

BENDIX/KING®

KMD 550/850

Multi-Function Display

Flight Information Services (FIS)

Pilot's Guide Addendum



For Software Version 02/02 and later

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Revision History

Manual KMD 550/850 Flight Information Services (FIS)
Pilot's Guide Addendum

Revision 6, February 2009

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Summary

Added XM products:

Precipitation Type (at Surface)

Freezing Levels

Winds Aloft

Translated Metars

Temporary Flight Restrictions (TFR's)

Revision History

Manual KMD 550/850 Flight Information Services (FIS)
Pilot's Guide Addendum

Revision 5, March 2007

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Summary

Added XM Receiver functionality.

Revision History

Manual KMD 550/850 Flight Information Services (FIS)
Pilot's Guide Addendum

Revision 4, November 2004

Part Number 006-18237-0000

Summary

Add FIS Area Products (AIRMETs, SIGMETs, Convective SIGMETs and Alert Weather Watches).

MODE Softkey now displays product selection menu on FIS product displays

Control Knob now allows cycling through graphical FIS products

Airport icons and identifiers are now displayed on FIS graphical product map displays per setting on Map Setup Page (2)

Added VOR icons and identifiers to FIS graphical product map displays (except graphical METARs) per setting on Map Setup Page (2)

Extended Track Line on Graphical Weather page

Revision History

Manual KMD 550/850 Flight Information Services (FIS)
Pilot's Guide Addendum

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Summary

METARs and SPECIs now expire after 120 minutes

Graphical METAR LIFR now displayed as magenta color

Miscellaneous corrections

Revision History

Manual KMD 550/850 Flight Information Services (FIS)
Pilot's Guide Addendum

Revision 2, November 2002

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Summary

Added FIS subscription management

Changed FIS Text Page format

Changed FIS METARs time-out

Airports now shown on NEXRAD Page

Changed FIS Network Page

Miscellaneous corrections

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Manual KMD 550/850 Flight Information Services (FIS)
Pilot's Guide Addendum

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Summary

Complete manual revision

Revision History

Manual KMD 550/850 Flight Information Services (FIS)
Pilot's Guide Addendum

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Summary

This is the original release of this publication.

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INTRODUCTION

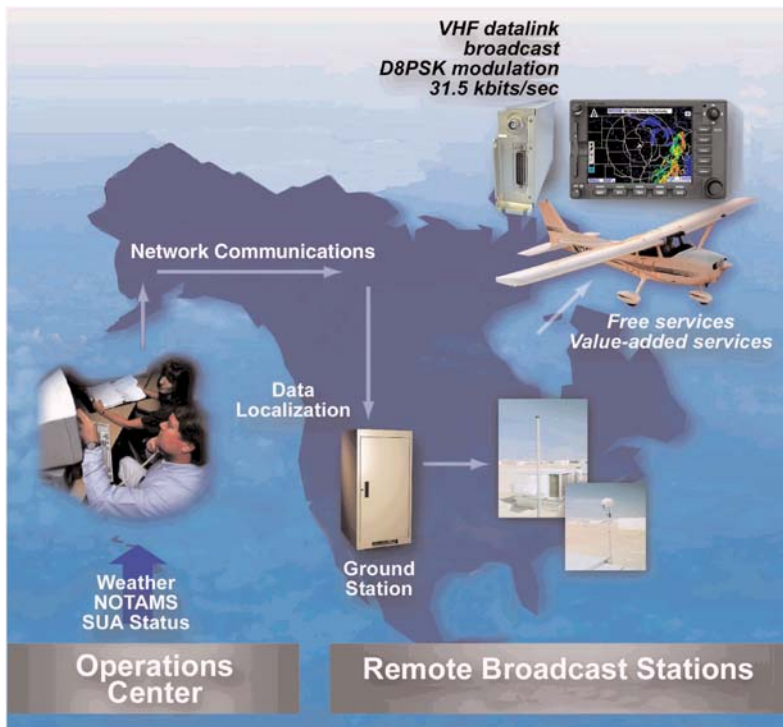
CONCEPT OF OPERATION

The Flight Information Services (FIS) system supplies real-time weather information and other flight advisory information to pilots to enhance situation awareness.

FIS or XM weather is not intended to replace voice radio services. Voice communication of weather and meteorological information, in accordance with FAA operating rules, is still required.

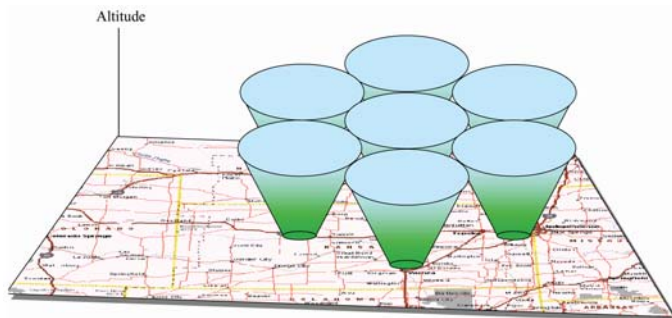
Real-time weather is available 24 hours / day, 7 days / week. Two different systems are available for delivery of the weather data: a ground-based VHF Data Link (VDL) network and Baron WxWorx weather delivered via the XM Radio satellite system. Data acquired from FAA approved weather sources is processed and then distributed to VDL Ground Stations and to the XM satellite network. The Ground Stations broadcast the information over a VHF Data Link (VDL) to aircraft within line-of-sight utilizing VDL mode 2 transmitters at a bit rate up to 31.5 kbps. The XM satellite network uses two geosynchronous satellites to broadcast network weather to aircraft at S-band (2.3 GHz) frequencies.

This diagram illustrates how FIS VDL data is received in the aircraft.

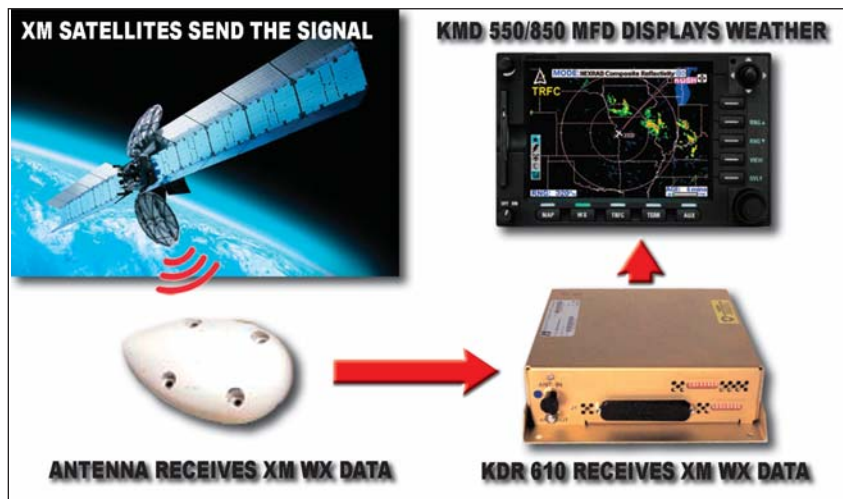


Introduction

See our website at www.bendixking.com for VDL network status and coverage. Continuous coverage of most of the continental US is possible at altitudes as low as 5,000 ft. AGL, except for regions of precipitous terrain. As with all VHF communications, the line-of-sight range increases with altitude. However, there is no appreciable increase in coverage above 17,500 ft MSL. The following illustration shows how altitude influences FIS VDL coverage.



The following diagram illustrates how XM Wx data is received in the aircraft.



The XM Satellite Radio weather system provides continuous coverage down to ground level over the entire continental United States. A good view of the southern horizon must be available in order to receive at least one of the two satellites.

To receive FIS or XM WX products, an aircraft must be equipped with a compatible VDL receiver (KDR 510) or XM receiver (KDR 610), dedicated VHF antenna or satellite antenna, and appropriate display (KMD 550/850). FIS VDL uses a one-way (ground-to-air) broadcast protocol.

XM WX uses one-way (satellite network to air) broadcast protocol. Data is continually broadcast without the need to request information, nor acknowledge receipt.

Both basic (no-cost) and value added fee-based products are transmitted by VDL. Basic VDL products are displayed using standard ICAO/WMO textual format.

No-cost VDL Subscription	Fee-based XM Subscription
Aviation Routine Weather Reports (METARs)	Aviation Routine Weather Reports (METARs)
Aviation Selected Special Weather Reports (SPECIs)	Aviation Selected Special Weather Reports (SPECIs)
Terminal Area Forecasts (TAFs)	Terminal Area Forecasts (TAFs)
Pilot Reports (PIREPs)	
AIRMETs	AIRMETs
SIGMETs	SIGMETs
Convective SIGMETs	Convective SIGMETs
Alert Weather Watches (AWW)	
Fee-based VDL Subscription	
NEXRAD Base Reflectivity	NEXRAD Composite Reflectivity
Graphical METARs	Graphical METARs
Graphical AIRMETs	Graphical AIRMETs
Graphical SIGMETs	Graphical SIGMETs
Graphical Convective SIGMETs	Graphical Convective SIGMETs
Graphical Alert Weather Watches	Precipitation Type, Freezing Levels, Winds Aloft, Severe Weather Storm Track SCITs, Temporary Flight Restrictions TFR's

The VDL ground station network and the XM satellite network repetitively broadcast the same product until either newer data is available or the information has exceeded a pre-determined expiration time. Basic products are broadcast at least once every 5 minutes by the VDL system. Products are broadcast once every 5 - 12 minutes (depending on the product) by the XM system.

NOTE: Due to inherent delays, areas of coverage and relative age and availability of the data that can be experienced, weather data cannot be viewed as an absolute depiction of conditions at a specific location.

EQUIPMENT OVERVIEW

The Datalink Weather Function of the Bendix/King KMD 550/850 Multi Function Display allows for the display and control of textual and graphical weather information received from the Honeywell KDR 510 VDL Receiver or the KDR 610 XM satellite receiver. The choice of VDL or XM receiver is made during installation. A single display can display only VDL weather or only XM weather, not both.

This Pilot's Guide Addendum describes the operation of the KMD 550/850 display and discusses the proper use of the displayed data for strategic weather planning. The detailed description of the general operation of the KMD 550/850 is contained in the KMD 550/850 Pilot's Guide.

The Bendix/King KMD 550/850 is shown below with the Text METAR Page selected.



CAUTION

Datalink weather information is to be used as a strategic planning tool for pilot decisions on avoiding inclement weather areas that are beyond visual range or where poor visibility precludes visual acquisition of inclement weather. Datalink weather information may be used as follows:

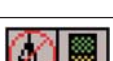
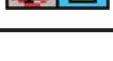
a. To aid the pilot in situational awareness of hazardous meteorological conditions.

b. As a cue to the pilot to communicate with the ATC controller, AFSS specialist, Operator Dispatch, or Airline Operations Control Center (AOCC) to get further information about the current meteorological conditions. In no case should the pilot take any evasive action based solely upon the datalink weather display.

The datalink weather information is intended for assistance in strategic flight planning purposes only and lacks sufficient resolution and updating necessary for tactical maneuvering.

DATALINK WEATHER FUNCTION STATUS ICONS

The Datalink Weather Function Status Icons are located in the lower left of the display. They are used to indicate whether or not the KMD 550/850 is currently receiving and/or displaying weather information. The following table shows the various icons and their meanings.

VDL Icon	XM Icon	Colors	Description
		Black on a cyan background.	No weather data is currently being received but previously received data is being displayed on the present page.
		Black on a cyan background.	Weather data is currently being received from a signal and displayed on the present page. XM signal is weak.
		Black on a cyan background.	Weather data is currently being received from a signal and displayed on the present page. XM signal is marginal.
		Black on a cyan background.	Weather data is currently being received from a signal and displayed on the present page. XM signal is good.
		Black on gray.	Weather data not being received nor displayed on the present page.
		Black on gray.	Weather data is currently being received from a signal but not displayed on the present page.
		Black on gray with red slash.	Fault with connection or data link radio.
		Black on gray.	Graphical METAR overlay is available but not displayed.
		Black, green and yellow on cyan.	Graphical METAR overlay is enabled and displayed.
		Black on gray.	Weather data not being received. Graphical METAR overlay is available but not displayed.
		Black, green and yellow on cyan.	Weather data not being received. Graphical METAR overlay is enabled and displayed.
		Black on gray with red slash.	Radio Fault. Graphical METAR overlay is available but not displayed.
		Black on gray with red slash; Black, green and yellow on cyan.	Radio Fault. Graphical METAR overlay is enabled and displayed.

Basic Service Weather Products

VDL Icon	XM Icon	Colors	Description
N/A	No TFR Icon present.		TFR data is not being received.
N/A		Black on gray.	TFR data is being received but is not currently being displayed.
N/A		Black on cyan.	TFR data is being received and displayed.
Icon			Description
	0 min – 15 min	Datalink lightning information received and displayed.	
	0 min – 15 min	Datalink lightning information received but not displayed.	
	15 min – 30 min	Datalink lightning information received and displayed but data is more than 15 minutes old.	
	15 min – 30 min	Datalink lightning information received but not displayed and data is more than 15 minutes old.	
	> 30 min	Datalink lightning is not being received.	
Icon	Description		
	Severe Weather Storm track information being received and displayed.		
	Severe Weather Storm track information being received but not displayed.		
	Severe Weather Storm track information not being received / data invalid.		

BASIC SERVICE WEATHER PRODUCTS

The following is a discussion of weather products offered with the basic no-fee VDL service. Accessing and navigating these services will be discussed in detail later in this addendum.

All basic and value-added products (except those identified as VDL Only) can also be obtained through a single fee-based XM subscription service.

METAR

A METAR (Aviation Routine Weather Report) describes the specific weather conditions at a particular airport at a given time. The KMD 550 provides a translated version of the METAR data. This is a readable version of the METAR data derived from the actual METAR. The raw METAR data is played at the end of the translated version. The elements of a METAR are in order as follows:

1. Type of report

2. ICAO station identifier
3. Date and time of issue
4. Modifier (AUTO if automated report or COR if corrected observation)
5. Wind
6. Visibility
7. Runway visual range (as required)
8. Weather phenomena
9. Sky condition
10. Temperature/dew point group
11. Altimeter
12. Remarks (as required)

METARs available within the selected range of the selected area will be displayed up to a maximum of 25 reports. These reports are displayed in an encoded textual format. METARs displayed graphically on the map are offered through a subscription service.

NOTE: When a specific element of METAR data is not available, it is omitted from the report. The user must know the sequence of data to recognize omissions. METAR observations older than 120 minutes will be discarded.

See Appendix A for instructions on decoding textual METARs.

SPECI

A SPECI (Aviation Selected Special Weather Report) is related to the METAR. SPECIs are issued when certain specific conditions or events have been observed at a particular location, usually an airport. A SPECI will contain the same elements as a METAR and will generally be issued for the following reasons:

1. Sudden, extreme changes in wind speed and/or direction.
2. Changes in surface visibility, especially those that change the flying category at the reporting site.
3. Changes in runway visibility above or below 2,400 feet.
4. Appearance or termination of significant weather or natural atmospheric events such as tornados, waterspouts, funnel clouds, thunderstorms, squalls and volcanic eruptions.
5. Changes in precipitation intensity or form.
6. Changes to ceilings when previously reported ceilings were at or below 3,000 feet, or the formation of a ceiling below 3,000 feet. Also, new formation of cloud layers or other obscuring phenomenon that occur below 1,000 feet.
7. Aircraft mishaps.
8. Other meteorological conditions that the agency or the observer determine as critical.

Basic Service Weather Products

Refer to the section on METARs for an explanation of the elements. The element sequence and content will be the same as those in a METAR report with the exception of the first element denoting report type. “SPECI” will be seen in place of “METAR”. The KMD 550 provides a translated version of the SPECI data. This is a readable version of the SPECI data derived from the actual SPECI. The raw SPECI data is played at the end of the translated version.

NOTE: When a specific element of SPECI data is not available, it is omitted from the report. The user must know the sequence of data to recognize omissions. SPECI observations older than 120 minutes will be discarded.

Basic service SPECIs are offered in the encoded textual format.

See Appendix A for instructions on decoding textual METAR/SPECIs.

TAF

A TAF (Terminal Area Forecast) is a statement of expected meteorological conditions at an airport during a specified period of time. Many aspects of the TAF are the same as a METAR. Abbreviations are the same as in a METAR with addition of a few more discussed later. Many of the data elements are formatted as those in a METAR report. A TAF will contain elements in the following order:

1. Type of report
2. ICAO station identifier
3. Date and time of issue
4. Date and time valid
5. Wind
6. Visibility
7. Weather phenomena
8. Sky conditions
9. Wind shear (as required)
10. Forecast weather change indicator

TAFs available within the selected range of the selected area will be displayed up to a maximum of 25 reports. These reports are displayed in an encoded textual format.

NOTE: TAFs older than the forecast validity period are discarded. Amended or corrected TAFs generated within the issuance period are provided as soon as they are available, and the previous outdated TAF is no longer transmitted.

See Appendix A for instructions on decoding textual TAFs.

PIREP (VDL ONLY)

A PIREP (Pilot Weather Report) is an observation of conditions at a specific location or along a specific route. These conditions are reported by pilots when communications are established with ground facilities such as EFAS, AFSS/FSS, ARTCC or ATC. Abbreviations are the same as in a METAR. Pilots are encouraged to promptly volunteer these reports. A PIREP will contain elements in the following order:

1. Type of message (urgent or routine)
2. Location in relation to an airport or VHF NAVAID
3. Time observed
4. Flight Level (may not always be present)
5. Type of aircraft (may not always be present)
6. Sky cover (may not always be present)
7. Weather conditions (may not always be present)
8. Temperature (may not always be present)
9. Wind direction and speed (may not always be present)
10. Turbulence (may not always be present)
11. Icing (may not always be present)
12. Remarks (may not always be present)

PIREPs available within the selected range of the selected area will be displayed up to a maximum of 25 reports. These reports are displayed in an encoded textual format.

NOTE: PIREPs older than 120 minutes are discarded.

See Appendix A for instructions on decoding textual PIREPs.

AIRMET

An AIRMET (Airman's Meteorological Information) is an advisory of significant weather that could be hazardous to single engine, light aircraft and VFR pilots. However, parameters are such that the phenomena does not require issuance of a SIGMET. AIRMETs address details regarding IFR, extensive mountain obscuration, turbulence, strong surface winds, icing and freezing levels. AIRMETs are considered widespread because they must either be affecting or forecast to affect an area at least 3,000 square miles. However, during the forecast period, the actual affected area may be much smaller. AIRMETs are issued every six hours and the maximum forecast period is 6 hours. An AIRMET will contain elements in the following order:

1. Forecast Area
2. Report Type

Basic Service Weather Products

3. Date and time issued
4. Report designation and reason for issuance
5. Validity period
6. Area of coverage
7. Weather phenomenon details.

These reports are displayed in an encoded textual format.

NOTE: AIRMETs may be issued up to 15 minutes prior to the start of the validity period. The system will display the data age as zero until the start of the validity period. AIRMETs older than 360 minutes are discarded. Amended, updated or corrected AIRMETs generated within the issuance period are provided as soon as they are available, and the previous outdated AIRMET is no longer transmitted.

When an AIRMET is cancelled, neither the original report nor the cancellation message can be displayed.

See Appendix A for instructions on decoding textual AIRMETs.

SIGMET

A SIGMET (Significant Meteorological Information) is an advisory of non-convective weather that is potentially hazardous to all aircraft. SIGMETs address details regarding severe icing not associated with thunderstorms, severe or extreme turbulence not associated with thunderstorms, dust or sand storms lowering visibility to less than 3 miles, volcanic ash. SIGMETs are considered widespread because they must either be affecting or forecast to affect an area at least 3,000 square miles. However, during the forecast period, the actual affected area may be much smaller. SIGMETs are issued as needed and the maximum forecast period is 4 hours, except for 6 hours for conditions associated with hurricanes. A SIGMET will contain elements in the following order:

1. Forecast Area
2. Report Type
3. Date and time issued
4. Report designation and reason for issuance
5. Validity period
6. Area of coverage
7. Location of weather phenomenon
8. Weather phenomenon details.

These reports are displayed in an encoded textual format.

NOTE: SIGMETs older than the forecast period are discarded. Amended, updated or corrected SIGMETs generated within the issuance period are provided as soon as they are available, and the previous outdated SIGMET is no longer transmitted.

When an SIGMET is cancelled, neither the original report nor the cancellation message can be displayed.

See Appendix A for instructions on decoding textual SIGMETs.

CONVECTIVE SIGMET

A Convective SIGMET (Convective Significant Meteorological Information) is an advisory of convective weather that the forecaster believes hazardous to all aircraft. Convective SIGMETs address details regarding severe thunderstorms, embedded thunderstorms, a line of thunderstorms, or thunderstorms producing heavy precipitation affecting an area 40 percent or more of an area at least 3,000 square miles. Convective SIGMETs are issued hourly with a maximum forecast period of 2 hours. A Convective SIGMET will contain elements in the following order:

1. Region Identifier and issue date and time
2. Report designator
3. Validity period
4. Area of coverage
5. Location details
6. Weather phenomena details

NOTE: Convective SIGMETs older than the forecast period are discarded. Amended, updated or corrected Convective SIGMETs generated within the issuance period are provided as soon as they are available, and the previous outdated Convective SIGMET is no longer transmitted.

See Appendix A for instructions on decoding textual Convective SIGMETs.

ALERT WEATHER WATCHES (VDL ONLY)

Alert Weather Watches (AWW) are Alert Severe Weather Watch Bulletins that describe areas of possible severe thunderstorm or tornado development. These are watches, not warnings; and are issued as needed. Severe weather may not actually develop. An Alert Weather Watch will contain elements in the following order:

1. Report designation and date and time of issuance
2. Watch number, reason for issuance, area of coverage and validity period.
3. Watch coordinates
4. Forecast

NOTE: Alert Weather Watches older than the forecast period are discarded.

See Appendix A for instructions on decoding textual Alert Weather Watches.

VALUE ADDED SERVICE WEATHER PRODUCTS

The following is a discussion of weather products offered with the value added VDL subscription service. Accessing and navigating these services will be discussed in detail later in this addendum.

All basic and value-added products (except those identified as VDL Only) can also be obtained through a single fee-based XM subscription service.

NOTE: Airport and VOR icons, with their identifiers, will be displayed on the graphical FIS maps at the range settings selected on Map Setup Page (2). However, only airport identifiers will be displayed on the Graphical METARs map display.

NEXRAD

Next Generation Radar (NEXRAD) is formally designated WSR-88D, which stands for Weather Service Radar (Doppler) and was commissioned in 1988.

FIS VDL provides NEXRAD base reflectivity and XM WX provides NEXRAD composite reflectivity. Each NEXRAD ground radar site scan is composed of separate beam scans at several elevation angles for 360° around the site. Base reflectivity is the highest precipitation echo (reflectivity) contained in the lowest NEXRAD radar elevation angle scan (5°). Composite reflectivity provides the highest precipitation echoes within all of the elevation scan angles. The NEXRAD base or composite reflectivity modes provide a display of echo intensity depicted by colors. NEXRAD information is good for identifying precipitation intensity.

CAUTION: NEXRAD data must be used for strategic planning purposes only. Due to inherent delays and relative age of the data that can be experienced, NEXRAD data cannot be used for tactical avoidance of weather.

NEXRAD reflectivity images older than 75 minutes are discarded and no longer displayed.

Figure 1 shows a typical NEXRAD display. Political boundaries, rivers, lakes, and oceans are depicted in conjunction with weather.

The NEXRAD data map is always displayed in a north up orientation.

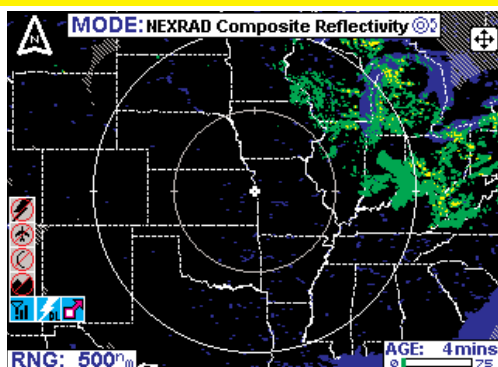


Figure 1

The display range may be changed to zoom in on a specific area to get a more detailed weather picture, or zoom out to display a wider range.

NEXRAD ABNORMALITIES

The following is a list of NEXRAD abnormalities that may be experienced:

1. Each NEXRAD site can operate in two modes, "Clear Air" mode or "Precipitation" mode. When no significant precipitation exists in the scanning area of the radar a NEXRAD site produces images in the "Clear Air" mode. In this mode the radar is very sensitive to small targets, making it possible to detect minute particles such as pollen, smoke and dust.
2. Ground clutter is detected when nearby buildings, trees, and towers reflect radar energy back to the NEXRAD site. Because NEXRAD is a Doppler radar, many stationary targets are filtered out. However, if a tower or tree sways slightly in the wind, it will show up on the scan as a target. These "moving" objects are the targets referred to as ground clutter. Radar returns from very near the site (within a radius 20-30 nautical miles) indicating very high reflectivities often include ground clutter.
3. Strokes are spurious radar data caused primarily by refractive bending of the beam back down to the ground. This often happens in areas where cool air interacts with prevailing warm air, such as along coastlines and over oceans or other large bodies of water. Blocky and linear features are characteristics of strokes within the displayed data.
4. Sun strokes occur when a radar antenna points directly at the sun. This shows up as high reflectivity for one or two radials. Sun strokes are shown as bright colored spikes on the display.
5. Military planes deploy metallic dust known as 'chaff' to diffuse their radar signatures and mask their presence on radar. Pilots frequently practice laying chaff trails over open ocean, although these trails often drift over land causing alterations in weather radar scans.
6. When a solid object, such as a mountain, intersects a radar beam, it blocks any reflectivity beyond that point and produces a shadow within the display.
7. When a building near a NEXRAD site is taller than the tower on which the radar antenna resides, it can block the beam, casting a long, narrow shadow (blank space) in the display.
8. NEXRAD sites sometimes return data that is entirely spurious. This is known as "going critical" and usually does not last longer than a few hours.
9. Atmospheric temperature inversions cause radar returns from the Earth's surface resulting in Anomalous Propagation (AP) echoes on the radar display.

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10. Echoes from migrating birds, bats, and insects will be displayed as circular patterns of level 1 reflectivity centered near NEXRAD sites.

11. Significant variation in humidity with altitude can cause reflections from the Earth's surface. These reflections are also displayed as large circular or oval areas of uniform low intensity.

12. Differences will be noted between the base reflectivity (VDL) and composite (XM) products. The base reflectivity product displays the lower extent of cloud masses, so the extent of water droplets appears to be less. The composite product provides more airborne water reflection seen at higher angles as viewed from the NEXRAD ground sites, so higher level features of the convective activity will be given. For example, the "blowout" portion of thunderstorms (the anvil portion) containing high altitude ice particles is often depicted as light precipitation and might be confused for lower altitude light precipitation. Either base or composite product provide accurate, but somewhat time delayed depiction of high levels of precipitation for fully developed or late stage thunderstorms.

NEXRAD LIMITATIONS

The following are limitations on the use of NEXRAD data:

1. NEXRAD does not provide sufficient information to determine cloud layers, precipitation characteristics (frozen vs. liquid, hail vs. rain, etc), nor does it provide information on turbulence, only the amount of reflected energy from the precipitation.

2. The displayed NEXRAD product does not provide sufficient detail to infer future weather trends. Due to delays involved in product creation and transmittal, the pilot should always review the age bar to determine information currency.

3. Due to NEXRAD site location limitations, terrestrial blockages and outages, NEXRAD coverage gaps exist. Coverage gaps are displayed as a cross hatched pattern as shown in Figure 2. Lack of reflectivity in a coverage gap area should not be construed as a lack of precipitation. Coverage gaps are portrayed identically on either VDL or XM.

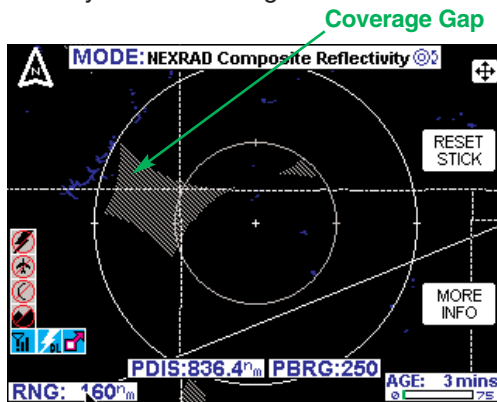


Figure 2

4. The resolution of NEXRAD VDL data is 4 kilometers (km). Thus, when zoomed in on the display, each square block is 4 km on a side. The intensity level reflected by the square will be the highest level sampled within the 4 km area.

The resolution of NEXRAD XM data is 2 km. Thus, when zoomed in on the display, each square block is 2 km on a side. The intensity level reflected by the square will be the highest level sampled within the 2 km area.

INTENSITY

Precipitation intensity is depicted using colors as follows:

Green	Light	Level 1	15-30 dBz (10-30 dBz for XM))
Yellow	Moderate	Level 2	30-40 dBz
Red	Heavy	Level 3-4	40-50 dBz
Magenta	Extreme	Level 5-8	50+ dBz

The NEXRAD dBz levels, descriptions and colors are consistent with FAA guidelines.

Moving the joystick and pressing the MORE INFO softkey will display the NEXRAD legend as shown in Figure 3a (FIS VDL) and 3b (XM WX).

The column labeled **dBz** is a measure of the radar echo intensity.

The strength of a radar return signal typically varies as a function of distance (i.e., weaker from distant targets, stronger from those nearby) and the object size.

Many weather sources available on the internet use color coding that is different than the KMD 550/850 color coding. The dBz and intensity level can be used to compare intensity levels between different sources of NEXRAD information since many internet weather providers will include a legend with dBz values indicated.

No Data, as shown in the legend, indicates the lack of coverage for reasons discussed previously.

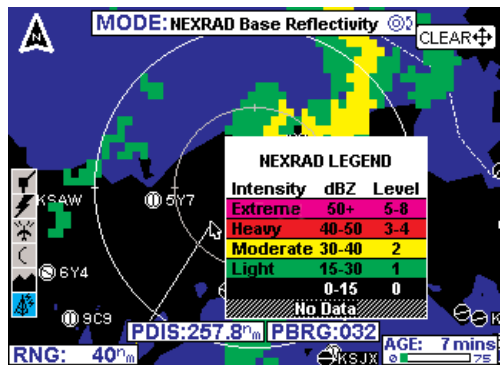


Figure 3a

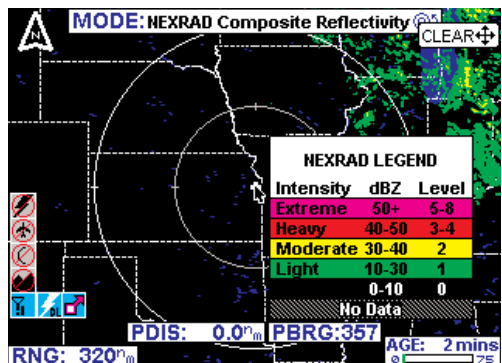


Figure 3b

PRECIPITATION TYPE (AT SURFACE) (XM ONLY)

The Precipitation Type (At Surface) product is decoded the same as the NEXRAD information is. It is displayed as shown in Figure 4.

