DYNON CERTIFIED

SkyView HDX

Airplane Flight Manual Supplement

(or Supplemental Airplane Flight Manual)

103272-000

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FAA Approval

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Airplane Registration: _____

Airplane Manufacturer: _____

Airplane Model: _____

Airplane Serial Number: _____

This document serves as a supplement to the aircraft flight manual, or as a supplemental flight manual. It must be attached to the FAA Approved Airplane Flight Manual (AFM) or, when no AFM exists, used as a supplemental aircraft operating manual when the Dynon Avionics SkyView HDX System is installed in accordance with STC SA02594SE.

The information contained herein supplements the information of the basic Airplane Flight Manual. For Limitations, Procedures, and Performance information not contained in this Supplement consult the basic Airplane Flight Manual or the placards and markings in the aircraft.

The following sections of this document are FAA APPROVED:

2: Limitations
3: Emergency & Non-Normal Procedures
4: Normal Operations
5: Performance
10: Appendix 1: Cessna Models 172F through 172S
11: Appendix 2: Beechcraft Bonanza P35 through V35B
12: Appendix 3: Piper PA-34 Seneca

EDWARD P KOLANO

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for Manager, Northwest Flight Test Section, AIR-715
Federal Aviation Administration
Seattle, WA

Date: 10-29-2020

Revision History

REV	DATE	APPROVED	DESCRIPTION OF CHANGE
A	3/5/2018		Initial Release
B	6/8/2018		Added 91.227 Language
C	7/10/2018		Added knob modules and updated operating limitation.
D	4/1/2019	ECO 324900	• Added 6-cylinder EGT/CHT, Flaps and Landing Gear functionality, • Revised illustrations, • Moved Airplane Limitations to section 8, and Emergency Procedures to Section 9, • Revised format of Emergency Procedure checklist, • Deleted the appendix. • Revised limitations section for new models
E	4/10/2019	ECO 326715	• Added autopilot slip, trim, slip/trim, airspeed high/low message. • Added autopilot VNAV engagement caution. • Formatted emergency procedures for improved clarity. • Added autopilot servo jam emergency procedure. • Clarified language on FAA approval signature page. • Formatted section 5.5 (Autopilot Operation) for improved clarity.
F	4/29/2019	ECO 327677	• Changed section 3.6 to reference "14 CFR 23.1545" instead of "FAR 23.1545" • Changed wording in section 5.5 to read "pull" instead of "turn off" with reference to circuit breakers. • Updated Figure 18
G	7/2/2019	ECO 331341	• Changed name of document from "SkyView HDX Airplane Flight Manual Supplement" • Added note regarding use of this document as an SAFM.
H	3/3/2020	ECO 344060	• Applied new document template. • Added information in Section 3.7, 3.10, 3.11 for twin engine airplanes / Dual EMS. • Added Section 4.5: Temperature Indicators. • Added Section 4.6: Synchroscope. • Added Section 6.4.2: Trim Messages. • Added Section 6.4.3: Slip Trim Messages. • Revision to Section 6.9: Yaw Damper behavior. • Added Section 9.6.4: Piper Aircraft PA-34 Seneca.

REV	DATE	APPROVED	DESCRIPTION OF CHANGE
I	4/10/2020	ECO 346079	• Addressed FAA review comments on Rev H, including: ▪ Update Section 2: System Overview to better distinguish between Primary, Secondary, and Standby EFIS displays. ▪ Replace Section 3: Flight Crew Alerting System with new, updated information. ▪ Updated the following sections of Section 4: Indications for technical accuracy: ○ 4.1 Airspeed Indicator ○ 4.3 Landing Gear Position Indicators ▪ Updated the following sections of Section 6: Autopilot for technical accuracy: ○ 6.1: Protective Features ○ 6.4.2: Trim Messages ○ 6.4.3: Slip Trim Messages ○ 6.5: Autopilot Controls ○ 6.6: Vertical Guidance Source Loss ○ 6.9: Yaw Damper ▪ Updated the following sections of Section 7: Normal Operations for technical accuracy: ○ 7.10: Course (OBS) Setting ○ 7.11: HDX Backup Power Check ○ 7.13: Backup EFIS-D10A Battery Condition Check ○ 7.16: Yaw Damper ○ 7.10: Course (OBS) Setting ○ 7.11: HDX Backup Power Check ○ 7.13: Backup EFIS-D10A Battery Condition Check ○ 7.16: Engage Autopilot ○ 7.17: Engage Flight Director ○ 7.18: Disengage Autopilot ○ 7.22: Go Around ○ 7.25: Approaches ○ 7.26: Autopilot Operational Check ▪ Updated the following sections of Section 9: Limitations for technical accuracy: ○ 9.1: General ○ 9.2: Backup Power ○ 9.6.4: Piper Aircraft PA-34 Seneca ▪ Updated Section 10:1: Airspeed, Altitude and/or Attitude Unreliable for technical accuracy. • Proofread document and fixed language, layout, and linking issues. • Removed outdated links and references.

REV	DATE	APPROVED	DESCRIPTION OF CHANGE
J	5/1/2020	ECO 346986	• Addressed FAA review feedback on Rev H: ▪ Re-ordered Table 1: Warnings, Table 2 Cautions, and Table 3: Messages. Ordering is by 1) core system, 2) component, 3) function per type of alert. ▪ Updated Section 4.2.1, 4.2.3, and 4.2.3 with additional screenshots and verbiage to clearly differentiate single- and twin-engine EMS indications. ▪ Updated Section 4.5 with new screenshot. ▪ Added Table 4: Autopilot Fail Down Modes in Section 6.1, describing Autopilot fail down modes. Subsequent tables renumbered. ▪ Re-arranged screenshots in Section 6.4 for readability. Updated screenshot in Section 6.4.4 to reflect UI. ▪ Removed table from Section 6.4, as information was outdated. Updated Sections 6.4.1 through 6.4.4 to sync with info in Section 3. ▪ Updated procedure in Section 7.14 to disable Dual Mode. ▪ Updated verbiage in Section 7.18 to be clearer. ▪ Added new Section 7.26.2: Yaw Axis Operation Check. Subsequent sections renumbered. ▪ Removed 2 limitations from Section 9: Limitations per FAA request. ▪ Updated Section 10.6: Autopilot / Yaw Damper Servo Jam to clearly describe role of frangible link.
K	8/11/2020	ECO 353760	• Reorganized document according to GAMA 1 guidelines. • Aircraft-specific information moved to separate Appendices to aid technical reviews of document as more Autopilots are added to airplanes on the AML. • Failure Modes (now Section 3.2) renamed to Non-Normal Procedures and content converted to GAMA style procedures. Emergency Procedures: Autopilot Disconnect and Yaw Damper Disconnect moved from Emergency Procedures to Non-Normal Procedures. • Engage Autopilot (now Section 4.4.1) updated per feedback from FAA/Dynon meeting. • Warning Alerts (now Section 7.8.2) updated per Dynon software developer input. • Caution Alerts (now Section 7.8.3) updated per feedback from FAA/Dynon meeting and Dynon software development input. • Message Alerts (now Section 7.8.4) updated per Dynon software developer input. • Airspeed Indicators (now Section 7.9.1) updated per feedback from FAA/Dynon meeting. • Engine Monitoring (now Section 7.9.2) updated per feedback from FAA/Dynon meeting. • Autopilot Protective Features (now Section 9.1.1) updated to include servo break-away information.
L	9/14/2020	ECO 356791	• Updated document footers per GAMA 1 guidelines (all pages affected). • Updated FAA Approval section (Page X) per FAA feedback. • Updated Tables 2, 3, 4 (Pages 7-4 through 7-20) with new column heads and some language/terminology changes per FAA feedback. • Updated Sections 10 (Page 10-1), 11 (Page 11-1), 12 (Page 12-1) to use prohibitive language per FAA feedback.

REV	DATE	APPROVED	DESCRIPTION OF CHANGE
M	10/8/2020	ECO 358194	• Moved FAA Approval page to first page per GAMA 1 guidelines. • Moved References page to Section 1: General • Added new Section 2.2: Engine Monitoring Visibility to Section 2: Limitations. Subsequent Section 2 headings renumbered. • Moved old Section 3.1.2: Autopilot / Yaw Damper Override to new Section 9.1.1. Subsequent Section 6 headings renumbered. • Updated language in new Section 3.1.3 Autopilot / Yaw Damper Servo Jam. • Updated language in Table 2: Warning Alerts, Table 3: Caution Alerts, Table 4: Messages per FAA feedback. • Updated language in 7.9.2: Engine Monitoring per FAA feedback.
N	10/23/2020	ECO 360164	• Moved FAA Approval page per FAA request. (page iii)
FAA Signature			

Technical changes since previous revision indicated with Change Bars in margins. Language and layout changes are not tracked.

Table of Contents

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1 General

SkyView HDX is an integrated system that aggregates air, engine, traffic, and navigation information for display to the pilot. The information is portrayed on the SkyView HDX display, which is a touchscreen, coupled with mechanical knobs and buttons. The SkyView HDX display provides Primary Flight Information (PFI) on the Primary Flight Display (PFD), Map with current position, and optionally Engine Monitoring information. Subsystems, such as the Autopilot, Communications, Transponder, as well as third-party equipment integrate with SkyView HDX to perform their functions.

Voice aural annunciations and written messages are used to alert the pilot to exceptional conditions, such as departures from desired altitudes or exceeding engine parameter limits.

Airspeed, altitude, and attitude data is collected by the Air Data, Attitude, Heading Reference System (ADAHRS.). Engine, fuel, and electrical system data is collected by the optional Engine Monitoring System (EMS).

Navigation data is provided by an integrated GPS and by external navigation sources.

ADS-B In traffic data is provided by an integrated ADS-B In receiver. ADS-B Out capability is provided by a position source and transponder, which have been shown to meet the requirements of 14 CFR 91.227.

The system stores an onboard terrain and chart database for display as the VFR Map.

This document contains information related to operating the optional Autopilot. Not every airplane is approved to be equipped with the SkyView HDX Autopilot system.

1.1 Reference Documents

- 102949-000 SkyView HDX Pilot's User Guide
- 103261-000 SkyView HDX System Installation Manual
- 103221-000 SkyView HDX System General Maintenance Manual

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2 Limitations

The limitations listed in this section apply to all airplanes with a SkyView HDX system.

Autopilot limitations for airplanes certified for a SkyView HDX Autopilot system are listed in the aircraft-specific appendices at the end of this document.

2.1 IFR Operations

For IFR operations, the SkyView HDX system must have at least one of each of the following components in fully functioning condition, with no System Setup error messages:

For all airplanes:

- SkyView HDX display unit.
- SV-ADAHRS-200 module.
- SV-BAT-320 backup battery.
- EFIS-D10A standby display.
- Functioning external navigation source, either an IFR GPS Navigator or NAV radio.

2.2 Engine Monitoring Visibility

For all airplanes equipped with EMS:

- Configuring the screen layout of a SkyView HDX display unit so the primary engine instruments are not visible to the pilot is prohibited.

For twin-engine airplanes with an Engine Monitoring System (EMS):

- A secondary (non-PFD) Skyview HDX display unit must be installed and dedicated to present Engine Monitoring information.
- The SkyView HDX display unit dedicated to present Engine Monitoring information must be configured to always show (no exceptions) EMS information in either 100% or 50% display page layout during takeoffs and landings.

2.3 Backup Power

For all airplanes:

- Backup power for both the primary and standby display systems must be checked prior to IFR flight. (See Section 4.2: SkyView HDX Backup Power Check and Section 4.3: EFIS-D10A Standby Display Backup Battery Condition Check for instructions.)
- IFR flight with Yellow or Red Backup Battery indicator status displayed is prohibited.

2.4 Synthetic Vision

For all airplanes:

- SkyView HDX Synthetic Vision is advisory in nature and must not be used as the sole means of terrain and obstacle avoidance.

2.5 Map

For all airplanes:

- The SkyView HDX Map and Flight Planning function is advisory in nature and must not be used as the sole means of terrain and obstacle avoidance.

3 Emergency & Non-Normal Procedures

3.1 Emergency Procedures

3.1.1 Airspeed, Altitude, and/or Attitude Unreliable

CONDITION: The pitch attitude is not consistent with airspeed, vertical speed, or altimeter indications, and one of the following is true:

- Airspeed reads "0" on all flight indicators, and CHECK PITOT HEAT Caution Alert is active, requiring immediate pilot action.
- Airspeed and altitude are increasing, attitude indicates nose down.
- Airspeed, Altimeter and VSI readings do not change on all indicators.

NOTE: *Connected diamond bullets in procedure indicate pilot must identify applicable listed condition.*

1. AP DISC Button_____ PRESS.
2. Pitot Heat Switch _____ ON.
3. Maneuver away from icing conditions.
4. Choose one:

◆ Airspeed reads "0" on all indicators, and CHECK PITOT HEAT Caution Alert is displayed:

- Pitot tube may be obstructed.
- Fly by reference to: ALTITUDE, VSI, and non-SkyView HEADING indicator.

–END–

◆ Airspeed and altitude are increasing, and attitude indicates nose down:

- Pitot tube may have been previously obstructed but is becoming unobstructed.
- Fly by reference to: ALTITUDE, VSI, and non-SkyView HEADING indicator.

–END–

◆ Altitude, Airspeed, or VSI readings do not change on all indicators

- Alternate Static Source _____ ON
- Fly by reference to ALTITUDE, VSI and non-SkyView HEADING indicator.

When the Alternate Static Air System is no longer needed:

- Alternate Static Source _____ OFF

–END–

3.1.2 Autopilot / Yaw Damper Disable

CONDITION:	One or more Autopilot servos are operating in a confusing or un-commanded fashion.

1. AP Power Switch _____ OFF.
2. Fly Manually.
    - Power has been removed from the Autopilot servos.

3.1.3 Autopilot / Yaw Damper Servo Jam

CONDITION:	One or more flight controls fail to move as expected and are jammed by an Autopilot servo.

1. AP DISC Button_____ PRESS.
2. Flight Controls _____ APPLY BREAK-AWAY FORCE.
3. Flight Controls _____ OPERATE.
4. AP Power Switch_____ OFF.
5. Plan to land at nearest suitable airport.
    - When pilot applies force to flight control system, frangible link will break and safely disconnect flight controls from malfunctioning Autopilot servo.
    - Once frangible link breaks, pilot needs to relax flight control input to avoid over correction. The flight controls will then operate normally.
    - Autopilot operation is prohibited until the cause of the malfunction has been determined and corrected.

3.2 Non-Normal Procedures

3.2.1 Loss of Airspeed, Altitude, Attitude, and/or Heading Display

CONDITION: Red X replaces the airspeed, altitude, attitude and/or heading indicators.

If the Autopilot is engaged, the AUTOPILOT DISCONNECT Warning Alert annunciates.

1. AP DISC Button _____ PRESS.
2. Aircraft Attitude _____ MAINTAIN / REGAIN AIRCRAFT CONTROL.
3. Plan to land at nearest suitable airport.
    - Monitor Secondary Displays, Standby Display, and other sensory cues as available.

3.2.2 Loss of Electrical Power

CONDITION: AIRCRAFT POWER LOST message is shown on the display, and the Main Menu indicates STAY ON and POWER OFF.

