DYNON CERTIFIED

SkyView HDX

System Functional Overview

STC SA02594SE

103014-000

Revision C

2/4/2021

Contact Information

Dynon Avionics, Inc.

19825 141st Place NE

Woodinville, WA 98072

Phone: 425-402-0433

Business Operations: 8:00 AM–5:00 PM (Pacific Time) Monday–Friday

Technical Support Operations: 7:30 AM–4:00 PM (Pacific Time) Monday–Friday

Email Sales: sales@dynoncertified.com

Email Support: support@dynoncertified.com

Web: www.dynoncertified.com

Revision History

REV	DATE	APPROVED	DESCRIPTION OF CHANGE
A	1/5/2018		Initial Release
B	8/4/2020	ECO # 339864	• Changed title of document to System Functional Overview. • Applied new template and style guide standards to document. • Restructured document to reflect integrated system strategy. • Updated all content in all sections to reflect the latest system behavior and configurations.
C	2/4/2021	ECO # 358207	• Moved Section 2.2: Integrated System to Section 2.1. Subsequent sections renumbered. • Updated Section 6: Autopilot System introduction. • Updated Section 6.1.1: SV-AP-PANEL with trim integration content. • Added Section 6.1.5: SV-AP-TRIMAMP Trim Motor Adapter. • Updated Section 6.2: System Functions and Controls to include Auto Trim. • Added Section 6.2.2: Auto-Trim. • Updated Section 7: Communication to include SV-COM-X25. • Updated Section 8.2: System Functions and Controls (Transponder) to include Flight ID. • Updated Section 9.2: System Functions and Controls (Weather) to include Lightning and PIREPS.

Table of Contents

1 Introduction

The purpose of this document is to provide the reader with a quick overview of the SkyView HDX system and its components and functions.

Refer to the *SkyView HDX Airplane Flight Manual Supplement* document for operational information, refer to the *SkyView HDX System Installation Manual* document for installation and configuration information, and refer to *SkyView HDX General Maintenance Manual* document for diagnostic and maintenance information.

1.1 Intended Audience

This document is intended for any airplane owner, pilot, installer, or service technician that is new to SkyView HDX and wants to learn more about the basic operation and system architecture.

1.2 Reference Documents

- 103261-000 SkyView HDX System Installation Manual (current revision)
- 103272-000 SkyView HDX Airplane Flight Manual Supplement (current revision)
- 103221-000 SkyView HDX General Maintenance Manual (current revision)

2 SkyView HDX System

SkyView HDX is an integrated Electronic Flight Instrument System (EFIS) that can aggregate flight, engine, navigation, traffic, and weather information for presentation to the pilot on a SkyView HDX display unit.

2.1 Integrated System

The Skyview HDX system can integrate three different major systems (see Section 2.1.1) and six ancillary systems (see Section 2.1.2). Systems can be combined per need and preference to provide a wide array of functions and present useful aircraft information to the pilot.

The SkyView HDX system is centered around the SkyView HDX display unit. Up to three display units may be installed in a SkyView HDX system. At least one display unit is required for installation of a major system. A single display unit can access and present information from all functions and features provided by the major and ancillary systems.

Third-party equipment can also integrate with the Skyview HDX system. NAV radio receivers, IFR GPS Navigators, position-reporting ELT transmitters, and COM transmitters are commonly integrated with the Skyview HDX system. Devices using the RS-232 protocol can connect directly to the SkyView HDX system, while ARINC-429 Navigators require the installation of the IFR Navigation Integration System.

It is important to note that certain requirements must be met to ensure a regulatory-compliant Primary Flight Information (PFI) system installation. If the SkyView HDX system is not being used to provide PFI, installation compliance, like placement of a Skyview HDX display unit, becomes less critical. Design guidance and requirements for a compliant installation are described in the *SkyView HDX System Installation Manual* document.

2.1.1 Major Systems

The following major systems can be integrated into the Skyview HDX system:

- Primary Flight Information System (see Section 3),
- Navigation System (see Section 4),
- Engine Monitoring System (see Section 5).

2.1.2 Ancillary Systems

The following ancillary systems can be integrated into the Skyview HDX system with some limitations:

- Autopilot System (see Section 6),
- Communication System (see Section 7),
- Transponder System (see Section 8),
- IFR Navigation Integration System (see Section 9),

- Traffic and Weather Information System (see Section 10),
- Angle of Attack Indicating System (see Section 11).

2.2 SkyView HDX Display Units

The most integral component of the SkyView HDX system is the SkyView HDX display unit (see Figure 1). SkyView HDX display units are multi-functional, high-definition, LCD color devices that process data inputs to generate graphical on-screen, representations of flight instrumentation and other aircraft information. SkyView HDX display units use LED backlighting technology for increased lifespan, more uniform brightness, and superior dimming control.

Pilots interact with system functions through the SkyView HDX display unit. The system functions available to the pilot are dependent upon the installed SkyView HDX systems (major and ancillary). Major systems require the installation of at least one display unit to function. Up to three SkyView HDX displays units, in any combination of the two sizes, can be installed in the airplane's instrument panels.

SkyView HDX displays units are available in two sizes:

- the SV-HDX1100 is a 10.1-inch, 1280 x 800-pixel display,
- the SV-HDX800 is a 7.1-inch, 1280 x 800-pixel display.

Figure 1: SV-HDX1100 and SV-HDX800 Display Units

The structure surrounding the lighted LCD screen is referred to as the bezel. All tactile controls for the system are located on the tilted shelf at the bottom of the bezel, or on the screen itself. Pilot interaction with the display using two knobs with buttons on the sides of the bezel, eight buttons along the bottom of the bezel, and by pressing touchable screen items. There is also a light sensor that is used for automatic screen brightness control.