Moving the joy stick in any direction displays the **MORE INFO** soft key on the right side of the screen. Pressing the **RESET STICK** soft key or waiting 30 seconds will return the screen to the previous Precipitation Type selection.

When the **MORE INFO** soft key is pressed the Legend window is shown as in Figure 6.

Pressing the **OVERLAY** button displays overlay selection soft keys on the right side of the screen. This allows selection of any of the five different overlays (depending upon availability) for the Precipitation Type screen. Overlay types are Flight Plan, Storm Scope (if installed), Data Link Lightning and Severe Weather Storm Track/Storm Cells. The overlay selections are highlighted on the legend on the left side of the screen. Press **SAVE & EXIT** to complete the selection.

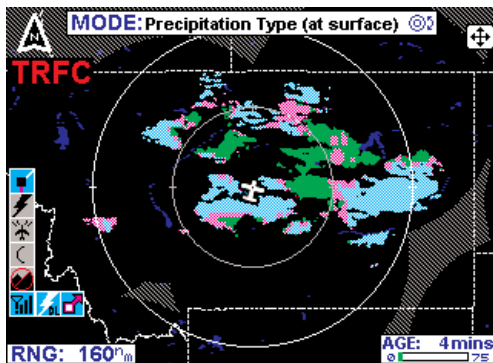


Figure 4

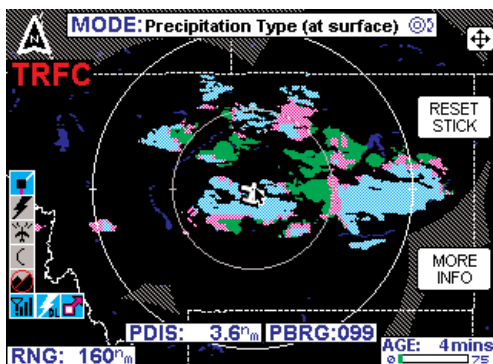


Figure 5

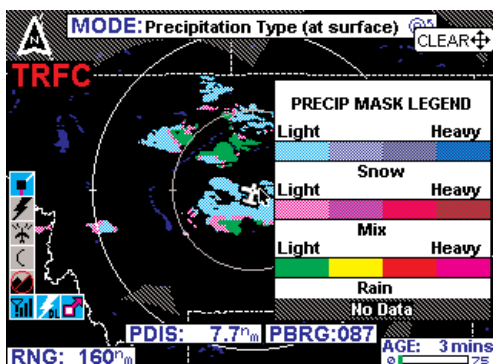


Figure 6

Pressing and holding the **OVERLAY** key will display the FIS Overlays window. This window displays the status of the overlays that are available to the Precipitation Type screen as shown in Figure 8. The window will no longer be displayed when the overlay key is released.

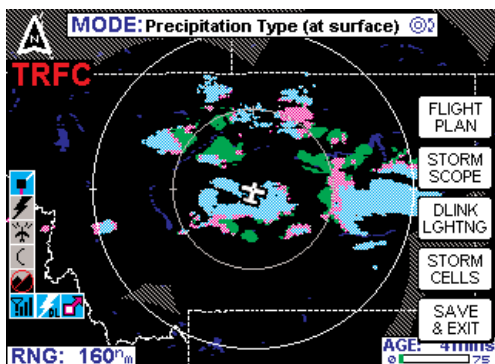


Figure 7

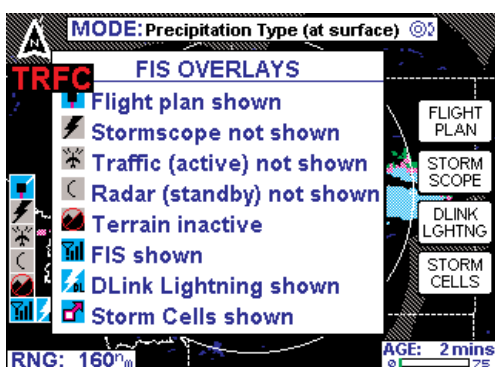


Figure 8

FREEZING LEVELS (XM ONLY)

The Freezing Level product decoded and displayed in a graphical format as shown in Figure 9. The color code for each altitude level is indicated in the legend box on the right of the display. Additionally the “IN” box in the legend indicates the current level the aircraft is in.

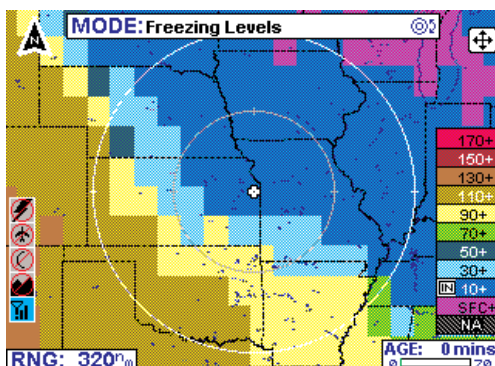


Figure 9

Moving the Joy stick will cause the **MORE INFO** and **RESET STICK** soft keys to be displayed on the right.

Pressing the **MORE INFO** soft key will display the full Freezing Levels Legend. This includes the range of each level. Moving the joy stick in any direction will revert the display back to the Freezing Levels screen or it will return to it in 30 seconds.

Pressing the **OVERLAY** button displays the overlay selection soft keys on the right side of the screen. This allows the flight plan to be overlaid on the Freezing Levels screen. The selection is made by pressing **FLIGHT PLAN** soft key on the right side of the screen. The overlay selection is highlighted on the legend on the left side of the screen. Press **SAVE & EXIT** to complete the selection.

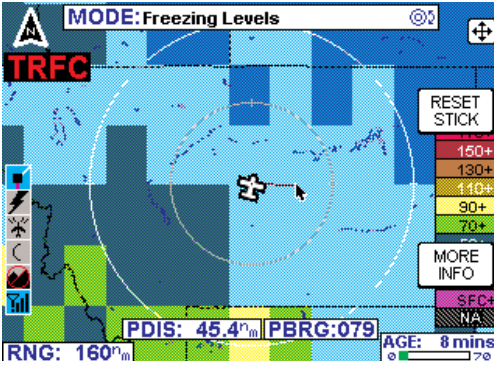


Figure 10

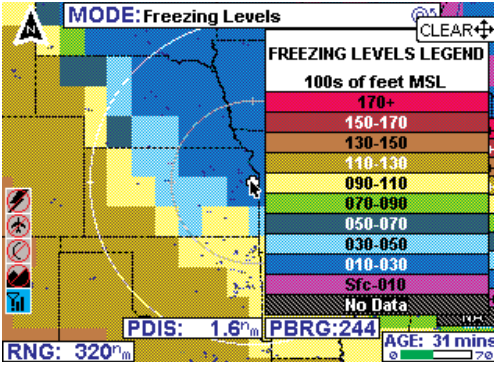


Figure 11

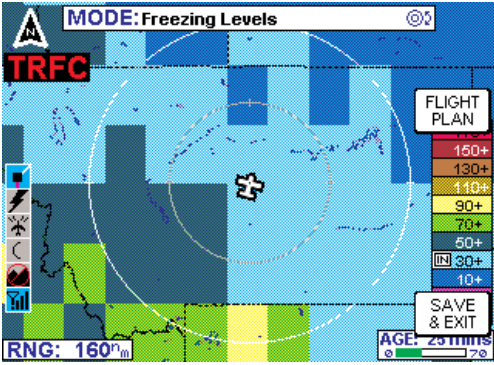


Figure 12

Pressing and holding the **OVERLAY** key will display the FIS Overlays window. This window displays the status of the overlays of the Freezing Levels screen as shown in Figure 13. The window will no longer be displayed when the overlay key is released.

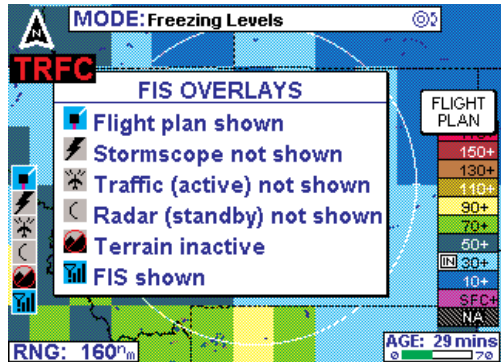


Figure 13

WINDS ALOFT (XM ONLY)

The Winds Aloft product shows wind speed and direction on the surface and at the selected altitudes. Displayed altitudes are at the surface (SFC) and from 3000ft to 18,000ft in 3000ft increments and from 24,000ft to 42,000ft in 6000ft increments. The displayed level can be changed by pressing either the Flight Level up (**FL UP**) or Flight Level down (**FL DN**) soft keys on the right of the display as shown in Figure 14.

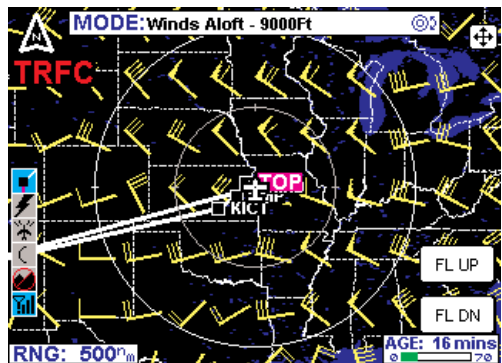


Figure 14

The Winds Aloft Screen will display at zoom levels from 50 to 500 NM. At the 320 and 500 NM range only the wind barb for the maximum magnitude within the area is displayed.

When winds aloft information isn't available for part of a selected area, a hash gradient will highlight that area as shown in Figure 15.

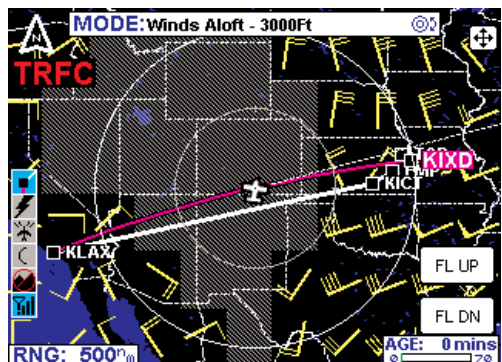


Figure 15

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This condition will always be true in the Rocky mountain area at 3000ft and below.

When there is not any wind data available for the selected Flight Level the message **“WINDS ALOFT AT THIS FLIGHT LEVEL NOT AVAILABLE DATA NOT RECEIVED”** as shown in Figure 16.

Moving the joystick in any direction displays the **MORE INFO** soft key as shown in Figure 17. Pressing the **RESET STICK** soft key or after 30 seconds the display returns to the previous Winds Aloft selection.

Moving the joystick over Wind Bar markers displays the Speed and wind direction information associated with that particular marker. See Figure 18. Pressing the **RESET STICK** soft key or after 30 seconds the display returns to the previous Winds Aloft selection.

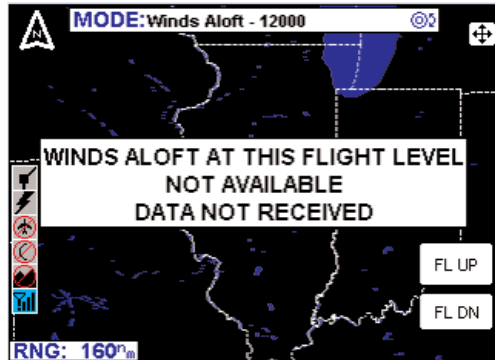


Figure 16

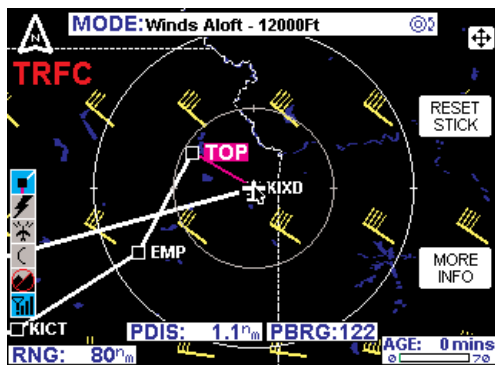


Figure 17

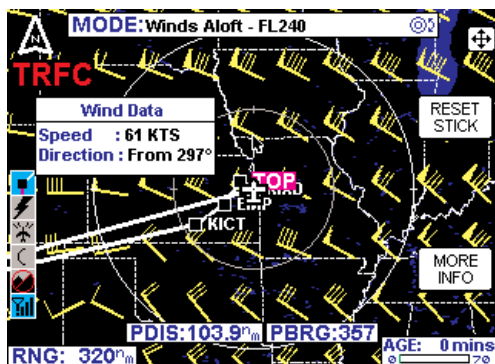


Figure 18

Pressing the **MORE INFO** key displays the Winds Aloft Legend as shown in Figure 19. Moving the joy Stick or after 30 seconds the display returns to the previous Winds Aloft selection.

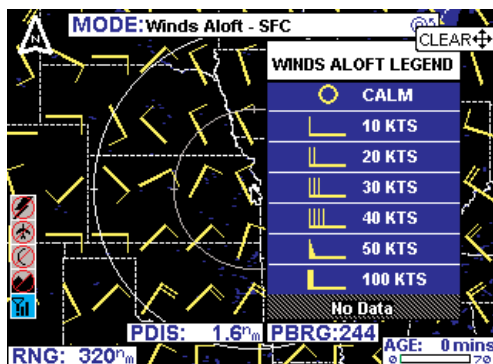


Figure 19

GRAPHICAL METAR

The graphical METAR is derived from the most currently received textual METAR or SPECI data from reporting sites. This is displayed on a map background to enhance situational awareness as shown on Figure 20.

The graphical METAR icon is gray when the textual METAR or SPECI report exceeds 75 minutes (AGED), but is less than the textual METAR expiration time of 120 minutes. Look at the textual report for ceiling and visibility information.

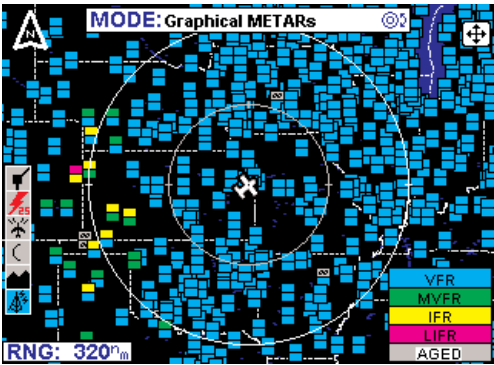


Figure 20

CAUTION: Graphical METAR data must be used for strategic planning purposes only. Due to inherent delays, areas of coverage and relative age and availability of the data that can be experienced, Graphical METAR data cannot be viewed as an absolute depiction of conditions at a specific location.

Graphical METARs are shown using two color coded boxes, one indicating ceiling (upper box), the other visibility (lower box). Next to the boxes is the ICAO station identifier for the airport to which the METAR pertains. Color coding for the boxes is specified in the table below:

Cyan	Ceiling > 3000 ft	VFR
Cyan	Visibility > 5 statute miles	
Green	1000 ft ≤ Ceiling ≤ 3000 ft	Marginal VFR
Green	3 sm ≤ Visibility ≤ 5 sm	
Yellow	500 ft ≤ Ceiling < 1000 ft	IFR
Yellow	1sm ≤ Visibility < 3sm	
Magenta	Ceiling < 500 ft	Low IFR
Magenta	Visibility < 1sm	
Gray	Report is older than 75 min	See Text Report for Ceiling and Visibility
Gray	Report is older than 75 min	
Black	Not Reported	Missing Data
Black	Not Reported	

Moving the joystick pointer to an area that will not highlight a specific report then pressing the **MORE INFO** softkey will display the graphical METAR legend as shown in Figure 21.

GRAPHICAL AIRMET

The graphical AIRMET is derived from the location description (if provided) in the textual AIRMET and displayed as a boundary box with the appropriate color for the condition as shown in the legend (for a description, see AIRMETs in the Basic Weather Services section). The "IN" box in the legend indicates the current aircraft position is within the corresponding forecast condition. The boundaries are displayed on a map background to enhance situational awareness as shown on Figure 22. Low Level Wind Shear and Freezing Level information will not be displayed on the GRAPHICAL AIRMET; check the textual AIRMETs for this information.

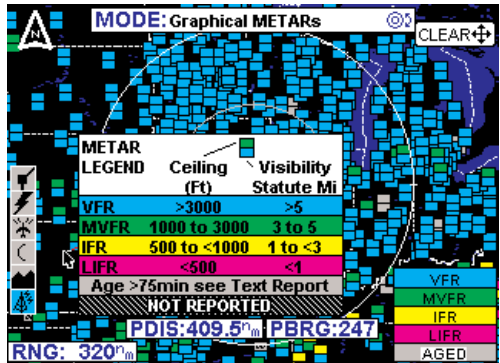


Figure 21

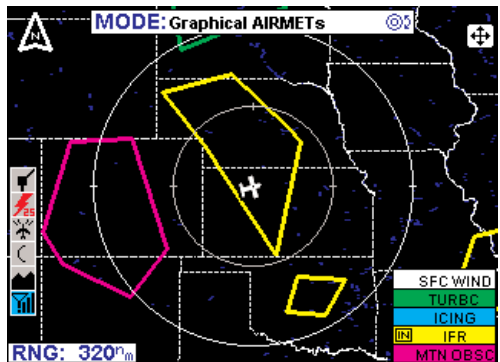


Figure 22

NOTE: If no location description is provided in the textual AIRMET the AIRMET cannot be depicted graphically. These AIRMETs are denoted by displaying the AIRMET identifier in green within the textual AIRMET.

GRAPHICAL SIGMET

The graphical SIGMET is derived from the location description in the textual SIGMET and displayed as a boundary box with the appropriate color for the condition (for a description, see SIGMETs in the Basic Weather Services section). This is displayed on a map background to enhance situational awareness as shown on Figure 23.

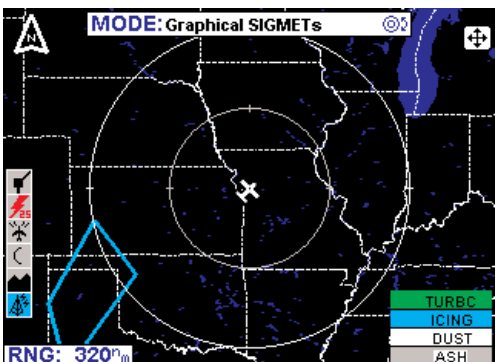


Figure 23

GRAPHICAL CONVECTIVE SIGMET

The graphical Convective SIGMET is derived from the location description in the textual Convective SIGMET and displayed as a yellow boundary box (for a description, see CONVECTIVE SIGMETs in the Basic Weather Services section). The “IN” box in the legend indicates the current aircraft position is within the corresponding forecast condition. The boundaries are displayed on a map background to enhance situational awareness as shown on Figure 24.

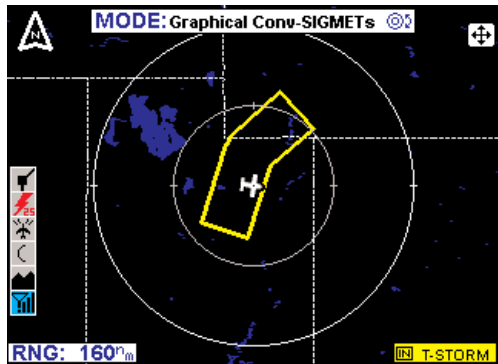


Figure 24

GRAPHICAL ALERT WEATHER WATCHES (VDL ONLY)

The graphical Alert Weather Watches (AWWs) are derived from the location description in the textual AWW and displayed as a boundary box with the appropriate color for the condition as shown in the legend (for a description, see ALERT WEATHER WATCHES in the Basic Weather Services section). The “IN” box in the legend indicates the current aircraft position is within the corresponding forecast condition. The boundaries are displayed on a map background to enhance situational awareness as shown on Figure 25.

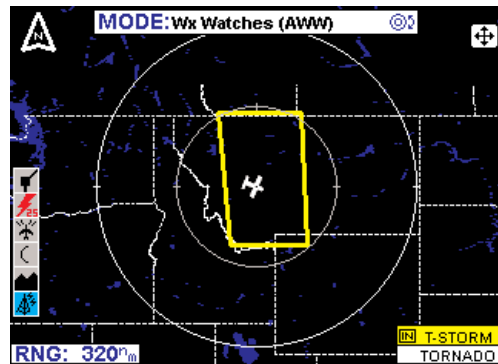


Figure 25

STARTUP

If a display such as Figure 26 is seen at startup, perform the steps in Setting Up a FIS Subscription.

Figure 27 is displayed at the end of the startup process on the KMD 550/850 if a FIS system is installed. Press OK to acknowledge that it is understood that FIS information is to be used as a strategic planning tool for pilot decisions on avoiding inclement weather areas which are beyond visual range or where poor visibility precludes visual acquisition of inclement weather.

Due to inherent delays, areas of coverage and relative age and availability of the data that can be experienced, weather data cannot be viewed as an absolute depiction of conditions at a specific location.

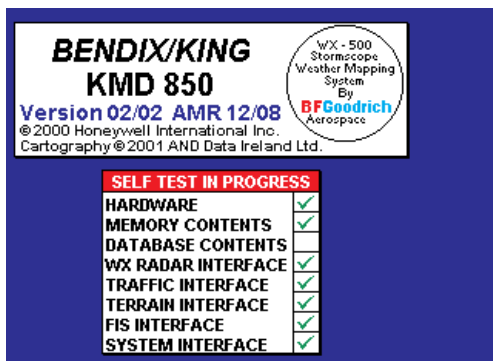


Figure 26

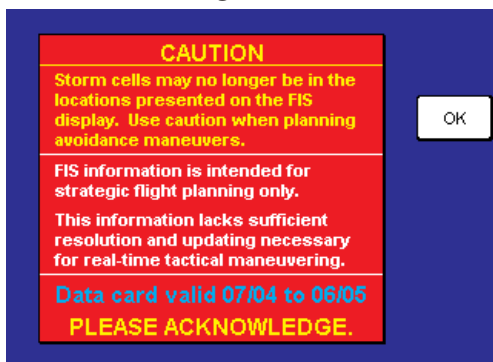


Figure 27

SUBSCRIPTIONS

A current subscription (VDL or XM) and a current data card (VDL only) are required to receive services. Subscriptions are used to gain access to services. Some VDL services are offered at no cost and others are fee based. All XM weather services are provided on a fee basis. All services not identified as VDL Only are available with an XM subscription.

VDL SUBSCRIPTIONS

A subscription must be set up to continue receiving FIS VDL services, **including** no-charge products. This process can be performed either via website, (<http://www.bendixking.com>) select Wingman Services, Data Link Weather, or alternatively by contacting Wingman Services at 800-247-0230 (or 913-712-3145). During this process, you will have the option to subscribe to fee-based products, such as NEXRAD and Graphical METARs, and/or may choose to subscribe to basic textual products, such as TAFs, METARs/SPECIs, and PIREPs, which will continue to remain free-of-charge.

FIS Subscriptions

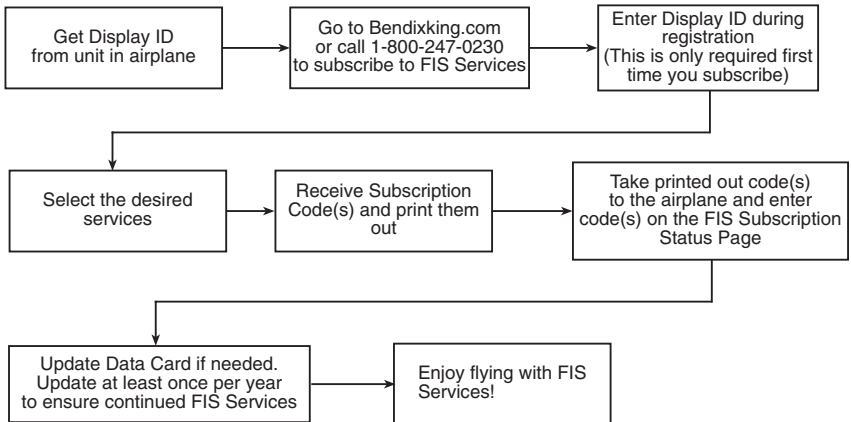
NOTE: Although the basic textual products are free of charge, they still require a subscription to receive the service as well as a current data card.

To accommodate users with varying service needs (for example, during different flying seasons over the course of a year), the display unit allows storage for up to four individual subscriptions, in much the same way that a computer can support multiple user accounts with different passwords. Once entered, the display unit manages selection of the appropriate subscription without any operator intervention. A subscription code must be entered into the display unit whenever you add or renew a subscription.

When subscribing for a FIS VDL service package, you may specify the date when service shall commence and the duration. If you subscribe to multiple packages, the start date and duration of each can differ (if desired). For instance, a user may select the free text weather package for an entire year and also choose a graphical weather package for part of the year.

During the subscription process, you will receive 1 to 4 subscription codes which you must enter into your display unit to permit access to all products. A subscription code is an alphanumeric sequence that permits access to the FIS VDL broadcast network in much the same way that a computer password permits access to a computer network. When you subscribe for FIS VDL services, the online system will ask for a FIS Display ID in order to provide you with the subscription code. The FIS Display ID is a unique alphanumeric serial number associated with your display unit. This ID is obtained by viewing the FIS Subscription Status page on your display unit. After obtaining the subscription code (from either bendixking.com or via a phone call to Wingman Services), enter this code into your display unit. The subscription code tells the display the service(s) to which you have subscribed and for what period of time.

Also, the data card must be updated at least once a year for continuance of FIS subscription service. The validity period for the subscription data on the data card is shown on the FIS Caution page at power on and also on the FIS Subscription Status Page. The data card contains both subscription data that is needed to access FIS products as well as the latest operating software. By updating the data card at least once a year prior to the expiration date you will ensure uninterrupted FIS service and also have the latest version of software to utilize new FIS products as they become available. Note that data card updates are available every 28 days and also include the latest version of Jeppesen navigation data.



How to Subscribe to FIS VDL Services

SETTING UP A VDL SUBSCRIPTION

NOTE: The following details require selection of a KDR-510 as the source for datalink weather data.

At least one subscription must be set up, even to receive the no-charge services. Up to four different concurrent subscriptions can be set up depending on the service packages desired.

NOTE: Entering more than four subscriptions will cause previous subscriptions to be overwritten.

To set up a subscription, perform the following steps:

1. Press the **AUX** Function Select Key to display the Auxiliary Mode Cover Page as shown in Figure 28.
2. Press the **WX SETUP** softkey to display the WX Setup Cover Page as shown in Figure 29.

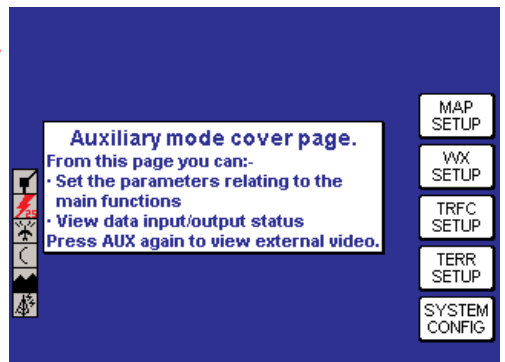


Figure 28



Figure 29

3. Press the **FIS** softkey to display the FIS Setup Cover Page as shown in Figure 30.

4. Press the **FIS SUBSCR** softkey to display Figure 31. On initial subscription setup the subscription window will show only blank spaces as shown in Figure 31, unless services were pre-provisioned at the factory. In this case some lines may not be blank. If adding another subscription, one or more previous subscriptions may be displayed with the associated validity period and status.

The unique identifier for the individual KMD 550/850 is displayed in the **FIS Display ID** window. The unique ID shown here is **0H0H0 00KX0**.

Obtain the unique ID for your system and visit the Wingman Services website on www.bendixking.com or call 1-800-247-0230. This ID will be used to obtain a Subscription Access Code.

***NOTE:** For uninterrupted FIS VDL services, the data card must be updated by the date shown in "Data card update required by" field.*

5. After obtaining the Subscription Code, press the **ADD SUBSCR** softkey to display Figure 32.

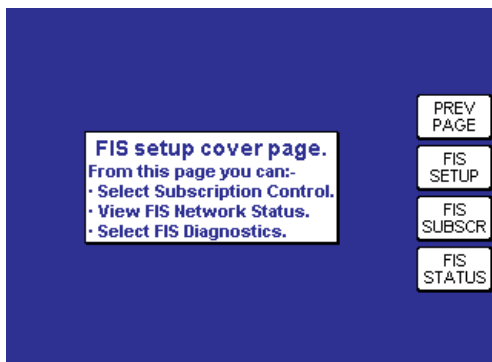


Figure 30

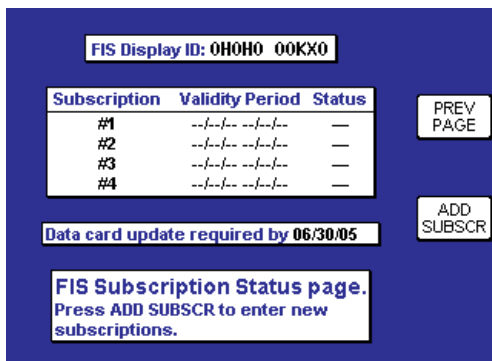


Figure 31



Figure 32

6. The inner Control Knob selects the alphanumeric character and the outer Control Knob selects the character position. Turn the inner Control Knob until the first character of the Subscription Code is displayed in first space. Turn the outer Control Knob clockwise to move to the next space to the right. Turn the inner Control Knob until the second character of the Subscription Code is displayed. Continue this sequence until the entire Subscription Code has been entered as shown in Figure 33.

After selecting the last character space of the Subscription Code the **ENTER** softkey is now available.

7. After entering the last Subscription Code character, press the **ENTER** softkey. The subscription should be accepted and processed as shown in Figure 34.

If an incorrect code has been entered, a message like that shown in Figure 35 will be displayed.



Figure 33

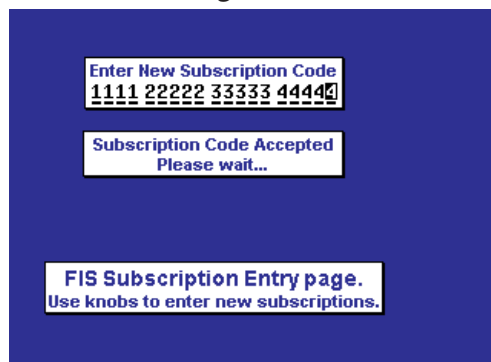


Figure 34

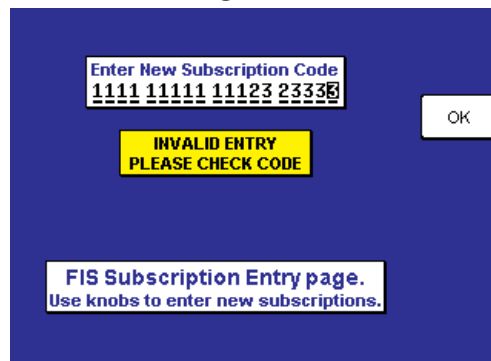


Figure 35

FIS Subscriptions

8. After the subscription has been accepted, Figure 36 will be displayed showing the subscription validity period and status. If the subscription has been entered prior to the beginning of subscription service, the entered subscription will begin when subscription services are turned on.

