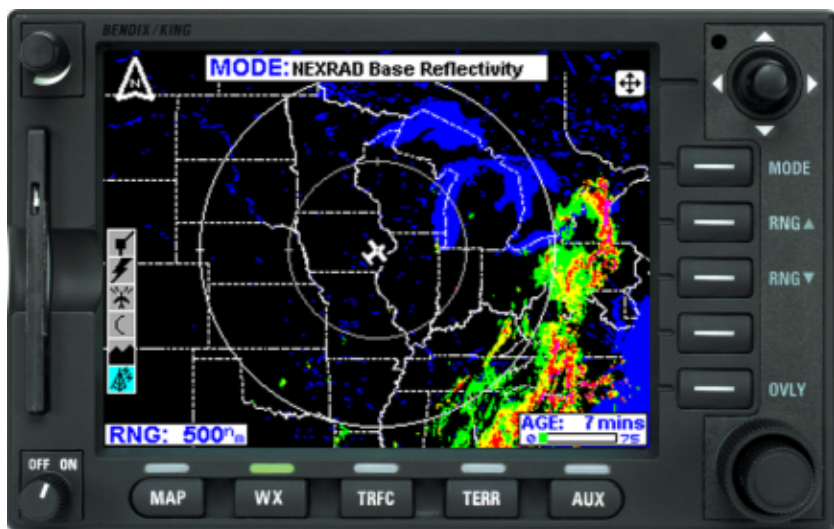# BENDIX/KING® KMD 550/850

## Multi-Function Display

# Flight Information Services (FIS)

## Pilot's Guide Addendum



For Software Version 01/11 or later

The information contained in this manual is for reference use only. If any information contained herein conflicts with similar information contained in the Airplane Flight Manual Supplement, the information in the Airplane Flight Manual Supplement shall take precedence.

**WARNING**

Prior to export of this document, review for export license requirement is needed.

**COPYRIGHT NOTICE**

# SUPPLEMENTAL SHEET

When studying the FIS Addendum, the following information may be helpful going in.

FIS Datalink Weather gives a "situation awareness" of one's position, or planned position, in relation to the weather. It is a tool that can be used to plan for the circumnavigation of severe weather (strategic planning). It cannot be used to attempt penetration of severe weather (tactical maneuvering) due to insufficient resolution and relative age of the data.

There are "regions of precipitous terrain" where coverage is not possible due to signal blockage by the terrain.

Always make note of the age of the data being displayed, especially in areas of rapidly changing weather conditions. Use good judgement when determining the currency of this data because of the age.

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# Table of Contents

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

The FIS system is operational 24 hours / day, 7 days / week. Data acquired from FAA approved weather sources is processed at the hub and then distributed to Ground Stations. 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 following diagram illustrates how FIS data is received in the aircraft.

## Introduction

At the time of this printing, coverage is not available in all locations. See our website at www.bendixking.com for network status.

When the network is fully deployed, continuous coverage 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 coverage.
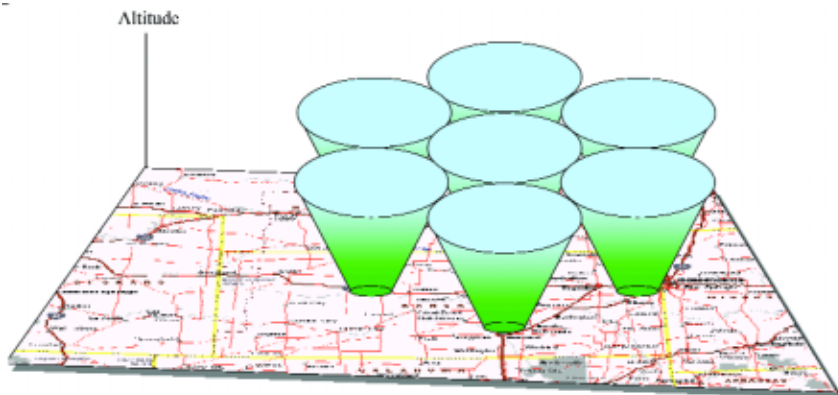


To receive FIS products, an aircraft must be equipped with a compatible VDL receiver (KDR 510), dedicated VHF antenna, and appropriate display (KMD 550/850). FIS uses a one-way (ground-to-air) broadcast protocol. Data is continually broadcast without the need to request information, nor acknowledge receipt.

Both basic (no-cost) and value added fee-based products are transmitted. Basic products are displayed using standard ICAO/WMO textual format. Most fee-based products are displayed in a graphical form.

The following basic services are obtained through a no-cost subscription service:

Aviation Routine Weather Reports (METARs)

Aviation Selected Special Weather Reports (SPECIs)

Terminal Area Forecasts (TAFs)

Pilot Reports (PIREPs)

The following are offered through a fee-based subscription service:

NEXRAD Base Reflectivity

Graphical METARs

The ground station network repetitively broadcasts 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.

## EQUIPMENT OVERVIEW

The FIS (Flight Information Services) 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.

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 other sections of the KMD 550/850 Pilot's Guide.

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

## CAUTION

FIS 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.  FIS 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 FIS display.

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

# BASIC SERVICE WEATHER PRODUCTS

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

## METAR

A METAR (Aviation Routine Weather Report) describes the specific weather conditions at a particular airport at a given time.  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 50 nautical miles 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.  At the time of this printing, METAR observations older than 75 minutes are discarded.  Sometime in the first half of 2003 METAR observations older than 120 minutes will be discarded.*

See Appendix A, Understanding METARs, 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.

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".

*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. At the time of this printing, SPECI observations older than 75 minutes are discarded. Sometime in the first half of 2003 SPECI observations older than 120 minutes will be discarded.*

Basic service SPECIs are offered in the encoded textual format.

See Appendix A, Understanding METARs, 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 100 nautical miles 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.*

See Appendix A, Understanding TAFs, for instructions on decoding TAFs.

## PIREP

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 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 150 nautical miles 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, Understanding PIREPs, for instructions on decoding PIREPs.

**Intentionally left blank**

# VALUE ADDED SERVICE WEATHER PRODUCTS

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

## NEXRAD

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

The NEXRAD base reflectivity mode provides a display of echo intensity depicted by colors. NEXRAD information is good for identifying precipitation intensity.

This NEXRAD base reflectivity data product content consists of reflectivity measured at the minimum scan angle of 0.5 degree elevation.

**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 Base 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.

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.
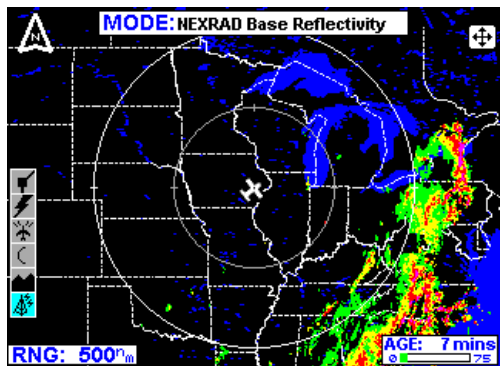


**Figure 1**

## 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.   Strobes are spurious radar data caused primarily by defractive 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 strobes within the displayed data.

4.   Sun strobes occur when a radar antenna points directly at the sun.  This shows up as high reflectivity for one or two radials.  Since base reflectivity is scanned at the lowest antenna elevation angle (0.5 degrees) typically sun strobes appear only when the sun is rising or setting.  Sun strobes 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.

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.

## NEXRAD LIMITATIONS

The following are limitations on the use of NEXRAD Base Reflectivity data:

1. NEXRAD base reflectivity does not provide sufficient information to determine cloud layers or precipitation characteristics (hail vs. rain, etc.).

2. The displayed NEXRAD base reflectivity 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 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.



*Figure 2*

4. NEXRAD base reflectivity is sampled at the minimum antenna elevation angle. An individual NEXRAD site cannot depict high altitude storms at close ranges, and has no information about storms directly over the site.
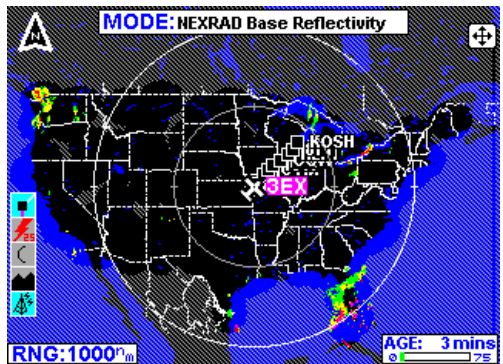
5. The resolution of NEXRAD data is 4 kilometers. Thus, when zoomed in on the display, each square block is 4 kilometers in diameter. The intensity level reflected by the square will be the highest level sampled within the 4 kilometer area.

## INTENSITY

Precipitation intensity is depicted using colors as follows:

| Green | Light | Level 1 | 15-30 dBz |
| Yellow | Moderate | Level 2 | 30-40 dBz |
| Red | Heavy | Level 3-4 | 40-50 dBz |
| Magenta | Intense | Level 5-8 | 50+ dBz |

Moving the joystick and pressing the MORE INFO softkey will display the NEXRAD legend as shown in Figure 3.

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.
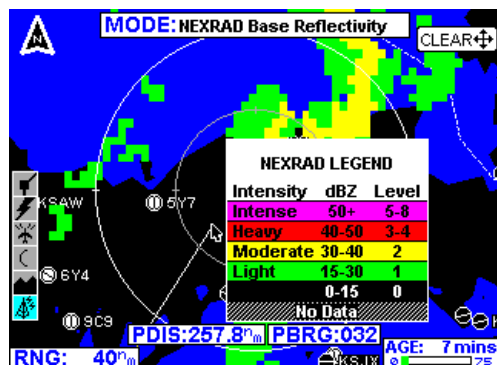


**Figure 3**

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

## 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 4.

The graphical METAR icon is gray when the textual METAR or SPECI report exceeds 75 minutes, but is less than the textual METAR expiration time of 120 minutes.
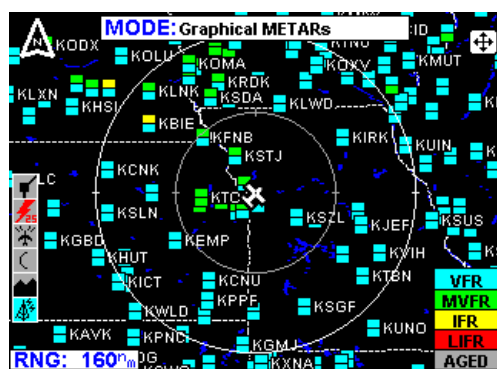


**Figure 4**

**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 | |
| Red | Ceiling < 500 ft | Low IFR |
| Red | Visibility < 1sm | |
| Gray | Report is older than 75 min | See Text Report for |
| Gray | Report is older than 75 min | Ceiling and Visibility |
| 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 5.
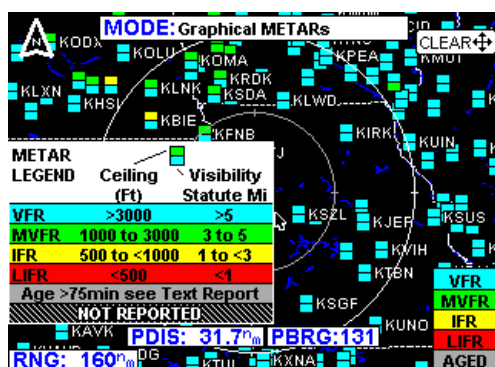


*Figure 5*

# STARTUP

If a display such as Figure 6 is seen at startup, perform the steps in Setting Up a FIS Subscription.
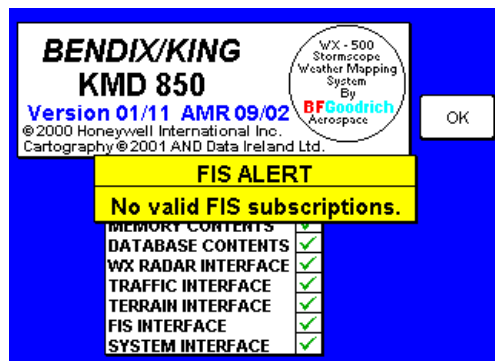


*Figure 6*

Figure 7 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.
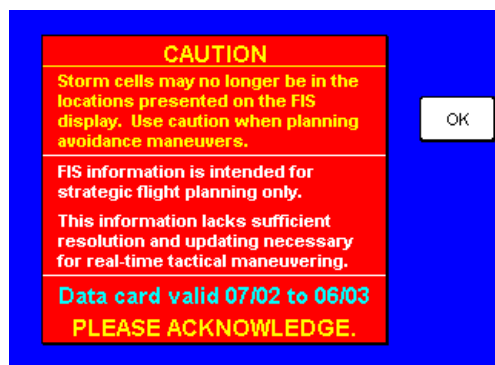


*Figure 7*

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

# FIS SUBSCRIPTIONS

Subscriptions are used to gain access to different services. Some services are offered at no cost and others are fee based. A current FIS subscription and a current data card is required to receive FIS services.

*NOTE: At the time of this printing, subscriptions are not required to gain access to FIS services.*

In the first quarter of 2003, customers will have to subscribe to continue receiving FIS 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.

*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 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 broadcast network in much the same way that a computer password permits access to a computer network. When you subscribe for FIS 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.

```
┌─────────────────┐    ┌─────────────────┐    ┌──────────────────────┐
│ Get Display ID  │───▶│ Go to Bendixking│───▶│ Enter Display ID     │
│ from unit in    │    │ .com or call    │    │ during registration  │
│ airplane        │    │ 1-800-247-0230  │    │ (This is only        │
│                 │    │ to subscribe to │    │ required first time  │
│                 │    │ FIS Services    │    │ you subscribe)       │
└─────────────────┘    └─────────────────┘    └──────────────────────┘
                                                          │
        ┌─────────────────────────────────────────────────┘
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│ Select the      │───▶│ Receive         │───▶│ Take printed out     │
│ desired         │    │ Subscription    │    │ code(s) to the       │
│ services        │    │ Code(s) and     │    │ airplane and enter   │
│                 │    │ print them out  │    │ code(s) on the FIS   │
│                 │    │                 │    │ Subscription Status  │
│                 │    │                 │    │ Page                 │
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        ┌─────────────────────────────────────────────────┘
        ▼
┌─────────────────────┐    ┌─────────────────┐
│ Update Data Card if │───▶│ Enjoy flying    │
│ needed. Update at   │    │ with FIS        │
│ least once per year │    │ Services!       │
│ to ensure continued │    │                 │
│ FIS Services        │    │                 │
└─────────────────────┘    └─────────────────┘
```

***How to Subscribe to FIS Services***

## SETTING UP A FIS SUBSCRIPTION

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 8.