1. STAY ON Button _____ PRESS.
2. Plan to land at nearest suitable airport.
    - The system is operating on the Backup Battery.
    - The system will continue to operate normally until the Backup Battery is depleted.
    - There is no indicator for Backup Battery power or time remaining. A fully charged Backup Battery provides 45 minutes of operation at a minimum.

3.2.3 Engine Monitoring System Failure

CONDITION: Red X replaces all engine and fuel indications.

1. Control engine power by sound and control lever position. Monitor engine performance using airspeed and vertical speed.
2. Plan to land at nearest suitable airport.

3.2.4 GPS X Fail

CONDITION: GPS X FAIL is shown on the display. ("X" being the configured GPS source (1, 2, 3, etc.)).

- The GPS position source has failed.
- The system is operating on the next available GPS position source.

3.2.5 GPS Position Source Failure

CONDITION: POSITION SOURCE FAIL is shown on the display.

1. Use other navigational means.
    - The system has no remaining GPS positions sources available.
    - The Map is no longer available.

3.2.6 Autopilot Disconnect

CONDITION: The Autopilot needs to be disconnected for any reason other than normal operations. There are several ways to disconnect Autopilot.

1. Disconnect Autopilot:
    - Press and release red AP Disconnect Button (either yoke- or panel-mounted)

    –OR–

    - Press the AP Button on the Autopilot Control Panel.

    –OR–

    - Press the AP Button on the Autopilot Control Menu.
2. Fly manually.

3.2.7 Yaw Damper Disconnect

CONDITION: The Yaw Damper needs to be disconnected for any reason other than normal operations. There are several ways to disconnect Yaw Damper.

1. Disconnect Yaw Damper:
    - Press and release red AP Disconnect Button (either yoke- or panel-mounted).

    –OR–

    - Press the YD Button on the Autopilot Control Panel.

    –OR–

    - Press the YD Button on the Autopilot Control Menu.
2. Fly manually.

4 Normal Operations

4.1 General

Although operation of the primary functions of the SkyView HDX system is intuitive, it does require a reasonable degree of familiarity to utilize all its functions without compromising attention to other flying tasks. Users are encouraged to read the *SkyView Pilot's User Guide* thoroughly before flight and to take advantage of the training videos available on Dynon Avionics YouTube channel.

4.1.1 Knobs and Buttons

Knobs are located on the left and right sides of the display. They can be rotated both directions and pushed. The current knob function is indicated by the "soft" label above the knob. Knob function is contextual and can change when the contents of the screen are changed by the pilot (see Figure 1).

Eight buttons are located across the bottom of each display. The area immediately above the buttons is the Main Menu, which shows "soft" labels that identify the function of each button. Buttons have different functions depending on the information being shown on the display. The labels for each button on the Main Menu will change accordingly (see Figure 1).

Figure 1: SkyView HDX Hardware Controls

4.1.2 Touch Controls

SkyView HDX displays contain touchscreen functionality. Touching various items on the display allows for the item to be selected and the value adjusted. For example, touching the HSI data source allows for alternate sources to be selected.

Pilot-selectable choices for the layout of each screen can be selected by pressing DISPLAY button on Main Menu. This allows the pilot to choose whether a display should show PFD, Map, or Engine information, or some combination thereof.

See Figure 2 for details for the touchable screen areas of main flight functions. Additionally, the Timer function has touchscreen control, and if a compatible NAV device is connected, the Course (CRS) functions as well.

1. Autopilot Menu Selector
2. Transponder Menu Selector
3. Speed Bug Selector
4. Altitude Bug Selector
5. Vertical Speed Bug Selector
6. Heading Bug Selector
7. BARO Selector
8. Density Altitude Display
9. HSI Source Selector

Figure 2: HDX Touch Controls

4.1.3 Synthetic Vision

Synthetic Vision can be turned on or off by pressing the MENU button on the Main Menu, touching the PFD TOOLS screen icon, and then touching the SYNVIS screen icon. A green highlight on the SYNVIS icon means it is turned on. No highlight means it is turned off.

4.1.4 HSI Data Source

To cycle through the available sources of navigation data for display on HSI:

- Press MENU button on Main Menu, then select PFD TOOLS > HSI SRC. Repeated touches of HSI SRC will cycle through available HSI data sources.

Or,

- Touch HSI SRC area near lower right corner of the PFD and beneath the Altimeter. Repeated touches of HSI SRC area will cycle through available HSI data sources.

4.1.5 Adjusting Values and Bugs

To adjust bug values using the left knob:

1. Touch applicable area on screen (see Figure 2). The function is shown and highlighted above knob.
2. Rotate left knob as needed to set value.

Or,

1. Push left knob to enter Knob Function Menu.
2. Rotate knob as needed to set value.
3. Push left knob to close menu (menu will also close automatically after 5 seconds). This assigns function to knob.
4. Rotate knob as needed to set value. The value is shown and highlighted on screen**.**

If a function is not present in the Knob Function Menu, then it does not have a touchable screen area and cannot be assigned to the left knob. To add or remove bugs to/from the Knob Function Menu, go to MENU > PFD TOOLS > BUGS.

4.1.6 BARO Setting

The Barometer setting can be adjusted with the left knob on the display or the BARO knob on the optional Knob Control Panel (see Section 4.1.11). Using the knob on the control panel simplifies the adjustment by eliminating the need to assign the function to the left knob.

To change the Barometer setting:

1. Push left knob to enter Knob Function Menu.
2. Rotate knob to highlight BARO.
3. Push knob to close menu (menu will also close automatically after 5 seconds). This assigns BARO Bug to knob, and BARO is shown above knob. The Barometer area on the PFD is also outlined to show that it is selected.
4. Rotate knob to adjust Barometer setting. While Barometer setting is changing, screen area is highlighted in Cyan to draw attention to it.
5. To synchronize Altimeter with the Barometer settings in Table 1, push and hold BARO knob (on display or control panel) until a SYNC message appears on PFD. The following occurs:
    - Altimeter is set to the nearest METAR (when ADS-B is available in-flight).

- Standard pressure is set (29.92 inHg or 1013 millibars when at/above 18k feet or no ADS-B on board).
- Altimeter is set to match the published airport elevation (when on the ground).
- Altimeter is set to match GPS altitude (when on the ground).

If none of the conditions in Table 1 are met, the Altimeter will not synchronize and a NO SYNC message appears on the PFD.

Table 1: BARO Settings

	With SV-ADSB - 472 Installed	Without SV-ADSB - 472 Installed
On the Ground:	Adjusts the altimeter based on the current GPS Altitude. After the (BARO) is synchronized a GPSALT message will appear in the altimeter box on the PFD.	
In the Air:	Adjusts the altimeter based on the METAR of the flight plan's destination airport if within 20nm. If there is no flight plan waypoint or it is too far away, then the altimeter is set to the nearest ADS-B METAR within 100nm with a valid altimeter setting. After the (BARO) is synchronized a SYNC message will appear in a window above the knob and the airport identifier will appear in the altimeter box on the PFD.	Adjusts the altimeter to the standard pressure setting *(i.e., 29.92 in Hg, 1013 mbar, or 760 mm Hg)*
Above 18,000 ft indicated altitude	Resets the altimeter to standard pressure altitude for use in the flight levels (i.e., 29.92 in Hg, 1013 mbar, or 760 mm Hg).	

4.1.7 Altitude Bug

The Altimeter can be adjusted with the left knob on the display or the ALT knob on the optional Knob Control Panel (see Section 4.1.11). Using the knob on the control panel simplifies the adjustment by eliminating the need to assign the function to the left knob.

To change the Altitude bug:

1. Push left knob to enter the Knob Function Menu.
2. Rotate knob to highlight ALT.
3. Push knob to close menu (menu will also close automatically after 5 seconds). This assigns ALT to knob, and ALT is shown above knob. The Altimeter area on the PFD is also outlined to show that it is selected.
4. Rotate knob to adjust ALT bug. While ALT bug is changing, screen area is highlighted in Cyan to draw attention to it.
5. To synchronize Altimeter to airplane's current altitude, push and hold ALT knob (on display and control panel) until SYNC message appears above left knob on display.

4.1.8 Minimum Altitude Bug

To set the Minimum Altitude bug:

1. Push left knob to enter Knob Function Menu.
2. Rotate knob to highlight MIN.
3. Push knob to close menu (menu will also close automatically after 5 seconds). This assigns MIN to knob, and MIN is shown above knob. The Minimum Altimeter area on the PFD is also outlined to show that it is selected.
4. Rotate knob to adjust MIN bug. While MIN bug is changing, screen area is highlighted in Cyan to draw attention to it.

4.1.9 HDG/TRK Bug

Heading/Track can be adjusted with the left knob on the display or the HDG/TRK knob on the optional Knob Control Panel (see Section 4.1.11). Using the knob on the control panel simplifies the adjustment by eliminating the need to assign the function to the left knob.

To set the Heading/Track bug:

1. Press left knob to enter Knob Function Menu.
2. Rotate knob to highlight HDG or TRK.
3. Push knob to close menu (menu will also close automatically after 5 seconds). This assigns HDG or TRK to knob, and HDG or TRK is shown above knob. The Heading or Track area on the PFD is also outlined to show that it is selected.
4. Rotate knob to adjust HDG or TRK bug. While HDG or TRK bug is changing, screen area is highlighted in Cyan to draw attention to it.
5. To synchronize Heading and Track to airplane's current heading/track, push and hold HDG/TRK knobs (on display or control panel) until SYNC message appears above left knob on display.

4.1.10 Course (OBS) Setting

To set the HSI course (OBS):

1. Press left knob to enter Knob Function Menu.
2. Rotate knob to highlight CRS.
3. Push knob to close menu (menu will also close automatically after 5 seconds). This assigns CRS to knob, and CRS is shown above knob. The HIS course area on the PFD is also outlined to show that it is selected.
4. Rotate knob to adjust CRS setting. While CRS setting is changing, screen area is highlighted in Cyan to draw attention to it.

The CRS value for each available HSI source is retained when that source is deselected and will be used when that HSI source is re-selected.

4.1.11 Knob Control Panel

The Knob Control Panel (see Figure 3) is an optional panel-mounted module for SkyView. This control panel has three knobs dedicated to the most common SkyView bug functions – ALT, BARO, and HDG/TRK. This module is particularly useful in systems with the SkyView Autopilot installed because it directly controls the bugs that allow the selection of Altitude (ALT), Heading (HDG) or Track (TRK), and Barometric Setting (BARO).

Rotating the knob change the value of the associated bug. Pushing and holding the ALT and HDG/TRK knobs synchronizes the bugs with current values. Pushing and holding the BARO knob sets the Altimeter to match the GPS altitude, standard pressure if above 18,000 feet, or (if SV-ADSB-472 is installed), the nearest appropriate METAR station.

Figure 3: Knob Control Panel (horizontal and vertical configurations)

4.1.12 VHF COM Radio

The optional COM Radio Control Panel (see Figure 4) tunes frequencies by airport and station type and allows the simultaneous reception of two frequencies, referred to as Dual Mode. To use the radio:

1. Press the APT button and use the knob to scroll through nearby airports.
2. Press the knob to select an airport.
3. TWR, ATIS, GND, and ATC will now select appropriate frequencies for the selected airport.
4. Press the knob to toggle the selected active and standby frequencies.
5. Press and hold the knob to monitor both active and standby frequencies (i.e., Dual Mode). The active frequency will have priority.
6. To exit Dual Mode, push and hold the knob again, or press DUAL on the Radio Menu.
7. Adjust frequencies with the labeled buttons or manually with the dual concentric knob.

Figure 4: COM Control Panel (Horizontal and Vertical Configurations)

4.2 SkyView HDX Backup Power Check

When the SkyView HDX system detects that it is not moving, and power is removed from a display connected to a backup battery, the system will automatically run an additional 30 seconds on backup battery power. This is so it can complete a battery condition test. The result of the test will appear in the battery status indicator at next system startup.

The battery icon is displayed next to the clock to indicate battery status:

- No icon: Last battery check was satisfactory.
- Yellow battery icon:
  - The manual battery test has not been accomplished within the last 365 days. Refer to the SkyView installation manual for instructions on performing the manual battery test.
  - The automatic condition test failed during the last three attempts. Perform the manual battery test according to the SkyView installation manual.
- Red X battery icon: battery check or annual test failed, or the battery is not connected

IFR flight with a yellow or red back up battery status indicator displayed is prohibited.

4.3 EFIS-D10A Standby Display Backup Battery Condition Check

The battery is in usable condition whenever the voltage indicates greater than 16.0. To check the Standby Backup battery voltage, observe the voltmeter under the EFIS > INFO > LEFT > VMETER selection option in the menu system. Verify that the battery charge is greater than 16.0 volts.

4.4 Autopilot Controls

This section covers primary means of operating the Autopilot. Additional methods and shortcuts can be found in the *Pilot's User Guide*. The primary means of controlling the Autopilot is via the Autopilot Control Menu (see Figure 28).

- On the HDX primary page, press MENU, then AUTOPILOT to display the Autopilot Control Menu.
- Or touch the Autopilot Mode Display to enter the Autopilot Control Menu.

In the Autopilot Control Menu:

- A green bar indicates the function is active.
- A white bar indicates the function is armed.
- A black bar indicates the function is off or not selected.
- Gray button labels indicate the mode is not available (e.g., gray NAV indicates no valid NAV source).

- HSI source color indicates the type of source. Magenta indicates a GPS-based source; Green indicates a radio-based source (VOR or localizer).

The optional Autopilot Control Panel (see Figure 5) for the SkyView HDX Autopilot provides dedicated buttons for engaging the Flight Director, Autopilot, and all control modes, including coupled approaches, VNAV, IAS Hold, and mode sequencing (provided that IFR navigation sources are installed). It also has a Level Button to immediately return the airplane to straight and level flight.

The "ALT" and "SRC" buttons on the control panel are abbreviations for "ALT HOLD" and "HSI SRC" in the Autopilot menu.

The control panel buttons are illuminated for low-light visibility, but do not indicate autopilot operation status. Use the autopilot mode display and/or the autopilot menu to determine autopilot operation status.

Figure 5: SV-AP-PANEL (Horizontal and Vertical Versions)

4.4.1 Engage Autopilot

Press the AP button to engage the servos. The Flight Director is automatically engaged.

If an AP mode or modes have been preselected, that mode will become active when the AP button is pressed, and the servos will engage. See below to pre-select an AP mode.

If no mode has been selected, the Autopilot will turn on and engage the servos in Roll Hold mode and Vertical Speed mode with the targets set to the current aircraft roll attitude and vertical speed. Different modes may then be selected.

Normally, the Autopilot will not engage if airspeed is outside the normal speed range configured by the installer during initial system setup. The only exception is LEVEL Mode, which will engage at any speed.

4.4.2 Engage Flight Director

The Flight Director is engaged by pressing the "FD" button instead of the "AP" button. To subsequently engage the servos, press the "AP" button.

4.4.3 Disengage Autopilot

The Autopilot can be disengaged with the AUTOPILOT DISCONNECT (AP DISC) button. An AP DISC button is included on the optional panel-mounted AP Control Panel, or the wheel/yoke-mounted button can be used.