CHECKING FIS VDL SUBSCRIPTIONS

To check FIS VDL subscription validity or status perform the following steps:

1. Repeat steps 1 through 3 in the Setting Up a FIS VDL Subscription section.
2. Press the **FIS SUBSCR** softkey. A screen similar to Figure 37 should be displayed. In this case subscription #1 has expired and subscription #2 is still valid.

FIS Display ID: 0H0H0 00KX0

Subscription	Validity Period	Status
#1	08/01/04-07/31/05	✓
#2	--/-- --/--	—
#3	--/-- --/--	—
#4	--/-- --/--	—

Data card update required by 06/30/05

FIS Subscription Status page.
Press ADD SUBSCR to enter new subscriptions.

PREV PAGE

ADD SUBSCR

Figure 36

FIS Display ID: 0H0H0 00KX0

Subscription	Validity Period	Status
#1	02/01/02-05/01/02	✗
#2	08/01/04-07/31/05	✓
#3	--/-- --/--	—
#4	--/-- --/--	—

Data card update required by 06/30/05

FIS Subscription Status page.
Press ADD SUBSCR to enter new subscriptions.

PREV PAGE

ADD SUBSCR

Figure 37

The symbols that may appear in the **Status** column, and their meanings, are shown in Figure 38a. Again, subscriptions will only be valid when FIS subscription service is turned on.

Symbol	Status	Description
—	Unknown	The system time is not known or no subscription is programmed.
🕒	Future	The current system time is prior to the displayed starting date. This subscription is not valid for enabling access to FIS today but it will become valid at some point in the future.
✓	Valid	The current system time is after the displayed starting date and before the displayed ending date.
📅	Almost Expired	The current system time is within seven (7) days of the displayed ending date.
✗	Expired	The current system time is beyond the displayed ending date.

Figure 38a

NOTE: Only the validity period for subscriptions is shown on the display. To determine which products are available with each subscription, access the account on Wingman Services at www.bendixking.com.

XM WX SUBSCRIPTIONS

An XM subscription must be set up to receive XM WX services. This process involves accessing the XM Radio website and a toll-free phone call to XM Radio.

SETTING UP AN XM WX SUBSCRIPTION

NOTE: The following details require selection of an XM receiver (such as a KDR-610) as the source for datalink weather data.

Setting up an XM WX subscription can be accomplished by following these steps:

- 1a. Retrieve the 8-digit ID from the KDR 610 label (should be attached to the opposite end of the receiver from the connectors)

OR

- 1b. Apply power to the display and receiver, select the **AUX** key, the **WX SETUP** softkey, the **FIS** softkey, and finally the **FIS SUBSCRIPTION** softkey. Record the 8-digit receiver ID displayed at the bottom of the FIS Subscription Status page.

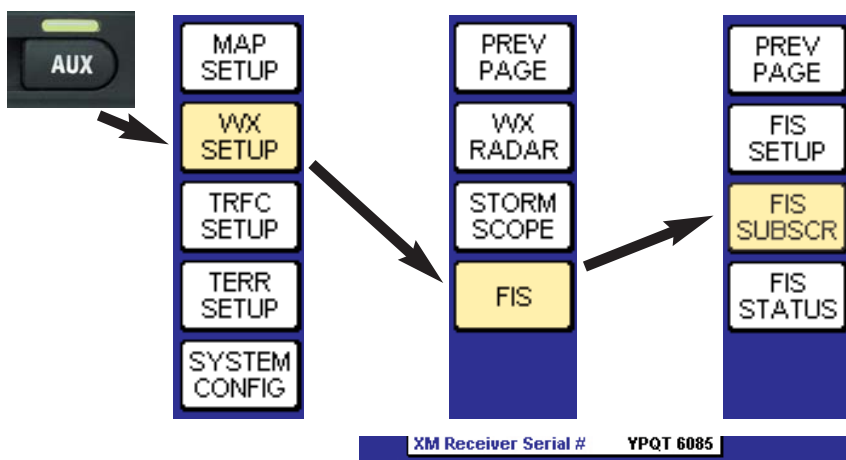


Figure 38b

2. Go to the website www.xmradio.com/weather/get_xm_wx.html to select your weather subscription package.
3. Apply power to the XM receiver, and place the receiver's antenna where the signal can be received from the XM satellites. Make certain the antenna has a good view of the southern horizon.
4. With the Receiver ID and desired subscription package in hand, contact XM Radio at 1-800-985-9200 for assistance in activating your receiver and setting up a weather product subscription. The receiver

should remain in view of the satellites during the subscription process.

5. Verify the activation of the receiver and the subscription validity by selecting and viewing the “**FIS Subscription Status Page**” on the KMD screen.

If for any reason the receiver was not exposed to the XM signal within the initial 24 hour broadcast period, or is not successfully authorized for some other reason, a subsequent 15 minute resend of the subscription information can be obtained. Get the receiver ID (instructions in step 1a or 1b above), go to the website <http://www.xmradio.com/refresh/>, and follow the instructions.

CHECKING XM WX SUBSCRIPTIONS

To check the FIS XM subscription and receiver status, apply power to the display and receiver, select the **AUX** key, then the **WX SETUP** softkey, the **FIS** softkey, and finally the **FIS SUBSCR** softkey, as in step 1b previously.

The Application IDs are displayed along with the receiver activation and subscription status. The Application IDs provide the groupings of products that are part of the subscription package. Green checkmarks indicate those App IDs or product groups that are contained in the subscription package for the XM receiver. Contact XM Radio at 1-800-985-9200 with the App ID information if the subscribed products are not received and displayed.

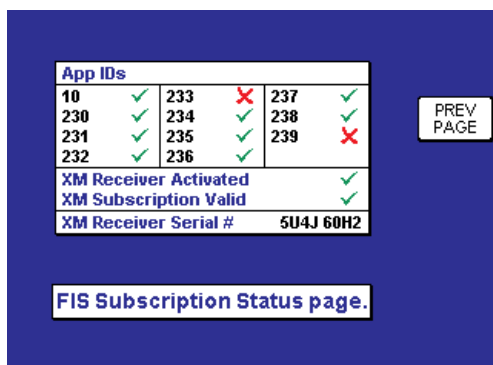


Figure 38c

Symbol	Subscription Status	Description
— (white)	No Information	The XM FIS receiver subscription information message has not been received.
✗	Not Subscribed	The user is not authorized for the Application ID.
✓	Subscribed	The user is authorized for the Application ID.

The following table lists the XM Radio assignment of App IDs for weather products. Assignments within the broadcast data stream may change and the most current assignments may not be reflected below. Contact XM concerning App ID information if the powered receiver has been in view of the satellites for 10 minutes or more and the correct products are not received. Those products that are currently displayed on the KMD 550/850 with the XM capable software release installed are set in bold font.

App ID	Product
App ID 10	Radar Coverage, METARs , County Warnings, City Forecasts
App ID 231	NEXRAD Radar, TAFs, Freezing Level, TFRs
App ID 232	SCITs, Lightning , Storm (Echo) Tops, Surface Precipitation, Winds Aloft, AIRMETs, SIGMETs , Cloud Tops

NORMAL OPERATION

To display the FIS pages, press the **WX** Function Select Key. Each press will cycle through Weather Radar (KMD 850 only), Stormscope® (if installed), FIS Graphics Page (Graphical METAR, NEXRAD, AIRMETs, SIGMETs, Convective SIGMETs and Alert Weather Watches (VDL Only) depending on what was last selected) and FIS Text Page.



The **MODE** Power Key may be used to select any of the available FIS weather pages by displaying the **SELECT FIS PRODUCT** Menu as shown in Figure 39a (Figure 39b and Figure 39c for XM). **MODE** will only be available when the KMD 550/850 is actively receiving weather data. On startup, this may take a few minutes. Available weather products will be displayed in black text. Products that are not yet available will be displayed in blue text and will not be selectable until they are available. Wx Watches and PIREPs are not available for XM WX and will not be listed.

Use the Joystick or the inner/outer Control Knobs to select the desired weather

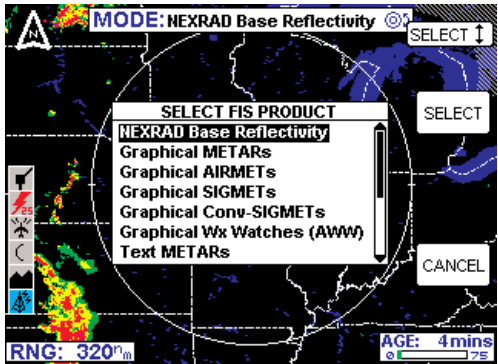


Figure 39a

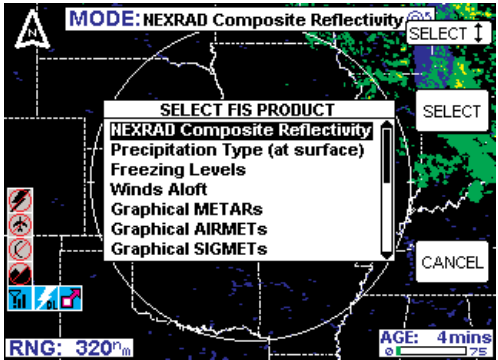


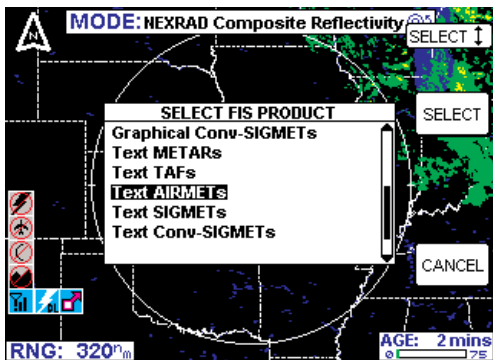
Figure 39b



product. After the desired product is selected, press the **SELECT** Softkey.



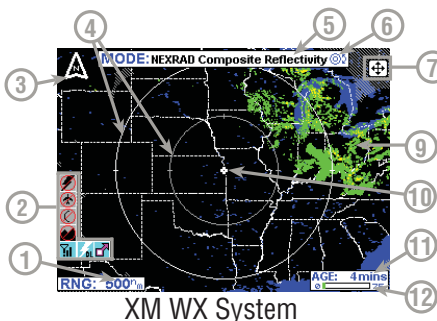
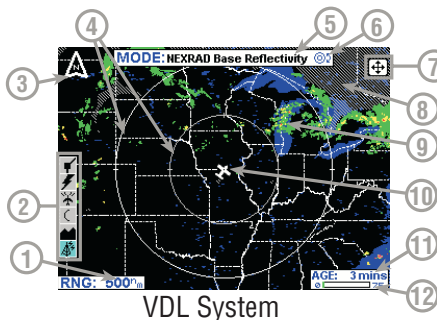
When the Control Knob Icon is displayed in the MODE field at the top of the display, as shown here, either the inner or outer Control Knob may be used to select and cycle through the available graphical weather products without having to use the **SELECT FIS PRODUCT** Menu.



NEXRAD PAGE

Figure 39c

The following illustration describes the NEXRAD VDL display. The NEXRAD XM display is the same except the FIS Icon is different and Composite Reflectivity is shown instead of Base Reflectivity.



- 1 Range Scale** - Indicates selected range.
- 2 Available Functions** - Displays icons representing data available (black) and displayed (color).
- 3 North Pointer** - Indicates north.
- 4 Range Rings** - Outer ring radius is selected range and inner ring radius is one half the selected range.
- 5 MODE** - Indicates the weather product being displayed.
- 6 Control Knob Icon** - Displayed when the Control Knobs are available for cycling through the graphical weather products.
- 7 Joystick Label** - Indicates joystick is active and can be used to pan map.
- 8 No Coverage Area** - Crosshatch pattern indicates area of no coverage.
- 9 Precipitation** - NEXRAD precipitation returns.

- 10 Aircraft Symbol** - Indicates present aircraft position and heading (if available) or track.
- 11 Age of Data** - Age of the data based on current time minus NEXRAD issue time.
- 12 Age Status Bar** - Indicates percentage of age versus elapsed time before expiration. The bar will be green the first 50% then turn yellow.

NEXRAD PAGE OPERATIONAL CONTROLS

CAUTION: NEXRAD data must only be used for strategic planning purposes. Due to inherent delays and relative age of the data that can be experienced, NEXRAD data cannot be used for tactical avoidance of weather.



MODE - Displays the Select FIS Product Menu.



Joystick - Moving the joystick allows panning of the map and placement of the pointer over the desired weather activity to be viewed.



RNG▲/RNG▼ - Displays **ZOOMING TO ### nm** and advances the indicator to the next range. The upper button increases range, the lower button decreases it. The selected range is displayed in the lower left corner of the display with the outer range ring the displayed range and the inner range ring is half the displayed range. The **RNG** button labels will not be displayed when their respective range limits are reached.



OVLY - Allows selection of flight plan and Datalink Lightning and Storm Cell Identification and Tracking (SCIT) lightning data (if Stormscope® equipment is installed) for overlay on the FIS map.



Control Knobs - Used to select and/or cycle through the available graphical weather products displays.

SELECTING AND USING THE NEXRAD PAGE

1. Press the **WX** Function Select Key until the FIS Graphics Page is displayed. If necessary, turn the Control Knob to obtain the NEXRAD display as shown in Figure 40. **NEXRAD Base Reflectivity (NEXRAD**

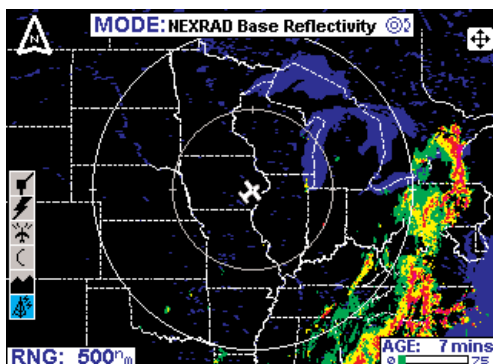


Figure 40

Composite Reflectivity for XM) will be displayed in the MODE field located at the top center of the display.

NOTE: If a message such as that shown in Figure 41 is displayed, it may be that the system has not had time to acquire a signal or has acquired a signal and not yet received all the data for a NEXRAD image. If this message is still present after more than 5-10 minutes, refer to the Messages section of this addendum.

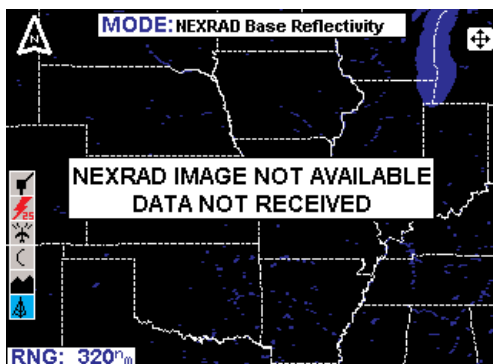


Figure 41

Always make note of the age of the data displayed in the bottom right corner. Remember, the older the age the more suspect the accuracy of the data. The colored bar will be green the first 50% of the expiration time period for the displayed data then turn yellow. Also, delays occurring prior to the weather distributor time stamping the data are not reflected in the displayed age. These delays can range from one to seven minutes.

If no data update has been received for 75 minutes the NEXRAD image is discarded and no longer displayed.

2. Press the **RNG▲/RNG▼** Key to zoom in on the display. The map is centered on the present position indicated by the symbolic aircraft.

3. To view a specific area of weather, move the joystick in the desired direction. A pointer will appear on the display connected to the symbolic aircraft with a flashing line (see Figure 42). The distance and bearing between present position and the pointer is shown at the bottom center of the display. As the joystick is held the pointer will continue to move. When the pointer reaches the edge of the display the map will pan to keep up with pointer movement. Release the joystick to stop moving the pointer. Press the **RNG▲/RNG▼** keys to zoom in or out on the pointer position.

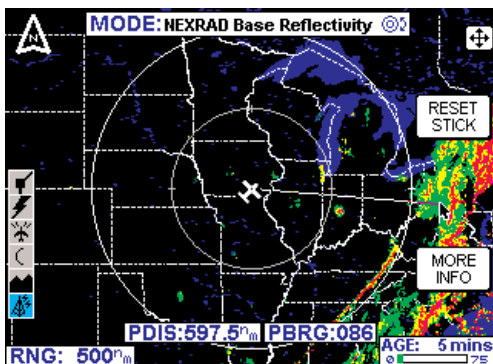


Figure 42

Normal Operation

Pressing the **MORE INFO** softkey will display the VDL **NEXRAD LEGEND** (Figure 43a) or the XM **NEXRAD LEGEND** (Figure 43b). To clear the legend from the display, move the joystick. The XM legend reflects the lower limit of 10 dBz for light precipitation.

Press the **RESET STICK** softkey to return to the present position display. If no actions are taken for a period of 30 seconds, the display will return to the present position.

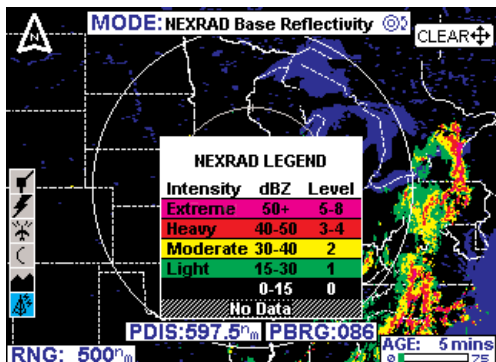


Figure 43a

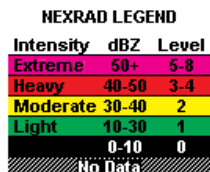


Figure 43b

4. Press the **OVLY** Key to overlay flightplan or lightning data on the NEXRAD map (see Figure 44). Lightning overlay capability will only be available if a Stormscope® is installed with the system.

The **FLIGHT PLAN** and **STORMSCOPE** softkeys toggle the respective overlay on or off as in Figure 45.

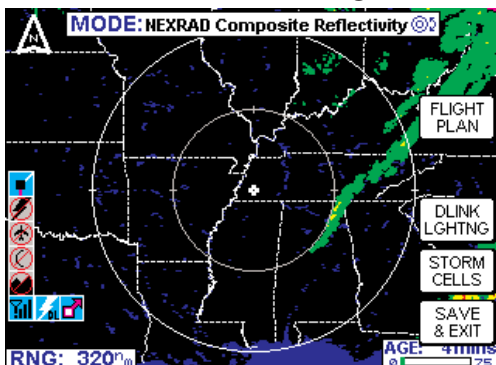


Figure 44

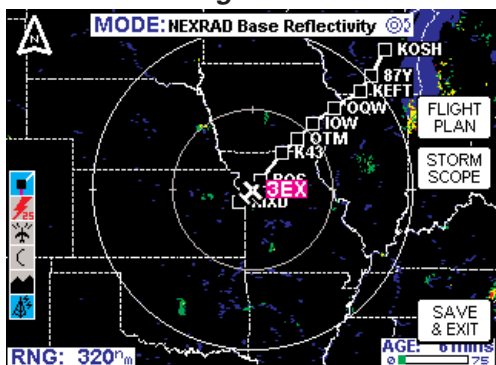


Figure 45

Press the **SAVE & EXIT** softkey to retain the selections on the display (see Figure 46).

If the severe weather storm track (SCIT) overlay is active the SCIT icon will be displayed in the legend on the left side of the screen. Where ever severe weather is located the SCIT icon will be displayed on the screen. The arrow of the icon will indicate the forecasted track of the weather (see Figure 47).

If the cursor is moved by the joy stick over any of the SCIT icons on the screen a pop up screen showing Storm Top (in kft), Movement: (direction, speed in knots), Hail: (Max hail size in inches) and Age Icon: (also indicated expiration time). (Figure 48).

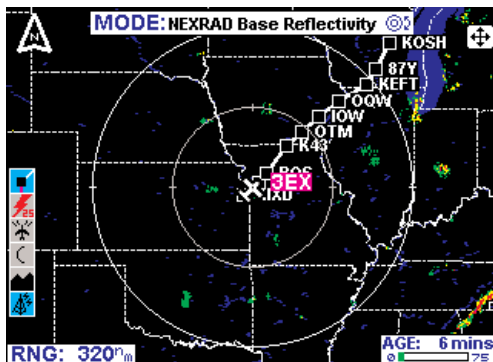


Figure 46

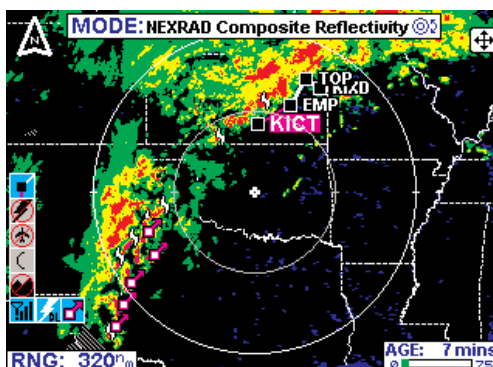


Figure 47

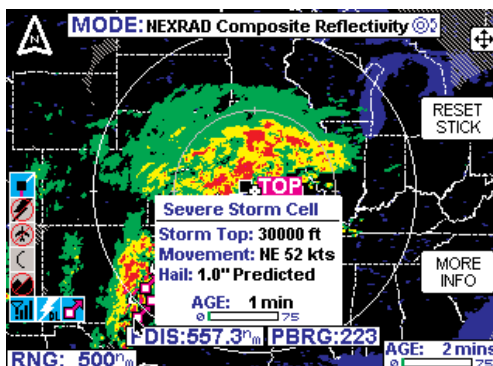
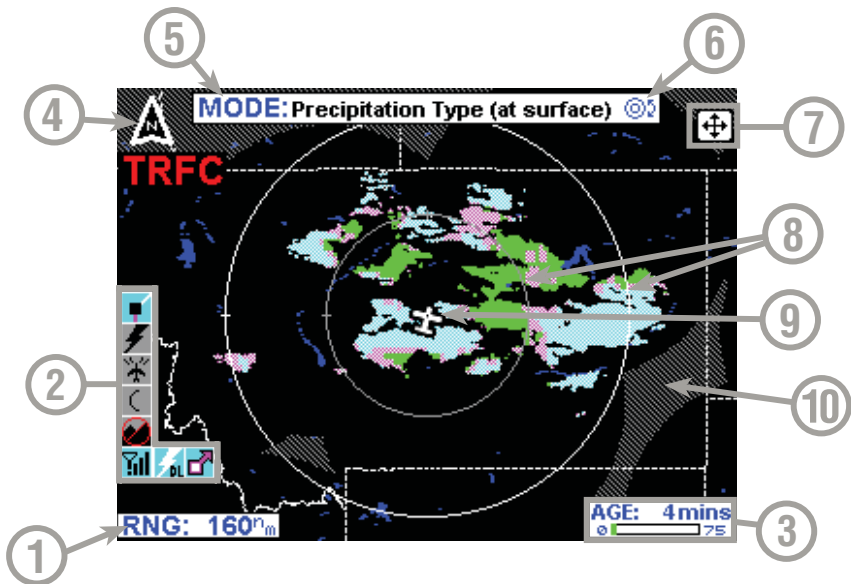


Figure 48

PRECIPITATION TYPE PAGE



- 1 **Range Scale** - Indicates selected range.
- 2 **Available Functions** - Displays icons representing data available (black) and displayed (color).
- 3 **Age Status Bar** - Indicates percentage of age versus elapsed time before expiration. The bar will be green the first 50% then turn yellow.
- 4 **North Pointer** - Indicates north.
- 5 **MODE** - Indicates the weather product being displayed.
- 6 **Control Knob Icon** - Displayed when the Control Knobs are available for cycling through the graphical weather products.
- 7 **Joystick Label** - Indicates joystick is active and can be used to pan map.
- 8 **Range Rings** - Outer ring radius is selected range and inner ring radius is one half the selected range.
- 9 **Aircraft Symbol** - Indicates present aircraft position and heading (if available) or track.
- 10 **No Coverage Data Available** - Indicates there is not any Freezing Levels available in that area.

PRECIPITATION TYPE COLOR CODING

PRECIP MASK LEGEND	
Light	Heavy
Snow	
Light	Heavy
Mix	
Light	Heavy
Rain	
No Data	

PRECIPITATION TYPE PAGE OPERATIONAL CONTROLS



MODE - Displays the Select FIS Product Menu.



Joystick - Moving the joystick allows panning of the map and placement of the pointer over the desired PRECIPITATION TYPE icon to be viewed.



RNG▲/RNG▼ - Displays **ZOOMING TO ### nm** and advances the indicator to the next range. The upper button increases range, the lower button decreases it. The selected range is displayed in the lower left corner of the display with the outer range ring the displayed range and the inner range ring is half the displayed range. The **RNG** button labels will not be displayed when their respective range limits are reached.

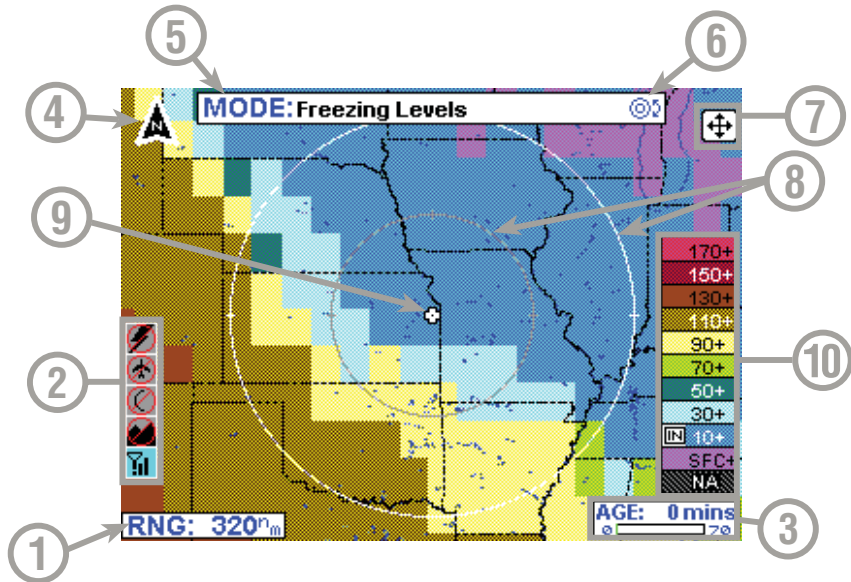


OVLY - Allows selection of flight plan data for overlay on the FIS map.



Control Knobs - Used to select and/or cycle through the available graphical weather products displays.

FREEZING LEVELS PAGE



- 1 **Range Scale** - Indicates selected range.
- 2 **Available Functions** - Displays icons representing data available (black) and displayed (color).
- 3 **Age Status Bar** - Indicates percentage of age versus elapsed time before expiration. The bar will be green the first 50% then turn yellow.
- 4 **North Pointer** - Indicates north.
- 5 **MODE** - Indicates the weather product being displayed.
- 6 **Control Knob Icon** - Displayed when the Control Knobs are available for cycling through the graphical weather products.
- 7 **Joystick Label** - Indicates joystick is active and can be used to pan map.
- 8 **Range Rings** - Outer ring radius is selected range and inner ring radius is one half the selected range.
- 9 **Aircraft Symbol** - Indicates present aircraft position and heading (if available) or track.
- 10 **Freezing Level Color Key** - Colors indicating Freezing Levels at the height shown.

FREEZING LEVELS COLOR CODING

FREEZING LEVELS LEGEND	
100s of feet MSL	
170+	
150-170	
130-150	
110-130	
090-110	
070-090	
050-070	
030-050	
010-030	
Sfc-010	
No Data	

FREEZING LEVELS PAGE OPERATIONAL CONTROLS



MODE - Displays the Select FIS Product Menu.



Joystick - Moving the joystick allows panning of the map and placement of the pointer over the desired FREEZING LEVELS icon to be viewed.



RNG▲/RNG▼ - Displays **ZOOMING TO ### nm** and advances the indicator to the next range. The upper button increases range, the lower button decreases it. The selected range is displayed in the lower left corner of the display with the outer range ring the displayed range and the inner range ring is half the displayed range.

The **RNG** button labels will not be displayed when their respective range limits are reached.

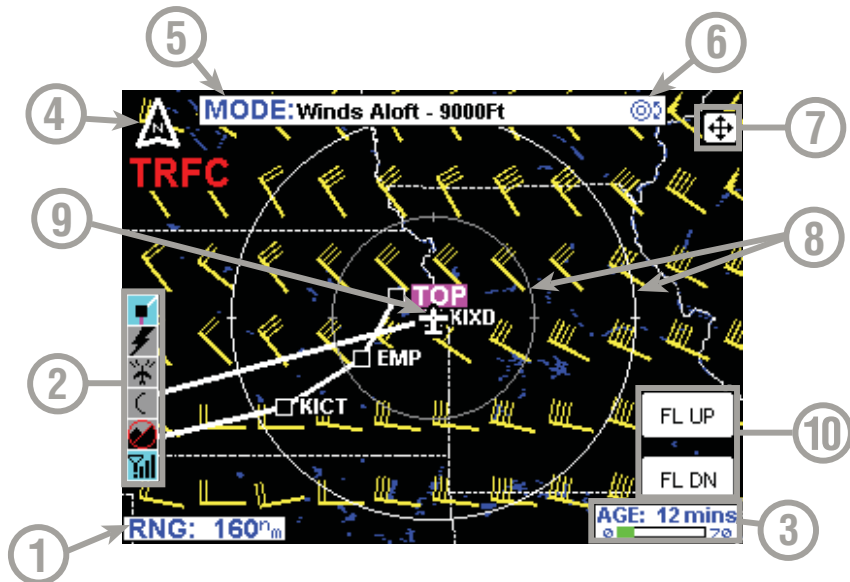


OVLY - Allows selection of flight plan data for overlay on the FIS map.



Control Knobs - Used to select and/or cycle through the available graphical weather products displays.

WINDS ALOFT PAGE



- 1 **Range Scale** - Indicates selected range.
- 2 **Available Functions** - Displays icons representing data available (black) and displayed (color).
- 3 **Age Status Bar** - Indicates percentage of age versus elapsed time before expiration. The bar will be green the first 50% then turn yellow.
- 4 **North Pointer** - Indicates north.
- 5 **MODE** - Indicates the weather product being displayed.
- 6 **Control Knob Icon** - Displayed when the Control Knobs are available for cycling through the graphical weather products.
- 7 **Joystick Label** - Indicates joystick is active and can be used to pan map.
- 8 **Range Rings** - Outer ring radius is selected range and inner ring radius is one half the selected range.
- 9 **Aircraft Symbol** - Indicates present aircraft position and heading (if available) or track.
- 10 **FL UP and FL DN** - Increments the Winds Aloft flight level that is being played.

WINDS ALOFT SCALE

WINDS ALOFT LEGEND	
	CALM
	10 KTS
	20 KTS
	30 KTS
	40 KTS
	50 KTS
	100 KTS
	No Data

WINDS ALOFT PAGE OPERATIONAL CONTROLS



MODE - Displays the Select FIS Product Menu.



Joystick - Moving the joystick allows panning of the map and placement of the pointer over the desired WINDS ALOFT icon to be viewed.



RNG▲/RNG▼ - Displays **ZOOMING TO ### nm** and advances the indicator to the next range. The upper button increases range, the lower button decreases it. The selected range is displayed in the lower left corner of the display with the outer range ring the displayed range and the inner range ring is half the displayed range.

The **RNG** button labels will not be displayed when their respective range limits are reached.