*Figure 8*

2. Press the **WX SETUP** softkey to display the WX Setup Cover Page as shown in Figure 9.

3. Press the **FIS** softkey to display the FIS Setup Cover Page as shown in Figure 10.
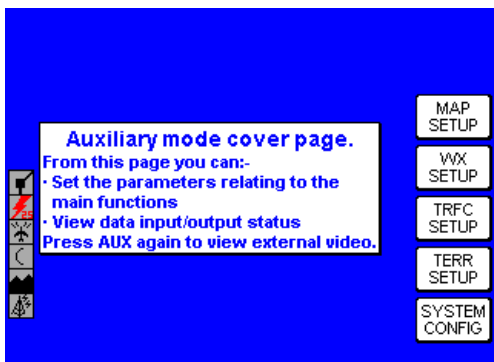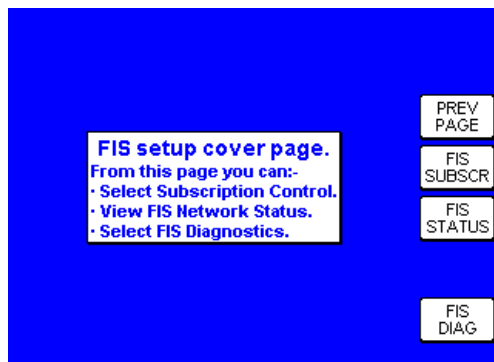


*Figure 9*



*Figure 10*

4. Press the **FIS SUBSCR** softkey to display Figure 11. On initial subscription setup the subscription window will show only blank spaces as shown in Figure 11, 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.

**Figure 11**

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 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 12.

**Figure 12**

6. The inner Control Knob selects the alphanumeric character and the outer Control Knob selects the

**Figure 13**

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 13.

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 14.

If an incorrect code has been entered, a message like that shown in Figure 15 will be displayed.

8. After the subscription has been accepted, Figure 16 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.



*Figure 14*
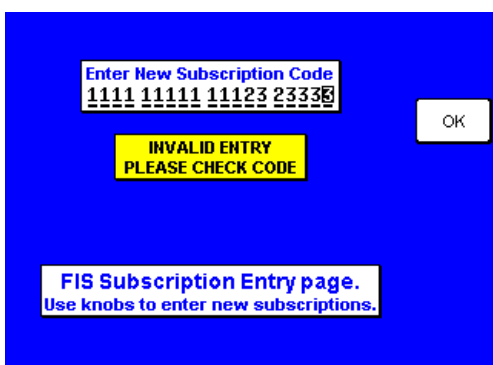


*Figure 15*
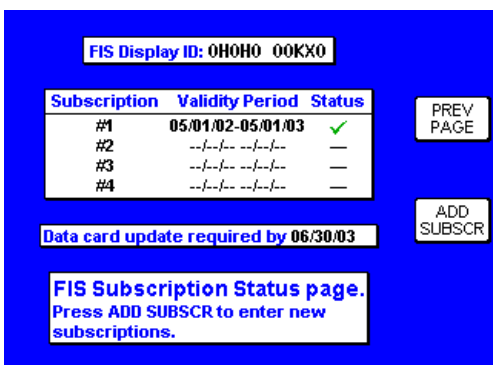


*Figure 16*

## CHECKING FIS SUBSCRIPTIONS

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

1. Repeat steps 1 through 3 in the Setting Up a FIS Subscription section.

2. Press the **FIS SUBSCR** softkey. A screen similar to Figure 17 should be displayed. In this case subscription #1 has expired and subscription #2 is still valid.
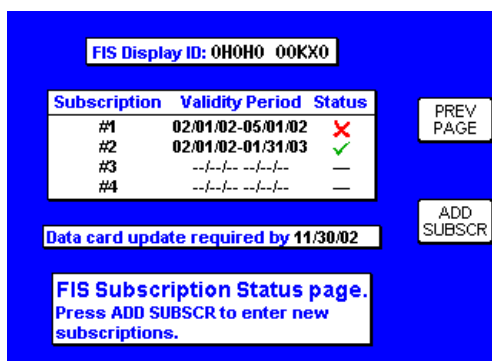


**Figure 17**

The symbols that may appear in the **Status** column, and their meanings, are shown in Figure 18. 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 18**

*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.*

# 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 or NEXRAD depending on what was last selected) and FIS Text Page.
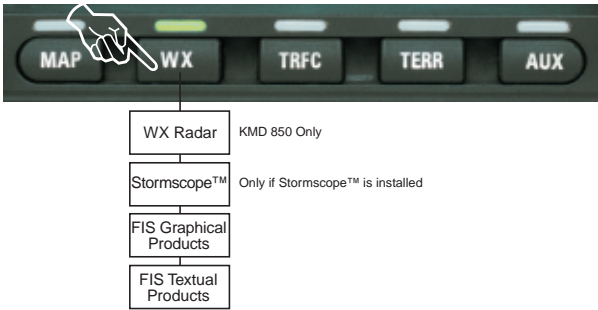


The **MODE** Power Key is used to change the mode of operation within each weather function as shown in the following diagram.
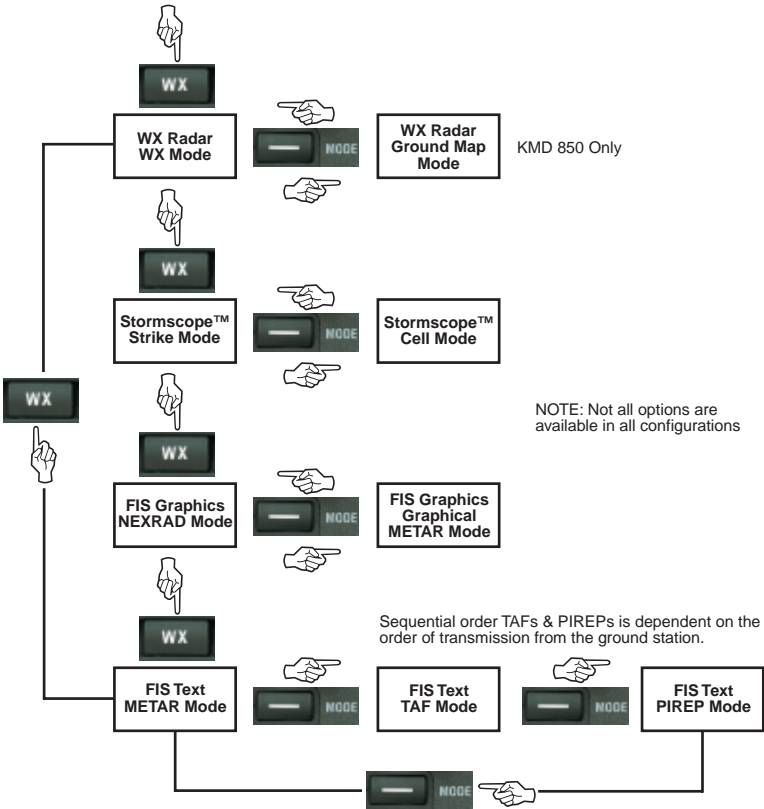
## NEXRAD PAGE

Press the **WX** Function Select Key until FIS Graphics Page is displayed. If Graphical METARs is displayed as the FIS Graphics Page, press the MODE Key to display NEXRAD Base Reflectivity. The following illustration describes the NEXRAD display.
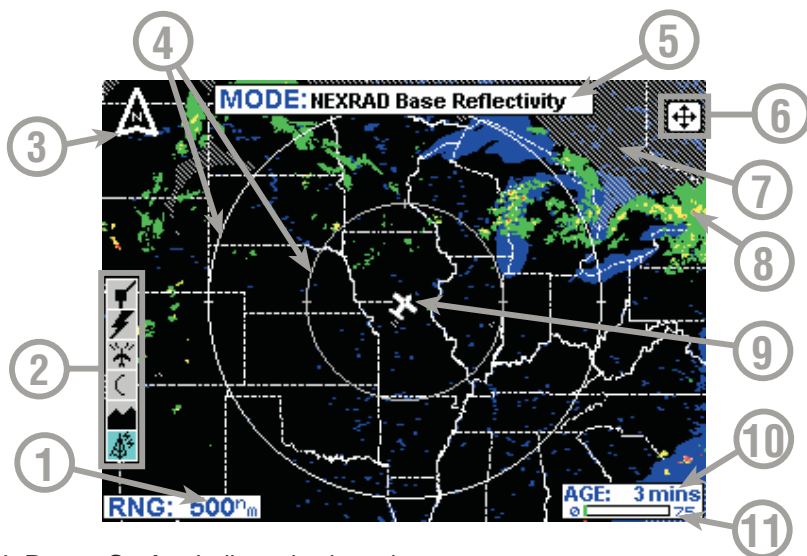


1 **Range Scale** - Indicated selected range.
2 **Available Functions** - Displays icons representing data available (black) and displayed (color).
3 **North Pointer** - Indicates north.
4 **Range Rings** - Outer ring radius is selected range and inner ring radius is one half the selected range.
5 **MODE** - Indicates the weather product being displayed.
6 **Joystick Label** - Indicates joystick is active and can be used to pan map.
7 **No Coverage Area** - Crosshatch pattern indicates area of no coverage.
8 **Precipitation** - NEXRAD precipitation returns.
9 **Aircraft Symbol** - Indicates present aircraft position and heading (if available) or track.
10 **Age of Data** - Age of the data based on current time minus NEXRAD issue time.
11 **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** - Toggles between Graphical METARs and NEXRAD.

**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 lightning data (if Stormscope™ equipment is installed) for overlay on the FIS map.

## USING THE NEXRAD PAGE

1. Press the **WX** Function Select Key until the FIS Graphics Page is displayed. If necessary, press the **MODE** Key to obtain the NEXRAD Base Reflectivity display as shown in Figure 19. **NEXRAD Base Reflectivity** will be displayed in the MODE field located at the top center of the display.
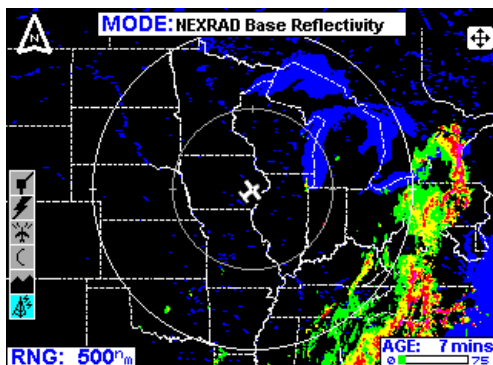


*Figure 19*

*NOTE: If a message such as that shown in Figure 20 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 a few minutes, refer to the Messages section of this addendum.*
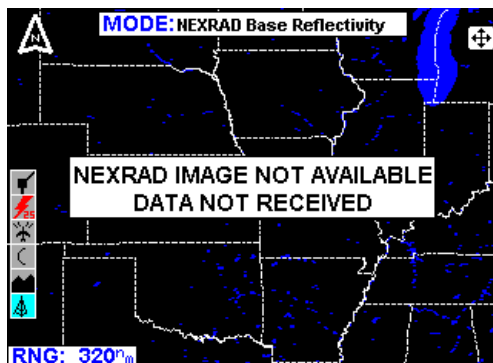


**Figure 20**

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.
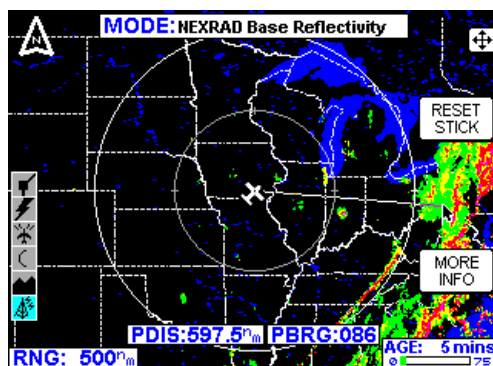


**Figure 21**

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 21). 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.

Pressing the **MORE INFO** softkey will display the **NEXRAD LEGEND** as in Figure 22. To clear the legend from the display, move the joystick.

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.
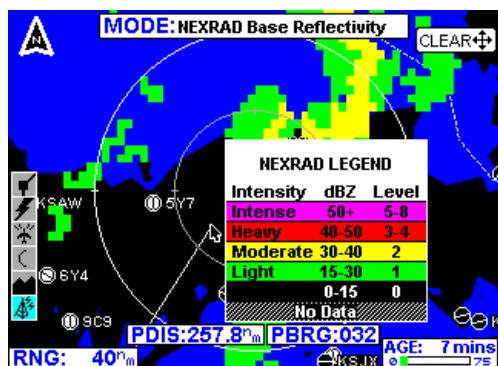


*Figure 22*

4. Press the **OVLY** Key to overlay flightplan or lightning data on the NEXRAD map (see Figure 23). 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 24.
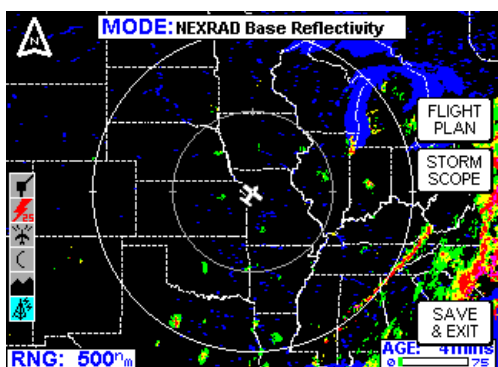


*Figure 23*
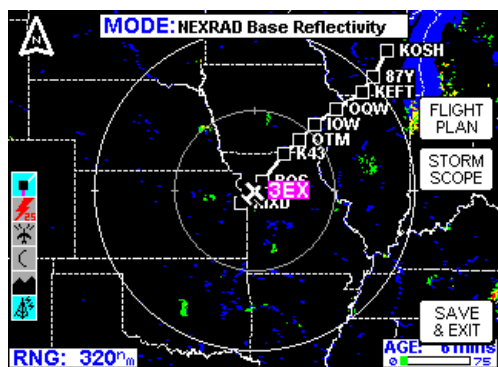


*Figure 24*

Press the **SAVE & EXIT** softkey to retain the selections on the display (see Figure 25).
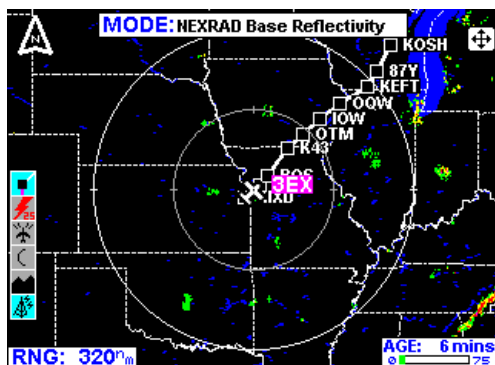


