*Envision*

# EXP5000
## Primary Flight Display
## Pilot's Guide

AVIDYNE

# Document Revision History

| Date | Revision | Description |
|---|---|---|
| Oct. 12, 2006 | 00 | Released per ECO-06-230 |
| Oct. 18, 2006 | 01 | Released per ECO-06-238 |
| Aug. 8, 2007 | 02 | Updated per ECO-07-254 |
| Oct. 3, 2007 | 03 | Updated per ECO-07-352 |
| May 21, 2008 | 04 | Updated per ECO-08-131 |
| June 27, 2008 | 05 | Updated per ECO-08-199 |
| August 29, 2008 | 06 | Updated per ECO-08-249 |
| | | |

This document is applicable to Software Part Numbers:

● 530-00194-000 - Rel 7.0.X, Landscape PFD, No RVSM

● 530-00200-000 - Rel 7.1 & later, Landscape PFD, With RVSM

● 530-00200-001, and -002 - Rel 7.1 & later, Landscape PFD, No RVSM

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# Table of Contents

# 1 Introduction

This Pilot's Guide provides information about the Envision EXP5000 PFD.

## 1.1 Notes and Warnings

Notes and warnings provide guidance for the use of the EXP5000. Avidyne strongly suggests that you pay close attention to notes and warnings for your own safety.

For example:

> **Note**: Notes provide useful information about how to use the EXP5000 Primary Flight Display.

Warnings are prefaced with exclamation points and denote information that can prevent serious injury or death on the part of the user.

The instructions and warnings in this manual are not intended to replace the instructions and warnings for other equipment on your aircraft. It is critical that you as the pilot in command have a complete understanding of the warnings, operating instructions, and limitations for all equipment installed on your aircraft.

This manual assumes that the reader is an appropriately licensed pilot. Avidyne strongly recommends that you use the EXP5000 only under VFR conditions until you are very familiar with the EXP5000.

If you have questions, please contact Avidyne at **800-284-3963 (800-AVIDYNE)** or **+1-781-402-7400** before operating with the Envision PFD under IFR conditions.

When using the EXP5000, be sure to cross-check the data displayed against other data sources for accuracy including other flight deck instruments and charts.

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# 2 EXP5000 System Overview

This section contains the following information:

- *EXP5000 Overview*, page 3
- *EXP5000 Upper Half Display*, page 5
- *EXP5000 Lower Half Display*, page 11
- *EXP5000 Buttons and Knobs*, page 15

## 2.1 EXP5000 Overview

This section provides an overview of the Envision EXP5000.



**Figure 1. The Envision EXP5000 PFD**

1) **Brightness Control (BRT/DIM)**—Allows you to adjust the display brightness. Press the top button to brighten the display; press the bottom button to dim it. The default brightness is 75%.

2) **Upper Half Display**—The upper half of your EXP5000 displays information about your aircraft attitude, autopilot status (when equipped), navigation and more. This section includes the following:

- Autopilot annunciations

- Attitude Direction Indicator (ADI)

- Airspeed Indicator (ASI)

- Altimeter

- Vertical Speed Indicator (VSI)

For information about the data displayed on the upper section of the EXP5000, see Section 2.2, "EXP5000 Upper Half Display" on page 5.

3) **Buttons**—Buttons allow you to display new information or change the display. Button labels change to reflect the current environment.

4) **Lower Half Display**—Displays the Horizontal Situation Indicator (HSI) and other details about direction, windspeed, and flight plans. The HSI can display a moving map to help you determine your exact location. For more information, see Section 2.3, "EXP5000 Lower Half Display" on page 11.

5) **Air Data Block**—Contains air data information, including true airspeed, ground speed, and outside air temperature (if an OAT sensor is installed).

6) **Left and Right Knobs**—Knobs allow you to change the display as indicated for the particular settings. The knob labels change to indicate the active function.

- Left button and knob functions are described in *Left Buttons and Knob*, on page 15.

- Right button and knob functions are described in *Right Buttons and Knob*, on page 19.

## *2.2 EXP5000 Upper Half Display*
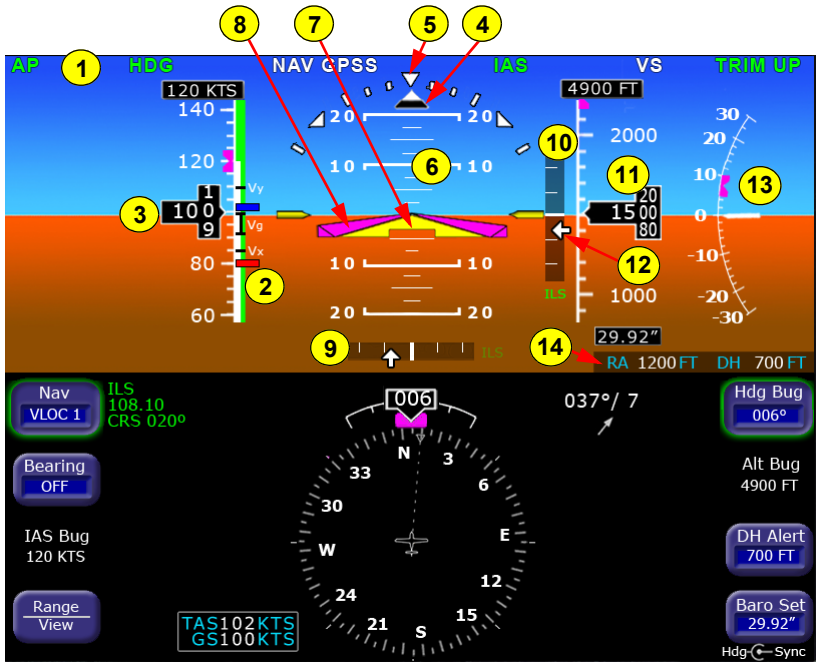


**Figure 2. EXP5000 Upper Half Display Symbols**

**Upper Half Display**

The upper portion of the EXP5000 contains the following information:

1) **Autopilot Annunciations**—If your aircraft is equipped with an S-TEC 55SR, 55X, or Intelliflight 2100 autopilot, autopilot annunciations will appear across the top of the PFD. For information on the annunciations, see the POH for your autopilot.

2) **Airspeed Tape**— Indicates the airspeed. The display range is either:

   ■ **20 kts to 300 kts** if using air data from the internal ADAHRS, or

   ■ **40 kts to 500 kts** if using air data from an external source.

   The box at the top of the tape displays the current value of the IAS Bug. The minor/major graduations are either 2 knots/10

knots or 5 knots/20 knots as configured for your aircraft by the avionics installer. Major graduations are labeled. Likewise, the airspeed tape ranges are set for your aircraft by the avionics installer. The airspeed tape has the following color bands:

| Band Color | | Meaning |
|---|---|---|
| Red | | $V_{NE}$ or $V_{MO}$ (depending on aircraft type) up to top of the airspeed tape. |
| Yellow | | $V_{NO}$ up to $V_{NE}$ (For $V_{NE}$ aircraft). |
| Green | | ■ $V_S$ up to $V_{NO}$ (For $V_{NE}$ aircraft).<br>■ $V_S$ up to $V_{MO}/M_{MO}$ (For $V_{MO}$ aircraft). |
| White | | $V_{SO}$ up to $V_{FE}$. |
| Red | | 20 kts up to $V_{SO}$.<br><br>This red band is removed during takeoff. |
| | | (Twin engine only) One engine inoperative VSpeeds are indicated by lines across the airspeed tape, as follows: |
| Blue | | ■ $V_{YSE}$ —Best Climb Rate, One-Engine Inoperative |
| Red | | ■ $V_{MCA}$—Minimum Controllable Airspeed, One-Engine Inop. |

3) **Airspeed Window**—Displays current indicated airspeed in knots. Hash marks are displayed below 20 knots.

4) **Skid/Slip Indicator**—The black trapezoid is centered under the roll pointer in coordinated flight. Full scale deflection is the width of the trapezoid.

5) **Bank Angle Indicator**—The bank angle indicator is composed of an inverted white triangle and an upright white triangular Roll Pointer. The upright white triangle points to the current bank angle. Graduations are at 0, 10, 20, 30, 45, and 60 degrees. (Note that the 0 and 45 degree marks are inverted triangles).

6) **Pitch Ladder**—The pitch ladder is marked as follows:

■ Every 2 1/2° within the range of ± 20°.

■ Every 5° from +20° to +50° and -20° to -30°.

■ 10° graduations of the pitch ladder have bar ends that point toward the horizon line.

- ■ ±90° is represented by small circles.

- ■ Large chevrons, described in *Section 3.7 Precision Flying with EXP5000*, are only visible at excessive pitch angles and point toward the horizon (above +50° and below -30°).

7) **Aircraft Reference Symbol (ARS)**—The ARS is fixed on the display and provides a reference from which you can determine aircraft attitude. The EXP5000 can be configured as one of two different symbols:

- ■ **Yellow Delta**—The Delta ARS displays in aircraft for which Flight Director is supported. The yellow outriggers are used with the ARS symbol to provide a reference for wings level flight.

- ■ **Flying W**—The flying W displays in aircraft for which Flight Director is not supported.

8) **Flight Director Steering Command Bars**—Displays the accuracy of the pilot or autopilot tracking the autopilot commands. The pilot or autopilot is to steer the airplane toward the command bars until the ARS is tucked into the steering command bars. For more information about Flight Director, see the appropriate autopilot section:

- ■ *Using the S-TEC 55X Autopilot with the EXP5000*, page 33.

- ■ *Using the S-TEC 1500 Autopilot with the EXP5000*, page 39.

- ■ *Using the S-TEC IntelliFlight 2100 Autopilot with the EXP5000*, page 42.

- ■ *Using Other Autopilots with the EXP5000 (PFD 530-00200-() software only)*, page 46.

> **Note**: The Flight Director steering command bars display only when Flight Director is enabled and available and the aircraft is configured to display the Delta ARS symbol.

9) **Horizontal Deviation Indicator (HDI)**—Displays when:

- ■ The NAV source is VLOC.

■ The localizer signal has been received.

Or (if used with Garmin 400W/500W navigator)

■ The Nav source is GPS

■ GPS horizontal deviation data has been received

The source of the HDI data is displayed immediately to the right of the HDI (e.g., LOC, ILS or GPS). If the localizer signal is lost, the HDI is replaced with a red **X** and the source letters turn red. If GPS data is lost, the HDI is removed from the display.

To remove the HDI, change either the NAV source or the VOR/LOC frequency.

10) **Altitude Tape**—Displays baro-corrected altitude. The display range is either:

■ -1,000 feet to 35,000 feet if using air data from the internal ADAHRS, or

■ -1,000 feet to 53,000 feet if using air data from an external source.

The box at the top of the tape displays the current value of the Alt Bug. In general, each minor graduation represents 20 feet and each 100 foot graduation is labeled. For higher power aircraft, each minor graduation represents 100 feet and each 500 foot graduation is labeled. These settings are set by the installer and may differ for your aircraft.

11) **Altitude Window**—Displays the current baro-corrected altitude.

12) **Vertical Deviation Indicator (VDI)**—Displays when:

■ The Nav source is VLOC
■ The ILS Glidescope signal has been received
■ The VDI is not displayed for back course localizer approaches

Or (if used with Garmin 400W/500W navigator)

■ The Nav source is GPS
■ GPS vertical deviation data has been received

To remove the VDI display, change either the NAV Source or the localizer frequency.

13) **Vertical Speed Indicator (VSI)**—Displays the vertical speed in Feet per Minute (fpm). The VSI generally shows ±2,000 fpm VSI scale. Scale graduations display every 100 fpm between ±1,000 fpm. For higher power aircraft, the VSI shows ±3,000 fpm VSI scale. Scale graduations display every 200 fpm between ±2,000 fpm. These settings are set by the installer and may differ for your aircraft.

When vertical speed is above scale limits, a digital readout of the current vertical speed is displayed on the appropriate end of the VSI scale. The maximum displayed value of the digital readout is either:

■   ±4,000 fpm if using air data from the internal ADAHRS, or

■   ±10,000 fpm if using air data from an external source.

14) **Radar Altimeter Indicator**—If your aircraft is equipped with a radar altimeter, the Radar Altimeter indicator displays the current altitude above ground level (up to 2500 ft. AGL) and the currently-set decision height. Set the decision height for the radar altimeter using the DH Alert button, described in *Right Buttons and Knob*,

### EXP5000 Display Options

The following display options are set during installation:

### *Horizon Heading Reference Marks*
Horizon Heading Reference Marks provide heading information on the ADI. If Horizon Heading Reference Marks are installed on your EXP5000, the marks and labels appear at each quadrant (N, E, S, W) and mid-quadrant (NE, SE, SW, NW). The reference pointer for the Heading Marks is the apex of the ARS.
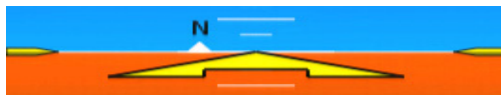
### Labeled VSpeeds

$V_X$ and $V_Y$ labels are shown at the correct airspeeds for the Best Angle of Climb speed ($V_X$) and Best Rate of Climb speed ($V_Y$). $V_X$ and $V_Y$ are adjusted based on density altitude, as described in the Airspeeds for Normal Operations section of your aircraft *Pilot Operating Handbook*. Additionally, the $V_G$ label displays at the Best Glide airspeed as listed in the Airspeeds for Emergency Operations section of your aircraft *POH*.

