Moving.** Use the directional keys to move your view north, south, east, or west to get a better view of a weather system.

**Figure 13: Map zoom and pan buttons**

![Map zoom and pan buttons](image)
Displaying labels

Click the LBL button to turn on the display of airport identifier and navigation aid labels. Click LBL again to turn off the display of labels. Graphical METARS (GM button) must be turned on for airport IDs to display; NAVAIDs (NAV button) must be turned on for navigation labels to display.

Figure 14: Airport and NAVAID labels
Using the legend

The three-page legend provides explanations of the graphical METARs and TAFs, radar, watch boxes (AIRMETs and SIGMETs), and Echo Tops icons.

To turn the legend on for reference, click the LGND button. To cycle through the three-page display and close the legend, click the LGND button, or click the legend panel itself.

The first legend page shows the graphical METAR, TAF, and wind icons. The second legend page shows the watch box AIRMET and SIGMET color codes and an explanation of the Echo Top display. The third legend page shows the precipitation radar colors. The radar legend automatically corresponds to the radar type and color palette selected. (Radar type—either US or Canadian—is selected in the button panel. Color palette is selected using the Configuration program; refer to page 16).

Figure 15 and Figure 16 illustrate the three legend pages. For detailed information on these items, proceed to the following discussions:

• Flight rule icons on page 38
• Weather condition icons on page 38
• Wind direction and speed icons (barbs) on page 40
• Weather warnings on page 46
• Echo Tops special labels on page 52
• Precipitation radar colors on page 48
Figure 15: Legend pages 1 and 2

Flight Rule Icons

- **VFR**
- **MVFR**
- **IFR**
- **IFR**
- **< CAT I**

Weather Phenomena

- **no sig wx.**
- **haze, etc...**
- **liquid precip.**
- **solid precip.**
- **hazardous wx.**
- **winds >= 20**
- **missing weather section**

Winds

- Location
  - 5 knots
  - 10 knots
  - 30 knots
  - 65 knots
- **idle winds**
- **missing winds**

SIGMETs and AIRMETs

- **convective SIGMET**
- **icing**
- **surface turbulence**
- **aero turbulence**
- **IFR**
- **mountain obscuration**
- **high surface winds**
- **other**

Echo Tops

- **precip top 35000 ft**
- **360 Conditions**
- **2D moving 5E or 20 knots**

Warning Areas

Page 1
Graphical METAR/TAF icons and wind icons

Page 2
AIRMET, SIGMET, Echo Top color code
Figure 16: Legend page 3

Page 3
Precipitation radar colors

The legend displayed automatically corresponds to the radar type and palette in effect.

US Radar - DO-267 palette

US Radar - WSI NOWrad palette

Using WSI InFlight
Displaying graphical METARs

By default, the Current Conditions window displays circle graphical METAR icons when the WSI InFlight system loads. Three graphical icons are used to summarize weather information for each reporting airport in the continental US and Canada:

- **Circles:** Flight rules
- **Diamonds:** Weather conditions
- **Barbs:** Surface wind speed and true direction

Use the GM (graphical METARs) button to toggle between these three icons to get a better understanding of weather conditions.

---

**NOTE:** METARs are issued by reporting airports each hour, usually 45 minutes past the hour. A Special METAR (SPECI) is issued anytime there is a major change in weather conditions.

---

To display graphical METAR information, follow these steps:

1. By default, the circle graphical METAR icons that represent flight rules are shown when the Current Conditions window first displays. Select the GM button once to turn on the diamond graphical METAR icons that represent weather conditions. Select the GM button again to turn on wind barbs. Select the GM button once more to turn off the display of graphical METARs.

2. If the legend is not shown, click the LGND button once to view an explanation of the graphical METAR icons. See Table 4 on page 38 for a description of the flight rule color codes. See Table 5 on page 39 for a description of the weather condition color codes. See page 40 for a description of wind barbs.

3. Click a graphical METAR icon (any type). A text version of the METAR is displayed. In addition, three extra buttons, ROUTE, MORE, and TRND, appear along the bottom of the screen. Click MORE to switch to a full screen textual display, which you can toggle between the METAR and TAF. Use BACK to return to the Current Conditions window. For an explanation of using the TRND button, see “Viewing the Trend window” on page 42. For an explanation of using the ROUTE button, see “Drawing a flight route” on page 59.
**NOTE:** To close the text display of the METAR that displays when you click on a graphical METAR icon, click on the text display.

**Flight rule icons.** The colored circle icons represent FAA flight rule classifications currently in effect at each reporting airport based on weather observation (METAR). Table 4 lists the flight rules and their associated color codes.

**NOTE:** These color coded circle icons are also used in the Trend window to identify FAA flight rule classifications based on the weather forecast (TAF).

**Table 4: Flight rule color codes**

<table>
<thead>
<tr>
<th>Color</th>
<th>Category</th>
<th>Ceiling (in feet)</th>
<th>Visibility (in nautical miles)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Black</td>
<td>Not Enough Data</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cyan (sky blue)</td>
<td>VFR</td>
<td>&gt; 3000</td>
<td>&gt; 5</td>
</tr>
<tr>
<td>Green</td>
<td>MVFR</td>
<td>1000 - 3000</td>
<td>3 - 5</td>
</tr>
<tr>
<td>Yellow</td>
<td>IFR</td>
<td>500 - 1000</td>
<td>1 - 3</td>
</tr>
<tr>
<td>Red</td>
<td>LIFR</td>
<td>200 - 500</td>
<td>1/2 - 1</td>
</tr>
<tr>
<td>Magenta</td>
<td>&lt; Cat I type approaches</td>
<td>&lt; 200</td>
<td>0 - 1/2</td>
</tr>
</tbody>
</table>

**Weather condition icons.** The colored diamond icons represent the weather conditions at each reporting airport. The left side of the diamond shows the worst observed weather and the right side alerts pilots as to whether potentially dangerous visibility conditions currently exist. If the right half of the diamond is the same color as the left, there are no obstructions to pilot visibility. If the right half of the diamond is yellow, visibility obstructions exist at the airport represented by the diamond. If windy conditions (sustained winds or gusts) \( \geq 20 \) knots exist at an airport, a small black diamond is drawn in the center of the icon. Both sides of each diamond icon are drawn in black if there is not enough data.

Using WSI InFlight
Table 5 explains the weather conditions and their associated color codes. See Figure 17 for an illustration of the split diamond icon.