*Figure 25*

# GRAPHICAL METARS PAGE

Press the **WX** Function Select Key until the FIS Graphics Page is displayed. If NEXRAD is displayed as the FIS Graphics Page, press the **MODE** Key to display Graphical METARs. The following illustration describes the Graphical METARs display.
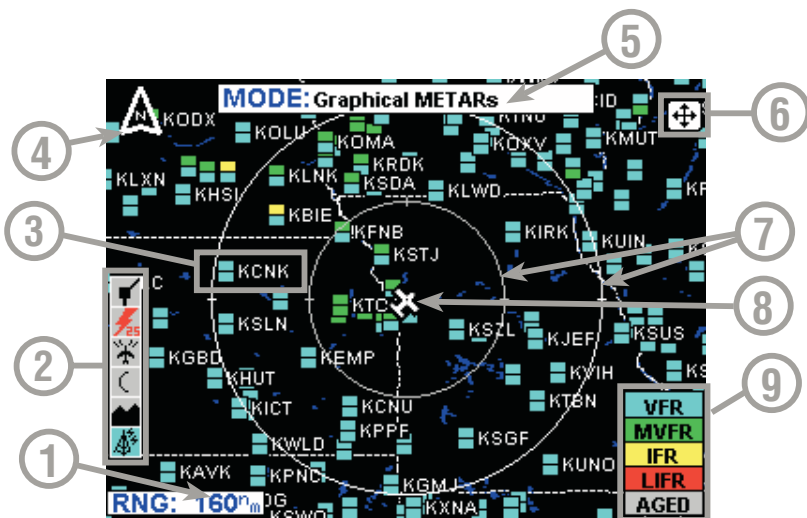


1  **Range Scale** - Indicated selected range.

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  **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  **METAR Color Key** - Colors indicating flight rules pertaining to ceiling and visibility.

## GRAPHICAL METARS PAGE OPERATIONAL CONTROLS



**MODE** - Toggles between Graphical METARs and NEXRAD.



**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.

## USING THE GRAPHICAL METARS PAGE

1. Press the **WX** Function Select Key until the FIS Graphics Page is displayed. If necessary, press the **MODE** Key to obtain the Graphical METAR display as shown in Figure 26. **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.*
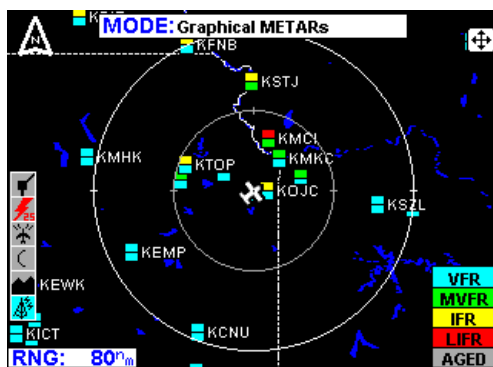


*Figure 26*

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 27). 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 28).
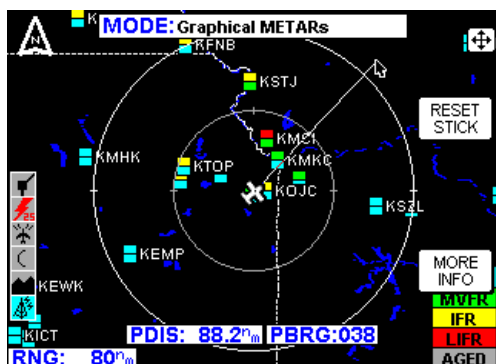


*Figure 27*



*Figure 28*

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 29.

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



*Figure 29*

actions are taken for a period of 30 seconds, the display will return to the aircraft present position display.
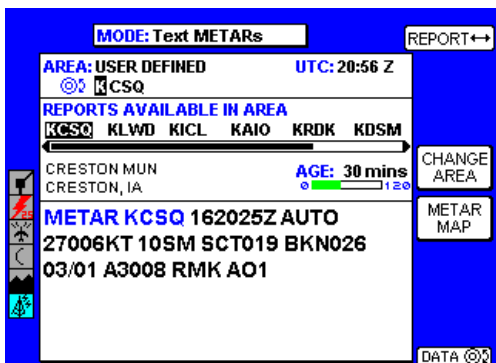
8. To view the graphical METAR LEGEND, move the joystick pointer to an area with no icons and press the **MORE INFO** softkey. The legend will be displayed as in Figure 30. Move the joystick to remove the legend from the display.

9. Press the **OVLY** Key to overlay flightplan data on the Graphical METAR map (see Figure 31).

The **FLIGHT PLAN** softkey toggles the overlay on or off as in Figure 32.

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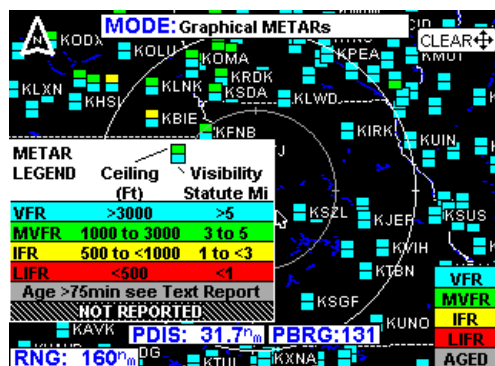


*Figure 30*
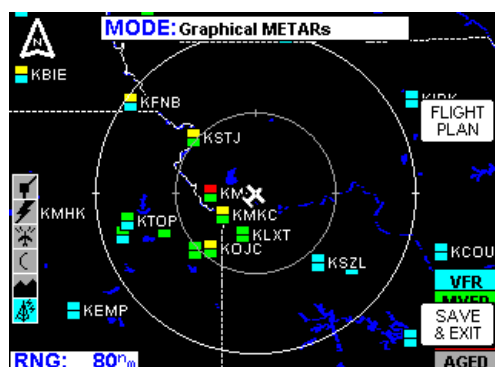


*Figure 31*
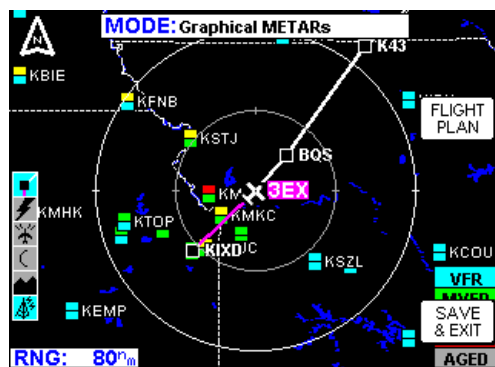


*Figure 32*

## 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.
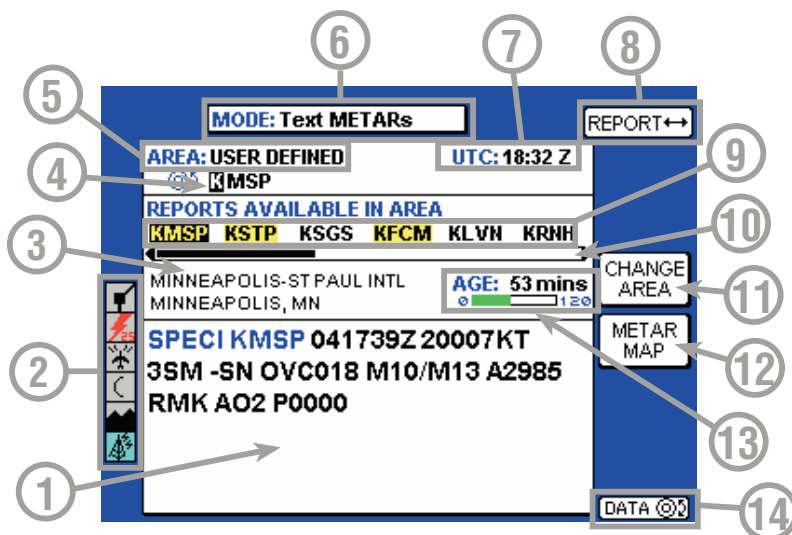


1 **Text Field** - The encoded weather report is displayed in this field.
2 **Available Functions** - Displays icons representing data available (black) and displayed (color).
3 **Selected Report Info** - Displays name, city and state of selected report.
4 **Selected Area Identifier** - Displays the 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 cycle between text METARs, TAFs and PIREPs.
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** - Indicates there are more available reports than can be displayed on the screen. Move the joystick 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).

## FIS TEXT PAGE OPERATIONAL CONTROLS

**MODE** - Toggles between METAR/SPECIs, PIREPs and TAFs.

**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 **AVAILABLE REPORTS** field.

**METAR MAP -** This softkey is only available when viewing text METARs and graphical METARs are available. When the METAR MAP softkey is pressed, the Graphical METARs Page will be displayed with the map centered on the location of the selected METAR 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 33.

*NOTE: If a message such as that shown in Figure 34 is displayed, it may be that the system has not had time to acquire a signal. If this message is still present after a few minutes, refer to the Messages section of this addendum.*

*If no METAR is available in the selected area, a message such as that shown in Figure 35 will be displayed.*

### CHANGING MODES & AREA

1. Press the **MODE** Key to view METAR/SPECIs, TAFs or PIREPS. The type of report viewed is displayed in the **MODE** field at the top of the display.

Figure 36 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 **AVAILABLE REPORTS** field lists closest first, furthest last.



**Figure 33**



**Figure 34**



**Figure 35**

For instance, the display shown in Figure 33 lists all available METARs within 50nm of KIXD (the selected **AREA**). KIXD is also a reporting station which is listed first in the **AVAILABLE REPORTS**. Use the joystick to scroll through the **AVAILABLE REPORTS**. Urgent, special or amended reports will be highlighted in yellow.
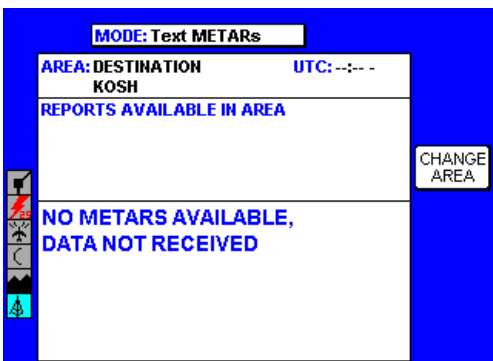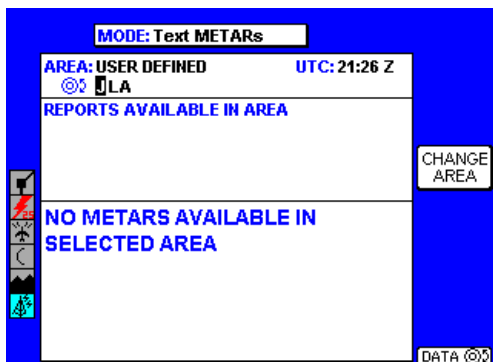
Note that the displayed report in Figure 33 is 61 minutes old. The bar indicates a percentage of time left before expiration. The bar will be green the first 50%, then turn yellow.
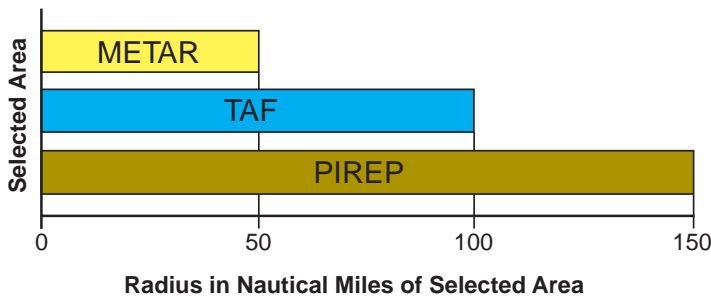


**Figure 36**
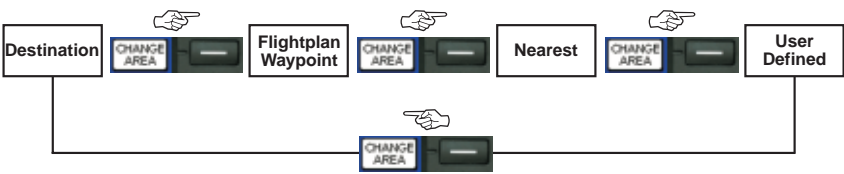


**Figure 37**

2. Press the **CHANGE AREA** softkey to view reports for either **NEAREST** to present position, **USER DEFINED** location, **DESTINA-TION** (last waypoint in a flightplan) or **FPLN WPT** (any waypoint in an active flightplan). The softkey cycles through the **AREA**s as shown in Figure 37.

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 36 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 38), 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.

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 39, use the Control Knob to enter data (note cursor position in Figure 39) or scan through available location options. The following is an example of using this feature.

1. The cursor will be over the first character of the waypoint identifier. Select the desired character by turning the inner knob. The screen will change to that shown in Figure 40.
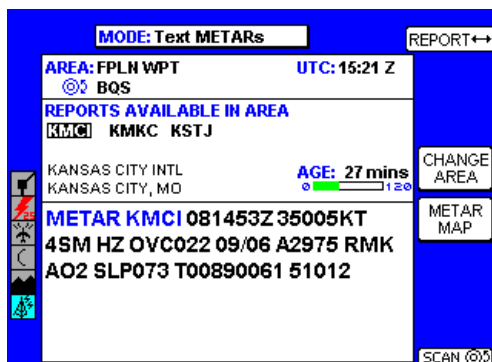


*Figure 38*
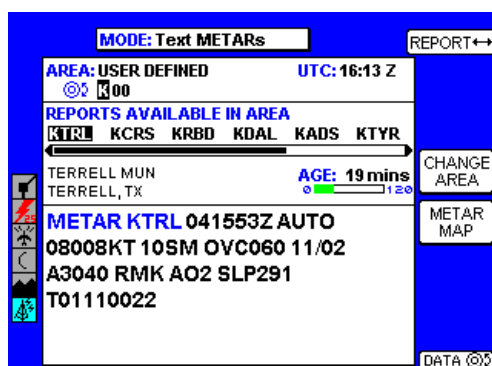


*Figure 39*
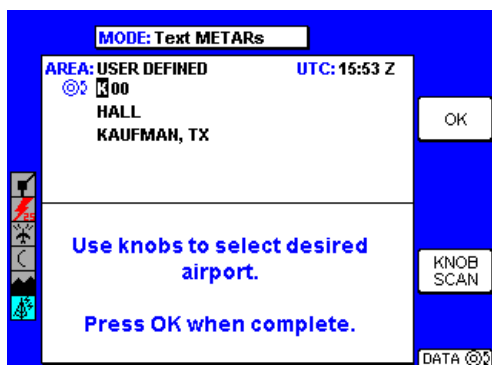


*Figure 40*

2. Turn the outer knob one click clockwise to move the cursor to the next character field as shown in Figure 41. 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 42.