At some altitudes, the characters marking the VSpeeds may overlap and may be partially obscured.

> **Note**: If your aircraft POH lists Best Glide airspeeds for multiple gross weights, $V_G$ is displayed as a range between the highest and lowest Best Glide airspeed. Make sure you consult the POH for the correct Best Glide airspeed for a particular gross weight.

> **Note:** The VSpeeds for your aircraft were entered by the installer. There is a small chance that, due to installer error, the VSpeed configuration will not be valid. In this case, an Invalid VSpeeds message displays on the Airspeed Tape. If this message displays, do not use the VSpeed information on the PFD, and contact your installer as soon as practical.

> **Note:** $V_X$ and $V_Y$ speeds depend on settings made during installation. Depending on your aircraft and installation settings, the $V_X$ and $V_Y$ speeds may not vary with density altitude.

### Barometer Units

Barometer units can be displayed in In-Hg (Inches of mercury [default]), Mb (Millibars), or hPa (Hectopascals). The average sea-level pressure is 29.92 in-hg or 1013.25 mb or hPa.

### Aircraft Reference Symbol

Delta or Flying W. See the discussion of the Aircraft Reference Symbol in Section 2.2, "EXP5000 Upper Half Display" on page 5 for more information.

## *2.3 EXP5000 Lower Half Display*

The lower half of your EXP5000 provides navigation information, PFD control softkeys, and air data.

The Horizontal Situation Indicator (HSI) displays as either a full 360° circle or as a 120° arc (See Figure 4 on page 12). All lower-half display features can appear in either the 360° or the 120° arc EHSI views.
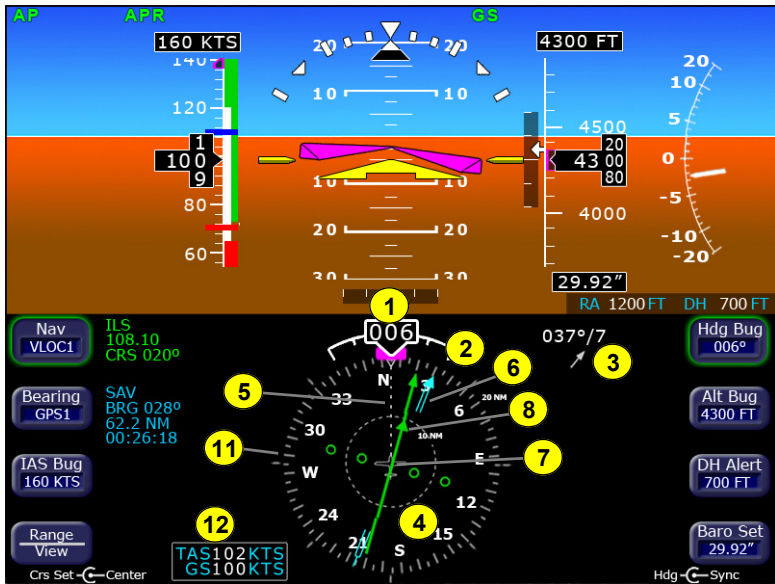


**Figure 3. EXP5000 Lower Half Display Symbols**

1) **Magnetic Heading**—A numeric indication of current aircraft magnetic heading.

2) **Rate of Turn Indicator**—The tip of the blue rate of turn indicator displays the current rate of turn. The indicator is marked for 1/2 and full standard rate of turn. An arrowhead indicates a value beyond 1 1/2 standard rate. For more information, see the Section , "Using Trend Indicators" on page 51.

3) **Wind Vector**—Displays the current wind speed and wind direction. The arrow indicates the direction of the wind relative to the current aircraft heading.

➡ After you turn, there will be a lag of several seconds in updating current wind speed and direction.

The wind vector on the HSI is very useful in any phase of flight where you need to take winds aloft into account. You can use a combination of the wind vector and projected track line in navigation tasks.

**Note**: Under very light wind conditions or when wind speed cannot be calculated, wind data will be replaced by dashes.

4) **HSI**—The Horizontal Situation Indicator (HSI) can be viewed as either a full 360° circle or as a 120° arc. The EHSI views are shown in Figure 4:
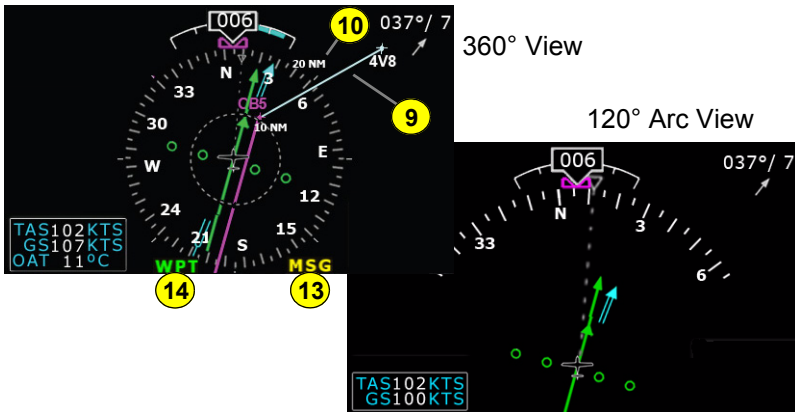


**Figure 4. EHSI Views**

5) **Projected Track Line**—The dashed gray projected track line originates from the aircraft present position symbol and terminates at the triangle along the outer edge of the compass rose. It displays a projection of the current ground track of the aircraft.

➡️ To take the guesswork out of determining proper crab angles for wind corrections, align the projected track line with the desired course.

**Note:** In dual-PFD equipped aircraft, differences between the two wind vectors during light winds are normal.

6) **Bearing Pointer**—The blue dual-line bearing pointer is associated with the Bearing source and displays the current bearing to the Bearing waypoint (GPS 1 or GPS 2) or to the station (VLOC 1 or VLOC 2). A bearing pointer does not display if you tune the VLOC source to an ILS or LOC station.

7) **Course Deviation Indicator (CDI)**—The green single-line CDI displays deviation from the set or desired course.

8) **To-From Flag**—The small green arrow indicates whether you are heading *to* or *from* the current VOR or GPS waypoint. If you are heading *to* the VOR, the arrow points the direction you are flying. If *from*, the arrow points towards your most recent VOR or waypoint.

9) **HSI Moving Map**—Displays up to a maximum of 15 waypoints and labels from the active flight plan. The active leg of the flight plan is depicted in magenta, and all other legs of the flight plan are depicted in white. The moving map will also display waypoints and labels of an approach and hold.

10) **HSI Map Range**—When the moving map is selected for display on the HSI via the *View* knob, the outer and inner rings of the compass rose are labeled with range in nautical miles. Outer ring ranges are 2, 5, 10, 20, 50, 100, and 200 NM.

11) **Compass Rose**—In both the 360° view and 120° arc view, the minor graduation marks represent 5 degrees, major graduation marks represent 10 degrees, with every 30 degrees labeled. The outer edge of the compass rose is marked with reference marks.

12) **Air Data Block**—This data block is configurable and may contain:

■ True Airspeed (TAS) in knots

■ Ground Speed (GS) in knots

■ OAT (Outside Air Temperature) in degrees F or C as configured

**13) MSG Annunciator**—Illuminates when there is a message on the GPS navigator.

**14) WPT Annunciator**—Illuminates when the GPS navigator detects the approaching of a waypoint.

## *2.4 EXP5000 Buttons and Knobs*

### Left Buttons and Knob

The left-hand buttons and knob on the Envision EXP5000 allow you to set the navigation configuration and course. The left button configuration is determined by your aircraft's autopilot and whether a radar altimeter is installed. Additionally, for *IntelliFlight* 2100 autopilots only, the IAS button becomes unavailable when the autopilot is controlling the aircraft, as shown in Figure 5. For more information, see *IntelliFlight 2100 Vertical Modes*, on page 44.

The Nav (Primary Navigation) button is enabled by default (the enabled button has a green rim). To enable a different left-hand button, press it. Once enabled, you can continue to press the button to change the setting.

> **Note:** The Nav button is re-enabled ten seconds after you last push or rotate the Bearing and Range/View button. Avidyne suggests that you enable the desired button just before you change the knob.

The state of each navigation button is displayed in the adjacent data block, as shown in Figure 5. For information about the data blocks, see *Nav and Bearing Data Blocks—The Nav data block content varies depending on the source, as follows:*, on page 18.



**All AP without RadAlt**   **55X with RadAlt**   **2100, AP Control**
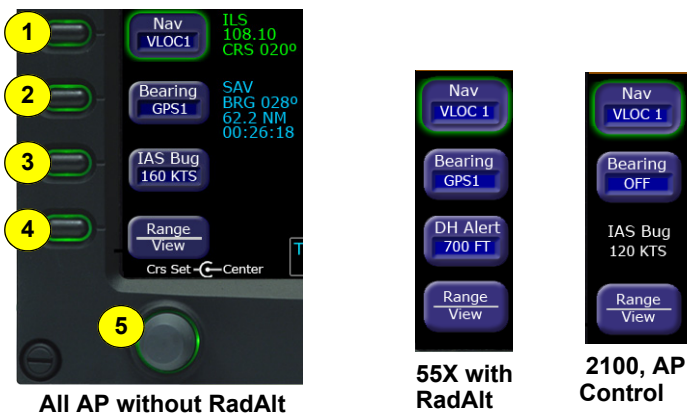
**Figure 5. Left Knob and Button Configurations**

1) **Nav (Primary Navigation)**—Controls the source for the Course Deviation Indicator (CDI) and adjacent data block. In a dual GPS/

VHF navigator system, the available sources are: GPS 1, VLOC 1, GPS 2, and VLOC 2.

2) **Bearing (Secondary Navigation)**—Controls the source for the Bearing Pointer and adjacent data block. In a dual GPS/VHF navigator system, the available sources are: GPS 1, VLOC 1, GPS 2, VLOC 2, ADF (if available), and OFF.

3) Depending on your aircraft configuration, this button will display one of the following:

   ■ **Indicated Airspeed Bug (IAS Bug)**—The IAS button displays the IAS Bug, except when the aircraft is configured with an S-TEC 55X Autopilot and a radar altimeter.

   For S-TEC 1500 and 55X Autopilots, the IAS Bug is for reference only and is never coupled to the autopilot.

   For the S-TEC *IntelliFlight* 2100 Autopilot:

   ◆ If the PFD is controlling the IAS bug, the button displays.
   ◆ If the autopilot is controlling the IAS bug, the IAS Bug and speed display as a label and cannot be set from the PFD.

   ■ **Decision Height Alert (DH Alert)**—If your aircraft is equipped with an S-TEC 55X Autopilot and a radar altimeter, the *DH Alert* button displays. For more information about the DH button and the radar altimeter, see *Right Buttons and Knob*, on page 19.

4) **HSI  Moving Map Range and View Button (Range/View)**— When selected, *Range/View* allows the left knob to control the HSI's moving map range and view:

   ■ **Pushing the knob**—Cycles the HSI through the HSI views (360° with map; 360° without map, 120° with map; 120° without map).

   ■ **Rotating the knob**—Changes the HSI moving map range when the map is available.

   For more information about the HSI Map, see Section 3.4, "Setting Up the HSI" on page 30.

5) **Left Knob**—The function of the left knob changes depending on the enabled button.

- When the IAS Bug is enabled, push *IAS Bug* to display the IAS knob label:

  IAS-⊙-Sync

  - ◆ **Push**—Syncs the setting to the current airspeed. After you push the knob, you can then rotate it to easily make small adjustments to your heading and speed.
  - ◆ **Rotate**—Changes the desired setting one number at a time.

- When DH Alert is enabled, push *DH Alert* to display the DH Set knob label. Rotate the

  DH -⊙-

  knob to change the DH Alert setting. For more information, see *Right Button and Knob Configurations*, on page 20.

- When Nav is enabled, the DTK (Direct Track) Set or Crs Set label displays when you can set a course, as shown in Table 2.1. For information about setting a course, see Section 3.5, "Using GPS/VHF Systems with the EXP5000" on page 32.

