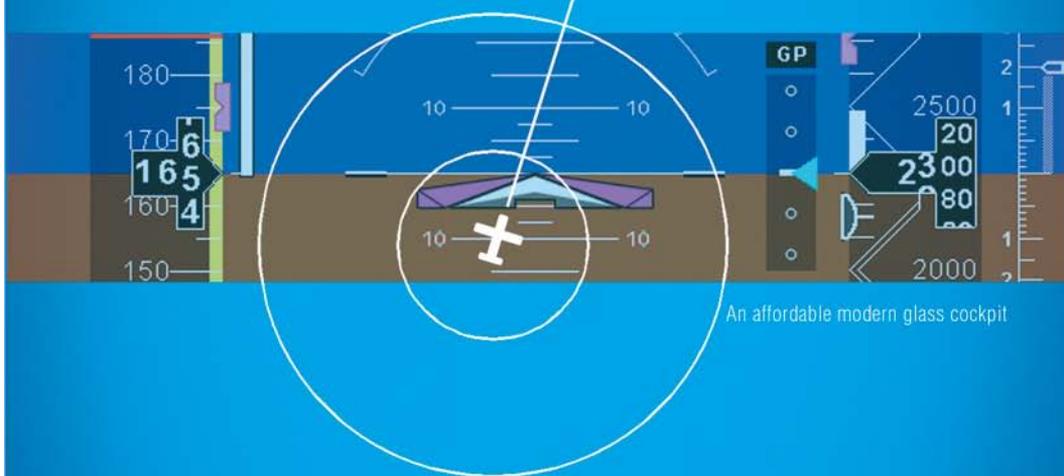


APEX EDGE SERIES KFD 840

Primary Flight Display



An affordable modern glass cockpit

PILOT'S GUIDE

BendixKing
by Honeywell

Honeywell

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APEX EDGE SERIES KFD 840 Primary Flight Display Pilot's Guide

KFD 840 PG PN 7450-0840-01

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Revision History and Instructions

Manual **KFD 840 Primary Flight Display Pilot's Guide**

Revision **D, July 12, 2010**

Summary

Added a clarification for when the heading SYNC button is pressed when the aircraft is on a 360 degree heading. See page 7-3.

Record of Revisions

REVISION NUMBER	REVISION DATE
<u>A</u>	<u>Sept 13, 2009</u>
<u>B</u>	<u>Sept 23, 2009</u>
<u>C</u>	<u>May 28, 2010</u>
<u>D</u>	<u>July 12, 2010</u>

List of Effective Pages

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T-1	■ July 12, 2010	Attitude Area	
T-2	May 28, 2010	3-1	May 28, 2010
T-3	May 28, 2010	3-2	May 28, 2010
T-4	May 28, 2010	3-3	May 28, 2010
Record of Revisions		3-4	■ July 12, 2010
RR-1	■ July 12, 2010	3-5	■ July 12, 2010
RR-2	■ July 12, 2010	3-6	May 28, 2010
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1. INTRODUCTION

HONEYWELL CUSTOMER SUPPORT

For more information, including details regarding your warranty, visit www.bendixking.com/kfd840pcutility.

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2. GETTING STARTED

The KFD 840 is a primary flight display (PFD) that provides all necessary information to the flight crew for complete navigation throughout the flight envelope. The KFD 840 displays the normal flight instruments (attitude, heading, airspeed, and altitude).

GENERAL INFORMATION

This section provides an overview of the operating controls and displays of the KFD 840. The PFD is shown below.



ID-295361

Figure 2-1 Controls and Displays

- | | |
|---|---------------------------------------|
| 1. Course Knob (CRS) | 6. Symbolic Aircraft |
| 2. Function select buttons | 7. Attitude Direction Indicator (ADI) |
| 3. Heading Knob (HDG) | 8. Airspeed Tape |
| 4. Horizontal Situation Indicator Display (HSI) | 9. SD Card Reader |
| 5. Altitude Tape | 10. Photocell |

Main Display Areas

The PFD display is divided into different display areas as shown on the figures below:

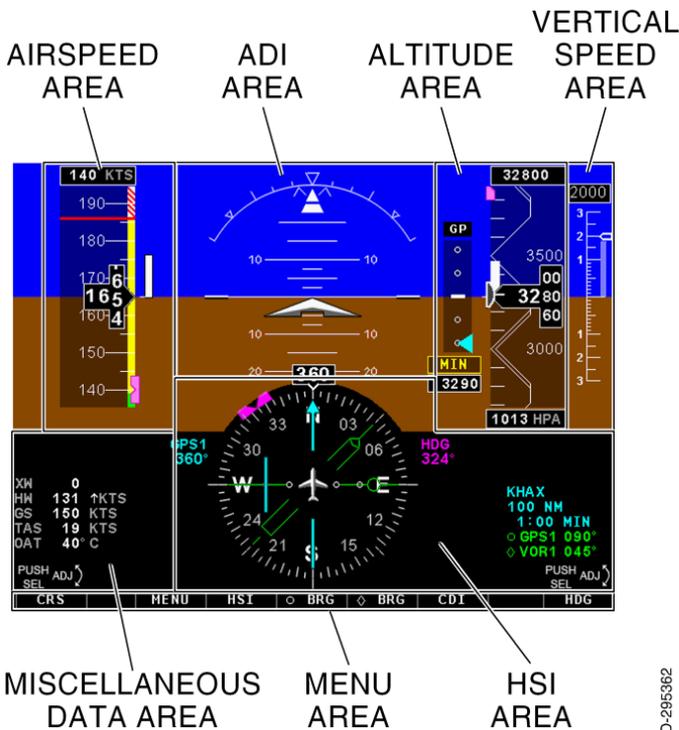


Figure 2-2 Display Main Areas - Part 1

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Figure 2-3 Display Main Areas - Part 2

Each area contains the displays and functions listed below:

- **Attitude Area: ADI window**
 - Attitude
 - Slip-skid indicator
 - Roll index and pointer
 - Flight director command bars
 - Rate of turn
- **Airspeed Area**
 - Airspeed tape, rolling digits, and trend vector
 - Selected airspeed readout and bug

- **Altitude Area**
 - Selected altitude readout and bug
 - Altitude trend vector
 - Altitude rolling digits and tape
 - Metric altitude
 - Minimum altitude (**MIN**) and bug
 - Barometric setting
 - Vertical deviation scale and pointer

- **HSI area**
 - Primary navigation (CDI) source
 - Course select
 - Lateral deviation scale and pointer
 - Compass scale
 - Selected heading readout and bug
 - Bearing Pointers
 - Waypoint Information
 - Bearing Information

- **Vertical Speed Area**
 - Vertical speed readout, scale, and pointer

- **Checklist Area**
 - User defined Checklist pages

- **Miscellaneous Navigation Data left and right of the HSI**
 - Wind speed and direction cross wind and headwind
 - Ground speed
 - True Airspeed
 - Outside Air Temperature

The following section provides a detailed explanation of the symbology and displays available on the KFD 840. In this example, the **CDI** needle has been turned ON and Bearing sources are being displayed. The **CDI** is shown centered in a **TO** condition.



Figure 2-4 Display Symbology

- | | |
|---|---|
| 1. Course Menu | 15. Vertical Speed Pointer |
| 2. Crosswind (XW)
Headwind (HW)
Ground Speed (GS)
True Airspeed (TAS) /
Outside Air Temperature
(OAT) | 16. Altitude Window |
| 3. Course Deviation indicator
(CDI) source | 17. Vertical Speed Indicator
(VSI) |
| 4. Magnetic Heading Indicator | 18. Minimum Alert Altitude Bug
(MIN) |
| 5. Airspeed Tape | 19. Glide slope/glide path
deviation pointer |
| 6. Airspeed Window | 20. MIN Altitude bug value |
| 7. Airspeed Trend Line | 21. Barometric set Window
(BARO) |
| 8. Symbolic Aircraft | 22. Heading bug value (HDG) |
| 9. Bank Angle Scale | 23. Bearing Source (O BRG /
◇ BRG)
GPS Navigator
Waypoint ID
Waypoint Distance
Waypoint Time |
| 10. Flight Director | 24. Heading Menu |
| 11. Vertical Guidance Window | 25. Heading Bug (HDG) |
| 12. Selected Altitude Bug | 26. Function Keys Menu |
| 13. Selected Altitude Digits | 27. Course Pointer |
| 14. Vertical Speed Digital
Readout | |

BASIC OPERATION

The KFD 840 utilizes two rotary control knobs and five function keys to control the unit.

Rotary Control Knobs



Figure 2-5 Rotary Control Knobs

The knob on the right of the display controls the heading bug (**HDG**) and the knob on the left of the display controls the course pointer (**CRS**). Both knobs are used to select and control additional functions. These functions are selected by pressing the knob.

The operation of both the right and left knobs are identical. Pressing the knob once (and releasing it in less than 2 seconds) displays the menu for the additional functions which can be controlled by that knob. Pressing the knob when the menu is displayed advances the menu selection up. The selection is highlighted and the active selection is displayed above the knob.



The left knob can be used to set the course pointer (**CRS**), set display brightness (**BRT**), set the airspeed bug (**AIR SPD**), Aircraft Configuration (**CONF**), and display the information screen (**INFO**). Detailed operation of each selection is provided later in this manual.