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.

5. Press the **OK** softkey when finished making selections. The display will be as shown in Figure 43.

6. Move the joystick right or left to view available reports.
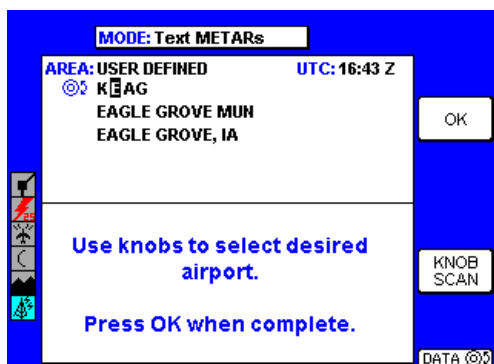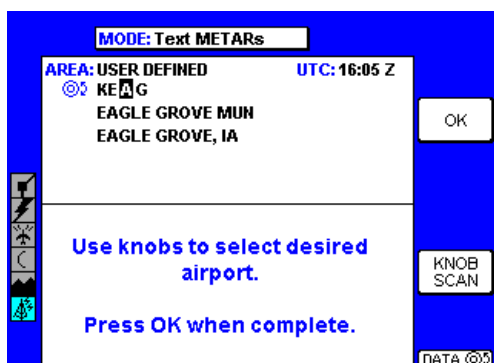
*NOTE: Available reports highlighted in yellow, like KMCW in Figure 43, indicates the report is a special report, urgent report or an amended report.*
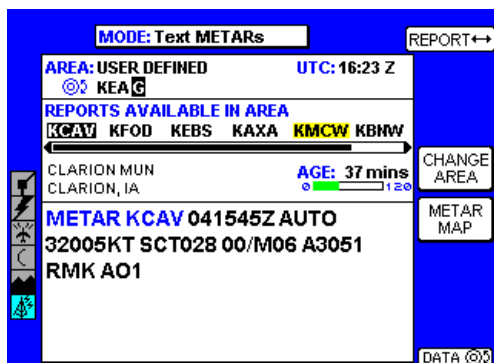


*Figure 41*





*Figure 43*

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 44.

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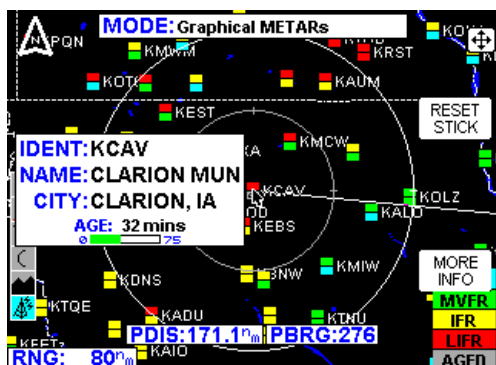


**Figure 44**

### *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 45 will be displayed.
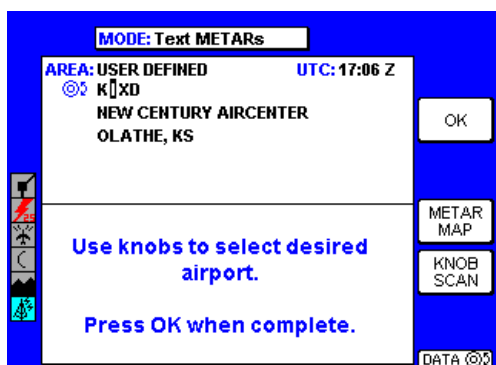
2. Continue to turn the outer knob clockwise to highlight the **N** as shown in Figure 46.
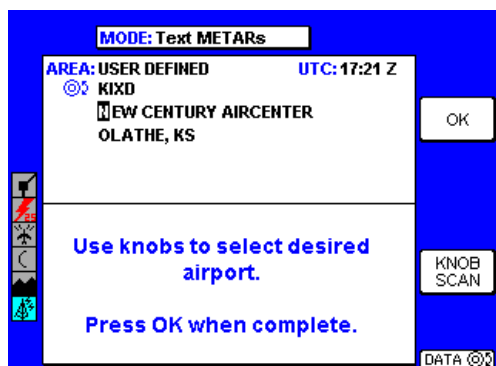


**Figure 45**



**Figure 46**

3. Turn the inner knob counterclockwise until an **E** is selected as shown in Figure 47.

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 48.

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 49.

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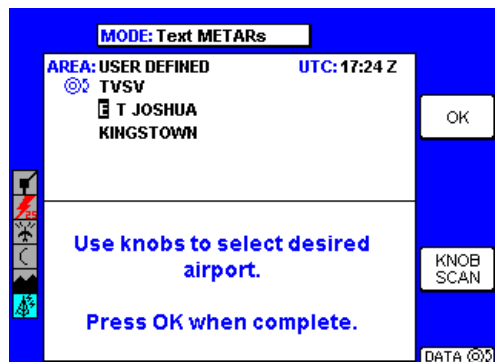


*Figure 47*
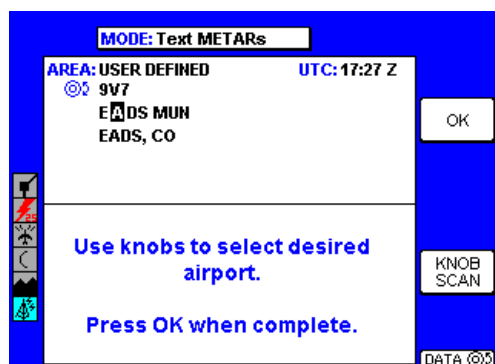


*Figure 48*
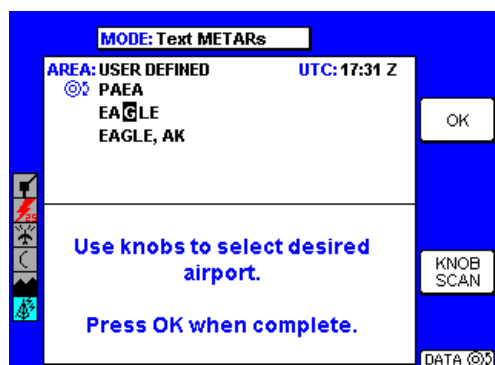


*Figure 49*

7. Turn the inner knob clockwise to select a **G** as shown in Figure 50. 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 51.

3. Turn the outer knob clockwise until the cursor is positioned as in Figure 51.

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 52.

*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.*
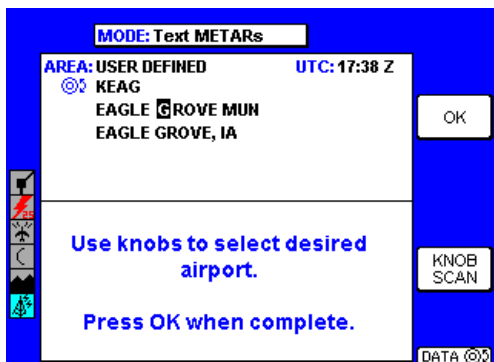
*Figure 50*
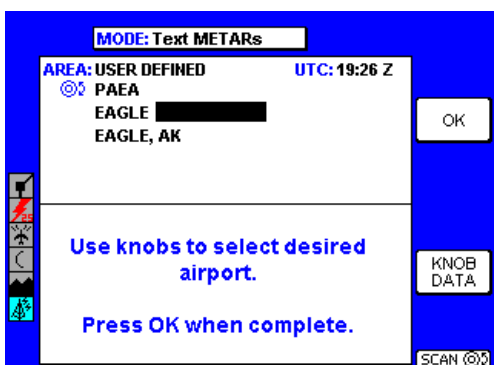
*Figure 51*
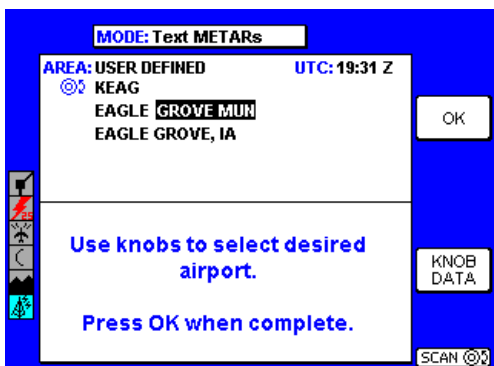
*Figure 52*

# FIS NETWORK STATUS PAGE

The FIS Network Status Page displays the location and identifier of installed 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.
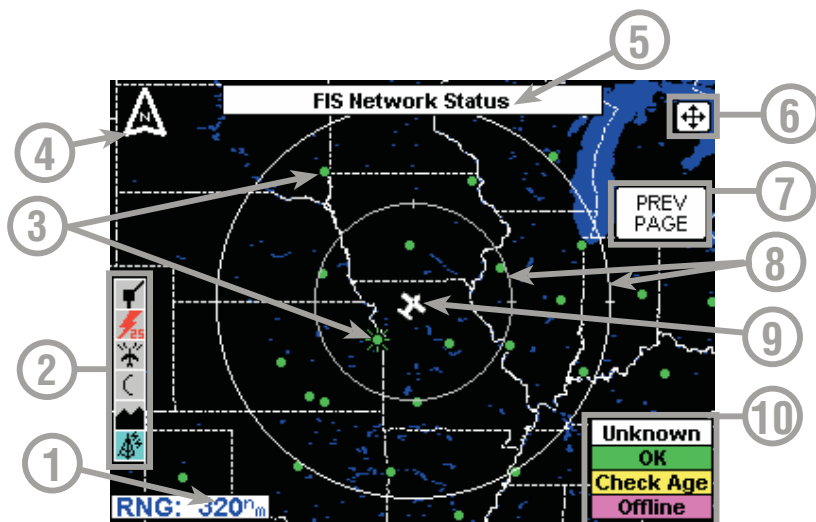


1 **Range Scale** - Indicated selected range.

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 53.

2. Press the **WX SETUP** softkey to display the WX Setup Cover Page as shown in Figure 54.

3. Press the **FIS** softkey to display the FIS Setup Cover Page as shown in Figure 55.
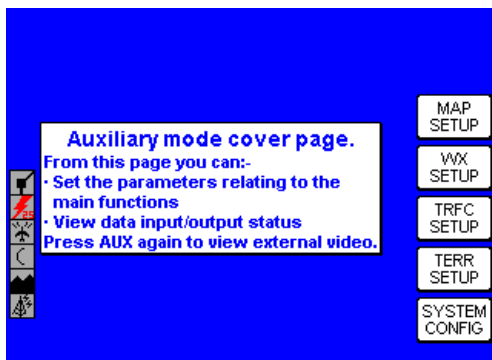


*Figure 53*
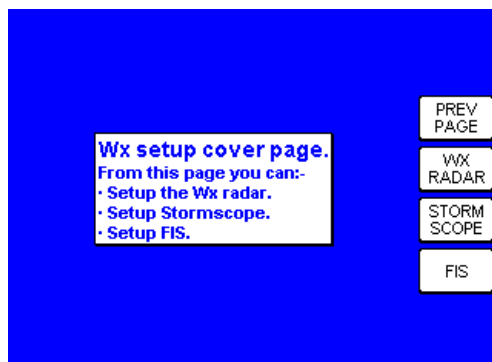


*Figure 54*
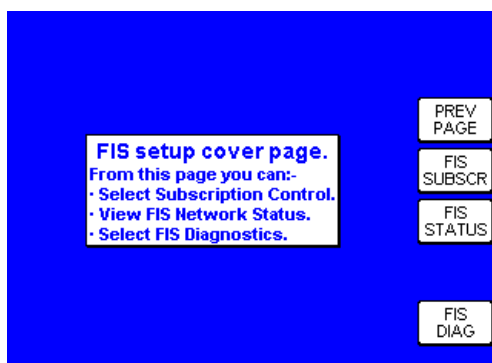


*Figure 55*

4. Press the **FIS STATUS** softkey to display the FIS Network Status Page as shown in Figure 56. 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.*



**Figure 56**

5. Ground station status and it's identifier number can be viewed by moving the joystick to position the pointer over the desired ground station as shown in Figure 57.

*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.*
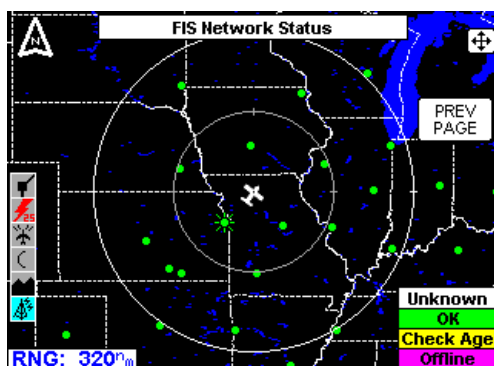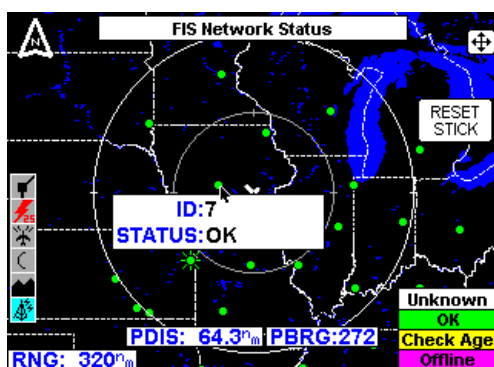


**Figure 57**

# MESSAGES

The following are descriptions of messages that may be displayed.