- Press either the yoke- or panel-mounted AP DISC Button to disengage the Autopilot servos and leave Modes and Flight Director active.
- Press either the yoke- or panel-mounted the AP Disconnect Button twice (i.e., double-click) to disengage the Autopilot servos and cancel all Modes and Flight Director.
- Press the AP button on the Autopilot control panel.
- Press the AP button on the Autopilot Control Menu.

4.4.4 Level Mode

Press the LEVEL button on the panel to engage Level Mode. Level Mode can be selected at any time, even if Autopilot is disconnected.

The level function cannot guarantee recovery below V_{NE} in all starting attitudes due to G limiting and servo effort limiting. Recoveries have only been demonstrated from 45 degrees of bank and 10 degrees nose down pitch.

4.4.5 Climb or Descend to a New Altitude at a Set Vertical Speed

1. Adjust the altitude bug to the new desired altitude.
2. Press the VS button.

If ALT HOLD is currently engaged VS bug will be set to zero. If no vertical mode is currently engaged, the VS bug will synchronize with the current vertical speed.

3. Adjust the vertical speed bug using the NOSE UP / DN buttons.

In ALT HOLD mode, the NOSE UP / NOSE DOWN buttons may be used to command a vertical speed transition without pressing the VS button. The initial press of NOSE UP/DN selects the default vertical speed of 500 fpm in the desired direction.

The AP limits airspeed to a safe value if the commanded vertical speed would over-speed or under-speed the aircraft.

4. ALT capture is automatically armed.
5. Engage the servos if not already engaged by pressing the AP button.

ALT capture is automatically activated as the airplane approaches the target altitude.

4.4.6 Climb or Descend to a New Altitude at a Set Airspeed

1. Adjust the altitude bug to the new desired altitude.
2. Press the IAS button.

The IAS bug will synchronize to the current airspeed.

3. NOSE UP / DN buttons to adjust the Autopilot's target airspeed.

Airspeed command is limited to the Autopilot minimum and maximum limits configured by the installer during initial system setup.

4. ALT capture is automatically armed.
5. Engage the servos if not already engaged by pressing the AP button.

ALT capture is automatically activated as the airplane approaches the target altitude.

4.4.7 Go Around

The Go Around function is available when the Autopilot is engaged in vertical guidance and is tracking a vertical deviation (i.e., status bar shows "VNAV" or "GS" as the active mode). To engage the Go Around function, press the NOSE UP button on the AP Control panel. Pressing Go Around (NOSE UP) at any time automatically switches Pitch and Roll Modes to:

1. TRK Mode, with value defaulting to the current GPS track, and
2. One of the following, depending upon how owner/pilot configured system in Autopilot Setup menu:
   - VS Mode defaulting to the default climb rate, or
   - IAS Mode, defaulting to the current airspeed

The need for airplane trim changes during the go-around may cause the autopilot servos to slip. The pilot must adjust the pitch trim to prevent the pitch servo from slipping.

4.4.8 HDG and TRK Hold

1. Adjust the HDG/TRK bug to the desired value.
2. Select HDG to follow a magnetic heading equal to the bug value.
3. Select TRK to follow a GPS referenced ground track equal to the bug value.
4. Engage the servos if not already engaged.

4.4.9 Enroute Lateral Navigation - VOR or GPS

This procedure is identical whether you are tracking using an enroute navigation source (GPS or VOR) or a non-precision approach (GPS, VOR or LOC).

1. Select a navigation source on the HSI (MENU > AUTOPILOT > HSI SRC). The navigation source must be providing valid course and deviation information.
2. Press the NAV button. If the CDI is already near-centered NAV mode will immediately become active. Otherwise NAV mode will arm. If NAV mode is armed, adjust the current mode's target (heading, track, or roll) to establish the desired intercept with the navigation source. NAV mode will become active once the navigation source CDI can be captured by the autopilot.

4.4.10 Approaches

1. While navigating on a course intercepting the approach course, select a navigation source on the on the HSI (MENU > AUTOPILOT > HSI SRC).
2. If appropriate, tune and identify the station and set the OBS appropriately via the CRS setting. The external navigation source must be providing valid course and deviation information.
3. When cleared for the approach:
    a. Press the NAV button in the Roll Menu to arm the NAV mode.
    b. Press the VNAV button in the Pitch Menu to arm VNAV mode.

NAV and VNAV modes arm and activate independently from each other. There is no limitation upon the order the modes can be armed or activated.

Autopilot pitch authority may be exceeded when lowering the flaps. Trim appropriately during changes in flap settings.

If a precision GPS approach is being flown with an approach approved GPS navigator and the autopilot is already in NAV mode (i.e. not flying vectors to final) arming of NAV mode is not necessary. Only VNAV will need to be armed when cleared for the approach.

VNAV mode will only capture vertical approach guidance from below. Plan your glide slope or a glide path capture accordingly.

If an ILS approach is being flown with another navigation source being used in the transition, for example an approach approved GPS navigator, upon being cleared for and activating the approach the SkyView HDX's HSI source must be switched from GPS to NAV. This may happen one of two ways:

1. If the GPS Navigator does not support auto-switching from GPS to NAV, you must manually perform this action by using AUTOPILOT > HSI SRC.
2. Some devices, such as the Garmin 430, 430W, and GTN series, can automatically change from the GPS to the localizer and send a signal to the SkyView to automatically change the HSI source at the appropriate time.

If the external GPS/NAV device is configured with this behavior enabled, one important detail is that such devices ALWAYS control whether its GPS or NAV radio is providing guidance. Thus, when configured for auto-switching, you must use that navigators' CDI or NAV/GPS toggle to change whether NAV or GPS guidance is shown on SkyView HDX's HSI. SkyView HDX's own HSI SRC button can only see EITHER the GPS or NAV side of the navigator at any time.

4.5 Autopilot Operation Check

To test the Autopilot functionality on the ground, such as during a pre-flight inspection, do the following:

4.5.1 Pitch and Roll Axis Operation Check

With master switch and Autopilot servo power switches ON:

1. Center flight control yoke, and lightly hold in place.

The weight of an unbalanced elevator may cause the servo to slip. Lightly hold the controls in the centered position when operating the autopilot on the ground to offset this effect.

2. Align HDG/TRK bug with current heading.
3. Select ALT and HDG.
4. Engage Autopilot.
5. Set Vertical Speed +1000.
6. Set Altitude 1000 feet above current. Feel yoke move in "Nose Up" direction.
7. Press and hold ALT button to return altitude bug to current. Feel yoke move to neutral.
8. Change HDG/TRK bug to right of current heading. Feel yoke move in "Right Roll" direction.
9. Change HDG/TRK bug to left of current heading. Feel yoke move in "Left Roll" direction.

4.5.2 Yaw Axis Operation Check

With master switch and Autopilot servo power switches ON:

1. Move rudder pedals left and right to feel operation.
2. Center rudder pedals, and lightly hold in place.
3. Engage Yaw Damper.
4. Move rudder pedals to the left. Rudder pedals should encounter some resistance to movement; the servo may slip.
5. Move rudder pedals to the right. Rudder pedals should encounter some resistance to movement; the servo may slip.
6. Disconnect Yaw Damper.
7. Move rudder pedals left and right to feel operation. Resistance should not occur.

The resistance offered by the servo indicates that the system is operating normally.

4.5.3 Autopilot Disconnect Check

With master switch and autopilot servo power switches ON:

1. Engage Autopilot.
2. Accomplish all that apply:
   - Press the AP button in the Autopilot Control menu, and ensure the autopilot disconnects. "AUTOPILOT DISCONECT" aural should be heard.
   - Turn the AP Servo Power switch to OFF, and ensure the autopilot disconnects. "AUTOPILOT DISCONECT" aural should be heard.
   - Press the AP button on the Autopilot Control Panel (if installed), and ensure the autopilot disconnects. "AUTOPILOT DISCONECT" aural should be heard.
   - Press the panel mounted disconnect button (if installed), and ensure the autopilot disconnects. "AUTOPILOT DISCONECT" aural should be heard.
   - Press the yoke mounted disconnect button (if installed), and ensure the autopilot disconnects. "AUTOPILOT DISCONECT" aural should be heard.

5 Performance

No change to airplane performance. Refer to the airplane's Pilot's Operating Handbook and associated Aircraft Flight Manual and supplements.

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6 Weight and Balance

No change to airplane. Refer to the airplane's Pilot's Operating Handbook and associated Aircraft Flight Manual and supplements.

Installation of a SkyView HDX system impacts the airplane's level weight and balance once, during initial installation. Certified installers must add new empty weight and balance information to airplane's Aircraft Flight Manual.

Pilots manage loading weight and balance according to the Aircraft Flight Manual. SkyView HDX has no impact on operational loading.

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7 System Overview

7.1 SkyView HDX Display Units

Up to three SkyView HDX display units can be installed in the airplane's instrument panel if space permits. The SkyView HDX display unit installed in the pilot's position is designated the Primary Display. It is configured during initial setup to always present PFD. It can also present Map and Engine Monitoring. Additional installed display units (referred to as Secondary Displays) have no PFD restrictions and can present any combination of PFD, Map, or Engine Monitoring. However, twin-engine airplanes with EMS require a dedicated display unit to present Engine Monitoring. A Secondary Display may also function as a backup should the Primary Display fail.

Primary Displays and Secondary Displays share attitude, air data and engine data. However, SkyView HDX systems include a Standby Display to provide instant attitude and air data backup. The standby display is a separate system from the SkyView HDX system.

7.2 Standby Display System

SkyView HDX-equipped airplanes always include a Standby Display that provides a display screen and an ADAHRS in a single component with a back-up battery to present attitude, altitude, and airspeed information. The approved standby display is the EFIS-D10A.

7.3 Synthetic Vision

SkyView HDX provides a synthetic vision representation of the local terrain and obstacles. This display is for advisory purposes only and must not be used as the sole means of avoidance.

7.4 VFR Map

SkyView HDX provides a display of GPS-derived aircraft position data from a non-certified GPS receiver. The map can display airport, airspace, obstacles, and other available aviation data. The map display is for advisory purposes only and is not an IFR-approved navigation source.

7.5 Terrain Alerts

Terrain clearance alerts are provided based on the predicted path of the airplane relative to the terrain database and the proximity of the aircraft to terrain. The synthetic vision alert is based both on altitude and on flight path. Terrain shown in red is an immediate threat to the aircraft. The map alert is based solely on GPS altitude.

- Yellow terrain is between 100 and 1000 feet below aircraft GPS altitude.
- Red terrain is above the aircraft, or 100 feet or less below the aircraft.

Terrain advisories are configured per pilot preference during initial system setup, and they are enabled from the MENU under MAP LAYERS. When enabled, terrain alerts are suppressed prior to takeoff and are enabled approximately 200 feet above the takeoff altitude. Terrain alerts are provided any time they are enabled, even if topographical relief is not shown on the map.

7.6 Navigation Databases

SkyView HDX uses a variety of databases containing navigation and obstacle related information. Depending on the database, these may be updated as frequently as every month. SkyView components should be kept updated with the latest available databases. These may be downloaded to a USB flash drive in accordance with the instructions found at www.dynonavionics.com.

7.7 Operational Software

Software is updated using a USB flash drive in accordance with the instructions for certified aircraft found at http://www.dynonavionics.com.

Updating the SkyView HDX operational software will automatically update all components connected to the SkyView HDX Network as appropriate.

7.8 Flight Crew Alerting System

The Flight Crew Alerting System is a central feature of the SkyView HDX system. This system provides the pilot and crew with system information organized by priority for all installed SkyView HDX sub-systems. The alerts and messages will vary depending upon the installed equipment. This section describes all possible alerts and messages.

System information is delivered in the form of flight crew Alerts and Messages that are organized by severity into one of three categories:

1. 

Warning Alerts:
   - Time-Critical Warning Alerts are used for flight-path related conditions that require immediate flight crew awareness and immediate flight crew response. Because these alert conditions are flightpath related, the messages appear on the Primary Flight Display.
   - Warning Alerts are for non-flightpath conditions that require immediate flight crew awareness and immediate flight crew response. These alerts appear in the Message Notification Window described in Section 7.8.1.
2. 

Caution Alerts:
   - Caution Alerts are used for conditions that require immediate flight crew awareness and subsequent flight crew response. These alerts appear in the Message Notification Window described in Section 7.8.1.

3. MESSAGE Messages

   - Messages are used for conditions that require immediate flight crew awareness and may require subsequent flight crew response. These alerts appear in the Message Notification Window described in Section 7.8.1.

7.8.1 Notification Methods

Whenever a new non-flightpath alert is triggered, the Alert Notification Indicator (i.e., button label) shown in Figure 6, flashes Red for Warning alerts, Yellow for Caution alerts, and Gray for informational Messages. A corresponding voice aural annunciates a spoken word such as "WARNING", "CAUTION" or "MESSAGE" depending on the alert type. Some alerts, like engine-related Warnings, will annunciate the actual message name, such as "OIL PRESSURE", or "AUTOPILOT DISCONNECT".

Figure 6: Warning Notification Indication

Pressing the WARNING, CAUTION, or MESSAGE button (i.e., Button #8) opens the Alert Notification Window. This window displays text associated with each active alert. After pressing the button, the alerts present in the window are considered acknowledged and the indicator stops flashing. The indicator color corresponds with highest alert level that is currently being triggered. Individual alerts may be configured by the installer to require acknowledgement after they have been triggered for the alert to disappear.

The appearance of alerts within the Alert Notification Window change when first triggered and after acknowledgement. The difference between an un-acknowledged and acknowledged message is shown in Figure 7. This difference is consistent with all alerts, regardless of color. When no alerts are active, the Alert Indicator states, "NO MSG".

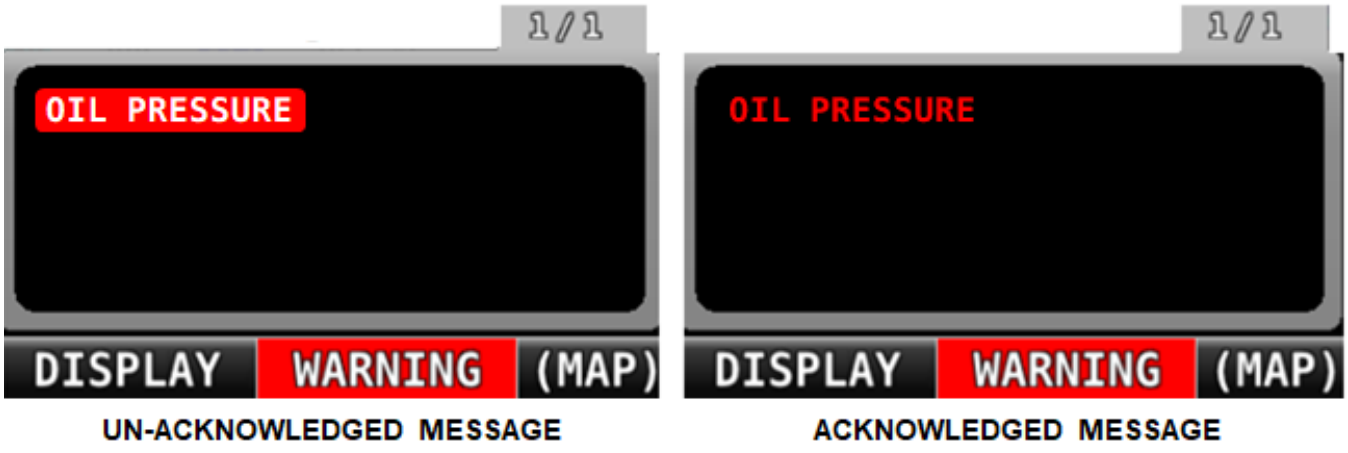


Figure 7: Alert Notification Window, Alert Appearance

7.8.2 Warning Alerts

Warning Alerts are for conditions that require immediate flight crew awareness and immediate flight crew response. If the Warning alert is flightpath related, the alert appears on the PFD and not in the Alert Notification Window. Warning Alerts are Red and may have specific voice aural annunciations.