The right knob can be used to control the heading bug selection (**HDG**), set the baro settings input (**BARO**), set the selected altitude bug (**ALT**) and set the minimum altitude alert (**MIN**). Detailed operation of each selection is provided later in this manual.

The two knobs allow for a 'Press-and-Hold' behavior. The system will recognize three states:

- Button pressed
- Length of time pressed
- Button released

For example, when the right rotary knob is pressed and released within two seconds while indicating the **BARO** function, the system will display a menu list of available controls for the knob, with the next selection on the menu, **ALT** will be boxed/highlighted and the menu selection displayed above the knob will change to **ALT** to indicate that it is now the active selection. For each subsequent press/release, the individual selections in the menu will be sequenced (boxed/highlighted). However, if the button is held for two or more seconds while **BARO** is the current selection, the **BARO** value will be set for the standard value of 29.92 IN or 1013 HPA. The menu sequencing function will then be inhibited for the remainder of that button cycle. For short press/release actions (less than two seconds), the selection will occur when the button is released.

Function Keys



Figure 2-6 Function Keys

The five function keys between the **CRS** and **HDG** knobs control the **MENU**, **HSI/CHK LST**, Bearing 1 pointer (**O BRG**), Bearing 2 pointer (**◇ BRG**), and course deviation indicator (**CDI**). Pressing any key once brings up the first menu selection for that function key. The menu selection advances one selection for each press of the key. Each time a menu is activated the menu display will remain active for 5 seconds. Detailed operation of each selection is provided later in this manual.

The flowchart below provides a list of the available menu items and the selection order for each knob and function key.

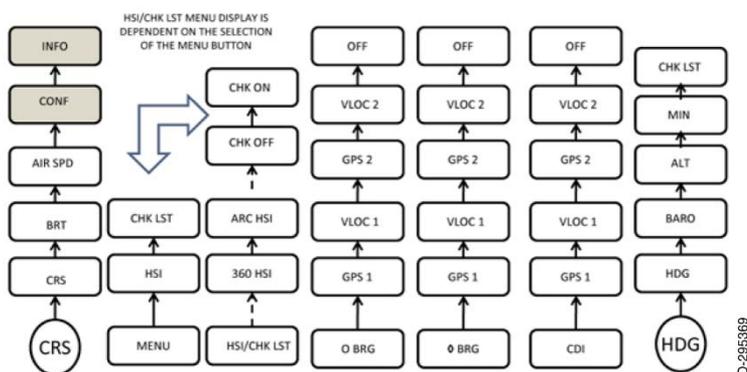


Figure 2-7 Default KFD 840 Menu Structure

The **CONF**, and **INFO** menus, shown in gray, are not selectable when airspeed is above 40 kts (46 mph).

The menu items on the **HSI/CHK LST** button also change depending on the state of the Menu button. Additional information is provided in subsequent sections of this manual.

Red X above Knob or Button Display

A red **X** above a knob or button display indicates the respective knob or button is stuck and the functions associated with that knob or button will not be available. The knob or button will not respond to any change while the red **X** is displayed. Press any knob or button other than the knob or button with the red **X**, to restore system operation. If the stuck button was temporary and the red **X** extinguishes press any button or knob to restore system operation.

Display Brightness (BRT)

Display brightness is controlled by the left knob. A photocell senses ambient lighting and determines day or night mode. Day mode controls dimming between maximum brightness and a minimum brightness that allows viewing in high ambient lighting. Night mode controls dimming to a lower threshold. The display cannot be dimmed completely in day or night mode.

Aircraft Configuration (CONF)

The **CONF** page is used to set the following aircraft configuration parameters of the KFD 840:

PARAMETER	SETTING
Baro Correction Units	IN HG or HPA
Metric Altitude	DISABLED/ENABLED
Minimum Altitude Alert (MIN)	DISABLED/ENABLED
Outside Air Temperature (OAT) Units	Degrees F or Degrees C

NOTE: The **CONF** and **INFO** menu selections are disabled when airspeed is above 40 kts (46 mph). The KFD 840 will automatically revert to PFD display above this speed.

To access the **CONF** page press the left knob until the **CONF** is highlighted in the menu. The **KFD Flight Settings** page will be displayed.

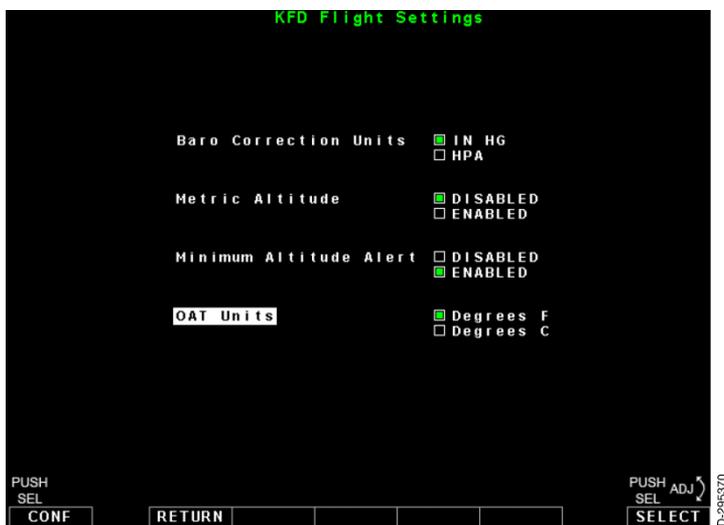


Figure 2-8 KFD Flight Settings Page Part 1

Press the right knob to cycle through the displayed parameters.



Figure 2-9 KFD Flight Settings Page Part 2

When the desired selection is highlighted, turn the right knob to change the setting of the highlighted parameter.

To save the setting change press the **SAVE** function below the display. The **SAVE** annunciation will be removed indicating the setting has been saved.

To exit the **KFD Flight Settings** page after saving the settings press the **RETURN** function key.

To exit the **KFD Flight Settings** page without saving press the **RETURN** function key.

3. ATTITUDE AREA

ATTITUDE DIRECTOR INDICATOR (ADI) WINDOW

The attitude director indicator ADI, centered in the top half of the PFD, is shown below. The descriptions of the elements of the ADI are given in the following paragraphs.

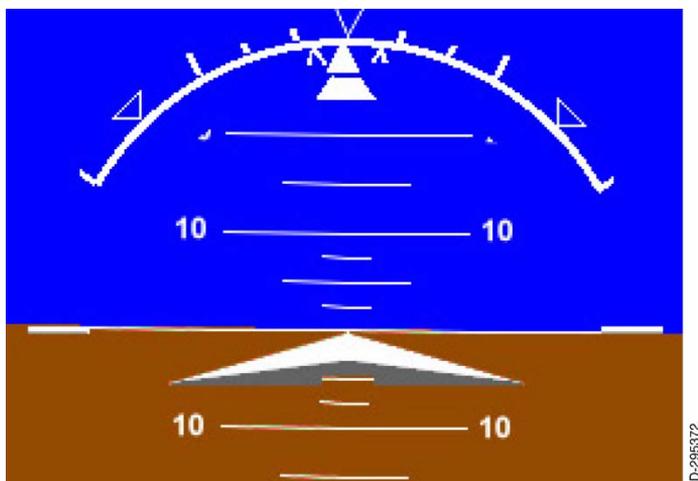


Figure 3-1 Attitude Director Window

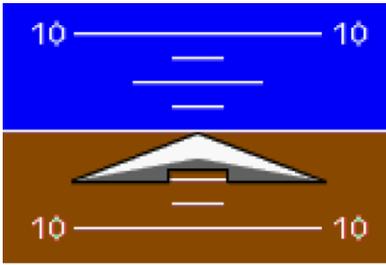
When attitude data is invalid, the entire attitude sphere changes to black. The pitch tape, roll pointer, and slip-skid indicator are removed; the **ATTITUDE FAILURE** annunciator is displayed.



Figure 3-4 Attitude Failure Indication

AIRCRAFT REFERENCE SYMBOL

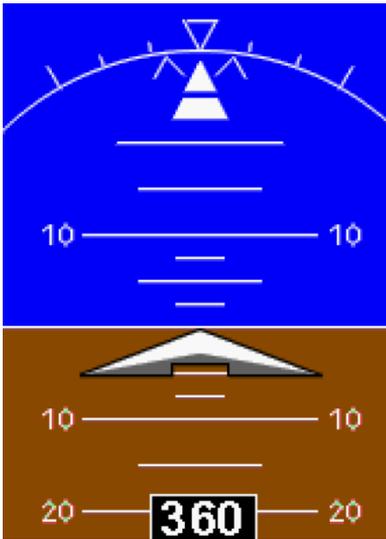
The aircraft reference symbol is a fixed object displayed in the center of the ADI. The aircraft reference symbol is used in conjunction with the attitude pitch tape to represent aircraft pitch and roll.



ID-295377

The single cue aircraft symbol is displayed as triangular white wedges shaded gray in the lower half. Peak is centered in the ADI.

ATTITUDE PITCH TAPE



ID-295378

The attitude pitch tape identifies the current aircraft pitch attitude. The attitude pitch tape is displayed through the center of the attitude display. The attitude pitch tape is labeled with numeric values to $\pm 60^\circ$ pitch angle.