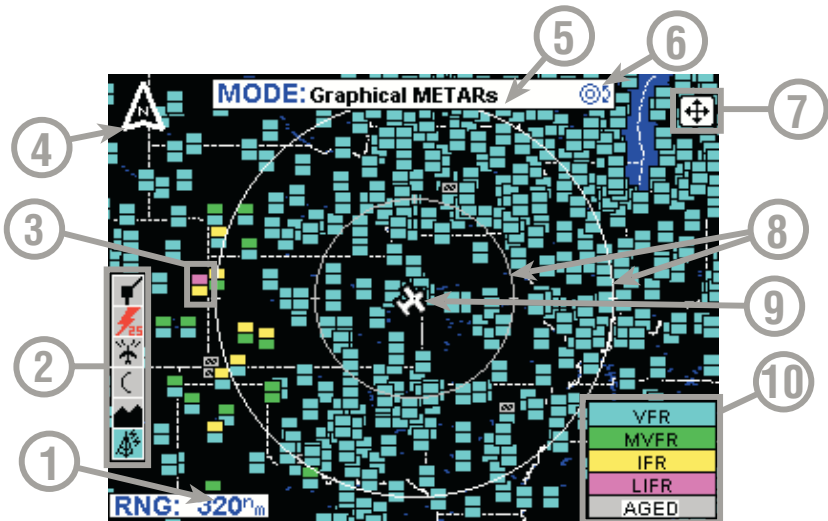
OVLY - Allows selection of flight plan data for overlay on the FIS map.



Control Knobs - Used to select and/or cycle through the available graphical weather products displays.

GRAPHICAL METARS PAGE

The following illustration describes the Graphical METARs display. The only difference between VDL and XM is the Datalink Wx Status icon.

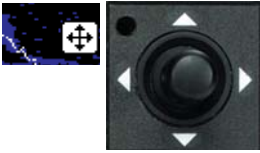


- 1 **Range Scale** - Indicates selected range.
- 2 **Available Functions** - Displays icons representing data available (black) and displayed (color).
- 3 **Graphical METAR Icon** - Ceiling indicated in top box, visibility in the bottom box and ICAO identifier of issuing airport. Note that ICAO identifiers are not displayed on all range settings.
- 4 **North Pointer** - Indicates north.
- 5 **MODE** - Indicates the weather product being displayed.
- 6 **Control Knob Icon** - Displayed when the Control Knobs are available for cycling through the graphical weather products.
- 7 **Joystick Label** - Indicates joystick is active and can be used to pan map.
- 8 **Range Rings** - Outer ring radius is selected range and inner ring radius is one half the selected range.
- 9 **Aircraft Symbol** - Indicates present aircraft position and heading (if available) or track.
- 10 **METAR Color Key** - Colors indicating flight rules pertaining to ceiling and visibility.

GRAPHICAL METARS PAGE OPERATIONAL CONTROLS



MODE - Displays the Select FIS Product Menu.



Joystick - Moving the joystick allows panning of the map and placement of the pointer over the desired METAR icon to be viewed.



RNG▲/RNG▼ - Displays **ZOOMING TO ### nm** and advances the indicator to the next range. The upper button increases range, the lower button decreases it. The selected range is displayed in the lower left corner of the display with the outer range ring the displayed range and the inner range ring is half the displayed range. The **RNG** button labels will not be displayed when their respective range limits are reached.



OVLY - Allows selection of flight plan data for overlay on the FIS map.



Control Knobs - Used to select and/or cycle through the available graphical weather products displays.

SELECTING AND USING THE GRAPHICAL METARS PAGE

1. Press the **WX** Function Select Key until the FIS Graphics Page is displayed. If necessary, turn the Control Knob to obtain the Graphical METARs display as shown in Figure 49. **Graphical METARs** will be displayed in the **MODE** field located at the top center of the display.

NOTE: This page will not be accessible until a valid FIS signal has been acquired and processed by the system.

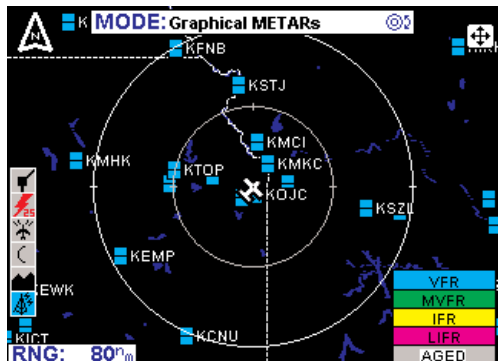


Figure 49

Normal Operation

2. Press the **RNG▲/RNG▼** Key to zoom in on the display. The map is centered on the present position indicated by the symbolic aircraft.

3. To view a specific METAR, move the joystick in the desired direction. A pointer will appear on the display connected to the symbolic aircraft with a flashing line (see Figure 50). The distance and bearing between present position and the pointer is shown at the bottom center of the display. As the joystick is held the pointer will continue to move. When the pointer reaches the edge of the display the map will pan to keep up with pointer movement. Release the joystick to stop moving the pointer. When the pointer moves over a graphical METAR icon, a box will pop up containing the **IDENT**, **NAME** and **CITY/STATE** pertaining to the location and the **AGE** of the report (see Figure 51).

4. Press the **RNG▲/RNG▼** keys to zoom in or out on the pointer position.

5. Press the **MORE INFO** softkey to display the Text METAR Page for the displayed location as in Figure 52.

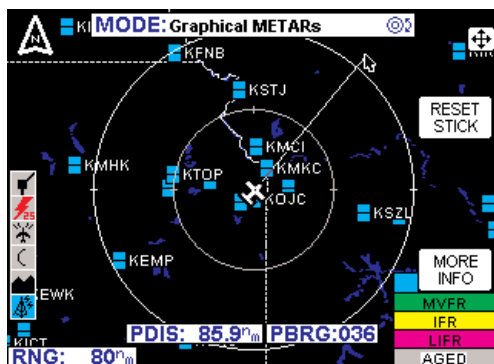


Figure 50

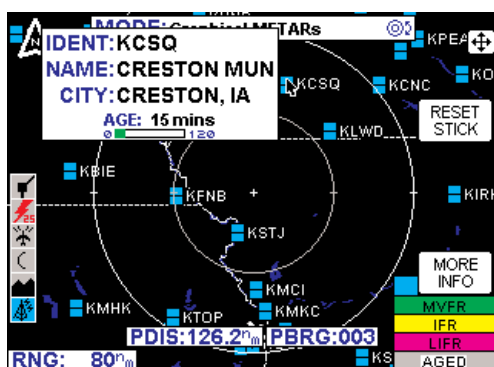


Figure 51

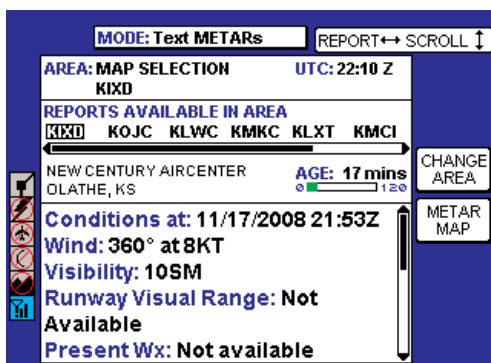


Figure 52

6. Press the **METAR MAP** softkey to return to the previous display.

7. Press the **RESET STICK** softkey to return to the present position display. If no actions are taken for a period of 30 seconds, the display will return to the aircraft present position display.

8. To view the graphical **METAR LEGEND**, move the joystick pointer to an area with no icons and press the **MORE INFO** softkey. The legend will be displayed as in Figure 53. Move the joystick to remove the legend from the display.

9. Press the **OVLY** Key to overlay flightplan data on the Graphical METAR map (see Figure 54).

The **FLIGHT PLAN** softkey toggles the overlay on or off as in Figure 55.

Press the **SAVE & EXIT** softkey to retain the selection on the display.

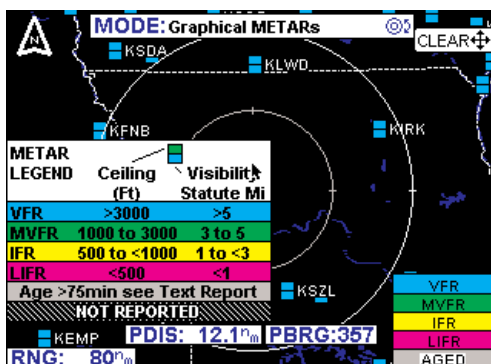


Figure 53

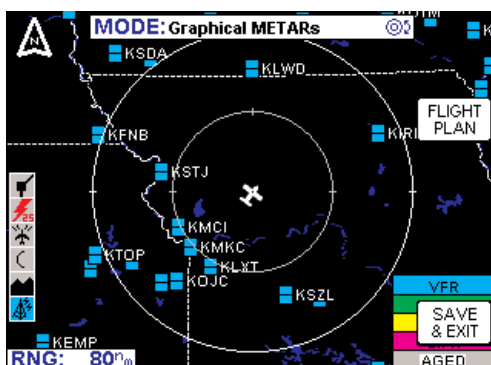


Figure 54

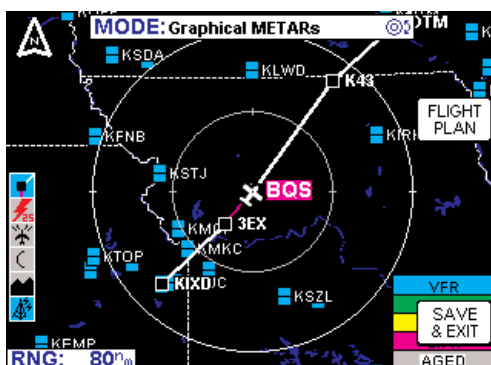
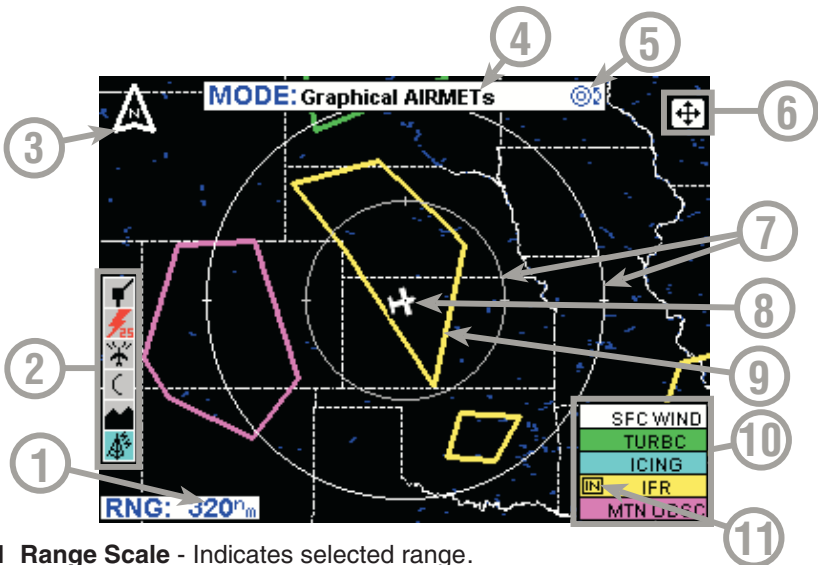


Figure 55

GRAPHICAL AIRMETS PAGE

The following illustration describes the Graphical AIRMETS display. The only difference between VDL and XM is the Datalink Wx Status icon.

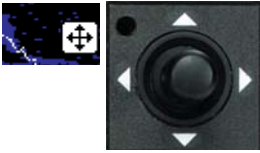


- 1 **Range Scale** - Indicates selected range.
- 2 **Available Functions** - Displays icons representing data available (black) and displayed (color).
- 3 **North Pointer** - Indicates north.
- 4 **MODE** - Indicates the weather product being displayed.
- 5 **Control Knob Icon** - Displayed when the Control Knobs are available for cycling through the graphical weather products.
- 6 **Joystick Label** - Indicates joystick is active and can be used to pan map.
- 7 **Range Rings** - Outer ring radius is selected range and inner ring radius is one half the selected range.
- 8 **Aircraft Symbol** - Indicates present aircraft position and heading (if available) or track.
- 9 **AIRMET Boundary** - Color coded line indicating the boundaries of an AIRMET.
- 10 **AIRMET Color Key** - Colors indicating AIRMET type.
- 11 **IN** - Indicates the current aircraft position is IN " an IFR AIRMET.

GRAPHICAL AIRMETS PAGE OPERATIONAL CONTROLS



MODE - Displays the Select FIS Product Menu.



Joystick - Moving the joystick allows panning of the map and placement of the pointer over the desired AIRMET to be viewed.



RNG▲/RNG▼ - Displays **ZOOMING TO ### nm** and advances the indicator to the next range. The upper button increases range, the lower button decreases it. The selected range is displayed in the lower left corner of the display with the outer range ring the displayed range and the inner range ring is half the displayed range. The **RNG** button labels will not be displayed when their respective range limits are reached.



OVLY - Allows selection of flight plan and lightning data (if Stormscope® equipment is installed) for overlay on the FIS map.



Control Knobs - Used to select and/or cycle through the available graphical weather products displays.

SELECTING AND USING THE GRAPHICAL AIRMETS PAGE

1. Press the **WX** Function Select Key until the FIS Graphics Page is displayed. If necessary, turn the Control Knob to obtain the Graphical AIRMETS display as shown in Figure 56. **Graphical AIRMETS** will be displayed in the **MODE** field located at the top center of the display.

NOTE: This page will not be accessible until a valid FIS signal has been acquired and processed by the system.

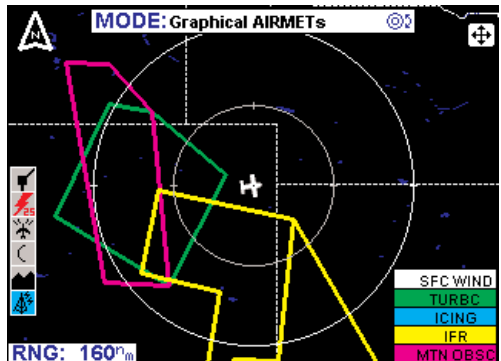


Figure 56

2. Press the **RNG▲/RNG▼** Key to zoom in on the display. The map is centered on the present position indicated by the symbolic aircraft.

Normal Operation

3. To view a specific AIRMET, move the joystick in the desired direction and place the pointer on the desired AIRMET border (see Figure 57). A box will pop up containing the AIRMET designator, **TYPE** and the **AGE** of the report.

4. Press the **RNG▲/RNG▼** keys to zoom in or out on the pointer position.

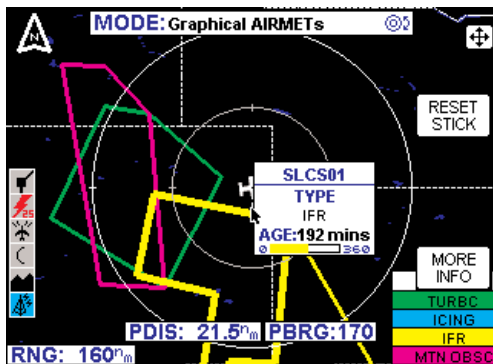


Figure 57

5. Press the **MORE INFO** Softkey to display the Text AIRMET Page for the displayed location as in Figure 58. The text describing AIRMET location is displayed in green to help differentiate between location information and weather information. When the text report is accessed from the map, the text will automatically be scrolled to the beginning of the weather information. Some report identifiers may be highlighted in green (**CHIZ02** and **SLCZ01**). These are AIRMET reports that contain insufficient location information to be displayed on the AIRMET Map.

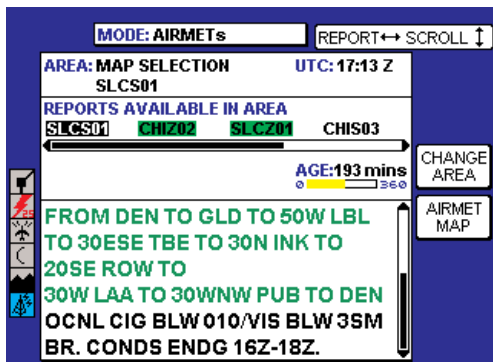


Figure 58

6. Press the **AIRMET MAP** Softkey to return to the previous display.

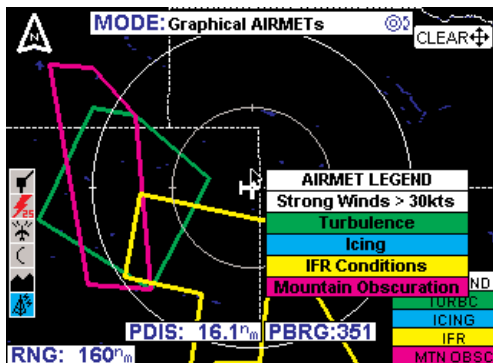


Figure 59

7. Press the **RESET STICK** Softkey to return to the present position display. If no actions are taken for a period of 30 seconds, the display will return to the aircraft present position display.

8. To view the graphical **AIRMET LEGEND**, move the joystick pointer to an empty area on the map and press the **MORE INFO** softkey. The legend will be displayed as in Figure 59. Move the joystick to remove the legend from the display.

9. Press the **OVLY** Key to overlay flightplan and/or Stormscope® data on the Graphical AIRMET map (see Figure 60). If a Stormscope® system is not installed, the **STORMSCOPE** Softkey will not be displayed.

The **FLIGHT PLAN** softkey toggles the overlay on or off as in Figure 61. The **STORMSCOPE** Softkey will toggle the lightning display symbols on or off (if a Stormscope® is installed).

Press the **SAVE & EXIT** softkey to retain the selection on the display.

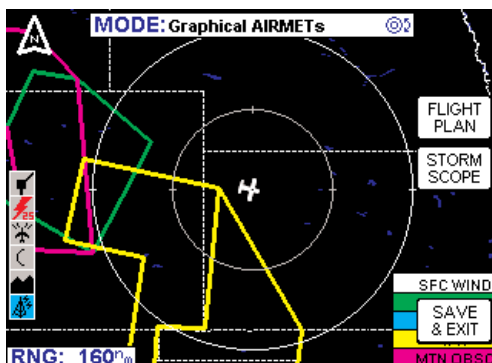


Figure 60

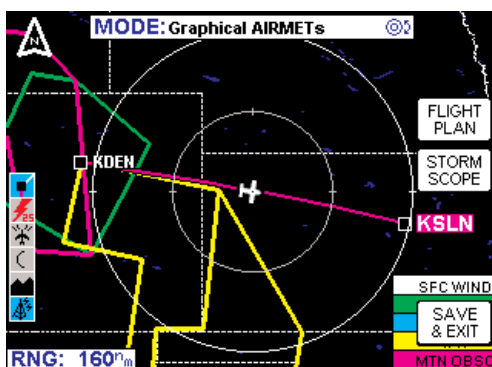
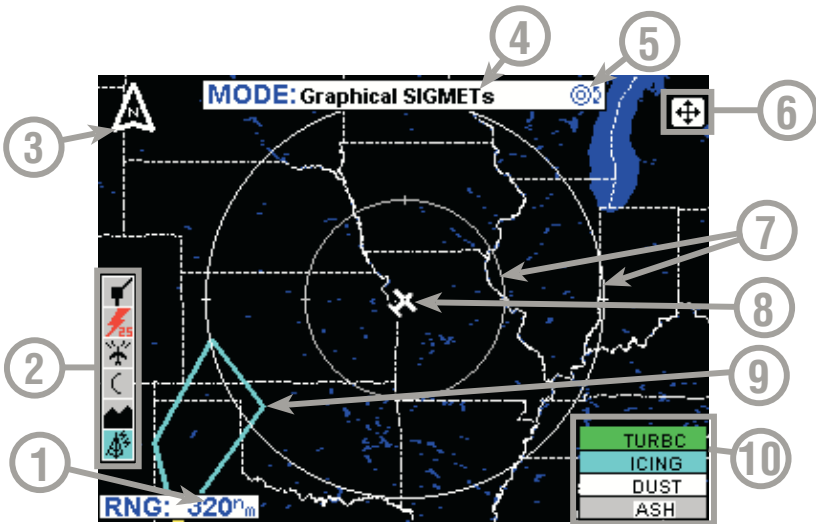


Figure 61

GRAPHICAL SIGMETS PAGE

The following illustration describes the Graphical SIGMETs display. The only difference between VDL and XM is the Datalink Wx Status icon.



- 1 **Range Scale** - Indicates selected range.
- 2 **Available Functions** - Displays icons representing data available (black) and displayed (color).
- 3 **North Pointer** - Indicates north.
- 4 **MODE** - Indicates the weather product being displayed.
- 5 **Control Knob Icon** - Displayed when the Control Knobs are available for cycling through the graphical weather products.
- 6 **Joystick Label** - Indicates joystick is active and can be used to pan map.
- 7 **Range Rings** - Outer ring radius is selected range and inner ring radius is one half the selected range.
- 8 **Aircraft Symbol** - Indicates present aircraft position and heading (if available) or track.
- 9 **SIGMET Boundary** - Color coded line indicating the boundaries of a SIGMET.
- 10 **SIGMET Color Key** - Colors indicating SIGMET type.

GRAPHICAL SIGMETS PAGE OPERATIONAL CONTROLS



MODE - Displays the Select FIS Product Menu.



Joystick - Moving the joystick allows panning of the map and placement of the pointer over the desired SIGMET to be viewed.



RNG▲/RNG▼ - Displays **ZOOMING TO ### nm** and advances the indicator to the next range. The upper button increases range, the lower button decreases it. The selected range is displayed in the lower left corner of the display with the outer range ring the displayed range and the inner range ring is half the displayed range. The **RNG** button labels will not be displayed when their respective range limits are reached.



OVLY - Allows selection of flight plan and lightning data (if Stormscope® equipment is installed) for overlay on the FIS map.



Control Knobs - Used to select and/or cycle through the available graphical weather products displays.

SELECTING AND USING THE GRAPHICAL SIGMETS PAGE

1. Press the **WX** Function Select Key until the FIS Graphics Page is displayed. If necessary, turn the Control Knob to obtain the Graphical SIGMETs display as shown in Figure 62. **Graphical SIGMETs** will be displayed in the **MODE** field located at the top center of the display.

NOTE: This page will not be accessible until a valid FIS signal has been acquired and processed by the system.

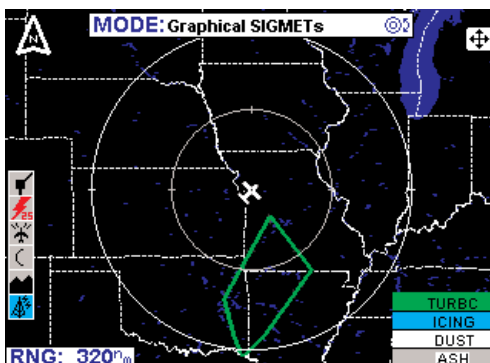


Figure 62

Normal Operation

2. Press the **RNG▲/RNG▼** Key to zoom in on the display. The map is centered on the present position indicated by the symbolic aircraft.

3. To view a specific SIGMET, move the joystick in the desired direction and place the pointer on the desired SIGMET border (see Figure 63). A box will pop up containing the SIGMET designator, **TYPE** and the **AGE** of the report.

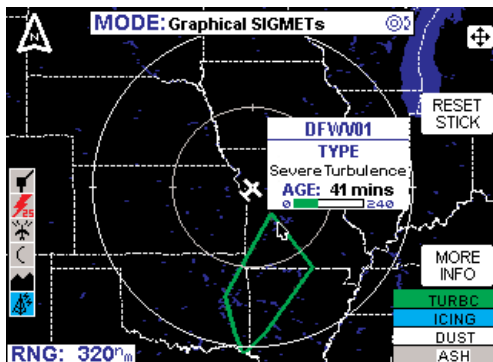


Figure 63

4. Press the **RNG▲/RNG▼** keys to zoom in or out on the pointer position.

5. Press the **MORE INFO** Softkey to display the Text SIGMET Page for the displayed location as in Figure 64. The text describing SIGMET location is displayed in green to help differentiate between location information and weather information. When the text report is accessed from the map, the text will automatically be scrolled to the beginning of the weather information.

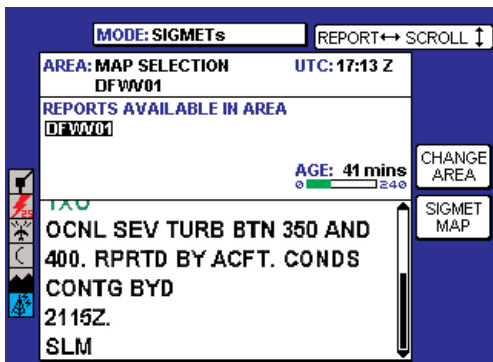


Figure 64

6. Press the **SIGMET MAP** Softkey to return to the previous display.

7. Press the **RESET STICK** Softkey to return to the present position display. If no actions are taken for a period of 30 seconds, the display will return to the aircraft present position display.

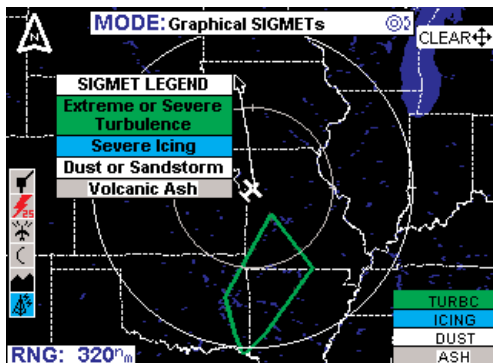


Figure 65

8. To view the graphical **SIGMET LEGEND**, move the joystick pointer to an empty area on the map and press the **MORE INFO** softkey. The legend will be displayed as in Figure 65. Move the joystick to remove the legend from the display.

9. Press the **OVLY** Key to overlay flightplan and/or Stormscope® data on the Graphical SIGMET map (see Figure 66). If a Stormscope® system is not installed, the **STORMSCOPE** Softkey will not be displayed.

The **FLIGHT PLAN** softkey toggles the overlay on or off as in Figure 67. The **STORMSCOPE** Softkey will toggle the lightning display symbols on or off (if a Stormscope® is installed).

Press the **SAVE & EXIT** softkey to retain the selection on the display.

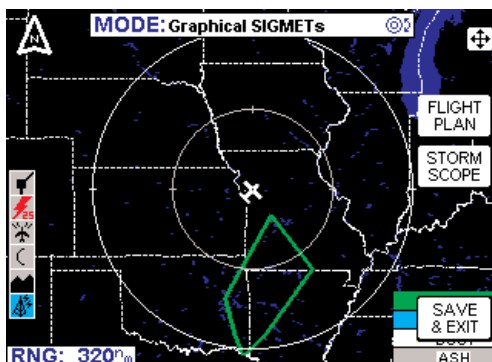


Figure 66

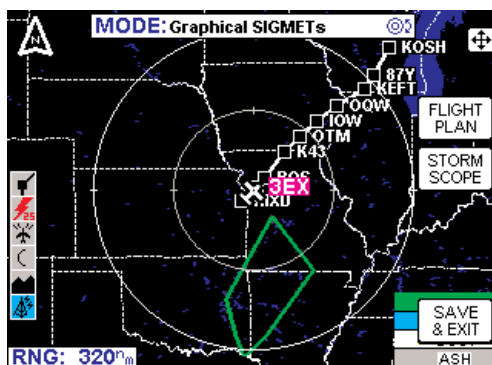
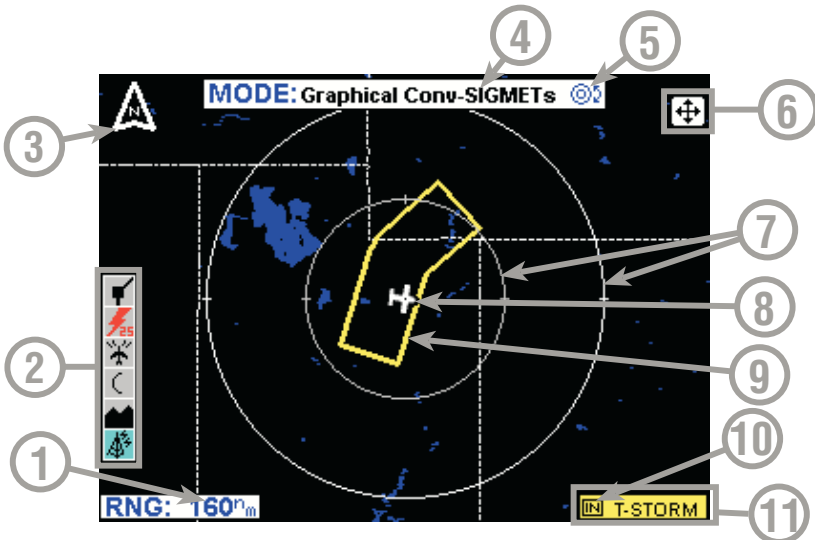


Figure 67

GRAPHICAL CONVECTIVE SIGMETs PAGE

The following illustration describes the Graphical Convective SIGMETs display. The only difference between VDL and XM is the Datalink Wx Status icon.



- 1 **Range Scale** - Indicates selected range.
- 2 **Available Functions** - Displays icons representing data available (black) and displayed (color).
- 3 **North Pointer** - Indicates north.
- 4 **MODE** - Indicates the weather product being displayed.
- 5 **Control Knob Icon** - Displayed when the Control Knobs are available for cycling through the graphical weather products.
- 6 **Joystick Label** - Indicates joystick is active and can be used to pan map.
- 7 **Range Rings** - Outer ring radius is selected range and inner ring radius is one half the selected range.
- 8 **Aircraft Symbol** - Indicates present aircraft position and heading (if available) or track.
- 9 **Convective SIGMET Boundary** - Color coded line indicating the boundaries of a Convective SIGMET.
- 10 **IN** - Indicates the current aircraft position is "IN" a thunderstorm Convective SIGMET.
- 11 **Convective SIGMET Color Key** - Colors indicating Convective SIGMET type.

GRAPHICAL CONVECTIVE SIGMETS PAGE OPERATIONAL CONTROLS



MODE - Displays the Select FIS Product Menu.



Joystick - Moving the joystick allows panning of the map and placement of the pointer over the desired Convective SIGMET to be viewed.



RNG▲/RNG▼ - Displays **ZOOMING TO ### nm** and advances the indicator to the next range. The upper button increases range, the lower button decreases it. The selected range is displayed in the lower left corner of the display with the outer range ring the displayed range and the inner range ring is half the displayed range. The **RNG** button labels will not be displayed when their respective range limits are reached.



OVLY - Allows selection of flight plan and lightning data (if Stormscope® equipment is installed) for overlay on the FIS map.



Control Knobs - Used to select and/or cycle through the available graphical weather products displays.

SELECTING AND USING THE GRAPHICAL CONVECTIVE SIGMETS PAGE

1. Press the **WX** Function Select Key until the FIS Graphics Page is displayed. If necessary, turn the Control Knob to obtain the Graphical Convective SIGMETs display as shown in Figure 68. **Graphical Conv SIGMETs** will be displayed in the **MODE** field located at the top center of the display.

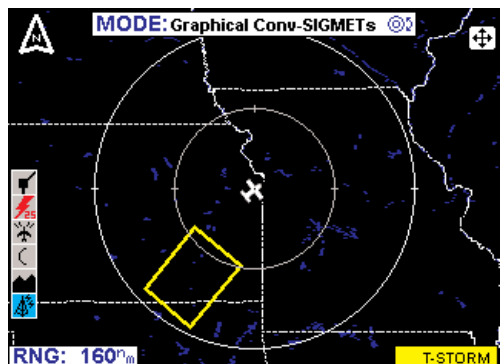


Figure 68

***NOTE:** This page will not be accessible until a valid FIS signal has been acquired and processed by the system.*

2. Press the **RNG▲/RNG▼** Key to zoom in on the display. The map is centered on the present position indicated by the symbolic aircraft.