## FIS ALERT, NO VALID FIS SUBSCRIPTIONS

The message shown in Figure 58 would indicate that no subscriptions have been set up or previously entered subscriptions have expired or will become valid at a future date.
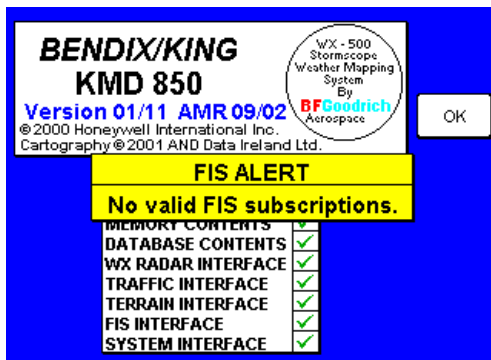


**Figure 58**

## NO DATA RECEIVED FROM FIS RECEIVER

If the KMD 550/850 display is unable to communicate with the KDR 510 VDL Receiver a message such as that shown in Figure 59 will be displayed.

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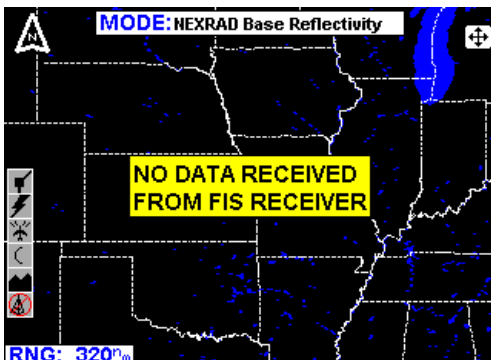


**Figure 59**

## NEXRAD IMAGE NOT AVAILABLE, DATA NOT RECEIVED

If no valid Nexrad data is received a message such as that shown in Figure 60 will be displayed.

This message usually means that the system is not in FIS coverage.

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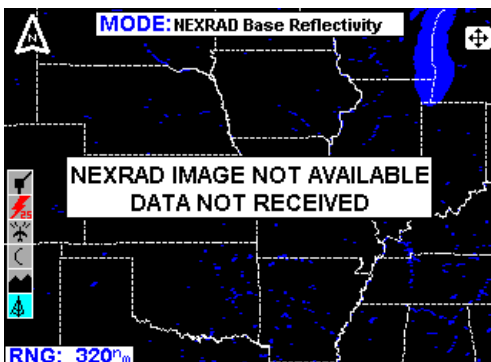


**Figure 60**

## GRAPHICAL METARS NOT AVAILABLE, DATA NOT RECEIVED

If no valid METAR data is received a message such as that shown in Figure 61 will be displayed.

This message usually means that the system is not in FIS coverage.

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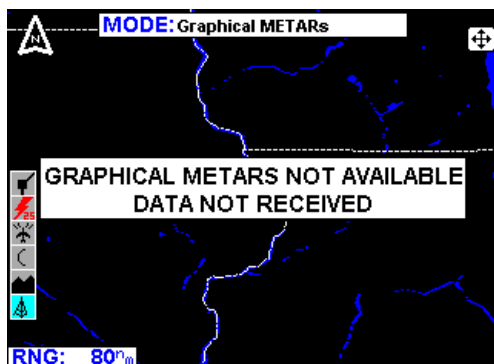


*Figure 61*

## NO METARS AVAILABLE IN SELECTED AREA

A message such as that shown in Figure 62 will be displayed if no METARs are 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.
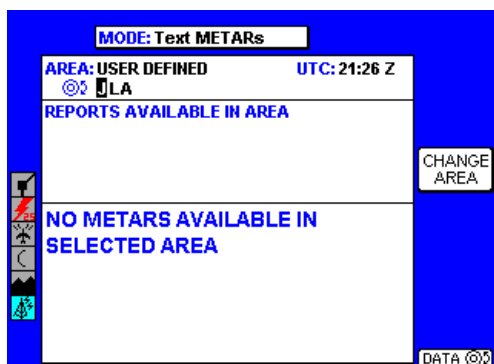


*Figure 62*

## FIS ALERT, FIS DATA NOT RECEIVED FOR 15 MINUTES

This message will be displayed (Figure 63) 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.
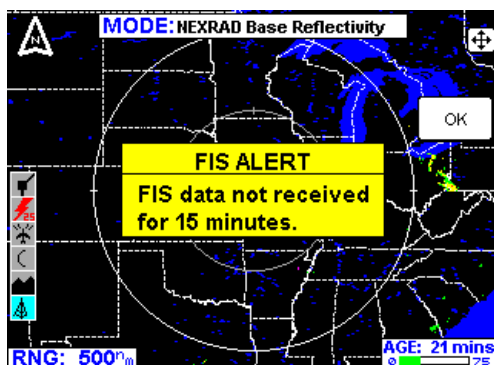


*Figure 63*

## NO METARS AVAIL-ABLE, DATA NOT RECEIVED

This message will be displayed (Figure 64) if no METAR data has been received.

This message means the FIS system has not received any METAR data. This may be due to not being in FIS coverage.
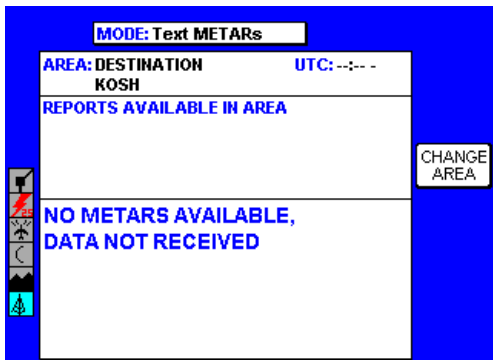


*Figure 64*

## INVALID ENTRY, PLEASE CHECK CODE

This message will be displayed (Figure 65) 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 65*

## ERROR PROCESSING SUBSCRIPTION CODE

This message will be displayed (Figure 66) 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 66*

## FIS DECRYPTION FAILURE. UNABLE TO ACCEPT A NEW SUBSCRIPTION CODE

This message will be displayed (Figure 67) if the internal decryption hardware has failed or is otherwise not responding to commands.



**Figure 67**

## NETWORK STATUS NOT AVAILABLE, DATA NOT RECEIVED

This message will be displayed (Figure 68) if no valid network status data is available.
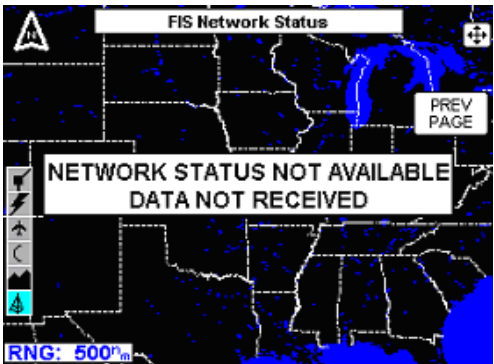
## FIS ALERT, ONE OR MORE FIS SUBSCRIPTIONS ARE CLOSE TO EXPIRING. PLEASE REVIEW YOUR SUBSCRIPTIONS

This message will be displayed (Figure 69) if the system detects at least one subscription is within 7 days of it's displayed ending date.
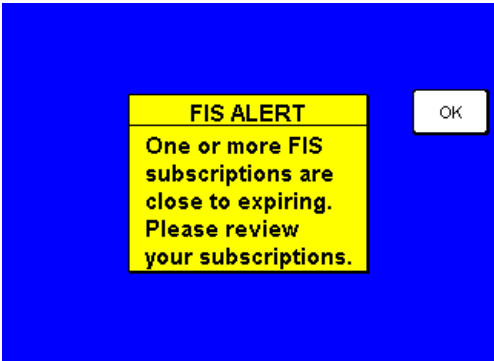


**Figure 68**



**Figure 69**

## FIS ALERT, ONE OR MORE FIS SUBSCRIPTIONS HAVE EXPIRED. PLEASE REVIEW YOUR SUBSCRIPTIONS

This message will be displayed (Figure 70) 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.
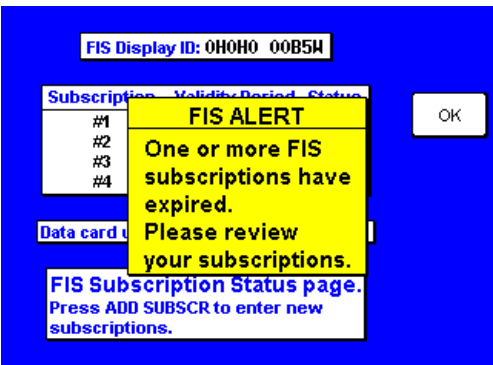


*Figure 70*

## FIS ALERT, DATA CARD UPDATE REQUIRED FOR CONTINUED RECEPTION OF FIS DATA

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 71 will be displayed. This is a reminder. FIS services will continue to function until reaching the ending date of the data card.
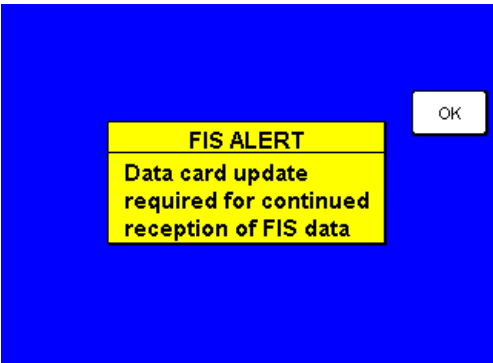


*Figure 71*

## FIS ALERT, NEW DATA CARD NOT YET VALID. UNABLE TO RECEIVE FIS DATA

This message will be displayed (Figure 72) if the system detects the system date is prior to the starting date of the data card.
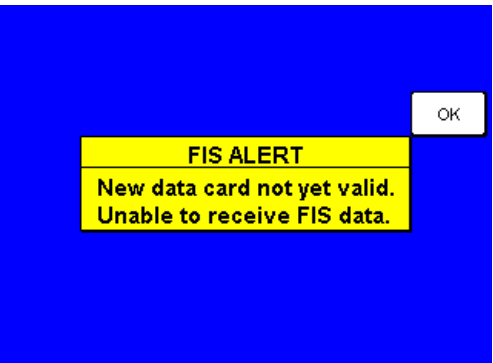


*Figure 72*

## FIS ALERT, DATA CARD HAS EXPIRED. UNABLE TO RECEIVE FIS DATA

If the system detects the system date is after the ending date of the data card a message such as that shown in Figure 73 will be displayed. FIS services will not be accessible.
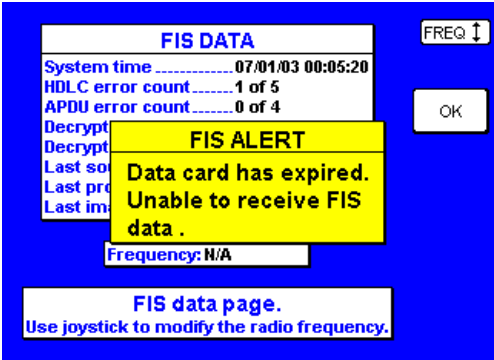


*Figure 73*

## FIS ALERT, FIS SUB-SCRIPTION ERROR. SWITCH OFF AND REPLACE DATA CARD

A message such as that shown in Figure 74 will be displayed if there is a problem internal to the data card.
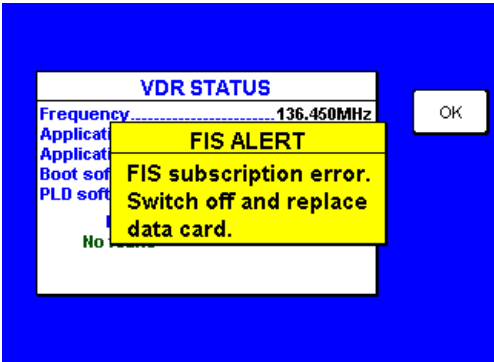


*Figure 74*

## FIS ALERT, FIS DECRYPTION ERROR. UNABLE TO RECEIVE FIS DATA

This message is similar in appearance to that shown in Figure 74.  This message indicates that a decryption hardware failure has occurred after system startup and a successful self-test.

# APPENDIX A

## UNDERSTANDING METARS (AVIATION ROUTINE WEATHER REPORTS) AND SPECIS (AVIATION SELECTED SPECIAL WEATHER REPORTS)

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

```
   1     2      3       4       5            6            7      8
METAR KPIT 201955Z AUTO 22015G25KT 3/4SM R28R/2600FT TSRA OVC010CB
18/16 A2992 RMK SLPO13 T01760158 PK WND 22030/15

   9    10                  11
```
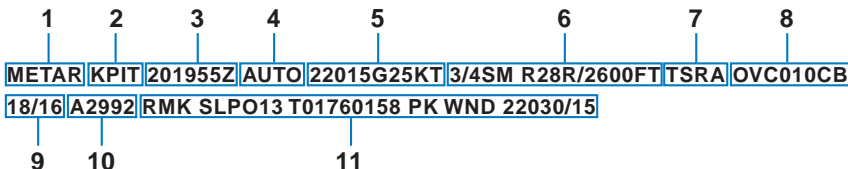
1.  Type of Report: **METAR** (SPECI will be seen here if this is a Special Weather Report)

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" in this element 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 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

**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.

**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.

## UNDERSTANDING TAFS (TERMINAL AREA FORE-CASTS)
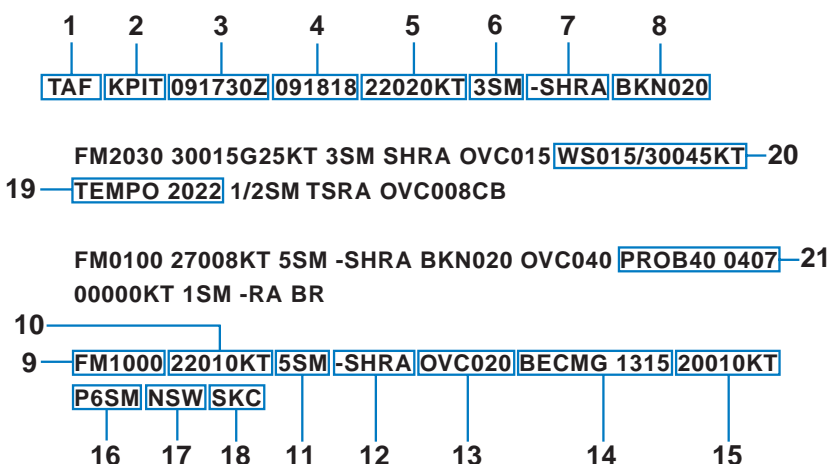


Refer to the numbers on the following diagram to find the appropriate descriptions.

**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.

**15.** Wind Becoming: **20010KT**

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

**16.** Visibility Becoming: **P6SM**

See #6 in the METAR 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 METAR section for details.