Warning Alerts are dependent upon installed systems and components. See Table 2 for a full listing of Warning Alerts, ordered by 1) Core System, 2) Component, and 3) Function.

Table 2: Warning Alert Conditions and Associated Crew Responses

WARNING ALERTS				
VISUAL INDICATION	**AURAL INDICATION**	**CONDITION**	**PRE-FLIGHT ACTION**	**IN-FLIGHT ACTION**
AUDIO OUTPUT FAIL	"WARNING"	Audio Alert System has failed. AoA system will not operate if installed.	Do not fly.	Use visual alerts to monitor status.
BACKUP BATTERY LOW	"WARNING"	The Backup Battery connected to the SkyView display unit is in use and has entered a low charge state.	Do not fly if flight requires Instrument Flight Rules (IFR). Allow backup battery to fully charge before flight.	Avoid operations in Instrument Meteorological Conditions (IMC). Land at nearest suitable airport.
DEMO MODE	(None)	System is in demo mode and is not airworthy.	Do not fly.	Monitor Standby Display System.
SKYNET POWER FAULT	"WARNING"	A fault has been detected in wiring that provides power to SkyView Network. Failure of Flight, Engine, and/or Navigation information may be imminent.	Do not fly.	Monitor Standby Display System.
(None)	"FLAPS OVERSPEED"	The value configured for V_{FE} has been exceeded.	No action.	Take command to manually decrease airplane's speed until the flaps have been fully retracted.

WARNING ALERTS				
VISUAL INDICATION	**AURAL INDICATION**	**CONDITION**	**PRE-FLIGHT ACTION**	**IN-FLIGHT ACTION**
(None)	"GEAR OVERSPEED"	The value configured for V_{LE} has been exceeded.	No action.	Take command to manually decrease airplane's speed until the landing gear has been fully retracted.
(None)	"OVER GEES"	The G Meter has entered the configured Red range	No action.	Reduce loads acting on airplane using pitch and power as appropriate.
(None)	"OVERSPEED"	The value configured for V_{NE} has been exceeded.	No action.	Take command to manually decrease airplane's speed below V_{NE}
ADAHRS CAL CORRUPT	"WARNING"	The calibration of the ADAHRS is corrupt.	Do not fly.	Monitor Standby Display System.
ADAHRS INTERNAL ERROR	"WARNING"	System sensor tests performed on ADAHRS failed.	Do not fly.	Monitor Standby Display System.
ADAHRS FAIL	"WARNING"	SkyView HDX has detected a problem with the ADAHRS module.	Do not fly.	SkyView PDF has failed. Monitor Standby Display System.
ARINC-429 OFFLINE	"WARNING"	The SV-ARINC-429 module is not communicating with the SkyView display unit (if installed).	Do not fly if flight requires external navigation sources.	SkyView will not display navigation from external sources. Use internal source, or follow navigation information on external devices.
CHT "X" HIGH	"CYLINDER HEAD TEMPERATURE"	CHT indicator for identified sensor has entered configured Red High range.	Refer to Airplane Flight Manual	Refer to Airplane Flight Manual
CHT "X" LOW	"CYLINDER HEAD TEMPERATURE"	CHT indicator for identified sensor has entered configured Red Low range.	Refer to Airplane Flight Manual	Refer to Airplane Flight Manual

WARNING ALERTS				
VISUAL INDICATION	**AURAL INDICATION**	**CONDITION**	**PRE-FLIGHT ACTION**	**IN-FLIGHT ACTION**
AMPS HIGH	"ELECTRICAL CURRENT"	Electrical current indicator has entered configured Red High range.	Refer to Airplane Flight Manual	Refer to Airplane Flight Manual
AMPS LOW	"ELECTRICAL CURRENT"	Electrical current indicator has entered configured Red Low range.	Refer to Airplane Flight Manual	Refer to Airplane Flight Manual
EMS "X" FAIL	"WARNING"	The identified EMS module has failed.	Do not fly.	Use control position(s) and aural cues to operate engine(s).
RPM HIGH	"ENGINE SPEED"	Tachometer indicator has entered configured Red High range.	Refer to Airplane Flight Manual	Refer to Airplane Flight Manual
RPM LOW	"ENGINE SPEED"	Tachometer indicator has entered configured Red Low range.	Refer to Airplane Flight Manual	Refer to Airplane Flight Manual
EGT "X" HIGH	"EXHAUST GAS TEMPERATURE"	EGT indicator for identified sensor has entered configured Red High range.	Refer to Airplane Flight Manual	Refer to Airplane Flight Manual
EGT "X" LOW	"EXHAUST GAS TEMPERATURE"	EGT indicator for identified sensor has entered configured Red Low range.	Refer to Airplane Flight Manual	Refer to Airplane Flight Manual
FUEL FLOW HIGH	"FUEL FLOW"	Fuel Flow indicator has entered configured Red HIGH range.	Refer to Airplane Flight Manual	Refer to Airplane Flight Manual
FUEL FLOW LOW	"FUEL FLOW"	Fuel Flow indicator has entered configured Red Low range.	Refer to Airplane Flight Manual	Refer to Airplane Flight Manual
FUEL PRES HIGH	"FUEL PRESSURE"	Fuel Pressure indicator has entered configured Red High range.	Refer to Airplane Flight Manual	Refer to Airplane Flight Manual

WARNING ALERTS				
VISUAL INDICATION	**AURAL INDICATION**	**CONDITION**	**PRE-FLIGHT ACTION**	**IN-FLIGHT ACTION**
FUEL PRES LOW	"FUEL PRESSURE"	Fuel Pressure indicator has entered configured Red Low range.	Refer to Airplane Flight Manual	Refer to Airplane Flight Manual
LEVEL HIGH	"FUEL QUANTITY"	Fuel Quantity indicator has entered configured Red High range.	Refer to Airplane Flight Manual	Refer to Airplane Flight Manual
LEVEL LOW	"FUEL QUANTITY"	Fuel Quantity indicator has entered configured Red High range.	Refer to Airplane Flight Manual	Refer to Airplane Flight Manual
OIL PRES HIGH	"OIL PRESSURE"	Oil Pressure indicator has entered configured Red High range.	Refer to Airplane Flight Manual	Refer to Airplane Flight Manual
OIL PRES LOW	"OIL PRESSURE"	Oil Pressure indicator has entered configured Red Low range.	Refer to Airplane Flight Manual	Refer to Airplane Flight Manual
(None)	"OIL TEMPERATURE"	Oil Temerature indicator has entered configured Red range.	Refer to Airplane Flight Manual	Refer to Airplane Flight Manual
Visual annunciation varies by configuration	"ENGINE MONITOR"	A system monitored by EMS other than the above has entered the configured Red range.	Refer to Airplane Flight Manual	Refer to Airplane Flight Manual
VOLTAGE HIGH	"VOLTAGE"	Voltage indicator has entered configured Red High range.	Refer to Airplane Flight Manual	Refer to Airplane Flight Manual
VOLTAGE LOW	"VOLTAGE"	Voltage indicator has entered configured Red Low range.	Refer to Airplane Flight Manual	Refer to Airplane Flight Manual

WARNING ALERTS				
VISUAL INDICATION	**AURAL INDICATION**	**CONDITION**	**PRE-FLIGHT ACTION**	**IN-FLIGHT ACTION**
Autopilot Bar shows ASPD HIGH	"AUTOPILOT AIRSPEED HIGH"	The Autopilot is applying nose up inputs to protect the airplane from exceeding the configured maximum Autopilot airspeed. Visual annunciation appears immediately. Aural warning after 10 seconds.	No action.	Take command to manually decrease airplane's speed.
Autopilot Bar shows ASPD LOW	"AUTOPILOT AIRSPEED LOW"	The Autopilot is applying nose down inputs to protect the airplane from slowing below the configured Autopilot minimum airspeed. Visual annunciation appears immediately. Aural warning after 10 seconds.	No action.	Take command to manually increase airplane's speed.
Autopilot Bar changes color and temporarily flashes	"AUTOPILOT DISCONNECT"	Both Autopilot axes have been disconnected.	No action.	Take command to fly manually.
Autopilot Bar changes color and temporarily flashes	"AUTOPILOT PITCH DISCONNECT"	The Autopilot pitch axis has been disconnected.	No action.	Take command to fly manually.
Autopilot Bar changes color and temporarily flashes	"AUTOPILOT ROLL DISCONNECT"	The Autopilot roll axis has been disconnected.	No action.	Take command to fly manually.
TRIM NOSE DOWN	"TRIM NOSE DOWN"	The Autopilot requires nose down trim. Visual annunciation appears immediately. Aural warning after 10 seconds.	No action.	Apply Nose Down Trim until the message stops.

WARNING ALERTS				
VISUAL INDICATION	**AURAL INDICATION**	**CONDITION**	**PRE-FLIGHT ACTION**	**IN-FLIGHT ACTION**
TRIM NOSE UP	"TRIM NOSE UP"	The Autopilot requires nose up trim. Visual annunciation appears immediately. Aural warning after 10 seconds.	No action.	Apply Nose Up Trim until the message stops.
TRIM RUNAWAY shown shown on PFD	"TRIM RUNAWAY"	SkyView has detected electric trim motor activity that was not commanded.	Do not fly.	Press and hold AP DISCONNECT button to stop trim motor activity. Turn off AP TRIM power switch. Trim airplane using mechanical trim control.

7.8.3 Caution Alerts

Caution Alerts are for conditions that require immediate flight crew awareness and subsequent flight crew response. Caution Alerts are Yellow and may have specific voice aural annunciations.

Caution Alerts are dependent upon installed systems and components. See Table 3 for a full listing of Caution Alerts, ordered by 1) Core System, 2) Component, and 3) Function.

Table 3: Caution Alert Conditions and Associated Crew Responses

CAUTION ALERTS				
VISUAL INDICATION	**AURAL INDICATION**	**CONDITION**	**PRE-FLIGHT ACTION**	**IN-FLIGHT ACTION**
BACKUP BATTERY IN USE	"CAUTION"	The SkyView display unit presenting the alert has switched to Backup Battery power.	Do not fly.	Choose one: 1) Alert appears on all displays, and airplane Master Switch is OFF: Turn airplane Master Switch ON, Confirm message(s) stop. 2) Alert appears on one display, and airplane Master Switch is ON: Affected display will operate for 45 minutes. Remaining displays continue to function normally. 3) Alert appears on all displays, and airplane Master Switch is ON: Displays will operate for 45 minutes. Plan to land at nearest suitable airport.
B/U BATT UNAVAIL	"CAUTION"	The SkyView display unit presenting the message no longer detects the Backup Battery.	Do not fly	Avoid operations in Instrument Meteorological Conditions (IMC).

CAUTION ALERTS				
VISUAL INDICATION	**AURAL INDICATION**	**CONDITION**	**PRE-FLIGHT ACTION**	**IN-FLIGHT ACTION**
CPU TEMP CRITICAL	"CAUTION"	The SkyView display unit presenting the message has critically high internal temperature. The display will automatically shutdown.	Use remaining SkyView display units, if available.	Monitor remaining SkyView display units and/or Standby Display System.
G Meter is automatically presented on PFD	"GEES"	The G Meter has entered the configured Yellow range.	Do not fly.	Operate elevator control to reduce G loading.
KNOB PANEL OFFLINE	"CAUTION"	Knob control panel is not communicating with SkyView.	Use SkyView display unit knob controls.	Use SkyView display unit knob controls.
NO HI-RES TERRAIN	"CAUTION"	No high-resolution terrain database is installed for airplane's current position.	Install high-resolution database.	Be aware that Synthetic Vision and Terrain Map resolution is degraded.
STANDBY NETWORK ERROR	"CAUTION"	SkyView Network has lost a redundant network connection to one or more system components.	Do not fly if flight requires Instrument Flight Rules (IFR).	Avoid operations in Instrument Meteorological Conditions (IMC).
TOUCH PANEL FAULT	"CAUTION"	Touch screen of affected SkyView unit display no longer functions.	Use SkyView display unit knob controls.	Use SkyView display unit knob controls.
EMS SFG FILE MISMATCH	"CAUTION"	EMS configuration files in SkyView display units do not match.	Update configuration file to most current version in all displays in SETUP MENU > SYSTEM SOFTWARE.	No in-flight action.

CAUTION ALERTS				
VISUAL INDICATION	**AURAL INDICATION**	**CONDITION**	**PRE-FLIGHT ACTION**	**IN-FLIGHT ACTION**
ACTV ADAHRS VIBRATION	"CAUTION"	The ADAHRS has detected vibration that affects performance of G-Meter, Attitude indicator, and Autopilot.	Do not fly.	Cross check and monitor instruments. If Autopilot is enagaged, disengage, and turn AP Power switch OFF. Do not use Autopilot for remainder of flight.
ADAHRS CAL OLD	"CAUTION"	The calibration of the ADAHRS module is out-of-date.	Do not fly.	Avoid operations in Instrument Meteorological Conditions (IMC).
NEED COMPASS CAL	"CAUTION"	Compass calibration for ADAHRS not performed.	Do not fly if flight requires Instrument Flight Rules (IFR).	Avoid operations in Instrument Meteorological Conditions (IMC).
NEED USER AOA CAL	"CAUTION"	Angle of Attack (AoA) calibration for ADAHRS not performed.	Do not fly if flight requires Instrument Flight Rules (IFR).	Avoid operations in Instrument Meteorological Conditions (IMC).
CHECK PITOT HEAT	"CAUTION"	Airspeed is no longer available, or is unreliable. GPS ground speed is being used to aid attitude computations.	Do not fly.	Refer to Section 3.1.1: Airspeed, Altitude, and/or Attitude Unreliable.
CROSS CHECK ATTITUDE	"CAUTION"	Airspeed is no longer available, or is unreliable. All GPS sources have failed.	Do not fly.	Refer to Section 3.1.1: Airspeed, Altitude, and/or Attitude Unreliable.
ADS-B IN OFFLINE	"CAUTION"	ADS-B module has failed or not communicating with SkyView.	Traffic and Weather is no longer availible, Use alternate sources for traffic and weather information.	Traffic and Weather is no longer availible, Use alternate sources for traffic and weather information.