### Table 5: Weather condition color codes

<table>
<thead>
<tr>
<th>Color</th>
<th>Weather Phenomena Class</th>
<th>Phenomena</th>
</tr>
</thead>
<tbody>
<tr>
<td>Black (both sides)</td>
<td>Not enough data or data has aged out</td>
<td></td>
</tr>
<tr>
<td>White</td>
<td>No significant weather</td>
<td></td>
</tr>
<tr>
<td>Green</td>
<td>Liquid precipitation</td>
<td>Drizzle (DZ)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Rain (RA)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Showers in vicinity (VCSH)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Unknown precipitation (UP)</td>
</tr>
<tr>
<td>Blue</td>
<td>Solid precipitation</td>
<td>Snow (SN)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Snow grains (SG)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Ice crystals (IC)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Ice pellets (PE)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Hail (GR)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Small hail (GS)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Volcanic ash (VA)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Sand (SA)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Sand/dust whirls (PO)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Sand storm (SS)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Dust storm (DS)</td>
</tr>
<tr>
<td>Red</td>
<td>Hazardous phenomena (thunderstorms, etc.)</td>
<td>Thunderstorm (TS)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Funnel cloud, tornado, waterspout (FC)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Squall (SQ)</td>
</tr>
<tr>
<td>Yellow</td>
<td>Obstruction to visibility</td>
<td>Fog (FG)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Haze (HZ)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Smoke (FU)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Spray (PY)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Mist (BR)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Sand (SA)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Dust (DU)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Volcanic ash (VA)</td>
</tr>
<tr>
<td>Black diamond in center of icon</td>
<td>Winds &gt;= 20 knots</td>
<td>Taken from either steady state or gust value</td>
</tr>
</tbody>
</table>
**Wind direction icons (barbs).** Wind barbs represent surface observations of wind speed and direction at each reporting airport. The direction is true, not magnetic.

Wind is blowing from the direction in which the barb points. Speed is indicated by the total of the feathers on the barb. There are three types of feathers: a short feather indicates 5 knots; a long feather 10 knots; a filled triangular pennant 50 knots. A barb with one short and two long feathers, for example, indicates 25 knots. A circle with no barb indicates calm winds. A hollow circle means no data.

**Figure 18: Wind barb**
Viewing TAFs

Most major airports provide terminal aerodrome forecast (TAF) information. A TAF report is the local weather forecast supplied by the area airport.

To display a TAF report:

1. In the Current Conditions window, click a graphical METAR icon for a major airport known to provide TAF information, e.g., KBOS or KLAX.
2. Click either the MORE or TRND button that appears in the lower right corner of the screen.
3. Click TAF to display the text of the TAF report (shown in Figure 19). Click METAR to display the text of the METAR report.
4. Click BACK (in the upper right corner) to return to the previous window.
5. Click on the text METAR window to close it.

Figure 19: Sample TAF text window
**Viewing the Trend window**

The Trend window (shown in Figure 20) gives a graphic overview of actual conditions contrasted with the forecasted conditions as provided by METARs and TAFs respectively. The display uses the same icons used by the graphical METARs (circles for flight rules and diamonds for weather conditions) and shows both the category and phenomenon icons in 15 minute intervals.

The current time is indicated with a grey bar for quick reference and in most cases will be close to the most recent METAR shown. Looking above the grey bar, you can quickly evaluate how forecasts (Prev, Tempo, and Prob) have compared with actual conditions (METAR). Below the grey bar, you can check forecast conditions for your estimated time of arrival. The forecasts fall into three categories:

- **Prev** - Prevailing conditions
- **Tempo** - Temporary conditions expected to last generally less than four hours at a time, and expected to occur less than half of the time period for which the Tempo conditions are indicated
- **Prob** - Indicates a 30%-40% probability/chance of conditions occurring, along with the associated Prev (prevailing) conditions

To display the Trend window:

1. Click on a graphical METAR icon. The TRND button appears at the bottom of the Current Conditions window.
2. Click TRND. The Trend window is displayed (see Figure 20). The first column lists the time. The second column displays graphical METAR icons. The remaining columns display a graphical representation of TAF information.
3. Click LGND to toggle the legend on or off, as needed, for graphical METAR and TAF interpretation. Click UP or DOWN to move through the display.
4. Click TAF to display textual TAF information. (See Viewing TAFs on page 41 for more information.) Click METAR to display textual METAR information.
5. Click BACK (in the upper right corner) to return to the Current Conditions window.
NOTE: In the display, the METAR icon will carry over from the previous 15 minute interval unless a new METAR or SPECI was issued during that interval. If two METARS/SPECIs were issued during that interval only the most recent will show.

Figure 20: Trend window
Displaying SIGMETs, AIRMETs, and TFRs

SIGMET and AIRMET data products (also referred to as watch boxes) display regions, outlined by bounding boxes, where pilots may encounter weather warning conditions such as convective storms, turbulence, icing, or obstructions to visibility.

Regions under TFRs (temporary flight restrictions) can also be displayed.

To display SIGMET, AIRMET, and TFR information:

1. Click the watch box button (located at the bottom of the screen; fourth button in the top row of the center panel) repeatedly to view all of the types of warnings available:
   - SMET: Convective SIGMETs
   - Z-AMET: Icing AIRMETs
   - T-AMET: Surface/aloft turbulence AIRMETs
   - S-AMET: IFR conditions/mountain obscuration AIRMETs
   - TFR: Temporary Flight Restrictions
   - WB: Watch boxes off

2. With any watch box button other than WB selected, check the map for the location of a watch box. Reference the time and color of the WB field in the data freshness bar to determine the reliability of the event boundaries.

3. Click the label that identifies a watch box to view the text of the warning.
NOTE: Some TFRs consist of multiple overlapping regions. In these cases, Reg+ and Reg- buttons appear at the bottom of the screen to allow different regions to be selected.

4. If the text (Figure 21) is too long for the display, click MORE to switch to a full screen textual display. Use BACK to return to the Current Conditions window.

Figure 21: AIRMET watch box with text display

5. Click in the text box to toggle the textual description off.

6. To view an explanation of the SIGMET and AIRMET color codes, click LGND until the second legend page appears. (See Figure 15 on page 35 for an illustration of the legend. Table 6 on page 46 also provides a key to the warning color codes.)

7. Since watch boxes can interfere with your view of radar, you have the option to switch them off. Click the watch box button until WB appears.
**Weather warnings.** SIGMETs and AIRMETs are color coded for immediate visual recognition. Table 6 lists the color code used with each weather warning type.

**Table 6: Weather warning color codes**

<table>
<thead>
<tr>
<th>Color Code</th>
<th>Button Label</th>
<th>Condition Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Magenta</td>
<td>SMET</td>
<td>Convective SIGMET</td>
</tr>
<tr>
<td>Blue</td>
<td>Z-AMET</td>
<td>Icing AIRMET</td>
</tr>
<tr>
<td>Yellow Green</td>
<td>T-AMET</td>
<td>Surface/aloft turbulence AIRMET</td>
</tr>
<tr>
<td>Red Magenta</td>
<td>S-AMET</td>
<td>IFR conditions/mountain obscuration AIRMET</td>
</tr>
</tbody>
</table>

**Displaying radar imagery**

WSI InFlight displays weather radar imagery for the continental US and southern Canada.

**Displaying US NOWrad radar**

WSI’s NOWrad® technology merges conventional radar imagery and NEXRAD’s reflectivity into a single radar mosaic for the continental US. The data displays at a high 1 NM resolution and updates every 5 minutes.

