FlightMax Entegra

EXP5000
Primary Flight Display
Pilot's Guide

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AVIDYNE

Document Revision History

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Contents

1 Introduction

This manual provides information about the Entegra PFD for the following models of Piper Aircraft:

Table 1. Supported Piper Aircraft Models

Aircraft Type	Model Name	Model Number
PA28	Warrior III	PA28-161
	Arrow	PA28R-201
	Archer	PA28-181
PA32	Saratoga II HP	PA32R-301
	Saratoga II TC	PA32R-301T
	6X	PA32-301FT
	6XT	PA32-301XTC
PA46	Mirage	PA46-350P
	Meridian	PA46-500TP

Note: All images contained within this document, including screenshots and other displays, are for reference use only and are subject to change. The images contained herein may differ slightly from your actual equipment or display.

1.1 Notes and Cautions

Notes and cautions provide guidance for the use of the Entegra PFD. 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 FlightMax Entegra Primary Flight Display.

Cautions 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 Entegra PFD only under VFR conditions until you are very familiar with the Entegra PFD.

If you have questions, please contact Avidyne at **800-284-3963 (800-AVIDYNE)** before operating with the Entegra PFD under IFR conditions.

When using the Entegra PFD, 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 System Overview

2.1 The Entegra PFD

Figure 1. Entegra PFD Main Display

1) **Brightness Control (BRT/DIM)**—Controls display brightness. Power-on default is 75% brightness.

2) **Buttons**—Buttons allow you to display new information or change the display. Button labels change depending on the current environment.

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

   - Right knob and button functions are described Section 2.5, "Right Buttons, Knob, and Bug Settings" on page 15.
   - Left knob and button functions are described in Section 2.6, "Left Knob & Buttons" on page 19.

2.2 Entegra Attitude Direction Indicator (ADI) Symbology

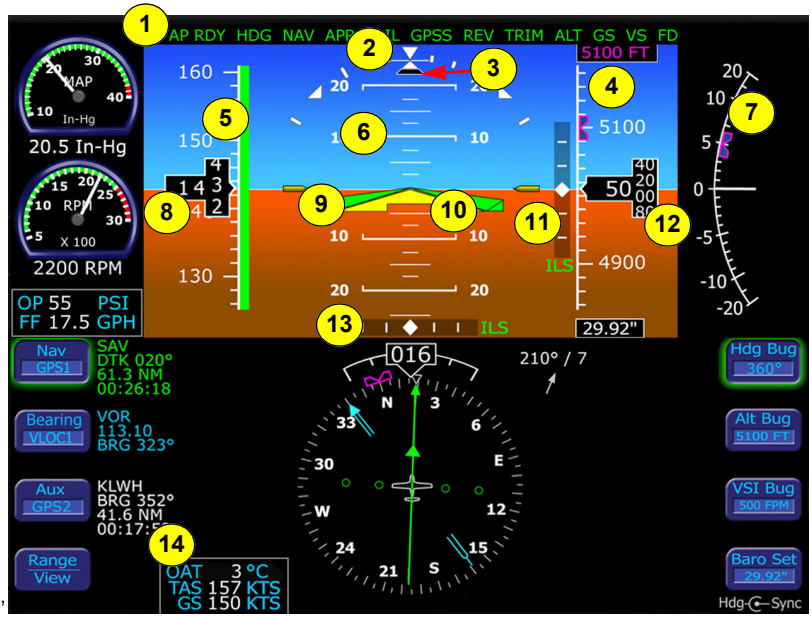


Figure 2. Entegra ADI Symbology

1) **Autopilot Annunciation Window**—The Autopilot annunciation area provides autopilot mode annunciation in your primary field of view. For more information, see Section 8.1, "S-TEC 55X Series Autopilots" on page 31.

Note: Autopilot annunciations are not displayed for PFDs integrated with S-TEC 1500 autopilots.

2) **Bank Angle Indicator**—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, & 60 degrees. (Note: The 0 and 45 degree marks are inverted triangles).

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

4) **Altitude Tape**—Displays pressure altitude (with barometric correction) with a display range from -1,000 feet to 35,000 feet. The display depends on the aircraft model, as follows:

   - **PA28/PA32**—Each minor graduation represents 20 feet and each 100 foot graduation is labeled.
   - **PA46**—Each minor graduation represents 100 feet and each 500 foot graduation is labeled.

5) **Airspeed Tape**—Indicated airspeed with a display range from 20 kts to 300 kts. VSpeed color bands are specific to the aircraft model, as follows:

   - **PA28/PA32**—Each minor graduation represents 2 knots and each 10 knot major graduation is labeled.
   - **PA46**—Each minor graduation represents 5 knots and each 20 knot major graduation is labeled.

     Speeds indicated are as follows:

V Speed	Meaning
V_{MO}	Maximum operating speed
V_{NE}	Never exceed speed
V_{NO}	Maximum structural cruise speed
V_{S}	No flap stall speed
V_{FE}	Maximum flap extension speed
V_{SO}	Full flap stall speed

While the range of the color bands is aircraft type specific, the general meaning for each band follows:

Band Color		Meaning
Red		V_{NE} or V_{MO} up to top of the airspeed tape
Yellow		V_{NO} up to V_{NE}. (V_{MO} aircraft will not have a yellow band.)
Green		V_S up to V_{NO} or V_{MO}.
White		V_{SO} up to V_{FE}.
Red		V_{SO} -10 kts up to V_{SO}, until a threshold airspeed of V_{SO} + 2 knots is achieved. The band then expands to extend from 20 kts up to V_{SO}. This behavior repeats whenever airspeed drops below 20 kts.

6) **Pitch Ladder**—The pitch ladder has graduations every 2 1/2 degrees within the range of ±20 degrees and graduations every 5 degrees from +20 degrees to +50 degrees and -20 degrees to -30 degrees. The 10 degree graduations of the pitch ladder have bar ends that point toward the horizon line. Large chevrons, described in Chapter 3 "Using Trend Indicators," visible at excessive pitch angles, point toward the horizon (above +50 degrees and below -30 degrees). ±90 degrees is represented by small circles.

7) **Vertical Speed Indicator (VSI)**—Displays the vertical speed in Feet per Minute (fpm). The display depends on the aircraft model, as follows:

   - **PA28/PA32**—±2,000 fpm VSI scale. Scale graduations occur every 100 fpm between ±1,000 fpm.
   - **PA46**—±3,000 fpm VSI scale. Scale graduations occur every 200 fpm between ±2,000 fpm.

   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 ±4,000 fpm.

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

9) **Flight Director Steering Command Bars**—Displays the accuracy of autopilot tracking the autopilot commands. The

autopilot steers the airplane toward the command bars until the delta shaped reference is tucked into the steering command bars.

10) **Aircraft Reference Symbol**—Current aircraft pitch angle is represented by the apex of the yellow delta-shaped reference against the pitch ladder. In wings level flight, the two yellow outriggers also serve as pitch angle representations

11) **Vertical Deviation Indicator (VDI)**—Displayed when VLOC is selected as NAV source and the ILS glide slope signal is received. The source of the VDI data is displayed immediately below the VDI (e.g. ILS). If the GS signal is lost, the VDI is replaced with a red **X** and the letters ILS turn red. Once displayed, the VDI may be removed by changing the NAV Source or changing the localizer frequency.

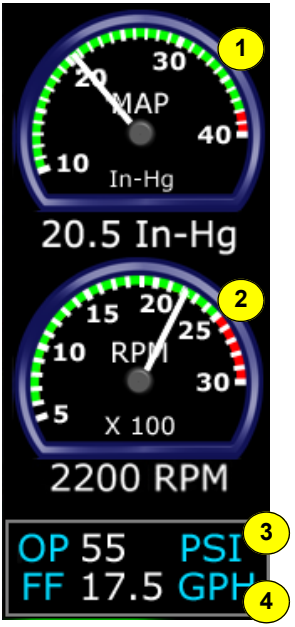
12) **Altitude Window**—Displays current baro-corrected altitude.

13) **Horizontal Deviation Indicator (HDI)**—Displayed when VLOC is selected as NAV source and the localizer signal is received. The source of the HDI data is displayed immediately to the right of the HDI (e.g. LOC or ILS). If the signal is lost, the HDI is replaced with a red **X** and the source letters turn red. Once displayed, the HDI may be removed by changing the NAV source or changing the VOR/LOC frequency.