On the blue scale, pitch reference markings are at $+2.5^\circ$, $+5^\circ$, $+7.5^\circ$, $+10^\circ$, $+15^\circ$, $+20^\circ$, $+25^\circ$, $+30^\circ$, $+40^\circ$, and $+60^\circ$. On the brown scale, pitch reference markings are at -2.5° , -5° , -7.5° , -10° , -15° , -20° , -30° , -45° , and -60° .

ATTITUDE ROLL POINTER AND SCALE

The roll scale is displayed on top of the ADI. The roll scale consists of a triangular roll pointer, short linear tick marks (at $\pm 10^\circ$ and $\pm 20^\circ$), and long linear tick marks (at $\pm 30^\circ$ and $\pm 60^\circ$). Inverted hollow triangles are displayed at 0° and $\pm 45^\circ$. The KFD 840 has two options for the roll pointer and scale.

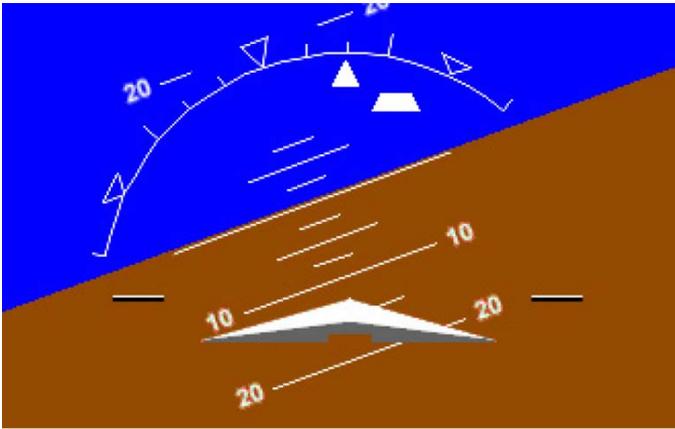


Figure 3-5 Attitude Roll Pointer and Scale

The first option is a roll pointer. In this option the roll arc is stationary with respect to the horizon and the pointer moves back and forth across the arc. The attitude roll pointer indicates the current aircraft roll attitude. The attitude roll pointer is a solid white triangle below the roll scale. The attitude roll pointer moves to the left as the roll angle increases and to the right as the roll angle decreases.

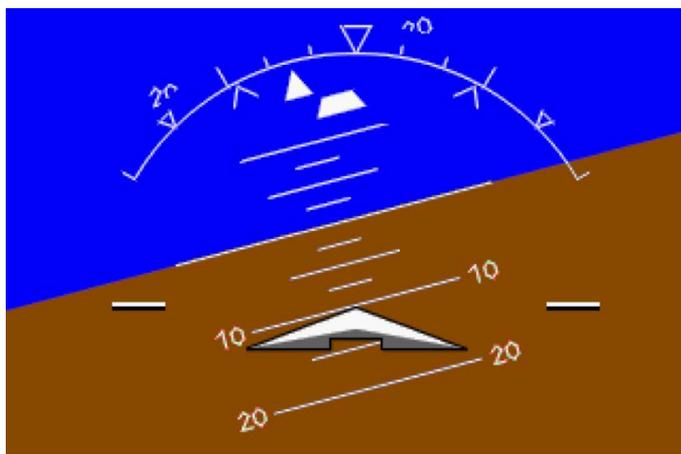


Figure 3-6 Attitude Sky Pointer and Scale

The second option is a Sky pointer. In this option the pointer is stationary with respect to the horizon and the roll arc moves to the left and right of the roll pointer. The attitude roll pointer indicates the current aircraft roll attitude. The roll scale is the same as the option above. The roll scale moves to the left as the roll angle increases and moves to the right as the roll angle decreases

The type of pointer is set at installation to match the type of pointer on the standby attitude indicator.

The attitude pitch tape is displayed behind the following symbols on the ADI:

- Attitude reference aircraft symbol
- Rate-of-turn indicator
- Flight director

SLIP-SKID/STANDARD RATE TURN MARKER DISPLAY

The slip-skid display indicates lateral acceleration of the aircraft. The slip-skid display replaces the traditional slip ball indicator where the trapezoid is the equivalent to the ball in a standard turn and bank indicator. The trapezoidal bottom half of the roll pointer is used as the slip-skid (lateral acceleration) indicator. When the trapezoid is displayed offset one width, this is equal to one ball out.

The inverted “V” marks on either side of the center mark of the roll scale mark the bank angle that must be flown to maintain a standard rate turn. The position of these “V” marks is a function of true air speed.

NOTE: The Standard Rate of Turn indicator will not be displayed if the Air Data, OAT, or TAS has failed or is inoperative.

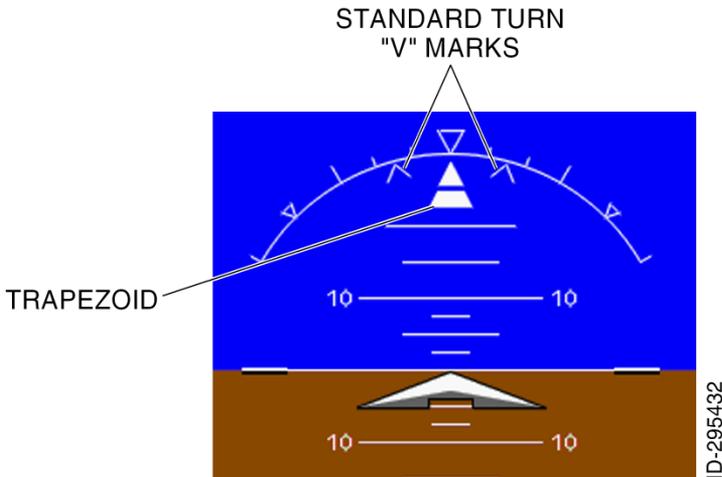


Figure 3-7 Slip-Skip Standard Rate Turn Marker Display

FLIGHT DIRECTOR COMMAND BARS

The flight director command bars, shown below, are displayed as a single cue wedge.

The flight director command bars are removed when the flight director is not engaged or not installed.

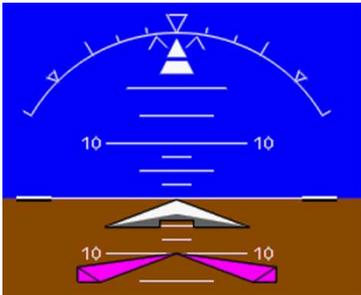
Single Cue Command Bar

The single-cue command bar consists of two solid magenta wedges that move as shown in the figures below:



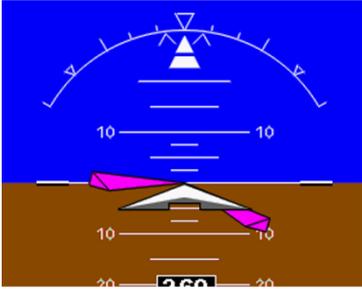
Pitch up command

ID-299771



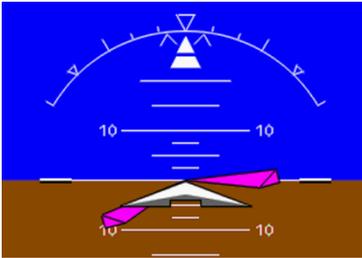
Pitch down command

ID-295435



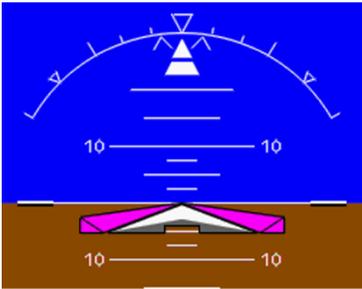
ID-295436

Roll right command.



ID-295437

Roll left command



ID-295438

The command bar moves behind the aircraft symbol.

4. AIRSPEED AREA

AIRSPEED DISPLAY

The airspeed display, shown below, is in the upper left of the PFD. The following items are displayed on the airspeed display:

1. Airspeed tape
2. Airspeed window
3. Never Exceed Airspeed V_{NE}
4. Selected Airspeed reference digital readout
5. Airspeed Trend Bar
6. Selected Airspeed Bug

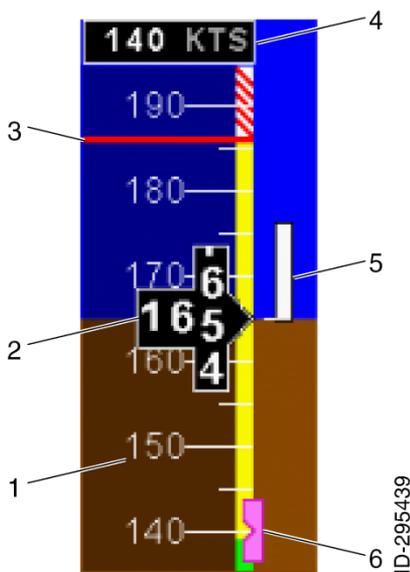
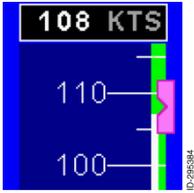


Figure 4-1 Airspeed Tape

SELECTED SPEED REFERENCE DIGITAL READOUT AND BUG

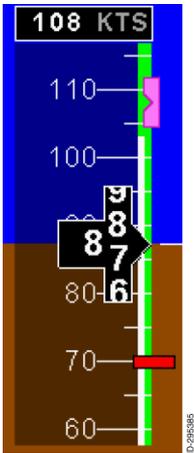


Press the left knob three times to activate the airspeed bug AIR SPD. Turn the knob clockwise to increase the speed bug setting and counterclockwise to decrease the value. Pressing and holding the left knob for more than 2 seconds will cause the airspeed bug to SYNC to the current airspeed.