You can choose between two color palettes for US radar: the FAA standard DO-267 color scheme (the default), which uses seven colors for easy recognition; or the WSI NOWrad palette which uses more colors for finer detail resolution (the same palette used by WSI’s pre-flight planning and briefing systems). To switch palettes, use the Display tab in the WSI InFlight Configuration program (refer to page 16).
Black indicates areas of radar coverage; grey areas are not covered. Weather systems may exist in grey areas, even though they are not shown. Refer to Table 7 on page 48 for additional information.

To display US radar imagery:

1. To unclutter your display, click the GM button until the Current Conditions window no longer displays graphical icons.
2. Click the radar button until USRD is selected. The radar button is located at the bottom of the screen, second button in the top row of the center panel.
3. Click LGND three times to view an explanation of the precipitation radar color codes.
4. Click the USRD button two more times to turn off the radar display.

Figure 22: US NOWrad display
Radar coverage mask. The radar coverage mask is color coded to show those regions where radar coverage is available. Table 7 lists the color code used. This scheme applies to all types of precipitation radar imagery displayed by WSI InFlight.

Table 7: Radar coverage mask color codes

<table>
<thead>
<tr>
<th>Color</th>
<th>Explanation</th>
</tr>
</thead>
</table>
| Grey  | Regions where radar data is missing or there is no radar coverage below 10,000 feet.  
  **Note:** Radar coverage may be available in these areas but only above 10,000 feet. If a radar return is displayed, that return is real. However the absence of a return is unreliable. Since radar coverage is provided dynamically, various regions may go grey periodically as a radar site goes down for maintenance or testing. |
| Black | Regions where radar coverage is available |

Precipitation radar colors. Precipitation radar imagery is color coded to show precipitation intensity levels. Table 8 describes the FAA standard color code (DO-267). Table 9 describes the WSI NOWrad palette.

Table 8: US radar precipitation intensity color codes - DO-267 color palette

<table>
<thead>
<tr>
<th>Color</th>
<th>Precipitation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Black</td>
<td>No significant precipitation. Rain &lt; 20 dBZ or no return. Can be clouds but no droplets large enough to be rain.</td>
</tr>
</tbody>
</table>
| Green | Rain $20 \leq x < 30$ dBZ  
Light to moderate precipitation. |
| Yellow | Rain $30 \leq x < 40$ dBZ  
Moderate to heavy precipitation with possible thunderstorms. |
| Red   | Rain $40$ dBZ or greater  
Heavy precipitation with probable thunderstorms. |
| Blue  | Snow $5$ dBZ or greater. Solid precipitation. |
| Pink  | Mixed precipitation, $5$ dBZ or greater  
Mixed solid and liquid precipitation, with icing probable. |
## Table 9: US radar precipitation intensity color codes - WSI NOWrad color palette

<table>
<thead>
<tr>
<th>Color</th>
<th>Precipitation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Black</td>
<td>No significant precipitation. Can be clouds but no droplets large enough to be rain.</td>
</tr>
</tbody>
</table>
| Light green   | Rain $15 \leq x < 20$ dBZ  
Very light to light precipitation. |
| Medium green  | Rain $20 \leq x < 30$ dBZ  
Light to moderate precipitation.       |
| Dark green    | Rain $30 \leq x < 40$ dBZ  
Moderate to heavy precipitation with possible thunderstorms. |
| Yellow        | Rain $40 \leq x < 45$ dBZ  
Moderate to heavy precipitation with probable thunderstorms. |
| Light orange  | Rain $45 \leq x < 50$ dBZ  
Heavy precipitation with probable thunderstorms. |
| Orange        | Rain $50 \leq x < 55$ dBZ  
Very heavy precipitation and thunderstorms. |
| Red           | Rain $55$ dBZ or greater  
Intense precipitation and thunderstorms. |
| Light blue    | Snow $5 \leq x < 20$ dBZ  
Light to moderate snow |
| Dark blue     | Snow greater than $20$ dBZ  
Solid precipitation. |
| Light pink    | Mixed precipitation $5 \leq x < 20$ dBZ  
Light to moderate mixed solid and liquid precipitation, with icing probable. |
| Pink          | Mixed precipitation greater than $20$ dBZ  
Heavy mixed solid and liquid precipitation, with icing probable. |
Displaying Canadian radar

Weather radar data for southern Canada is collected and processed by Environment Canada. The imagery is displayed in the Canadian color palette.

As with US radar, black indicates areas of radar coverage; grey areas are not covered. Weather systems may exist in grey areas, even though they are not shown. Refer to Table 7 on page 48 for additional information.

To display Canadian radar:

1. Click the radar button until CRD is selected. The radar button is located at the bottom of the screen, second button in the top row of the center panel.

2. To view an explanation of the color codes, click LGND until the Canadian radar scale is visible.

Figure 23: Canadian radar display
Displaying echo tops

The Echo Tops display indicates the location, elevation, and direction, if applicable, of a storm. Echo Tops are depicted using an arrow which indicates the location, height, and direction of a storm. The associated text indicating the storm cell height (in hundreds of feet) and its velocity (in knots). If storm direction and speed are unknown, a box is used instead of an arrow. Special labels also indicate hazardous phenomenon associated with the storm.

To display Echo Tops information:

1. Click the ETP button to turn on the Echo Tops display (shown in Figure 24).
2. To display the Echo Tops legend for more detail about the display, click the LGND button twice.
3. Click the ETP button again to turn off the Echo Tops display.
**Using WSI InFlight**

**Figure 24: Echo Tops display**

![Echo Tops display](image)

**Echo Tops special labels.** Table 10 lists the special labels used to indicate hazardous phenomenon associated with the storm.

**Table 10: Echo Tops special labels**

<table>
<thead>
<tr>
<th>Label</th>
<th>Hazardous Phenomenon</th>
</tr>
</thead>
<tbody>
<tr>
<td>HAIL</td>
<td>Probable hail</td>
</tr>
<tr>
<td>HAIL+</td>
<td>Confirmed hail</td>
</tr>
<tr>
<td>MESO</td>
<td>Mesocyclonic - storm displays some rotation consistent with the potential development of tornadoes.</td>
</tr>
<tr>
<td>TVS</td>
<td>Tornadic - storm displays a marked rotational signature consistent with tornadic development.</td>
</tr>
</tbody>
</table>
Animating historical data

WSI InFlight receives a continuous stream of data over a satellite link. The system saves each update for up to 2 hours\(^1\) in local memory when the system is on. This data can be animated as looping weather images to show the progression of weather over time. The Historical image will display previous versions of the product in arrival sequence and pause after the most recent image. Note the time in the upper left hand corner of the image as a strategic tool for viewing the latest radar image. A zoom-in during animation will continue the animation on the zoomed image.

To view the history animation loop:

1. Select the weather products you wish to animate by selecting their buttons in the button panel. You can animate graphical METARS (GM), radar (USRD or CRD), echo tops (ETP), and watch boxes. You can also view your recorded flight track (TRK) if GPS is installed and active.