Normal Operation

3. To view a specific Convective SIGMET, move the joystick in the desired direction and place the pointer on the desired Convective SIGMET border (see Figure 69). A box will pop up containing the Convective SIGMET designator, **TYPE** and the **AGE** of the report.

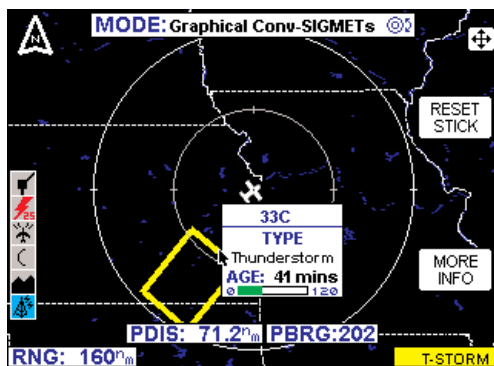


Figure 69

4. Press the **RNG▲/RNG▼** keys to zoom in or out on the pointer position.

5. Press the **MORE INFO** Softkey to display the Text Convective SIGMET Page for the displayed location as in Figure 70. The text describing Convective SIGMET location is displayed in green to help differentiate between location information and weather information. When the text report is accessed from the map, the text will automatically be scrolled to the beginning of the weather information.

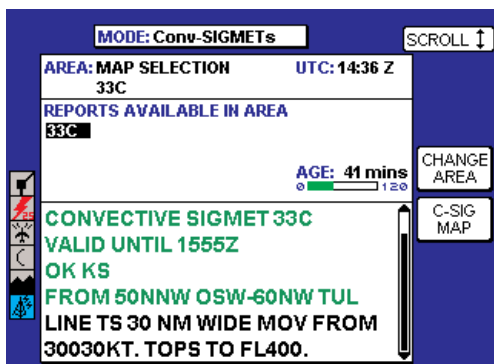


Figure 70

6. Press the **C-SIG MAP** Softkey to return to the previous display.

7. Press the **RESET STICK** Softkey to return to the present position display. If no actions are taken for a period of 30 seconds, the display will return to the aircraft present position display.

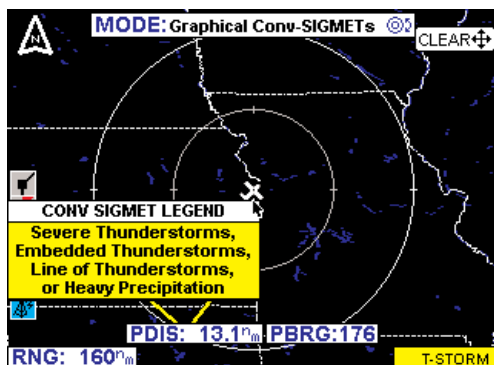


Figure 71

8. To view the graphical **CONV SIGMET LEGEND**, move the joystick pointer to an empty area on the map and press the **MORE INFO** softkey. The legend will be displayed as in Figure 71. Move the joystick to remove the legend from the display.

9. Press the **OVLY** Key to overlay flightplan and/or Stormscope® data on the Graphical Convective SIGMET map (see Figure 72). If a Stormscope® system is not installed, the **STORMSCOPE** Softkey will not be displayed.

The **FLIGHT PLAN** softkey toggles the overlay on or off as in Figure 73. The **STORMSCOPE** Softkey will toggle the lightning display symbols on or off (if a Stormscope® is installed).

Press the **SAVE & EXIT** softkey to retain the selection on the display.

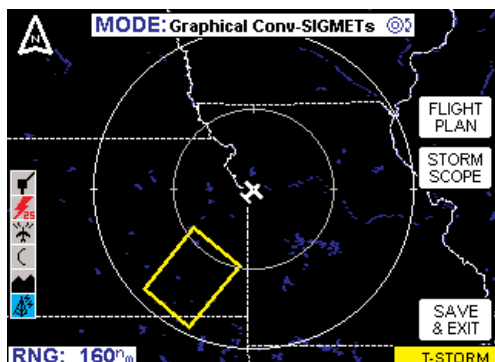


Figure 72

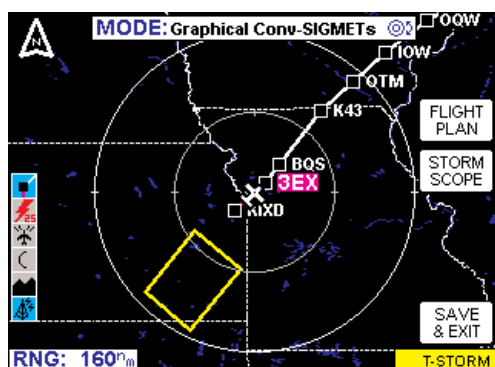
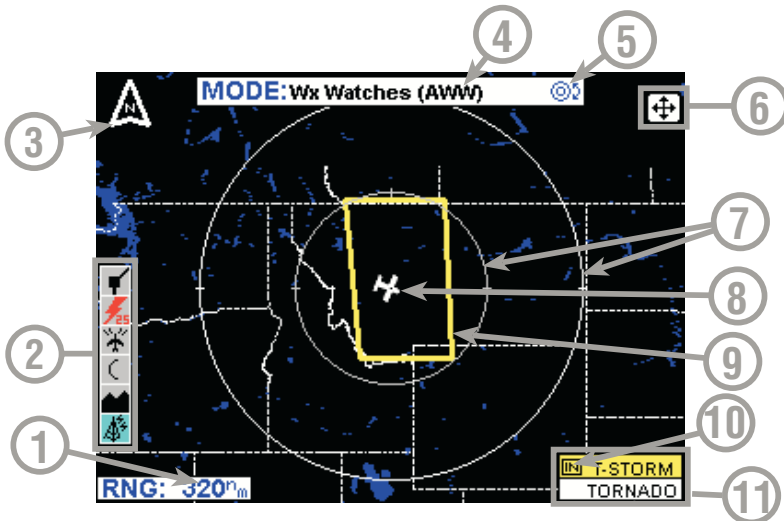


Figure 73

GRAPHICAL ALERT WEATHER WATCHES PAGE (AWW) (VDL ONLY)

The following illustration describes the Graphical Alert Weather Watches (AWW) display.



- 1 **Range Scale** - Indicates selected range.
- 2 **Available Functions** - Displays icons representing data available (black) and displayed (color).
- 3 **North Pointer** - Indicates north.
- 4 **MODE** - Indicates the weather product being displayed.
- 5 **Control Knob Icon** - Displayed when the Control Knobs are available for cycling through the graphical weather products.
- 6 **Joystick Label** - Indicates joystick is active and can be used to pan map.
- 7 **Range Rings** - Outer ring radius is selected range and inner ring radius is one half the selected range.
- 8 **Aircraft Symbol** - Indicates present aircraft position and heading (if available) or track.
- 9 **Weather Watch Boundary** - Color coded line indicating the boundaries of an Alert Weather Watch.
- 10 **IN** - Indicates the current aircraft position is "IN" a severe thunderstorm watch area.
- 11 **Weather Watch Color Key** - Colors indicating Alert Weather Watch type.

GRAPHICAL ALERT WEATHER WATCHES PAGE OPERATIONAL CONTROLS



MODE - Displays the Select FIS Product Menu.



Joystick - Moving the joystick allows panning of the map and placement of the pointer over the desired Weather Watch to be viewed.



RNG▲/RNG▼ - Displays **ZOOMING TO ### nm** and advances the indicator to the next range. The upper button increases range, the lower button decreases it. The selected range is displayed in the lower left corner of the display with the outer range ring the displayed range and the inner range ring is half the displayed range. The **RNG** button labels will not be displayed when their respective range limits are reached.



OVLY - Allows selection of flight plan and lightning data (if Stormscope® equipment is installed) for overlay on the FIS map.



Control Knobs - Used to select and/or cycle through the available graphical weather products displays.

SELECTING AND USING THE GRAPHICAL ALERT WEATHER WATCHES PAGE

1. Press the **WX** Function Select Key until the FIS Graphics Page is displayed. If necessary, turn the Control Knob to obtain the Graphical Alert Weather Watches display as shown in Figure 74. **Wx Watches (AWW)** will be displayed in the **MODE** field located at the top center of the display.

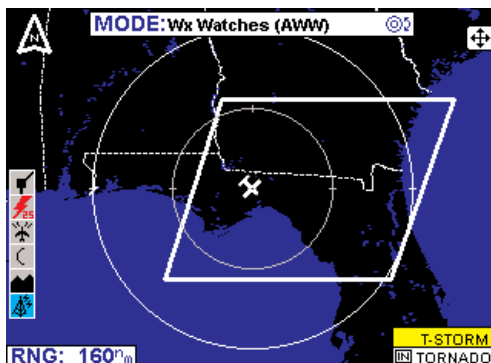


Figure 74

***NOTE:** This page will not be accessible until a valid FIS signal has been acquired and processed by the system.*

2. Press the **RNG▲/RNG▼** Key to zoom in on the display. The map is centered on the present position indicated by the symbolic aircraft.

Normal Operation

3. To view a specific Alert Weather Watch, move the joystick in the desired direction and place the pointer on the desired Weather Watch border (see Figure 75). A box will pop up containing the Weather Watch designator, **TYPE** and the **AGE** of the report.

4. Press the **RNG▲/RNG▼** keys to zoom in or out on the pointer position.

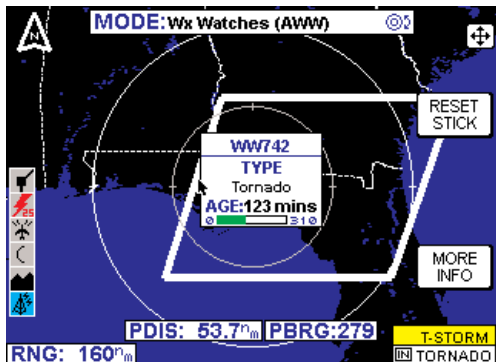


Figure 75

5. Press the **MORE INFO** Softkey to display the Text Alert Weather Watch Page for the displayed location as in Figure 76. The text describing AWW location is displayed in green to help differentiate between location information and weather information. When the text report is accessed from the map, the text will automatically be scrolled to the beginning of the weather information.

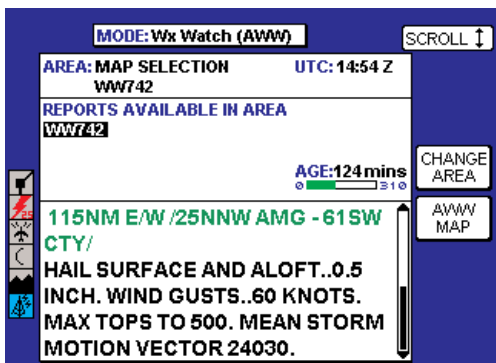


Figure 76

6. Press the **AWW MAP** Softkey to return to the previous display.

7. Press the **RESET STICK** Softkey to return to the present position display. If no actions are taken for a period of 30 seconds, the display will return to the aircraft present position display.

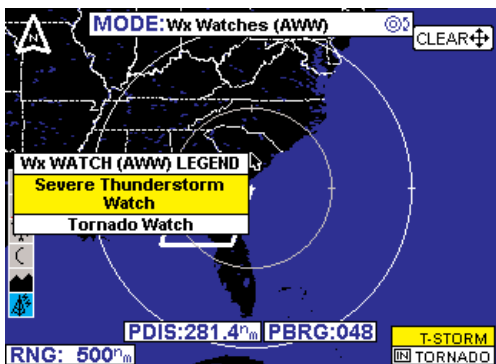


Figure 77

8. To view the graphical **Wx WATCH (AWW) LEGEND**, move the joystick pointer to an empty area on the map and press the **MORE INFO** softkey. The legend will be displayed as in Figure 77. Move the joystick to remove the legend from the display.

9. Press the **OVLY** Key to overlay flightplan and/or Stormscope® data on the Graphical Alert Weather Watch map (see Figure 78). If a Stormscope® system is not installed, the **STORMSCOPE** Softkey will not be displayed.

The **FLIGHT PLAN** softkey toggles the overlay on or off as in Figure 79. The **STORMSCOPE** Softkey will toggle the lightning display symbols on or off (if a Stormscope® is installed).

Press the **SAVE & EXIT** softkey to retain the selection on the display.

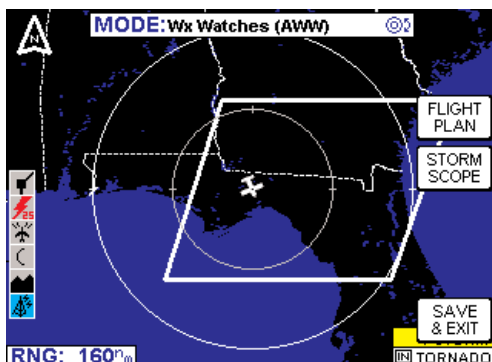


Figure 78

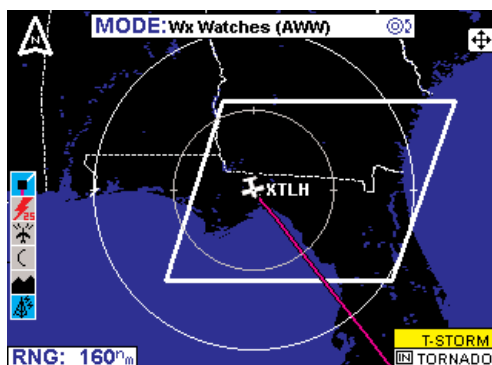
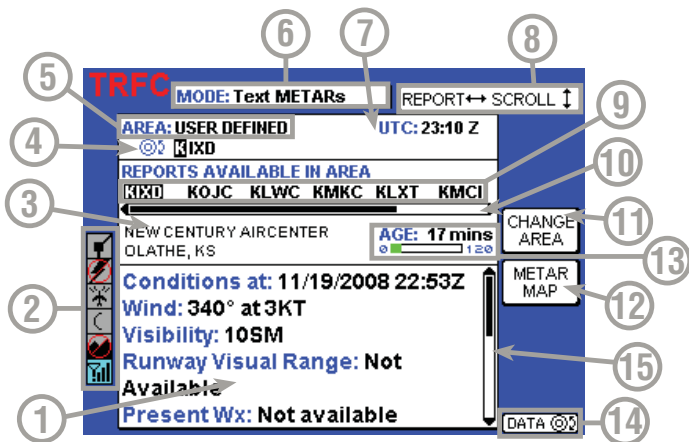


Figure 79

FIS TEXT PAGE

Press the **WX** Function Select Key until the FIS Text Page is displayed. The following illustration describes the FIS Text Page display. The only difference between VDL and XM is the Datalink Wx Status icon.



- 1 **Text Field** - The translated METARs data is displayed first in this window followed by the encoded weather report is displayed in this field.
- 2 **Available Functions** - Displays icons representing data available (black) and displayed (color).
- 3 **Selected Report Info** - Displays name, city and state of selected report.
- 4 **Selected Area Identifier** - Displays the identifier of the area selection.
- 5 **Area Selection** - Pressing the **CHANGE AREA** soft key cycles between Destination, Flightplan WPT, Nearest and User Defined.
- 6 **Mode** - Pressing the **MODE** key will display the **SELECT FIS PRODUCT** Menu.
- 7 **UTC** - Current UTC time.
- 8 **Report** - Each horizontal movement of the joystick will move the cursor over the next report in the **AVAILABLE REPORTS** field.
- 9 **Available Reports** - Shows available reports based on the selection in the **AREA** field. Special, urgent or amended reports are highlighted in yellow.
- 10 **Scroll Bar Left/Right** - Indicates there are more available reports than can be displayed on the screen. Move the joystick left/right to cycle through the reports.
- 11 **Change Area Soft Key** - Cycles the **AREA** field between Destination, Flightplan Waypoint (FLPN WPT), Nearest and User Defined.
- 12 **METAR Map Soft Key** - When this key is pressed the graphical METAR page is displayed with the map centered on the selected METAR. This is only available when valid data for graphical METARs is being received.
- 13 **Age of Report** - Age of report based on UTC time minus time of report. The bar indicates percentage of age versus elapsed time before expiration. The bar will be green the first 50% then turn yellow.
- 14 **Knob Function Label** - Indicates the knob function is set to **DATA** input (USER DEFINED) or **SCAN** data (FLPN WPT).
- 15 **Scroll Bar Up/Down** - Indicates there is more available data in this report than can be displayed on the screen. Move the joystick Up/Down to cycle through the reports.

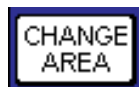
FIS TEXT PAGE OPERATIONAL CONTROLS



MODE - Displays the Select FIS Product Menu.



Joystick - Moving the joystick right or left moves the cursor through the available reports.



CHANGE AREA - Pressing the **CHANGE AREA** softkey will cycle through the four options available for the **AREA** field in the upper right of the display. Available selections are **DESTINATION**, **NEAREST**, **FLPN WPT** and **USER DEFINED**. The closest available weather reports for the selected **AREA** will be displayed in the **REPORTS AVAILABLE IN AREA** field.



(PRODUCT) MAP - This softkey is available when viewing textual weather products that are available graphically and will reflect the selected weather product (METAR, AIRMET, SIGMET, etc.). When this softkey is pressed, the corresponding graphical weather product map will be displayed with the map centered on the location of the selected report.



SCAN/DATA - The **SCAN** feature is only available when **FLPN WPT** is the selected **AREA**. The **DATA** feature is available when **USER DEFINED** is selected. When the Control Knob function is set to **SCAN**, the inner knob cycles through the available flight plan waypoints. When the Control Knob function is set to **DATA**, the outer knob moves the cursor to the desired character in the desired field. The inner knob allows the selection of the desired letter or number in each field.

USING THE FIS TEXT PAGE

Press the **WX** Function Select Key until the FIS Text Page is displayed as shown in Figure 80.

NOTE: If a message such as that shown in Figure 81 (METARs or other weather product) is displayed, it may be that the system has not had time to acquire a signal. If this message is still present after 5-10 minutes, refer to the Messages section of this addendum.

*If no report for the selected weather product is available in the selected area, **NO (Selected Product) AVAILABLE IN SELECTED AREA** will be displayed.*

When viewing FIS textual reports of Area Products, such as AIRMETS (as in Figure 82), SIGMETs, Convective SIGMETs and Weather Watches (VDL Only), the description of the affected area will be displayed in green. The description of the weather phenomenon will be displayed in black. If the textual page is accessed from one of the graphical area product pages, the page will automatically be scrolled to the beginning of the weather description.

NOTE: If an AIRMET report identifier in the REPORTS AVAILABLE IN AREA field is highlighted in green, the description of the affected area does not represent a polygon (e.g. area along and 25 nm either side of a line from...) and cannot be displayed on the AIRMET map.

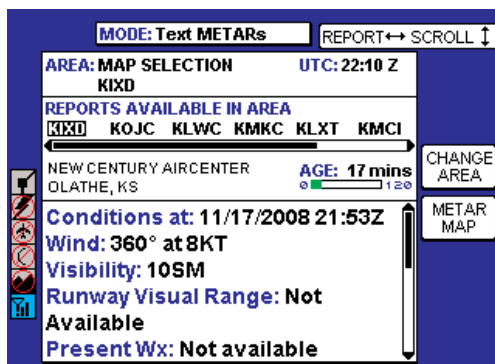


Figure 80

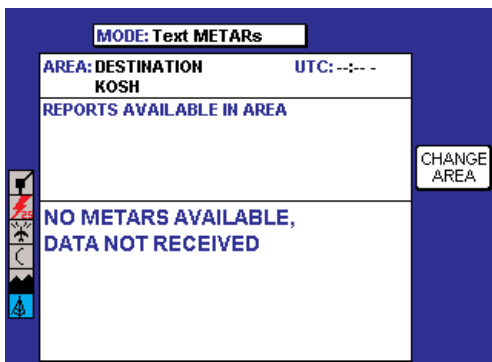


Figure 81

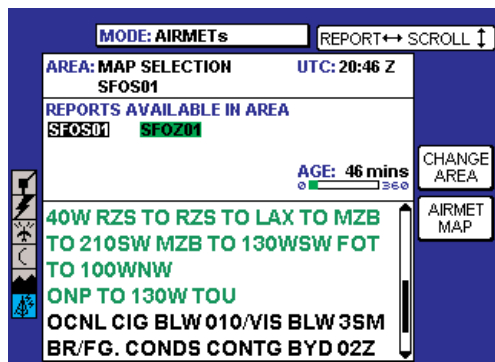


Figure 82

CHANGING MODES & AREA

1. Press the **MODE** Key to display the **SELECT FIS PRODUCT** Menu as shown in Figure 83. Use the Joystick or the Control Knobs to select the desired textual product.

The type of report selected is then displayed in the **MODE** field at the top of the display.

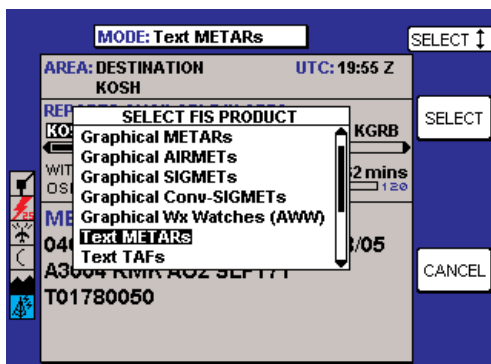


Figure 83

Figure 84 shows the relationship between the selected **AREA** and the selected **MODE**. The system filters and then displays reports for the selected **MODE** based on the distance from the selected **AREA**. The **REPORTS AVAILABLE IN AREA** field lists closest first, furthest last.

For instance, the display shown in Figure 80 lists all available METARs within 50nm of KIXD (the selected **AREA**). KIXD is also a reporting station which is listed first in the **REPORTS AVAILABLE IN AREA**. Use the joystick to scroll across through the available reports. Urgent, special or amended reports will be highlighted in yellow.

Note that the displayed report in Figure 80 is 61 minutes old. The bar indicates a percentage of time left before expiration. The bar will be green the first 50%, then turn yellow.

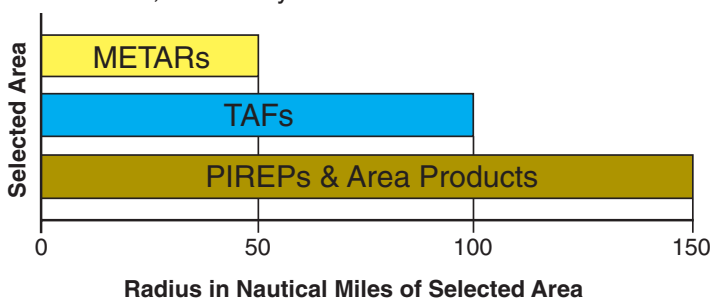


Figure 84

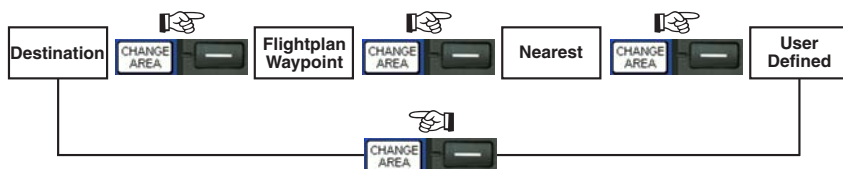


Figure 85

Normal Operation

2. Press the **CHANGE AREA** softkey to view reports for either **NEAREST** to present position, **USER DEFINED** location, **DESTINATION** (last waypoint in a flightplan) or **FPLN WPT** (any waypoint in an active flightplan). The softkey cycles through the **AREAs** as shown in Figure 85.

These four selectable areas are used to make it easier to find all the reports near a specific location without having to know the exact identifier of the reporting station. Again, refer to Figure 84 to understand the relationship between the selected **AREA** and the selected **MODE**.

SELECTING IDENTIFIERS USING THE DATA/SCAN KNOB

Scanning Flightplan Waypoints

If **FPLN WPT** is selected in the **AREA** field (as shown in Figure 86), the **SCAN** Knob can be used to sequence through all the waypoints on the active flightplan. The next waypoint from the current position will be displayed.

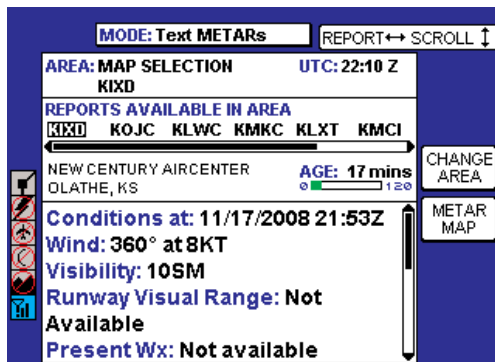


Figure 86

Turn the inner knob clockwise to sequence forward through the waypoints. Turn the inner counter-clockwise to sequence backward through the waypoints.

Finding User Defined Areas By Identifier

If **USER DEFINED** has been selected, as in Figure 87, use the Control Knob to enter data (note cursor position in Figure 87) or scan through available location options. The following is an example of using this feature.

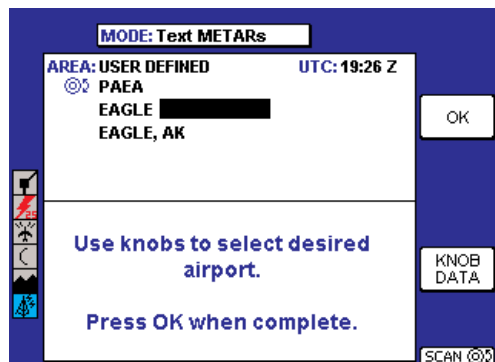


Figure 87

1. The cursor will be over the first character of the way-point identifier. Select the desired character by turning the inner knob. The screen will change to that shown in Figure 88.

2. Turn the outer knob one click clockwise to move the cursor to the next character field as shown in Figure 89. Turn the inner knob to select the desired character.

3. Turn the outer knob one click clockwise to move the cursor to the next character field. Turn the inner knob to select the desired character. See Figure 90.

4. Turn the outer knob one click clockwise to move the cursor to the next character field. Turn the inner knob to select the desired character.

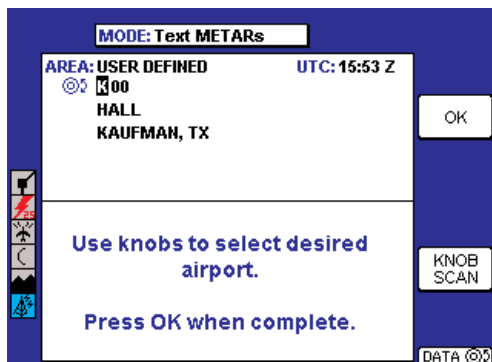


Figure 88

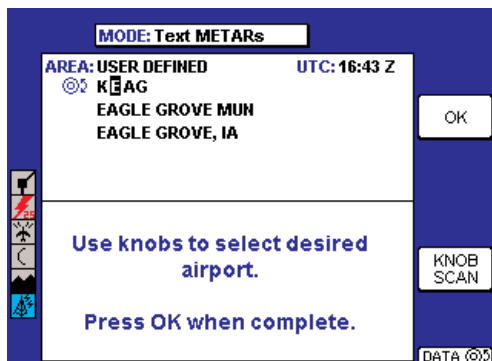


Figure 89

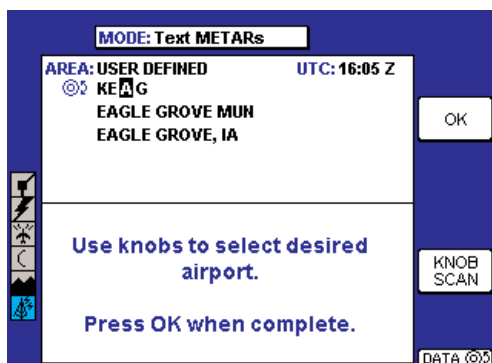


Figure 90

Normal Operation

5. Press the **OK** softkey when finished making selections. The display will be as shown in Figure 91.

6. Move the joystick right or left to view available reports.

NOTE: Available reports highlighted in yellow, like KMCW in Figure 91, indicates the report is a special report, urgent report or an amended or corrected report.

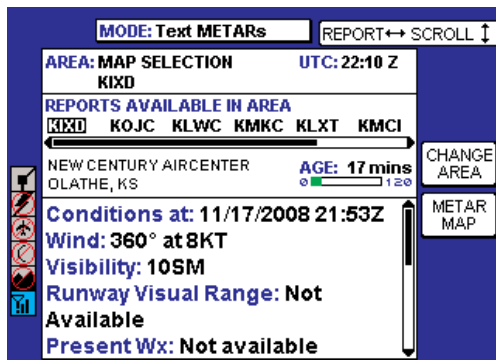


Figure 91

7. Press the **METAR MAP** softkey to display the selected report location (in this case KCAV) centered on the Graphical METAR display as shown in Figure 92.

NOTE: The METAR MAP softkey is only available when viewing METARs and valid data for graphical METARs is being received.

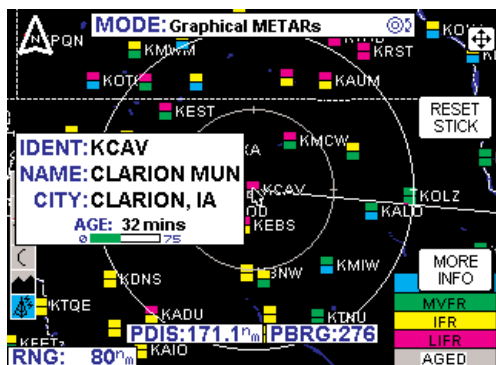


Figure 92

Finding User Defined Areas by Name or City

When the identifier of the desired location is known, the method previously described can be used to select it. However, if the identifier is not known, the name of the location can be entered. The system will also allow entry of just the first few characters of the location name to help find it in the database. If neither the identifier nor the location name is known, the city/state can be scanned.

To Enter Location Name:

The following example shows entering **EAGLE GROVE MUN** as a location.

1. Turn the outer Control Knob one click clockwise. Figure 93 will be displayed.

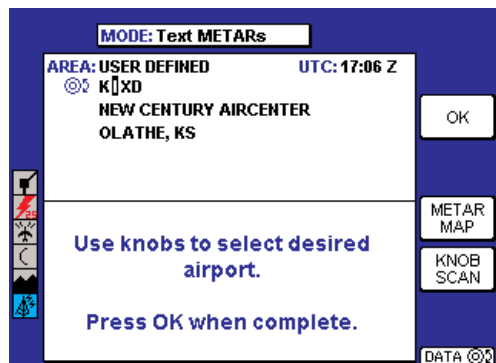


Figure 93

2. Continue to turn the outer knob clockwise to highlight the **N** as shown in Figure 94.

3. Turn the inner knob counterclockwise until an **E** is selected as shown in Figure 95.

4. Turn the outer knob clockwise until the cursor is positioned for the next character. Turn the inner knob to select a **A** as in Figure 96.