A SkyView HDX display screen contains three main regions, described from top to bottom:

- The Top Bar is located on the top of the screen. It is configurable and presents important airplane information, including time or a timer (when running), Autopilot status, backup battery status, COM radio frequency, and transponder status.
- The main portion of the screen (i.e., main screen) is configurable and can present the Primary Flight Display (PFD), Map, and Engine Monitoring System (EMS) information. It can also present the system alerts and messages, function control menus, and configuration menus.
- The Button Bar is located on the bottom of the screen. It is displayed when the system is fully powered-on. It presents knob and button soft labels. Knob and button functionality are contextual, depending upon what is presented on the screen. Labels will always show the current function.

Display layout options are selected by pressing the DISPLAY button. The pilot then selects whether the display should present PFD, Map, or EMS information, or a combination thereof. Information can be presented in 100%-page layouts, 50%-page layouts, and a bottom band layout. See Figure 2 for PFD, Map, and EMS configured for 50% page layout with bottom band; see Figure 3 for PFD configured for 100% page layout.

Figure 2: 50% PFD and Map Page Layout with EMS Bottom Band.

2.2.1 Controls

SkyView HDX display units have knobs and buttons to control various functions, including powering the unit *ON* and *OFF*, accessing and navigating menus, selecting, or activating features, and adjusting values.

Figure 3: SkyView HDX Display Controls

Buttons generally require a single action (i.e., momentarily press). Pressing the button will provide a distinct tactile "click" response to the pilot. The click occurs when the button is fully pressed, but the action does not occur until the button is released. When a button is pressed in this manner, a function or action denoted by the label above the button is invoked. Button labels are contextual and may change depending on the menus and feature control pages the pilot selects.

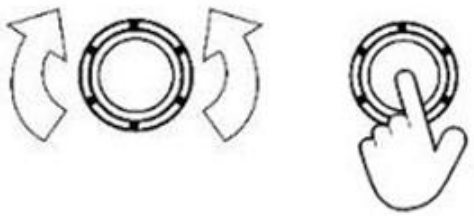

Figure 4: Knob Rotation and Button Push Actions

A button has a function if a label is displayed above it. If there is no label, then no function is available. Some buttons have additional behavior when the button is pressed and held down for two seconds. An example is Button #1. When you press-and-hold Button #1, the SkyView HDX display unit will power *ON/OFF*. Additional press-and-hold behaviors for other buttons are described in the *SkyView HDX Airplane Flight Manual Supplement* document.

Knobs rotate in both directions and can be pushed. The current knob function is indicated by the label above the knob. Knob function is contextual and can change when the content of the screen is changed by the pilot.

On some menu pages with both vertical lists and a horizontal group of tabs, one or both knobs have a "push and rotate" behavior, which controls horizontal scrolling of the cursor across rows and columns.

2.2.2 Functions

A SkyView HDX display unit has a Function Control Menu (i.e., Menu) for controlling various system functions (see Figure 5). To access the menu, press the MENU button (Button #6). The icons in menu are tactile and touching them opens a Control Page for the function. For example, touching the COM RADIO icon opens its Control Page. There are also shortcut icons on the Top Bar for Autopilot, COM Radio, and Transponder functions. Information about using function controls is available in the *SkyView HDX Airplane Flight Manual Supplement* document.

Figure 5: Function Control Menu (Menu) with Optional Systems Installed

2.2.3 Flight Crew Alerting

The Flight Crew Alerting is a central feature of the SkyView HDX display unit. This feature provides the pilot and crew with system information organized by priority for all installed SkyView HDX 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 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 (see Figure 7).
2. CAUTION 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 (see Figure 7).
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 (see Figure 7).

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".

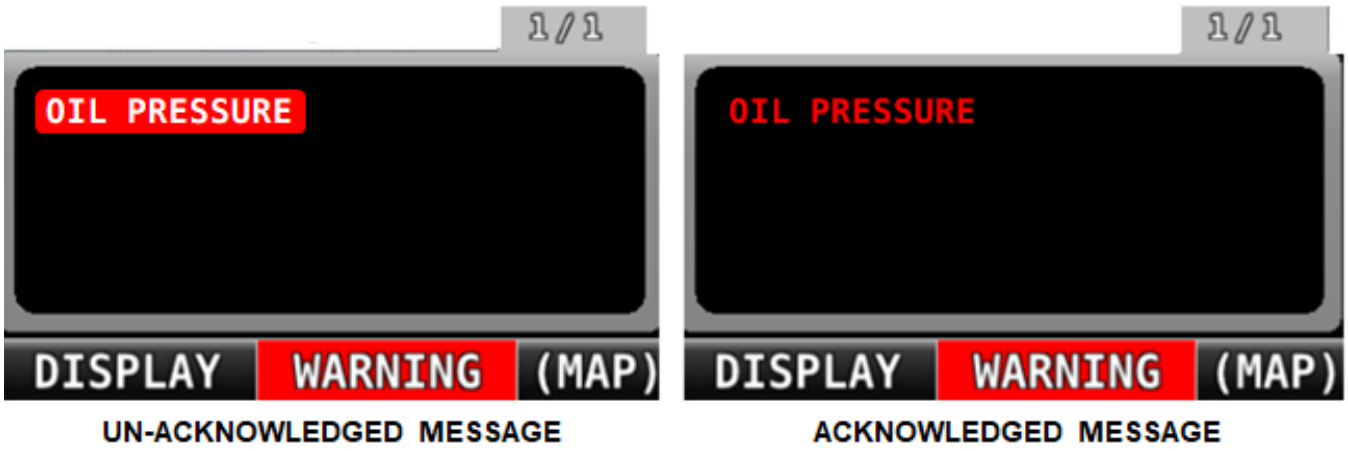

Figure 7: Alert Notification Window, Alert Appearance

3 Primary Flight Information System

The Primary Flight Information (PFI) system replaces the analog instruments that have traditionally provided PFI. SkyView HDX's PFI provides much more functionality than traditional analog instruments. All PFI functions are provided to the pilot on SkyView HDX display unit in a standard Primary Flight Display (PFD) format (see Figure 8). The PFI can also be presented in the traditional "Six-Pack" format (see Figure 9).