2. Click HIST to open the History window and start an animation loop.

3. Use the control keys (listed below) to control the animation loop:
   
   - > to Play
   - || to Pause
   - |< to Back 10 minutes
   - >| to Forward 10 minutes

4. Select BACK (in the upper right corner) to return to the Current Conditions window.

---

1. Or less, depending upon the memory capacity of the display computer.
Viewing winds/temperatures aloft

The Winds Aloft window (Figure 25) displays vivid graphic representations of winds or temperatures at selected elevations.

NOTE: The display shows conditions that were forecast by computer models for the current time. The data freshness values at the top of the window are the times the forecasts were valid.

To view winds/temperatures aloft:

1. Click the ALFT button to open the Winds Aloft window.
2. Use the UP and DOWN buttons to display forecast conditions at different altitudes. The altitude currently displayed is indicated in both the title bar at the top of the screen and the scale box in the lower left corner of the map (FL is flight level in 100s of feet).
3. Click the WIND button to cycle through the available overlays:
   • WINDB - Wind barbs (true direction and speed)
   • WINDC - Winds, color coded
   • TEMP - Temperatures

   For an explanation of the graphic conventions, click the LGND button.
4. Click the BACK button to close the Winds Aloft window and return to the Current Conditions window.
Displaying navigation aids

The navigation aids overlay shows the location of VORs (VOR, VOR/DME, and VORTAC) and NDBs (non-directional beacons). The zoom level determines the types of NAVAIDs displayed – VORs are visible when the map scale is 25 NM or less; NDBs at 10 NM or less.

To display navigation aids:

1. Click the NAV button so that it is green.
2. Click the zoom in (+) or zoom out (−) buttons until the map scale is 25 NM. Purple icons indicate the location of VORs, VOR/DMEs, and VORTACs. Table 11 provides a key to the icons.
3. Click the zoom in (+) button so that the map scale is 10 NM. Pink rosettes show the location of NDBs. The line radiating from each VOR icon shows magnetic north.

4. Click the LBL button to toggle off/on the display of NAVAID identifiers. They appear in yellow type to distinguish them from airport identifiers which are displayed inside grey boxes.

5. Click a VOR or NDB icon to display additional information about it; including type, identifier, name, latitude, and longitude. Click the icon again or the text box itself to close the text display.

TIP: You can use NAVAIDs as waypoints when drawing a flight route. Refer to page 59.

Table 11: NAVAID (VOR and NDB) icons

<table>
<thead>
<tr>
<th>Map Scale</th>
<th>Icon</th>
<th>Type/Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt; 25NM</td>
<td>none displayed</td>
<td></td>
</tr>
<tr>
<td>&lt;=25NM</td>
<td><img src="image" alt="VOR Icon" /></td>
<td>VOR</td>
</tr>
<tr>
<td></td>
<td><img src="image" alt="VOR/DME Icon" /></td>
<td>VOR/DME</td>
</tr>
<tr>
<td></td>
<td><img src="image" alt="VORTAC Icon" /></td>
<td>VORTAC</td>
</tr>
<tr>
<td>&lt;=10NM</td>
<td><img src="image" alt="NDB Icon" /></td>
<td>NDB</td>
</tr>
<tr>
<td></td>
<td><img src="image" alt="Line Icon" /></td>
<td>Line indicates magnetic north (added to all types of VOR icons at close zoom)</td>
</tr>
</tbody>
</table>
Using map lookup

You can quickly zoom and center the Current Conditions map on a specific airport or NAVAID, or view the METAR and TAF for an airport, simply by entering its identifier in the Map Lookup window (Figure 26).

To use map lookup:

1. Click the FIND button in the Current Conditions window. The Map Lookup window opens (Figure 26).

2. Enter the identifier for the airport or NAVAID by clicking the letter keys at the top of the screen.

   If you make a mistake:
   - Click BS to backspace one letter.
   - Click Reset to start over.

   The “K” airport ID preface is supplied for you. If you wish to find a NAVAID or Canadian airport instead of a US airport, use the BS key to delete the K.

3. If you wish to find a NAVAID with a three-character identifier (GLL, for example), enter the ID and click the Enter button. If you want to find an airport with a four-character identifier (KCYS, for example), the airport name automatically appears when you enter the fourth letter.

4. To choose the display for the specified airport or NAVAID; either:
   - Click INFO to open a full text window containing the METAR or TAF for the selected airport. Click BACK to return to the Map Lookup window.
   - Click MAP to view the Current Conditions map, centered and zoomed on the specified airport or NAVAID. If you selected an airport, the METAR is displayed as well. To close the METAR, click either the icon for the airport or the text window.

---

TIP: The Map Lookup window is also used to draw a flight route on the Current Conditions map. Refer to see “Drawing a flight route” on page 59.
Figure 26: Map Lookup window
Drawing a flight route

To visualize the weather’s impact on your flight plan, you can draw a magenta flight route line between your origin and destination airports, including NAVAIDS and airports as en route points if desired (as shown in Figure 27). Two methods are available:

- clicking airport and NAVAID icons on the Current Conditions map display (page 60)
- entering identifiers in the Map Lookup window (page 61).

You can use a combination of the two methods.

The Map Lookup window provides an easy way to remove the flight route from the map display (page 62).

Figure 27: Flight route
Drawing a flight route by selecting icons

To draw a flight route by selecting icons in the Current Conditions window:

1. Click the GM (graphical METARS) and NAV buttons to overlay airport and NAVAID icons on the Current Conditions map.

   **NOTE:** NAVAIDS are visible only at close zoom levels (map scale equals 25NM or less).

2. Click the icon (graphical METAR, any type) for the departure airport.

3. Click the ROUTE button that appears at the bottom of the screen. A magenta outline appears around the airport icon to indicate its selection. Click the METAR text box to close it, if it is in your way.

4. Optional. Select one or more waypoints in the order they will be flown. For each:
   a) Click the icon for the NAVAID or en route airport.
   b) Click ROUTE.
   c) Click the icon or text box to close the text display, if desired.

5. Repeat this procedure for the destination airport's icon. A magenta line appears for each flight segment.

   **NOTE:** To remove a point from the flight route, select the icon and click ROUTE again.
Drawing a flight route by entering IDs

To specify a flight route by entering airport and NAVAID IDs:

1. Click the FIND button. The Map Lookup window opens. (If a flight route is already entered in the Route box in the lower left corner, you can click CLR to remove it.)

2. Enter the departure airport’s ID by clicking the letter keys (the K preface is provided).

   If you make a mistake:
   • Click BS to backspace one letter.
   • Click Reset to start over.

3. When you have specified the ID (for example, KCYS), click ADD. The airport ID appears in the Route box in the lower left corner of the Map Lookup window.

4. Optional. Specify one or more en route points — either airports or NAVAIDs. Click Reset to remove the previous identifier from the ID field, or simply type over it. If the new ID consists of three characters, enter the ID and click Enter. (Four-character IDs are entered in the ID field automatically.) Click ADD to put the ID in the Route box.