**Table 2.1    DTK or Crs Set Labels**

| NAV Source | GPS Nav Condition | Left Knob Label |
|---|---|---|
| GPS 1 or GPS 2 | GPS in Auto-Leg mode | None |
| GPS 1 or GPS 2 | GPS in OBS mode | DTK Set-⊙-Center |
| VLOC 1 or VLOC 2 | Tuned NavAid is a VOR | Crs Set-⊙-Center |
| VLOC 1 or VLOC 2 | Tuned NavAid is an ILS or LOC | Crs Set-⊙- |

- When Range/View is enabled, the left knob controls the HSI view, and if applicable, the moving map range, as follows:

**Table 2.2    HSI Moving Map Range Labels**

| View Selection | Left Knob Label |
|---|---|
| With moving map | Range-⊙-View |
| Without moving map | -View |

**Nav and Bearing Data Blocks**—The Nav data block content varies depending on the source, as follows:

**Table 2.3    Primary Navigation Source**

| NAV Source | Data Block Format |
|---|---|
| GPS 1 or GPS 2 | ■  Waypoint Identifier<br>■  Desired Track to Waypoint<br>■  Distance to Waypoint<br>■  Time-to-Go to Waypoint |
| VLOC 1 or VLOC 2 (VOR  Tuned) | ■  "VOR"<br>■  VOR Frequency<br>■  Course |
| VLOC 1 or VLOC 2 (ILS or LOC Tuned) | ■  "ILS" or "LOC"<br>■  Localizer Frequency<br>■  Course |

The Bearing data block content depends on the source, as follows:

**Table 2.4    Bearing Source**

| Bearing Source | Data Block Format |
|---|---|
| GPS 1 or GPS 2 | ■  Waypoint Identifier<br>■  Bearing to Waypoint<br>■  Distance to Waypoint<br>■  Time-to-Go to Waypoint |
| VLOC 1 or VLOC 2 (VOR  Tuned) | ■  "VOR"<br>■  VOR Frequency<br>■  Bearing to station |
| VLOC 1 or VLOC 2 (ILS or LOC Tuned) | ■  "ILS" or "LOC"<br>■  Localizer Frequency |
| ADF (if available) | ■  ADF Frequency (if available)<br>■  ADF Bearing |
| OFF | ■  Blank |

**Right Buttons and Knob**

The right button configuration is determined by your aircraft's autopilot and whether a radar altimeter is installed. Additionally, for *IntelliFlight* 2100 autopilots only, some buttons are unavailable while the autopilot is controlling the aircraft. For more information, see *IntelliFlight 2100 Vertical Modes*, on page 44.

After you press a button to enable it, use the right knob to change the target settings for that Bug (or setting). The knob label displays the current functionality, as shown in Table 2.5 on page 23.

**Note:** The *Hdg Bug* button is re-enabled ten seconds after you last push or rotate the knob to set the *Alt Bug*, *VSI Bug, DH Alert,* or *Baro Set* buttons. Avidyne recommends that you always select the desired button just before you use the knob.

**S-Tec 1500 or Intelliflight 2100 autopilot
with radar altimeter**

**Other autopilots
No Radar Altimeter**

**Set Alt & VSI
bugs on autopilot**
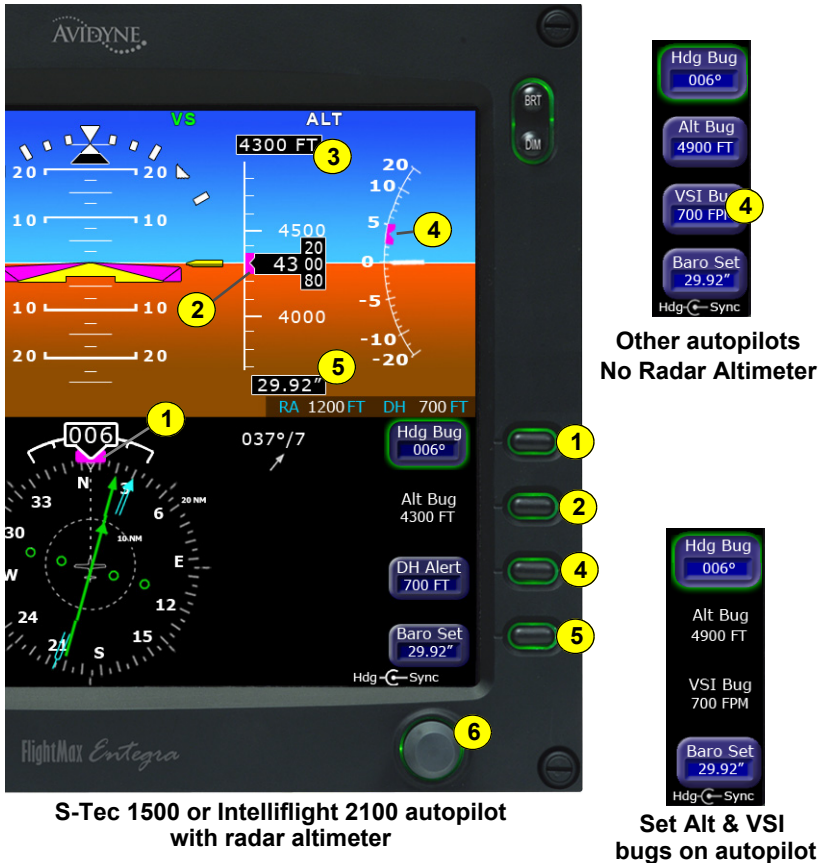
**Figure 6. Right Button and Knob Configurations**

1) **Heading Bug (Hdg Bug)**—Controlled by the right knob when *Hdg Bug* is selected, the notched part of the magenta bug symbol indicates the current Heading Bug value. The Heading Bug is positioned on the selected side of the compass rose and remains in partial view when the HSI is in 120° view and the Heading Bug value is outside the current compass rose field of view. The range is 001 to 360 degrees.

2) **Altitude Bug (Alt Bug)**—Controlled by the right knob when you select *Alt Bug*. The notched part of the magenta bug symbol indicates the current altitude preselect value. When the selected value is outside the current altimeter field of view, the Bug is positioned at the appropriate end of the tape and remains in partial view (left). The Alt Bug displays on the altitude tape and the range of values is the same as the altitude tape (–1,000 feet to 35,000 feet).
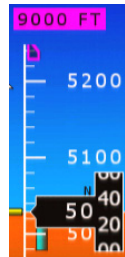
Press the *Alt Bug* button to switch between the Alt Bug modes (1,000 ft., 100 ft., and 10 ft.). The default adjustment position is 1,000 ft. Push the button to select the mode, then rotate the knob to adjust the altitude for that mode.
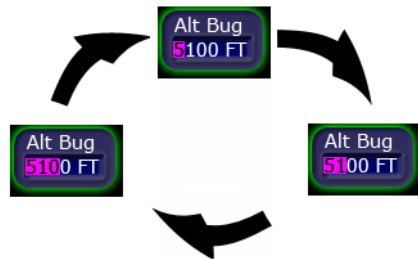
3) **Altitude Preselect**—Displays the numeric value of the Altitude Bug setting. When *Alt Bug* is selected, the numbers appear as black on magenta.

4) Depending on your aircraft configuration, this button will display one of the following:

■ **Decision Height Alert (DH Alert)**—If your aircraft is equipped with an S-TEC 1500 or *IntelliFlight* 2100 Autopilot and a radar altimeter, the *DH Alert* button displays.

When the altitude is within 50 feet of the decision height alert value, the radar altitude value will flash. When the radar altitude is less than the decision height alert value, the radar altitude value will display with a yellow background.

■ **Vertical Speed Indicator Bug (VSI Bug)**—If your aircraft is equipped with an S-Tec 55X or *IntelliFlight* 2100 and does not have a Radar Altimeter, this button displays VSI Bug and controls the right knob when pressed. The notched part of the magenta bug symbol indicates the current VSI Bug set value. The VSI Bug displays on the VSI Indicator. The VSI Bug range is ±1,600 fpm, which is the maximum vertical speed allowed by the S-TEC 55X autopilot.

■ **Blank**—If your aircraft is equipped with an S-TEC 1500 but does not have a radar altimeter, this button is blank and has no function.

> **Note**: If your aircraft is equipped with an S-TEC *IntelliFlight* 2100 Autopilot and a radar altimeter, then the VSI Bug button does not display on the PFD and the VSI Bug can only be set from the Autopilot. Additionally, if the VSI Bug is not active, the Bug is removed from the Vertical Speed Indicator (that is, a hollow VSI Bug will never display).

5) **Barometric Correction Setting (Baro Set)**—Controlled by the right knob when you select *Baro Set*, the value indicates the current barometric correction setting. The baro correction may display as inches of mercury (Hg), millibars (Mb), or hectopascals (Hp). Barometric units are set during EXP5000 installation. The range of allowable values is 27.50" to 31.50" (931 mb/HPa - 1067 mb/HPa). The value appears in the button label and in the Barometric Correction Setting window.

6) **Right Knob**—Once you enable one of the setting buttons, you can either rotate or push the knob:

■ **Rotate**—Allows you to change the desired setting one number at a time.

■ **Push**:

◆ **Hdg Bug**, **Alt Bug**, or **VSI Bug**—Syncs the setting to the current heading, altitude, airspeed, or vertical speed. After pushing the knob, you can then rotate it to easily make small adjustments to your selected heading, altitude, and speed.

◆ **DH Alert**—If your aircraft is equipped with an S-TEC 1500 or *IntelliFlight* 2100 Autopilot and a radar altimeter, initiates a self-test. To perform a self-test, with the right knob labeled DH/Test, press it. The RadAlt will read the test altitude, which is depicted by a T appended to the RadAlt value (2500T, for example). DH self-test mode is only available when the autopilot is not engaged. Otherwise, no action is available.

◆ **Baro Set**—Sets the barometric correction to the international standard setting of 29.92" (1013 hPa/mb).

Table 2.5 summarizes the right knob settings:

**Table 2.5    Right Knob Settings**

| Active Button | Knob Label | Rotary Action | Push Action |
|---|---|---|---|
| Hdg Bug | Hdg —Ⓒ— Sync | Sets Heading Bug | Syncs Heading Bug to current magnetic heading. |
| Alt Bug | Alt —Ⓒ— Sync | Sets Altitude Bug | Syncs Altitude Bug to nearest 100'. |
| DH Alert | DH —Ⓒ— Test<br>DH —Ⓒ— | When available, sets the Decision Height Alert | When available, initiates DH self-test. Otherwise, blank. |
| Baro Set | Baro —Ⓒ— Stnd | Sets Baro | Sets Baro to 29.92. |

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# 3 Flying with the EXP5000

## 3.1 Introduction

This chapter provides information needed to use the EXP5000, and includes the following sections:

- *Starting the EXP5000*, page 26
- *EXP5000 Alignment Messages*, page 27
- *Setting Up the HSI*, page 30
- *Using GPS/VHF Systems with the EXP5000*, page 32
- *Using the S-TEC 55X Autopilot with the EXP5000*, page 33
- *Using the S-TEC 1500 Autopilot with the EXP5000*, page 39
- *Using the S-TEC IntelliFlight 2100 Autopilot with the EXP5000*, page 42
- *Using Other Autopilots with the EXP5000 (PFD 530-00200-() software only)*, page 46
- *Precision Flying with EXP5000*, page 50
- *Using the EXP5000 for Approaches*, page 52

## 3.2   Starting the EXP5000

The EXP5000 includes a solid state Air Data and Attitude Heading Reference System (ADAHRS) which requires an alignment time before you are ready for flight.

The EXP5000 is designed to operate during engine start and shut down procedures. EXP5000 start-up is automatic once power is applied via the battery switch.

➡️   A common startup procedure is to turn on BAT and conduct the aircraft preflight during the ADAHRS alignment process. The PFD and the ADAHRS alignment process may restart when you start the engine.

Approximately 10 seconds after turning on the EXP5000, the AHRS Alignment message box is displayed. In addition to AHRS Alignment messages, the box also displays the aircraft model, product name, and software part number. The informational messages automatically transition as described in Table 3.6 on page 27. When warm-up is complete, the message box is removed.



**Figure 7. AHRS Alignment Message**

Typical alignment time is 3 minutes but may take longer if the aircraft is subjected to motion. Air data (airspeed, altitude, vertical speed) will become valid prior to attitude data. The start-up message block displays a series of messages as shown in Table 3.6 on page 27, and is automatically removed when warm-up is complete.

## EXP5000 Alignment Messages

**Note:** For faster alignments (3 minutes or less), Avidyne recommends that you do not move the aircraft until alignment is complete. The OK TO TAXI message provides increased flexibility during ground operations, but it may extend overall alignment time.