CAUTION ALERTS				
VISUAL INDICATION	**AURAL INDICATION**	**CONDITION**	**PRE-FLIGHT ACTION**	**IN-FLIGHT ACTION**
COM RADIO PNL OFFLINE	"CAUTION"	COM Radio control panel is not communicating with SkyView.	If Dynon COM radio required for flight, do not fly.	Use alternate communication equipment. If none available, use Lost Comms Procedures.
COM XCEIVER OFFLINE	"CAUTION"	COM Radio receiver is not communicating with SkyView.	If Dynon COM radio required for flight, do not fly.	Use alternate communication equipment. If none available, use Lost Comms Procedures.
HDG SOURCE FAIL	"CAUTION"	The Remote Magnetometer module has failed or is not communicating with SkyView. Heading information is unavailable.	Use magnetic compass and GPS track for directional reference. Do not fly if flight requires Instrument Flight Rules (IFR).	Use magnetic compass and GPS track for directional reference. Avoid operations in Instrument Meteorological Conditions (IMC).
MAG FACT CAL CORRUPT	"CAUTION"	The Remote Magnetometer's factory calibration is no longer valid. Heading information is unavailable.	Use magnetic compass and GPS track for directional reference. Do not fly if flight requires Instrument Flight Rules (IFR).	Use magnetic compass and GPS track for directional reference. Avoid operations in Instrument Meteorological Conditions (IMC).
GPS "X" FAIL	"CAUTION"	The identified GPS position source has failed. SkyView has switched to the next available GPS position source.	Be aware that GPS redundancy has been reduced.	Be aware that GPS redundancy has been reduced.
NO ADSB OUT: GPS LOST	"CAUTION"	The Transponder's GPS source is not communicating with SkyView. ADS-B Out is not available.	If ADS-B Out is required, request clearance online using FAA's ADS-B Deviation Authorization Preflight Tool (ADAPT).	Continue to destination. Be aware that ATC or other aircraft may not be able to determine your position.

CAUTION ALERTS				
VISUAL INDICATION	**AURAL INDICATION**	**CONDITION**	**PRE-FLIGHT ACTION**	**IN-FLIGHT ACTION**
POSITION SOURCE 'X' FAIL	"CAUTION"	The identified position source has failed.	Verify that all Navigation Equipment is powered ON. If message persists, navigate using other appropriate methods.	Verify that all Navigation Equipment is powered ON. If message persists, navigate using other appropriate methods.
XPNDR ALT ENCODER FAIL	"CAUTION"	The Transponder is not communicating with the altitude source.	If Mode C Altitude Encoding is required, do not fly.	Advise ATC, continue to destination.
XPNDR FAIL	"CAUTION"	Transponder has failed.	If Transponder is required, do not fly.	Advise ATC, continue to destination.
XPNDR HEX CODE NOT SET	"CAUTION"	Transponder hex code is not entered in SkyView display units.	If Transponder is required, do not fly. Enter Transponder hex code in SETUP MENU > TRANSPONDER SETUP.	Advise ATC, continue to destination.
AP DISCONNECT BROKEN	"CAUTION"	The Autopilot disconnect monitor has detected a wiring fault.	Turn Autopilot power OFF. Autopilot is disabled and must not be used until fault has been corrected.	Turn Autopilot power OFF. Do not use Autopilot for remainder of flight.
AP DISCONNECT STUCK	"CAUTION"	The Autopilot disconnect monitor has detected a wiring fault.	Turn Autopilot power OFF. Autopilot is disabled and must not be used until fault has been corrected.	Turn Autopilot power OFF. Do not use Autopilot for remainder of flight.
AP PANEL OFFLINE	"CAUTION"	Autopilot control panel is not communicating with SkyView.	Autopilot control panel unavailable. Use SkyView Control Menu.	Autopilot control panel unavailable. Use SkyView Control Menu.

CAUTION ALERTS				
VISUAL INDICATION	**AURAL INDICATION**	**CONDITION**	**PRE-FLIGHT ACTION**	**IN-FLIGHT ACTION**
AP TRIM MALFUNCTION	"CAUTION"	SkyView sent a command to move the trim motor, but did not receive feedback that the motor is moving.	Turn electric trim power OFF. Trim aircraft manually. Electric trim is disabled and must not be used until fault has been corrected.	Turn electric trim power OFF. Trim aircraft manually. Electric trim is disabled and must not be used until fault has been corrected.

7.8.4 Messages

Messages are for conditions that require immediate flight crew awareness and may require subsequent flight crew response. Messages are Gray and may have specific voice aural annunciations.

Messages are dependent upon installed systems and components. See Table 4 for a full listing of Messages, ordered by 1) Core System, 2) Component, and 3) Function.

Table 4: Messages and Associated Crew Responses

MESSAGES				
VISUAL INDICATION	**AURAL INDICATION**	**CONDITION**	**PRE-FLIGHT ACTION**	**IN-FLIGHT ACTION**
BACKUP BATTERY LOW CHARGE	"MESSAGE"	The Backup Battery connected to the SkyView display unit has a low charge, but is not in use.	Do not fly if flight requires Instrument Flight Rules (IFR). Allow backup battery to fully charge before flight.	Avoid operations in Instrument Meteorological Conditions (IMC).
BATTERY TEST FAILED	"MESSAGE"	Battery backup battery test did not pass.	Perform succsessful battery test prior to flight.	N/A
BATTERY TEST NEEDED	"MESSAGE"	A year has passed since the previous backup battery test.	Perform succsessful battery test prior to flight.	N/A

MESSAGES				
VISUAL INDICATION	**AURAL INDICATION**	**CONDITION**	**PRE-FLIGHT ACTION**	**IN-FLIGHT ACTION**
CHECK BARO SETTING	"MESSAGE"	The current BARO setting and the nearest METAR-based altimeter setting are more than 0.1 INHG apart; or, the airplane has descended below FL180 and the BARO should be reset.	Adjust BARO to field elevation.	Adjust BARO setting as appropriate.
CPU TEMP HIGH	"MESSAGE"	An SkyView display unit's internal temperature is high.	Do not fly.	Increase airflow or reduce ambient temperature near affected display.
Minimums bug appears on Altimeter	"MINIMUMS"	Airplane has descended below set MINIMUM altitude.	No action.	Pilot awarness only.
SYSTEM EVENT "X": SEE SETUP	"MESSAGE"	SkyView has logged a system event for the Dynon Diagnostic file. The airplane can be flown.	Contact Dynon Technical Support for instructions on how to provide Dynon with a Diagnostic File for review.	No action.
SOFTWARE MISMATCH	"MESSAGE"	Software versions in SkyView HDX display units do not match.	Before flight, update software to most current version in all displays in SETUP MENU > SYSTEM SOFTWARE.	Do not use SkyView HDX display unit presenting Red Xs over indicators.
TAIL # MISMATCH	"MESSAGE"	Tail numbers in SkyView display units do not match.	Before flight, enter correct tail number in all displays in SETUP MENU > SYSTEM SETUP.	Pilot awarness only.
TIMER EXPIRED	"TIMER EXPIRED"	A User-Determined timer has expired.	Pilot determined.	Pilot determined.

MESSAGES				
VISUAL INDICATION	**AURAL INDICATION**	**CONDITION**	**PRE-FLIGHT ACTION**	**IN-FLIGHT ACTION**
(None)	"APPROACHING ALTITUDE"	The airplane is approaching the configured altitude.	No action.	Pilot awarness only.
(None)	"APPROACHING MINIMUMS"	The airplane's altitude is 200 feet above the selected MINIMUM altitude.	No action.	Pilot awarness only.
(None)	"APPROACHING WAYPOINT"	The airplane is within 30 seconds of crossing flight plan enroute waypoint.	No action.	Pilot awarness only.
(None)	"FLIGHT PLAN UPDATED"	A new flight plan has been received by SkyView from the external flight plan source.	Pilot awarness only.	Pilot awarness only.
(None)	"LEAVING ALTITUDE"	The airplane is leaving the configured altitude.	No action.	Pilot awarness only.
(None)	"TRAFFIC"	A new traffic advisory target has been identified.	No action, alert is suppressed on the ground.	Pilot awarness only.
(None)	"TRAFFIC NOT AVAILABLE"	Traffic information is no longer available.	Revert to alternative traffic avoidance methods.	Revert to alternative traffic avoidance methods.
XPNDR ERROR	"MESSAGE"	The transponder has detected a problem and notified SkyView. The Transponder may not function correctly.	If Transponder is required, do not fly.	Advise ATC, continue to destination.
XPNDR NOT IN ALT MODE	"MESSAGE"	Airplane is in Air, Transponder is not set to ALT Mode.	No action	Set transponder mode as required.

MESSAGES				
VISUAL INDICATION	**AURAL INDICATION**	**CONDITION**	**PRE-FLIGHT ACTION**	**IN-FLIGHT ACTION**
(None)	"CHECK GEAR"	Gear is not DOWN, and airspeed is below configured Landing Gear Check Speed.	Not Applicable.	Confirm correct landing gear position.
SWITCH FUEL TANK	"SWITCH FUEL TANK"	A reminder to switch fuel tanks at a user-selectable elapsed time or quantity.	Not Applicable.	Pilot determined.
ADD POWER shown on PFD	"GO AROUND"	The Autopilot Go Around function has been engaged.	No action.	Set power for Go-Around.
Autopilot Bar flashes momentarily	"AUTOPILOT"	The Autopilot has been engaged.	Pilot awarness only.	Pilot awarness only.
Autopilot Bar flashes momentarily	"AUTOPILOT MODE"	An Autopilot mode has changed either manually or automaticly since it was engaged.	Pilot awarness only.	Pilot awarness only.
EXT LEVEL BUTTON STUCK	"MESSAGE"	The Autopilot disconnect monitor has detected a wiring fault.	Turn Autopilot power OFF. Autopilot is disabled and must not be used until fault has been corrected.	Turn Autopilot power OFF. Do not use Autopilot for remainder of flight.
PITCH SERVO OFFLINE	"MESSAGE"	The Autopilot pitch servo is not communicating or is not powered on.	If AP Power Switch is OFF, Turn AP Power Switch ON. If AP Power Switch is ON and message persists, Turn AP Power Switch OFF. Autopilot is disabled and must not be used until fault has been corrected.	If AP Power Switch is OFF, Turn AP Power Switch ON. If AP Power Switch is ON and message persists, Turn AP Power Switch OFF. Do not use Autopilot for remainder of flight.

MESSAGES				
VISUAL INDICATION	**AURAL INDICATION**	**CONDITION**	**PRE-FLIGHT ACTION**	**IN-FLIGHT ACTION**
ROLL SERVO OFFLINE	"MESSAGE"	The Autopilot roll servo is not communicating or is not powered on.	If AP Power Switch is OFF, Turn AP Power Switch ON. If AP Power Switch is ON and message persists, Turn AP Power Switch OFF. Autopilot is disabled and must not be used until fault has been corrected.	If AP Power Switch is OFF, Turn AP Power Switch ON. If AP Power Switch is ON and message persists, Turn AP Power Switch OFF. Do not use Autopilot for remainder of flight.
Slip/Skid Indicator Ball turns Green with letters YD	"YAW DAMPER"	The Autopilot Yaw Damper has been engaged.	Pilot awareness only.	Pilot awareness only.
Slip/Skid Indicator Ball turns White	"YAW DAMPER DISCONNECT"	The Autopilot Yaw Damper has been disengaged.	Pilot awareness only.	Pilot awareness only.
YAW SERVO OFFLINE	"MESSAGE"	The Autopilot yaw damper servo is not communicating or is not powered on.	If AP Power Switch is OFF, Turn AP Power Switch ON. If AP Power Switch is ON and message persists, Turn AP Power Switch OFF. Autopilot is disabled and must not be used until fault has been corrected.	If AP Power Switch is OFF, Turn AP Power Switch ON. If AP Power Switch is ON and message persists, Turn AP Power Switch OFF. Do not use Autopilot for remainder of flight.

7.9 Indications

7.9.1 Airspeed Indicators

Installation of SkyView HDX does not necessitate changes to airplane's airspeed limitations. Refer to the Aircraft Limitations in the airplane's Aircraft Flight Manual (AFM) for the airspeed limitations. Configuration values for airspeed markings are entered into SkyView HDX during initial system setup.

The following airspeed indicator provides 14 CFR 23.1545 compliant airspeed markings for vertical tape-style displays:

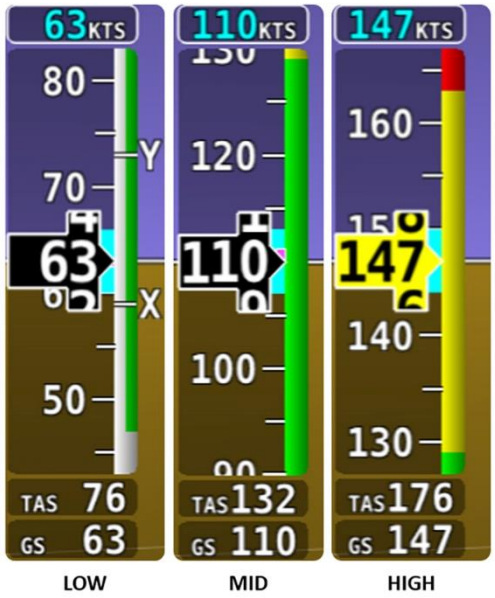
- RED BAND: Indicates speeds at and above the never exceed speed (V_{NE}).
- RED LINE: Indicates minimum control speed (V_{MC}) – twin-engine airplanes.
- YELLOW BAND: Indicates the range of speeds below the never exceed speed (V_{NE}), and above the maximum normal operations speed (V_{NO}).
- GREEN BAND: Indicates the range of speeds at or below the maximum normal operations speed (V_{NO}), and above the flaps up stall speed (V_{S1}).
- WHITE BAND: Indicates the range of speeds above the minimum flight speed in landing configuration (V_{S0}) and below the maximum flaps extended speed (V_{FE}).
- CYAN LINE: Indicates best rate of climb with a single engine (V_{YSE}) – twin-engine airplanes.

Other, optional indications can include:

- WHITE X: Indicates best angle of climb (V_X).
- WHITE Y: Indicates best rate of climb (V_Y).
- WHITE A: Indicates maneuvering speed (V_A).

Reference Figure 8 for an example of airspeed markings typical across the airspeed range.

Single-engine Airplane



Twin-engine Airplane

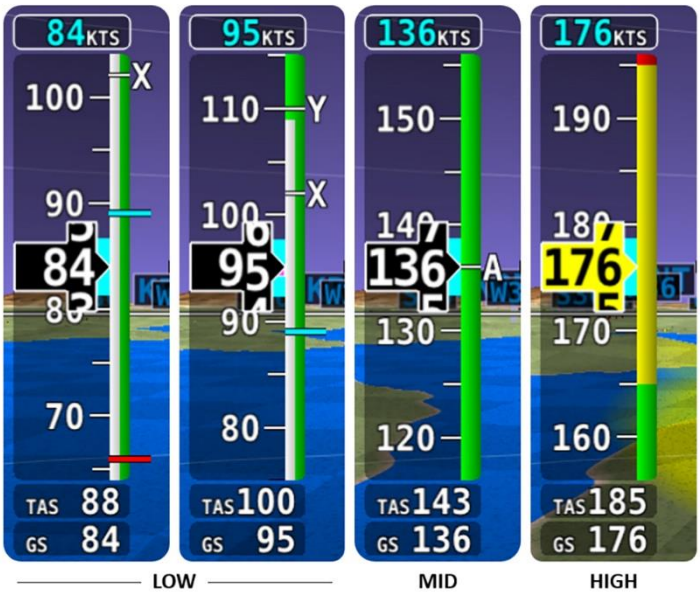


Figure 8: Airspeed Marking Examples

7.9.2 Engine Monitoring

The optional SkyView HDX Engine Monitoring System (EMS) provides engine and airplane system information to the pilot.