14) **Air Data**—Displays True Airspeed (TAS) and Ground Speed (GS) in knots, and Outside Air Temperature (OAT) in degrees Celsius. Invalid data is displayed as dashes (---).

2.3 Engine Instruments

Single Engine Piston



If you are flying a single engine piston aircraft (PA28, PA32, PA46-350P), the PFD displays gauges similar to the following:

1) **Manifold Pressure Gauge**—Displays current engine manifold pressure (MAP) in inches of mercury. A numeric display below the MAP dial displays the manifold pressure value to the nearest 0.1 inch of mercury. If the MAP needle enters the warning (red) area, if one exists, the numeric readout also displays the MAP value in red.

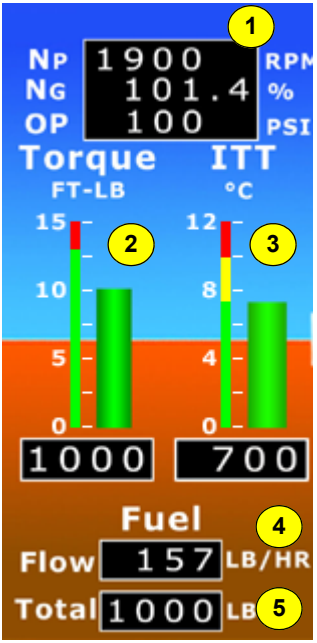
2) **Tachometer**—Displays current engine speed in 100's of RPM. A numeric display below the tachometer dial displays RPM, to the nearest 10 RPM. If the tachometer needle enters a caution (yellow) or warning (red) area, the numeric readout displays the RPM value in the corresponding color.

3) **OP (Oil Pressure)**—Displays the current oil pressure in pounds per square inch (PSI). If the oil pressure value enters a caution (yellow) or warning (red) range, the numeric readout displays the oil pressure value in the corresponding color.

4) **FF (Fuel Flow)**—Displays the current engine fuel flow as a numeric display, to the nearest 0.1 gallon per hour (GPH)

Single Engine Turbine

If you are flying a single engine turbine-aircraft (PA46-500TP), the PFD displays gauges similar to the following:



1) **Engine Start Parameters**—During engine start or parameter exceedance, numeric displays of the following parameters are provided.

   - **Propeller Speed (Np)**—Units of RPM.
   - **Gas Turbine Speed (Ng)**—Units of %.
   - **Oil Pressure (OP)**—Units of PSI.

2) **Torque Gauge**—Displays current engine torque in foot-pounds. A numeric display below the torque analog indicator displays the torque value to the nearest 10 foot-pound. If the torque enters the warning (red) area, the analog indicator bar and numeric readout out display in red.

3) **Inter-Turbine Temperature (ITT) Gauge**—Displays current engine ITT in °C. A numeric display below the ITT analog indicator displays the ITT value to the nearest 5°C. If the ITT enters the caution (yellow) or warning (red) area, the analog indicator bar and numeric readout out display in the corresponding color.

4) **Fuel Flow**—Displays the current engine fuel flow as a numeric display, to the nearest 1 pound per hour (or 1 kilogram per hour if metric units are selected).

5) **Fuel Quantity**—Displays the total (left plus right) fuel quantity to the nearest 5 pounds (or 2 kilograms if you select metric units).

2.4 HSI Symbology

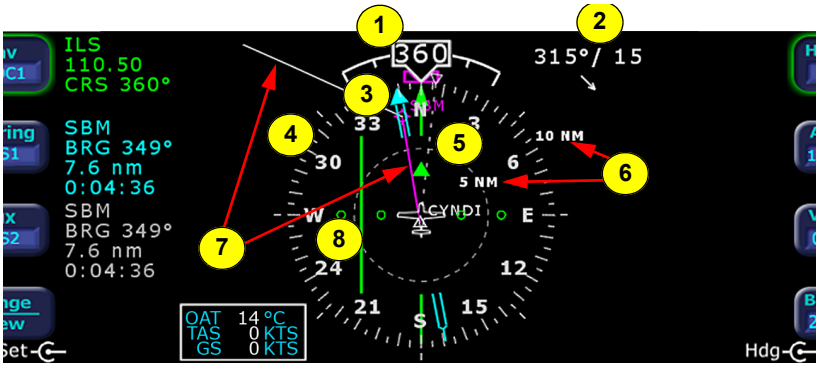


Figure 3. EHSI 360-degree View

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

2) **Wind Vector**—Displays the current wind speed and wind direction. The arrow indicates the direction of the wind relative to the current aircraft heading. There will be a several-second lag in updating current wind speed and direction after turns.

3) **Bearing Pointer**—The blue dual-line bearing pointer is associated with the Bearing source and displays the current bearing to the Bearing waypoint (GPS1 or GPS2) or bearing to the station (VLOC1 or VLOC2). A bearing pointer will not be displayed if the VLOC source is tuned to an ILS or LOC station.

4) **Compass Rose**—In both 360 degree full 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 every 45 degrees.

5) **Projected Track Line**—The dashed white 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.

6) **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. Selectable ranges for the outer ring are 2, 5, 10, 20, 50, 100, and 200 NM.

7) **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.

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

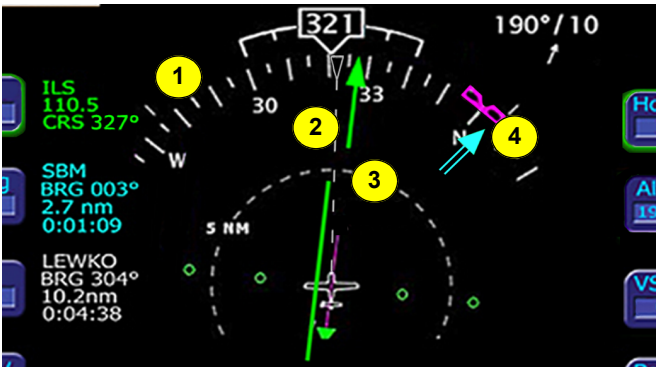


Figure 4. EHSI Arc View

Figure 4 shows the EHSI Arc View with the same symbols as shown in Figure 3.

1) **Compass Rose.**

2) **Projected Track Line.**

3) **Course Deviation Indicator (CDI)**—In this figure, the single-line CDI displays a more pronounced deviation from the set or desired course.

4) **Bearing Pointer**.

2.5 Right Buttons, Knob, and Bug Settings

Right Buttons and Knob

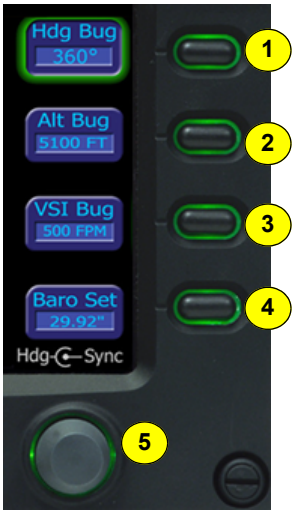
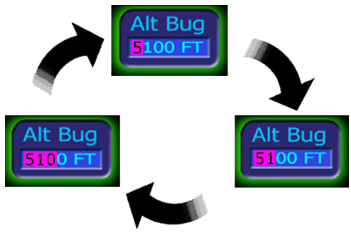


Figure 5. Right Buttons and Knob

1) **Heading Bug Button (Hdg Bug**)—When selected, allows the right knob (1) to control the position and value of the heading bug (3) on the HSI compass rose. The range of the allowable values is 001 to 360 degrees. The selected numeric value appears in the button label.

2) **Altitude Bug Button (Alt Bug)**—When selected, allows the right knob to control the position of the altitude bug and the autopilot altitude preselect value. The range of values is the same as the altitude tape (-1,000 feet to 35,000 feet). The Alt Bug has three resolution setting modes: 1,000 ft., 100 ft., and 10 ft. modes. The default adjustment position is at the 1,000 ft. mode and each button press steps the adjustment position down one place. The selected numeric value appears in the button and in the Altitude Preselect window.



3) **Vertical Speed Indicator Bug Button (VSI Bug)**—When selected, allows the right knob to control position of the VSI bug and the autopilot vertical speed command. The range of allowable values matches the allowable rates of the autopilot. The selected numeric value appears in the button label.