**18.** Sky Conditions Becoming: **SKC**

See #8 in the METAR 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 (PILOT REPORTS)

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

**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**

# APPENDIX B

## COMMON WEATHER ABBREVIATIONS

| | | | | |
|---|---|---|---|---|
| ABNDT | Abundant | | ADVCTG | Advecting |
| ABNML | Abnormal | | ADVCTN | Advection |
| ABT | About | | ADVCTS | Advects |
| ABV | Above | | ADVN | Advance |
| AC | Convective outlook or altocumulus | | ADVNG | Advancing |
| | | | ADVY | Advisory |
| ACC | Altocumulus castellanus clouds | | ADVYS | Advisories |
| | | | AFCT | Affect |
| ACFT MSHP | Aircraft Mishap | | AFCTD | Affected |
| ACCUM | Accumulate | | AFCTG | Affecting |
| ACFT | Aircraft | | AFDK | After dark |
| ACLT | Accelerate | | AFOS | Automated Field Operations System |
| ACLTD | Accelerated | | | |
| ACLTG | Accelerating | | AFSS | Automated Flight Service Station |
| ACLTS | Accelerates | | | |
| ACPY | Accompany | | AFT | After |
| ACRS | Across | | AFTN | Afternoon |
| ACSL | Altocumulus standing lenticular | | AGL | Above ground level |
| | | | AGN | Again |
| ACTV | Active | | AGRD | Agreed |
| ACTVTY | Activity | | AGRS | Agrees |
| ACYC | Anticyclone | | AGRMT | Agreement |
| ADJ | Adjacent | | AHD | Ahead |
| ADL | Additional | | AK | Alaska |
| ADQT | Adequate | | AL | Alabama |
| ADQTLY | Adequately | | ALF | Aloft |
| ADRNDCK | Adirondack | | ALG | Along |
| ADVCT | Advect | | ALGHNY | Allegheny |
| ADVCTD | Advected | | | |

| | | | |
|---|---|---|---|
| ALP | Airport Location Point | APPR | Appear |
| ALQDS | All quadrants | APPRG | Appearing |
| ALSTG | Altimeter setting | APPRS | Appears |
| ALT | Altitude | APRNT | Apparent |
| ALTA | Alberta | APRNTLY | Apparently |
| ALTHO | Although | APRX | Approximate |
| ALTM | Altimeter | APRXLY | Approximately |
| ALUTN | Aleutian | AR | Arkansas |
| AMD | Amend | ARL | Air Resources Lab |
| AMDD | Amended | ARND | Around |
| AMDG | Amending | ARPT | Airport |
| AMDT | Amendment | ASAP | As soon as possible |
| AMP | Amplify | ASSOCD | Associated |
| AMPG | Amplifying | ASSOCN | Association |
| AMPLTD | Amplitude | ATCT | Air Traffic Control Tower |
| AMS | Air mass | ATLC | Atlantic |
| AMT | Amount | ATTM | At this time |
| ANLYS | Analysis | ATTN | Attention |
| ANS | Answer | AVBL | Available |
| AO1 | Automated Reporting Station | AVG | Average |
| AO2 | Automated Reporting Station | AVN | Aviation model |
| | | AWC | Aviation Weather Center |
| AOA | At or above | AWT | Awaiting |
| 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 |

| | | | | |
|---|---|---|---|---|
| BCFG | Patchy fog | | BLKT | Blanket |
| BCH | Beach | | BLKTG | Blanketing |
| APCH | Approach | | BLKTS | Blankets |
| APRNT | Apparent | | BLO | Below or below clouds |
| APRX | Approximate, Approximately | | BLW | Below |
| ATCT | Air Traffic Control Tower | | BLZD | Blizzard |
| AUTO | Automated report | | BN | Blowing sand |
| B | Began | | BND | Bound |
| BC | Patches (descriptor used with FG) | | BNDRY | Boundary |
| | | | BNDRYS | Boundaries |
| BCKG | Backing | | BNTH | Beneath |
| BCM | Become | | BOOTHEEL | Bootheel |
| BCMG | Becoming | | BR | Branch or mist (METAR, used only for visibility between 5/8 and 6 miles) |
| BCMS | Becomes | | | |
| BDA | Bermuda | | | |
| BDRY | Boundary | | | |
| BECMG | Becoming | | BRF | Brief |
| BFDK | Before dark | | BRK | Break |
| BFR | Before | | BRKG | Breaking |
| BGN | Begin | | BRKHIC | Breaks in higher clouds |
| BGNG | Beginning | | | |
| BGNS | Begins | | BRKS | Breaks |
| BHND | Behind | | BRKSHR | Berkshire |
| BINOVC | Breaks in overcast | | BRM | Barometer |
| BKN | Broken | | BS | Blowing snow |
| BL | Blowing | | BTWN | Between |
| BLD | Build | | BYD | Beyond |
| BLDG | Building | | C | Celsius |
| BLDUP | Buildup | | CA | California or cloud-to-air lightning in PIREPs |
| BLKHLS | Black Hills | | | |
| | | | CAA | Cold air advection |
| | | | CARIB | Caribbean |

| | | | |
|---|---|---|---|
| CAS | Committee for Aviation Services | CHINO | Sky condition at secondary location not available |
| CASCDS | Cascades | CHOP | Turbulence type characterized by rapid, rhythmic jolts |
| CAT | Clear air turbulence | | |
| CAVOK | Clear sky, unlimited visibility | | |
| | | CHSPK | Chesapeake |
| CB | Cumulonimbus | CI | Cirrus |
| CBMAM | Cumulonimbus Mammatus clouds | CIG | Ceiling |
| | | CIGS | Ceilings |
| CC | Cirrocumulus | CLD | Cloud |
| CCCC | Generic WMO format code group for a four-letter loca-tion identifier | CLDNS | Cloudiness |
| | | CLDS | Clouds |
| | | CLKWS | Clockwise |
| CCLDS | Clear of clouds | CLR | Clear |
| CCLKWS | Counterclockwise | CLRG | Clearing |
| CCSL | Cirrocumulus standing lenticular | CLRS | Clears |
| | | CMPLX | Complex |
| CCx | Code used in the WMO abbreviated heading to indicate a corrected fore-cast, where x is the letter A through X | CNCL | Cancel |
| | | CNCLD | Canceled |
| | | CNCLG | Canceling |
| | | CNCLS | Cancels |
| | | CNDN | Canadian |
| CDFNT | Cold front | CNTR | Center |
| CFP | Cold front passage | CNTRD | Centered |
| CG | Cloud to ground (lightning) | CNTRL | Central |
| | | CNTY | County |
| CHC | Chance | CNTYS | Counties |
| CHCS | Chances | CNVG | Converge |
| CHG | Change | CNVGG | Converging |
| CHGD | Changed | CNVGNC | Convergence |
| CHGG | Changing | CNVTN | Convection |
| CHGS | Changes | CNVTV | Convective |
| CHI | Cloud-Height indicator | | |

| | | | |
|---|---|---|---|
| CNVTVLY | Convectively | CT | Connecticut |
| CONFDC | Confidence | CTC | Contact |
| CO | Colorado | CTGY | Category |
| COMPR | Compare | CTSKLS | Catskills |
| COMPRG | Comparing | CU | Cumulus |
| COMPRD | Compared | CUFRA | Cumulus fractus |
| COMPRS | Compares | CVR | Cover |
| COND | Condition | CVRD | Covered |
| CONS | Continuous | CVRG | Covering |
| CONT | Continue | CVRS | Covers |
| CONTD | Continued | CWSU | Center Weather Service Units |
| CONTLY | Continually | CYC | Cyclonic |
| CONTG | Continuing | CYCLGN | Cyclogenesis |
| CONTRAILS | Condensation trails | DABRK | Daybreak |
| CONTS | Continues | DALGT | Daylight |
| CONTDVD | Continental Divide | DBL | Double |
| CONUS | Continental U.S. | DC | District of Columbia |
| COORD | Coordinate | DCR | Decrease |
| COR | Correction | DCRD | Decreased |
| CPBL | Capable | DCRG | Decreasing |
| CRC | Circle | DCRGLY | Decreasingly |
| CRLC | Circulate | DCRS | Decreases |
| CRLN | Circulation | DE | Delaware |
| CRNR | Corner | DEG | Degree |
| CRNRS | Corners | DEGS | Degrees |
| CRS | Course | DELMARVA | Delaware-Maryland-Virginia |
| CS | Cirrostratus | | |
| CSDR | Consider | DFCLT | Difficult |
| CSDRBL | Considerable | DFCLTY | Difficulty |
| CST | Coast | DFNT | Definite |
| CSTL | Coastal | DFNTLY | Definitely |

| | | | |
|------|------------|---------|-------------|
| DFRS | Differs | DP | Deep |
| DFUS | Diffuse | DPND | Deepened |
| DGNL | Diagonal | DPNG | Deepening |
| DGNLLY | Diagonally | DPNS | Deepens |
| DIGG | Digging | DPR | Deeper |
| DIR | Direction | DPTH | Depth |
| DISC | Discontinue | DR | Low Drifting (descriptor used with DU, SA or SN |
| DISCD | Discontinued | | |
| DISCG | Discontinuing | DRDU | Drifting dust |
| DISRE | Disregard | DRFT | Drift |
| DISRED | Disregarded | DRFTD | Drifted |
| DISREG | Disregarding | DRFTG | Drifting |
| DKTS | Dakotas | DRFTS | Drifts |
| DLA | Delay | DRSA | Low drifting sand |
| DLAD | Delayed | DRSN | Low drifting snow |
| DLT | Delete | DRZL | Drizzle |
| DLTD | Deleted | DS | Duststorm |
| DLTG | Deleting | DSCNT | Descent |
| DLY | Daily | DSIPT | Dissipate |
| DMG | Damage | DSIPTD | Dissipated |
| DMGD | Damaged | DSIPTG | Dissipating |
| DMGG | Damaging | DSIPTN | Dissipation |
| DMNT | Dominant | DSIPTS | Dissipates |
| DMSH | Diminish | DSND | Descend |
| DMSHD | Diminished | DSNDG | Descending |
| DMSHG | Diminishing | DSNDS | Descends |
| DMSHS | Diminishes | DSNT | Distant |
| DNS | Dense | DSTBLZ | Destabilize |
| DNSLP | Downslope | DSTBLZD | Destabilized |
| DNSTRM | Downstream | DSTBLZG | Destabilizing |
| DNWND | Downwind | DSTBLZS | Destabilizes |

| | | | |
|---|---|---|---|
| DSTBLZN | Destabilization | EFCT | Effect |
| DSTC | Distance | ELNGT | Elongate |
| DTRT | Deteriorate | ELNGTD | Elongated |
| DTRTD | Deteriorated | ELSW | Elsewhere |
| DTRTG | Deteriorating | EMBD | Embedded |
| DTRTS | Deteriorates | EMBDD | Embedded |
| DU | Widespread dust storm | EMERG | Emergency |
| DURC | During climb | ENCTR | Encounter |
| DURD | During descent | ENDG | Ending |
| DURG | During | ENE | East-northeast |
| DURGC | During climb | ENELY | East-northeasterly |
| DURGD | During descent | ENERN | East-northeastern |
| DURN | Duration | ENEWD | East-northeastward |
| DVLP | Develop | ENHNC | Enhance |
| DVLPD | Developed | ENHNCD | Enhanced |
| DVLPG | Developing | ENHNCG | Enhancing |
| DVLPMT | Development | ENHNCS | Enhances |
| DVLPS | Develops | ENHNCMNT | Enhancement |
| DVRG | Diverge | ENRT | Enroute |
| DVRGG | Diverging | ENTR | Entire |
| DVRGNC | Divergence | ERN | Eastern |
| DVRGS | Diverges | ERY | Early |
| DVV | Downward vertical velocity | ERYR | Earlier |
| | | ESE | East-southeast |
| DWNDFTS | Downdrafts | ESELY | East-southeasterly |
| DWPNT | Dew point | ESERN | East-southeastern |
| DWPNTS | Dew points | ESEWD | East-southeastward |
| DU | Dust (METAR) | ESNTL | Essential |
| DZ | Drizzle (METAR) | ESTAB | Establish |
| E | East | EST | Estimate |
| EBND | Eastbound | | |

| | | | |
|---|---|---|---|
| ETA | Estimated time of arrival or ETA model | FCSTG | Forecasting |
| | | FCSTR | Forecaster |
| ETC | Et cetera | FCSTS | Forecasts |
| ETIM | Elapsed time | FEW | Few (used to describe cloud cover or weather phenomena, >0 octas to 2 octas cloud amount) |
| EVE | Evening | | |
| EWD | Eastward | | |
| EXCLV | Exclusive | | |
| EXCLVLY | Exclusively | | |
| EXCP | Except | | |
| EXPC | Expect | FG | Fog (METAR, only when visibility is less than 5/8 mile) |
| EXPCD | Expected | | |
| EXPCG | Expecting | | |
| EXTD | Extend | FIBI | Filed but impracticable to transmit |
| EXTDD | Extended | | |
| EXTDG | Extending | FIG | Figure |
| EXTDS | Extends | FILG | Filling |
| EXTRM | Extreme | FIR | Flight information region |
| EXTN | Extension | | |
| EXTRAP | Extrapolate | FIRAV | First available |
| EXTRAPD | Extrapolated | FIS | Flight Information Service |
| EXTRM | Extreme | FIS-B | Flight Information Service - Broadcast |
| EXTRMLY | Extremely | | |
| EXTSV | Extensive | FIRST | First observation after a break in coverage at manual station |
| F | Fahrenheit | | |
| FA | Aviation area forecast | | |
| | | FL | Florida or flight level |
| FAM | Familiar | FLG | Falling |
| FC | Funnel cloud (+FC = Tornado or water spout) | FLRY | Flurry |
| | | FLRYS | Flurries |
| | | FLT | Flight |
| FCST | Forecast | FLW | Follow |
| FCSTD | Forecasted | FLWG | Following |
| | | FM | From |