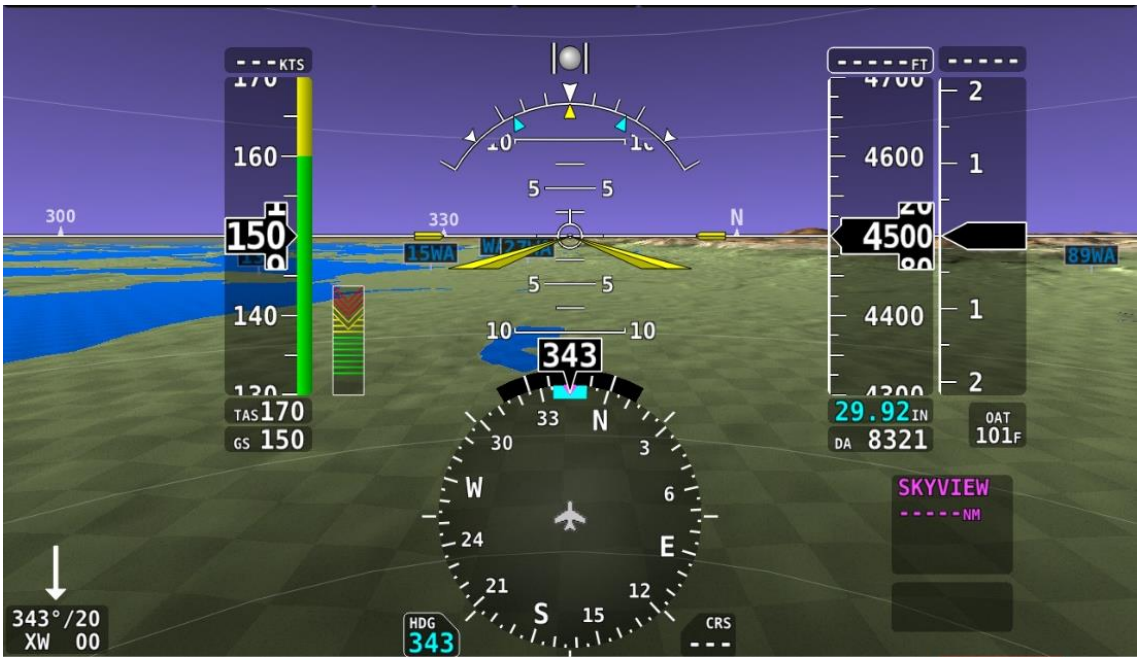

Figure 8: Primary Flight Display (PFD) Format

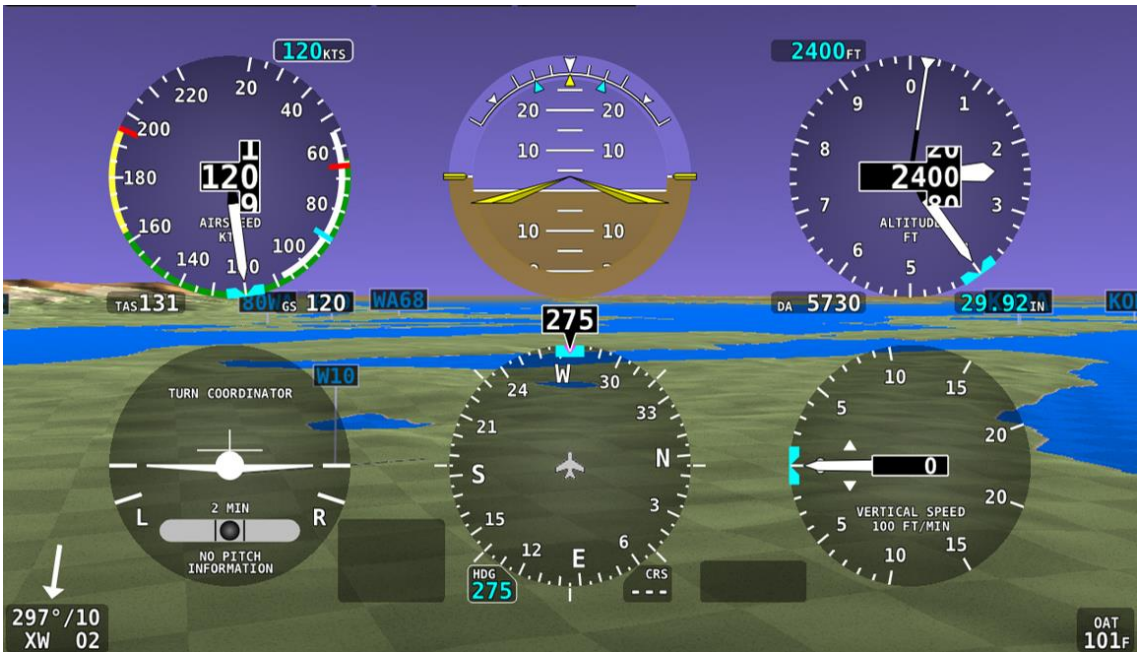

Figure 9: "Six Pack" Display Format

3.1 System Equipment

The following is the minimum equipment required to provide PFI functionality:

- At least one – SV-HDX800 or SV-HDX1100 Display unit (see Section 2.2),
- One per display – SV-BAT-320 backup battery (see Section 3.1.1),
- One – Standby Flight Display unit (see Section 3.1.2),
- One – SV-ADAHRS-200 ADAHRS module (see Section 3.1.3),
- One – SV-MAG-236 remote magnetometer (see Section 3.1.4),
- One – Outside Air Temperature (OAT) sensor (see Section 3.1.5),
- One – SV-GPS-2020 WAAS GPS antenna/receiver (see Section 3.1.6).

3.1.1 SV-BAT-320 Backup Battery

If avionics power is lost in flight, a properly operating SV-BAT-320 backup battery (see Figure 10) can provide power to a SkyView HDX display and other SkyView components to keep critical functions like Primary Flight Information (PFI), engine monitoring, and GPS navigation for at least 45 minutes.

An SV-BAT-320 also powers up a SkyView HDX display without external power, allowing engine parameter monitoring during engine start. An SV-BAT-320 is automatically charged by the SkyView HDX display during flight. One SV-BAT-320 is required for each SkyView HDX display in a SkyView HDX system.