4) **Barometric Correction Setting Button (Baro Set)**—When selected, allows the right knob to control the value of the barometric correction setting. The range of allowable values is 27.50” to 31.50” (931 mb/HPa - 1067 mb/HPa). The selected value appears in the button label and in the Barometric Correction Setting window (10).

5) **Right Knob**—The function of the right knob changes based on which button on the right side is selected (indicated by green highlighted ring around the button label). The symbol above the knob denotes the current function of the knob.

Table 2. Right Knob Settings

Active Button	Knob Label	Rotary Action	Push Action
Hdg Bug	Hdg Sync	Sets heading bug	Syncs heading bug to current magnetic
Alt Bug	Alt Sync	Sets altitude bug	Syncs altitude bug to nearest 100’
VSI Bug	VSI Sync	Sets VSI bug	Syncs VSI bug to nearest 50 fpm
Baro Set	Baro Stnd	Sets Baro	Sets Baro to 29.92

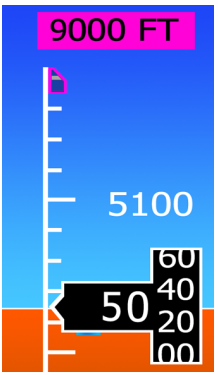
Note: The *Alt Bug*, *VSI Bug*, and *Baro Set* button selections all timeout back to the *Hdg Bug* button selection ten seconds after they are last pushed or changed by knob rotation. Because of the button timeouts, Avidyne recommends that you always select the desired button before rotating the knob.

PFD Bug and Barometer Settings

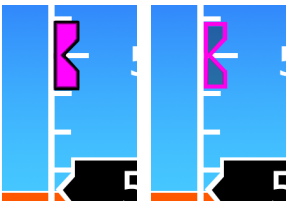
Figure 6. PFD Bug and Barometer Settings

For the Meridian (PA46-500TP) only:

- The Heading Bug is always filled, regardless of autopilot heading mode.
- The Altitude Bug is always hollow, because it is not used as the autopilot altitude preselect.
- The VSI Bug is not available.



Partial



Solid **Hollow**

1)Altitude 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 bug is solid when coupled to the autopilot and hollow when not coupled.

2) **Altitude Preselect**—Displays the digital value of the altitude bug setting and, when enabled, the altitude that the autopilot is commanded to capture and hold. Digits appear as black numbers on magenta background when *Alt Bug* is selected.

3) **VSI Bug**—Controlled by the right knob when you select *VSI Bug*. The notched part of the magenta bug symbol indicates the current VSI bug set value. VSI bug range is ±1,600 fpm. The bug is solid when coupled with the autopilot, and hollow when not coupled.

4) **Heading 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 bug is solid when coupled with the autopilot, and hollow when not coupled. The heading bug is positioned at the appropriate side of the tape and remains in partial view when “arc view” is selected and the selected heading bug value is outside the current compass rose field of view.

5) **Barometric Correction Setting**—Controlled by the right knob when you select *Baro Set*, the boxed value indicates the current barometric correction setting in inches of mercury. Digits appear as black numbers on white background when *Baro Set* is selected. The baro correction is capable of displaying units in inches of mercury, millibars, or hectopascals. This selection is accomplished as a maintenance action at initial configuration/ installation into the aircraft.

2.6 Left Knob & Buttons

Figure 7. Left Knob & Buttons

1) **Nav (Primary Navigation)**—Controls the source for the CDI and adjacent data block. In a dual GPS/Nav configuration, the available sources are: GPS1, VLOC1, GPS2, and VLOC2. The content of the associated data block varies according to the selected source as follows:

Table 3. Primary Navigation Source

NAV Source	Data Block Format
GPS1 or GPS2	■ Waypoint Identifier ■ Desired Track to Waypoint ■ Distance to Waypoint ■ Time-to-Go to Waypoint
VLOC1 or VLOC2 (VOR Tuned)	■ "VOR" ■ VOR Frequency ■ Course
VLOC1 or VLOC2 (ILS or LOC Tuned)	■ "ILS" or "LOC" ■ Localizer Frequency ■ Course

2) **Bearing (Secondary Navigation)**—The adjacent push button controls the source for the Bearing Pointer and adjacent data block. In a dual GPS/Nav configuration, the available sources are: GPS1, VLOC1, GPS2, VLOC2, OFF. The content of the associated data block varies according to the selected source:

Table 4. Primary Bearing or Auxiliary Source

Bearing or Aux Source	Data Block Format
GPS1 or GPS2	■ Waypoint Identifier ■ Bearing to Waypoint ■ Distance to Waypoint ■ Time-to-Go to Waypoint
VLOC1 or VLOC2 (VOR Tuned)	■ "VOR" ■ VOR Frequency ■ Bearing to station
VLOC1 or VLOC2 (ILS or LOC Tuned)	■ "ILS" or "LOC" ■ Localizer Frequency
OFF	■ Blank

3) **Aux (Auxiliary Navigation)**—The adjacent push button controls the source of the adjacent data block only. In a dual GPS/Nav configuration, the available sources are: GPS1, VLOC1, GPS2, VLOC2, OFF. The content of the associated block varies according to the selected source as shown in Table 4, above.

Note: The Bearing, Aux, and Range/View button selections will all timeout back to the Nav Button selection ten seconds after they were last pushed or changed by knob rotation. Because of the button timeouts, a recommended technique is to always select the desired button prior to rotating the knob.

4) **Crs Set (Course Set) Knob**—The Crs Set label displays when you can set a course, as shown in Table 5:

Table 5. Left Knob Labels

NAV Source	GPS Nav Condition	Left Knob Label
GPS1 or GPS2	GPS in Auto-Leg mode	None
GPS1 or GPS2	GPS in OBS mode	
VLOC1 or VLOC2	Tuned NavAid is a VOR	
VLOC1 or VLOC2	Tuned NavAid is an ILS or LOC	

5) **Left Knob**—The function of the left knob changes based on which button on the left side is selected (indicated by green highlighted ring around the button label).

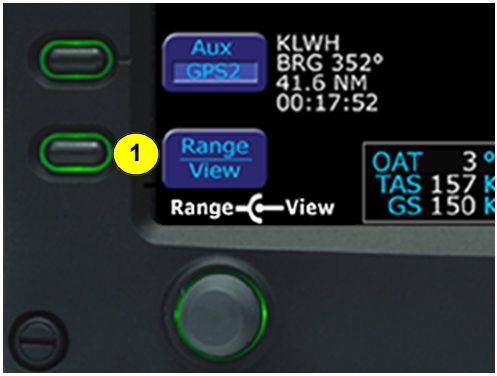


Figure 8. Left Buttons HSI Moving Map Range

1) **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 left knob will cycle the HSI through the four HSI views. Turning the left knob will change the HSI moving map range (when in view). Only two of the four allowable modes will contain a moving map depiction.

   The allowable modes and knob label varies as follows:

Table 6. HSI Moving Map Range Labels

View Selection	Left Knob Label
360 degree with moving map	Range–View
360 degree with no moving map	–View
120 degree with moving map	Range–View
120 degree with no moving map	–View

3 Initialization

The Entegra PFD is equipped with a solid state Air Data and Attitude Heading Reference System (ADAHRS) which requires an alignment time prior to flight.

The Entegra PFD is designed to operate during engine start and shut down procedures. PFD start-up is automatic once power is applied via the battery switch. A common Entegra PFD startup procedure is to turn on BAT and conduct the aircraft preflight during the ADAHRS alignment process. During engine start, the PFD and the ADAHRS alignment process may restart.

The PFD displays the Initialization Display immediately after it is turned on. Note that the overall software version number is listed in the box, as is the aircraft for which the Vspeeds are set up.

Figure 9. FlightMax Initialization

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. Engine instruments are available immediately after PFD start-up. The warmup block automatically transitions to the next several boxes as described in the following table and then is automatically removed when warm-up is complete.

Note: For faster alignments (3 minutes or less), it is recommended that the aircraft not be moved until alignment is complete. The OK TO TAXI screen is provided for increased flexibility during ground operations, but it may extend overall alignment time.