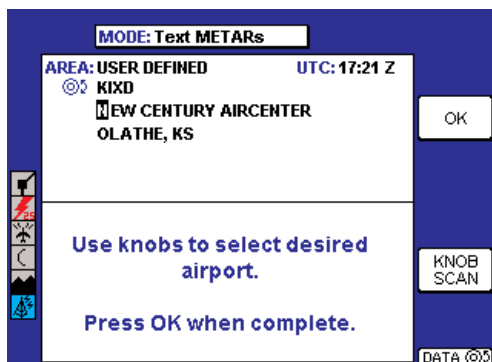


Figure 94

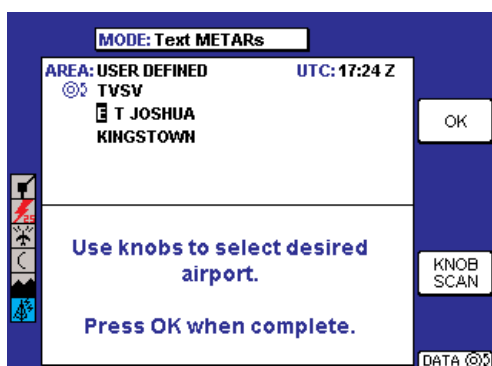


Figure 95

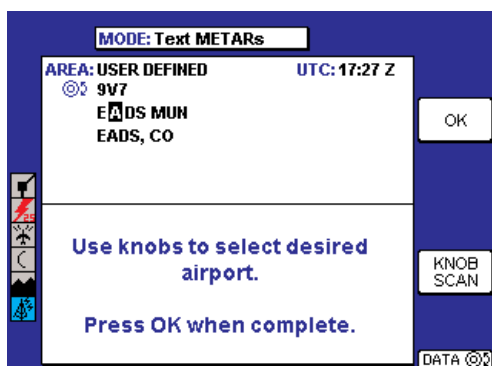


Figure 96

Normal Operation

5. Turn the outer knob clockwise until the cursor is positioned for the next character entry.

Turn the inner knob to select a **G** as in Figure 97.

6. Turn the outer knob clockwise until the cursor is positioned for the next desired character entry.

7. Turn the inner knob clockwise to select a **G** as shown in Figure 98. The desired location is now displayed because it is the first instance in the database with a **G** in this field.

To Scan for Location Name:

Sometimes, only a portion of the airport name may come to mind. The following example shows scanning for **EAGLE GROVE MUN** when **EAGLE** is the only portion of the name remembered.

1. Repeat Step 1 through 6 of the previous procedure.

2. Press the **KNOB SCAN** softkey. The Control Knob label will now display **SCAN**. The knob label will now show **SCAN** as in Figure 99.

3. Turn the outer knob clockwise until the cursor is positioned as in Figure 99.

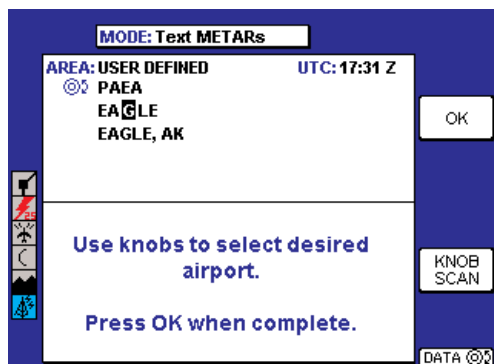


Figure 97

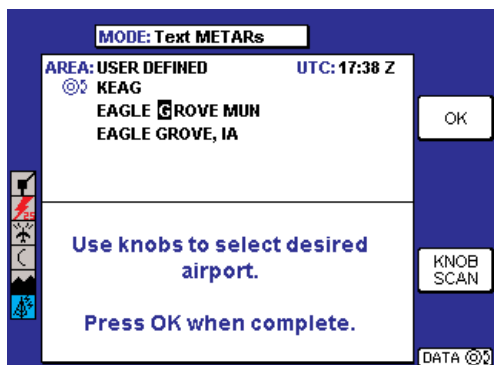


Figure 98

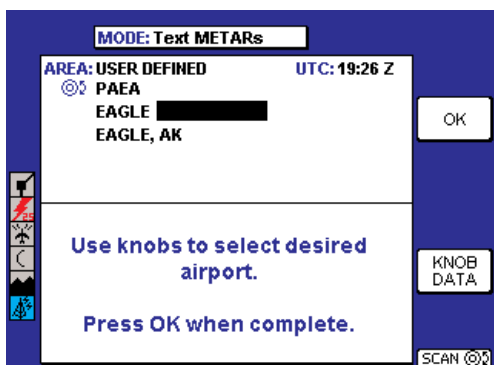


Figure 99

4. Turn the inner knob to sequence through all the location names in the database beginning with **EAGLE**, stopping at the desired name as in Figure 100.

NOTE: This same method may be used with the name of the city where the airport is located.

This method is also used to choose the desired airport among those of identical names, but located in different cities.

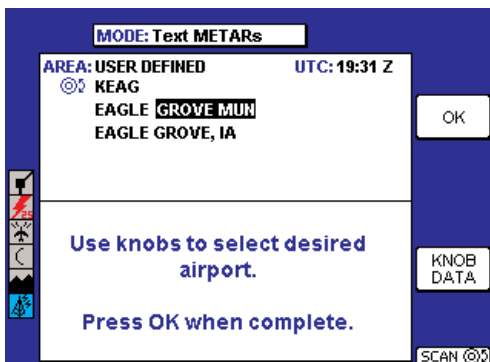
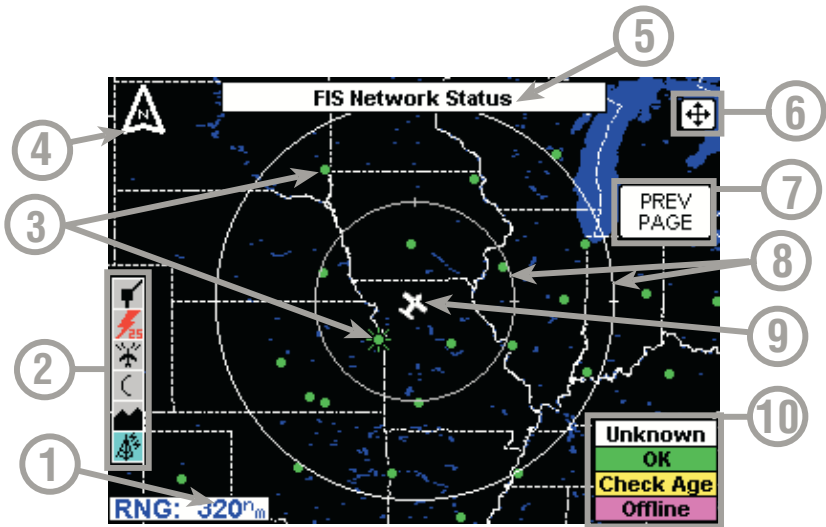


Figure 100

FIS NETWORK STATUS PAGE (VDL ONLY)

The FIS Network Status Page displays the location and identifier of installed VDL ground stations. This page can also be used to determine which stations are being received and the status of each station.

The following illustration describes the FIS Network Status Page display.



- 1 **Range Scale** - Indicates selected range.
- 2 **Available Functions** - Displays icons representing data available (black) and displayed (color).
- 3 **FIS Ground Station Icon** - Transmitting rays will be displayed on a ground station from which data has been received within the last 30 seconds.
- 4 **North Pointer** - Indicates north.
- 5 **MODE** - Indicates the weather product being displayed.
- 6 **Joystick Label** - Indicates joystick is active and can be used to pan map.
- 7 **Softkey Label** - Pressing the PREV PAGE softkey will return to the previous display.
- 8 **Range Rings** - Outer ring radius is selected range and inner ring radius is one half the selected range.
- 9 **Aircraft Symbol** - Indicates present aircraft position and heading (if available) or track.
- 10 **Color Key** - Ground station status legend.

Unknown indicates the station status is unknown. If network status information has not been recently received, all sites will be shown as Unknown in white at their last known location.

OK indicates the station is broadcasting current information.

Check Age indicates the station is operating, but may not be broadcasting the most recent information. Check the age of the data before using.

Offline indicates the station is known to be offline.

1. Press the **AUX** Function Select Key to display the Auxiliary Mode Cover Page as shown in Figure 101.



2. Press the **WX SETUP** softkey to display the WX Setup Cover Page as shown in Figure 102.

3. Press the **FIS** softkey to display the FIS Setup Cover Page as shown in Figure 103.

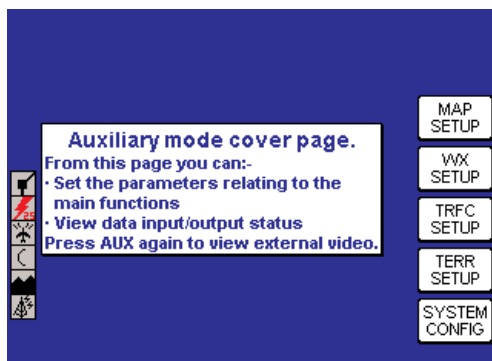


Figure 101

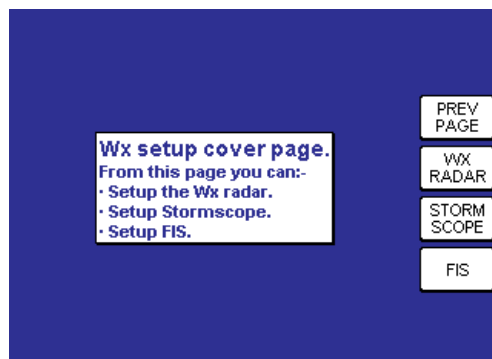


Figure 102

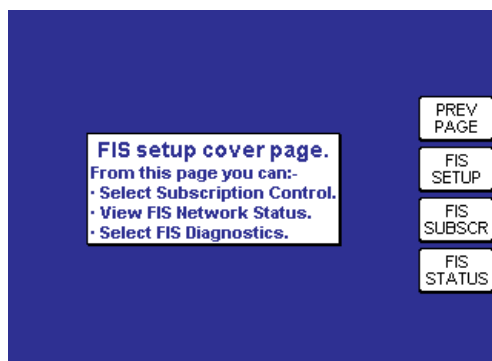


Figure 103

Normal Operation

4. Press the **FIS STATUS** softkey to display the FIS Network Status Page as shown in Figure 104. A ground station icon with “transmitting rays” emanating from that location is a station from which data was received within the last 30 seconds.

NOTE: At any given moment the FIS receiver may not be receiving the closest transmitting site. This is not a problem since all stations transmit the same data.

5. Ground station status and its identifier number can be viewed by moving the joystick to position the pointer over the desired ground station as shown in Figure 105.

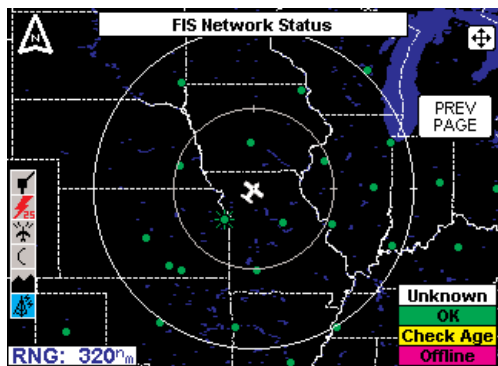


Figure 104

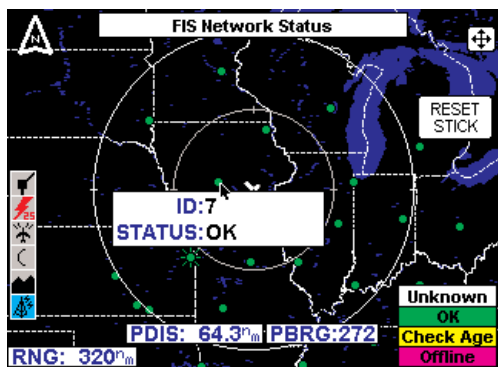


Figure 105

NOTE: Visit Wingman Services at www.bendixking.com to view the latest information about network transmitter locations and to cross-reference ground station IDs with the location names.

MESSAGES

The following are descriptions of messages that may be displayed.

FIS ALERT, NO VALID FIS SUBSCRIPTIONS

The message shown in Figure 106 would indicate that no subscriptions have been set up or previously entered subscriptions have expired or will become valid at a future date. This is the only indication received when an XM WX subscription has expired.

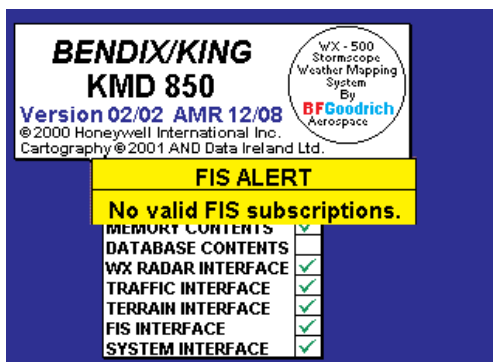


Figure 106

NO DATA RECEIVED FROM FIS RECEIVER

If the KMD 550/850 display is unable to communicate with the KDR 510 VDL Receiver or the KDR 610 XM Receiver, a message such as that shown in Figure 107 will be displayed.

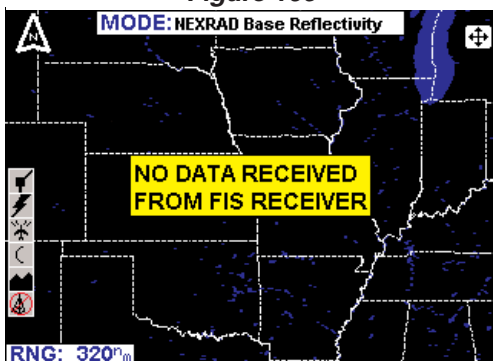


Figure 107

If this message persists, it may indicate a problem with the Receiver or the wiring between the KDR 510/610 and the KMD 550/850.

(PRODUCT) NOT AVAILABLE, DATA NOT RECEIVED

If no valid graphical FIS data is received, a message such as the NEXRAD Image product example in Figure 108 will be displayed.

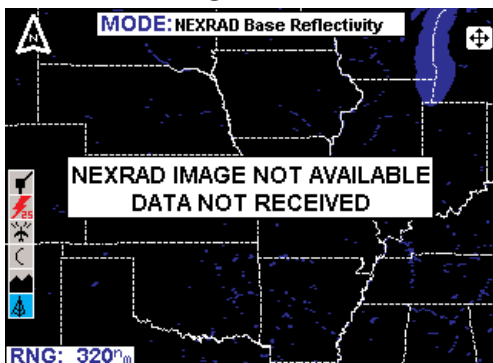


Figure 108

This message usually means that the system is not in FIS VDL coverage, or the XM WX signal strength is poor.

The message can also occur while in coverage if not all of the data for a weather product has been received.

NO (PRODUCT) AVAILABLE IN SELECTED AREA

A message such as the METARs example shown in Figure 109 will be displayed if no data for the FIS product selected is available in the selected area.

This message means that the FIS system is working properly, there are simply no reports of the selected mode within the area.

FIS ALERT, FIS DATA NOT RECEIVED FOR 15 MINUTES

This message will be displayed (Figure 110) if FIS data has previously been received, but it has been 15 minutes or more since the last reception. The message can be cleared by pressing the **OK** softkey. The message will not appear again unless data is again received then again lost for 15 minutes.

NO (PRODUCT) AVAILABLE, DATA NOT RECEIVED

This message will be displayed as in the METARs example in Figure 111 if no FIS product data has been received.

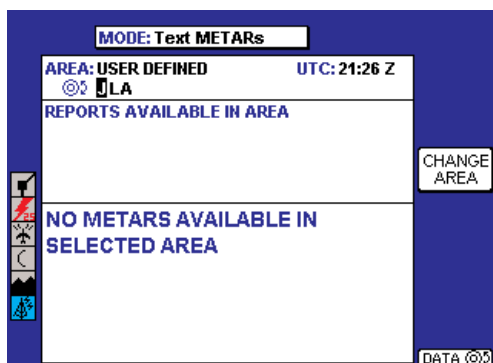


Figure 109

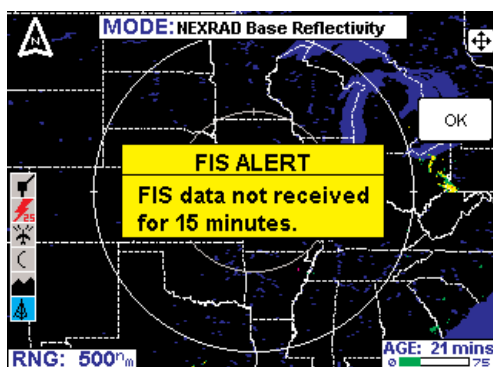


Figure 110

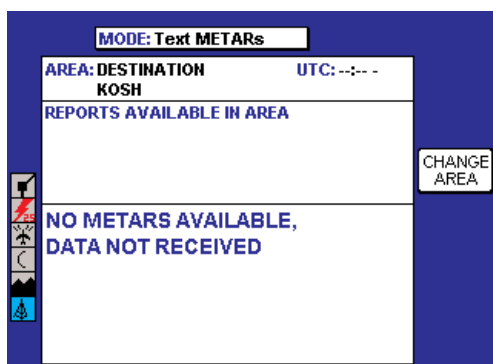


Figure 111

This message means the FIS system has not received any data for the selected FIS weather product. This may be due to not being in FIS coverage or to poor signal strength.

INVALID ENTRY, PLEASE CHECK CODE (VDL ONLY)

This message will be displayed (Figure 112) if an invalid Subscription Code is entered. This may be due to an error entering the Subscription Code. Also, it may be due to a Subscription Code being entered that is associated with a different Display ID.

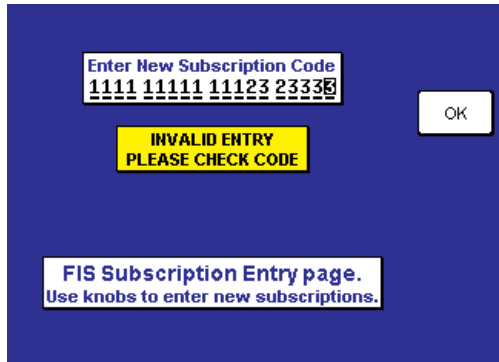


Figure 112

ERROR PROCESSING SUBSCRIPTION CODE (VDL ONLY)

This message will be displayed (Figure 113) when there is a problem processing the Subscription Code. Cycling power to the unit and re-entering the code usually resolves the problem. If this message persists, the problem may be with the Database Card or the decryption hardware.



Figure 113

FIS DECRYPTION FAILURE. UNABLE TO ACCEPT A NEW SUB- SCRIPTION CODE (VDL ONLY)

This message will be displayed (Figure 114) if the internal decryption hardware has failed or is otherwise not responding to commands.

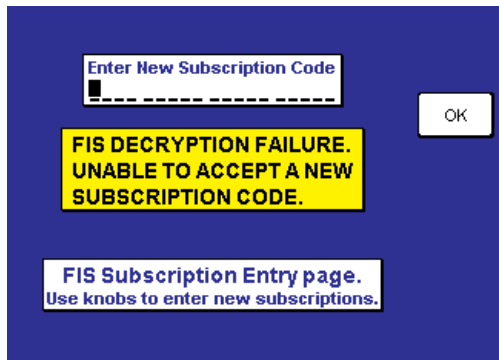


Figure 114

**NETWORK STATUS
NOT AVAILABLE,
DATA NOT RECEIVED
(VDL ONLY)**

This message will be displayed (Figure 115) if no valid network status data is available.

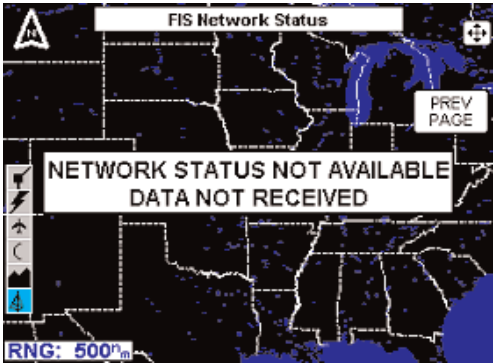


Figure 115

**FIS ALERT, ONE OR
MORE FIS SUBSCRIP-
TIONS ARE CLOSE TO
EXPIRING. PLEASE
REVIEW YOUR SUB-
SCRIPTIONS
(VDL ONLY)**

This message will be displayed (Figure 116) if the system detects at least one subscription is within 7 days of it's displayed ending date.

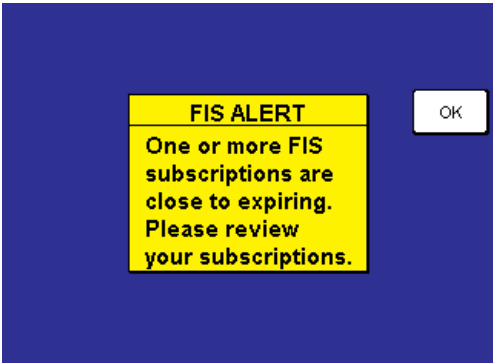


Figure 116

**FIS ALERT, ONE OR
MORE FIS SUBSCRIP-
TIONS HAVE
EXPIRED. PLEASE
REVIEW YOUR SUB-
SCRIPTIONS
(VDL ONLY)**

This message will be displayed (Figure 117) if the system detects at least one subscription is within the 1 day of it's displayed ending date. Services pertaining to this subscription will still be accessible.

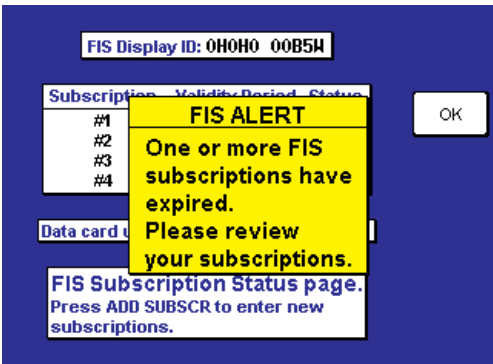


Figure 117

FIS ALERT, DATA CARD UPDATE REQUIRED FOR CONTINUED RECEPTION OF FIS DATA (VDL ONLY)

If the system detects that the system date is within 30 days of the ending date of the data card a message such as that shown in Figure 118 will be displayed. This is a reminder. FIS services will continue to function until reaching the ending date of the data card.

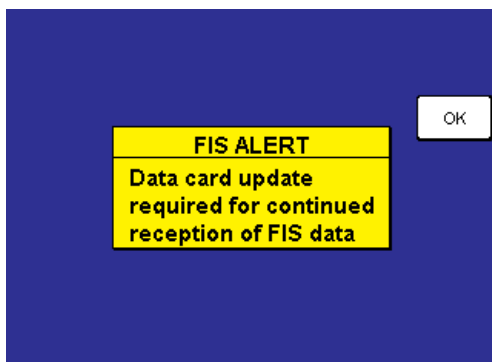


Figure 118

FIS ALERT, NEW DATA CARD NOT YET VALID. UNABLE TO RECEIVE FIS DATA (VDL ONLY)

This message will be displayed (Figure 119) if the system detects the system date is prior to the starting date of the data card.

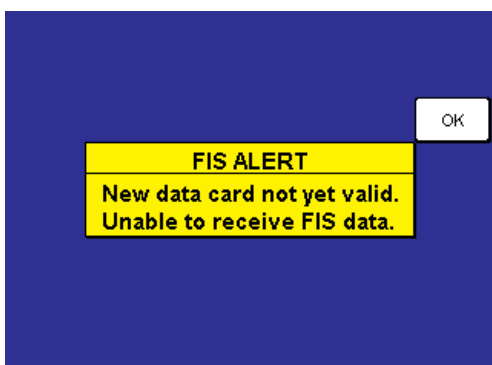


Figure 119

FIS ALERT, DATA CARD HAS EXPIRED. UNABLE TO RECEIVE FIS DATA (VDL ONLY)

If the system detects the system date is after the ending date of the data card a message such as that shown in Figure 120 will be displayed. FIS services will not be accessible.

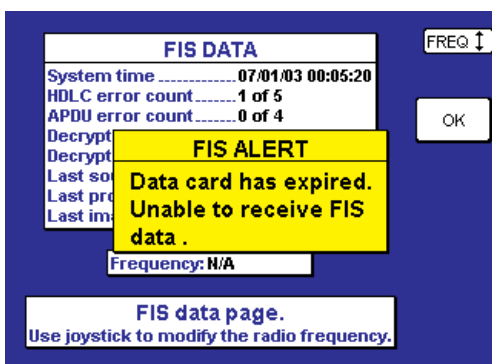


Figure 120

FIS ALERT, FIS SUBSCRIPTION ERROR. SWITCH OFF AND REPLACE DATA CARD (VDL ONLY)

A message such as that shown in Figure 121 will be displayed if there is a problem internal to the data card.

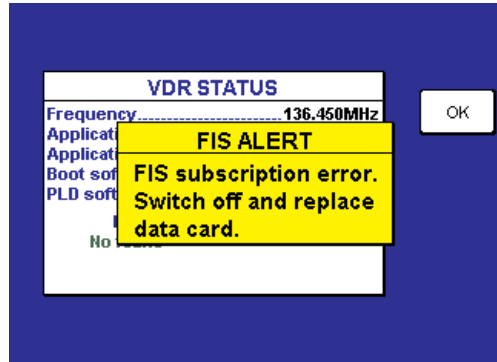


Figure 121

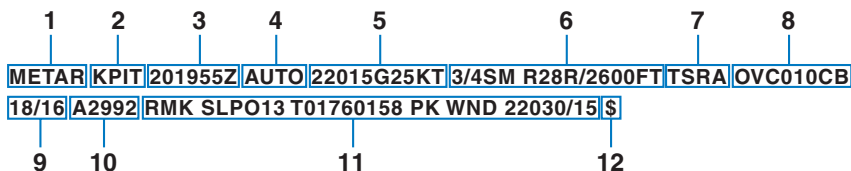
FIS ALERT, FIS DECRYPTION ERROR. UNABLE TO RECEIVE FIS DATA (VDL ONLY)

This message is similar in appearance to that shown in Figure 121. This message indicates that a decryption hardware failure has occurred after system startup and a successful self-test.

APPENDIX A

UNDERSTANDING TEXTUAL AVIATION WEATHER REPORTS

UNDERSTANDING METARS



Refer to the numbers on the following diagram to find the appropriate descriptions.

1. Type of Report: **METAR** (SPECI will be seen here if this is a Special Weather Report)

2. ICAO Station Identifier: **KPIT**

This is the location for which the METAR pertains.

3. Date and Time of Issue: **201955Z**

The **20**th day of the month at **1955Z**ulu or UTC.

4. **AUTO** indicates the reporting station is an automated station. If the reporting station is a manned station this element will be omitted. Also, if a report from an automated station is modified by a person this element will be omitted. "COR" indicates a corrected report.

5. Wind: **22015G25KT**

220 is the 3 digit true direction to the nearest 10°. Airport advisory service, ATIS and ATC towers report wind direction as magnetic. "VRB" in this place indicates variable winds less than or equal to 6 knots. If wind direction is varying more than 60° with speeds over 6 knots, an entry similar to "180V260" will be displayed in this place. This example actually shows wind direction varying by 80°.

15 is the 2 or 3 digit wind speed (in knots).

25 is the 2 or 3 digit wind gust speed in knots (**KT**) because it follows a **G** (Gust).

6. Visibility: **3/4SM R28R/2600FT**

3/4 indicates 3/4 statute mile (**SM**) visibility.

Runway Visual Range (RVR) for **R28R** (runway 28 right) is 2600

Understanding Weather Reports

feet (**2600FT**). An “M” in this distance number indicates visibility is less than the lowest reportable sensor value. A “P” indicates visibility is greater than the highest reportable sensor value.

NOTE: Only reported at those locations with certified RVR reporting capability.

7. Significant Present Weather: **TSRA**

TS is a two letter designation for thunderstorm. Other possible designations could be as follows:

BC	Patches
BL	Blowing
DR	Low Drifting
FZ	Supercooled/Freezing
MI	Shallow
PR	Partial
SH	Showers

The second two letter designator, **RA**, indicates moderate rain. Moderate is indicated by the absence of a “+”, “-” or “VC” preceding the designation. These preceding designations represent the following:

+	Heavy
-	Light
VC	In the vicinity

Other possible designations could be as follows:

BR	Mist
DS	Dust Storm
DU	Widespread Dust
DZ	Drizzle
FC	Funnel Cloud
+FC	Tornado/Water Spout
FG	Fog
FU	Smoke
GR	Hail
GS	Small Hail/Snow Pellets
HZ	Haze
IC	Ice Crystals
PE	Ice Pellets
PO	Dust/Sand Whirls
PY	Spray
SA	Sand
SG	Snow Grains
SN	Snow
SQ	Squall
SS	Sandstorm
UP	Unknown Precipitation (Automated Observations)
VA	Volcanic Ash

8. Sky Condition: **OVC010CB**

OVC indicates the sky is overcast. Cloud cover is based on the sky being divided into eighths or octas. Overcast means the sky is 8 octas covered. The cloud cover designators are as follows:

SKC Sky Clear
CLR Clear below 12,000 ft. (automated observing systems)
FEW 1-2 Octas
SCT 3-4 Octas
BKN 5-7 Octas
OVC 8 octas

“VV” may also be encountered here indicating an indefinite ceiling. For example, VV004 would indicate a vertical visibility of 400 feet.

010 indicates clouds are at 1000 feet.

CB denotes cloud type is cumulonimbus. “TCU” is another possible designator meaning towering cumulus. CI is cirrus.

9. Temperature/Dew Point: **18/16**

18 indicated the temperature is 18° Celsius. An “M” preceding the temperature means the temperature is below 0° Celsius.

16 indicated the dew point is 16° Celsius. An “M” preceding the dew point means the dew point is below 0° Celsius.

10. Altimeter Setting: **A2992**

A indicates the setting is in inches of mercury.

2992 is the altimeter setting. The first two digits are inches and the second two are hundredths.

11. Remarks: **RMK SLP013 T01760158 PK WND 22030/15**

RMK designates the beginning of the remarks. Remarks can contain anything, but often include the following:

SLP indicates sea level pressure in millibars from selected stations.

013 indicates pressure is 1001.3 millibars.

T01760158. Selected stations may also include a 9 place code indicating temperature and dewpoint to the nearest 1/10 degree. **T** denotes temperature. **0** indicates temperature is above 0° Celsius. A “1” in this position indicates a temperature below 0° Celsius. **176** indicates a temperature of 17.6° Celsius. The next **0** indicates the dew point is above 0° Celsius. A “1” in this position indicates a dew point below 0° Celsius. **158** indicates a dewpoint of 15.8° Celsius.

PK WND 22030/15. Selected stations may include peak wind observations which will appear in the remarks element.

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PK WND denotes peak wind.

200 indicates wind direction from 200°.

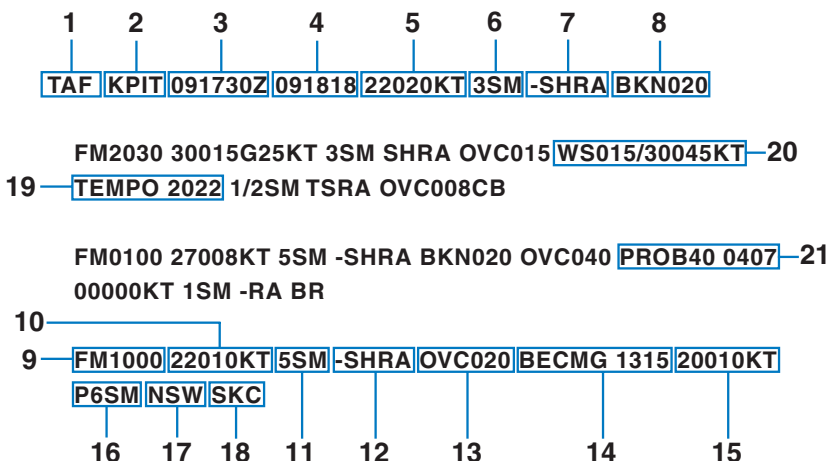
30/15 indicates a maximum instantaneous wind of 30 knots occurred at 15 minutes past the hour.