EMS information can be presented on a SkyView HDX display in three different size formats, depending upon owner/pilot preference or requirements of the airplane:

- 100% display page
- 50% display page
- Bottom Band

During initial system setup, SkyView HDX is configured to indicate the limitations described in the Airplane's Flight Manual (AFM). The only colors used to express these limitations are:

- RED: Do not exceed
- YELLOW: Caution range
- GREEN: Normal Operating range

For twin-engine airplanes, SkyView HDX is configured to provide EMS information as follows:

- During takeoffs and landings, a secondary (non-PFD) display unit must always present EMS information in either 100% or 50% display page layout with no exceptions.
- During normal flight operations a secondary (non-PFD) display is configured to present EMS information in either 100% or 50% display page layout, with the following exception:
  - If the pilot selects to present the Map on 50% display page instead of EMS information, then minimum required EMS information (i.e., fuel level, manifold pressure, and condensed engine health indications) must be presented on the Bottom Band.

To present the minimum required EMS information on the Bottom Band, the pilot needs to turn on the Bottom Band from the Main Menu (i.e., press DISPLAY > SETUP > ENGINE BOTTOM BAND).

7.9.2.1 100% Display Page

The 100% display page fills an entire display screen.

On Single-engine airplanes, the 100% page (see Figure 9) is used only when a display unit has been dedicated to EMS, or when operating the engine on the ground for maintenance reasons.

On Twin-engine airplanes, the 100% page (see Figure 10) is used for all normal flight operations.

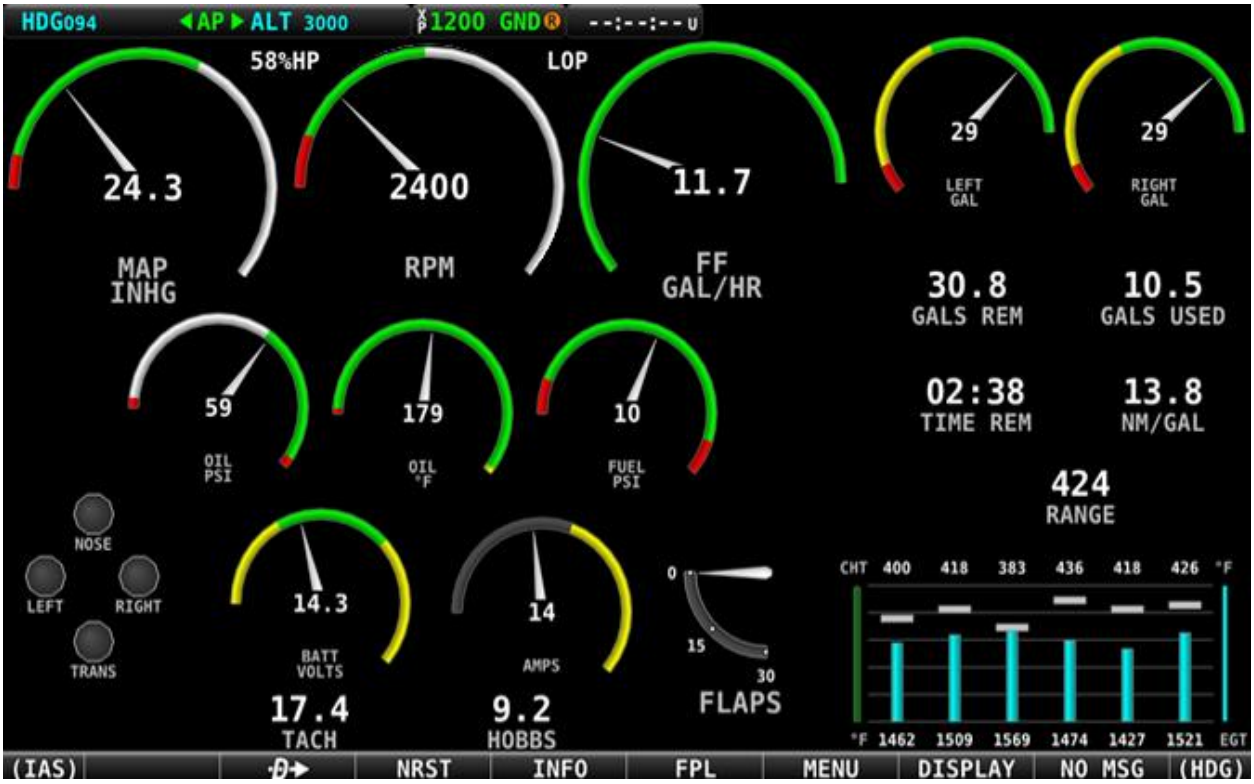


Figure 9: Example 100% Display Page for Single-engine Airplanes

Figure 10: Example 100% Display Page for Twin-engine Airplanes

7.9.2.2 50% Display Page

The 50% display page fills one-half of a display screen.

On Single-engine airplanes, the 50% page (see Figure 11) is used to provide additional information beyond what is needed for engine operations, such as timers and counters.

On Twin-engine airplanes, the 50% page (see Figure 12) is used to show the required information if the dedicated EMS display unit fails.

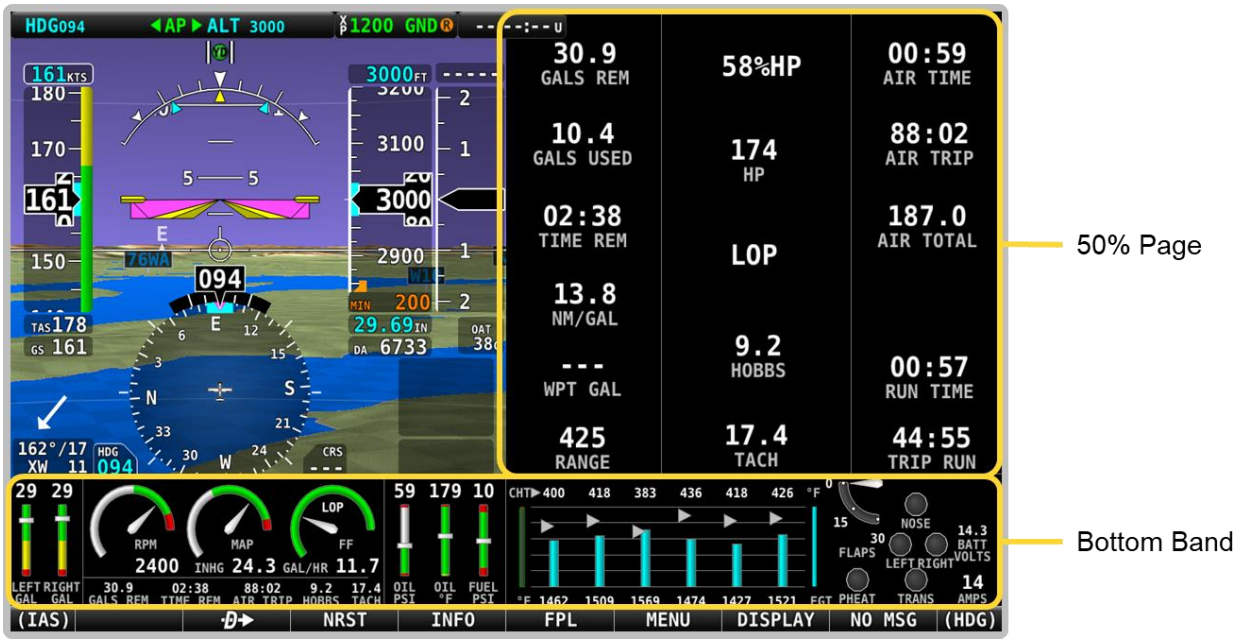


Figure 11: Example 50% and Bottom Band for Single-engine Airplanes

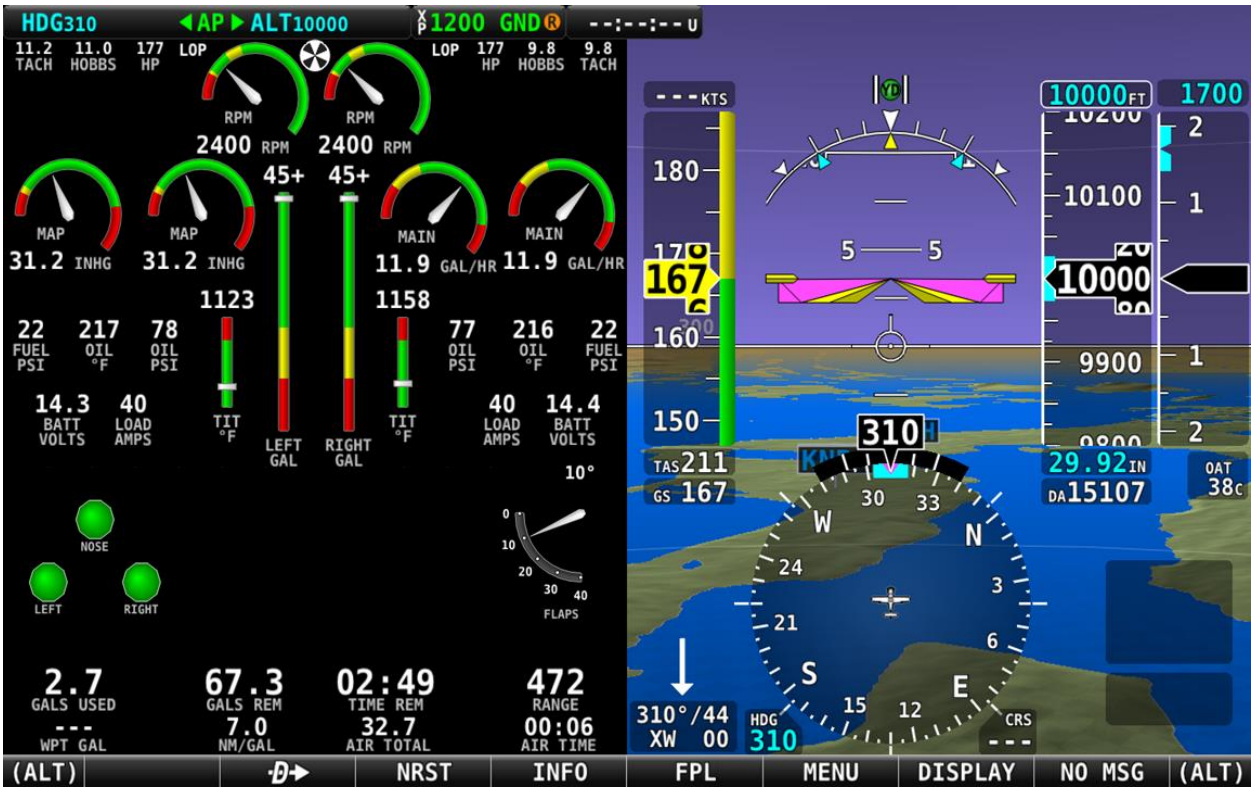


Figure 12: Example 50% Page for Twin-engine Airplanes

7.9.2.3 Bottom Band

The Bottom Band allows EMS information to be displayed along with the PFD and/or Map on one display screen.

On Single-engine airplanes, the Bottom Band (see Figure 11) is used for all normal flight operations unless a dedicated EMS display is installed. This is because the required information can be displayed in the Bottom Band, and the remainder of the display screen can be used for the PFD and/or Map displays, especially if the airplane only has one display.

On Twin-engine airplanes, the Bottom Band (see Figure 13) can be used to show the required information if the dedicated EMS display unit fails.

Figure 13: Example Bottom Band for Twin-engine Airplanes

The Bottom Band can be partially obscured by the Map page. The result is a partial Bottom Band (see Figure 14) with primary engine instruments. A full Bottom Band (see Figure 15) is available for primary and secondary engine instruments by controlling the Map page size. The Map page size is controlled by the operation of the Map Minimize/Maximize control button that appears on the Map page (see Figure 16). Pressing the map button toggles the map to maximize or minimize the page. Engine and system alerts continue to function even if the Map is maximized.

Figure 14: Example Partial Bottom Band Display

Figure 15: Example Full Bottom Band Display

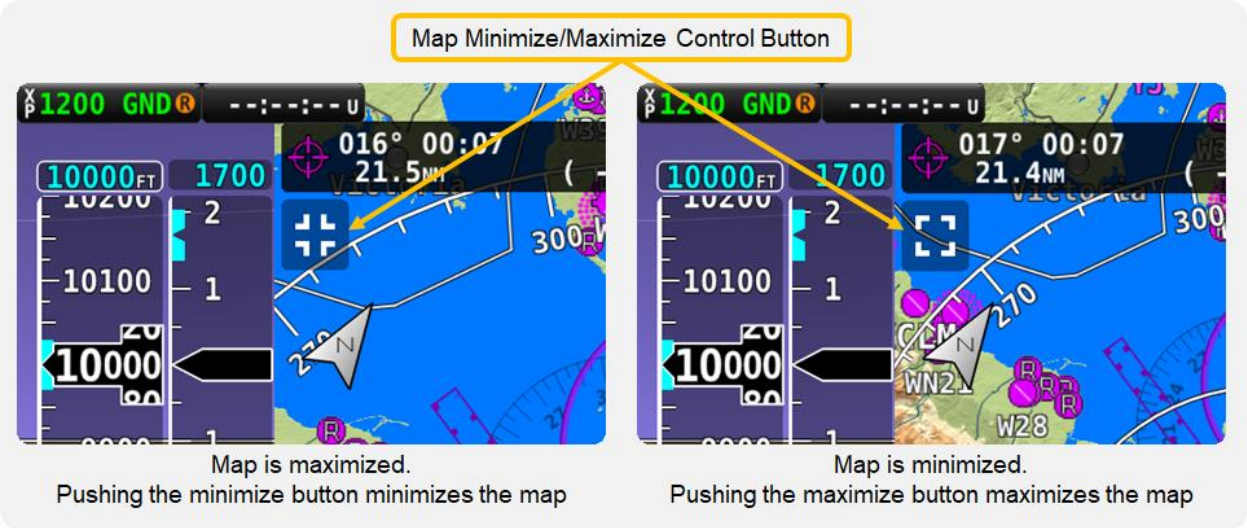


Figure 16: Map Minimize/Maximize Control Button

7.9.3 Landing Gear Position Indicators

If connected to the EMS module, landing gear can have position visual indicators (see Figure 17) and aural annunciations ("CHECK GEAR" and "GEAR OVERSPEED") to alert the pilot to landing gear conditions.