Table 7. Initialization Phases

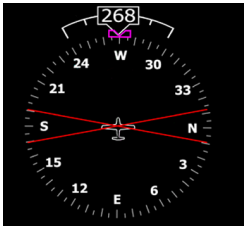
Alignment Phase & Dialogue Displayed	Approximate Duration	Pilot Action
INITIAL AHRS ALIGNMENT REMAIN STATIONARY OK TO TAXI IN X SECONDS	30 Seconds	Remain Stationary
AHRS WARMING UP OK TO TAXI	90 seconds, if stationary. Up to several minutes if moving.	Permissible to taxi but recommend remaining stationary for faster overall alignments
READY FOR FINAL AHRS ALIGNMENT BRING AIRCRAFT TO A STOP AS SOON AS PRACTICAL	5 seconds, if stationary. Up to several minutes if moving.	If moving, bring aircraft to a stop as soon as practical.
FINAL AHRS ALIGNMENT REMAIN STATIONARY READY TO GO IN X SECONDS	40 - 45 seconds	Remain stationary
READY FOR FINAL AHRS ALIGNMENT BRING AIRCRAFT TO A STOP AS SOON AS PRACTICAL XXXX	--	Remain stationary and wait an additional 2 minutes. If the message does not clear itself, contact a Service Center and provide the displayed AHRS code.

4 Default Settings

Figure 10. Default Settings

When powered up, the Entegra PFD starts with the following default values:

- **Hdg Bug, Alt Bug, VSI Bug (if present), Baro Set**—The value from just before previous shutdown
- **Alt Bug Mode**—Thousands mode
- **Nav**—GPS1
- **Bearing**—OFF
- **Aux**—OFF
- **View**—360 degree view with flight plan
- **Range**—10 NM
- **Right Side Active Button**—Hdg Bug
- **Left Side Active Button**—Nav
- **Right Knob**—Sets Hdg Bug
- **Left Knob**—Inactive



Note: The HSI displays a red **X** in place of the CDI until a flight plan is activated in your current (Primary) Nav Source (i.e. GPS1, VLOC1, etc.). In this case, the red **X** does **not** indicate a compass failure.

5 Setting Up the HSI

The FlightMax Entegra PFD can integrate with single or dual GNS 400/500-series GPS/NAV systems. At the time of initial install, the Entegra PFD is configured for the number of GPS/NAV systems on board.

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

Moving map data is displayed on the HSI portion of the Entegra PFD in two of the four possible view selections (full compass rose with map, arc view with map). GPS/NAV 1 is also the primary source for ground-speed readout and a required element for the wind vector calculation and display. In the event GPS/NAV 1 is unavailable, ground speed and wind vector data are derived from GPS/NAV 2. If the Nav source is selected to a VOR or localizer source, the HSI will display the course deviation indicator without a map display.

Use *Bearing* to select the GPS/NAV source for the blue double-line bearing pointer. If the selected bearing source is a Localizer, the bearing pointer will not be displayed.

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

For increased situational awareness, it is important to remember that the CDI on the Entegra PFD's HSI comes from the selected "Nav" source which may be different from the CDI displayed on the GPS/NAV 1 or GPS/NAV 2 displays. While using the crossfill capability of the GPS/NAVs in dual configurations is fully supported and a common technique, it can prevent one from taking full advantage of the multiple Nav source display capability of the Entegra PFD.

6 Using GPS/NAV

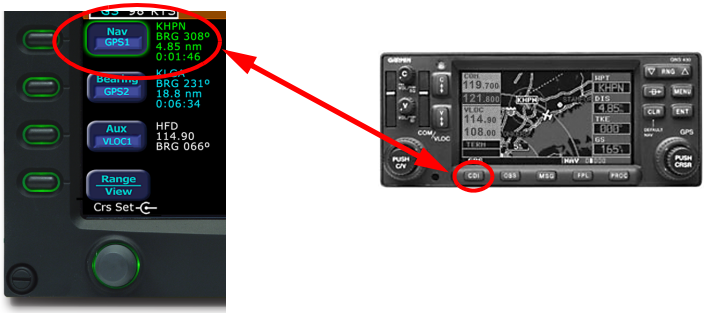
Primary navigation course setting is allowed when one of three conditions is met:

1) **PFD Nav Source = GPS1 or GPS2** and the requested GPS/NAV is in OBS mode.

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

3) **PFD Nav Source = VLOC** and the current frequency is an ILS or localizer. In this case, the ability to set a course is for reference. The CDI is driven by the received localizer signal, regardless of the set course.

CDI scaling on the Entegra HSI is automatically set by the GPS/NAV system as a function of the Nav source selected by the PFD *Nav* button.



The source selected for Nav is coupled with the *CDI* button on the GPS/NAV. When you toggle the *Nav* button on the Entegra PFD from GPS1 to VLOC1 and back, the CDI source on GPS/NAV 1 toggles from GPS to VLOC and back to match the current “Nav” setting. Similarly, when you toggle *CDI* on the GPS/NAV from GPS to VLOC and back, the “Nav” source of the Entegra PFD changes to follow.

Avidyne recommends that you use the CDI button on GPS/NAV 1 to toggle the Nav source back and forth, especially in a dual-GPS/NAV installation where the PFD Nav button cycles through all four Nav sources (GPS 1, VLOC 1, GPS 2, VLOC 2), and the CDI button on the GPS/NAV 1 makes it easy to switch the PFD between GPS 1 and VLOC 1 and back.

7 Precision Flight with PFD

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

You can obtain level flight by placing the apex of the yellow delta-shaped reference symbol on the horizon line in cruise conditions of 6000' MSL at 160 KIAS. 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).

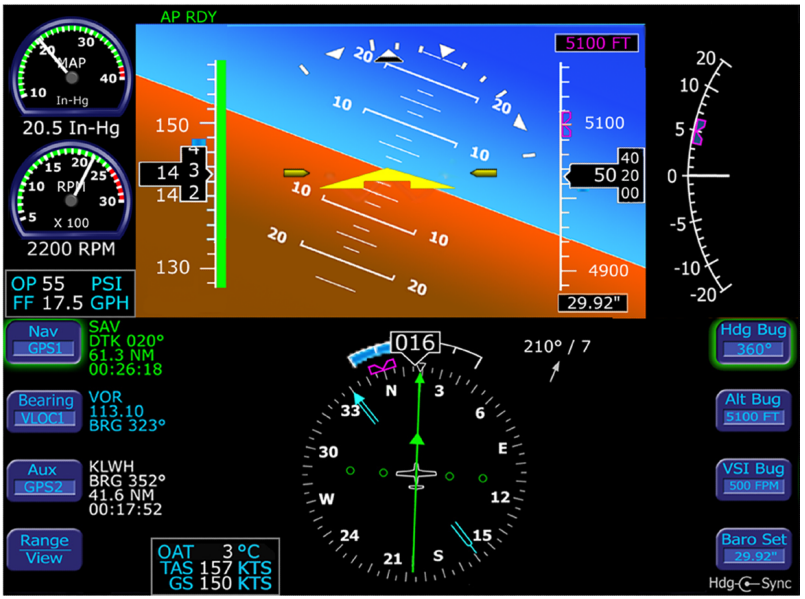


Figure 11. Precision Flying

The proper technique for flying a constant rate turn involves using a combination of the turn indicator and the bank angle indicator. Typical bank angles for a standard rate turn are approximately 23 degrees in cruise conditions. Figure 11 shows a standard rate turn to the left.

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 Entegra ADI horizon line.

7.1 Using Trend Indicators

You can 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 will result in a smooth capture of the desired airspeed and altitude.