**Table 3.6     Initialization Phases**

| Alignment Phase & Dialog Displayed | Approximate Duration | Pilot Action |
|---|---|---|
| **INITIAL AHRS ALIGNMENT**<br><br>REMAIN STATIONARY OK TO TAXI IN xx SECONDS | 30 Seconds | Remain Stationary |
| **AHRS WARMING UP**<br><br>OK TO TAXI | 90 seconds, if stationary.<br><br>Up to several minutes if moving. | You can taxi, but Avidyne recommends remaining stationary for faster overall alignments |
| **READY FOR FINAL AHRS ALIGNMENT**<br><br>BRING AIRCRAFT TO A STOP AS SOON AS PRACTICAL | 5 seconds, if stationary.<br><br>Up to several minutes if moving. | If moving, bring aircraft to a stop as soon as practical. |
| **FINAL AHRS ALIGNMENT**<br><br>REMAIN STATIONARY READY TO GO IN X SECONDS | 40 - 45 seconds | Remain stationary |

## AHRS Alignment Errors

While alignment and startup should proceed smoothly, in the case of error, you may see one of the following messages in the AHRS Init box:

**Table 3.7     AHRS Alignment Errors**

| Message | Recommended Pilot Action |
|---|---|
| **UNABLE TO COMPLETE ALIGNMENT**<br><br>**MOTION SENSED - STOP AIRCRAFT**<br>Alignment Should Resume Within 2 Mins. | Stop aircraft as soon as practical and wait for alignment to resume. |
| **UNABLE TO COMPLETE ALIGNMENT**<br><br>**MAGNETIC ANOMALY IN THE AREA**<br>Recommend Moving Aircraft | Move Aircraft to different location and begin startup operations. |
| **UNABLE TO COMPLETE ALIGNMENT**<br><br>**SOFTWARE FAULT EXPERIENCED**<br>Recommend Power Cycle | Power Cycle the PFD. If message displays again, contact Avidyne Technical Support. |
| **UNABLE TO COMPLETE ALIGNMENT**<br><br>**ATTITUDE SENSOR FAILURE**<br>Recommend One-Time Power Cycle | Power Cycle the PFD. If message displays again, contact Avidyne Technical Support. |
| **UNABLE TO COMPLETE ALIGNMENT**<br><br>**NO COMM. WITH MAGNETOMETER** | Contact an Avidyne Entegra Certified Service Center. |

**Note**: If any error message continues to display, contact an Avidyne Entegra Certified Service Center.

## Mag Cal Error

If the following alert is displayed, contact an Avidyne Entegra Certified Service Center as soon as practical.

## 3.3   Startup Settings



**Figure 8. Default Startup Settings**

When powered up, the Envision EXP5000 starts with the following default values:

- **Hdg Bug, Alt Bug, Baro Set**—The value from just before previous shutdown
- **Map Range, Map View—**The setting from just before previous shutdown
- **DH**—The setting from just before previous shutdown
- **Alt Bug Mode**—Thousands mode
- **VSI Bug**—If the *VSI Bug* button displays on your PFD, the VSI Bug is set to 0. If the *VSI Bug* button does not display on your PFD, the VSI Bug only displays when activated from the Autopilot.
- **IAS Bug**—The setting from just before previous shutdown
- **Nav**—GPS 1
- **Bearing**—OFF
- **Right Side Active Button**—Hdg Bug
- **Left Side Active Button**—Nav
- **Right Knob**—Sets Hdg Bug
- **Left Knob**—Inactive

## 3.4   Setting Up the HSI

The Envision EXP5000 can integrate with single or dual GNS 400/500-series GPS or GPS/VHF navigator systems. When your EXP5000 PFD is installed, it is configured for the number and type of navigator systems on board.

Use the *Nav* button (Primary Nav) to select the navigator source for the green single-line CDI and the moving map data. The active flight plan from the selected navigator unit drives the moving map on the HSI and will display up to 15 waypoints, including the curved approach path and holding pattern segments.

**Note**:  Garmin 400W/500W-Series GPS or GPS/VHF navigator systems are capable of flying a parallel offset track. Since the 400W/500W navigators do not provide the PFD with information to depict the parallel offset flight plan correctly, the PFD does the following when the 400W/500W is navigating to a parallel offset track:

● The offset flight plan is not depicted.

● The original non-offset flight plan is depicted on the HSI with the active leg shown in white instead of magenta.

● The To Waypoint identifier is removed from the Nav/Bearing/Aux datablock.

● The waypoint identifier in the Primary Nav datablock is removed.

**Note**: The Garmin 430W is capable of redrawing holding patterns based on groundspeed. However, the 400W/500W navigators do not always transmit the correct information to external devices to allow them to draw holding patterns correctly.  In these situations, the depiction of the holding pattern on the PFD will not match that of the 400/500W.  If this occurs, correct guidance is still provided on the CDI/HDI and also to the autopilot while in GPSS mode.

GPS 1 is also the primary source for ground-speed readout and a required element for the wind vector calculation and display. If GPS 1 is unavailable, ground speed and wind vector data are derived from GPS 2. If the Nav source is selected to a VOR or localizer source, the

HSI will display the appropriate course deviation indicator. The moving map from the associated GPS will still be displayed.

For more information about the Wind Vector and the HSI moving map display, see Section 2.3, "EXP5000 Lower Half Display" on page 11

Use the *Bearing* button to select the Nav source for the blue double-line bearing pointer. If the selected bearing source is a Localizer, the bearing pointer does not display.

To take full advantage of the EXP5000, GPS 2 can be loaded with Direct-To waypoints, alternative flight plans, or Navaid frequencies to provide additional guidance beyond what is loaded into GPS 1. This information can be selected for display on the EXP5000 as the *Bearing*.

While using the crossfill capability of dual-configured GPS systems is fully supported and a common technique, it can prevent you from taking full advantage of the multiple Nav source display capability of the EXP5000.

For information about loading data into your GPS/VHF unit see the *Pilot's Guide* for your GPS/VHF system.

**Note**: The CDI on the EXP5000's HSI comes from the selected *Nav* source which may be different from the CDI displayed on the GPS 1 or GPS 2 displays.

## 3.5 Using GPS/VHF Systems with the EXP5000

You can use the EXP5000 to set a primary navigation course setting on the HSI when one of three conditions is met:

● **PFD Nav Source = GPS 1 or GPS 2** and the selected GPS/VHF system is in OBS mode.

● **PFD Nav Source = VLOC 1 or VLOC 2** and the current frequency is a VOR station.

● **PFD Nav Source = VLOC 1 or VLOC 2** and the current frequency is an ILS or localizer. In this case, you can set a course for reference. The CDI is driven by the received localizer signal, regardless of the course set.

The CDI scale on the EXP5000's HSI is automatically set by the GPS/VHF system as a function of the Nav source you select with the PFD *Nav* button.



**Figure 9. Setting CDI Scale on EXP5000's HSI**

The source you select for Nav is coupled with the *CDI* button on the GPS/VHF unit, as follows:

● When you toggle the *Nav* button on the EXP5000 from GPS 1 to VLOC 1 and back, the CDI source on GPS 1 changes from GPS to VLOC and back to match the current *Nav* setting.

● Similarly, when you toggle the *CDI* button on the GPS/VHF unit from GPS to VLOC and back, the *Nav* source on the EXP5000 changes to match.

➡ Avidyne recommends that you use the CDI button on GPS 1 to toggle the Nav source back and forth, especially for dual-GPS installations where the PFD *Nav* button cycles through all four Nav sources (GPS 1, VLOC 1, GPS 2, VLOC 2), and the CDI button on GPS 1 makes it easy to switch the EXP5000 between GPS 1 and VLOC 1 and back.

## 3.6   Using the S-TEC 55X Autopilot with the EXP5000

If your aircraft is equipped with an S-TEC 55X Autopilot, the EXP5000 provides the following:

● Flight Director steering command bars

● Autopilot Bugs that are functional and can control the autopilot

● Autopilot annunciations

This section describes EXP5000-specific autopilot features. For detailed information on using your autopilot, see your autopilot documentation.

### S-Tec 55X Autopilot Annunciations

Autopilot annunciations display left to right across the top of the EXP5000. The color of the annunciated text indicates the mode or state as follows:

● **Green** - Active (armed)

● **Amber** - Failed

### S-Tec 55X Autopilot Bugs

The color of Heading, Altitude, or VSI  Bugs indicate when the bug is coupled with the autopilot.

● A **solid magenta** Heading, Altitude, or VSI Bug indicates that the bug is coupled to the autopilot in an active mode.

● A **hollow magenta** Heading, Altitude, or VSI Bug indicates that the bug is not coupled to the autopilot in an active mode.

For more information about the EXP5000 bugs, see *Right Buttons and Knob*, on page 19.

### AP (Autopilot) and FD (Flight Director) Modes

The FD (Flight Director) displays the flight profile commanded by the autopilot. In FD-equipped aircraft, the FD steering command bars indicate how to fly the aircraft to achieve the path commanded by the autopilot. The presence and color of the FD steering command bars and autopilot annunciations reflect the AP and FD mode:

● **AP (Autopilot) Mode** - There are no Flight Director steering command bars and only the AP annunciation appears on the PFD. The autopilot flies the aircraft.

● **FD (Flight Director) Mode** - The Flight Director steering command bars are **green** and the FD annunciation appears on the PFD  In FD mode, the command bars show you where to steer, but you need to fly the aircraft so that the Aircraft Reference Symbol  (ARS) is tucked into the FD steering command bars.

> **Note:** A small amount of jitter in the FD steering command bars is considered normal.

● **AP/FD (Full Autopilot) Mode** - The FD steering command bars are **magenta** and both AP and FD annunciations appear on the PFD. In AP/FD mode, the autopilot flies the aircraft, precisely tucking the ARS into the FD steering command bars.

## S-Tec 55X Horizontal Modes

The EXP5000 supports the following horizontal autopilot modes.

● **Heading Capture/Hold Mode** (**HDG Mode**) - The PFD supports the S-Tec 55X HDG mode as follows:

  ■ To set the heading, on the EXP5000, press the *Hdg Bug* button and rotate the right knob.

  ■ To engage the heading mode, on the autopilot control head, press the *HDG* button.

  The Heading Bug becomes solid magenta and the autopilot flies the input heading. The autopilot control head and the EXP5000 annunciate HDG. The Heading Bug remains solid magenta until HDG mode is cancelled. You can select a new heading at any time while the autopilot is in HDG mode and the autopilot will fly the new heading.

● **Nav Mode** - The PFD supports the S-Tec 55X NAV mode as follows:

  ■ To engage the NAV mode, on the autopilot control head, press the *NAV*  button.

> **Note:** The autopilot can be coupled only to a **Nav** source selected on the PFD; it *cannot* be coupled to a **Bearing** source.

The autopilot intercepts and flies the active plan of the navigation source selected on the PFD:

■ Nav = GPS1 or GPS2 (GPS flight plan), or

■ Nav = VLOC1 or VLOC2 (VOR or localizer).

The EXP5000 and the autopilot control head annunciate NAV.

If you select a localizer, the autopilot will automatically engage APR mode. The EXP5000 and autopilot annunciate NAV APR. In APR mode, the Heading Bug is hollow and remains at its last set value, which may not be aligned with the Nav course.

Glideslope capture is supported while in NAV APR ALT mode.

● **GPS Roll Steering Mode** (**GPSS Mode**) - In GPSS mode, the autopilot flies the active flight plan of the selected GPS (Nav = GPS 1 or GPS 2). Because GPSS is more accurate, Avidyne recommends that for navigation, you use GPSS mode during autopilot operations.

■ To engage the GPSS mode, on the autopilot control head, press the NAV button twice.

The GPS commands the autopilot to fly legs of the entered flight plan. The EXP5000 and the autopilot control head annunciate GPSS. The Heading Bug, which is not used, is hollow and remains at its last set value, which may not be aligned with the current course.

> If a VLOC is selected in NAV on the PFD and GPSS mode is engaged on the autopilot, the autopilot will track the active flight plan in GPS 1 if VLOC 1 is selected or GPS 2 if VLOC 2 is selected. It will not track VLOC 1 or VLOC 2 as the selected source in NAV on the PFD. Therefore the course deviation on the PFD CDI and the course deviation flown by the autopilot can be different. This situation may be confusing and should be avoided.
>
> During this condition, the normally green "GPSS" annunciation on the PFD changes to amber to alert you of this condition.

> ⚠️ Do not use GPSS mode on the final approach segment of a VLOC approach (ILS, LOC or non-GPS-overlay VOR). You must select NAV mode (and clear GPSS mode) prior to the turn onto the final approach course.

## Vertical Modes

**Note:** One of the Horizontal Modes (HDG or NAV) must be engaged on the autopilot control head before you can engage a vertical mode.

● **Altitude Hold Mode** - Push *ALT* on the autopilot control panel to enable altitude hold. The target altitude is the current altitude when you pressed the *ALT* button and the autopilot will hold that altitude. The Alt Bug will be set to the nearest 100 feet of the current altitude and will become solid magenta. If Flight Director is available, the Flight Director steering command bars will display.

> **Note:** You can use the knob on the right side of the autopilot control head as an altitude "bump," such that each rotational click of the knob will change target altitude by 20 feet. The Altitude Bug setting will not change.

● **Vertical Speed Mode** (**VS mode**) - Push the *VSI Bug* button and rotate the right knob on the EXP5000 to set the desired vertical speed. The VSI Bug will be hollow. Engage VS mode by pressing the *VS* button on the autopilot control head. At this point, the VSI Bug will become solid magenta. If Flight Director is available, the Flight Director steering command bars will display. When VS mode is cancelled, the VSI Bug will be hollow but remains at its last value.

> **Note:** The VSI Bug may be set to a range of +/- 1,600 fpm. This range coincides with the VS limits of the autopilot.