Selected airspeed is displayed in knots or miles per hour (with a resolution of 1 kt or 1 mph). The proper units are selected during time of installation and are not pilot selectable.

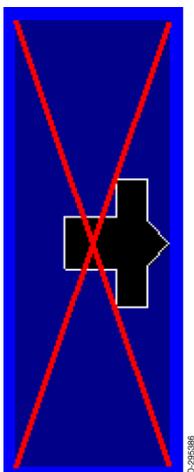
When the selected airspeed exceeds the displayed range, the bug parks at the top or bottom of the display with half the bug visible to indicate the direction to the selected airspeed.

AIRSPEED TAPE AND ROLLING DIGITS



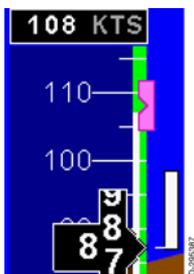
The airspeed tape is a moving scale with an airspeed reference line and airspeed marks with a range of 30 to 240 kts (35 to 276 mph). A rolling digit display of the current indicated airspeed is displayed in a window in the middle of the airspeed tape. The digits are white on a black background.

The white scale tick marks on the tape are in 5-kts/mph increments and blank below 30 kts/mph. The scale displays ± 30 kts/mph from the vertical center (airspeed reference line) of the tape. The scale slides down for accelerating airspeeds and up for decelerating airspeeds.



If airspeed data is invalid, the airspeed tape is removed and replaced with a red **X**. If invalid, the airspeed rolling digits display is removed. Loss of air data will also cause the loss of TAS (true airspeed), standard rate of turn indicator, and winds (if installed).

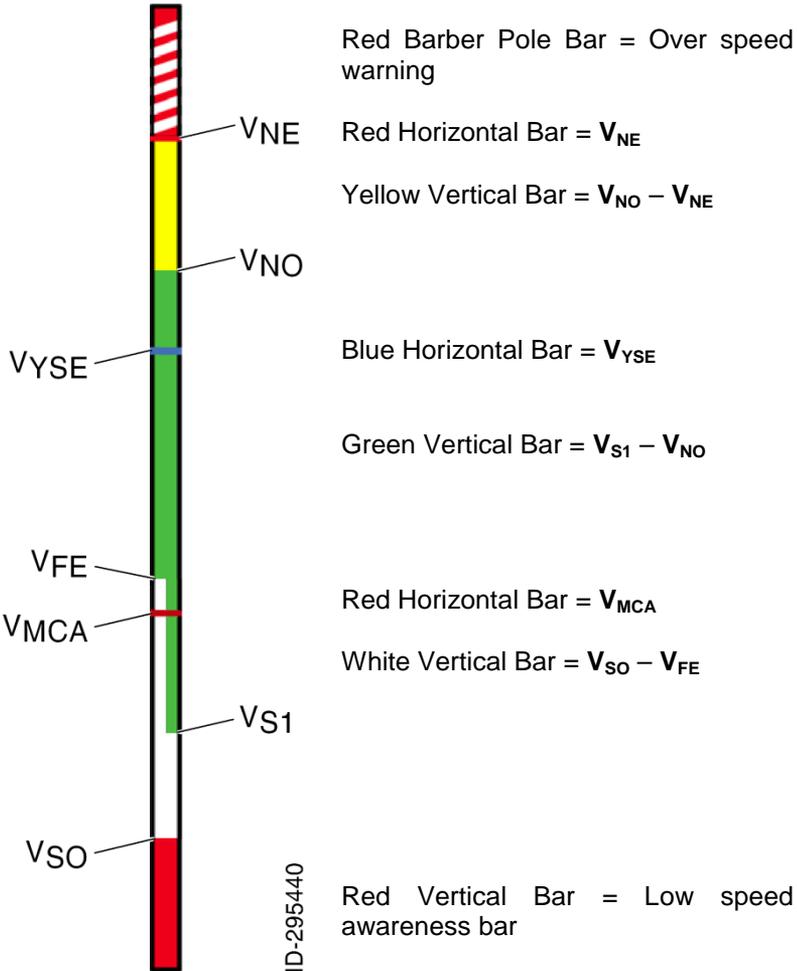
AIRSPEED TREND VECTOR



Airspeed trend is represented by a white vertical bar positioned along the right side of the airspeed tape depicting the airspeed in 6 seconds if the current acceleration/deceleration trend continues. The airspeed trend vector expands upward for positive acceleration values and downward for negative acceleration values.

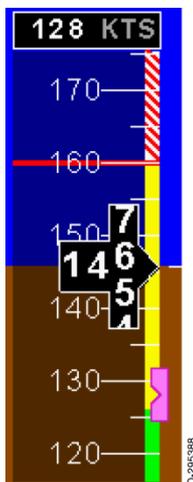
AIRSPPEED COLOR BANDS

The airspeed tape color bands are:



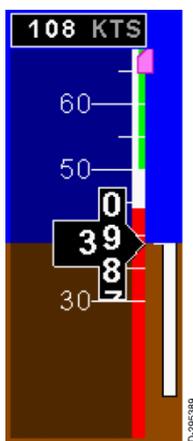
NOTE: V_{YSE} and V_{MCA} are only used in multi-engine aircraft.

OVER SPEED AWARENESS BAR



A solid red horizontal bar goes across the full width of the airspeed tape at V_{NE} . Additionally a vertical red barber pole starting at V_{NE} is displayed on the right side of the airspeed tape at and above V_{NE} .

LOW SPEED AWARENESS BAR



A red low speed awareness bar is always displayed along the lower right side of the airspeed tape, extending up from the bottom of the tape.

The top of the low speed awareness thermometer bar is a representation of the stall speed at max weight in the landing configuration.

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5. ALTITUDE AREA

ALTITUDE DISPLAY

The altitude display, shown below, includes the following:

- | | |
|---|------------------------------|
| 1. Selected Altitude Bug | 6. Baro Setting |
| 2. Altitude Trend Vector | 7. Metric Altitude |
| 3. Minimum Alert Altitude Bug | 8. Altitude window |
| 4. Minimum Alert Indicator (MIN) | 9. Altitude Tape |
| 5. MIN Digits | 10. Selected Altitude Digits |

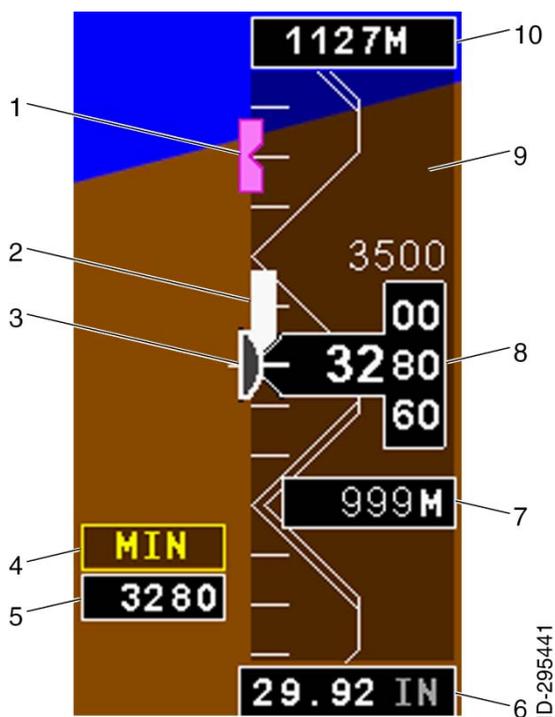
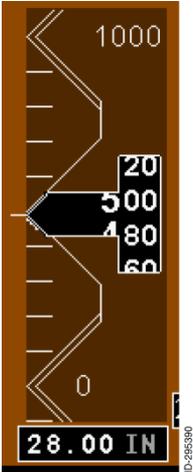


Figure 5-1 Altitude Display

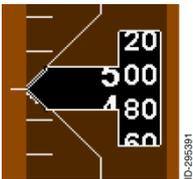
ALTITUDE TAPE



The altitude tape, used in conjunction with the altitude digital readout, is a semi-transparent moving scale display with a fixed pointer that has a range of -2000 to +34,000 feet. The scale shows ± 550 feet from the center of the tape. There are tick marks for every 100 feet of altitude, except for increments coincident with a chevron. The scale markings on the tape are labeled in 500-foot increments.

A chevron is displayed at 500-foot and 1000-foot intervals to emphasize the incrementations. The 1000-foot marks show double chevrons, while the 500-foot marks show single chevrons.