| | | | |
|---|---|---|---|
| FMGGgg | From the time (UTC) indicated by GGgg. Generic WMO format code group, indicating a significant and rapid (in less than one hour) change to a new set of pre-vailing conditions | FU | Smoke |
| | | FV | Flight visibility |
| | | FVRBL | Favorable |
| | | FWD | Forward |
| | | FYI | For your information |
| | | FZ | Freezing |
| FMT | Format | FZRANO | Freezing rain sensor not available |
| FNCTN | Function | | |
| FNT | Front | G | Gust |
| FNTL | Frontal | GA | Georgia |
| FNTS | Fronts | GEN | General |
| FNTGNS | Frontogenesis | GENLY | Generally |
| FNTLYS | Frontolysis | GEO | Geographic |
| FORNN | Forenoon | GEOREF | Geographical refer-ence |
| FPM | Feet per minute | GF | Fog |
| FQT | Frequent | GICG | Glaze icing |
| FQTLY | Frequently | GLFALSK | Gulf of Alaska |
| FRM | Form | GLFCAL | Gulf of California |
| FRMG | Forming | GLFMEX | Gulf of Mexico |
| FRMN | Formation | GLFSTLAWR | Gulf of St. Lawrence |
| FROPA | Frontal passage | GND | Ground |
| FROSFC | Frontal surface | GR | Hail (greater than 1/4 inch in diam-eter) |
| FRQ | Frequent | | |
| FRST | Frost | | |
| FRWF | Forecast wind factor | GRAD | Gradient |
| FRZ | Freeze | GRDL | Gradual |
| FRZLVL | Freezing level | GRDLY | Gradually |
| FRZN | Frozen | GRT | Great |
| FRZG | Freezing | GRTLY | Greatly |
| FT | Feet | GRTLKS | Great Lakes |
| FTHR | Further | | |

| | | | |
|---|---|---|---|
| GS | Small hail or snow pellets (smaller than 1/4 inch in diameter) | HWVR | However |
| | | HWY | Highway |
| | | HZ | Haze |
| GSTS | Gusts | IA | Iowa |
| GSTY | Gusty | IC | Ice crystals or icing |
| GTS | Global Telecommunication System | ICAO | International Civil Aviation Organization |
| HAZ | Hazard | ICG | Icing |
| HDFRZ | Hard freeze | ICGIC | Icing in clouds |
| HDSVLY | Hudson Valley | ICGICIP | Icing in clouds and in precipitation |
| HDWND | Head wind | | |
| HGT | Height | ICGIP | Icing in precipitation |
| HI | High | ID | Idaho |
| HI | Hawaii | IFR | Instrument flight rules |
| HIER | Higher | | |
| HIFOR | High level forecast | IL | Illinois |
| HLF | Half | IMC | Instrument meteo-rolgical conditions |
| HLTP | Hilltop | | |
| HLSTO | Hailstones | IMDT | Immediate |
| HND | Hundred | IMDTLY | Immediately |
| HPC | Hydrometeorological Prediction Center | IMPL | Impulse |
| | | IMPLS | Impulses |
| HR | Hour | IMPT | Important |
| HRS | Hours | INCL | Include |
| HRZN | Horizon | INCLD | Included |
| HTG | Heating | INCLG | Including |
| HURCN | Hurricane | INCLS | Includes |
| HUREP | Hurricane report | INCR | Increase |
| HV | Have | INCRD | Increased |
| HVY | Heavy | INCRG | Increasing |
| HVYR | Heavier | INCRGLY | Increasingly |
| HVYST | Heaviest | INCRS | Increases |
| | | INDC | Indicate |

| | | | | |
|---|---|---|---|---|
| INDCD | Indicated | | ISOLD | Isolated |
| INDCG | Indicating | | JCTN | Junction |
| INDCS | Indicates | | JTSTR | Jet stream |
| INDEF | Indefinite | | KFRST | Killing frost |
| INFO | Information | | KLYR | Smoke layer aloft |
| INLD | Inland | | KOCTY | Smoke over city |
| INSTBY | Instability | | KS | Kansas |
| INTCNTL | Intercontinental | | KT | Knots |
| INTER | Intermittent | | KY | Kentucky |
| INTL | International | | L | Left |
| INTMD | Intermediate | | LA | Louisiana |
| INTMT | Intermittent | | LABRDR | Labrador |
| INTMTLY | Intermittently | | LAST | Last observation before a break in coverage at a manual station |
| INTR | Interior | | | |
| INTRMTRGN | Intermountain region | | | |
| | | | LAT | Latitude |
| INTS | Intense | | LAWRS | Limited aviation weather reporting station |
| INTSFCN | Intensification | | | |
| INTSFY | Intensify | | | |
| INTSFYD | Intensified | | LCL | Local |
| INTSFYG | Intensifying | | LCLY | Locally |
| INTSFYS | Intensifies | | LCTD | Located |
| INTSTY | Intensity | | LCTN | Location |
| INTVL | Interval | | LCTMP | Little change in temperature |
| INVRN | Inversion | | | |
| IOVC | In overcast | | LDG | Landing |
| INVOF | In vicinity of | | LEVEL | Level |
| IP | Ice pellets | | LFTG | Lifting |
| IPV | Improve | | LGRNG | Long-range |
| IPVG | Improving | | LGT | Light |
| ISOL | Isolate | | LGTR | Lighter |
| | | | LGWV | Long wave |
| | | | LI | Lifted Index |

| | | | |
|---|---|---|---|
| LIFR | Low instrument flight rules | LTGCW | Lightning cloud-to-water |
| LIS | Lifted Indices | LTGIC | Lightning in cloud |
| LK | Lake | LTL | Little |
| LKS | Lakes | LTLCG | Little change |
| LKLY | Likely | LTR | Later |
| LLJ | Low level jet | LTST | Latest |
| LLWAS | Low-level wind shear alert system | LV | Leaving |
| | | LVL | Level |
| LLWS | Low-level wind shear | LVLS | Levels |
| | | LWR | Lower |
| LMTD | Limited | LWRD | Lowered |
| LMTG | Limiting | LWRG | Lowering |
| LMTS | Limits | LYR | Layer |
| LN | Line | LYRD | Layered |
| LO | Low | LYRS | Layers |
| LONG | Longitude | M | Minus or Less than lowest sensor value |
| LONGL | Longitudinal | | |
| LRG | Large | MA | Massachusetts |
| LRGLY | Largely | MAN | Manitoba |
| LRGR | Larger | MAX | Maximum |
| LRGST | Largest | MB | Millibars |
| LST | Local standard time | MCD | Mesoscale discussion |
| LTD | Limited | | |
| LTG | Lightning | MD | Maryland |
| LTGCA | Lightning cloud-to-air | MDFY | Modify |
| | | MDFYD | Modified |
| LTGCC | Lightning cloud-to-cloud | MDFYG | Modifying |
| | | MDL | Model |
| LTGCG | Lightning cloud-to-ground | MDLS | Models |
| | | MDT | Moderate |
| LTGCCCG | Lightning cloud-to-cloud cloud-to-ground | MDTLY | Moderately |

| | | | | |
|---|---|---|---|---|
| ME | Maine | MRGLLY | Marginally |
| MED | Medium | MRNG | Morning |
| MEGG | Merging | MRTM | Maritime |
| MESO | Mesoscale | MS | Mississippi |
| MET | Meteorological | MSG | Message |
| METAR | Aviation Routine Weather Report | MSL | Mean sea level |
| METRO | Metropolitan | MST | Most |
| | | MSTLY | Mostly |
| MEX | Mexico | MSTR | Moisture |
| MHKVLY | Mohawk Valley | MT | Montana |
| MI | Michigan , shallow, or mile | MTN | Mountain |
| MID | Middle | MTNS | Mountains |
| MIDN | Midnight | MULT | Multiple |
| MIL | Military | MULTILVL | Multilevel |
| MIN | Minimum | MVFR | Marginal visual flight rules |
| MIFG | Shallow fog | | |
| MISG | Missing | MWO | Meteorological Watch Office |
| MLTLVL | Melting level | MX | Mixed (character-ized as a combina-tion of clear and rime ice |
| MN | Minnesota | | |
| MNLD | Mainland | | |
| MNLY | Mainly | | |
| MO | Missouri | MXD | Mixed |
| MOD | Moderate | N | North |
| MOGR | Moderate or greater | N/A | Not applicable |
| MOV | Move | NAB | Not above |
| MOVD | Moved | NAT | North Atlantic |
| MOVG | Moving | NATL | National |
| MOVMT | Movement | NAV | Navigation |
| MOVS | Moves | NAVAID | Electronic naviga-tion aid facility (lim-ited to VOR or VORTAC for PIREPs) |
| MPH | Miles per hour | | |
| MRGL | Marginal | NB | New Brunswick |

| | | | |
|---|---|---|---|
| NBND | Northbound | NMBRS | Numbers |
| NBRHD | Neighborhood | NML | Normal |
| NC | North Carolina | NMRS | Numerous |
| NCDC | National Climatic Data Center | NNE | North-northeast |
| NCEP | National Center of Environmental Prediction | NNELY | North-northeasterly |
| | | NNERN | North-northeastern |
| | | NNEWD | North-northeast-ward |
| NCO | NCEP Central Operations | NNW | North-northwest |
| NCWX | No change in weather | NNWLY | North-northwesterly |
| | | NNWRN | North-northwestern |
| ND | North Dakota | NNWWD | North-northwest-ward |
| NE | Northeast | | |
| NEB | Nebraska | NNNN | End of message |
| NEC | Necessary | NOAA | National Oceanic and Atmospheric Administration |
| NEG | Negative | | |
| NEGLY | Negatively | | |
| NELY | Northeasterly | NOPAC | Northern Pacific |
| NERN | Northeastern | NOS | National Ocean Service |
| NEWD | Northeastward | | |
| NEW ENG | New England | NOSPECI | No SPECI reports are taken at the station |
| NFLD | Newfoundland | | |
| NGM | Nested grid model | | |
| NGT | Night | NPRS | Nonpersistent |
| NH | New Hampshire | NR | Near |
| NIL | None | NRLY | Nearly |
| NJ | New Jersey | NRN | Northern |
| NL | No layers | NRW | Narrow |
| NLT | Not later than | NS | Nova Scotia |
| NLY | Northerly | NSC | No significant cloud |
| NM | New Mexico | NSW | No significant weather |
| NMBR | Number | | |
| | | NTFY | Notify |
| | | NTFYD | Notified |
| | | NV | Nevada |

| | | | |
|---|---|---|---|
| NVA | Negative vorticity advection | OFP | Occluded frontal passage |
| NW | Northwest | OFSHR | Offshore |
| NWD | Northward | OH | Ohio |
| NWLY | Northwesterly | OHD | Overhead |
| NWRN | Northwestern | OK | Oklahoma |
| NWS | National Weather Service | OMTNS | Over mountains |
| NY | New York | ONSHR | On shore |
| NXT | Next | OR | Oregon |
| OAT | Outside air temperature | ORGPHC | Orographic |
| OBND | Outbound | ORIG | Original |
| OBS | Observation | OSV | Ocean station vessel |
| OBSC | Obscure | OTLK | Outlook |
| OBSCD | Obscured | OTP | On top |
| OBSCG | Obscuring | OTR | Other |
| OCFNT | Occluded front | OTRW | Otherwise |
| OCLD | Occlude | OUTFLO | Outflow |
| OCLDS | Occludes | OV | Over |
| OCLDD | Occluded | OVC | Overcast |
| OCLDG | Occluding | OVHD | Overhead |
| OCLN | Occlusion | OVNGT | Overnight |
| OCNL | Occasional | OVR | Over |
| OCNLY | Occasionally | OVRN | Overrun |
| OCR | Occur | OVRNG | Overrunning |
| OCRD | Occurred | OVTK | Overtake |
| OCRG | Occurring | OVTKG | Overtaking |
| OCRS | Occurs | OVTKS | Overtakes |
| OFC | Office | P | Higher than greatest sensor value |
| OFCM | Office of the Federal Coordinator for Meteorology | P6SM | Visibility forecast to be greater than 6 statute miles |

| | | | |
|---|---|---|---|
| PA | Pennsylvania | PPINE | Radar weather report no echoes observed |
| PAC | Pacific | PPSN | Present position |
| PATWAS | Pilot's automatic telephone weather answering service | PR | Partial |
| PBL | Planetary boundary layer | PRBL | Probable |
| | | PRBLY | Probably |
| PCPN | Precipitation | PRBLTY | Probability |
| PD | Period | PRECD | Precede |
| PDMT | Predominant | PRECDD | Preceded |
| PE | Ice pellets | PRECDG | Preceding |
| PEN | Peninsula | PRECDS | Precedes |
| PERM | Permanent | PRES | Pressure |
| PGTSND | Puget Sound | PRESFR | Pressure falling rapidly |
| PHYS | Physical | | |
| PIBAL | Pilot balloon observation | PRESRR | Pressure rising rapidly |
| PIREP | Pilot weather report | PRFG | Partial fog |
| PK WND | Peak wind | PRIM | Primary |
| PL | Ice pellets | PRIN | Principal |
| PLNS | Plains | PRIND | Present indications are... |
| PLS | Please | | |
| PLTO | Plateau | PRJMP | Pressure jump |
| PM | Postmeridian | PROB | Probability |
| PNHDL | Panhandle | 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 |
| PNO | Precipitation amount not available | | |
| PO | Dust/ sand swirls | | |
| POS | Positive | | |
| POSLY | Positively | | |
| PPINA | Radar weather report not available | | |

| | | | |
|---|---|---|---|
| PROC | Procedure | PVLD | Prevailed |
| PROD | Produce | PVLG | Prevailing |
| PRODG | Producing | PVLS | Prevails |
| PROG | Forecast | PVLT | Prevalent |
| PROGD | Forecasted | PWB | Pilot weather briefing |
| PROGS | Forecasts | PWINO | Precipitation identifier sensor not available |
| PRSNT | Present | | |
| PRSNTLY | Presently | | |
| PRST | Persist | PWR | Power |
| PRSTS | Persists | PY | Spray |
| PRSTNC | Persistence | QN | Question |
| PRSTNT | Persistent | OCNL | Occasional |
| PRVD | Provide | QSTNRY | Quasistationary |
| PRVDD | Provided | QTR | Quarter |
| PRVDG | Providing | QUAD | Quadrant |
| PRVDS | Provides | QUE | Quebec |
| PS | Plus | R | Right (with reference to runway designation) |
| PSBL | Possible | | |
| PSBLY | Possibly | | |
| PSBLTY | Possibility | RA | Rain (METAR) |
| PSG | Passage | RADAT | Radiosonde additional data |
| PSN | Position | | |
| PSND | Positioned | RAOB | Radiosonde observation |
| PTCHY | Patchy | | |
| PTLY | Partly | RCA | Reach Cruising Altitude |
| PTNL | Potential | | |
| PTNLY | Potentially | RCH | Reach |
| PTNS | Portions | RCHD | Reached |
| PUGET | Puget Sound | RCHG | Reaching |
| PVA | Positive vorticity advection | RCHS | Reaches |
| | | RCKY | Rocky |
| | | RCKYS | Rockies |
| | | RCMD | Recommend |
| PVL | Prevail | RCMDD | Recommended |