Figure 10: SV-BAT-320

3.1.2 Standby Flight Display

A Standby Flight Display is required by the Skyview HDX STC. The Standby Flight Display provides pilots with immediate Primary Flight information (PFI) in case of a SkyView HDX system failure. It also allows pilots to cross-compare the PFIs to ensure data integrity. The Standby Flight Display must be installed in the instrument panel in front of the pilot and near the SkyView HDX display unit.

The EFIS-D10A (see Figure 11) serves as a Standby Flight Display for SkyView HDX. It features internal, calibrated solid-state sensors and a digital display to present Airspeed, Altitude, and Attitude data. If avionics power is lost in flight, the EFIS-D10A has an internal backup battery that provides power for at least 45 minutes.

Figure 11: EFIS-D10A

3.1.3 SV-ADAHRS-200 ADAHRS Module

ADAHRS is an acronym for Air Data Attitude Heading Reference System. The Primary Flight Information (PFI) functions on a SkyView HDX display are generated using data from a group of calibrated sensors built into an SV-ADAHRS-200 module (see Figure 12). All sensors are solid state (i.e., there are no moving parts). These sensors include accelerometers, which measure forces in all three directions; rotational rate sensors, which sense rotation about all three axes; and pressure transducers for measuring air data.

Pitot, Static, and Angle of Attack (AoA) lines are connected to an SV-ADAHRS-200 module. An Outside Air Temperature (OAT) sensor can also be connected to an SV-ADAHRS-200.

Figure 12: SV-ADAHRS-200

3.1.4 SV-MAG-336 Remote Magnetometer Module

The SV-MAG-236 remote magnetometer (see Figure 13) is used in SkyView HDX systems to locate a magnetometer in an area free of magnetic disturbances. An Outside Air Temperature (OAT) sensor can also be connected to an SV-MAG-236.

Figure 13: SV-MAG-236

3.1.5 SV-OAT-340 Outside Air Temperature Sensor

An Outside Air Temperature (OAT) sensor (see Figure 14) is externally mounted where it can accurately measure the air temperature. Only one OAT sensor is required in a SkyView HDX system. An OAT sensor can be connected to either an SV-ADAHRS-200 module or an SV-MAG-236 remote magnetometer.

Figure 14: SV-OAT-340

3.1.6 SV-GPS-2020 WAAS GPS Receiver/Antenna

The SV-GPS-2020 WAAS antenna/receiver (see Figure 15) is externally mounted and specifically designed for use in a SkyView HDX system. It has a much higher refresh rate than common third-party GPS devices, which ensures smooth Map operation. The SV-GPS-2020 is powered by a SkyView HDX display unit, and it will continue to provide position updates when the SkyView HDX display unit is operating on backup battery power. An SV-GPS-2020 provides high-integrity GPS (position and time) data to a SkyView HDX display unit that is required by the FAA 2020 ADS-B Out mandate (14 CFR § / FAR 91.227).

Figure 15: SV-GPS-2020

3.2 System Functions and Controls

The Primary Flight Information System generates the Primary Flight Display (PFD). The PFD (see Figure 16) has the following functions:

- Attitude Indicator
- Altitude Indicator
- Airspeed Indicator
- Vertical Speed Indicator
- Airplane Attitude Indicator
- Flight Path Maker
- Horizontal Situation Indicator
- Wind Indicator
- Synthetic Vision
- Traffic Indicators
- Navigation Source Indicator
- Outside Air Temperature Indicator
- G–Meter

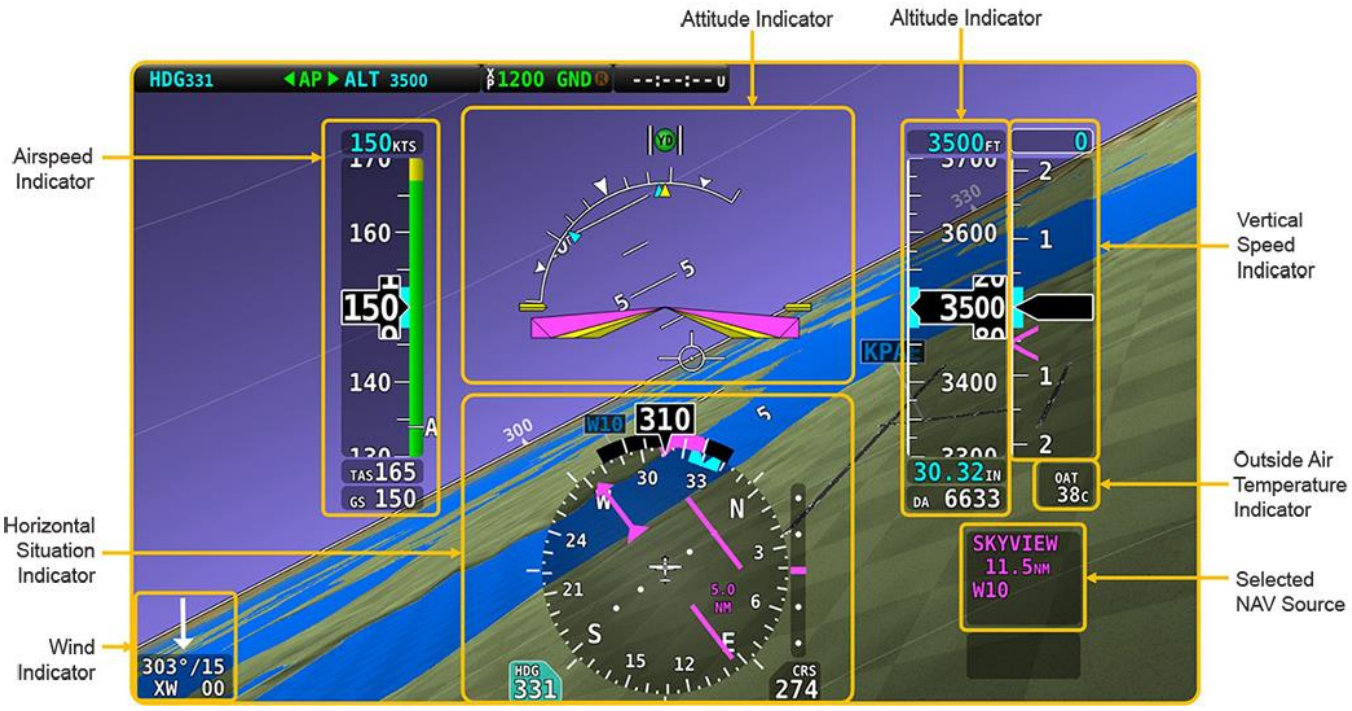

Figure 16: SkyView HDX Primary Flight Display Functions

The PFD can be set to either 100%-page, or if other major systems are installed, 50%-page layout to share the screen with other system information.