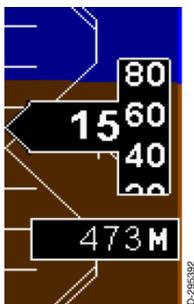
ALTITUDE ROLLING DIGITS



The altitude rolling digits are displayed in conjunction with the altitude tape to depict the current barometric altitude. The actual altitude value is displayed in the readout window. The range of the digital readout is between -2000 and +34,000 feet, with a resolution of 20 feet. A minimum of three digits are displayed with leading zeros, when necessary.

The altitude digital readout rolls down for increasing barometric altitude and up for decreasing barometric altitude. For negative altitudes, a leading minus sign is displayed.

METRIC ALTITUDE

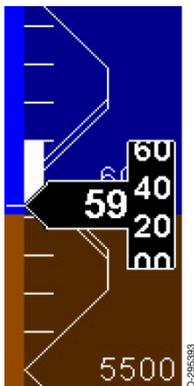


The digital metric altitude, positioned below the altitude rolling digits, represents the current altitude in meters. The current altitude shows when metric altitude option is **ENABLED** using the **CONF** page. **CONF** page is only displayed when the aircraft is on the ground.

When metric altitude is displayed, feet are still displayed on the altitude rolling digits. The digits in the Metric window are displayed in white followed by a white **M** to indicate meters.

The metric altitude range is limited from -610 to +10,363 meters, with a resolution of 5 meters.

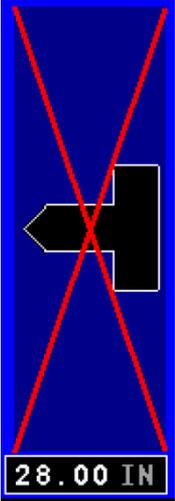
ALTITUDE TREND VECTOR



The altitude trend vector is a white bar starting at the altitude reference line on the left side of the altitude tape and extends up or down to the altitude the aircraft is predicted to be at in 6 seconds, based on the current vertical speed.

The altitude trend vector is removed when the aircraft is in level flight (not climbing or descending or zero trend).

ALTITUDE DATA INVALID



If altitude data is invalid, all altitude data is removed and a red **X** is placed over the entire altitude tape area. Loss of air data will also cause the loss of TAS (true airspeed), standard rate of turn indicator, and winds (if installed).

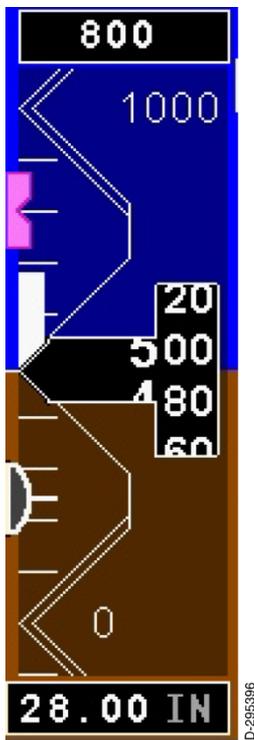
ALTITUDE SELECT READOUT AND BUG



Press the right knob three times to activate the Altitude bug **ALT**. Turn the knob clockwise to increase the **ALT** bug setting and counterclockwise to decrease the value.

Pressing and holding the right knob for more than 2 seconds when **ALT** is highlighted will cause the altitude bug to **SYNC**, synchronize to the current altitude.

ALTITUDE SELECT DISPLAY



The altitude select display consists of a white selected altitude digital readout at the top of the altitude tape and a magenta selected altitude bug positioned at the appropriate altitude on the left side of the tape. The altitude select display has a resolution of 100 feet.

The magenta altitude select bug moves along the left side of the altitude tape. The bug position corresponds to the altitude select value in the readout. When the selected altitude exceeds the displayed range, the bug parks at the top or bottom of the display with half the bug visible to indicate the direction of the selected altitude.

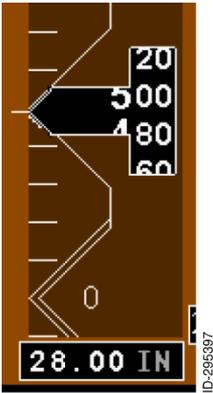
The digital readout is displayed in either feet or metric units. Metric units are displayed when metric altitude is **ENABLED** from the **CONF** page. When altitude is displayed in metric units the altitude readout is followed by a white M. The readout has a resolution of 30 meters.

The selected altitude display is blank on initial power up and initializes to the current altitude bug location after start up.

If the selected altitude data is invalid, the selected altitude bug is removed and the selected altitude digital readout is replaced with amber dashes.

BAROMETRIC (BARO) SETTING

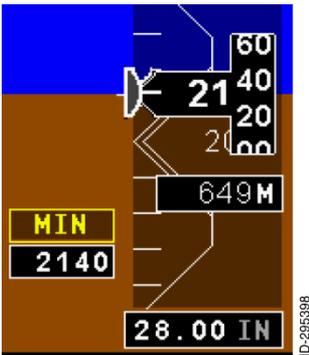
The **BARO** set window is located directly below the altitude tape. Press the right knob two times until **BARO** is highlighted. Turn the knob clockwise to increase the baro and counterclockwise to decrease the value. The digits are white followed by a gray IN (inches of mercury) or HPA (hectopascals). The range limit for inches of mercury is from 22 to 30.98 inHg, rounded to a resolution of .01. The range limit for hectopascals is 745 HPA to 1049 HPA, rounded to a resolution of 1.



When the **BARO** is highlighted, pushing and holding the knob will cause the baro setting to go to the standard barometric correction (**STD**) 29.92 inHg (or 1013 HPA).

IN or **HPA** is a pilot selectable on the **CONF** page.

MINIMUM ALTITUDE ALERT (MIN) BUG



Minimum Altitude Alert **MIN** must be **ENABLED** on the **CONF** page for this function to operate. If **MIN** is **DISABLED** on the **CONF** page the menu item on the right knob will still be displayed but it will not be selectable.

Press the right knob four times to activate the **MIN** display. Turn the knob clockwise to increase the MIN bug setting and counterclockwise to decrease the value. Pressing and holding the

right knob when **MIN** is the active selection will (**SYNC**) synchronize the **MIN** value to the current altitude.

A reference bug is placed on the altitude tape to show the **MIN** relative to the barometric altitude. The **MIN** bug is displayed in white in a cutout box to the left of the altitude tape.

The **MIN** range is -20 to 16,000 feet and is rounded to a resolution of 10 feet. The Minimum Alert Altitude display is removed when the value is less than -20 feet. **MIN** is displayed on power up and returns to the value set when the unit power was removed.

MINIMUM ALTITUDE ALERT CONDITION ARMED



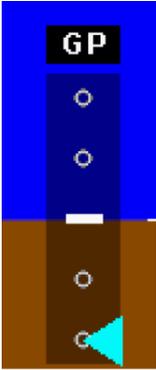
When a minimum altitude is set and the barometric altitude is within 50 feet of the set minimum, a yellow boxed window is displayed in the lower right corner of the ADI, above the Minimum Altitude Alert window, indicating the minimum altitude detection condition is armed.



When the barometric altitude is equal to or less than the approached minimums set value, "MIN" is displayed in the annunciator box.

If **MIN** data is invalid, the digital readout is replaced with three amber dashes (---). The **MIN** label continues to be displayed.

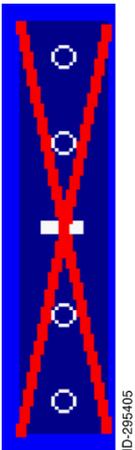
VERTICAL DEVIATION SCALE AND POINTER



When instrument landing system (ILS) glide slope, **GS**, is selected or GPS glide path, **GP**, descent is active when GPS is selected. The vertical deviation display consists of a white rectangular center point with two white hollow dots above and below and a pointer indicating current glide slope/ glide path deviation.

When vertical deviation is outside the limits of the scale, the deviation pointer parks at the appropriate end of the scale with half the pointer out of view.

Vertical Deviation Invalid



If vertical deviation data is invalid, the pointer is removed and a red **X** is placed over the deviation scale. If vertical information is provided in ARINC 429 format, the vertical deviation scale is removed when invalid. Refer to installer for your aircraft's specific configuration.

6. VSI AREA

VERTICAL SPEED (VS) DISPLAY

The vertical speed display with the rate of altitude changes measured in feet per minute (fpm) is shown below.

The VS display includes the following:

- Vertical speed scale and pointer
- Vertical speed digital readout

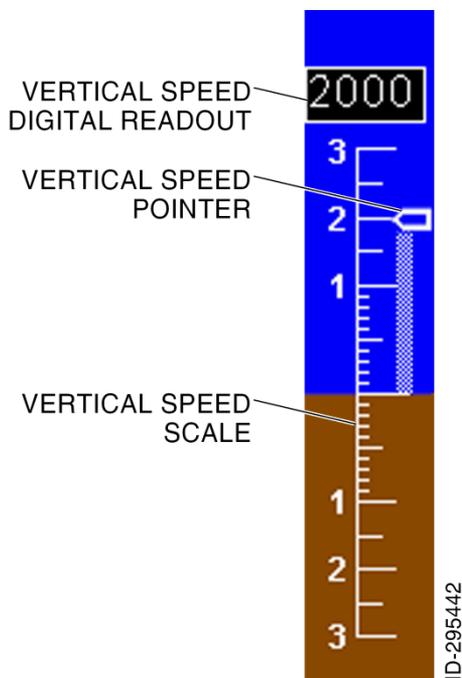
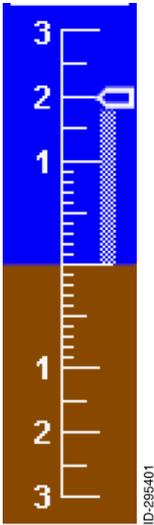


Figure 6-1 VSI Display

Vertical Speed Scale and Pointer

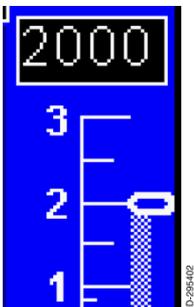


The vertical speed scale and pointer consist of a fixed scale and moving pointer used to indicate altitude rate. The scale range is +/- 3000 fpm.