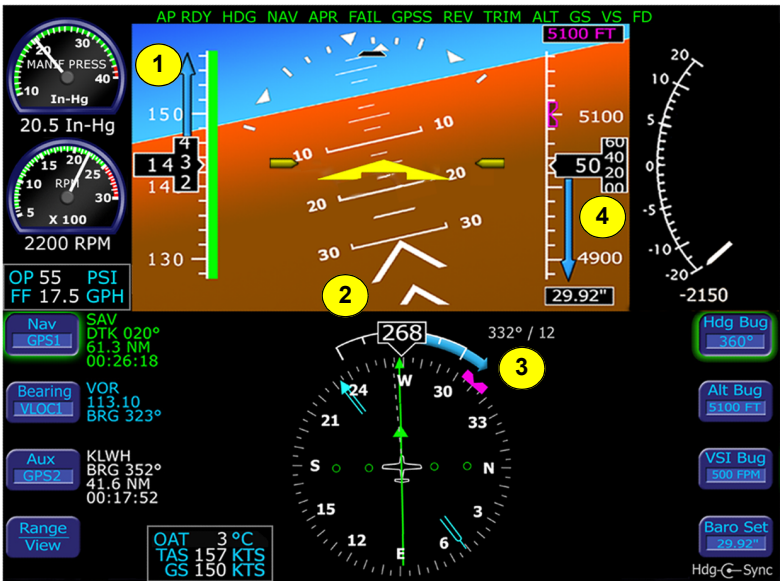


Figure 12. Trend Indicators

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. An arrowhead indicates a value beyond the current tape field of view.

   - **PA28 and PA32**—Indicates changes in speed greater than 0.8 knots/sec.
   - **PA46**—Indicates changes in speed greater than 1.8 knots/sec.

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 11/2 standard rate.

4) **Altitude Trend Indicator**—The tip of the blue airspeed 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.

   - **PA28 and PA32**—Indicates changes in altitude greater than 240 feet/min.
   - **PA46**—Indicates changes in altitude greater than 600 feet/min.

8 Controlling the Autopilot

Depending on the aircraft model, the Entegra PFD is integrated with either the S-TEC Fifty Five X (55X) or S-Tec System 1500 Autopilot.

- **S-Tec 55X**—Piper aircraft models PA28, PA32, and the PA46-350P. Information about using this Autopilot follows in Section 8.1, "S-TEC 55X Series Autopilots" on page 31.
- **S-TEC System 1500**—Piper model PA46-500TP. For information, see Section 8.2, "S-TEC 1500 Autopilots" on page 36.

8.1 S-TEC 55X Series Autopilots

For many Piper aircraft, the Entegra PFD is fully integrated with the S-TEC System 55X autopilot. The Heading, Altitude and VSI reference bugs are provided on the Entegra PFD to aid in pilot situational awareness and autopilot control.

When an active autopilot mode is selected, full guidance is provided from the Entegra PFD to the autopilot, including smooth transitions to altitude and heading captures. Mode annunciations displayed on the autopilot's faceplate are also displayed at the top of the PFD.

The reference bugs' status, autopilot annunciations, and the flight director steering command bars will indicate when Entegra is coupled with the autopilot. A solid magenta Heading, Altitude, or VSI bug indicates that the function is currently coupled to an active mode of the autopilot. A hollow magenta bug indicates that the function is not currently coupled to the autopilot in an active mode. In other words, a hollow bug indicates manual or "hand-flying" status. The following is a description of the six autopilot modes supported by the Entegra PFD. The autopilot may only be coupled to the GPS/NAV selected as the PFD Nav source. The autopilot may not be coupled to the GPS/NAV selected as the PFD Bearing source.

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

In flight director equipped aircraft, when a vertical mode of the autopilot is being used, a set of flight director command bars will indicate the required steering of the aircraft to achieve the

commanded tracking from the autopilot. In a full autopilot mode, “AP” will be in the autopilot annunciation field, the command bars will be visible and magenta and the aircraft should track those bars very precisely.

In flight director-only mode, “FD” will be displayed in the autopilot annunciation field, the command bars will be visible and green, and you are expected to actuate the flight controls as required to track those bars.

S-TEC 55X Horizontal Modes

1) **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. At this point, the heading bug will become solid magenta and the autopilot will track the input heading. The autopilot control head and the PFD will indicate “HDG”. The heading bug will remain solid magenta until heading mode is cancelled. Select a new heading at any time while the autopilot is in heading mode and the autopilot will track the new heading bug value.

2) **Nav/Apr Mode**—Press the NAV button on the autopilot control head to engage Nav mode. The autopilot will intercept and track the desired course. In this mode, the autopilot tracks the active plan of the selected GPS (Nav=GPS1 or GPS2) or an active VOR or localizer (Nav=VLOC1 or VLOC2). The autopilot control head and the PFD will indicate “NAV”. If a localizer is selected, the autopilot will automatically select APR mode. Both the autopilot control head and the PFD will annunciate “NAV APR”. Glideslope capture is supported while in “NAV APR ALT” mode. In Nav/Apr mode, the heading bug will be hollow and remains at its last set value, which is not necessarily aligned with the Nav course.

3) **GPS Roll Steering Mode**—In this mode, the autopilot tracks the active flight plan of the selected GPS (Nav=GPS1 or GPS2). Press the NAV button on the autopilot control head twice to engage GPSS mode. The autopilot will then begin tracking the GPS steering commands from the selected GPS. The autopilot control head and the PFD will indicate “GPSS”. Use of GPSS mode is recommended during GPS navigation, including GPS and GPS-overlay approaches due to its increased accuracy. In this mode, the heading bug will be hollow and remains at its last set value, which is not necessarily aligned with the Nav 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 GPS1 if VLOC1 is selected or GPS2 if VLOC2 is selected and not track VLOC1 or VLOC2 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. The GPSS annunciation on the PFD is displayed in reverse video yellow to indicate this mode conflict.

GPSS mode must not be used on the final approach segment of a VLOC approach (ILS, LOC or non-GPS-overlay VOR). GPSS mode must be deselected (i.e., NAV mode selected) prior to the turn onto the final approach course.

S-TEC 55X Vertical Modes

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

1) **Altitude Hold Mode**—Push *ALT* on the autopilot control panel to enable altitude hold. Current altitude at the time of button press will be selected as the target altitude 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. The Flight Director steering command bars will be present.

Note: The knob on the right side of the autopilot control head can be used 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.

2) **Vertical Speed Mode**—Push *VSI* and rotate the PFD knob to set the desired vertical speed. The VSI bug is hollow at this point. Engage the VS mode by pressing the VS button on the autopilot control head. At this point, the VSI bug will become solid magenta. The Flight Director steering command bars will be present. When VS mode is cancelled, the VSI bug will become

hollow and remains at its last value, and the flight director will be removed.

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

3) **Altitude Capture Mode**—Push *Alt Bug* on the Entegra PFD and rotate the right knob to set a desired target altitude. Engage Altitude Capture mode by pressing the ALT and VS buttons on the autopilot control head simultaneously. The Alt Bug and VSI Bug will become solid magenta while the flight director steering command bars are shifted to correspond with the autopilot commands. In autopilot mode, annunciated as “AP”, the autopilot will then follow the VSI bug to the selected target altitude. In flight director mode, annunciated as “FD”, the flight director command bars will move to the appropriate location, but it is your responsibility to match the command bars. 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.

S-TEC 55X Flight Director Modes

The flight director is a display of the flight profile commanded from the autopilot. In the typical installation, a remote switch on the instrument panel allows the control of the autopilot modes between autopilot “AP”, and flight director “FD”. “FD” mode is a manual mode in which you are expected to manually fly toward the command bars. When the autopilot is engaged in AP or FD mode, the Flight Director will be displayed except while in CWS mode.

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

Control Wheel Steering (CWS) Mode

When the CWS button is pressed and held the PFD flight director is removed, the autopilot roll and pitch servos disengage, CWS and VS

are displayed on the PFD and autopilot. While the CWS button is held, the autopilot dynamically displays current VS values of aircraft on its control head. The PFD VS bug is hollow and remains at the last set value.

Prior to releasing the CWS button, allow the aircraft to stabilize in the desired attitude for 2 to 3 seconds, release the CWS switch and the autopilot roll and pitch servos will engage and synchronize with the aircraft's turn rate and vertical speed. The PFD flight director

remains removed, CWS and VS are displayed on the PFD and autopilot and the PFD VS bug remains hollow. Vertical speed can be controlled by VS knob on the autopilot directly or, after pressing VS mode on autopilot, by the PFD VS bug. The PFD controls the vertical speed only when the PFD VS bug is solid.

After the CWS button is released, other horizontal or vertical modes of the autopilot can be selected through use of the appropriate buttons on its control head.

Autopilot Operation During PFD Failures

In the unlikely event of a total PFD failure, the autopilot can still be controlled via its control head. GPS roll steering (GPSS Mode) is the only autopilot horizontal mode available. Alt Hold Mode and VS mode are still available and may be controlled using the Alt and VS buttons and the rotary knob on the autopilot control head. See the autopilot user's guide for usage instructions.