**B-17**

| | | | |
|---|---|---|---|
| RCMDG | Recommending | RGT | Right |
| RCMDS | Recommends | RH | Relative humidity |
| RCRD | Record | RI | Rhode Island |
| RCRDS | Records | RIME | Type of icing characterized by a rough, milky, opaque appearance |
| RCV | Receive | | |
| RCVD | Received | | |
| RCVG | Receiving | | |
| RCVS | Receives | RIOGD | Rio Grande |
| RDC | Reduce | RLBL | Reliable |
| RDGG | Ridging | RLTV | Relative |
| RDVLP | Redevelop | RLTVLY | Relatively |
| RDVLPG | Redeveloping | RM | Remarks |
| RDVLPMT | Redevelopment | RMK | Remark |
| RE | Regard | RMN | Remain |
| RECON | Reconnaissance | RMND | Remained |
| REF | Reference | RMNDR | Remainder |
| RES | Reserve | RMNG | Remaining |
| REPL | Replace | RMNS | Remains |
| REPLD | Replaced | RNFL | Rainfall |
| REPLG | Replacing | RNG | Range |
| REPLS | Replaces | ROT | Rotate |
| REQ | Request | ROTD | Rotated |
| REQS | Requests | ROTG | Rotating |
| REQSTD | Requested | ROTS | Rotates |
| RESP | Response | RPD | Rapid |
| RESTR | Restrict | RPDLY | Rapidly |
| RGD | Ragged | RPLC | Replace |
| RGL | Regional model | RPLCD | Replaced |
| RGLR | Regular | RPLCG | Replacing |
| RGN | Region | RPLCS | Replaces |
| RGNS | Regions | RPRT | Report |
| | | RPRTD | Reported |

| | | | |
|---|---|---|---|
| RPRTG | Reporting | RVSD | Revised |
| RPRTS | Reports | RVSG | Revising |
| RPT | Repeat | RVSS | Revises |
| RPTG | Repeating | RWY | Runway |
| RPTS | Repeats | RY | Runway |
| RQR | Require | S | South |
| RQRD | Required | SA | Sand (METAR) |
| RQRG | Requiring | SAB | Satellite Analysis Branch |
| RQRS | Requires | SCSL | Stratocumulus Standing Lenticular cloud |
| RRx | Code used in the WMO abbreviated heading to indicate a delayed forecast, where x is the letter A through X | SCT | Scattered (describing cloud cover or weather phenomena, 3 to 4 octas cloud amount |
| RSG | Rising | SASK | Saskatchewan |
| RSN | Reason | SATFY | Satisfactory |
| RSNG | Reasoning | SBND | Southbound |
| RSNS | Reasons | SBSD | Subside |
| RSTR | Restrict | SBSDD | Subsided |
| RSTRD | Restricted | SBSDNC | Subsidence |
| RSTRG | Restricting | SBSDS | Subsides |
| RSTRS | Restricts | SC | South Carolina or stratocumulus |
| RTRN | Return | SCND | Second |
| RTRND | Returned | SCNDRY | Secondary |
| RTRNG | Returning | SCSL | Stratocumulus standing lenticular |
| RTRNS | Returns | SCT | Scatter |
| RUF | Rough | SCTD | Scattered |
| RUFLY | Roughly | SCTR | Sector |
| RVR | Runway Visual Range | SD | South Dakota |
| RVRNO | RVR system not available | SE | Southeast |
| RVS | Revise | | |

| | | | | |
|---|---|---|---|---|
| SEC | Second | | SLGT | Slight |
| SELY | Southeasterly | | SLGTLY | Slightly |
| SEPN | Separation | | SLO | Slow |
| SEQ | Sequence | | SLOLY | Slowly |
| SERN | Southeastern | | SLOR | Slower |
| SEV | Severe | | SLP | Slope or sea level pressure |
| SEWD | Southeastward | | SLPG | Sloping |
| SFC | Surface | | SLPNO | Sea-level pressure not available |
| SG | Snow grains | | | |
| SGFNT | Significant | | SLW | Slow |
| SGFNTLY | Significantly | | SLY | Southerly |
| SH | Showers | | SM | Statute mile |
| SHFT | Shift | | SML | Small |
| SHFTD | Shifted | | SMLR | Smaller |
| SHFTG | Shifting | | SMRY | Summary |
| SHFTS | Shifts | | SMTH | Smooth |
| SHLD | Shield | | SMTHR | Smoother |
| SHLW | Shallow | | SMTHST | Smoothest |
| SHRT | Short | | SMTM | Sometime |
| SHRTLY | Shortly | | SMWHT | Somewhat |
| SHRTWV | Shortwave | | SN | Snow |
| SHUD | Should | | SNBNK | Snowbank |
| SHWR | Shower | | SNFLK | Snowflake |
| SIERNEV | Sierra Nevada | | SNGL | Single |
| SIG | Signature | | SNOINCR | Snow increase |
| SIGMET | Significant meteoro-logical information | | SNOINCRG | Snow increasing |
| | | | SNST | Sunset |
| SIMUL | Simultaneous | | SOP | Standard operating procedure |
| SK | Sky cover | | | |
| SKC | Sky clear | | SP | Snow pellets |
| SKED | Schedule | | SPC | Storm Prediction Center |
| SLD | Solid | | | |

| | | | |
|---|---|---|---|
| SPCLY | Especially | STBLTY | Stability |
| SPD | Speed | STD | Standard |
| SPECI | Special observation | STDY | Steady |
| SPKL | Sprinkle | STFR | Stratus fractus |
| SPLNS | Southern Plains | STFRM | Stratiform |
| SPRD | Spread | STG | Strong |
| SPRDG | Spreading | STGLY | Strongly |
| SPRDS | Spreads | STGR | Stronger |
| SPRL | Spiral | STGST | Strongest |
| SQ | Squall | STM | Storm |
| SQLN | Squall line | STMS | Storms |
| SR | Sunrise | STN | Station |
| SRN | Southern | STNRY | Stationary |
| SRND | Surround | SUB | Substitute |
| SRNDD | Surrounded | SUBTRPCL | Subtropical |
| SRNDG | Surrounding | SUF | Sufficient |
| SRNDS | Surrounds | SUFLY | Sufficiently |
| SS | Sunset or sand storm (METAR) | SUG | Suggest |
| | | SUGG | Suggesting |
| SSE | South-southeast | SUGS | Suggests |
| SSELY | South-southeasterly | SUP | Supply |
| SSERN | South-southeastern | SUPG | Supplying |
| SSEWD | South-southeast-ward | SUPR | Superior |
| | | SUPSD | Supersede |
| SSW | South-southwest | SUPSDG | Superseding |
| SSWLY | South-southwest-erly | SUPSDS | Supersedes |
| | | SVG | Serving |
| SSWRN | South-southwestern | SVRL | Several |
| SSWWD | South-southwest-ward | SW | Southwest |
| | | SWD | Southward |
| ST | Stratus | SWWD | Southwestward |
| STAGN | Stagnation | | |
| STBL | Stable | | |

| | | | |
|---|---|---|---|
| SWLY | Southwesterly | THRUT | Throughout |
| SWRN | Southwestern | THSD | Thousand |
| SX | Stability index | THTN | Threaten |
| SXN | Section | THTND | Threatened |
| SYNOP | Synoptic | THTNG | Threatening |
| SYNS | Synopsis | THTNS | Threatens |
| SYS | System | TIL | Until |
| TA | Temperature | TKOF | Takeoff |
| TACAN | UHF Tactical Air Navigation Aid | TM | Time |
| | | TMPRY | Temporary |
| TAF | Terminal Area Forecast | TMPRYLY | Temporarily |
| | | TMW | Tomorrow |
| TB | Turbulence | TN | Tennessee |
| TCNTL | Transcontinental | TNDCY | Tendency |
| TCU | Towering cumulus | TNDCYS | Tendencies |
| TDA | Today | TNGT | Tonight |
| TEI | Text element indicator | TNTV | Tentative |
| | | TNTVLY | Tentatively |
| TEMP | Temperature | TOC | Top of Climb |
| TEMPO | Temporary | TOP | Top of Clouds |
| THK | Thick | TOPS | Tops |
| THKNG | Thickening | TOVC | Top of overcast |
| THKNS | Thickness | TP | Type of aircraft |
| THKR | Thicker | TPG | Topping |
| THKST | Thickest | TRBL | Trouble |
| THN | Thin | TRIB | Tributary |
| THNG | Thinning | TRKG | Tracking |
| THNR | Thinner | TRML | Terminal |
| THNST | Thinnest | TRMT | Terminate |
| THR | Threshold | TRMTD | Terminated |
| THRFTR | Thereafter | TRMTG | Terminating |
| THRU | Through | | |

| | | | |
|---|---|---|---|
| TRMTS | Terminates | UNEC | Unnecessary |
| TRNSP | Transport | UNKN | Unknown |
| TRNSPG | Transporting | UNL | Unlimited |
| TROF | Trough | UNRELBL | Unreliable |
| TROFS | Troughs | UNRSTD | Unrestricted |
| TROP | Tropopause | UNSATFY | Unsatisfactory |
| TRPCD | Tropical continental air mass | UNSBL | Unseasonable |
| | | UNSTBL | Unstable |
| TRPCL | Tropical | UNSTDY | Unsteady |
| TRRN | Terrain | UNSTL | Unsettle |
| TRSN | Transition | UNSTLD | Unsettled |
| TS | Thunderstorm | UNUSBL | Unusable |
| TSFR | Transfer | UP | Unknown precipitation (used only by automated sites that are incapable of discrimination) |
| TSFRD | Transferred | | |
| TSFRG | Transferring | | |
| TSFRS | Transfers | | |
| TSNO | Thunderstorm information not available | UPDFTS | Updrafts |
| | | UPR | Upper |
| TSNT | Transient | UPSLP | Upslope |
| TURBC | Turbulence | UPSTRM | Upstream |
| TURBT | Turbulent | URG | Urgent |
| TWD | Toward | USBL | Usable |
| TWDS | Towards | UT | Utah |
| TWI | Twilight | UTC | Universal Time Coordinate |
| TWR | Tower | | |
| TWRG | Towering | UUA | Urgent PIREP Weather Reports |
| TX | Texas | | |
| UA | Pilot weather reports | UVV | Upward vertical velocity |
| | | UWNDS | Upper winds |
| UDDF | Up- and downdrafts | V | Varies |
| UN | Unable | VA | Virginia or Volcanic Ash |
| UNAVBL | Unavailable | | |

| | | | |
|---|---|---|---|
| VAAC | Volcanic Ash Advisory Center | VR | Veer |
| VAAS | Volcanic Ash Advisory Statement | VRB | Variable |
| | | VRG | Veering |
| VAL | Valley | VRBL | Variable |
| VARN | Variation | VRISL | Vancouver Island, BC |
| VC | Vicinity | | |
| VCNTY | Vicinity | VRS | Veers |
| VCOT | VFR conditions on top | VRT MOTN | Vertical motion |
| | | VRY | Very |
| VCTR | Vector | VSB | Visible |
| VFR | Visual flight rules | VSBY | Visibility |
| VFY | Verify | VSBYDR | Visibility decreasing rapidly |
| VFYD | Verified | | |
| VFYG | Verifying | VSBYIR | Visibility increasing rapidly |
| VFYS | Verifies | | |
| VHF | Very High Frequency | VT | Vermont |
| | | VV | Vertical velocity or vertical visibility |
| VIS | Visibility | | |
| VSNO | Visibility at secondary location not availble | W | West |
| | | WA | Washington |
| | | WAA | Warm air advection |
| VLCTY | Velocity | WAFS | Word Area Forecast System |
| VLCTYS | Velocities | | |
| VLNT | Violent | WBND | Westbound |
| VLNTLY | Violently | WDLY | Widely |
| VMC | Visual meteorological conditions | WDSPRD | Widespread |
| | | WEA | Weather |
| VOL | Volume | WFO | Weather Forecast Office |
| VOR | VHF Omnidirectional Radio Range | | |
| | | WFSO | Weather Forecast Service Office |
| | | | |
| VORT | Vorticity | WFP | Warm front passage |
| VORTAC | VOR and TACAN combination | WI | Wisconsin |
| | | WIBIS | Will be issued |

| | | | | |
|---|---|---|---|---|
| WINT | Winter | WS | Wind shear |
| WK | Weak | WSHFT | Windshift |
| WKDAY | Weekday | WSFO | Weather Service Forecast Office |
| WKEND | Weekend | WSTCH | Wasatch Range |
| WKNG | Weakening | WSW | West-southwest |
| WKNS | Weakens | WSWLY | West-southwesterly |
| WKR | Weaker | WSWRN | West-southwestern |
| WKST | Weakest | WSWWD | West-southwest-ward |
| WKN | Weaken | | |
| WL | Will | WTR | Water |
| WLY | Westerly | WTSPT | Waterspout |
| WMO | World Meteorological Organization | WUD | Would |
| | | WV | West Virginia or wind |
| WND | Wind | WVS | Waves |
| WNDS | Winds | WW | Severe weather watch |
| WNW | West-northwest | | |
| WNWLY | West-northwesterly | WWD | Westward |
| WNWRN | West-northwestern | WX | Weather |
| WNWWD | West-northwest-ward | WY | Wyoming |
| | | XCP | Except |
| WO | Without | XPC | Expect |
| WPLTO | Western Plateau | XPCD | Expected |
| WRM | Warm | XPCG | Expecting |
| WRMG | Warming | XPCS | Expects |
| WRN | Western | XPLOS | Explosive |
| WRMR | Warmer | XTND | Extend |
| WRMST | Warmest | XTNDD | Extended |
| WRMFNT | Warm front | XTNDG | Extending |
| WRMFNTL | Warm frontal | XTRM | Extreme |
| WRNG | Warning | XTRMLY | Extremely |
| WRS | Worse | YDA | Yesterday |

| | |
|---|---|
| YKN | Yukon |
| YLSTN | Yellowstone |
| Z | Zulu time |
| ZN | Zone |
| ZNS | Zones |

**Honeywell**