The tick marks are displayed in increments of 100 fpm up to 1000 fpm. From 1000 fpm they are labeled in 500 fpm increments. The tick marks for 1000, 2000, and 3000 are labeled 1, 2, and 3, respectively.

A white pointer indicates the vertical speed on the scale. For vertical speeds in excess of 3000 fpm, the pointer parks off the top or bottom of the scale.

Vertical Speed Digital Readout



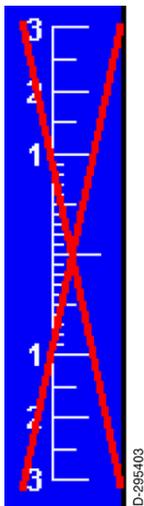
The vertical speed digital readout indicates the rate of climb or descent and is used in conjunction with the vertical speed scale and pointer. The readout is displayed above the vertical speed scale when the rate of ascent is greater than or equal to 300 fpm and below the vertical speed scale when the rate of descent is greater than or equal to -300 fpm.

The range of the digital vertical speed window is -9999 fpm to +9999 fpm. The window is removed with vertical speeds less than +/-300 fpm.

The vertical speed digital readout has a resolution of 50 fpm when the altitude rate is less than +1000 fpm and has a resolution of 100 fpm when the altitude rate is +1000 fpm or greater.

If vertical speed data is invalid, the vertical speed digital readout is removed.

Vertical Speed Data Invalid



If pressure altitude or vertical speed data is invalid, the vertical speed scale markings and pointer are replaced with a red **X**.

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Figure 7-2 Partial Compass (ARC HSI)

The display is selected by pushing the **MENU** button and selecting the **HSI** or **HSI** button if displayed. Use the **HSI** button to select the **360 HSI** or **ARC HSI**.

The **360 HSI** or **ARC HSI** compass displays consist of a compass rose centered around the aircraft symbol. Aircraft heading is displayed at the white lubber line triangle at the top of the compass. Cardinal headings are labeled N, S, E, and W. Intermediate headings at 30, 60, 120, 150, 210, 240, 300, and 330 degree increments are labeled with one- or two- digit degree markings (for instance, 060 degrees is 06, 330 degrees is 33). The short scale tick markings are in 5 degree increments and the long ones at 10 degree increments.

The **360 HSI** display contains outer tick marks at every 45 degrees except at the lubber line location. The partial compass display does not contain outer tick marks.

The **ARC HSI** compass shows ± 60 degrees from the current aircraft heading.

Heading Readout

The heading readout is a digital representation of the compass heading. The heading readout is displayed as three digits, using leading zeros when needed and is limited from 001 to 360 degrees.

Select Heading Readout AND Bug



Figure 7-3 Selected Heading Readout and Bug

A heading select bug (notched magenta rectangle) moves around the compass when the **HDG** knob is rotated. The selected heading readout is displayed below the selected heading annunciator in a three-digit format, in the upper left portion of the HSI. The readout range is 001 to 360.

Selecting **HDG** with the **HDG** knob will allow the selected heading to be set. Pushing and holding the HDG knob will (**SYNC**) synchronize the selected heading to the current aircraft heading.

If the aircraft is on a heading of 360 degrees with the 360 HSI displayed and the heading **SYNC** is pushed, the heading bug may be removed and the selected heading value may show dashes. Turning the HDG knob will restore the display.

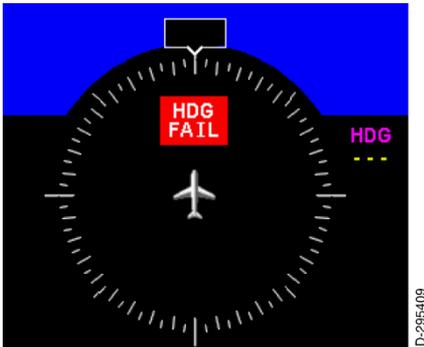
Heading Select Bug Off-scale

When the compass is displayed in **ARC HSI** mode and the heading select bug goes beyond the range, a magenta off-scale arrow on the side of the compass arc that is nearer to the selected heading points toward the magenta bug.



Figure 7-4 Heading Select Bug Off-Scale

Heading Data Invalid



If heading data is invalid, cardinal and intermediate headings are removed; the heading, course selection, distance readout, and identifier are replaced with amber dashes, a red **HDG FAIL** flag is displayed in the middle upper portion of the compass display.

Course Selected Digital Readout



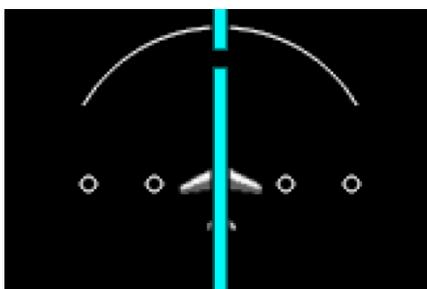
The selected course display consists of a digital readout and a cyan pointer. The pointer rotates within the compass rose. The selected course value is indicated at the top left of the HSI.

If selected course data is invalid, the course selected digital readout is replaced with amber dashes (---).

When a CDI source (VOR or LOC) is selected on the unit, the course pointer is positioned by turning the **CRS** knob. When a VOR source is received, pushing and holding the left knob for more than 2 seconds **SYNC**, button synchronizes the course pointer with the current course heading.

NOTE: When changing course in OBS Mode or doing a Direct To in OBS mode on a KLN 900 or KLN 90/A/B the course on the KFD 840 will have to be adjusted manually.

Lateral Deviation Scale and Pointer



The four-dot lateral deviation scale revolves with the course pointer. The lateral deviation indicator moves to the left or right to show the lateral deviation from the selected course.

Lateral deviation information comes from the VOR, ILS, or the GPS.

Lateral (and vertical) deviation scales are not the same for all GPS units. To determine the course widths for each mode refer to the manual for the GPS that is installed in each particular aircraft.

For deviation values outside the limits of the scale, the deviation pointer parks at the end of the scale closer to the deviation value. When lateral deviation is invalid the deviation needle is replaced with a red X.

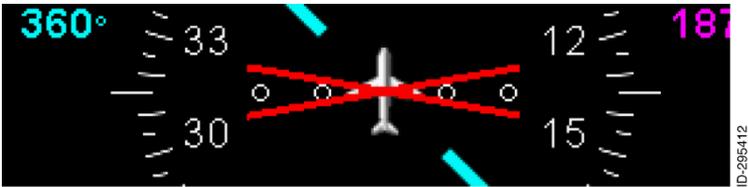


Figure 7-5 Lateral Deviation Invalid

Bearing Pointers

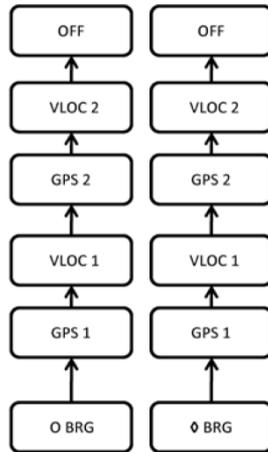


Figure 7-6 Bearing Pointers

Two green bearing pointers that point to the selected NAV source are displayed. The source is either VOR or GPS. When VOR is selected, the pointer indicates the relative bearing to the selected NAV facility. When GPS is the source, the pointer points to the active waypoint in the flight plan.

The circle bearing pointer is a single line pointer with the O symbol between the center and the pointer tip. The diamond bearing pointer is a double line pointer with the ◊ symbol between the center and pointer tip. Therefore, when the pointers lie over each other, both pointers and their identifying symbols are seen. The full menu of navigation selections is displayed even if that navigation unit is not installed.

Bearing Pointer Source



The bearing pointer source is selected with the **O BRG** and **◊ BRG** soft keys on the unit. The digital bearing to the station is displayed next to the selected source. If the bearing data is invalid the readout displays amber dashes.

If the bearing data is invalid, the bearing pointer is removed. If the bearing source is GPS and magnetic variation data is invalid, the bearing pointer is removed.

GPS Identifier and Distance



The waypoint identifier and distance readout are displayed near the upper right corner of the HSI. The source for this data is GPS only. The KFD 840 does not display any DME data.

Distance to the waypoint is displayed below the waypoint identifier. The distance is displayed with a resolution of 1 nm, for distances of 100 nm or more and a resolution of 0.1 nm for distances less the 100 nm.

Time to the waypoint is displayed below the distance.