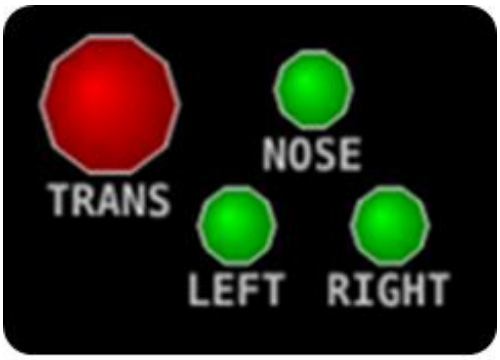


Figure 17: Example Landing Gear Position Indicator

The landing gear's visual indicators and the aural annunciations are optional and are configured to function during initial system setup. Visual indicators and aural annunciations function independently and are configured separately.

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7.9.4 Flaps Position Indicator

If connected to the EMS module, flaps can have a position visual indicator (see Figure 18) and aural annunciation ("FLAPS OVERSPEED") to alert the pilot to flap conditions.

Figure 18: Example Flap Position Indicator

The flaps' visual indicators and the aural annunciations are optional and are configured to function during initial system setup. Visual indicators and aural annunciations function independently and are configured separately.

7.9.5 Temperature Indicators

Cylinder Head Temperatures (CHT) and Exhaust Gas Temperatures (EGT) can be displayed in separate indicators or combined (see Figure 19). The CHT function is depicted as a symbol, and the EGT function is depicted as a bar. Turbine Inlet Temperature (TIT) can also be indicated using a variety of indicator styles.

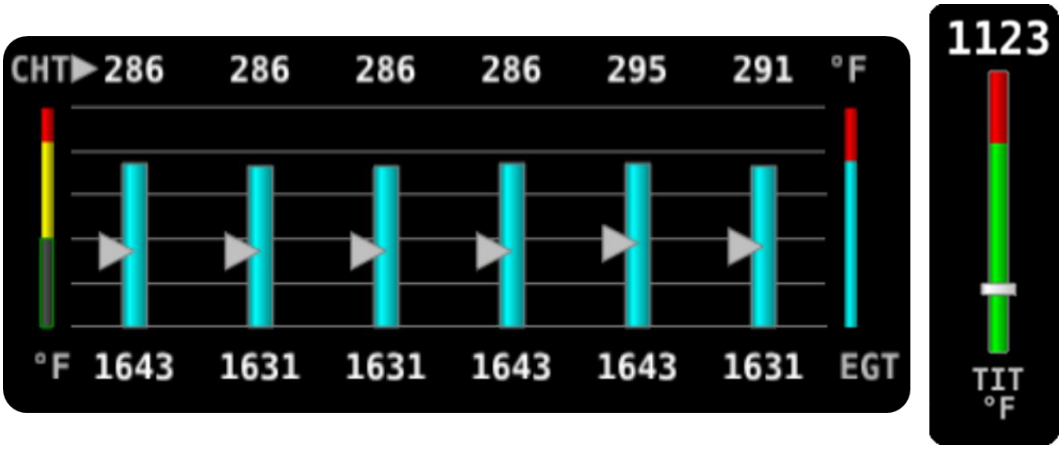

Figure 19: Example Combined CHT/EGT and TIT Indicators

7.9.6 Synchroscope

Twin-engine airplanes require the ability to exactly match the left and right engine RPM to prevent discomfort to the occupants, and fatigue to the airframe structure. To aid the pilot's task, the Synchroscope is used to match the engine RPM to be the same. The Synchroscope is located between the RPM indicators on all the engine displays. When the Synchroscope is rotating clockwise, the right engine is turning faster than the left. When the Synchroscope is rotating counterclockwise, the left engine is turning faster than the right. To synchronize the engines simply adjust the propeller controls as required to stop the Synchroscope from rotating.

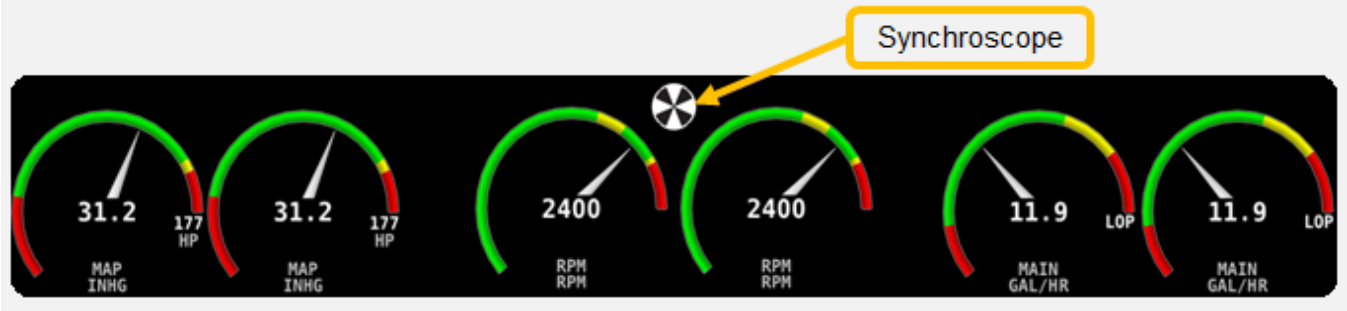

Figure 20: Example Synchroscope

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8 Handling, Service, and Maintenance

No change to airplane. Refer to the aircraft's Pilot's Operating Handbook and associated Aircraft Flight Manual and supplements.

Maintain and service SkyView HDX in accordance with the *SkyView HDX General Maintenance Manual* document and the *Autopilot Servo Installation and Maintenance Manual* document associated with the airplane.

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9 Supplements

9.1 Autopilot

The SkyView HDX Autopilot system is an optional, digitally controlled two-axis (roll and pitch) or three-axis (roll, pitch, and yaw) control system that provides flight path control functions to the pilot. The Autopilot can follow a heading by reference to the compass, follow direction over the ground by reference to GPS track information, or navigate according to a CDI when coupled to SkyView's internal VFR GPS navigation data, or when coupled to external navigation source providing VOR, localizer, cross track error or GPS navigation data.

The Autopilot can also hold altitude, and transition between altitudes at either a selected climb rate or airspeed. The Autopilot will also follow vertical guidance including glideslope and glidepath information when coupled to an external navigation source.

On some airplanes, the Autopilot may also have an optional third servo connected to the rudder. The rudder servo acts as a yaw damper to reduce and prevent yaw excursions while cruising or maneuvering, whenever the Autopilot is engaged. The Yaw Damper (YD) function may also be activated during manual flight (see Section 9.1.10 for more information).

All Autopilot modes are annunciated visually on the PFD in a space reserved specifically for this purpose called the Autopilot Information Bar (see Figure 22). Visual and voice aural alerts are provided when the Autopilot is engaged, disengaged, the Autopilot mode is changed, or the Autopilot encounters a limit condition.

The Autopilot may be activated and deactivated by the pilot by several means, including on-screen AP icons, an optional push button mounted on the panel or control yoke, as well as the optional Autopilot control panel (see Figure 29).

In the event of a mechanical jam or failure in the servo motor, there is a frangible link called a shear screw for each servo that can be broken by the pilot (see Section 3.1.3: Autopilot / Yaw Damper Servo Jam for more information.). This frees the controls from the servo so that the airplane can continue to be flown manually.

If for any reason the pilot wishes to stop the autopilot from functioning, the servos can be electrically disabled via the AP Power switch mounted to the instrument panel.

9.1.1 Autopilot / Yaw Damper Override

If the airplane flight path needs to be temporarily adjusted from the current Autopilot and/or Yaw Damper trajectory, then simply maneuver the airplane using the flight controls. Doing so will make the Autopilot servos slip, and while maneuvering, servo forces will be felt in the flight controls. Upon release of the flight controls, the Autopilot and/or Yaw Damper resumes normal operation.

9.1.2 Protective Features

The Autopilot automatically protects the aircraft envelope while the Autopilot is engaged. The Autopilot will not, however, self-engage to protect the aircraft envelope while flying manually. The Autopilot provides the following protective features:

1. G LIMIT PROTECTION:
   - Keeps total vertical acceleration of aircraft between 0G and +2G.
   - Overrides all vertical axis control modes.
2. AIRSPEED PROTECTION:
   - Limits the maximum airspeed to: V_{NE} - 5%.
   - Limits the minimum airspeed to: V_{S0} + 30%.
   - Overrides all vertical axis modes except G limit.
   - Prevents autopilot from being engaged outside of the minimum and maximum control speeds.
3. BANK LIMIT PROTECTION:
   - Control inputs will not exceed 35^{o} bank angle.
   - Overrides all lateral axis modes.
4. TAKE OFF PROTECTION:
   - Autopilot disengages if engaged when airspeed comes alive (~20 kts) to prevent the airplane from taking off with the autopilot engaged.
   - This allows the autopilot to be engaged on the ground for test and maintenance.
5. FAIL DOWN FEATURE:
   - Autopilot will fail down to a less complex mode if the current or requested function is no longer possible. See Table 5 for the corresponding fail down mode for all Autopilot modes.
   - Prevents Autopilot from disconnecting when data from an external source is lost.
   - When such a fail-down occurs, the autopilot mode flashes and is replaced with the new mode. A visual and audio cue is generated for such mode changes.

Table 5: Autopilot Fail Down Modes

Engaged Mode	Primary Fail Down Mode	Secondary Fail Down Mode
NAV	TRK	HDG
TRK	HDG	Autopilot Disconnects
HDG	TRK	Autopilot Disconnects
IAS	ALT	Autopilot Disconnects
VNAV	ALT	Autopilot Disconnects
VS	Autopilot Disconnects	Not Applicable
ALT	Autopilot Disconnects	Not Applicable

6. SERVO BREAK-AWAY:

   - Each Autopilot servo has a frangible link (i.e., shear screw) that will break-away when applied force to the control reaches a certain value. (Refer to the Aircraft-Specific Appendices at end of document for break-away force values.)
   - The frangible link provides protection from the condition of a flight control becoming jammed by an Autopilot servo malfunction.
   - The pilot must overcome the servo break-away force if a flight control fails to move as expected and is jammed by the Autopilot servo (see Section 3.1.3: Autopilot / Yaw Damper Servo Jam).
   - Always hold the elevator control at or near the neutral position when the Autopilot is engaged on the ground.

The weight of an unbalanced elevator may cause the servo to slip. Lightly hold the controls in the centered position when operating the Autopilot on the ground to offset this effect.

9.1.3 Flight Director

Autopilot control modes can be used without engaging the servos by manually flying and following the commands provided by the flight director. Autopilot enforced limits on airspeed and G are honored by the flight director. For example, if a descent rate is selected that reaches the maximum autopilot operation speed the flight director will indicate a pitch up to reduce speed and limit descent rate.

There are two Flight Director Cue symbol options available to select from in SETUP MENU > PFD SETUP > FLIGHT DIRECTOR. The options are Single Cue, and Dual Cue (see Figure 21).

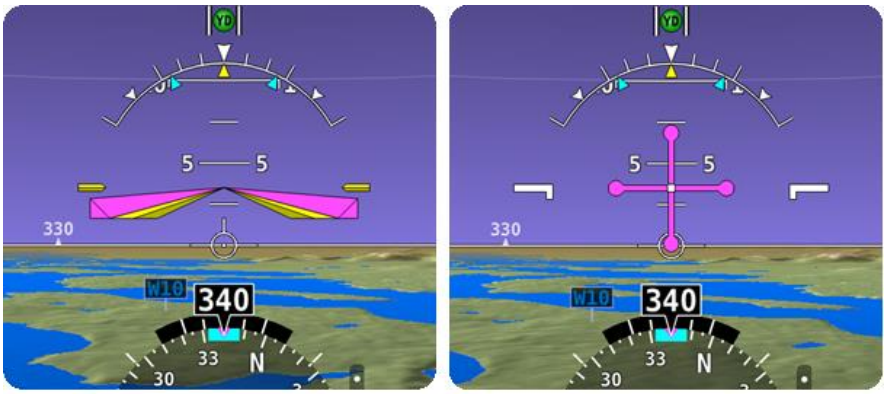


Figure 21: Available Flight Director Cues

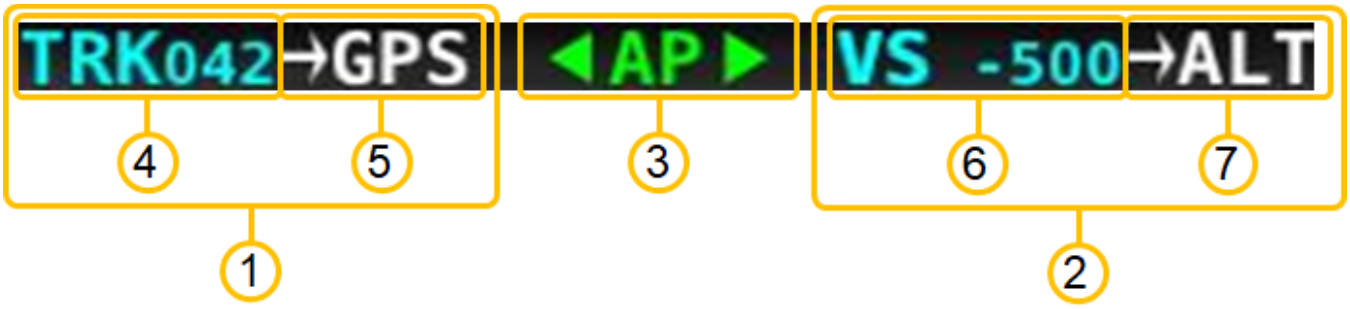
9.1.4 Autopilot Information Bar

The Autopilot Information Bar provides indications of when the Autopilot is active, and what lateral and/or vertical control modes are active, and which are armed. The AP Info bar resides in the upper left of the PFD (see Figure 22 and Figure 23). Touching the AP Info Bar will open the Autopilot Control Menu screen (see Section 9.1.6 for more information).

Autopilot Information Bar will display:

- AP in green when one or both Roll and Pitch servos are engaged.
- Green arrows located on either side of the AP symbol which point to the engaged servo(s) (Roll to the left, and Pitch to the right).
- AP in yellow color and flashing for 10 seconds whenever the autopilot has been disconnected.
- The active lateral and vertical modes in cyan color, along with the corresponding value set by the pilot.
    - The newly activated mode will flash for 10 seconds when it is sequenced from being previously armed.
- The armed mode that the Autopilot will automatically transition to when the capture criteria for the armed mode becomes satisfied, appears in white color.

Figure 22: Autopilot Information Bar



1. Lateral Mode Indications
2. Vertical Mode Indications
3. Autopilot Engaged Indication
4. Active Lateral Mode and Value
5. Armed Lateral Mode
6. Active Vertical Mode and Value
7. Armed Vertical Mode

Figure 23: Autopilot Information Bar, shown with AP Engaged

9.1.5 Autopilot Annunciations

The Autopilot will annunciate a variety of alerts to inform the pilot of conditions affecting the Autopilot's performance. This section describes all Autopilot performance related alerts, their associated voice aural annunciations, and the conditions that cause them to annunciate.

9.1.5.1 Servo Slip Alerts

Servo slip alerts will display in the PFD whenever a servo is unable to move the controls in the direction commanded by the Autopilot. (See Figure 24 for examples of these alerts and where they are located on the PFD.)

Slip alerts are usually transient in nature and indicate to the pilot that a servo is slipping, which means the Autopilot is unable to perform the commanded task while the alert is present. Slip alerts may occur when control loads are increased by:

- Turbulent air,
- Pilot overriding the flight controls,
- Out-of-adjustment trim for affected control.