The PFD has touchable controls. Functions can be selected by touching points on the screen. A value associated with that function can then be adjusted with a knob. For example, touching the Selected Heading Indicator (#6 in Figure 17) activates a knob that can increase or decrease the heading value and move the heading bug left or right to the desired heading.

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 17: SkyView HDX Primary Flight Display Touch Controls

4 Navigation System

The SkyView HDX display unit uses FAA Obstacle and Terrain and Airport Information databases and GPS-derived airplane position data to present the Map, provide flight planning information, and plot navigational course guidance (see Figure 18 and Figure 19).

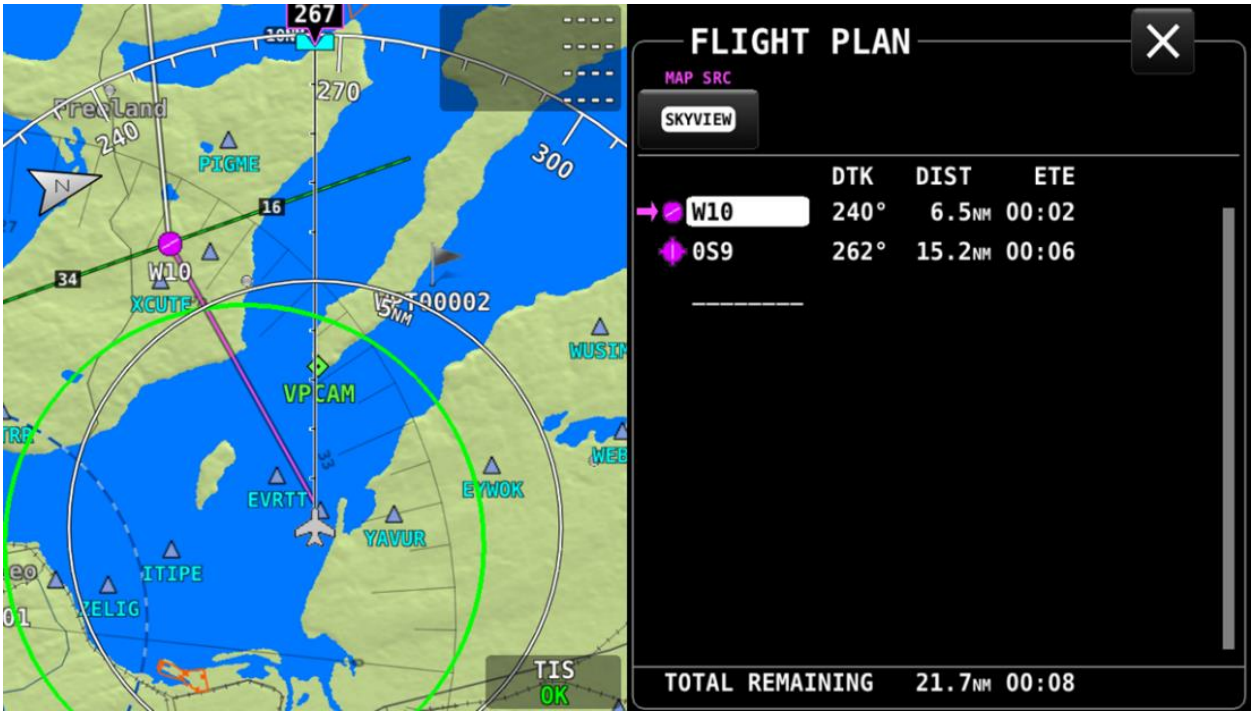

Figure 18: Flight Plan Page with Plotted Course and Active Waypoint

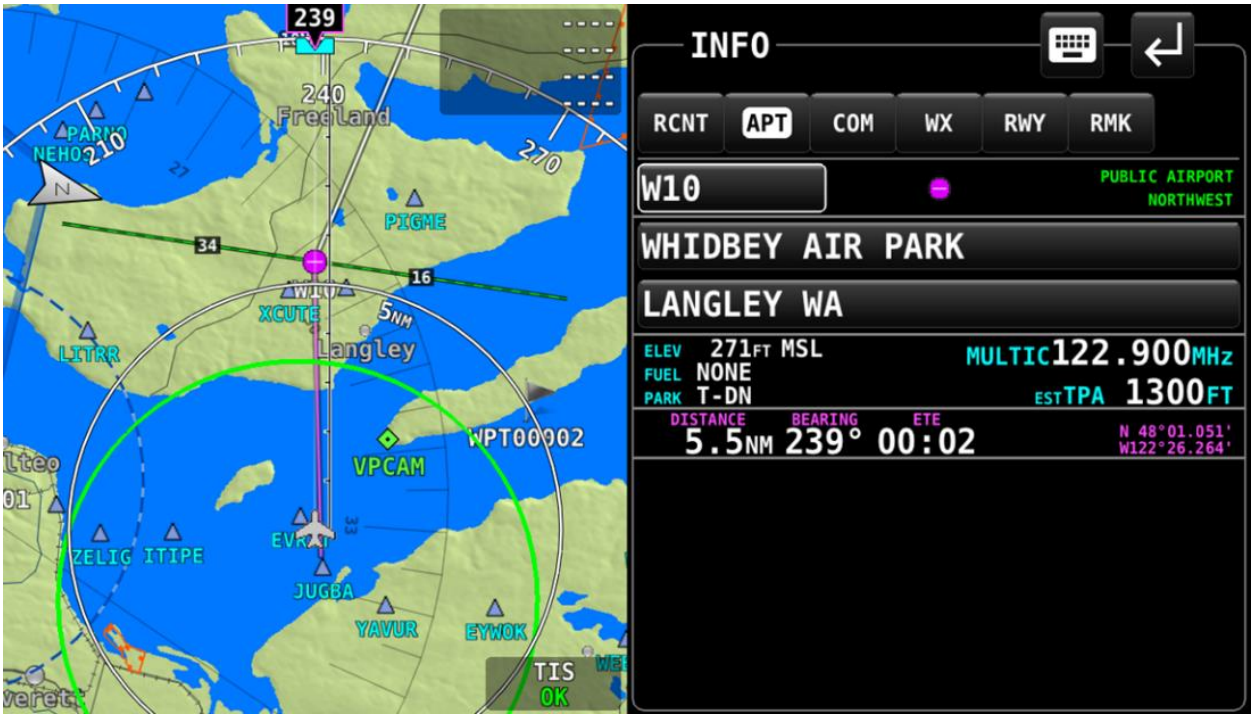

Figure 19: Airport Information Page

4.1 System Equipment

For the Navigation system to function effectively, the Primary Flight Information system (see Section 3) must be installed. No equipment other than the required equipment for the Primary Flight Information system is required for the Navigation system. However, up-to-date navigation databases and charts must be loaded on the SkyView HDX display unit(s).

4.2 System Functions and Controls

The Navigation system has the following functions:

- Map,
- Flight Planning,
- Airport Information (including Frequencies),
- Terrain and Obstacles,
- Course Guidance,
- Optional third-party geo-referenced sectionals, airport diagrams, and approach plates (if equipped).

The Map has touchscreen functionality and can present airport, airspace, obstacles, and other available aviation data. The Navigation and Flight Planning functions help the pilot find airports or navaids and navigate to a sequence of one or more waypoints.

4.2.1 Navigation Databases and Charts

A SkyView HDX system should be kept updated with the latest available databases. Depending on the database, these may be updated as frequently as every month. See the *SkyView HDX General Maintenance Manual* document for information about loading databases.

In additional to the Map, a SkyView HDX system can display third-party GEO-referenced sectional charts, IFR Low and High charts, Approach plates, and Airport diagrams in additional to the Map. See the *SkyView HDX General Maintenance Manual* document for information about loading charts.

Figure 20: Third-Party Sectional Chart with Plotted Course and Active Waypoint

5 Engine Monitoring System