● **Altitude Capture Mode** - Push the *Alt Bug* button on the EXP5000 and rotate the right knob on the EXP5000 to set a desired target altitude. Engage Altitude Capture mode by simultaneously pressing the *ALT* and *VS* buttons on the autopilot control head. The Alt Bug and VSI Bug will become solid magenta, while the Flight Director steering command bars, if configured on the aircraft, are shifted to correspond with the autopilot commands.

As the target altitude is approached, the VSI Bug will automatically move toward zero and will become hollow when the target altitude is captured. At the target altitude, the delta-shaped aircraft reference symbol is tucked into the Flight Director command bars.

> **!** When engaging the Altitude Capture Mode, confirm that both ALT and VS are engaged on the autopilot. If VS is not engaged the autopilot will level the aircraft at the current altitude when ALT is engaged on the autopilot.

> **!** The vertical modes of the S-TEC 55X Autopilot (Alt Hold, Alt Capture, and VS Mode) are wired to the pilot PFD only. If the copilot altimeter or VSI differs from the pilot's, the copilot PFD may display a mismatch between the bugs and the autopilot controlled altitude or vertical speed.

## S-Tec 55X Autopilot Operation During a PFD Failure

In the unlikely event of a total PFD failure, the autopilot can still be controlled via its control head. How it works depends on whether you have a one or two PFDs as follows.

### Failure with a Single PFD

In a single-PFD installation, the Nav Relay automatically connects GPS 1 to the autopilot. The GPS provides NAV data to the autopilot which, if set to GPSS mode, will fly as commanded. GPS roll steering (GPSS Mode) is the only horizontal mode available on the autopilot.

> **Note:** In a single-PFD configuration, only GPS1 is capable of being the navigation source to the autopilot in the event of a PFD failure.

> **!** **For S-TEC 55X Autopilots.** If the Heading Hold mode of the 55X is engaged when the PFD is powered down or shuts down, it is likely that the aircraft will enter a 1/4- to 1/2-standard rate turn to the right and will remain in the turn indefinitely.
>
> Heading mode is inoperative when the PFD is inoperative. In this case, GPSS mode is the *only* horizontal mode available.

### Failure with Dual PFDs

In a dual-PFD installation, the Nav Relay automatically connects the remaining PFD to the autopilot.  The remaining PFD provides NAV data to the autopilot which, if set to GPSS mode, will fly as commanded. GPS roll steering (GPSS Mode) is the only horizontal mode available on the autopilot.

> **For S-TEC 55X Autopilots.** If the Heading Hold mode of the 55X is engaged when the PFD is powered down or shuts down, it is likely that the aircraft will enter a 1/4- to 1/2-standard rate turn to the right and will remain in the turn indefinitely.
>
> Heading mode is inoperative when the PFD is inoperative. In this case, GPSS mode is the *only* horizontal mode available.

### Vertical Modes During a PFD Failure

In the event of a PFD failure, the ALT Hold Mode and VS mode are available and may be controlled using the *ALT* and *VS* buttons and the rotary knob on the autopilot control head. See the autopilot documentation for further information.

## 3.7   Using the S-TEC 1500 Autopilot with the EXP5000

If your aircraft is equipped with an S-TEC 1500 Autopilot, the EXP5000 provides the following:

● Flight Director steering command bars

● Autopilot bugs, which display, but cannot be controlled from the PFD

This section describes EXP5000-specific autopilot features. For detailed information on using your autopilot, see your autopilot documentation.

### S-Tec 1500 Autopilot Annunciations

The PFD does not display S-TEC 1500 autopilot annunciations.

### S-Tec 1500 Autopilot Bugs

On the PFD, the Vertical mode autopilot bugs, ALT (Altitude Bug) and VS (Vertical Speed Bug), are advisory only. They can be controlled only from the autopilot. If you change either of these bugs on the S-Tec 1500, the bug value on the PFDs is automatically updated.

The Heading Bug works as described in "S-TEC 1500 Horizontal Modes" on the next page.

### S-TEC 1500 Vertical Modes

The vertical speed bug and the altitude hold bug display on the EXP5000, however they cannot be set from the EXP5000. Control the vertical modes directly on the S-Tec 1500 autopilot.

### Dual-PFD Synchronization

See Section 5.2, "Synchronized and Non-synchronized Controls" on page 69, to learn which PFD settings and Bugs are synchronized between PFDs and which can have different values on the pilot and copilot PFDs.

## S-TEC 1500 Horizontal Modes

This section describes horizontal and flight director modes supported by the EXP5000.

> **Note:** The autopilot can be coupled only to a **Nav** source selected on the PFD; it *cannot* be coupled to a **Bearing** source.

● **Heading Capture/Hold Mode**—Press the *Hdg Bug* button on the PFD and rotate the right knob to set a desired heading. Press the *HDG* button on the autopilot control head to engage heading mode. The autopilot will track the input heading. The autopilot control head will annunciate HDG. Select a new heading at any time while the autopilot is in heading mode and the autopilot will track the new heading bug value.

> **Note:** See the S-TEC 1500 faceplate for engaged mode annunciation.

● **Nav/Apr Mode**—Press the NAV button on the autopilot control head to engage Nav mode.

  ■ If the nav source on the PFD is NAV = GPS1 or GPS2, the autopilot will fly the active flight plan using GPS roll steering and will annunciate NAV GPSS.

  ■ If the nav source on the PFD is Nav = VLOC1 or VLOC2, the autopilot will fly the active VOR or localizer signal.

  ■ When a localizer is the active Nav source, the autopilot will automatically transition to APR mode when the localizer is captured and will annunciate NAV APR.

  ■ Glideslope capture is supported when the autopilot is in NAV APR mode and ALT (altitude hold) mode.

## AP (Autopilot) and FD (Flight Director) Modes

The EXP5000 supports the AP (Autopilot) and FD (Flight Director) modes for S-Tec 1500 autopilots.  In FD-equipped aircraft, single-cue FD steering command bars display the flight profile commanded by the autopilot. The FD steering command bars indicate how to fly the aircraft to achieve the path commanded by the autopilot.

Engage the AP and FD modes as described in the S-Tec 1500 documentation. They can not be engaged from the PFD.

The presence of the FD steering command bars (magenta) reflect the AP and FD mode:

● **AP (Autopilot) Mode** - There are no Flight Director steering command bars. The autopilot flies the aircraft.

> **Note:** The autopilot can be coupled only to a **Nav** source selected on the PFD; it *cannot* be coupled to a **Bearing** source.

● **FD (Flight Director) Mode** - In FD mode, the FD steering command bars show you where to steer, but you need to fly the aircraft so that the Aircraft Reference Symbol  (ARS) is tucked into the FD steering command bars.

> **Note:** A small amount of jitter in the FD steering command bars is considered normal.

● **AP/FD (Full Autopilot) Mode** - In AP/FD mode, the autopilot flies the aircraft, precisely tucking the ARS into the FD steering command bars.

The FD steering command bars are limited to +/- 30° in roll and +/- 15° in pitch with respect to the aircraft reference symbol.

## Autopilot Operation During a PFD Failure

> ⚠ **S-TEC 1500 Autopilot Operation During PFD Failures**
>
> The S-TEC 1500 requires a dual-PFD installation to operate. If either PFD fails, the autopilot cannot be engaged.

## 3.8 Using the S-TEC IntelliFlight 2100 Autopilot with the EXP5000

If your aircraft is equipped with an S-TEC Intelliflight 2100 Autopilot, read this section for information on how the EXP5000 operates with the S-Tec IntelliFlight 2100 autopilot. The following sections describe the autopilot modes and annunciations supported by the PFD.

### IntelliFlight 2100 Autopilot Bugs

The color of Heading, Altitude, or VSI  Bugs indicates when the bug is coupled to the autopilot.

● A **solid magenta** Heading, Altitude, or VSI Bug indicates that the bug is coupled to the autopilot.

● A **hollow magenta** Heading, Altitude, or VSI Bug indicates that the bug is not coupled to the autopilot.

For more information about the EXP5000 bugs, see *Right Buttons and Knob*, on page 19.

### IntelliFlight 2100 Autopilot Annunciations

The autopilot annunciations display left to right across the top of the EXP5000. The color of the annunciated text indicates the mode or state as follows:

● Green - Active mode

● White - Armed mode

● Amber - Failure state

When a mode fails, both the FAIL message and the failed mode display in amber. The message alternates between the failed mode and the word FAIL.

The following table identifies the autopilot messages that can be annunciated across the top of the PFD. From left to right, the columns in this table map to fields "in the same location" across the top of the PFD. For example, any AP Status message will display in the left-most position and any Trim Status message will display in the right-most position.

**Table 3.8      IntelliFlight 2100 Annunciations**

| AP Status | Active Lateral Mode | Armed Lateral Mode | Control Wheel Steering | Active Vertical Mode | Armed Vertical Mode | Trim Status |
|---|---|---|---|---|---|---|
| AP INIT | ROLL | NAV | CWS | PITCH | ALT | TRIM UP |
| AP FAIL | HDG | APR | | IAS | GS | TRIM DN |
| AP | NAV | REV | | VS | FAIL | |
| FD | NAV GPSS | NAV GPSS | | GS | | |
| AP RDY | APR | APR GPSS | | ALT HOLD | | |
| | APR GPSS | FAIL | | FAIL | | |
| | REV | | | | | |
| | FAIL | | | | | |

## Dual-PFD Synchronization

See Section 5.2, "Synchronized and Non-synchronized Controls" on page 69, to learn which PFD settings and Bugs are synchronized between PFDs and which can have different values on the pilot and copilot PFDs.

## IntelliFlight 2100 Horizontal Modes

The Envision PFD supports the following Intelliflight 2100 horizontal modes:

> **Note:** The autopilot can be coupled only to a GPS or NAV selected as the PFD **Nav** source. The autopilot can **not** be coupled to a **Bearing** source.

● **Heading Capture/Hold Mode**—Press the *Hdg Bug* button on the PFD and rotate the right knob to set a desired heading. Press the *HDG* button on the autopilot control head to engage heading mode. The autopilot will track the input heading. The autopilot control head will annunciate HDG. Select a new heading at any time while the autopilot is in heading mode and the autopilot will track the new heading bug value.

● **Nav/Apr Mode**—Press the NAV button on the autopilot control head to engage Nav mode.

   ■ If GPS (Nav=GPS 1 or GPS 2) is the selected nav source on the PFD, the autopilot will track the active flight plan using GPS roll steering and will display "NAV GPSS".

   ■ If VLOC (Nav=VLOC 1 or VLOC 2) is the selected nav source on the PFD, the autopilot tracks the active VOR or localizer signal.

   ■ When a localizer is the active Nav source, the autopilot will automatically transition to APR mode when the localizer is captured and will display "NAV APR".

   ■ Glideslope capture is supported when the autopilot is in NAV APR and altitude hold ("ALT") modes.

## IntelliFlight 2100 Vertical Modes

For the *IntelliFlight* 2100 Autopilot, all vertical modes are controlled from the Autopilot control panel, but the bugs display on the PFD. When the autopilot is commanding the bug, the button label background is removed (as shown in Figure 2.5 Right Knob Settings on page 23), and the bug displays as solid. In this case, the bug can only be controlled from the autopilot.

If the autopilot is disengaged, the button label background displays. You can change autopilot bug values on the PFD, however, the new bug values are not sent to the autopilot. Use them for reference only.

## IntelliFlight 2100 Flight Director Modes

The Flight Director (FD) displays the flight profile commanded by the autopilot. In FD-equipped aircraft, the FD command bar indicates how to fly the aircraft to achieve the path commanded by the autopilot. The color of the FD command bar reflects the status of the autopilot. These modes are:

● **AP (Autopilot) Mode** - There are no Flight Director steering command bars and only the AP annunciation appears on the PFD. The autopilot flies the aircraft.

● **FD (Flight Director) Mode** - The Flight Director steering command bars are **green** and the FD annunciation appears on the PFD  In FD mode, the command bars show you where to steer, but you need to guide the aircraft so that the Aircraft Reference Symbol  (ARS) is tucked into the steering command bars.

● **AP/FD (Autopilot and Flight Director) Mode** - The FD steering command bars are **magenta** and both AP and FD annunciations appear on the PFD. In AP/FD mode, the autopilot flies the aircraft toward the FD command bars, tucking the ARS into the FD command bars.

A switch on the S-TEC *IntelliFlight* faceplate enables you to select the AP (autopilot) and FD (flight director) modes.

The FD steering command bars are limited to +/- 30° in roll and +/- 15° in pitch with respect to the aircraft reference symbol.

**Operating the IntelliFlight 2100 Autopilot During a PFD Failure**

> **S-TEC IntelliFlight 2100 Autopilot Operation During PFD Failures**
>
> The S-TEC 2100 is intended to be used in a dual-PFD configuration. However, if your aircraft is equipped with the autopilot ADAHRS disconnect switch, and a PFD fails, you can still operate the autopilot from the working PFD (after switching the autopilot ADAHRS disconnect switch).