Note: Only GPS/NAV 1 is capable of being the navigation source to the autopilot in the event of a PFD failure

8.2 S-TEC 1500 Autopilots

The Entegra PFD integrates with the S-TEC System 1500 autopilot, available with the Piper PA46-500TP (Meridian). Full guidance is provided from the Entegra PFD for horizontal modes. Flight director steering command bars are displayed when commanded to do so by the autopilot.

Control of the S-TEC 1500 vertical modes and display of mode information is via the autopilot faceplate.

The flight director command bars, if displayed, are always magenta, and the heading bug is always filled (magenta) regardless of autopilot mode. VSI bug and button are removed, and the Altitude bug is always hollow to indicate that it cannot be coupled to the autopilot.

The following is a description of the S-TEC 1500 autopilot modes supported by the Entegra PFD. The autopilot may only be coupled to the GPS/NAV selected as the PFD Nav source. The autopilot may not be coupled to the GPS/NAV selected as the PFD Bearing source.

S-TEC 1500 Horizontal Modes

1) **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 indicate “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: Heading bug is always filled. Refer to the S-TEC 1500 faceplate for engaged mode annunciation

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

   - If GPS (Nav=GPS1 or GPS2) 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=VLOC1 or VLOC2) 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

Flight Director Modes

The flight director is a display of the flight profile commanded from the autopilot. A switch on the S-TEC 1500 faceplate allows you to toggle the control of the autopilot modes between autopilot “AP”, and flight director “FD”. “FD” mode is a manual mode in which you are expected to manually fly toward the command bars. When the autopilot is engaged in AP or FD mode, the Flight Director will be displayed.

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

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.

Note: The command bars for the S-TEC 1500 always display in magenta, regardless of Flight Director mode. For Flight Director status, see the S-TEC 1500 faceplate.

9 Wind Vector & Track Line

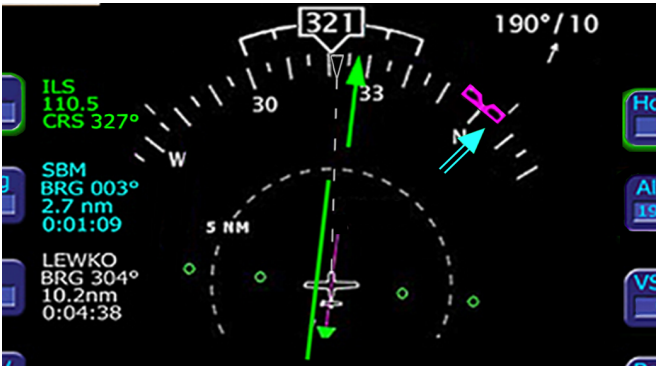


Figure 13.

The wind vector on the HSI is very useful in any phase of flight where winds aloft should be taken into account. A combination of the wind vector and projected track line can be used to your advantage in navigation tasks. A very useful technique is to align the projected track line with the desired course. This will take the guess work out of determining proper crab angles for wind corrections.

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

10 Approaches Using the PFD

10.1 Precision Approaches

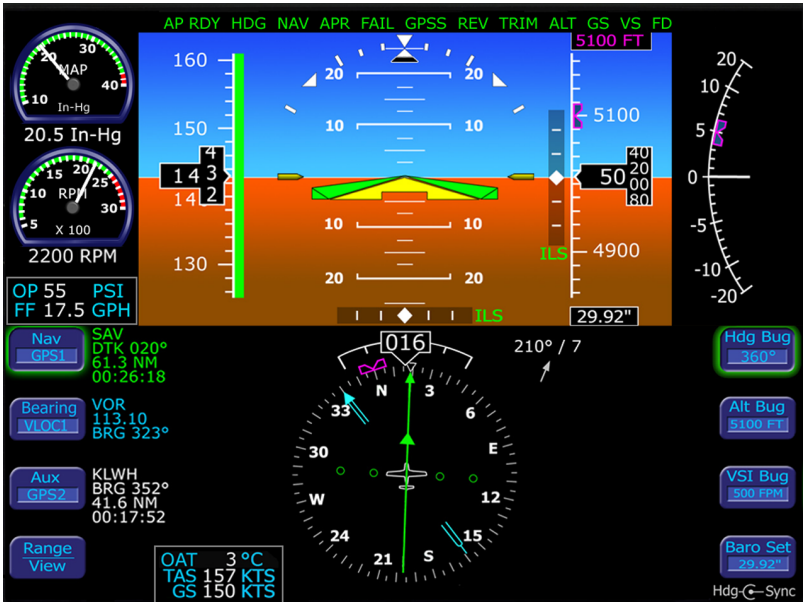


Figure 14. Precision Approaches

The Entegra PFD is designed to take full advantage of the auto transition capability of the GPS/NAV systems for flying a GPS flight plan ending in an ILS approach. In this case, the GPS/NAV CDI source automatically switches from GPS to VLOC when it begins receiving the glideslope/glidepath signal. At that time, the Entegra PFD “Nav” source also changes and 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 a localizer or ILS has been selected via the Entegra PFD “Nav” button, the HDI and VDI will be automatically displayed when applicable localizer and glideslope signals are received. No pilot action is required for the horizontal and vertical deviation indicators to be displayed.

It is recommended that the inbound course be set via the Entegra PFD course set knob to serve as reference during the localizer intercept and tracking. This is automatic if the GPS/NAV system has been setup to Autoslew. The CDI deflection will be driven by the localizer signal itself, regardless of the course setting.

To perform an autopilot-coupled approach, ensure the approach has been activated in the GPS selected as the Nav source. At that point, 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.

It is recommended that the altitude bug be set to the published approach decision height 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 GPS/NAV. This will enable the Entegra PFD to display the approach waypoints on its moving map

Note: Upon reaching the FAF, ensure that the correct baro is entered in both the PFD and standby altimeter. Also verify that the PFD and standby altimeter indicate the same altitude

10.2 Non-Precision Approaches

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

A recommended technique when performing an autopilot-coupled non-precision approach is to select the HDG, NAV and ALT buttons on the autopilot while still outside the FAF. Prior to reaching the FAF, use Entegra's VSI bug, if present, to set the desired VS descent rate, use Entegra's HDG Bug to set the desired heading for climbout/ missed approach, and use Entegra's Alt Bug to set the desired intermediate level off altitude or the MDA as a visual reminder. Crossing the FAF, VS mode should be selected on the autopilot and just prior to reaching MDA, ALT should be selected on the autopilot to command altitude hold.

The Entegra PFD is designed to fully support flying back course localizer approaches. To perform a back course localizer, ensure the front course value is set via the Entegra PFD course knob. As soon as the Entegra system determines itself to be established on the back course localizer, the HDI source label indicates "LOC BCRS" and both the HDI and CDI display correct sensing. There is no further pilot action required.

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

10.3 Missed Approach

Prior to missed approach, disconnect the autopilot, ensure the aircraft is trimmed for the power setting, establish a climb attitude and use Entegra's Alt Bug to set the desired missed 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 GPS/NAV to continue the coupled missed approach.

If an altitude capture is attempted to a target altitude above current aircraft altitude and a negative value has been set in the VSI Bug, the system will not proceed with the altitude capture but will transition into altitude hold mode instead. The same is true for target altitudes below current aircraft altitude but positive values set in the VSI Bug.

Note: This procedure does not apply to PFDs integrated with the S-TEC 1500 autopilot.

11 Using Dual PFDs

This section discusses features specific to aircraft equipped with dual PFDs.