5. Enter the destination airport the same way.

   NOTE: To insert a point in the Route, select the ID in the Route box that is below where you want the new ID to appear. Enter the new waypoint in the ID field, and click INSRT.

   NOTE: To remove a point from the flight route, select the ID in the Route box and click DEL. To remove the specified route altogether, click CLR.

6. To view the flight route in the Current Conditions window, click BACK. A magenta line indicates the specified route.
Removing a flight route from the map display

To remove the flight route line from the Current Conditions map display:

1. Click FIND to open the Map Lookup window.
2. Click CLR.
3. Click BACK to return to the Current Conditions window.

Using GPS lock and flight tracking

If you have a GPS system connected and configured to your WSI InFlight system, GPS lock and flight tracking are available from the Current Conditions window (shown in Figure 28). The GPS lock function centers the display to the aircraft position. GPS flight tracking displays a line indicating your previous flight path, up to two hours (depending upon the capacity of the display computer). This feature allows you to view weather patterns in context with your flight's progress.

To configure GPS lock and flight tracking:

1. Click the GPSL button to toggle the GPS lock on or off.
2. Click the TRK button to turn GPS flight tracking on or off.

NOTE: The GPSL and TRK buttons only appear on the Current Conditions window if GPS has been configured on the GPS tab of the Configuration application (see page 21).
Figure 28: GPS flight tracking display

GPS Flight Tracking system ON
Displaying status information

Click the STAT button on the Current Conditions window to display the Status Overview window (shown in Figure 29). The Status Overview window provides information about the performance of the WSI InFlight system.

The Status Overview window displays the current software version number and includes four buttons — EFB, GPS, Receiver, and Wx Data — which you can select to view the current status of system components. Clicking the Save Status Report button captures information about system performance and writes it to a text file for troubleshooting.

Figure 29: Status Overview window

In addition, limited status information is provided next to each button.

- The values beside the EFB button provide information about the amount
of system memory currently being used by WSI InFlight and any other applications that may be running.

- The label beside the GPS button indicates whether the GPS is connected or disabled.
- The text beside the Receiver button are error codes that provide information about errors that occur during system initialization or operation. See Troubleshooting on page 73 for information on the possible error conditions and their resolution. During normal operation, this text reads "Locked BER nominal".
- The text beside the Wx Data button are error codes that provide information about errors that occur during system initialization. See Troubleshooting on page 73 for information on the possible error conditions and their resolution.

This status information is color coded as follows:

- Green - nominal (the system is functioning as expected)
- Yellow - warning or approaching a limit
- Red - error or, for memory and disk, at the limit

**Viewing EFB/MFD information**

Click the EFB button to display additional information about your electronic flight bag (EFB) or multi-function display (MFD) device. The information displayed on the MFD Status window (shown in Figure 30) includes:

- Amount of free memory
- Total amount of memory
- Memory load
- Amount of free memory available in file storage
Figure 30: MFD Status window

<table>
<thead>
<tr>
<th>Category</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Memory Free MB</td>
<td>34.3 Megabytes</td>
</tr>
<tr>
<td>Memory Total MB</td>
<td>127.5 Megabytes</td>
</tr>
<tr>
<td>Memory Load %</td>
<td>73%</td>
</tr>
<tr>
<td>File-Storage Free</td>
<td>38194.0 Megabytes</td>
</tr>
</tbody>
</table>
**Viewing GPS information**

If you are using GPS, you can click the GPS button in the Status Overview window to monitor the status of the data connection between WSI InFlight and the GPS device.

**Figure 31: Sample GPS Status window**

**GPS Source Data.** Displays raw GPS messages as they arrive at the display computer from the GPS device; can be useful for identifying the GPS message format.

**Latest Position and Latest Track.** Latest aircraft position and heading that WSI InFlight has decoded from the GPS data stream.

**GPS Port Configuration.** Summary of the serial connection settings specified on the GPS tab in the WSI InFlight Configuration application (see page 21).

The bottom-most pane summarizes the current connection status.

For more information, see “Using GPS lock and flight tracking” on page 62.
Viewing Receiver information

Click the Receiver button on the Status Overview window to monitor receiver and signal status.

Figure 32: Sample Receiver Status window

BER Monitor. The BER Monitor field provides a real-time monitor on the bit error rate. If BER spikes, data frames are being lost. During normal operation, BER should remain low. As a general guide, normal operation is below the yellow line. Operation above the yellow line may result in lost data. Operation above the red line may lose signal lock and initiate the reacquisition procedure.

Frame Monitor. The Frame Monitor field provides a real-time monitor on data frame activity. In this case spikes indicate that data frames are being collected by the WSI InFlight software. Corrupted data frames are indicated by red spikes instead of green spikes.
**Receiver ID.** The Receiver ID field lists the receiver address, also known as the TID.

**Selected Beam.** Satellite beam to which the signal is currently locked.

**Bit Error Rate.** Summary statistics for the bit error rate readings over the previous five minutes. Normal system operation occurs for BER levels below 5. BER levels at or above 10 generate a warning. BER levels at or about 20 generate a BER error. In the event of weak signal system performance, these numbers should be recorded for reporting to WSI Customer Service.

**Receiver Status Summary.** Summary of the status of the satellite receiver, the connection between the receiver and the display computer, the receiver’s lock on the satellite signal, and the quality of the signal. The message, “LOCKED: BER NOMINAL,” indicates that the system is functioning properly.

**ASE Status.** The ASE Status field provides information about the status of the Application Service Element software which formats the data for presentation.

**WX Data and PIDs.** Two buttons provide access to additional information. Click WX Data to view a list of the weather products your system is currently receiving (See "Viewing Wx Data information" on page 70.) Click PIDs to view the list of weather products your system has been authorized to receive according to your subscription plan.
**Viewing Wx Data information**

Click the Wx Data button on either the Status Overview or Receiver Status window to display the Data Status window (Figure 33). The Data Status window lists all the weather products that your system receives. As each product is received and saved by the display, the products are recorded. This record can be useful for troubleshooting purposes.

**Figure 33:** Data Status window
Viewing Authorized Product IDs (PIGs)

Click the PIDs button in the Receiver Status window to display the Authorized Product IDs window (Figure 34). This window lists the weather products that your InFlight receiver has been authorized to receive according to the terms of your WSI subscription. The authorization information is broadcast from the satellite when you activate your subscription and is stored in the receiver.

Each product is identified by a product identification number (PID) and/or name.

Figure 34: Authorized Product IDs window
**Saving a Status Report**

Click the Save Status Report button in the Status Overview window to write current system status information to a text file. If you experience a problem with your system, this report can be a helpful troubleshooting tool. The file is automatically named WSI_InFlight_StatusReport_[date_time_written].tsv and saved in the same folder as the application (typically C:\Program Files\WSI\WSI InFlight).

The file is tab-delimited and best viewed in an application like Microsoft Excel. It captures basic memory usage and port configuration information, as well as time histories of serial port activity, bit error rate, and GPS outputs.
Chapter 4
Troubleshooting

This chapter describes procedures for troubleshooting your WSI InFlight system. If at any time you should experience a disruption in your service, refer to the checklist below before contacting WSI Customer Service. For information on how to contact WSI Customer Service, see page 7.