## 3.9 Using Other Autopilots with the EXP5000 (PFD 530-00200-() software only)

The prevous sections describe how the S-TEC 55X, S-Tec 1500, and S-Tec Intelliflight 2100 autopilots work with the EXP5000. This section describes features that the EXP5000 supports with other autopilots. If your aircraft is equipped with an autopilot other than those described in previous sections and if you have PFD software P/N 530-00200-(), the EXP5000 may provide the following:

● Flight Director (FD) steering command bars (optional)

● Autopilot bugs, which display and can be changed from the PFD, but are not used by the autopilot.

This section describes EXP5000-specific autopilot features. For detailed information on using your autopilot, see your autopilot documentation.

### Autopilot Annunciations

The PFD does not display autopilot annunciations for other autopilots.

### Autopilot Bugs

Altitude and vertical speed bugs are displayed and can be changed on the PFD, but are not used by the autopilot; they are advisory only. Control the vertical modes directly on the autopilot as described in the autopilot documentaiton

### Vertical Modes

Altitude and vertical speed bugs are displayed and can be changed on the PFD, but are not used by the autopilot; they are advisory only. Control the vertical modes directly on the autopilot as described in the autopilot documentaiton

### Horizontal Modes

All horizontal modes are controlled from the autopilot as described in the autopilot documentation. The heading bug displays on the EXP5000, however it cannot be set from the EXP5000.

The EXP5000 supports the following horizontal mode features.

● **Heading Capture/Hold Mode** (**HDG Mode**) - The PFD supports the HDG mode as follows:

- ■ To set the heading, on the EXP5000, press the *Hdg Bug* button and rotate the right knob. The Heading Bug is magenta.

- ■ Engage the heading mode on the autopilot.

  The autopilot flies the input heading. You can select a new heading at any time while the autopilot is in HDG mode and the autopilot will fly the new heading.

● **NAV (Navigation) Mode** - The autopilot flies a course or plan specified by the Nav source. Program the Nav source (GPS or Nav radio), select the Nav source on the EXP5000, and then engage NAV mode on the autopilot. The autopilot intercepts and flies the active leg. The Nav sources can be:

- ■ Nav = GPS1 or GPS2 (GPS flight plan)

- ■ Nav = VLOC1 or VLOC2

  Refer to your autopilot documentation for further autopilot features.

  **Note:** In NAV mode, the Heading Bug is hollow (not coupled with the AP), remains at its last set value, and may *not* be aligned with the course being flown.

● **GPSS (GPS Roll Steering) Mode** - If this feature is available and engaged on the autopilot, the autopilot flies the active flight plan of the selected GPS (NAV = GPS1 or GPS2). When you engage GPSS mode on the autopilot, the autopilot flies the GPS steering commands from the selected GPS. Avidyne recommends that you use GPSS mode as the Nav Mode during autopilot operations to provide a higher level of accuracy.

  **Note:** In GPSS mode, the Heading Bug is hollow (not coupled with the AP), remains at its last set value, and may *not* be aligned with the course being flown.

  ⚠️ Do not use GPSS mode on the final approach segment of a VLOC approach (ILS, LOC or non-GPS-overlay VOR). You must select NAV mode (and clear GPSS mode) prior to the turn onto the final approach course.

⚠️

If a VLOC is selected in NAV on the PFD and GPSS mode is engaged on the autopilot, the autopilot will track the active flight plan in GPS 1 if VLOC 1 is selected or GPS 2 if VLOC 2 is selected. It will not track VLOC 1 or VLOC 2 as the selected source in NAV on the PFD. Therefore the course deviation on the PFD CDI and the course deviation flown by the autopilot can be different. This situation may be confusing and should be avoided.

## AP (Autopilot) and FD (Flight Director) Modes

The EXP5000 supports the AP (Autopilot) and FD (Flight Director) modes for other autopilots. In FD-equipped aircraft, the FD displays the flight profile commanded by the autopilot. The FD steering command bars indicate how to fly the aircraft to achieve the path commanded by the autopilot.

Engage the AP and FD modes as described in the documentation for your autopilot. They can not be engaged from the PFD.

The presence of the FD steering command bars (magenta) reflect the AP and FD mode:

● **AP (Autopilot) Mode** - There are no Flight Director steering command bars. The autopilot flies the aircraft.

> **Note:** The autopilot can be coupled only to a **Nav** source selected on the PFD; it *cannot* be coupled to a **Bearing** source.

● **FD (Flight Director) Mode** - In FD mode, the FD steering command bars show you where to steer, but you need to fly the aircraft so that the Aircraft Reference Symbol  (ARS) is tucked into the FD steering command bars.

> **Note:** A small amount of jitter in the FD steering command bars is considered normal.

● **AP/FD (Full Autopilot) Mode** - In AP/FD mode, the autopilot flies the aircraft, precisely tucking the ARS into the FD steering command bars.

The FD steering command bars are limited to +/- 30° in roll and +/- 15° in pitch with respect to the aircraft reference symbol.

## Operating the Autopilot During a PFD Failure

In the unlikely event of a total PFD failure in n aircraft with one PFD, switch the Nav Relay to connect GPS 1 to the autopilot. By doing this, the GPS will provide NAV data to the autopilot which, if set to GPSS mode, will fly flight plan activated in the GPS. Also, the vertical modes (ALT and VS) will continue to work on the autopilot. See the autopilot documentation for further information.

## 3.10 Precision Flying with EXP5000

This section describes several techniques which take advantage of the EXP5000's features to produce precision flight performance.

### Obtaining Level Flight

You can obtain level flight by placing the apex of the yellow delta-shaped reference symbol a the pitch angle where the altitude trend vector is not displayed and the VSI reads zero (0). The pitch angle for level flight will vary with flight conditions, depending on speed, altitude and weight. There is no manual adjust capability (i.e. parallax adjust).

### Flying a Constant Rate Turn

The proper technique for flying a constant rate turn involves using a combination of the turn indicator and the bank angle indicator. Figure 10 shows a constant rate turn to the right.
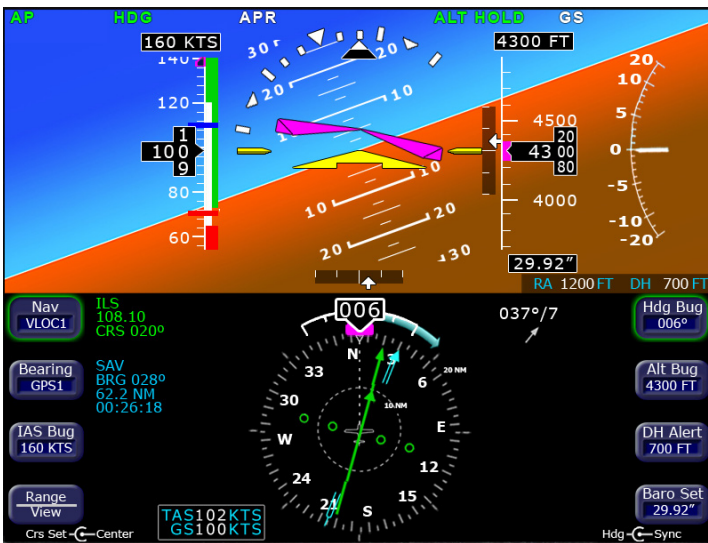


**Figure 10. Flying a Constant Rate Turn**

Initiate the standard rate turn by banking to an initial bank angle of 20 degrees with reference to the bank angle indicator, then adjust the bank angle to standard rate by reference to the standard rate turn indicator. Deviations from an intended bank angle are extremely easy to notice with the EXP5000 ADI horizon line.

## Using Trend Indicators

Use the trend indicators to capture and maintain a desired airspeed and altitude by adjusting the pitch and/or power to the airspeed or altitude you want. This results in a smooth capture of the desired airspeed and altitude.
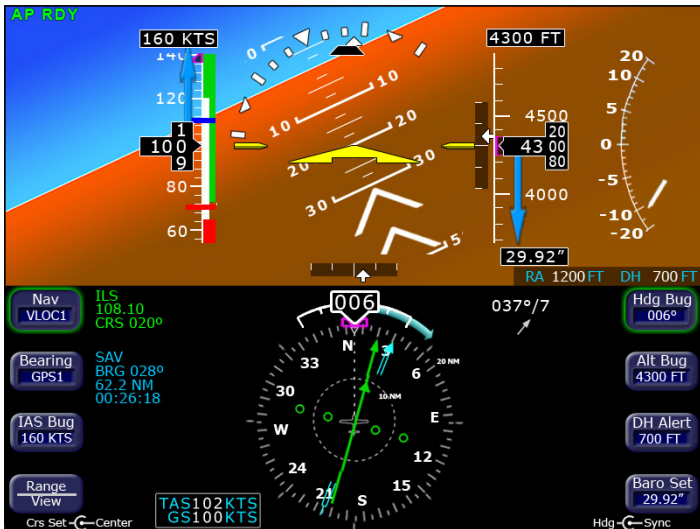


**Figure 11. Trend Indicators**

1) **Airspeed Trend Indicator**—The tip of the blue airspeed trend indicator displays the predicted airspeed six seconds into the future at the current rate of change. The Airspeed Trend Indicator displays changes greater than 0.8 knots/sec. An arrowhead indicates a value beyond the current tape field of view.

2) **Excessive Pitch Chevrons**—Large white chevrons display at pitch values greater than +50 degrees and less than -30 degrees. In all cases, the chevrons point towards the horizon line.

3) **Rate of Turn Indicator**—The tip of the blue rate of turn indicator displays the current rate of turn. The indicator is marked for 1/2 and full standard rate of turn. An arrowhead indicates a value beyond 1 1/2 standard rate.

4) **Altitude Trend Indicator**—The tip of the blue altitude trend indicator displays the predicted altitude six seconds into the future at the current rate of change. An arrowhead indicates a value beyond the current tape field of view.

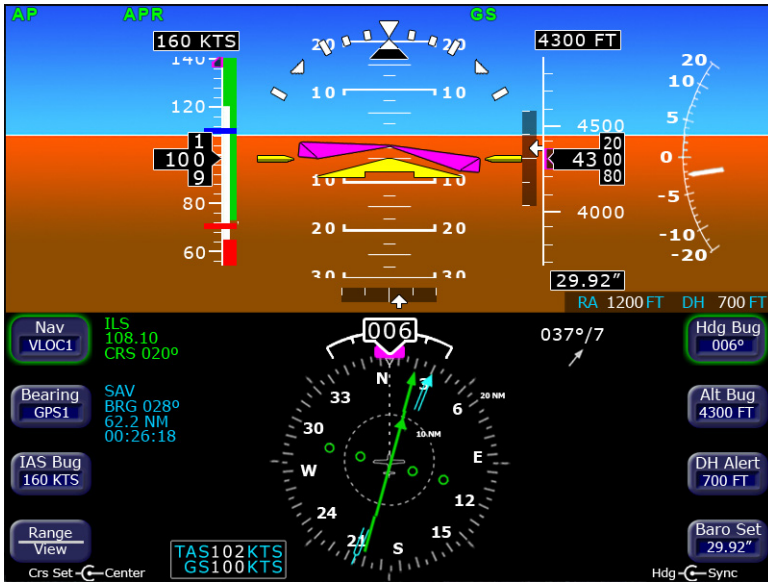## 3.11  Using the EXP5000 for Approaches

### Precision Approaches



**Figure 12. Flying an ILS Approach**

### Flying an ILS Approach

The EXP5000 is designed to take full advantage of the auto transition capability of the Navigator systems for flying a GPS flight plan ending in an ILS approach. In this case, the horizontal deviation indicator (HDI) and vertical deviation indicator (VDI) windows are displayed on the ADI.

The CDI course is automatically set to the inbound localizer course resulting in a hands-free transition.

As long as you select a localizer or ILS via the EXP5000 Nav button, the HDI and VDI will automatically display when applicable localizer and glideslope signals are received. No pilot action is required.

Avidyne recommends that you set the inbound course using the EXP5000 Course Set knob to serve as reference during the localizer intercept and tracking. This is automatic if the Navigator system has been set to Autoslew. The CDI deflection will be driven by the localizer signal itself, regardless of the course setting.

## Flying a WAAS Approach

The EXP5000 is designed to take full advantage of the WAAS approach features provided in GNS-400W/500W series GPS or GPS/VHF navigators (Figure 13).



**Figure 13. Flying a WAAS Approach**

When GPS is selected as the primary navigation source and the selected 400W/500W is providing guidance for a LPV, L/VNAV, and LNAV+V approach, the PFD provides horizontal and vertical guidance by means of the HDI and VDI.

● For non-precision GPS approaches, the PFD will provide horizontal guidance by means of the HDI.

● "GPS" will be annunciated next to the HDI to indicate that GPS is the navigation source.

● "TERM" or "APPR" will be annunciated next to the "GPS" annunciation to indicate when the navigator is in terminal or approach mode, respectively.

● A "GPS INTEG" annunciation is provided to the left of the HDI, if the 400W/500W has determined that satellite coverage is insufficient for use of GPS as the primary navigation source. If the GPS INTEG annunciation is displayed, VLOC should be selected as the navigation source.

Refer to the 400W/500W pilot guide for more information.