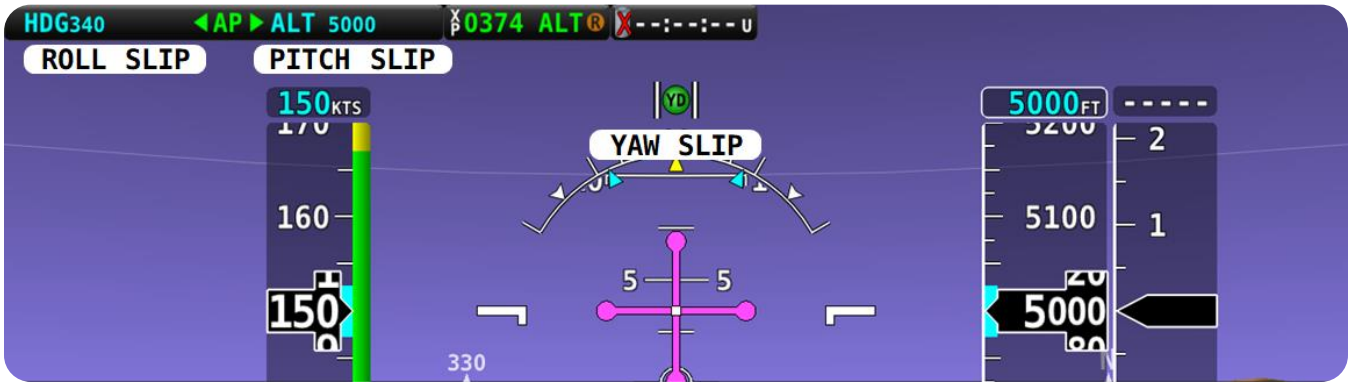


Figure 24: Roll Slip and Pitch Slip Alert Examples

9.1.5.2 Trim Alerts

Trim Alerts will display whenever the Autopilot detects that it is carrying trim loads. These alerts indicate to the pilot that trim adjustment is necessary. The pilot should adjust the trim in the direction indicated in the alert until the alert is removed. (See Figure 25 for examples of these alerts and where they are located on the PFD.)

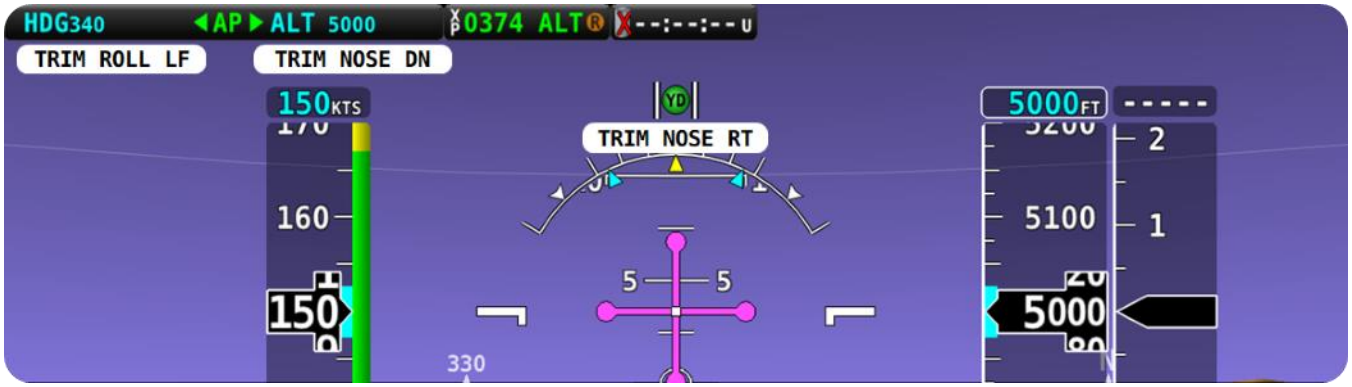


Figure 25: Trim Alert Examples

9.1.5.3 Slip Trim Alerts

When the Autopilot carries a large trim load for an extended period, the affected servo may begin to slip. When this occurs, the Autopilot triggers a Slip Trim Alert for the affected axis. When the alert persists, the aircraft is likely severely out of trim. In this situation disconnect the Autopilot, trim the aircraft appropriately, and then re-engage the Autopilot. (See Figure 26 for an example of a Slip Trim Alert).

Figure 26: Slip Trim Alert Example

9.1.5.4 Airspeed High/Low Alerts

Anytime the airplane reaches the minimum or maximum control speeds configured in the Autopilot, the Autopilot will pitch the nose up or down as required to prevent the airplane from exceeding these control speeds. Whenever this protective feature is active, the Autopilot informs the pilot by annunciating these alerts in the area below the vertical control mode annunciations. (See Figure 27 for an example of an Airspeed High or Airspeed Low Alert.)

Figure 27: Airspeed High/Low Alert Example

9.1.6 Autopilot Control

Operating the Autopilot requires the selection of the correct control mode to accomplish the desired Autopilot task. The lateral and vertical servos can be engaged individually or simultaneously. The servos can be engaged using the Autopilot Control Menu (see Figure 28), located on the display, or by using the optional instrument panel mounted Autopilot Control Panel (see Figure 29). Both controls provide the same buttons and functions, with two exceptions:

1. The *Autopilot Control Menu* does not provide the LEVEL button or function.
2. The *Autopilot Control Panel* does not provide the Yaw Damper button or function.

Only the AP and the LEVEL buttons will engage the Autopilot servos. All other control mode selections only arm the servos for engagement directly into the selected mode. The servos will remain armed in the selected mode until the AP button is pushed. Pushing the AP button will engage the servos into the armed mode currently displayed on the Autopilot information bar (see Figure 23).

The Autopilot can be *engaged* using the following methods:

1. Press and release the AP button on the Autopilot menu screen,
2. Press and release the AP button on the optional Autopilot control panel,
3. Press the LEVEL button on the optional Autopilot control panel.

The autopilot can be *disengaged* using the following methods:

1. Press and release the red Autopilot disconnect button,
2. Press and release the AP button on the Autopilot menu screen,
3. Press and release the AP button on the optional Autopilot control panel,
4. Turn off the Autopilot master switch OR pull circuit breaker.

Pressing the AP button DOES NOT disable the Flight Director.

The AP disconnect button may either be panel mounted or mounted on the control wheel/yoke.

For a functional description of the of each autopilot control mode, refer to Table 6.

Table 6: Autopilot Control Modes

CONTROL MODE	FUNCTIONALITY DESCRIPTION
LEVEL	Rolls wings level, simultaneously raises nose above horizon, then holds zero vertical speed.
HDG	Turns toward and holds compass heading as selected by HDG/TRK bug.
TRK	Turns toward and holds ground track as selected by HDG/TRK bug.
ROLL	Holds current bank angle, within bank angle limits. **NOTE**: This mode can only be activated when the autopilot is activated and no other lateral mode (HDG, TRK, or NAV) has been selected at the moment of engagement.
NAV	Intercepts course by turning towards CDI needle, then maintains selected OBS course. VOR/LOC: Reverts to HDG mode if CDI is lost with HDG target set to OBS value, or to current HDG if OBS is not set. GPS: Reverts to TRK mode if CDI is lost with TRK target set to OBS value, or to current GPS ground track if OBS is not set.
ALT	Holds altitude commanded in the Autopilot status bar. **NOTE**: When activating this mode, commanded altitude is automatically set to the current indicated altitude.
VS	Maintains the selected vertical speed as airplane performance allows, until approaching the altitude bug, then transitions to ALT mode. **NOTE**: If VS mode is selected when altitude is near the selected altitude the Autopilot will not automatically capture altitude. This allows the pilot to initiate a VS climb/descent away from the altitude bug. **NOTE**: A VS setting of 0 will not maintain a specific altitude. However, if a specific altitude is not required, a VS setting of 0 can provide a more comfortable ride quality than ALT mode in turbulent conditions.
IAS	Maintains the selected air speed during climb (if not aircraft performance limited) until the selected altitude approaches, then transitions to ALT to maintain selected altitude.
VNAV	Automatically captures and tracks a glideslope or glidepath when intercepted from below, regardless of selected lateral mode. It will not capture if descending from above the glideslope or glidepath. **CAUTION**: It is possible for the Autopilot to capture and track a glideslope or glidepath prior to the airplane reaching the final approach course of an instrument approach. If this is not desired, do not arm VNAV mode until established on the final approach course.

Figure 28: Autopilot Control Menu

9.1.7 Vertical Guidance Source Loss

If vertical guidance information is lost, the autopilot reverts to ALT hold at the altitude at which the vertical guidance source was lost. The aural AUTOPILOT MODE will annunciate, and the new mode will indicate flashing on the Autopilot Info Bar.

9.1.8 Go Around

The Go Around function is available when the Autopilot is engaged in vertical guidance and is tracking a vertical deviation. To engage the Go Around function, press the NOSE UP button on the AP control panel. Pressing the NOSE UP button at any time automatically switches Pitch and Roll Modes to the following:

1. TRK Mode, with value defaulting to the current GPS track, and
2. Depending on pilot preference and Autopilot system setup:
   - VS Mode, defaulting to the preset vertical speed value.
   - IAS Mode, defaulting to the current airspeed.

9.1.9 Autopilot Control Panel

The optional Autopilot control panel (Figure 29) includes dedicated buttons for engaging the Flight Director, Autopilot, and all modes, including setting up fully coupled approaches; VNAV; IAS Hold; and mode sequencing (provided that the necessary IFR navigation sources are installed). It also has a LEVEL button to immediately return the airplane to straight and level flight.

Figure 29: Autopilot Control Panel

9.1.10 Yaw Damper

The Yaw Damper function, when installed, dampens yaw oscillations induced by turbulence, which improves the airplanes ride quality. The function will also keep the Slip/Skid Indicator centered during maneuvers.

The Yaw Damper is engaged independently from the Autopilot and can be engaged when the autopilot is not engaged. The Yaw Damper control appears only on the Autopilot Control Menu (see Figure 28). To engage the Yaw Damper, select the YD button. The YD button light will turn green when engaged, and the Slip/Skid Indicator will appear green, with the letters YD in black, as shown in Figure 30.

Because the Yaw Damper provides active control of the rudder, it should be deactivated when manual flight maneuvering is required, such as when entering an airport traffic pattern. Disengaging the Yaw Damper requires a pilot action such as those described in Table 7. However, if forgotten, applying pressure on a rudder pedal when the Yaw Damper is engaged will just override the Yaw Damper and cause the Yaw Damper servo to slip, just as do the Autopilot servos.

The Yaw Damper function is not available on all airplanes.

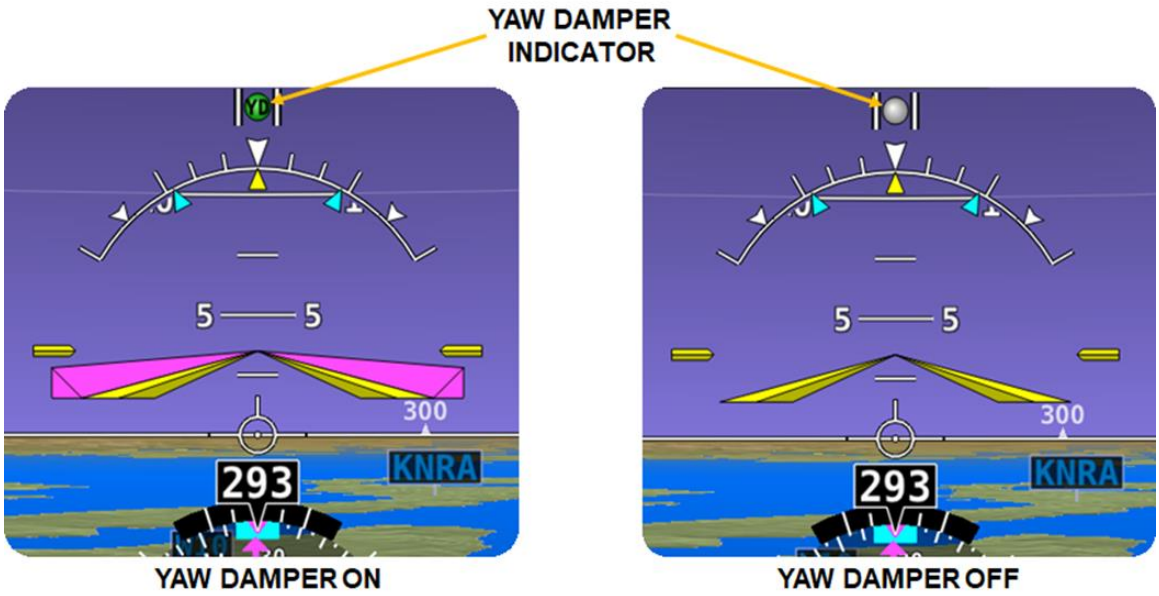


Figure 30: Yaw Damper Engaged Indication

Table 7: Yaw Damper Disconnect Methods

DISCONNECT METHOD	AP ENGAGED?	RESULT
Press YD button on AP Control Menu	YES or NO	Yaw Damper servo disengages (autopilot is not affected)
AP Disconnect Switch	YES	Yaw Damper and Autopilot servos disengage
	NO	Yaw Damper servo disengages

10 Appendix 1: Cessna Models 172F through 172S

10.1 Autopilot Limitations

Maximum Flap Setting:

- Use of the Autopilot with flaps extended beyond 10 degrees is prohibited.

Minimum Altitude:

- Use of the Autopilot below 250 feet AGL is prohibited.

Servo Frangible Link:

- Use of the Autopilot when any servo frangible link (shear screw) is broken is prohibited.

10.2 Autopilot Servo Frangible Link Break-Away Forces

Pitch Servo:

63 lbs.

Roll Servo:

21 lbs.

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11 Appendix 2: Beechcraft Bonanza P35 through V35B

11.1 Autopilot Limitations

Maximum Flap Setting:

- Use of the Autopilot with flaps extended beyond 15 degrees is prohibited.

Minimum Altitude:

- Use of the Autopilot below 425 feet AGL is prohibited.

Servo Frangible Link:

- Use of the Autopilot when any servo frangible link (shear screw) is broken is prohibited.

11.2 Autopilot Servo Frangible Link Break-Away Forces

Pitch Servo:

73 lbs.

Roll Servo:

24 lbs.

Yaw Servo:

91 lbs.

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12 Appendix 3: Piper PA-34 Seneca

12.1 Autopilot Limitations

Minimum Engine Operation:

- Use of the Autopilot when both engines are not operating at the same power setting is prohibited.

Maximum Flap Setting:

- Use of the Autopilot with flaps extended beyond 10 degrees is prohibited.

Minimum Altitude:

- Use of the Autopilot below 200 feet AGL is prohibited.

Maximum Climb/Descend Rate:

- Use of the Autopilot when exceeding a climb or descent rate of 2,000 FPM is prohibited.

Servo Frangible Link:

- Use of the Autopilot when any servo frangible link (shear screw) is broken is prohibited.

12.2 Autopilot Servo Frangible Link Break-Away Forces

Pitch Servo:

68 lbs.

Roll Servo:

38 lbs.

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