The Status Overview window, displayed using the STAT button on the Current Conditions window, provides status information on system components including error codes when problems occur. For more information, see “Displaying status information” on page 64.

System is unable to load

The system has been started but continues to display the Initializing window.

___ Is the error code "Data Port Error: Create File: Access is denied" displayed in the Initialization Progress pane at the bottom of the window?

Verify that the serial COM port used to receive the weather data is configured correctly by checking the settings on the Wx Port tab in the WSI InFlight Configuration program (see pages 16 and 20).

This message typically indicates that another application is using the requested data port. The Port Search tab in the WSI InFlight Configuration program can be used to verify that the WSI InFlight receiver is connected to the expected port (see pages 16 and 24).

___ Is the error code "Data Port Error: Create File: The system cannot find the file specified" displayed in the Initialization Progress pane at the bottom of the window?

Verify that the serial COM port used to receive the weather data is configured correctly by checking the settings on the Wx Port tab in the WSI InFlight Configuration program (see pages 16 and 20).
Troubleshooting

This message typically indicates that a port has been selected that does not exist on the computer. The Port Search tab in the WSI InFlight Configuration program can be used to verify that the WSI InFlight receiver is connected to the expected port (see pages 16 and 24).

Is the error code "GPS Port Error: Failed to open port: Check port settings" displayed in the Initialization Progress pane at the bottom of the window?

Verify that the serial COM port connected to the GPS is configured correctly by checking the settings on the GPS tab in the WSI InFlight Configuration program (see pages 16 and 21).

This message typically indicates that a port has been selected that does not exist on the computer or that the port is already in use by another application. The Port Search tab in the WSI InFlight Configuration program can be used to verify that the GPS device is connected to the expected port (see pages 16 and 24).

Are other error codes displayed in the Initialization Progress pane at the bottom of the window?

Other error codes may indicate an internal error. Call WSI Customer Service for assistance.

Display is blank

The system is installed, but nothing is shown on the display. It is completely blank.

Is the display device plugged in and turned on?

Verify that the power supply to your display is connected and operating.

Are the contrast and brightness settings correct?

Check the monitor contrast and brightness settings. Make sure they are adjusted so that the screen is not set to black.
Data is not updating

The WSI InFlight Application is running but it does not appear that I am getting any new data.

_____ Is the clock on the display computer set correctly?

For WSI InFlight to function properly, your computer’s clock must be set to within five minutes of the correct time and date for the time zone selected in your computer. You can verify the clock settings using the Windows Control Panel (the exact steps depend upon your display computer’s operating system).

_____ Does an error code appear next to the Receiver button on the Status Overview window?

If one of the following error codes is displayed next to the Receiver button, you may need to take corrective action.

Table 12: Receiver status error codes

<table>
<thead>
<tr>
<th>Error</th>
<th>Possible Cause</th>
<th>Resolution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Receiver status unknown</td>
<td>No data yet</td>
<td>Wait</td>
</tr>
<tr>
<td>Receiver not responding, and receiver has not raised its RTS (our CTS) pin</td>
<td>No response from receiver for 1 minute</td>
<td>Check that the receiver has power Check that the cable to the receiver is making full contact at both ends Check that the receiver is correctly wired and verify continuity on all pins If the problem persists, refer to Receiver not responding on page 80 for a description of an additional diagnostic procedure</td>
</tr>
<tr>
<td>Check power to receiver and then cable wiring to receiver</td>
<td>Most likely, receiver is either not connected to the computer, or not powered</td>
<td></td>
</tr>
</tbody>
</table>

continued next page >
Table 12: Receiver status error codes

<table>
<thead>
<tr>
<th>Error</th>
<th>Possible Cause</th>
<th>Resolution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Receiver not responding, but receiver has</td>
<td>No response from receiver for 1 minute, although receiver is powered and</td>
<td>Check that the receiver is correctly wired and verify continuity on all pins</td>
</tr>
<tr>
<td>raised its RTS (our CTS) pin</td>
<td>connected to the computer</td>
<td>Check Frame Monitor in Receiver Status page to see if receiver is busy transferring data</td>
</tr>
<tr>
<td>Check cable wiring to receiver</td>
<td>Message often appears briefly when receiver is busy transferring a large block</td>
<td>If the problem persists, refer to Receiver not responding on page 80 for a description of an additional diagnostic procedure</td>
</tr>
<tr>
<td></td>
<td>of weather data</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Not locked: BER out of tolerance</td>
<td>Satellite signal not acquired</td>
<td>Check antenna cable</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Clear the line of sight</td>
</tr>
<tr>
<td>Locked: BER warning</td>
<td>Signal is marginal (that is, BER levels at or above 10)</td>
<td>Clear the line of sight</td>
</tr>
<tr>
<td>Locked: BER out of tolerance</td>
<td>Signal is weak or non-existent (that is, BER levels at or above 20)</td>
<td>Clear the line of sight</td>
</tr>
</tbody>
</table>

Is the system receiving data? Is there any interruption to your signal?

Click on the Receiver button on the Status Overview window. Green data bars should appear in the Frame Monitor when the unit receives product packages. If no data bars appear within 5 minutes, make sure the BER Monitor is reporting a low BER (green dots drawn below yellow line). If not, refer to Table 12 (page 75). Try moving to a clear area. If this does not help, call WSI Customer Service for assistance.

Is the error code "ASE is falling behind" displayed in the ASE Status field on the Receiver Status window?

This error code indicates that the display processor is unable to keep pace with the data stream. Try closing other programs on the display device. If the problem persists, an upgrade to faster display hardware is necessary.

Troubleshooting
Is the error code "ASE has shutdown" displayed in the ASE Status field on the Receiver Status window?

This error code indicates an internal error. Call WSI Customer Service for assistance.

Is an object blocking the omni directional antenna?

In this situation you will see higher BER values being displayed on the Receiver Status window. The line of sight from the antenna to the satellite must be clear. If not, move to an area with no obstructions of the southern sky (approximately over southwest Texas) and no large reflecting surfaces such as a hanger.

Is ice or snow building up on the antenna?

In this situation you will see high BER values (>20) being displayed on the Receiver Status window. Gently remove the ice or snow buildup. If the omni directional antenna cannot receive data, your system will not update correctly.

Has the coaxial cable between the omni directional antenna and your system been cut or damaged?

In this situation you will see high BER values (>20) being displayed on the Receiver Status window. Replace the coaxial cable. This should be installed by a certified aviation technician.

Is the coaxial cable running near high voltage electrical sources such as 220 volt wiring, or near an extremely hot surface that has damaged the cable?

In this situation you will see high BER values being displayed on the Receiver Status window. Try re-routing the cable. This should be installed by a certified aviation technician.

Do red lines appear in the Frame Monitor display on the Receiver Status window?