11.1 Selecting the ADAHRS Source

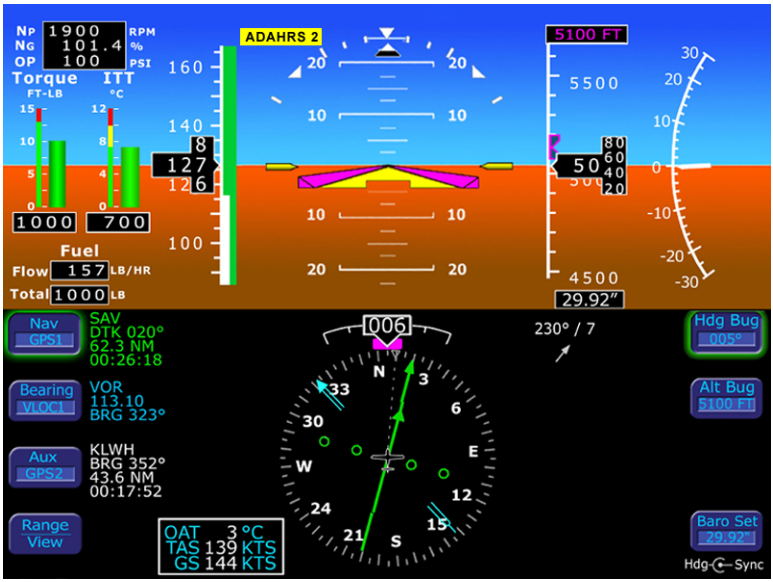
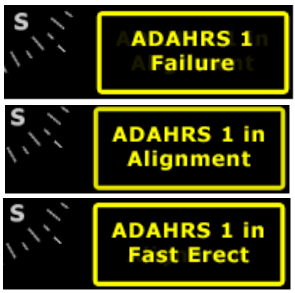


Figure 15. Dual PFD Display

For dual PFD-equipped aircraft, each PFD has a complete and independent ADAHRS. Each PFD can display either its own ADAHRS data or the other PFD ADAHRS data. If the PFD is displaying the other PFD's ADAHRs data, an annunciation indicating this fact is displayed in the center top of the display. For example "ADAHRS 2" is displayed if Pilot's PFD is displaying Copilot PFD's ADAHRS. An instrument panel mounted ADAHRS source selection switch determines the source of ADAHRS data for each PFD.

Note: With both PFDs operating normally, it is recommended that the ADAHRS source selection switch be set such that both PFDs are displaying their own ADAHRS data in order to permit cross-checking of attitude, heading, and air data. In the case of an ADAHRS failure, the switch can be set to display the remaining operating ADAHRS

If the ADAHRS that is not selected for display has failed, is in alignment, or is in fast erect, this condition will be annunciated with a yellow message box in the lower right corner of the HSI.



11.2 Synchronized and Non-synchronized Controls

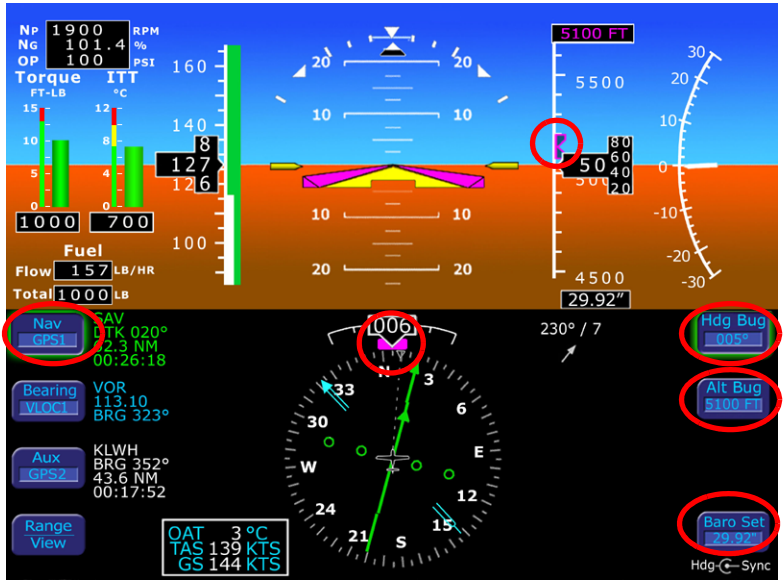


Figure 16. Dual PFDs – Synchronized Controls

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. To provide maximum flexibility in the navigational needs of the two crew members, other controls are not synchronized.

Synchronized
Primary Nav Source selection
Course setting (if supported by selected Nav source and mode)
Hdg Bug
Alt Bug
VSI Bug (if present)

Not Synchronized
Bearing Nav Source
Aux Nav Source
HSI views
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.

12 Invalid Sensor Data

12.1 Invalid Air Data

Figure 17. 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 by dashes.

3) Outside Air Temperature and True airspeed data are removed and replaced by dashes.

If Invalid Air Data occurs, revert to the mechanical backup airspeed indicator and altimeter. Avidyne recommends that you cross reference the PFD attitude to the backup ADI when flying with invalid air data.

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

12.2 Invalid Heading

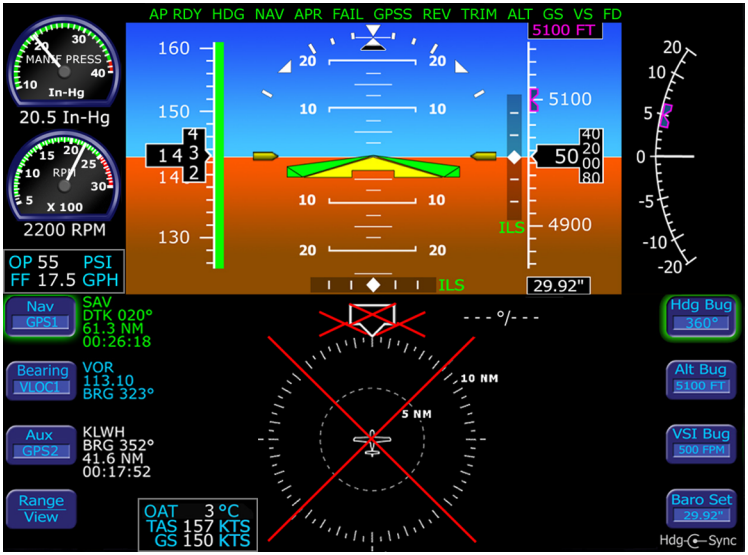


Figure 18. Invalid Heading

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

Note: Refer to the aircraft compass for heading. Refer to the Entegra PFD, 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.

12.3 Crosscheck Monitor

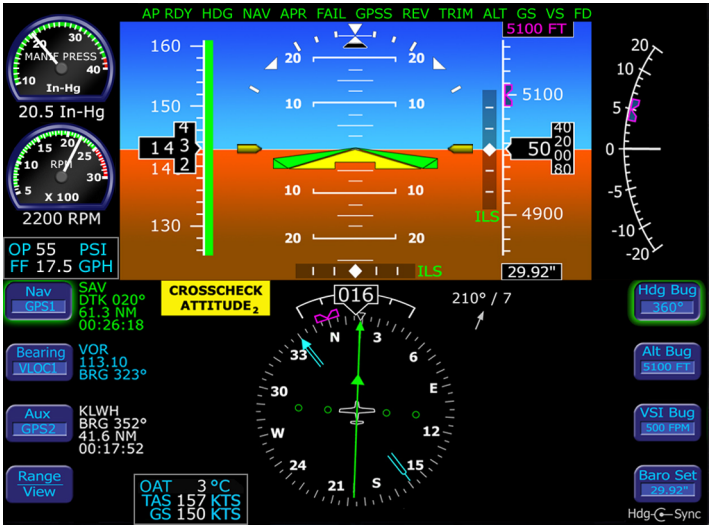


Figure 19. Crosscheck Monitor

The Entegra PFD 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.“”

1) 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 PFD attitude is valid.

The message will not display when air data is invalid (as shown on page 46). Cross referencing the PFD attitude to the backup ADI is recommended during flight with invalid air data.

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.