12. Maintenance Indicator: \$

\$ designates that the sensor needs maintenance.

NOTE: When the maintenance indicator is shown, some of the data may be inaccurate.

UNDERSTANDING TAFS



Refer to the numbers on the following diagram to find the appropriate descriptions.

1. Type of Report: **TAF**

TAF indicates a Terminal Area Forecast. TAF AMD indicates an amended forecast.

2. ICAO Station Identifier: **KPIT**

This is the airport for which the TAF pertains.

3. Date and Time of Issue: **091730Z**

The **9th** day of the month at **1730Z**ulu or UTC.

4. Date and Time Valid: **091818**

The **9th** day of the month, valid for 24 hours from 091800Z to 101800Z. An amended forecast (TAF AMD) will be valid for only the time interval remaining, usually less than 24 hours.

5. Forecast Wind: **22020KT**

See #5 in the UNDERSTANDING METARs section for details.

6. Forecast Visibility: **3SM**

See #6 in the UNDERSTANDING METARs section for details, except RVR is not included in a TAF

7. Forecast Weather Phenomenon: **-SHRA**

See #7 in the UNDERSTANDING METARs section for details.

8. Sky Conditions: **BKN020**

See #8 in the UNDERSTANDING METARs section for details.

9. Beginning of Changed Forecast Conditions: **FM1000**

FM denotes “from” and **1000** indicates 1000Z. “From” means a significant change in prevailing conditions is expected. The described conditions follow this element and supercede all previous forecast conditions.

10. Forecast Wind: **22010KT**

See #5 in the UNDERSTANDING METARs section for details.

11. Forecast Visibility: **5SM**

See #6 in the UNDERSTANDING METARs section for details.

12. Forecast Weather Phenomenon: **-SHRA**

See #7 in the UNDERSTANDING METARs section for details.

13. Forecast Sky Conditions: **OVC020**

See #8 in the UNDERSTANDING METARs section for details.

14. Change in Conditions: **BECMG 1315**

BECMG indicates “becoming” over the time interval between 1300Z (**13**) and 1500Z (**15**). “Becoming” describes a gradual change in forecast conditions. The described conditions follow this element and supercede previously reported like elements.

15. Wind Becoming: **20010KT**

See #5 in the UNDERSTANDING METARs section for details. This element may be omitted if no change is expected.

16. Visibility Becoming: **P6SM**

See #6 in the UNDERSTANDING METARs section for details. This element may be omitted if no change is expected.

17. Weather Phenomenon Becoming: **NSW**

NSW indicates “No Significant Weather”. See #7 in the UNDERSTANDING METARs section for details.

Understanding Weather Reports

18. Sky Conditions Becoming: **SKC**

See #8 in the UNDERSTANDING METARs section for details. This element may be omitted if no change is expected.

19. Change in Conditions: **TEMPO 2022**

TEMPO indicates “temporary” changes expected as described between 2000Z (**20**) and 2200Z (**22**). “Temporary” indicates a temporary fluctuation in conditions, usually lasting less than one hour. The described conditions follow this element.

20. Low Level Windshear: **WS015/30045KT**

WS indicates “windshear” not associated with convective activity.

015 indicates the windshear is expected at 1500 feet. AGL. Wind is expected from 300° (**300**) at 45 knots (**45KT**).

21. Change in Conditions: **PROB40 0407**

PROB40 indicates a 40% “probability” of described conditions occurring between 0400Z (**04**) and 0700Z (**07**). The described conditions follow this element.

UNDERSTANDING PIREPS

1 2 3

KCRW **UA** **OV KBKW 360015-KCRW** **TM 1815/FL120/TP BE99/SK IMC/**
WX RA/TA M08/WV 290030/TB LGT-MDT/IC LGT RIME/RM MDT MXD
ICG DURGC KROA NWBND FL080-100 1750Z

The following is an example of a typical PIREP with an explanation of the elements.

1. Station Identifier: **KCRW**

This is the station identifier of the nearest weather reporting location to the reported conditions.

2. Report Type: **UA**

Reports will be routine (UA) or urgent (UUA).

3. Location: **OV KBKW 360015-KCRW**

OV indicates the report is in relation to a VOR. **KBKW** is the VOR identifier, in this case Beckley VOR. **360015-KCRW** indicates position as related to the VOR. In this case, **15** miles out on the **360** degree radial. **KCRW** indicates this is a leg to the Charleston, West Virginia VOR.

The next series of elements contain data that is read much like that in METARs and TAFs. Each element starts with a 2-letter designator which denotes the type of data with that element. The following defines the element designators:

- /TM:** Time as Coordinated Universal Time
- /FL:** Altitude as Flight Level
- /TP:** Aircraft Type
- /SK:** Sky Cover (may include cloud height and coverage)
- /WX:** Weather Phenomenon (can include flight visibility, precipitation and restrictions to visibility).
- /TA:** Outside air temperature at altitude in degrees Celsius.
- /WV:** Wind (direction in degrees magnetic north and speed in knots)
- /TB:** Turbulence (refer to the Airman's Information Manual)
 - CAT** - Clear Air Turbulence
 - CHOP** - Choppy Turbulence
 - OCNL** - Occasional
 - NEG** - No Turbulence
 - ABV** - Above
 - BLO** - Below
 - LGT** - Light - Momentarily causes slight, erratic changes in altitude and/or attitude.
 - MOD** - Moderate - Greater intensity changes in altitude and/or attitude, but aircraft remains in positive control at all times. Usually causes changes in indicated airspeed.
 - SEV** - Severe - Causes large and abrupt changes to aircraft altitude and/or attitude. Large variations in indicated airspeed and momentary loss of control.
 - EXTRM** - Extreme - Aircraft is violently tossed about and is nearly impossible to control. May cause structural damage.
- /IC:** Icing (refer to the Airman's Information Manual)
 - CLR** - Clear
 - MX** - Mixed (combination of rime and clear icing)
 - NEG** - No Icing
 - ABV** - Above
 - BLO** - Below
 - Trace - Ice becomes perceptible. Rate of evaporation is almost equal to the rate of accumulation. Deicing/anti-icing equipment is not utilized unless encountered for a period of time greater than 1 hour.

Understanding Weather Reports

LGT - Light - Rate of accumulation may be a problem if flight is prolonged for longer than 1 hour without deicing/anti-icing equipment. Deicing/anti-icing removes and/or prevents accumulation.

MOD - Moderate - The rate of accumulation is such that even short encounters become potentially hazardous. Use of deicing/anti-icing equipment or diversion is necessary.

SEV - Severe - Flight diversion is necessary. Deicing/anti-icing equipment is not effective.

/RM: Remarks (for reporting elements not included or to clarify previously reported items). Remarks can include anything. The example translates to "moderate (**MDT**) mixed (**MXD**) icing during climb (**DURGC**) from Roanoke, VA (**KROA**) northwestbound (**NWBND**) between Flight Level 080 and 100 (**FL080100**) at **1750Z**".

UNDERSTANDING AIRMETS

1	2	3	4
CHIT	WA	151900	AMD

5— **AIRMET TANGO UPDT 2 FOR TURB**

6— **VALID UNTIL 160100**

7— **AIRMET TURB...KS MO**

8— **FROM MCI TO STL TO SGF TO ICT TO MCI**

9— **MOD TURB BLW 100 EXPCD**

10— **CONDS IPVG AFT 160000Z**

The following is an example of a typical AIRMET with an explanation of the elements.

1. Forecast Area: **CHIT**

This is the forecast area identifier of the issuing Weather Service Forecast Office.

BOS	Boston
CHI	Chicago
DFW	Dallas/Ft. Worth
MIA	Miami
SFO	San Francisco
SLC	Salt Lake City

The **T** denotes the reason for the AIRMET. This could be one of the following:

S	Sierra	IFR	Ceilings < 1,000 feet and/or visibility < 3 miles affecting > 50% of the area at one time or extensive mountain obscuration.
T	Tango	Turbulence	Moderate turbulence, sustained surface winds of ≥ 30 knots at the surface or low level windshear.
Z	Zulu	Icing	Moderate icing and/or freezing levels.

AIRMET items are considered widespread. Widespread is considered an area $\geq 3,000$ square miles.

2. Report Type: **WA**

WA identifies an AIRMET.

3. Date and Time Issued: **151900**

15 indicates the 15th day of the month. **1900** indicates UTC.

NOTE: AIRMETs may be issued up to 15 minutes prior to the start of the validity period. The FIS system will display the data age as zero until the start of the validity period.

4. **AMD** indicates an amended report. Reports can be amended due to changing weather conditions or issuance/cancelation of a SIGMET. **COR** in this field would indicate a corrected AIRMET. **RTD** indicates a delayed AIRMET.

5. This line indicates that there is a second (2) update (**UPDT**) to this **AIRMET** issued for turbulence (**FOR TURB**). More than one meteorological condition may be addressed as shown in the following:

FOR IFR AND MTN (mountain) **OBSCN** (obscuration)

FOR ICE AND FRZLVL (freezing level)

FOR STG (strong) **SFC** (surface) **WINDS AND LLWS** (low level wind shear)

6. This updated AIRMET is valid until **0100** UTC on the 16th day (**16**) of the month. An AIRMET does not contain an explicit validity start time.

7. This **AIRMET** forecasts turbulence (**TURB**) for the states of **KS** (Kansas) and **MO** (Missouri). Geographic areas are also covered such as **CSTL WTRS** (coastal waters). Other geographic abbreviations are used as well (see Appendix A).

8. The affected area is defined by lines **FROM MCI** (Kansas City) **TO STL** (St. Louis) **TO SGF** (Springfield) **TO ICT** (Wichita) and back **TO MCI**. Areas can be defined by lines between points which are airport or navaid identifiers.

Understanding Weather Reports

9. Moderate (**MOD**) turbulence (**TURB**) below (**BLW**) 10,000 feet expected (**EXPCD**).
10. Conditions (**CONDS**) improving (**IPVG**) after (**AFT**) the 16th day (**16**) of the month **0000** UTC.

If conditions end more than one hour prior to the indicated expiration time, an amended AIRMET will be issued stating it's cancellation. If conditions end within one hour of the indicated expiration time, the AIRMET will be allowed to expire without cancellation. Once the report is cancelled or expires, the FIS system no longer broadcasts the report.

UNDERSTANDING SIGMETS

- | 1 | 2 | 3 |
|------|-----|--------|
| CHIR | UWS | 041430 |
- 4—SIGMET ROMEO 1 VALID UNTIL 041830
 - 5—KY TN WV VA OH
 - 6—FROM CVG TO EKN TO PSK TO VXV TO CVG
 - 7—OCNL SEV TURB BTN 300 AND 360. RPRTD BY AIRCRAFT.
CONDS CONTG BYD 1830Z.
 - 8—SLM/GTB

The following is an example of a typical SIGMET issued for turbulence with an explanation of the elements.

1. Forecast Area: **CHIR**

This is the forecast area identifier of the issuing Weather Service Forecast Office.

BOS	Boston
CHI	Chicago
DFW	Dallas/Ft. Worth
MIA	Miami
SFO	San Francisco
SLC	Salt Lake City

The **R** denotes report ROMEO. A new alphabetic designator is given each time a SIGMET is issued for a new weather phenomenon. The order of issuance is as follows:

N	NOVEMBER
O	OSCAR
P	PAPA
Q	QUEBEC
R	ROMEO
U	UNIFORM
V	VICTOR
W	WHISKEY

X XRAY
Y YANKEE

SIGMETs are issued for:

Severe icing not associated with thunderstorms

Severe or extreme turbulence or clear air turbulence (CAT)

Dust storms or sandstorms lowering visibilities to < 3 miles

Volcanic ash

2. Report Type: **UWS**

UWS indicates this is the first issuance of report ROMEO. Subsequent reports for ROMEO would display **WS**.

3. Date and Time Issued: **041430**.

04 indicates the 4th day of the month. **1430** indicates UTC.

4. This line indicates that **SIGMET ROMEO 1** is **VALID UNTIL** the 4th day (**04**) of the month at **1830** UTC.

Each subsequent report issued for this same weather phenomenon designated **ROMEO** would increment the number. For example, ROMEO 2, ROMEO 3 and so on.

5. Area of coverage by state or geographic area. In addition to state abbreviations, other area abbreviations may be seen here, such as, TX CSTL WTRS (Texas Coastal Waters).

6. Location of weather phenomenon. Three letter designators for nav aids or airports are used to describe boundaries of coverage. If the weather phenomenon extends across multiple forecast areas, the location is described as if no boundaries exist.

7. Details of weather phenomenon. The example is typical of a synopsis for turbulence:

OCNL (occasional) **SEV** (severe) **TURB** (turbulence) **BTN** (between) **300** (30,000 feet) **AND 360** (36,000 feet). **RPRTD** (reported) **BY AIRCRAFT**. **CONDS** (conditions) **CONTG** (continuing) **BYD** (beyond **1830Z**).

More typical examples of descriptors used in other SIGMET weather phenomenon are as follows:

MOD (moderate) TO

STG (strong) UDDFS (updrafts and downdrafts)

UPDFTS (updrafts)

DWNDFTS (downdrafts)

INVOF (in vicinity of) MTNS (mountains)

BLO (below) 360

BTWN (between) FRZLVL (freezing level) AND 360

ABV (above) 360

Understanding Weather Reports

RPRTD (reported) BY ACFT (aircraft) IN VCNTY (vicinity)
RPRTD BY SVRL (several) ACFT

8. Issuers initials.

If conditions end more than one half hour prior to the indicated expiration time, and the report does not state that conditions will continue, a cancellation will be issued with CNCL SIGMET as the report designator. If conditions are expected to continue, a new SIGMET will be issued. If conditions end within one half hour of the indicated expiration time, the SIGMET will be allowed to expire without cancellation. Once the report is cancelled or expires, the FIS system no longer broadcasts the report.

UNDERSTANDING CONVECTIVE SIGMETS

	1	2	3
	↓	↓	↓
	MKCC	WST	221855
4	—CONVECTIVE SIGMET 20C		
5	—VALID UNTIL 2055Z		
6	—ND SD		
7	—FROM 60W MOT-GFK-ABR-90W MOT		
	INTSFYG AREA SVR TSTMS MOVG FROM 2445. TOPS ABV FL450.		
8	—WIND GUSTS TO 60KT RPRTD. TORNADES...HAIL TO 2 IN...WIND GUSTS TO 65KT PSBL ND PTN.		

The following is an example of a typical Convective SIGMET with an explanation of the elements.

1. Station Identifier: **MKCC**

MKC is the station identifier of the Aviation Weather Center (AWC) in Kansas City.

The **C** denotes the report is for the Central portion of the continental United States. The choices are as follows:

C Central
E East
W West

Convective SIGMETs are issued for:

Severe weather including: (a) Surface winds ≥ 50 knots,
(b) Surface hail $\geq 3/4$ inch in diameter or (c) Tornadoes

Embedded thunderstorms (obscured by haze or other phenomena)

Line of thunderstorms

Thunderstorms $\geq$ VIP level 4 affecting $\geq 40\%$ of an area ≥ 3000 sq. mi.

2. Report Type: **WST**

WST indicates this is a convective SIGMET.

3. Date and Time Issued: **221855**.

22 indicates the 22nd day of the month. **1855** indicates UTC.

4. This line is the identifying number of the Convective SIGMET. Numbering begins daily at 0000 UTC. The **C** denotes the Central portion of the country.

5. This line indicates that **CONVECTIVE SIGMET 20C** is **VALID UNTIL 2055Z** time. Expiration time is two hours after issuance, but Convective SIGMETs are issued hourly and replace the previous hour's product.

Each subsequent report issued for this same weather phenomenon would increment the number. For example, 21C, 22C and so on.

6. Area of coverage by state **ND** (North Dakota) and **SD** (South Dakota) or geographic area. In addition to state abbreviations, other area abbreviations may be seen here, such as **FL CSTL WTRS** (Florida Coastal Waters).

7. Location of weather phenomenon (may be an area, single cell or line). Three letter designators for navairs or airports are used to describe boundaries of coverage.

The starting and ending point are identical for an area of thunderstorms, like this: **FROM 90W MOT-GFK-ABR-90W MOT** (from 90 nm west of Minot, ND to Grand Forks, ND to Aberdeen, SD to 90 nm west of Minot, ND).

A Single Cell thunderstorm 35 nm west of Kansas City would look like this: **35WMKC**

A Line of severe thunderstorms would look like this: **FROM 90SE SGF-70NE TXK-50NE LFK** (from 90 nm southeast of Springfield, MO to 70 nm northeast of Texarkana, AR to 50 nm northeast of Lufkin, TX).

8. Details of weather phenomenon. Convective SIGMET details are mostly in plain language with some abbreviations. This example is typical for an area of severe thunderstorms:

INTSFYG (intensifying) **AREA** (of) **SVR TSTMS** (severe thunderstorms) **MOVG** (moving) **FROM 2445** (240 degrees at 45 knots). Storm **TOPS ABV** (above) **FL450** (flight level 4-5-0). **WIND GUSTS TO 60KT** (knots) **RPRTD** (reported). **TORNADOES...HAIL TO 2 IN** (inches in diameter)...**WIND GUSTS TO 65 KT** (knots) **PSBL** (possible) in the **ND PTN** (North Dakota portion).

Understanding Weather Reports

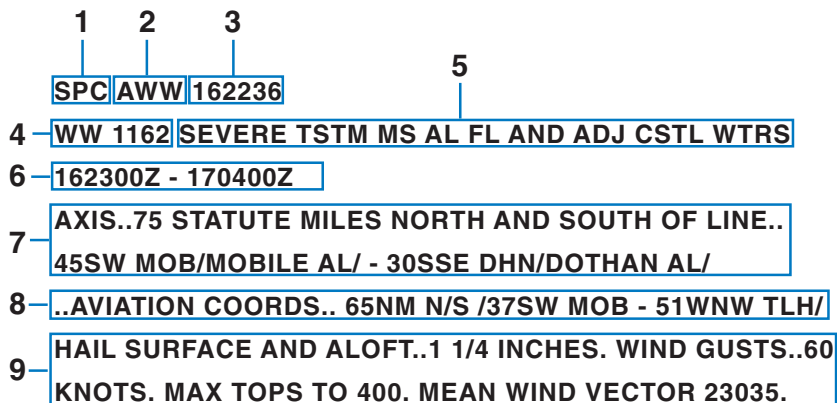
For a single cell thunderstorm:

ISOLD (isolated) **SVR TSTM** (severe thunderstorm) **D30** (30 nm in diameter) **MOVG** (moving) **FROM 2520** (250 degrees at 20 knots). Storm **TOPS ABV** (above) **FL450** (flight level 4-5-0). **HAIL TO 2 IN** (inches in diameter) **WIND GUSTS TO 65 KT** (knots) **PSBL** (possible).

For a line of thunderstorms 25 nm wide:

LINE (line of) **SVR TSTMS** (severe thunderstorms) **25 MI WIDE** **MOVG** (moving) **FROM 2745** (270 degrees at 45 knots). Storm **TOPS ABV** (above) **FL450** (flight level 4-5-0). **WIND GUSTS TO 60KT** (knots) **RPRTD** (reported). **TORNADOES...HAIL TO 2 IN** (inches in diameter)...**WIND GUSTS TO 65 KT** (knots) **PSBL** (possible).

UNDERSTANDING ALERT WEATHER WATCHES (AWW)



The following is an example of a typical Alert Weather Watch with an explanation of the elements.

1. Station Identifier: **SPC**

SPC is the station identifier for the Storm Prediction Center in Norman, Oklahoma.

AWWs are issued for:

- Tornado
- Damaging winds or winds > 58 knots
- Hail $\geq 3/4$ inch in diameter.

2. Report Type: **AWW**

AWW indicates this is an Alert Weather Watch.

3. Date and Time Issued: **162236**.

16 indicates the 16th day of the month. **2236** indicates UTC.

4. **WW 1162** is the identifying number of the Alert Weather Watch. Numbering begins yearly at 0000.

5. This line indicates the type of weather and the affected areas. **SEVERE TSTM** (severe thunderstorm) for **MS** (Mississippi) **AL** (Alabama) **FL** (Florida) **AND ADJ CSTL WTRS** (adjacent coastal waters).

6. This line indicates that the watch is valid from **162300Z - 170400Z** (the 16th at 2300 Zulu to the 17th at 0400 Zulu).

7. Coordinates of the watch box area. Draw a line **75 STATUTE MILES NORTH AND SOUTH OF A LINE..** The endpoints of the line are **45SSW MOB/MOBILE AL/-30SSE DHN/DOTHAN AL/** (45 miles south-southwest of Mobile, Alabama and 30 miles south-southeast of Dothan, Alabama). Connect the lines to form the box. Sometimes it might be defined as **EAST AND WEST OF A LINE..** or **EITHER SIDE OF A LINE..**

8. Aviation coordinates of the watch box area. Draw a line **65NM N/S /** (65 nautical miles north and south) of a line). The endpoints of the line are **37SW MOB - 51WNW TLH/** (37 nautical miles southwest of Mobile, Alabama and 51 nautical miles west-northwest of Tallahassee, Florida). Connect the lines to form the box.

9. Details of the forecast weather. AWW details are mostly in plain language with some abbreviations. This is an example of a typical product.

HAIL SURFACE AND ALOFT..1 1/4 INCHES (hail diameter potential of one and one quarter inches) **WIND GUSTS..60 KNOTS** (wind gust potential of 60 knots) **MAX TOPS TO 400** (maximum tops of the storms is 40,000 feet). **MEAN WIND VECTOR 23035** (motion of storm is 230 degrees at 35 knots).

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APPENDIX B**COMMON WEATHER ABBREVIATIONS**

ABNDT	Abundant	ADVYS	Advisories
ABNML	Abnormal	AFCT	Affect
ABT	About	AFCTD	Affected
ABV	Above	AFCTG	Affecting
AC	Convective outlook or altocumulus	AFDK	After dark
ACC	Altocumulus castel- lanus clouds	AFOS	Automated Field Operations System
ACCAS	Altocumulus castel- lanus clouds	AFSS	Automated Flight Service Station
ACFT MSHAP	Aircraft Mishap	AFT	After
ACCUM	Accumulate	AFTN	Afternoon
ACFT	Aircraft	AGL	Above ground level
ACLT	Accelerate	AGN	Again
ACLTG	Accelerated	AGRD	Agreed
ACLTG	Accelerating	AGRS	Agrees
ACLTG	Accelerates	AGRMT	Agreement
ACPY	Accompany	AHD	Ahead
ACRS	Across	AIRMET	Airman's Meteorological Information
ACSL	Altocumulus standing lenticular	AK	Alaska
ACTV	Active	AL	Alabama
ACTVTY	Activity	ALF	Aloft
ACYC	Anticyclone	ALG	Along
ADJ	Adjacent	ALGHNY	Allegheny
ADL	Additional	ALP	Airport Location Point
ADQT	Adequate	ALQDS	All quadrants
ADQTLY	Adequately	ALSTG	Altimeter setting
ADRNDCK	Adirondack	ALT	Altitude
ADVCT	Advect	ALTA	Alberta
ADVCTD	Advected	ALTHO	Although
ADVCTG	Advecting	ALTM	Altimeter
ADVCTN	Advection	ALUTN	Aleutian
ADVCTS	Advects	AMD	Amend
ADVNT	Advance	AMDD	Amended
ADVNG	Advancing	AMDG	Amending
ADVY	Advisory	AMDT	Amendment

Common Weather Abbreviations

AMP	Amplify	ATTN	Attention
AMPG	Amplifying	AUTO	Automated report
AMPLTD	Amplitude	AVBL	Available
AMS	Air mass	AVG	Average
AMT	Amount	AVN	Aviation model
ANLYS	Analysis	AWC	Aviation Weather Center
ANS	Answer	AWIPS	Advanced Interactive Weather Processing System
AO1	Automated Reporting Station	AWOS	Automated Weather Observing system
AO2	Automated Reporting Station	AWT	Awaiting
AOA	At or above	AWW	Alert Weather Watch
AOB	At or below	AZ	Arizona
AP	Anomalous Propagation	AZM	Azimuth
APCH	Approach	B	Began
APCHG	Approaching	BACLIN	Baroclinic
APCHS	Approaches	BAJA	Baja, California
APLCN	Appalachian	BATROP	Barotropic
APLCNS	Appalachians	BC	British Columbia or patches (descriptor used with FG)
APPR	Appear	BCFG	Patchy fog
APPRG	Appearing	BCH	Beach
APPRS	Appears	BCKG	Backing
APRNT	Apparent	BCM	Become
APRNTLY	Apparently	BCMG	Becoming
APRX	Approximate	BCMS	Becomes
APRXLY	Approximately	BD	Blowing dust
AR	Arkansas	BDA	Bermuda
ARL	Air Resources Lab	BDRY	Boundary
ARND	Around	BECMG	Becoming
ARPT	Airport	BFDK	Before dark
ASAP	As soon as possible	BFR	Before
ASL	Above Sea Level	BGN	Begin
ASMD	As Amended	BGNG	Beginning
ASOS	Automated Surface Observing System	BGNS	Begins
ASSOCD	Associated	BHND	Behind
ASSOCN	Association	BINOVC	Breaks in overcast
ATCT	Air Traffic Control Tower	BKN	Broken
ATLC	Atlantic	BL	Blowing
ATTM	At this time	BLD	Build

Common Weather Abbreviations

BLDG	Building	CAA	Cold air advection
BLDS	Builds	CAPE	Convective available potential energy
BLDUP	Buildup	CARIB	Caribbean
BLKHLS	Black Hills	CAS	Committee for Aviation Services
BLKT	Blanket	CASCDS	Cascades
BLKTG	Blanketing	CAT	Clear air turbulence
BLKTS	Blankets	CAVOK	Ceiling and visibility OK
BLO	Below or below clouds	CAVU	Ceiling and visibility unlimited
BLW	Below	CB	Cumulonimbus
BLZD	Blizzard	CBMAM	Cumulonimbus Mammatus clouds
BN	Blowing sand	CC	Cirrocumulus
BND	Bound	CCCC	Generic WMO format code group for a four-letter location identifier
BNDRY	Boundary	CCL	Convective condensation level
BNDRYS	Boundaries	CCLDS	Clear of clouds
BNTH	Beneath	CCLKWS	Counterclockwise
BOOTHEEL	Bootheel	CCSL	Cirrocumulus standing lenticular
BR	Branch or mist (METAR, used only for visibility between 5/8 and 6 miles)	CCx	Code used in the WMO abbreviated heading to indicate a corrected forecast, where x is the letter A through X
BRF	Brief	CDFNT	Cold front
BRG	Branching	CDFNTL	Cold frontal
BRK	Break	CFP	Cold front passage
BRKG	Breaking	CG	Cloud to ground (lightning)
BRKHIC	Breaks in higher clouds	CHC	Chance
BRKS	Breaks	CHCS	Chances
BRKSHR	Berkshire	CHG	Change
BRKSHRS	Berkshires	CHGD	Changed
BRM	Barometer	CHGG	Changing
BRN	Bulk Richardson Number	CHGS	Changes
BRS	Branches	CHI	Cloud-Height indicator
BS	Blowing snow	CHINO	Sky condition at
BTWN	Between		
BWER	Bounded weak echo region		
BYD	Beyond		
C	Celsius		
CA	California or cloud-to-air lightning in PIREPs		

Common Weather Abbreviations

	secondary location not available	COMPR	Compare
CHOP	Turbulence type characterized by rapid, rhythmic jolts	COMPRG	Comparing
CHSPK	Chesapeake	COMPRD	Compared
CI	Cirrus	COMPRS	Compares
CIG	Ceiling	COND	Condition
CIGS	Ceilings	CONS	Continuous
CIN	Convective inhibition	CONT	Continue
CLD	Cloud	CONTD	Continued
CLDNS	Cloudiness	CONTLY	Continually
CLDS	Clouds	CONTG	Continuing
CLKWS	Clockwise	CONTRAILS	Condensation trails
CLR	Clear	CONTS	Continues
CLRG	Clearing	CONTDVD	Continental Divide
CLRS	Clears	CONUS	Continental U.S.
CMPLX	Complex	COORD	Coordinate
CNCL	Cancel	COR	Correction
CNCLD	Canceled	CPBL	Capable
CNCLG	Canceling	CPC	Climate Prediction Center
CNCLS	Cancels	CRC	Circle
CNDN	Canadian	CRCLC	Circulate
CNTR	Center	CRCLN	Circulation
CNTRD	Centered	CRLC	Circulate
CNTRLN	Centerline	CRLN	Circulation
CNTRS	Centers	CRNR	Corner
CNTRL	Central	CRNRS	Corners
CNTY	County	CRS	Course
CNTYS	Counties	CS	Cirrostratus
CNVG	Converge	CSDR	Consider
CNVGG	Converging	CSDRBL	Considerable
CNVGNC	Convergence	CST	Coast
CNVTN	Convection	CSTL	Coastal
CNVTV	Convective	CT	Connecticut
CNVTVLY	Convectively	CTC	Contact
CONFDC	Confidence	CTGY	Category
CO	Colorado	CTSKLS	Catskills
COMPAR	Compare	CU	Cumulus
COMPARG	Comparing	CUFRA	Cumulus fractus
COMPARD	Compared	CVR	Cover
COMPARS	Compares	CVRD	Covered
		CVRG	Covering

Common Weather Abbreviations

CVRS	Covers	DLY	Daily
CWSU	Center Weather Service Units	DMG	Damage
CYC	Cyclonic	DMGD	Damaged
CYCLGN	Cyclogenesis	DMGG	Damaging
DABRK	Daybreak	DMNT	Dominant
DALGT	Daylight	DMSH	Diminish
DBL	Double	DMSHD	Diminished
DC	District of Columbia	DMSHG	Diminishing
DCR	Decrease	DMSHS	Diminishes
DCRD	Decreased	DNDFTS	Downdrafts
DCRG	Decreasing	DNS	Dense
DCRGLY	Decreasingly	DNSLP	Downslope
DCRS	Decreases	DNSTRM	Downstream
DE	Delaware	DNWND	Downwind
DEG	Degree	DP	Deep
DEGS	Degrees	DPND	Deepened
DELMARVA	Delaware-Maryland-Virginia	DPNG	Deepening
DFCLT	Difficult	DPNS	Deepens
DFCLTY	Difficulty	DPR	Deeper
DFNT	Definite	DPTH	Depth
DFNTLY	Definitely	DR	Low Drifting (descriptor used with DU, SA or SN)
DFRS	Differs	DRDU	Drifting dust
DFUS	Diffuse	DRFT	Drift
DGNL	Diagonal	DRFTD	Drifted
DGNLLY	Diagonally	DRFTG	Drifting
DIGG	Digging	DRFTS	Drifts
DIR	Direction	DRSA	Low drifting sand
DISC	Discontinue	DRSN	Low drifting snow
DISCD	Discontinued	DRZL	Drizzle
DISCG	Discontinuing	DS	Duststorm
DISRE	Disregard	DSCNT	Descent
DISRED	Disregarded	DSIPT	Dissipate
DISREG	Disregarding	DSIPTD	Dissipated
DKTS	Dakotas	DSIPTG	Dissipating
DLA	Delay	DSIPTN	Dissipation
DLAD	Delayed	DSIPTS	Dissipates
DLT	Delete	DSND	Descend
DLTD	Deleted	DSNDG	Descending
DLTG	Deleting	DSNDS	Descends