## Flying an Autopilot-Coupled WAAS Approach

To perform an autopilot-coupled GPS WAAS approach, do the following:

● Ensure that the nav source is set to GPS and that the selected navigator has the approach loaded and activated.

● Autopilot should remain in GPSS mode until intercepting the final approach course (only GPSS mode will provide procedure turn and hold guidance).

● When the VDI is displayed, and the HDI annunciator is "GPS APPR", activate APR mode on the autopilot head. Provided that ALT mode is selected, and the airplane is within 50% scale deflection on the HDI, GS mode and glide path capture capability will be armed.

● As the glide path is approached, GS mode will become active to follow the GPS generated glide path. This behavior is similar to the glide slope function of an ILS approach.

The autopilot will then track the horizontal and vertical guidance provided by the 400W/500W in the same way it would track localizer and glideslope guidance. Refer to the autopilot's user's guide for Glideslope capture scenarios.

## Flying an Autopilot-Coupled Approach

To perform an autopilot-coupled approach, ensure the approach has been activated in the Navigator selected as the Nav source. Then:

● Press NAV on the autopilot control head to activate Nav mode.

● Press the APR button on the Autopilot control head to activate the Glideslope capture capability.

The autopilot will then track the Glidescope and localizer. Refer to the autopilot user's guide for Glideslope capture scenarios.

Avidyne recommends that you set the Altitude Bug to the published approach decision altitude to serve as a visual reference during the approach.

**Note:** For maximum situational awareness during all types of precision and non-precision instrument approaches, always select and activate the approach in the Navigator. This will enable the EXP5000 to display the approach waypoints on its moving map.

**Note**: Upon reaching the Final Approach Fix (FAF), ensure that the correct baro setting is entered in both the EXP5000 and standby altimeter. Also verify that the EXP5000 and standby altimeter indicate the same altitude.

## Using the Radar Altimeter

If your aircraft is equipped with a radar altimeter, you can set the decision height on the radar altimeter using the DH Alert button, described in detail in *Right Buttons and Knob*, on page 19.

## Non-Precision Approaches

The EXP5000 is also designed to aid in the flying of non-precision approaches. Once the published approach has been activated in the Navigator system, the inbound course on the EXP5000 will be automatically set to match the inbound course of the published approach.

### Flying an Autopilot-Coupled Non-Precision Approach

A recommended technique when performing an autopilot-coupled non-precision approach is:

1) Select the HDG, NAV and ALT buttons on the autopilot while still outside the Final Approach Fix (FAF).

2) Prior to reaching the FAF, if present, set the desired VS descent rate:

- Use the EXP5000 HDG Bug to set the desired heading for climbout/missed approach.
- Use the EXP5000 Alt Bug to set the desired intermediate level off altitude or the minimum descent altitude (MDA) as a visual reminder.

3) After crossing the FAF, select VS mode on the autopilot.

**4)** Just prior to reaching MDA, select ALT on the autopilot to command altitude hold.

## Flying a Back Course Localizer Approach

The EXP5000 is designed to fully support flying back course localizer approaches. To perform a back course localizer approach, ensure the front course value is set via the EXP5000 Course Set knob. As soon as the EXP5000 determines that it is established on the back course localizer, the HDI source label annunciates LOC BCRS and both the HDI and CDI display correct sensing. There is no further pilot action required. The VDI will not be displayed for back course localizer approaches.

**Note:** For coupled approaches, the Autopilot may have to be set to reverse mode. Please consult the Autopilot POH for proper operation.

## Missed Approach

Prior to missed approach, disconnect the autopilot, ensure the aircraft is trimmed for the power setting, establish a climb attitude and use the EXP5000 Alt Bug to set the desired missed approach altitude. On the climbout, select *HDG* or *NAV* (depending on missed approach instructions) on the autopilot, press *ALT* and *VS* simultaneously on the autopilot, and press *OBS* on the Navigator to continue the coupled missed approach.

# 4 Invalid Sensors and Error Conditions

When the data coming into the EXP5000 is unavailable or otherwise invalid, the EXP5000 provides appropriate warnings and messages.

This section discusses the following topics:

- *Invalid Air Data*, page 58
- *Invalid Heading*, page 59
- *Crosscheck Monitor*, page 60
- *Warmstart Conditions*, page 61
- *Recoverable Attitude*, page 62
- *Invalid Attitude & Heading*, page 63
- *Nav Source Crosscheck*, page 64
- *Loss of Communication with Autopilot*, on page 65

## 4.1 Invalid Air Data
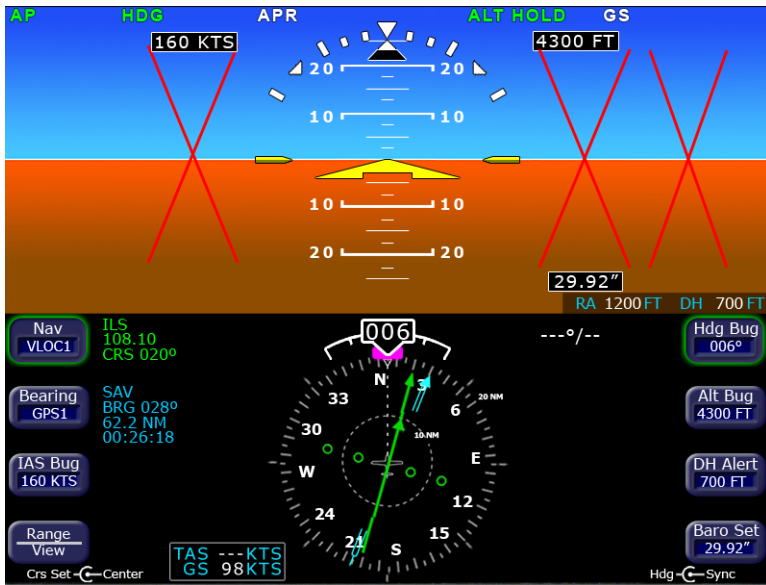


**Figure 14. Invalid Air Data**

If air data becomes unavailable:

**1)** Airspeed, altitude, and vertical speed data are removed and replaced by red **X**'s.

**2)** Wind Vector data is removed and replaced with dashes.

**3)** True airspeed data is removed and replaced with dashes.

If invalid air data occurs, use the mechanical backup airspeed indicator and altimeter. Avidyne recommends that you cross reference the EXP5000 attitude to the backup ADI when flying with invalid air data.

> **Note:** When the EXP5000 determines that the air data is valid, it will resume air data display.

## *4.2 Invalid Heading*
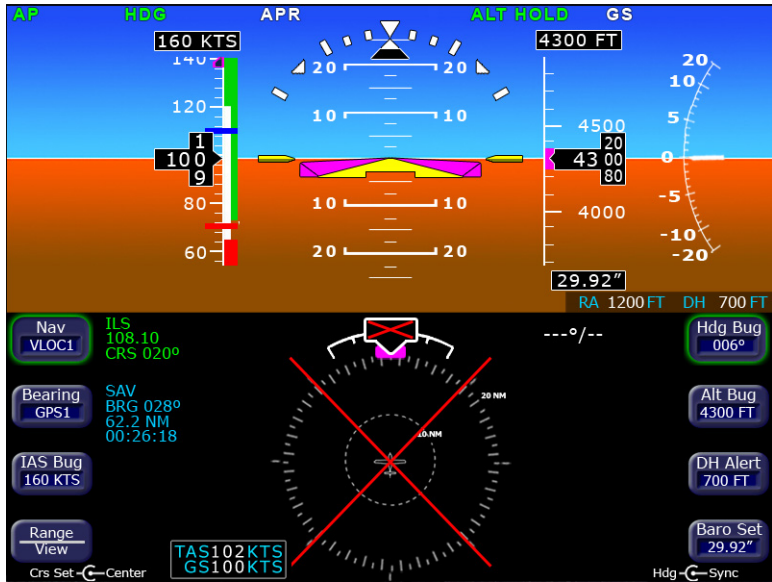


**Figure 15. Invalid Heading**

If valid heading data becomes unavailable, heading data and HSI navigation data are removed from the display and replaced with a red **X**.

**Note:** Refer to the aircraft compass for heading. Refer to the EX5000 MFD or GPS Navigator for ground track and flight plan.

When heading data is determined to be valid, the display of heading and HSI navigation data will be restored.
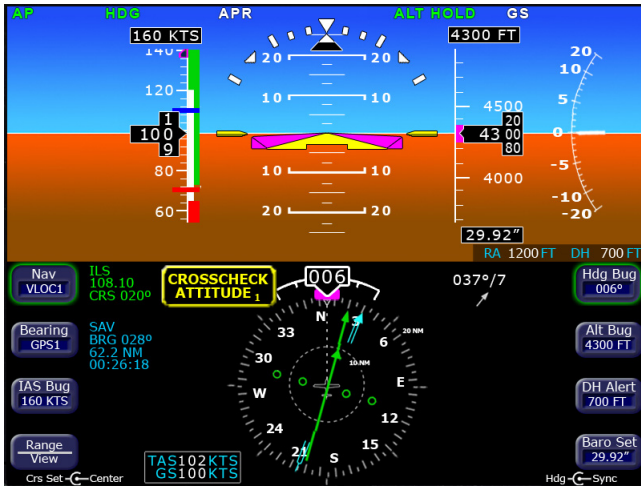
## 4.3 Crosscheck Monitor



**Figure 16. Crosscheck Monitor**

The Envision EXP5000 comes equipped with a self-check monitor. When this monitor detects a condition that does not warrant removal of data, a CROSSCHECK ATTITUDE warning message displays.

When this message is displayed, scan all backup instruments and auxiliary instruments (backup attitude indicator, backup airspeed indicator, and back up altimeter) to crosscheck the aircraft attitude. The warning message is automatically removed when the self-check monitor confirms the EXP5000 attitude is valid.

> ⚠ For aircraft equipped with a 55X autopilot, if a CROSSCHECK ATTITUDE alert displays on the PFD, Avidyne strongly recommends using Autopilot (not HDG mode).

The message will not be displayed when air data is invalid (as shown on page 58). Cross referencing the EXP5000 attitude to the backup ADI is recommended during flight with invalid air data.

**Note**: Highly dynamic maneuvering such as multiple linked lazy-8 leaves may result in small pitch and/or bank errors. If the errors build up to an excessive amount, the crosscheck attitude message may display.

**Note:** In dual PFD installations, the CROSSCHECK ATTITUDE message applies to the selected ADAHRS source.

## *4.4 Warmstart Conditions*

The EXP5000 is capable of performing a warmstart from a fully aligned condition when subjected to a power loss of less than 30 seconds. In this event, the "PLEASE STANDBY" message in the warmup box is displayed for approximately 2 seconds followed by the "ATTEMPTING QUICK RESTART" message and its countdown. There is no requirement to limit dynamic maneuvering during this warmstart attempt.

> **Note:** Two warmstart attempts in a row without a successful alignment between attempts will result in a full alignment attempt.

**Figure 17. Quick Restart Messages**

## *4.5 Recoverable Attitude*



**Figure 18. Recoverable Attitude Situation**

If a recoverable attitude data failure occurs:

**1)** All normal button labels are removed.

**2)** Attitude data is removed from the display and replaced with a red **X**.

**3)** A *Fast Erect* button label and message displays.

When you press *Fast Erect,* the message will change to "Maintain straight and level flight" until the 10 second count-down timer expires. At that point, all attitude data is restored.

⚠ It is imperative that you obtain straight and level flight before pressing *Fast Erect*. Use the backup instruments and/or outside visual references to obtain straight and level conditions.

## *4.6 Invalid Attitude & Heading*
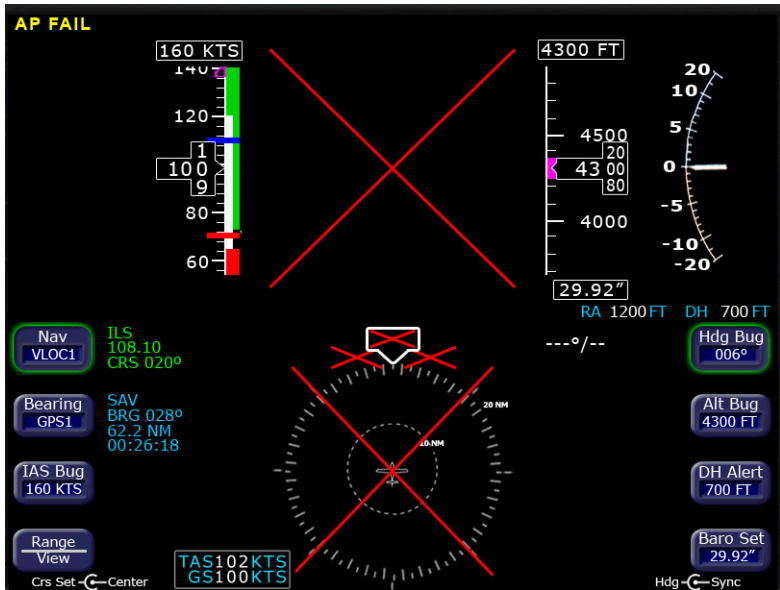


**Figure 19. Invalid Attitude and Heading**

If valid attitude and heading data becomes unavailable, attitude data, wind vector data, heading data, and HSI navigation data are removed from the display.