12.4 Recoverable Attitude

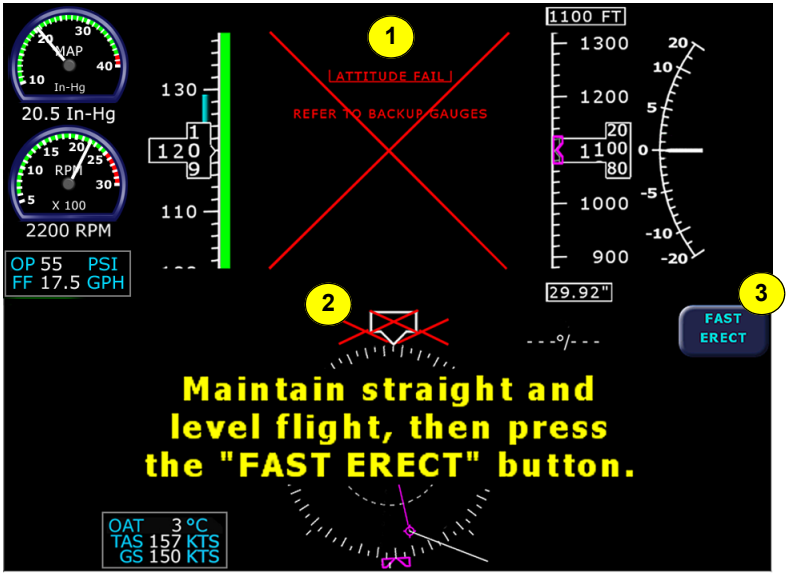


Figure 20. Recoverable Attitude Failure

If a recoverable attitude data failure occurs:

1) All normal button labels are removed.

1) An “Attitude Fail - Refer to backup gauges” message displays.

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.

12.5 Invalid Attitude & Heading

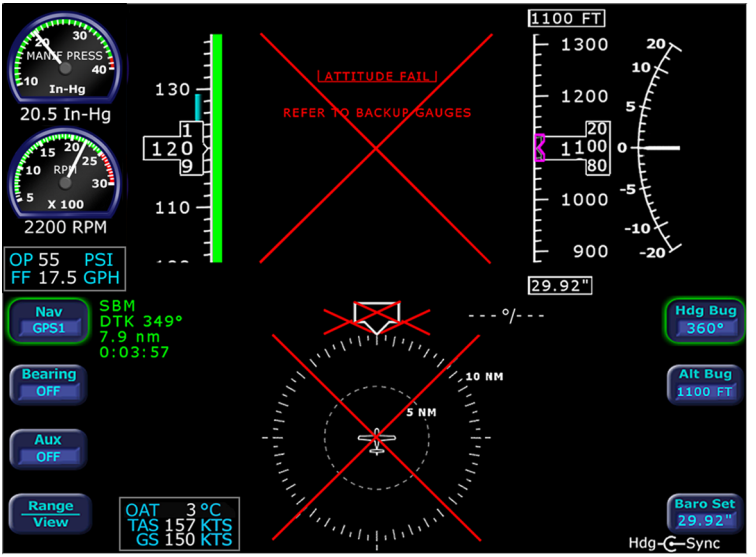


Figure 21. Invalid Attitude and Heading

If valid attitude and heading data becomes unavailable:

1) Attitude data, wind vector data, heading data, and HSI navigation data are removed from the display.

2) An “Attitude Fail - Refer to Backup Gauges” message displays.

Note: For software part numbers 530-00138-000 Rev 02 or higher (some PA28 and 32 aircraft) and 530-00171-000 (all PA46 aircraft), 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 12.8, "Warmstart Conditions" on page 53.

If your aircraft does not support warmstart, or 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 S-TEC 55X-equipped aircraft, consider using the autopilot to reduce workload. Use GPSS mode to maintain the flight plan route.

12.6 Invalid Engine Data

Figure 22. Invalid Engine Data

If valid engine data becomes unavailable:

1) Engine Instrument needles will be removed from the indicator dials.

2) Engine Instrument numeric readouts will be shown as three white dashes instead of digits.

It is likely that if data for one engine instrument is lost, that data will be lost for all four engine instruments. Use engine instruments on Multi-Function Display (MFD) or Copilot PFD, if available. If engine sensors have failed and the data is not available on PFD or MFD, land as soon as practical.

12.7 Nav Source Crosscheck

When receiving valid navigation information from two radios tuned to the same navigation aid, the PFD 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.

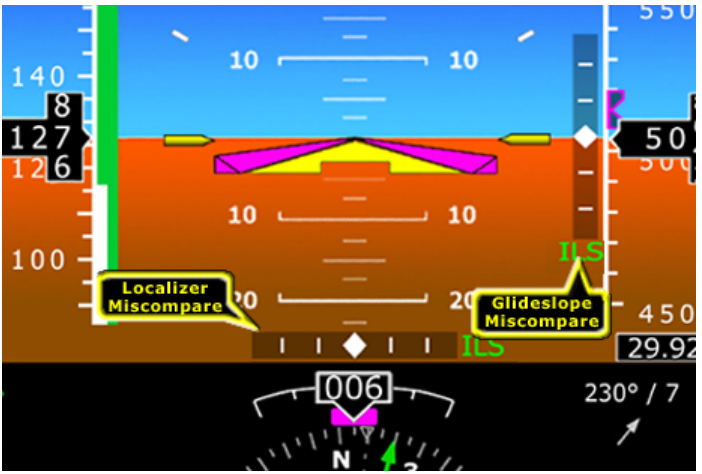


Figure 23. Localizer and Glideslope Crosscheck Errors

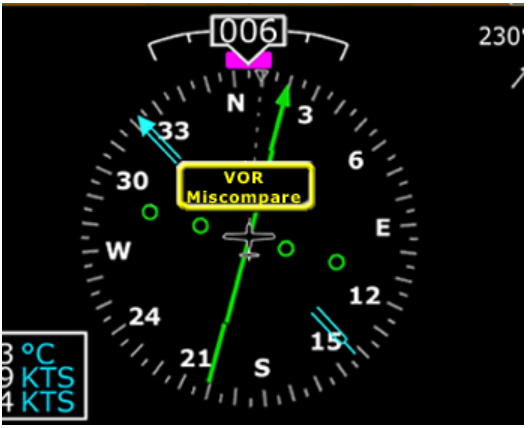


Figure 24. VOR Crosscheck Error

12.8 Warmstart Conditions

The PFD 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.

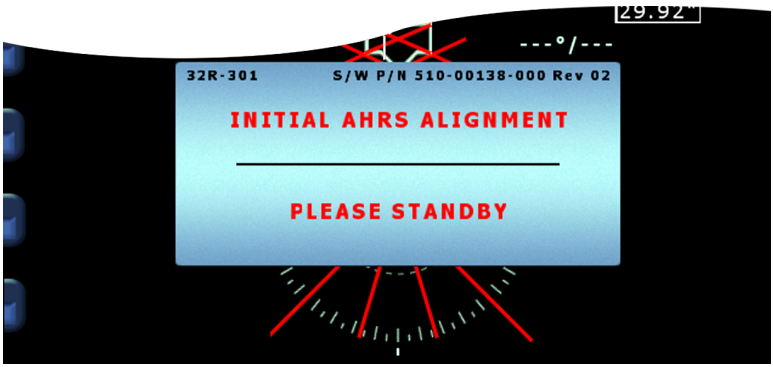


Figure 25. Initial AHRS Alignment Message

Figure 26. Quick Restart Message

12.9 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.

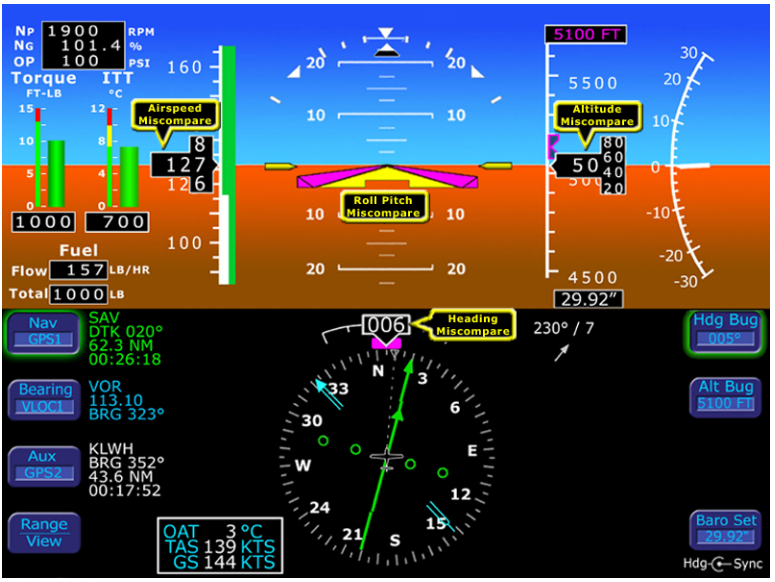


Figure 27. ADAHRS Alert Messages

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.

12.10 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.

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