Common Weather Abbreviations

DSNT	Distant	EMBD	Embedded
DSTBLZ	Destabilize	EMBDD	Embedded
DSTBLZD	Destabilized	EMERG	Emergency
DSTBLZG	Destabilizing	ENCTR	Encounter
DSTBLZS	Destabilizes	ENDG	Ending
DSTBLZN	Destabilization	ENE	East-northeast
DSTC	Distance	ENELY	East-northeasterly
DTRT	Deteriorate	ENERN	East-northeastern
DTRTD	Deteriorated	ENEWD	East-northeastward
DTRTG	Deteriorating	ENHNC	Enhance
DTRTS	Deteriorates	ENHNCD	Enhanced
DU	Widespread dust storm	ENHNCG	Enhancing
DURC	During climb	ENHNCS	Enhances
DURD	During descent	ENHNCMNT	Enhancement
DURG	During	ENRT	Enroute
DURGC	During climb	ENTR	Entire
DURGD	During descent	ERN	Eastern
DURN	Duration	ERY	Early
DVLP	Develop	ERYR	Earlier
DVLPD	Developed	ESE	East-southeast
DVLPG	Developing	ESELY	East-southeasterly
DVLPMT	Development	ESERN	East-southeastern
DVLPS	Develops	ESEWD	East-southeastward
DVRG	Diverge	ESNTL	Essential
DVRGG	Diverging	ESTAB	Establish
DVRGNC	Divergence	EST	Estimate
DVRGS	Diverges	ESTS	Estimates
DVV	Downward vertical velocity	ETA	Estimated time of arrival or ETA model
DWNDFTS	Downdrafts	ETC	Et cetera
DWPNT	Dew point	ETIM	Elapsed time
DWPNTS	Dew points	EVE	Evening
DX	Duplex	EWD	Eastward
DZ	Drizzle (METAR)	EXCLV	Exclusive
E	East	EXCLVLY	Exclusively
EBND	Eastbound	EXCP	Except
EFCT	Effect	EXPC	Expect
ELNGT	Elongate	EXPCD	Expected
ELNGTD	Elongated	EXPCG	Expecting
ELSW	Elsewhere	EXTD	Extend

Common Weather Abbreviations

EXTDD	Extended		erage at manual station
EXTDG	Extending		
EXTDS	Extends	FL	Florida or flight level
EXTN	Extension	FLG	Falling
EXTRAP	Extrapolate	FLRY	Flurry
EXTRAPD	Extrapolated	FLRYS	Flurries
EXTRM	Extreme	FLT	Flight
EXTRMLY	Extremely	FLW	Follow
EXTSV	Extensive	FLWG	Following
F	Fahrenheit	FM	From
FA	Aviation area forecast	FMGGgg	From the time (UTC) indicated by GGgg. Generic WMO format code group, indicating a significant and rapid (in less than 1 hour) change to a new set of prevailing conditions
FAH	Fahrenheit		
FAM	Familiar		
FC	Funnel cloud (+FC = Tornado or water spout)		
FCST	Forecast	FMT	Format
FCSTD	Forecasted	FNCTN	Function
FCSTG	Forecasting	FNT	Front
FCSTR	Forecaster	FNTL	Frontal
FCSTS	Forecasts	FNTS	Fronts
FEW	Few (used to describe cloud cover or weather phenomena, >0 octas to 2 octas cloud amount)	FNTGNS	Frontogenesis
		FNTLYS	Frontolysis
		FORNN	Forenoon
		FPM	Feet per minute
FG	Fog (METAR, only when visibility is less than 5/8 mile)	FQT	Frequent
		FQTLY	Frequently
FIBI	Filed but impracticable to transmit	FRM	Form
FIG	Figure	FRMG	Forming
FILG	Filling	FRMN	Formation
FIR	Flight information region	FROPA	Frontal passage
		FROSFC	Frontal surface
FIRAV	First available	FRQ	Frequent
FIS	Flight Information Service	FRST	Frost
		FRWF	Forecast wind factor
FIS-B	Flight Information Service - Broadcast	FRZ	Freeze
FIRST	First observation after a break in cov-	FRZLVL	Freezing level
		FRZN	Frozen
		FRZG	Freezing

Common Weather Abbreviations

FT	Feet or Terminal Forecast		1/4 inch in diameter)
FTHR	Further	GSTS	Gusts
FU	Smoke	GSTY	Gusty
FV	Flight visibility	GTS	Global Telecommunication System
FVRBL	Favorable	GV	Ground visibility
FWD	Forward	HAZ	Hazard
FYI	For your information	HCVIS	High clouds visible
FZ	Freezing	HDFRZ	Hard freeze
FZRANO	Freezing rain sensor not available	HDSVLY	Hudson Valley
G	Gust	HDWND	Head wind
GA	Georgia	HGT	Height
GEN	General	HI	High or Hawaii
GENLY	Generally	HIER	Higher
GEO	Geographic	HIFOR	High level forecast
GEOREF	Geographical reference	HLF	Half
GF	Fog	HLTP	Hilltop
GICG	Glaze icing	HLSTO	Hailstones
GLFALSK	Gulf of Alaska	HLYR	Haze layer
GLFCAL	Gulf of California	HND	Hundred
GLFMEX	Gulf of Mexico	HPC	Hydrometeorological Prediction Center
GLFSTLAWR	Gulf of St. Lawrence	HR	Hour
GND	Ground	HRS	Hours
GNDFG	Ground fog	HRZN	Horizon
GOES	Geostationary Operational Environmental Satellite	HTG	Heating
GR	Hail (greater than 1/4 inch in diameter)	HURCN	Hurricane
GRAD	Gradient	HUREP	Hurricane report
GRDL	Gradual	HV	Have
GRDLY	Gradually	HVY	Heavy
GRT	Great	HVYR	Heavier
GRTLY	Greatly	HVYST	Heaviest
GRTR	Greater	HWVR	However
GRTST	Greatest	HWY	Highway
GRTLKS	Great Lakes	HZ	Haze
GS	Small hail or snow pellets (smaller than	IA	Iowa
		IC	Ice crystals or ice
		ICAO	International Civil Aviation Organization
		ICG	Icing
		ICGIC	Icing in clouds

Common Weather Abbreviations

ICGICIP	Icing in clouds and in precipitation	INTSFY	Intensify
ICGIP	Icing in precipitation	INTSFYD	Intensified
ID	Idaho	INTSFYG	Intensifying
IFR	Instrument flight rules	INTSFYS	Intensifies
IL	Illinois	INTSTY	Intensity
IMC	Instrument meteorological conditions	INTVL	Interval
IMDT	Immediate	INVRN	Inversion
IMDTLY	Immediately	IOVC	In overcast
IMPL	Impulse	INVOF	In vicinity of
IMPLS	Impulses	IP	Ice pellets
IMPT	Important	IPV	Improve
INCL	Include	IPVG	Improving
INCLD	Included	IR	Infrared
INCLG	Including	ISOL	Isolate
INCLS	Includes	ISOLD	Isolated
INCR	Increase	JCTN	Junction
INCRD	Increased	JTSTR	Jet stream
INCRG	Increasing	KFRST	Killing frost
INCRGLY	Increasingly	KLYR	Smoke layer aloft
INCRS	Increases	KOCTY	Smoke over city
INDC	Indicate	KS	Kansas
INDCD	Indicated	KT	Knots
INDCG	Indicating	KY	Kentucky
INDCS	Indicates	L	Left
INDEF	Indefinite	LA	Louisiana
INFO	Information	LABRDR	Labrador
INLD	Inland	LAPS	Local Analysis and Prediction System
INSTBY	Instability	LAMP	Local AWIPS MOS Program
INTCNTL	Intercontinental	LAST	Last observation before a break in coverage at a manual station
INTER	Intermittent	LAT	Latitude
INTL	International	LAWRS	Limited aviation weather reporting station
INTMD	Intermediate	LCL	Local or Lifted condensation level
INTMT	Intermittent	LCLY	Locally
INTMTLY	Intermittently	LCTD	Located
INTR	Interior	LCTN	Location
INTRMTRGN	Intermountain region		
INTS	Intense		
INTSFCN	Intensification		

Common Weather Abbreviations

LCTMP	Little change in temperature	LTGCCCCG	ground Lightning cloud-to-cloud cloud-to-ground
LDG	Landing	LTGCW	Lightning cloud-to-water
LEVEL	Level	LTGIC	Lightning in cloud
LFM	Limited fine mesh model	LTL	Little
LFTG	Lifting	LTLCG	Little change
LGRNG	Long-range	LTR	Later
LGT	Light	LTST	Latest
LGTR	Lighter	LV	Leaving
LGWV	Long wave	LVL	Level
LI	Lifted Index	LVLS	Levels
LIFR	Low instrument flight rules	LWR	Lower
LIS	Lifted Indices	LWRD	Lowered
LK	Lake	LWRG	Lowering
LKS	Lakes	LYR	Layer
LKLY	Likely	LYRD	Layered
LLJ	Low level jet	LYRS	Layers
LLWAS	Low-level wind shear alert system	M	Minus or Less than lowest sensor value
LLWS	Low-level wind shear	MA	Massachusetts
LMTD	Limited	MAN	Manitoba
LMTG	Limiting	MAX	Maximum
LMTS	Limits	MB	Millibars
LN	Line	MCD	Mesoscale discussion
LNS	Lines	MD	Maryland
LO	Low	MDFY	Modify
LONG	Longitude	MDFYD	Modified
LONGL	Longitudinal	MDFYG	Modifying
LRG	Large	MDL	Model
LRGLY	Largely	MDLS	Models
LRGR	Larger	MDT	Moderate
LRGST	Largest	MDTLY	Moderately
LST	Local standard time	ME	Maine
LTD	Limited	MED	Medium
LTG	Lightning	MEGG	Merging
LTGCA	Lightning cloud-to-air	MESO	Mesoscale
LTGCC	Lightning cloud-to-cloud	MET	Meteorological
LTGCG	Lightning cloud-to-	METAR	Aviation Routine

Common Weather Abbreviations

	Weather Report	MULTLVL	Multilevel
METRO	Metropolitan	MVFR	Marginal visual flight rules
MEX	Mexico	MWO	Meteorological Watch Office
MHKVLY	Mohawk Valley	MX	Mixed (characterized as a combination of clear and rime ice)
MI	Michigan , shallow, or mile	MXD	Mixed
MID	Middle	N	North
MIDN	Midnight	N/A	Not applicable
MIL	Military	NAB	Not above
MIN	Minimum	NAT	North Atlantic
MIFG	Shallow fog	NATL	National
MISG	Missing	NAV	Navigation
MLTLVL	Melting level	NAVAID	Electronic navigation aid facility (limited to VOR or VORTAC for PIREPs)
MN	Minnesota	NB	New Brunswick
MNLD	Mainland	NBND	Northbound
MNLY	Mainly	NBRHD	Neighborhood
MO	Missouri	NC	North Carolina
MOD	Moderate	NCDC	National Climatic Data Center
MOGR	Moderate or greater	NCEP	National Center of Environmental Prediction
MOS	Model Output Statistics	NCO	NCEP Central Operations
MOV	Move	NCWX	No change in weather
MOVD	Moved	ND	North Dakota
MOVG	Moving	NE	Northeast
MOVMT	Movement	NEB	Nebraska
MOVS	Moves	NEC	Necessary
MPH	Miles per hour	NEG	Negative
MRGL	Marginal	NEGLY	Negatively
MRGLLY	Marginally	NELY	Northeasterly
MRNG	Morning	NERN	Northeastern
MRTM	Maritime	NEWD	Northeastward
MS	Mississippi	NEW ENG	New England
MSG	Message		
MSL	Mean sea level		
MST	Most		
MSTLY	Mostly		
MSTR	Moisture		
MT	Montana		
MTN	Mountain		
MTNS	Mountains		
MULT	Multiple		

Common Weather Abbreviations

NFLD	Newfoundland	NS	Nova Scotia
NGM	Nested grid model	NSC	No significant cloud
NGT	Night	NSW	No significant weather
NH	New Hampshire	NTFY	Notify
NHC	National Hurricane Center	NTFYD	Notified
NIL	None	NV	Nevada
NJ	New Jersey	NVA	Negative vorticity advection
NL	No layers	NW	Northwest
NLT	Not later than	NWD	Northward
NLY	Northerly	NWLY	Northwesterly
NM	New Mexico	NWRN	Northwestern
NMBR	Number	NWS	National Weather Service
NMBRS	Numbers	NY	New York
NMC	National Meteorological Center	NXT	Next
NML	Normal	OAT	Outside air temperature
NMRS	Numerous	OBND	Outbound
NNE	North-northeast	OBS	Observation
NNELY	North-northeasterly	OBSC	Obscure
NNERN	North-northeastern	OBSCD	Obscured
NNEWD	North-northeastward	OBSCG	Obscuring
NNW	North-northwest	OCFNT	Occluded front
NNWLY	North-northwesterly	OCLD	Occlude
NNWRN	North-northwestern	OCLDS	Occludes
NNWWD	North-northwestward	OCLDD	Occluded
NNNN	End of message	OCLDG	Occluding
NOAA	National Oceanic and Atmospheric Administration	OCLN	Occlusion
NOPAC	Northern Pacific	OCNL	Occasional
NOS	National Ocean Service	OCNLY	Occasionally
NOSPECI	No SPECI reports are taken at station	OCR	Occur
NPRS	Nonpersistent	OCRD	Occurred
NR	Near	OCRG	Occurring
NRLY	Nearly	OCRS	Occurs
NRN	Northern	OFC	Office
NRW	Narrow	OFCM	Office of the Federal Coordinator for Meteorology
		OFP	Occluded frontal passage
		OFSHR	Offshore

Common Weather Abbreviations

OH	Ohio	PERM	Permanent
OHD	Overhead	PGTSND	Puget Sound
OK	Oklahoma	PHYS	Physical
OMTNS	Over mountains	PIBAL	Pilot balloon obser- vation
ONSHR	On shore	PIREP	Pilot weather report
OR	Oregon	PK WND	Peak wind
ORGPHC	Orographic	PL	Ice pellets
ORIG	Original	PLNS	Plains
OSV	Ocean station vessel	PLS	Please
OTLK	Outlook	PLTO	Plateau
OTP	On top	PM	Postmeridian
OTR	Other	PNHDL	Panhandle
OTRW	Otherwise	PNO	Precipitation amount not available
OUTFLO	Outflow	PO	Dust/ sand swirls
OV	Over	POS	Positive
OVC	Overcast	POSLY	Positively
OVHD	Overhead	PPINA	Radar weather report not available
OVNGT	Overnight	PPINE	Radar weather report no echoes observed
OVR	Over	PPSN	Present position
OVRN	Overrun	PR	Partial
OVRNG	Overrunning	PRBL	Probable
OVTK	Overtake	PRBLY	Probably
OVTKG	Overtaking	PRBLTY	Probability
OVTKS	Overtakes	PRECD	Precede
P	Higher than greatest sensor value	PRECD D	Preceded
P6SM	Visibility forecast to be greater than 6 statute miles	PRECD G	Preceding
PA	Pennsylvania	PRECD S	Precedes
PAC	Pacific	PRES	Pressure
PATWAS	Pilot's automatic telephone weather answering service	PRESFR	Pressure falling rapidly
PBL	Planetary boundary layer	PRESRR	Pressure rising rapidly
PCPN	Precipitation	PRFG	Partial fog
PD	Period	PRIM	Primary
PDS	Periods	PRIN	Principal
PDMT	Predominant	PRIND	Present indications are...
PE	Ice pellets	PRJMP	Pressure jump
PEN	Peninsula		

Common Weather Abbreviations

PROB	Probability	PUGET	Puget Sound
PROBC C	Forecaster's assessment of the probability of occurrence of a thunderstorm or precipitation event, along with associated weather elements (wind, visibility, and/or sky condition) whose occurrences are directly related to, and contemporaneous with, the thunderstorm or precipitation event	PVA	Positive vorticity advection
		PVL	Prevail
		PVLD	Prevailed
		PVLG	Prevailing
		PVLS	Prevails
		PVLT	Prevalent
		PWB	Pilot weather briefing
		PWINO	Precipitation identifier sensor not available
PROC	Procedure	PWR	Power
PROD	Produce	PY	Spray
PRODG	Producing	QN	Question
PROG	Forecast	QPFERD	NCEP excessive rainfall discussion
PROGD	Forecasted	QPFHSD	NCEP heavy snow discussion
PROGS	Forecasts	QPFSPD	NCEP special precipitation discussion
PRSNT	Present		
PRSNTLY	Presently	QSTNRY	Quasistationary
PRST	Persist	QTR	Quarter
PRSTS	Persists	QUAD	Quadrant
PRSTNC	Persistence	QUE	Quebec
PRSTNT	Persistent	R	Right (with reference to runway designation) or rain
PRVD	Provide	RA	Rain (METAR)
PRVDD	Provided	RADAT	Radiosonde additional data
PRVDG	Providing	RAOB	Radiosonde observation
PRVDS	Provides	RCA	Reach Cruising Altitude
PS	Plus	RCH	Reach
PSBL	Possible	RCHD	Reached
PSBLY	Possibly	RCHG	Reaching
PSBLTY	Possibility	RCHS	Reaches
PSG	Passage	RCKY	Rocky
PSN	Position	RCKYS	Rockies
PSND	Positioned	RCMD	Recommend
PTCHY	Patchy		
PTLY	Partly		
PTNL	Potential		
PTNLY	Potentially		
PTNS	Portions		

Common Weather Abbreviations

RCMDD	Recommended	RLBL	Reliable
RCMDG	Recommending	RLTV	Relative
RCMDS	Recommends	RLTVLY	Relatively
RCRD	Record	RM	Remarks
RCRDS	Records	RMK	Remark
RCV	Receive	RMN	Remain
RCVD	Received	RMND	Remained
RCVG	Receiving	RMNDR	Remainder
RCVS	Receives	RMNG	Remaining
RDC	Reduce	RMNS	Remains
RDGG	Ridging	RNFL	Rainfall
RDR	Radar	RNG	Range
RDVLP	Redevelop	ROT	Rotate
RDVLPG	Redeveloping	ROTD	Rotated
RDVLPMT	Redevelopment	ROTG	Rotating
RE	Regard	ROTS	Rotates
RECON	Reconnaissance	RPD	Rapid
REF	Reference	RPDLY	Rapidly
RES	Reserve	RPLC	Replace
REPL	Replace	RPLCD	Replaced
REPLD	Replaced	RPLCG	Replacing
REPLG	Replacing	RPLCS	Replaces
REPLS	Replaces	RPRT	Report
REQ	Request	RPRTD	Reported
REQS	Requests	RPRTG	Reporting
REQSTD	Requested	RPRTS	Reports
RESP	Response	RPT	Repeat
RESTR	Restrict	RPTG	Repeating
RGD	Ragged	RPTS	Repeats
RGL	Regional model	RQR	Require
RGLR	Regular	RQRD	Required
RGN	Region	RQRG	Requiring
RGNS	Regions	RQRS	Requires
RGT	Right	RRx	Code used in the WMO abbreviated heading to indicate a delayed forecast, where x is the letter A through X
RH	Relative humidity	RS	Receiver station
RHINO	RHI not operative	RSG	Rising
RI	Rhode Island	RSN	Reason
RIME	Type of icing characterized by a rough, milky, opaque appearance		
RIOGD	Rio Grande		

Common Weather Abbreviations

RSNG	Reasoning		(describing cloud cover or weather phenomena, 3 to 4 octas cloud amount)
RSNS	Reasons		
RSTR	Restrict		
RSTRD	Restricted	SCTD	Scattered
RSTRG	Restricting	SCTR	Sector
RSTRS	Restricts	SD	South Dakota
RTRN	Return	SE	Southeast
RTRND	Returned	SEC	Second
RTRNG	Returning	SELY	Southeasterly
RTRNS	Returns	SEPN	Separation
RUC	Rapid Update Cycle	SEQ	Sequence
RUF	Rough	SERN	Southeastern
RUFLY	Roughly	SEV	Severe
RVR	Runway Visual Range	SEWD	Southeastward
RVRNO	RVR system not available	SFC	Surface
RVS	Revise	SFERICS	Atmospherics
RVSD	Revised	SG	Snow grains
RVSG	Revising	SGFNT	Significant
RVSS	Revises	SGFNTLY	Significantly
RW	Rain shower	SH	Showers
RWY	Runway	SHFT	Shift
RY	Runway	SHFTD	Shifted
S	South	SHFTG	Shifting
SA	Sand (METAR)	SHFTS	Shifts
SAB	Satellite Analysis Branch	SHLD	Shield
SAO	Surface observation	SHLW	Shallow
SASK	Saskatchewan	SHRT	Short
SATFY	Satisfactory	SHRTLY	Shortly
SBND	Southbound	SHRTWV	Shortwave
SBSD	Subside	SHUD	Should
SBSDD	Subsided	SHWR	Shower
SBSDNC	Subsidence	SIERNEV	Sierra Nevada
SBSDS	Subsides	SIG	Signature
SC	South Carolina or stratocumulus	SIGMET	Significant meteorological information
SCND	Second	SIMUL	Simultaneous
SCNDRY	Secondary	SK	Sky cover
SCSL	Stratocumulus standing lenticular	SKC	Sky clear
SCT	Scatter or Scattered	SKED	Schedule
		SLD	Solid
		SLGT	Slight

Common Weather Abbreviations

SLGTLY	Slightly	SPENES	Satellite precip. estimate statement
SLO	Slow	SPKL	Sprinkle
SLOLY	Slowly	SPLNS	Southern Plains
SLOR	Slower	SPRD	Spread
SLP	Slope or sea level pressure	SPRDG	Spreading
SLPG	Sloping	SPRDS	Spreads
SLPNO	Sea-level pressure not available	SPRL	Spiral
SLT	Sleet	SQ	Squall
SLW	Slow	SQAL	Squall
SLY	Southerly	SQLN	Squall line
SM	Statute mile	SR	Sunrise
SMK	Smoke	SRN	Southern
SML	Small	SRND	Surround
SMLR	Smaller	SRNDD	Surrounded
SMRY	Summary	SRNDG	Surrounding
SMS	Synchronous mete- orological satellite	SRNDS	Surrounds
SMTH	Smooth	SS	Sunset or sand storm (METAR)
SMTHR	Smoother	SSE	South-southeast
SMTHST	Smoothest	SSELY	South-southeasterly
SMTM	Sometime	SSERN	South-southeastern
SMWHT	Somewhat	SSEWD	South-southeastward
SN	Snow	SSW	South-southwest
SNBNK	Snowbank	SSWLY	South-southwesterly
SND	Sand	SSWRN	South-southwestern
SNFLK	Snowflake	SSWWD	South-southwest- ward
SNGL	Single	ST	Stratus
SNOINCR	Snow increase	STAGN	Stagnation
SNOINCRG	Snow increasing	STBL	Stable
SNST	Sunset	STBLTY	Stability
SNW	Snow	STD	Standard
SNWFL	Snowfall	STDY	Steady
SOP	Standard operating procedure	STFR	Stratus fractus
SP	Snow pellets	STFRM	Stratiform
SPC	Storm Prediction Center	STG	Strong
SPCLY	Especially	STGLY	Strongly
SPD	Speed	STGR	Stronger
SPECI	Special observation	STGST	Strongest
		STLT	Satellite
		STM	Storm

Common Weather Abbreviations

STMS	Storms		Forecast
STN	Station	TB	Turbulence
STNRY	Stationary	TCNTL	Transcontinental
SUB	Substitute	TCU	Towering cumulus
SUBTRPCL	Subtropical	TDA	Today
SUF	Sufficient	TEI	Text element indicator
SUFLY	Sufficiently	TEMP	Temperature
SUG	Suggest	TEMPO	Temporary
SUGG	Suggesting	THD	Thunderhead
SUGS	Suggests	THDR	Thunder
SUP	Supply	THK	Thick
SUPG	Supplying	THKNG	Thickening
SUPR	Superior	THKNS	Thickness
SUPSD	Supersede	THKR	Thicker
SUPSDG	Superseding	THKST	Thickest
SUPSDS	Supersedes	THN	Thin
SVG	Serving	THNG	Thinning
SVR	Severe	THNR	Thinner
SVRL	Several	THNST	Thinnest
SW	Southwest	THR	Threshold
SW-	Light snow shower	THRFTR	Thereafter
SW+	Heavy snow shower	THRU	Through
SWD	Southward	THRUT	Throughout
SWLG	Swelling	THSD	Thousand
SWLY	Southwesterly	THTN	Threaten
SWODY1	SPC Severe Weather Outlook for Day 1	THTND	Threatened
		THTNG	Threatening
SWOMCD	SPC Mesoscale discussion	THTNS	Threatens
SWRN	Southwestern	TIL	Until
SWWD	Southwestward	TKOF	Takeoff
SX	Stability index	TM	Time
SXN	Section	TMPRY	Temporary
SYNOP	Synoptic	TMPRYLY	Temporarily
SYNS	Synopsis	TMW	Tomorrow
SYS	System	TN	Tennessee
T	Thunder	TNDCY	Tendency
TA	Temperature	TNDCYS	Tendencies
TACAN	UHF Tactical Air Navigation Aid	TNGT	Tonight
TAF	Terminal Area	TNTV	Tentative
		TNTVLY	Tentatively

Common Weather Abbreviations

TOC	Top of Climb		snow showers
TOP	Top of Clouds	TSW+	Thunderstorm with heavy snow showers
TOPS	Tops	TURBC	Turbulence
TOVC	Top of overcast	TURBT	Turbulent
TP	Type of aircraft	TWD	Toward
TPG	Topping	TWDS	Towards
TRBL	Trouble	TWI	Twilight
TRIB	Tributary	TWR	Tower
TRKG	Tracking	TWRG	Towering
TRML	Terminal	TX	Texas
TRMT	Terminate	UA	Pilot weather reports
TRMTD	Terminated	UDDF	Up- and downdrafts
TRMTG	Terminating	UN	Unable
TRMTS	Terminates	UNAVBL	Unavailable
TRNSP	Transport	UNEC	Unnecessary
TRNSPG	Transporting	UNKN	Unknown
TROF	Trough	UNL	Unlimited
TROFS	Troughs	UNRELBL	Unreliable
TROP	Tropopause	UNRSTD	Unrestricted
TRPCD	Tropical continental air mass	UNSATFY	Unsatisfactory
TRPCL	Tropical	UNSBL	Unseasonable
TRRN	Terrain	UNSTBL	Unstable
TRSN	Transition	UNSTDY	Unsteady
TRW	Thunderstorm	UNSTL	Unsettle
TRW+	Thunderstorm with heavy rain shower	UNSTLD	Unsettled
TS	Thunderstorm (METAR)	UNUSBL	Unusable
TS +	Thunderstorm with heavy snow	UP	Unknown precipitation (used only by automated sites incapable of discrimination)
TSFR	Transfer	UPDFTS	Updrafts
TSFRD	Transferred	UPR	Upper
TSFRG	Transferring	UPSLP	Upslope
TSFRS	Transfers	UPSTRM	Upstream
TSHWR	Thundershower	URG	Urgent
TSNO	Thunderstorm information not available	USBL	Usable
TSNT	Transient	UT	Utah
TSQLS	Thundersquall	UTC	Universal Time Coordinate
TSTM	Thunderstorm		
TSW	Thunderstorm with		

Common Weather Abbreviations

UUA	Urgent PIREP Weather Reports	VOR	VHF Omnidirectional Radio Range
UVV	Upward vertical velocity	VORT	Vorticity
UWNDS	Upper winds	VORTAC	VOR and TACAN combination
V	Varies	VR	Veer
VA	Virginia or Volcanic Ash	VRB	Variable
VAAC	Volcanic Ash Advisory Center	VRG	Veering
VAAS	Volcanic Ash Advisory Statement	VRBL	Variable
VAD	Velocity azimuth display	VRISL	Vancouver Island, BC
VAL	Valley	VRS	Veers
VARN	Variation	VRT MOTN	Vertical motion
VC	Vicinity	VRY	Very
VCNTY	Vicinity	VSB	Visible
VCOT	VFR conditions on top	VSBY	Visibility
VCTR	Vector	VSBYDR	Visibility decreasing rapidly
VCTS	Thunderstorms in the vicinity	VSBYIR	Visibility increasing rapidly
VDUC	VAS Data Utilization Center (NSSFC)	VT	Vermont
VFR	Visual flight rules	VV	Vertical velocity or vertical visibility
VFY	Verify	VWP	VAD Wind profiler
VFYD	Verified	W	West
VFYG	Verifying	WA	Washington
VFYS	Verifies	WAA	Warm air advection
VHF	Very High Frequency	WAFS	Word Area Forecast System
VIS	Visibility	WBND	Westbound
VSNO	Visibility at secondary location not available	WDLY	Widely
VLCTY	Velocity	WDSPRD	Widespread
VLCTYS	Velocities	WEA	Weather
VLNT	Violent	WFO	Weather Forecast Office
VLNTLY	Violently	WFSO	Weather Forecast Service Office
VLY	Valley	WFP	Warm front passage
VMC	Visual meteorological conditions	WI	Wisconsin
VOL	Volume	WIBIS	Will be issued
		WINT	Winter
		WK	Weak

Common Weather Abbreviations

WKDAY	Weekday	WTR	Water
WKEND	Weekend	WTSPT	Waterspout
WKNG	Weakening	WUD	Would
WKNS	Weakens	WV	West Virginia or wind
WKR	Weaker	WVS	Waves
WKST	Weakest	WW	Severe weather watch
WKN	Weaken	WWD	Westward
WL	Will	WWS	Severe weather watches
WLY	Westerly	WX	Weather
WMO	World Meteorological Organization	WY	Wyoming
WND	Wind	XCP	Except
WNDS	Winds	XPC	Expect
WNW	West-northwest	XPCD	Expected
WNWLY	West-northwesterly	XPCG	Expecting
WNWRN	West-northwestern	XPCS	Expects
WNWWD	West-northwest-ward	XPLOS	Explosive
WO	Without	XTND	Extend
WPLTO	Western Plateau	XTRMLY	Extremely
WRM	Warm	YDA	Yesterday
WRMG	Warming	YKN	Yukon
WRMR	Warmer	YLSTN	Yellowstone
WRMST	Warmest	Z	Zulu time
WRMFNT	Warm front	ZN	Zone
WRMFNTL	Warm frontal	ZNS	Zones
WRN	Western		
WRNG	Warning		
WRS	Worse		
WS	Wind shear		
WSHFT	Windshift		
WSFO	Weather Service Forecast Office		
WSO	Weather service office		
WSR-88D	NWS Doppler Radar		
WSTCH	Wasatch Range		
WSW	West-southwest		
WSWLY	West-southwesterly		
WSWRN	West-southwestern		
WSWWD	West-southwest-ward		

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