CDI Source

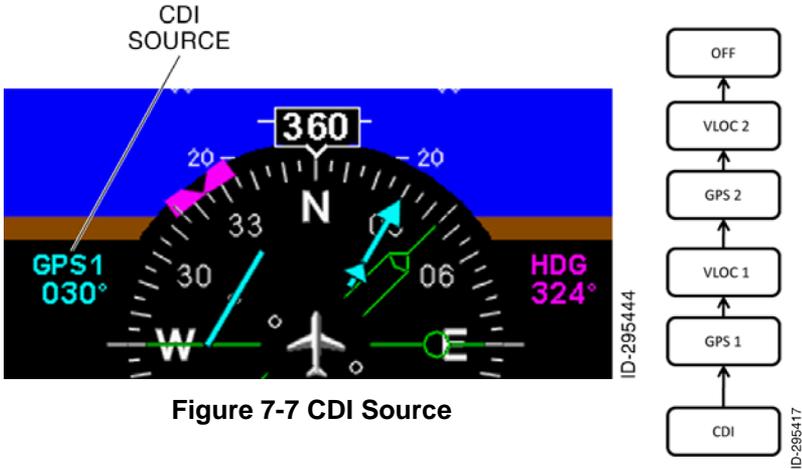


Figure 7-7 CDI Source

The navigation source is selected using the **CDI** button with the following available sources on the HSI; VLOC 1, VLOC 2, GPS 1 or GPS 2. The navigation source for the **CDI** is identified by an annunciator near the top right of the HSI above the selected course heading readout.

If the selected navigation source data is invalid, the navigation source course information changes to amber dashes.

The full menu of navigation selections is displayed even if that navigation unit is not installed.

To/From Pointer

The To/From pointer is a colored triangle, shown near the center of the full or partial (arc) compass. The pointer indicates whether the aircraft is flying to or from the selected navigation source or GPS waypoint.



Figure 7-8 TO Pointer



Figure 7-9 FROM Pointer

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8. CHECKLIST AREA

CHECK LIST FUNCTION

The Checklist pages can be accessed using two of the function select buttons on the bottom of the unit. Press the **MENU** function select button to display the **CHK LST/HSI** menu. Press the button again to highlight and select **CHK LST**. The **CHK LST** menu of **CHK ON/CHK OFF** will be displayed above the **CHK LST** button as shown in the figure below.



Figure 8-1 Checklist Menu - CHK OFF

Press the **CHK LST** select button, which is now labeled **CHK LST**, to select either **CHK ON/CHK OFF**. If **CHK ON** is selected the Check Lists will be displayed on the upper right corner of the display, to the right of the ADI as shown in the figure below.



Figure 8-2 Checklist Menu - CHK ON

Press the right knob four times until **CHK LST** is highlighted. Turn the knob to move through the checklist pages as shown in the figure below.



Figure 8-3 Checklist Display

NOTE: The checklist feature of the KFD 840 is not a replacement for any required aircraft or operations checklist.

The Checklist pages are created using a KFD 840 PC utility and then saved to a SD data card. Users can read files from the data card, select the appropriate files and save them to the KFD 840. Each file contains multiple checklists as determined by the PC tool. Selecting the READ button provides users with summary data including the number of checklists and a brief description of their use.

To read checklist files from the SD card use the following procedure:

NOTE: The SD-Card can be inserted and removed from the KFD 840 with power on or off the unit without damaging the SD-Card.

1. Place the SD Card into the card slot on the front left hand side of the KFD 840.
2. Apply power to the aircraft.
3. Depress and hold the #1 and #5 buttons on the KFD 840 then apply power to the KFD 840 while continuing to depress the #1 and #5 buttons until the Maintenance screen appears.

4. At the maintenance mode screen depress the #3 (ACCEPT) button on the bottom middle of the screen.
5. Depress the left hand knob twice to get into the Checklist mode.
6. Depress button #1 (READ). The files on the SD-card will be displayed in the Checklist box.



Figure 8-4 Check Maintenance Mode

7. Rotate the right-hand knob to SELECT the desired checklist, and then press the OPEN button.
8. Use the N.LIST or P.LIST, (Next or Previous) button to review the pages in the file. Make sure they have not been corrupted by the transfer and read correctly.



Figure 8-5 Checklist Pages on SD Card

9. If the checklist is ok, depress the **SAVE** button. This will save the selected Checklist to the KFD 840.



Figure 8-6 Checklist Saved to KFD 840

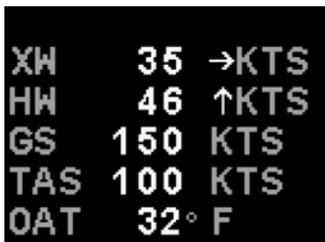
10. To exit, depress the left knob to go to the Main screen, and then select **EXIT** by pressing the #1 button, or remove/cycle power to the KFD 840. Remove the SD card.

The KFD 840 PC Utility is available for download from the Bendix/King website using the following URL: <http://www.bendixking.com/kfd840pcutility>. This utility allows the installer to download and enter the appropriate Checklist page for a particular aircraft onto an SD Card which can then be loaded into the KFD 840 using the instructions noted above.

Once the checklist pages have been loaded, the installer is responsible for verifying the function of the checklist pages by cycling through the pages on the main screen of the KFD 840 and by ensuring that the checklist pages are appropriate to the type of aircraft. Changes can be made to the checklist pages using the PC Utility tool noted above.

9. MISCELLANEOUS DATA AREA

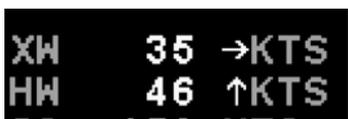
WIND, GROUND SPEED, TRUE AIRSPEED, AND OUTSIDE AIR TEMPERATURE



ID-295422

The wind, cross wind (**XW**) and Head wind (**HW**), ground speed (**GS**), true airspeed (**TAS**), and outside air temperature (**OAT**) labels are located on the left side of the HSI.

Wind



ID-295423

The wind display consists of a digital readout for wind speed in knots and arrows for direction. The wind information is only available from GPS1 and it must be a digital GPS. If GPS1 is analog or is inoperable, wind information will not be displayed. Wind will not be available if the installed GPS does not provide track data. Wind display will be removed if GPS, **TAS** or **OAT** fails.

X-Y (Cartesian) format consists of a lateral, **XW** – Crosswind, digital wind speed and arrow and a longitudinal, **HW** – Headwind, digital wind speed and arrow. The **HW**, head wind, label does not change for a tail wind; it is indicated by the direction arrow.

The wind calculation is based upon the indicated airspeed. To obtain the most accurate wind information, correct the indicated airspeed to calibrated airspeed using the aircraft AFM/POH airspeed corrections, if available, and then calculate the True airspeed. The wind values can then be calculated based upon the most accurate true airspeed.

Ground Speed

GS 150 KTS ID: 096426 Ground Speed, **GS**, is displayed in the lower left portion of the PFD in knots/miles per hour, with a resolution of 1 kt/mph. Speeds between 00 and 999 kts/mph are displayed in white with a trailing gray **KTS** or **MPH** label. If the ground speed data is invalid, the ground speed digits are removed.

True Airspeed

TAS 19 KTS ID: 096426 True airspeed, **TAS**, is displayed in the lower left corner of the PFD in kt/mph (same as the units of the indicated airspeed), with a resolution of 1 kt/mph. This true airspeed is calculated based upon the indicated airspeed. To obtain the most accurate value of true airspeed correct the indicated airspeed to calibrated airspeed using the aircraft AFM/POH airspeed corrections, if available, then calculate the true airspeed. Speeds between 30 and 999 kts/mph are displayed in white with a trailing gray **KTS** or **MPH** label. If **TAS** data is invalid, the true airspeed digits are removed and the standard rate of turn indicator will be removed from the display.

Outside Air Temperature

OAT 40° C ID: 096426 Outside air temperature, **OAT**, is shown in the lower right corner of the PFD in degrees Celsius or Fahrenheit with a resolution of 1° is selectable by the pilot on the on the **CONF** page . A minus (-) sign to the left of the temperature readout indicates below zero readings. Temperatures between -70° Celsius and +50° Celsius or -94° Fahrenheit to +122° Fahrenheit are displayed in white with a trailing gray C or F label. If **OAT** data is invalid, the **OAT** digits are replaced with amber dashes. If **OAT** is invalid **TAS** will also be invalid and the standard rate of turn indicator will be removed from the ADI display.