> **Note:** You may be able to recover from a failed attitude condition by pulling both PFD circuit breakers for less than 20 seconds. This will initiate a warmstart as described in Section 4.4, "Warmstart Conditions" on page 61.

> ⚠️ If warmstart is unsuccessful, use back-up instruments for attitude and heading for the remainder of the flight. During IFR flights, proceed to the nearest VMC conditions and do not re-enter IMC.

> **Note:** For aircraft equipped with a 55X autopilot, consider using the autopilot to reduce workload. Use GPSS mode to maintain the flight plan route.

## *4.7 Nav Source Crosscheck*

When receiving valid navigation information from two radios tuned to the same navigation aid, the EXP5000 compares the data from the two and provides an alert if there is a miscompare.

This comparison is only done when one of the radios is selected as the primary navigation source.
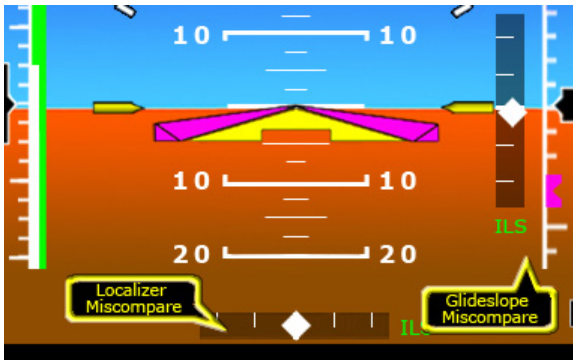


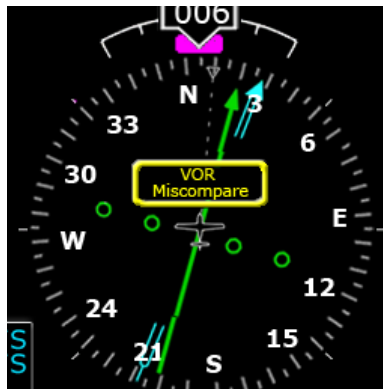**Figure 20. Localizer and Glideslope Crosscheck Errors**



**Figure 21. VOR Crosscheck Error**

## *4.8 Loss of Communication with Autopilot*

If autopilot data becomes unavailable, the autopilot annunciators are removed from the display and a message with the text, "NO COMMUNICATION WITH AUTOPILOT," is displayed at the top of the PFD (Figure 22).



**Figure 22. Autopilot Data Unavailable Message**

**Note**: It is normal to see this message when the PFD is turned on before the autopilot, but it should not persist for any longer than 20 seconds after the autopilot is turned on. If the message appears after the autopilot has initialized, cycle power to the PFD. If the problem persists, contact an Avidyne Entegra Certified Service Center as soon as practical.

*Loss of Communication with Autopilot*

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# 5 Using Dual PFDs

This section discusses features specific to aircraft equipped with dual PFDs, as follows:

- *Selecting the ADAHRS Source*, page 67
- *Synchronized and Non-synchronized Controls*, page 69
- *Pilot Priority Switch*, page 71
- *Dual PFD Error Conditions*, page 72

## 5.1 Selecting the ADAHRS Source



**Figure 23. Dual PFD Display**

For dual PFD-equipped aircraft, each PFD has a complete and independent ADAHRS. Each PFD can display ADAHRS data from either PFD. If one PFD is displaying the ADAHRS data from the other PFD, a message displays at the center top of the PFD. As shown in the example above, the message ADAHRS 2 displays on the Pilots PFD when it is displaying the Copilot PFD's ADAHRS.

*Selecting the ADAHRS Source*

Select the ADAHRS source from a switch mounted on the aircraft instrument panel. To locate the ADAHRS Source Selection switch, see the *Pilot's Operating Handbook* for your aircraft.

**Note:** When both PFDs are operating normally, Avidyne recommends that you set the ADAHRS source selection switch so that each PFD displays its own ADAHRS data. This allows you to easily cross-check attitude, heading, and air data.

In the case of an ADAHRS failure, set the switch to display the ADAHRS on the remaining operating PFD.

If the ADAHRS that is not selected for display fails, is in alignment, or is in fast erect, a yellow message box describing the condition displays in the lower right corner of the HSI.
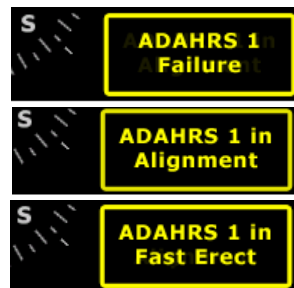
## *5.2 Synchronized and Non-synchronized Controls*

When equipped with dual PFDs, some controls are synchronized between the two PFDs to reduce confusion and improve situational awareness. For these controls, adjusting any of the settings on one PFD also changes the other PFD.
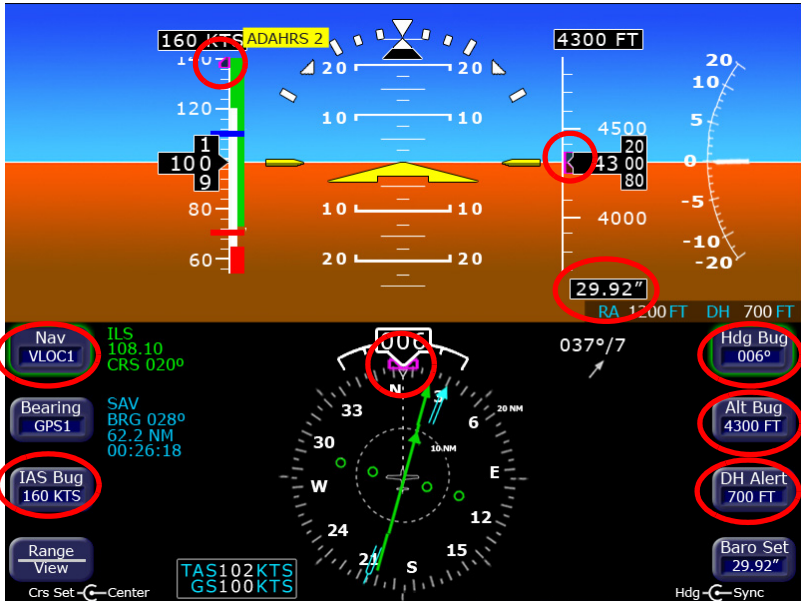


**Figure 24. Dual PFDs – Synchronized Controls**

However, to provide maximum flexibility for the navigational needs of two crew members, other controls are not synchronized.

Table 5.9 on page 70 lists the primary PFD controls and whether or not they are synchronized:

**Table 5.9    Dual PFD Synchronized Controls**

| Synchronized | Not Synchronized |
|---|---|
| Primary Nav Source selection | Bearing Nav Source |
| Course setting (if supported by selected Nav source and mode) | HSI views |
| Hdg Bug |  |
| Alt Bug |  |
| IAS Bug (if available) |  |
| DH Alert (if available) |  |
| Baro Setting |  |

**Note:** While the bugs that control the autopilot can be set by either PFD, the autopilot uses only the Pilot PFD heading to measure its deviation. If the Copilot PFD heading differs from the Pilot PFD, the Copilot PFD may show a mismatch between the heading bug and the autopilot-controlled heading.

## *5.3 Pilot Priority Switch*

On dual-PFD equipped aircraft, the Pilot Priority switch mounted in the flightdeck instrument panel allows you to inhibit the controls on the Copilot PFD when a non-pilot is in the right-hand seat. See your aircraft *Pilot's Operating Handbook* to locate the Pilot Priority switch.
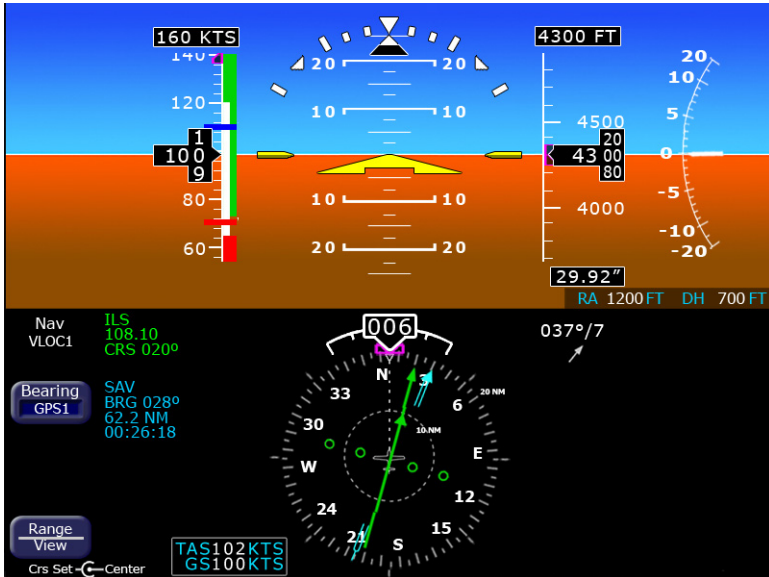


**Figure 25. Uncoupled Copilot PFD**

The Pilot Priority can be set as follows:

● **Enabled** — The *Nav*, *Hdg Bug*, *Alt Bug*, *IAS Bug or VSI Bug*, *DH Alert,* and *Baro Set* **buttons** are removed from the Copilot PFD, as shown in Figure 25. They can be controlled only from the Pilot PFD. The copilot can see the bugs, Nav, and BARO settings on their PFD, but cannot make changes.

Enabling Pilot Priority prevents the passenger (a child, for example) from accidentally changing a bug, Nav, or BARO setting and affecting the flight path. Bug values are especially important when the Autopilot is flying the aircraft using the bugs.

● **Disabled** — All buttons on the copilot PFD are available, including *Nav*, *Hdg Bug*, *Alt Bug*, *IAS Bug* or *VSI Bug*, *DH Alert,* and *Baro Set*. The copilot can view and change the bugs, Nav, and BARO settings.

## *5.4 Dual PFD Error Conditions*

**ADAHRS Miscompares**

In dual-PFD equipped aircraft, the two PFDs compare their ADAHRS measurements for fault detection. If airdata, attitude, or heading miscompare occurs, both PFD's will display the appropriate warning message adjacent to the affected instrument.
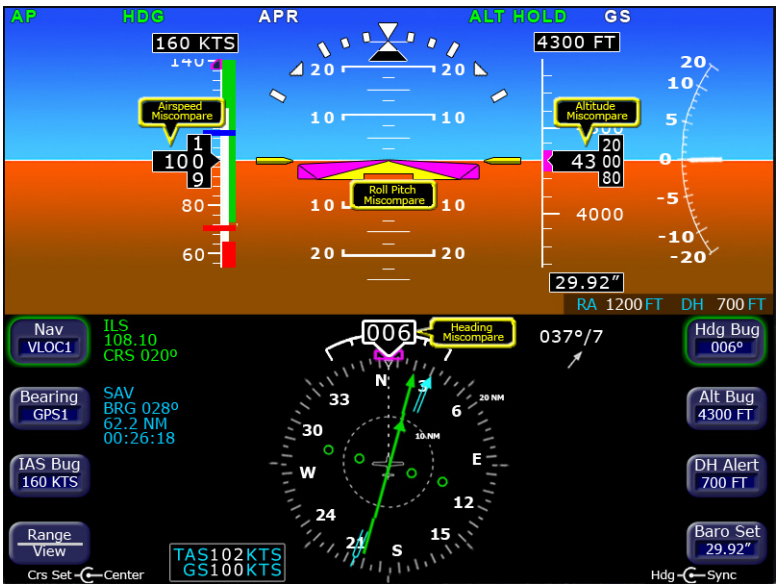


**Figure 26. ADAHRS Alert Messages**

> **Notes:** The ADAHRS miscompare messages are suppressed if:
>
> - One of the ADAHRS has failed, is in alignment, or is in fast erect.
> - The ADAHRS source selection switch is set to ADAHRS1 or ADAHRS2.
> - A PFD-to-PFD communication failure has occurred.

**PFD-to-PFD Communication Fault**

If, at any point, one PFD loses contact with the other, a yellow error message will appear at the lower right corner of the HSI reading "No COM with Pilot PFD" or "No COM with Copilot PFD."

If you see the "No COM with Copilot PFD" error, a communication failure has occurred and the following dual PFD functions are no longer available:

● ADAHRS Source Selection

● Synchronize Controls

● ADAHRS Comparison Monitoring.

**Vertical Modes with S-TEC 55X Autopilot**
The vertical modes of the S-TEC 55X Autopilot (Alt Hold, Alt Capture, VS Mode, and so on) are wired to the pilot PFD only. If the copilot altimeter or VSI differs from the pilot, the copilot PFD may display a mismatch between the bugs and the autopilot controlled altitude or vertical speed.

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This document is applicable to Software Part Numbers 530-00194-000 and 530-00200-().

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(c) The Product has not been altered in any manner other than as previously authorized by Avidyne in writing; and

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P/N 600-00157-000 Rev. 06  August 29, 2008