Red lines indicate that data has been corrupted between the receiver and the display application. Check cables and serial port settings on the display device. Red lines can appear if the display device cannot keep pace with the flow of data and the installation does not support hardware flow control.
___Is BER low (<10) but no data visible on the Frame Monitor display or Current Conditions window?

The WSI InFlight receiver must receive an authorization message before it will transmit weather data and must be power cycled (turned off and then on) before any authorization change can take effect. (This feature minimizes the chance that unexpected service changes will take place while in flight.) Ensure that service for the receiver has been requested from WSI. If so, try power cycling the receiver. The PIDs button on the Receiver Status page can be used to display a list of currently-authorized products. Note that authorization changes will appear in this list as soon as they are received over the air, but will not take effect until the receiver is power cycled.

___Is the Frame Monitor showing data (green lines) but no weather data appears?

Verify that the internal clock for your EFB or MFD is set correctly according to the selected current time zone.

Erratic cursor movement

A bug in Windows can cause the operating system to interpret the serial input from the satellite receiver as mouse commands. In that case, the cursor moves wildly about the display device screen. For a temporary workaround, you can start the display device and Windows before powering on the WSI InFlight receiver. For a permanent fix, consult the Technical Notes section of the WSI Customer Account Center at http://www.wsi.com/myaccount/.
Current Conditions map is not displaying

The map that should display in the Current Conditions window has been replaced with error codes.

___ Does the error code "Updating" appear?

This error code indicates that the system is busy. Try closing other applications on the display device. If the problem persists, an upgrade to faster display hardware is probably necessary.

___ Does the error code "Init Error" appear?

This error code indicates that there is a version mismatch in the live data. Select the "Clear Live Data" button on the Wx Format tab of the Configuration program to erase the stored live data and start fresh. (see pages 16 and 18.)

All my graphical METARs turn black periodically

This event indicates that WSI has not received the new hour’s report. The graphical METAR is turned black to indicate that there is no new data for the station. If you want to refer to the previous hour’s report, you can access the report text by selecting the airport icon.

Some weather products are not displayed

Your receiver may not be authorized for the products. Click the PIDs button in the Receiver Status window to view a list of the products for which your receiver has been authorized. If you have just started the WSI InFlight application, wait at least 15 minutes for data to collect. If the list does not match your product subscription after that time, contact WSI Customer Services (refer to page 7 for contact information).
**Receiver not responding**

You can use the HyperTerminal program on a Windows-based laptop to view diagnostic information accessed directly from the receiver. This is a useful procedure in the event the WSI InFlight client is not receiving any data at all.

To view the receiver diagnostic information, follow these steps:

1. On the laptop open HyperTerminal by selecting Programs>Accessories>Communications>HyperTerminal.
2. Set the following parameters:
   - 57600 bits per second
   - 8 data bits
   - "None" for parity
   - 1 stop bit
   - "None" for flow control
3. Define the COM port.
4. Connect the COM2 diagnostic cable between the receiver and the laptop.
5. To switch the receiver into a VERBOSE reporting mode, you must enter the following commands in the terminal window:
   ```
   @VERBOSE
   @END
   ```
   Since commands typed in the terminal window do not appear, type the commands in an ASCII editor (such as Notepad).
6. In the terminal window, hit Enter, then copy the commands from Notepad and paste them in the terminal window. Hit Enter again.
7. If you are successful, the receiver should reboot and search for a satellite signal. If the receiver doesn’t reboot, power the receiver on and off again and reenter the commands. It may take several attempts.
8. Once a signal is acquired, the receiver will periodically report BER. BER shows signal health and indicates that the receiver is functioning appropriately. Low numbers are a good indication that the receiver is working correctly. The standard is 0/1000.
9. If the "Receiver not responding" error message continues to display, call WSI Customer Service for assistance.
Appendix A

METAR/TAF Reference

This appendix provides a reference to the standard METAR and TAF report codes. For more information consult the most recent Aeronautical Information Manual at http://www.faa.gov/AIM.

METAR Reference Key

Refer to Table 13 for an explanation of how to decode the following METAR report:

METAR KPVD 231551Z 03007KT 5SM -RA BR SCT035 OVC050 19/17 A2994 RMK A02 SLP138 P0005 T01949174

Table 13: METAR Report Elements

<table>
<thead>
<tr>
<th>Element</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>KPVD</td>
<td>Observation for Providence, RI</td>
</tr>
<tr>
<td>231551Z</td>
<td>Report issued on the 23rd at 1551 GMT</td>
</tr>
<tr>
<td>03007KT</td>
<td>Winds from 030 at 7 knots</td>
</tr>
<tr>
<td>5SM</td>
<td>Visibility at 5 Statute Miles</td>
</tr>
<tr>
<td>-RA</td>
<td>Light rain</td>
</tr>
<tr>
<td>BR</td>
<td>Mist</td>
</tr>
<tr>
<td>SCT035</td>
<td>Scattered clouds (3/8 to 4/8 coverage) at 3500' AGL</td>
</tr>
<tr>
<td>OVC050</td>
<td>Overcast at 5000'</td>
</tr>
<tr>
<td>19/17</td>
<td>Temperature 19, dew point 17 (Celsius)</td>
</tr>
<tr>
<td>A2994</td>
<td>Altimeter 29.94</td>
</tr>
<tr>
<td>RMK</td>
<td>Remarks (precedes Remarks section)</td>
</tr>
<tr>
<td>A02</td>
<td>Automated observation with precipitation discriminator</td>
</tr>
<tr>
<td>SLP138</td>
<td>Sea level pressure 1013.8 millibars</td>
</tr>
<tr>
<td>P0005</td>
<td>0.5 inches of liquid precipitation in the last hour</td>
</tr>
<tr>
<td>T01940174</td>
<td>Temperature/dew point in tenths (19.4/17.2 Celsius)</td>
</tr>
</tbody>
</table>
The following tables describe METAR abbreviations for various elements including weather phenomena, descriptors, cloud types, and intensity values.