10. EMERGENCY OPERATIONS

The following failure modes can be detected by the KFD 840 and will be displayed on the screen with a large red **X** or red failure message in the appropriate area of the screen:

- ADC Failure (Air Data Computer)
- “**ATTITUDE FAILURE**” AHRS Failure (Attitude Heading Reference System)
- “**HDG FAIL**” CRM Failure (Compass Remote Magnetometer), Heading Failure

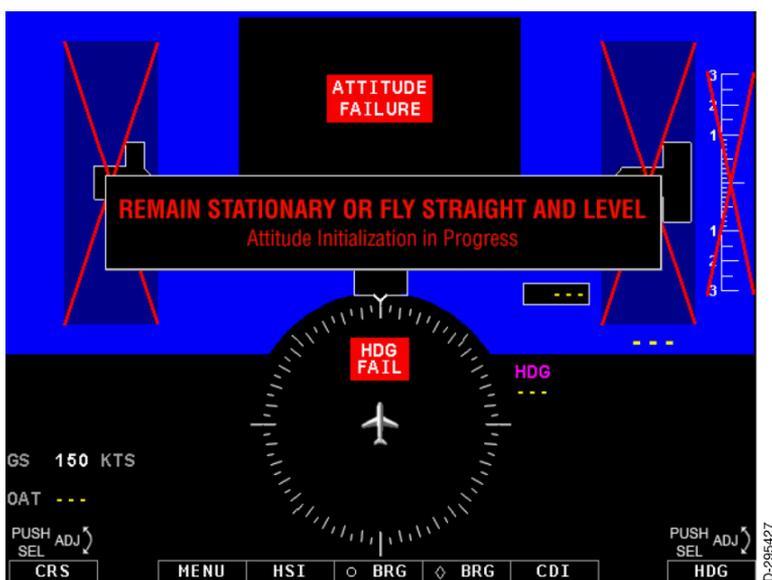


Figure 10-1 Failure Modes

ADC (AIR DATA COMPUTER) FAILURE

The KFD 840 will display an ADC (Air Data Computer) failure by displaying red **X**'s over the airspeed, altitude and vertical speed information.

The pilot must fly using the standby instruments when the air data has failed.

ADC health is determined by internally monitoring the voltage levels of the ADC throughout flight. This monitor does not detect or display failures for blocked pitot/static port(s). Symptoms of a blockage of the Pitot/Static system would manifest themselves in a manner similar to a traditional Pitot/Static system.

ATTITUDE FAILURE, AHRS FAILURE

The “**ATTITUDE FAILURE**” message indicates that the AHRS (Attitude and Heading Reference System) has failed and the data can no longer be expected to be accurate. The KFD 840 will display a black background with the “**ATTITUDE FAILURE**” message in red as shown below, indicating that there has been a failure of the **AHRS**.

The pilot must fly using the standby instruments when the AHRS has failed.



Figure 10-2 Attitude Failure

HDG (HEADING) FAIL, CRM FAILURE (COMPASS REMOTE MAGNETOMETER)

A “**HDG FAIL**” message indicates that the CRM500, Compass Remote Magnetometer, has either failed or lost communication with the KFD 840. Loss of communication or internal failure will remove all heading data from the display; however it will not have any impact on the pitch or roll attitude display.

The pilot must fly using the standby instruments when the magnetometer has failed.



ID-295429

Figure 10-3 Heading Fail

IN-FLIGHT RESTART

The KFD 840 is capable of a partial reset in-flight under emergency conditions. If a power failure occurs or an emergency condition occurs that warrants the need to reset the system, the pilot should maintain straight and level flight until the alignment is completed or as long as possible without compromising the safety of the flight.

If an internal fault is detected (Only on P/N 8350-0840-06 or higher), the unit may automatically attempt a reset.

The pilot must fly using the standby instruments following an in-flight restart.



Figure 10-4 In-Flight Reinitialiation

Once the unit has repowered in flight, altitude and airspeed information may return. However the attitude indicator and HSI information will remain inoperative and in a flagged condition until the aircraft has landed and the AHRS has been initialized and the failure condition is eliminated.

CONFIGURATION MODULE ERRORS

DISPLAYED ERROR	DESCRIPTION
<p>NO VALID CONFIGURATION</p> <p>NO FLIGHT – OBTAIN MAINTENANCE</p>	<p>There is a problem in the system configuration that has been detected on power up. The display will be locked and normal operation will not be possible. If this message is displayed during ground operations flight is prohibited. If this message is displayed in flight continued flight by reference to the standby instruments will be required.</p>
<p>CONFIGURATION MODULE AND INTERNAL CHECKSUM FAILURE</p> <p>NO FLIGHT – OBTAIN MAINTENANCE</p>	<p>There is a problem in the system configuration that has been detected on power up. The display will be locked and normal operation will not be possible. If this message is displayed during ground operations flight is prohibited. If this message is displayed in flight continued flight by reference to the standby instruments will be required.</p>
<p>CONFIGURATION MISMATCH WILL LOAD MODULE DATA</p> <p>FLIGHT OK- PRESS MIDDLE BUTTON TO CONTINUE</p>	<p>This message is to provide pilot awareness that there is a mismatch between the configuration module and the PFD. The configuration module data will be used. Flight and continued flight is permitted. It is recommended obtaining maintenance at the next available opportunity.</p>

DISPLAYED ERROR	DESCRIPTION
CONFIGURATION INTERNAL CHECKSUM FAILURE FLIGHT OK- PRESS MIDDLE BUTTON TO CONTINUE	This message is to provide pilot awareness that there is a difference between the configuration module and the PFD data. The configuration module data will be used. Flight and continued flight is permitted. It is recommended obtaining maintenance at the next available opportunity.
CONFIGURATION MODULE CHECKSUM FAILURE FLIGHT OK- PRESS MIDDLE BUTTON TO CONTINUE	This message is to provide pilot awareness that there is a difference between the configuration module and the PFD data. The display information stored in the PFD will be used. Flight and continued flight is permitted. It is recommended obtaining maintenance at the next available opportunity.
NO CONFIGURATION MODULE FLIGHT OK- PRESS MIDDLE BUTTON TO CONTINUE	This message is to provide pilot awareness the configuration module cannot be sensed by the display system. The display information stored in the PFD will be used. Flight and continued flight is permitted. It is recommended obtaining maintenance at the next available opportunity.

MINOR FAILURE INDICATIONS

Loss of data, no computed data or failures to non critical or secondary display parameters will amber dash the data value field.

11. APPENDIX

ACRONYMS AND ABBREVIATIONS

Acronyms and abbreviations used in this guide are defined as follows:

<u>TERMS</u>	<u>DEFINITION</u>
ADI	attitude direction indicator
ADC	air data computer
AHRS	attitude heading reference system
ALT	altitude
BARO	barometric
BRG	bearing
CDI	course deviation indicator
CRM	compass remote magnetometer
CRS	course
FD	flight director
FPM	feet per minute
GP	glide path
GPS	global positioning system
GS	ground speed
GS	glide slope
HDG	heading
HSI	horizontal situation indicator
HPA	Hectopascals
HW	headwind
InHg	inches of mercury
kts	knots per hour

TERMS

DEFINITION

LOC	localizer
m	meters
MIN	minimum
min	minutes
mph	miles per hour
NAV	navigation
NM	nautical miles
OAT	outside air temperature
PFD	primary flight display
TAS	true Airspeed
VOR	VHF omnidirectional range
VLOC	VOR/localizer
XW	crosswind

AIRCRAFT CONFIGURATION

This section is provided as a reference to the pilot for a record of the configuration of the KFD 840 as it is installed in the aircraft

ITEM	RESOLUTION	INPUT VALUE RANGE	UNITS	CONFIGURATION
Roll Adjust	0.1	0-180.0	DEG	
Pitch Adjust	0.1	0-90.0	DEG	
S/R Pointer	--	SKY, ROLL	--	
V _{S0}	1.0	0-240 (276)	Kts / (MPH)	
V _{S1}	1.0	0-240 (276)	Kts / (MPH)	
V _{FE}	1.0	0-240 (276)	Kts / (MPH)	
V _{NO}	1.0	0-240 (276)	Kts / (MPH)	
V _{NE}	1.0	0-240 (276)	Kts / (MPH)	
V _{MCA}	1.0	0-240 (276)	Kts / (MPH)	
V _{YSE}	1.0	0-240 (276)	Kts / (MPH)	

ITEM	RESOLUTION	INPUT VALUE RANGE	UNITS	CONFIGURATION
GPS1 Type	--	NONE, ARINC, ANALOG	--	
GPS2 Type	--	NONE, ARINC, ANALOG	--	
VOR1 Type	--	NONE, ARINC, ANALOG, SERIAL	--	
VOR2 Type	--	NONE, ARINC, ANALOG, SERIAL	--	
AP Type	--	NONE, ARINC, ANALOG	--	
ALT BUG ON	--	ON, OFF	--	
MAX DIM BUS	--	(0-14999) ACCEPT	--	
MIN DIM BUS	--	ACCEPT	--	
BUS ENABLE	--	ON, OFF	--	

ITEM	RESOLUTION	INPUT VALUE RANGE	UNITS	CONFIGURATION
AP Out Type	--	BANK, TURN	--	
VOR Offset	0.1	0-180.0	DEG	
LOC Offset	1	-100 TO +100	%FULL SCALE	
GS OFFSET	1	-100 TO +100	%FULL SCALE	
MPH Mode	-	ON. OFF	--	
FD Pitch Gain ¹	1	10-2560	--	
FD Roll Gain ¹	1	+/-999	--	
FD Pitch Filt ¹	1	10-2560	--	
FD Roll Filt ¹	1	+/-999	--	
NOTE 1: Only on P/N 8350-0840-06 or higher				

Each of the items noted above can be selected using the right control knob and adjusted to the parameters listed. If the installer alters an item, the category description is highlighted in yellow to indicate a change.

Once the appropriate settings have been entered, the data can be saved by selecting the "SAVE" button at the bottom of the screen. Pressing the "SAVE" button will store the data permanently into the internal memory of the KFD 840 and the configuration module.