The Engine Monitoring System (EMS) can replace a variety of engine and airframe system instruments and indicators, including:

- Engine Instruments,
- Fuel System Instruments,
- Flaps and Landing Gear Position,
- Fuel/Time/Distance Remaining Computer.

5.1 System Equipment

The following is the minimum equipment required to provide EMS functionality:

- At least one – SV-HDX800 or SV-HDX1100 Display unit (see Section 2.1),
- At least one – SV-EMS-200 EMS module (see Section 5.1.1),
- Required and optional sensors per aircraft.

5.1.1 SV-EMS-220 Engine Monitoring System Module

The engine gauges and other aircraft indicators presented on a SkyView HDX display unit are generated from data acquired by the SV-EMS-200 EMS module (Figure 21) and its connected sensors and inputs. An SV-EMS-200 supports popular four- and six-cylinder engines in single- and dual-engine airplanes. Two EMS modules are required to monitor two engines.

Figure 21: SV-EMS-220

5.2 System Functions and Controls

The EMS can measure a wide variety of engine and environmental parameters, including:

- Tachometer
- Manifold Pressure
- Propeller Synchroscope
- Fuel Flow
- Fuel Pressure
- Fuel Level
- Oil Pressure
- Oil Temperature
- Cylinder Head Temperature
- Exhaust Gas Temperature
- Turbine Inlet Temperature
- Battery Voltage
- Electrical Load (Amps)
- Landing Gear Position
- Flap Position
- Pitot Heat
- Emulated Annunciation Lights

A SkyView HDX display unit uses configuration files to map sensors inputs to pins on the SV-EMS-200 EMS module. The files also configure engine gauge styles, colors, and organizational layout of the Bottom Band, 50% Page, and 100% Page (see Figure 22 and Figure 23). Dynon provides generic configuration files that generate FAA-approved EMS setups; however, installers are required to configure engine gauge color bands to correspond with the engine limitations that are published in the airplane's flight manual. For information about configuring an EMS, see the *SkyView HDX Installation Manual* document.

There are three options for viewing EMS information on a SkyView HDX display unit, the 100% Page view, 50% Page view, and the Bottom Band. See Figure 22 and Figure 23 for typical single-engine presentations.

Due to the amount of information that needs to be shown, twin-engine airplanes require a dedicated display unit configured to show the engine information using a 100% page. However, 50% page and Bottom Bar layouts are available for use if the dedicate EMS display unit fails. See Figure 24 and Figure 25 for a typical twin-engine presentation.