**Table 14: General METAR Abbreviations**

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>A01</td>
<td>Automated observation w/o precipitation discriminator (rain/snow)</td>
</tr>
<tr>
<td>A02</td>
<td>Automated observation w/ precipitation discriminator (rain/snow)</td>
</tr>
<tr>
<td>BKN</td>
<td>Broken (5/8 to 7/8 coverage)</td>
</tr>
<tr>
<td>CLR</td>
<td>Clear at or below 12000’ (AWOS/ASOS report)</td>
</tr>
<tr>
<td>COR</td>
<td>Correction to the observation</td>
</tr>
<tr>
<td>FEW</td>
<td>1/8 or 2/8 cloud coverage</td>
</tr>
<tr>
<td>LDG</td>
<td>Landing</td>
</tr>
<tr>
<td>M</td>
<td>In temperature field means &quot;minus&quot; or below zero</td>
</tr>
<tr>
<td></td>
<td>In RVR listing indicates visibility less than lowest reportable sensor value</td>
</tr>
<tr>
<td>NO</td>
<td>Not available (e.g. SLPNO, RVRNO)</td>
</tr>
<tr>
<td>NSW</td>
<td>No significant weather</td>
</tr>
<tr>
<td>OVR</td>
<td>Overcast</td>
</tr>
<tr>
<td>P</td>
<td>In RVR indicates visibility greater than highest reportable sensor value (e.g. P6000)</td>
</tr>
<tr>
<td>PROB40</td>
<td>Probability 40 percent</td>
</tr>
<tr>
<td>R</td>
<td>Runway (used in RVR measurement)</td>
</tr>
<tr>
<td>RMK</td>
<td>Remark</td>
</tr>
<tr>
<td>RY/RWY</td>
<td>Runway</td>
</tr>
<tr>
<td>SCT</td>
<td>Scattered (3/8 to 4/8 coverage)</td>
</tr>
<tr>
<td>SKC</td>
<td>Sky clear</td>
</tr>
<tr>
<td>SLP</td>
<td>Sea level pressure (e.g. 1013.9 millibars reported as SLP138)</td>
</tr>
<tr>
<td>SM</td>
<td>Statute miles</td>
</tr>
<tr>
<td>SPECI</td>
<td>Special report</td>
</tr>
<tr>
<td>TKOF</td>
<td>Takeoff</td>
</tr>
<tr>
<td>T</td>
<td>Temperature/dew point given to nearest 1/10 degree (e.g. T01940172 indicates temperature of 19.4 and dew point of 17.2 in degrees Celsius)</td>
</tr>
<tr>
<td>V</td>
<td>Varies (wind direction and RVR)</td>
</tr>
</tbody>
</table>
### Table 14: General METAR Abbreviations

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>VC</td>
<td>Vicinity</td>
</tr>
<tr>
<td>VRB</td>
<td>Variable wind direction when speed is equal to or less than 6 knots</td>
</tr>
<tr>
<td>VV</td>
<td>Vertical visibility (indefinite ceiling)</td>
</tr>
</tbody>
</table>

### Table 15: METAR Weather Phenomena Abbreviations

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>BR</td>
<td>Mist</td>
</tr>
<tr>
<td>DS</td>
<td>Dust storm</td>
</tr>
<tr>
<td>DU</td>
<td>Widespread dust</td>
</tr>
<tr>
<td>DZ</td>
<td>Drizzle</td>
</tr>
<tr>
<td>FC</td>
<td>Funnel cloud</td>
</tr>
<tr>
<td>+FC</td>
<td>Tornado/water spout</td>
</tr>
<tr>
<td>FG</td>
<td>Fog</td>
</tr>
<tr>
<td>FU</td>
<td>Smoke</td>
</tr>
<tr>
<td>GR</td>
<td>Hail</td>
</tr>
<tr>
<td>GS</td>
<td>Small hail/snow pellets</td>
</tr>
<tr>
<td>HZ</td>
<td>Haze</td>
</tr>
<tr>
<td>IC</td>
<td>Ice crystals</td>
</tr>
<tr>
<td>PE</td>
<td>Ice pellets</td>
</tr>
<tr>
<td>PO</td>
<td>Dust/sand whirls</td>
</tr>
<tr>
<td>PY</td>
<td>Spray</td>
</tr>
<tr>
<td>RA</td>
<td>Rain</td>
</tr>
<tr>
<td>SA</td>
<td>Sand</td>
</tr>
<tr>
<td>SG</td>
<td>Snow grains</td>
</tr>
<tr>
<td>SN</td>
<td>Snow</td>
</tr>
<tr>
<td>SQ</td>
<td>Squall</td>
</tr>
<tr>
<td>SS</td>
<td>Sandstorm</td>
</tr>
</tbody>
</table>
### Table 15: METAR Weather Phenomena Abbreviations

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>UP</td>
<td>Unknown precipitation (automated observations)</td>
</tr>
<tr>
<td>VA</td>
<td>Volcanic ash</td>
</tr>
</tbody>
</table>

### Table 16: METAR Weather Descriptor Abbreviations

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>BC</td>
<td>Patches</td>
</tr>
<tr>
<td>BL</td>
<td>Blowing</td>
</tr>
<tr>
<td>DR</td>
<td>Low drifting</td>
</tr>
<tr>
<td>FZ</td>
<td>Super cooled/freezing</td>
</tr>
<tr>
<td>MI</td>
<td>Shallow</td>
</tr>
</tbody>
</table>

### Table 17: METAR Cloud Type Abbreviations

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>CB</td>
<td>Cumulonimbus</td>
</tr>
<tr>
<td>TCU</td>
<td>Towering Cumulus</td>
</tr>
</tbody>
</table>

### Table 18: METAR Intensity Value Abbreviations

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>-</td>
<td>Light</td>
</tr>
<tr>
<td>No sign</td>
<td>Moderate</td>
</tr>
<tr>
<td>+</td>
<td>Heavy</td>
</tr>
</tbody>
</table>
TAF Reference Key

Refer to Table 19 for an explanation of how to decode the following TAF report:

TAF KJFK 292331Z 300034 34006KT P6SM BKN040 OVC100
TEMPO 0001 4SM BR BKN025
FM0400 35010KT P6SM SCT050 =

Table 19: TAF Report Elements

<table>
<thead>
<tr>
<th>Element</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>KJFK</td>
<td>Observation for Kennedy International Airport, NY</td>
</tr>
<tr>
<td>292331Z</td>
<td>Report issued on the 29th at 2331 GMT</td>
</tr>
<tr>
<td>300034</td>
<td>Forecast valid from the 30th at 0000Z until the 30th at 2400Z</td>
</tr>
<tr>
<td>34006KT</td>
<td>Winds from 340 at 6 knots</td>
</tr>
<tr>
<td>P6SM</td>
<td>Visibility Plus 6 Statute Miles</td>
</tr>
<tr>
<td>BKN040</td>
<td>Broken clouds (5/8 to 7/8 coverage) at 4000’ AGL</td>
</tr>
<tr>
<td>OVC100</td>
<td>Overcast at 10000’</td>
</tr>
<tr>
<td>TEMPO 0001</td>
<td>Temporary conditions exist between 0000Z and 0100Z</td>
</tr>
<tr>
<td>4SM</td>
<td>Visibility 4 Statute Miles</td>
</tr>
<tr>
<td>BR</td>
<td>Mist</td>
</tr>
<tr>
<td>BKN025</td>
<td>Broken clouds (5/8 to 7/8 coverage) at 2500’ AGL</td>
</tr>
<tr>
<td>FM0400</td>
<td>After 0400Z following conditions prevail</td>
</tr>
<tr>
<td>35010KT</td>
<td>Winds from 350 at 10 knots</td>
</tr>
<tr>
<td>P6SM</td>
<td>Visibility Plus 6 Statute Miles</td>
</tr>
<tr>
<td>SCT050</td>
<td>Scattered clouds (3/8 to 4/8 coverage) at 5000’ AGL</td>
</tr>
<tr>
<td>=</td>
<td>End of forecast</td>
</tr>
</tbody>
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