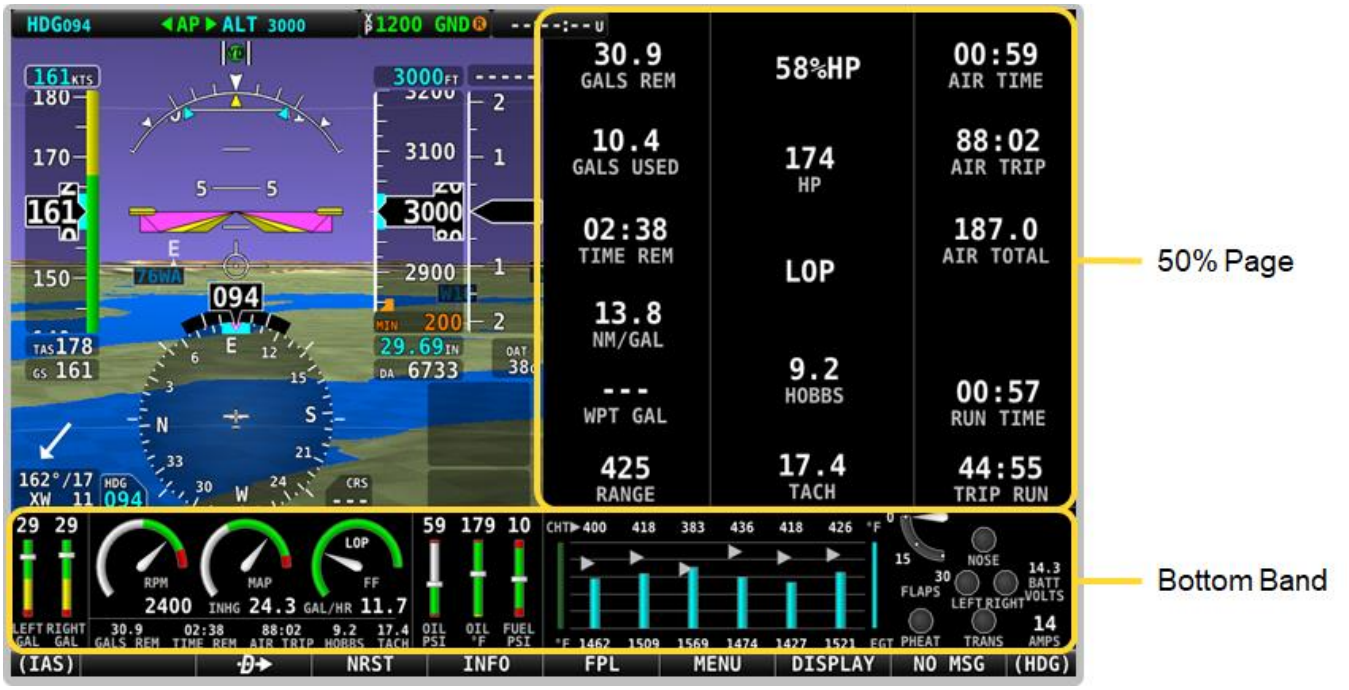

Figure 22: Typical Single Engine EMS 50% Page Layout with Bottom Band

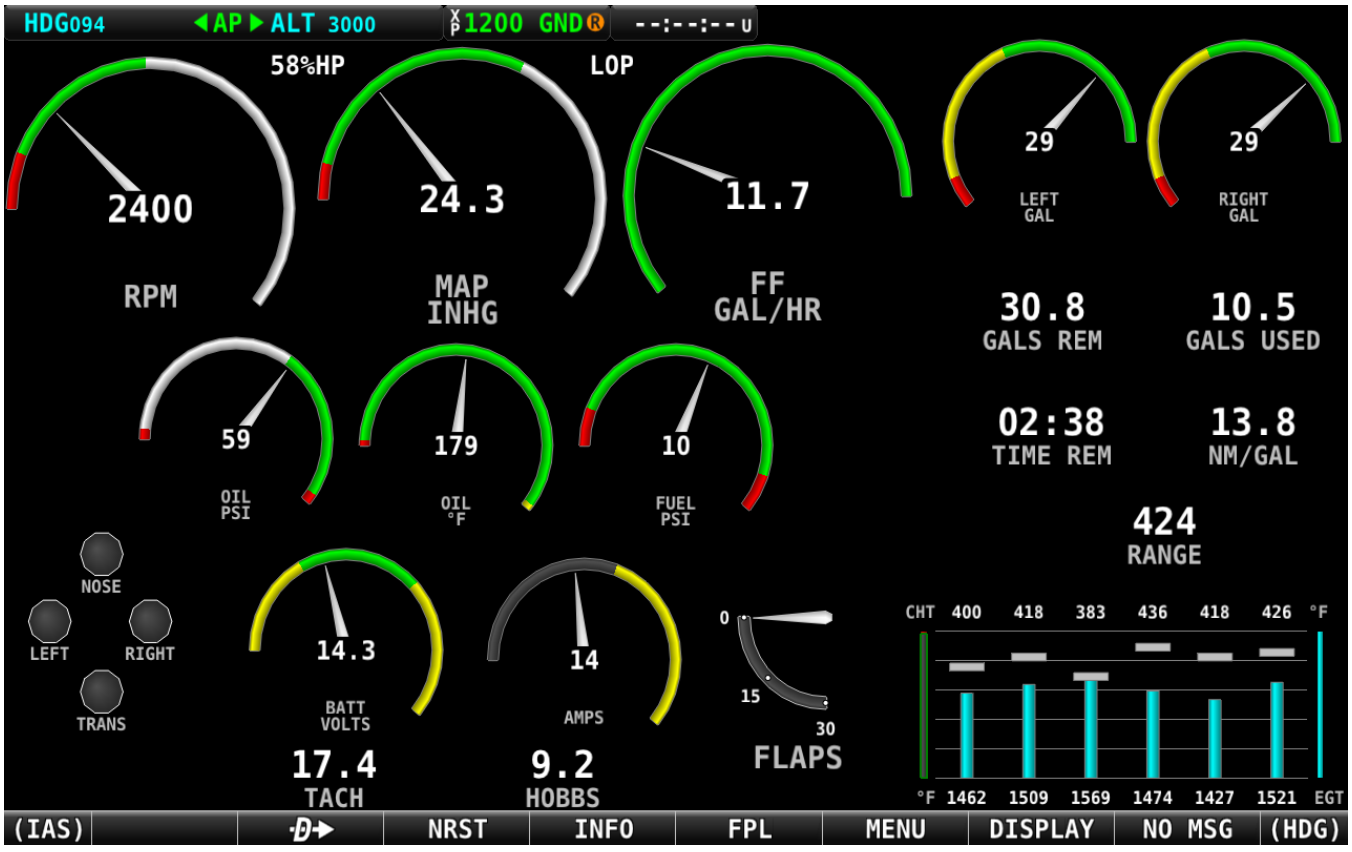

Figure 23: Typical Single-Engine EMS 100% Page Layout

Figure 24: Typical Twin-Engine EMS 100% Page Layout

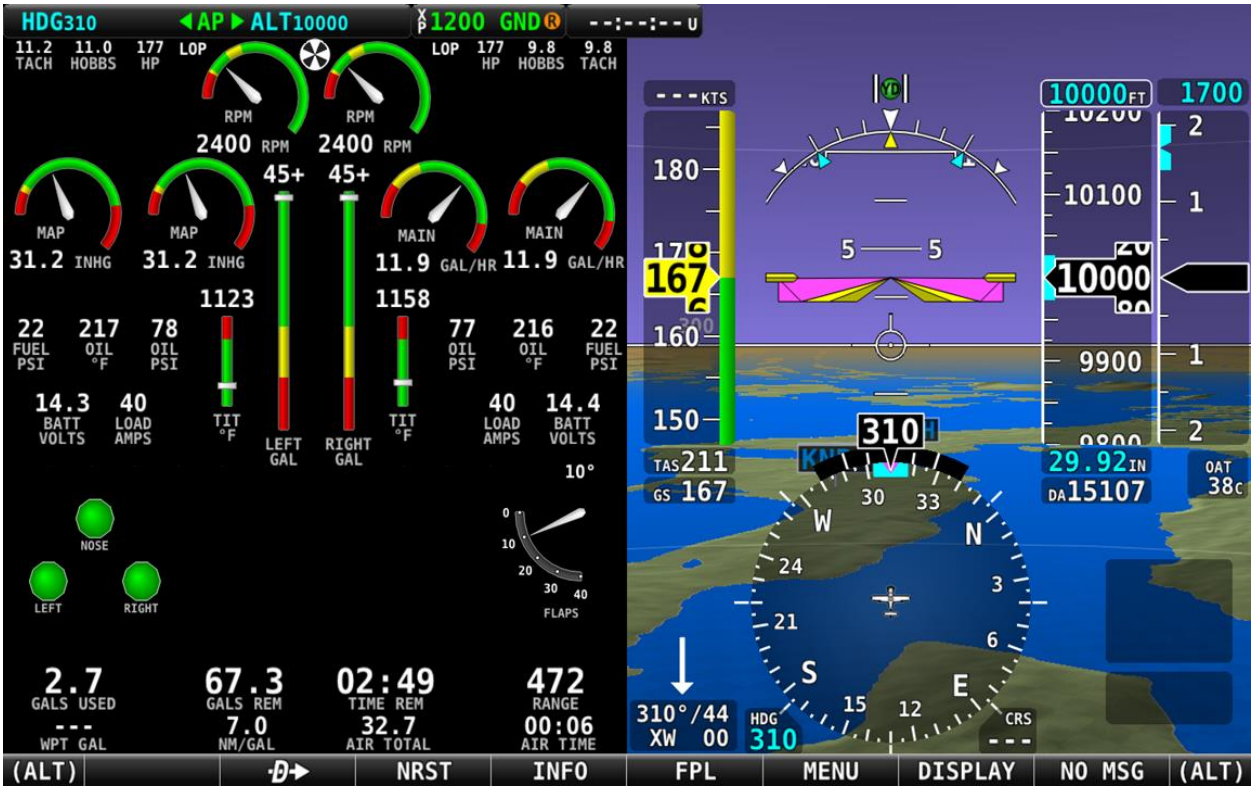

Figure 25: Typical Twin-Engine EMS 50% Page Layout

6 Autopilot System

The optional Autopilot system integrates with SkyView HDX system to provide two- or three-axis Autopilot control, depending upon what installation has been certified for the aircraft. SkyView HDX Autopilot can also integrate with existing Trim systems via the SV-AP-PANEL control panel (see Section 6.1.1 for more information). Autopilot is not available for all airplanes.

6.1 System Equipment

For the Autopilot system to function, both the Primary Flight Information system (see Section 3) and the Navigation system (see Section 4) must be installed and functioning.

In addition to the required equipment for the Primary Flight Information system and the Navigation system, the following minimum equipment is also required to provide Autopilot functionality:

- One – Pitch Servo per airplane specification (see Section 6.1.4),
- One –Roll Servo per airplane specification (see Section 6.1.4),
- At least one – Autopilot Disconnect Switch (SV-BUTTON-APDISC or Yoke-mounted) (see Section 6.1.2).

Additionally, the following equipment is optional:

- One Yaw Servo (if applicable) per airplane specification (see Section 6.1.4),
- One SV-AP-TRIMAMP Trim Motor Adapter (see Section 6.1.5).
- SV-AP-PANEL (vertical or horizontal version) Autopilot control panel (see Section 6.1.1),
- SV-LEVEL-BUTTON Autopilot Level button (recommended if no SV-AP-PANEL is installed) (see Section 6.1.3).

6.1.1 SV-AP-PANEL Autopilot Control Panel

The SV-AP-PANEL is a panel-mounted control for SkyView HDX systems with Autopilot. It provides dedicated buttons for engaging the Autopilot, engaging the Flight Director, and changing the Autopilot's control modes (see Section 6.2.1). It also has a built-in Level button (see Section 6.1.3).

In addition to Autopilot function control, the SV-AP-PANEL allows system integration with electric trim systems. For certified airplanes, integration requires the SV-AP-TRIMAMP trim motor adapter (see Section 6.1.5). The SV-AP-PANEL provides the following Trim system functions:

- Use of the SkyView Autopilot's Auto-Trim feature (see Section 6.2.2).
- Receive/transmit SkyView Autopilot commands to trim motor.
- Independent control of pitch axis trim (i.e., Nose Up/Down).
- A common interface for all trim switches, providing:
  - switch prioritization,
  - switch cut-outs for stuck switches without interrupting other switches,
- Signal time-outs for rudimentary trim runaway protection.

Figure 26**: **SV-AP-PANEL (Horizontal and Vertical Versions)

6.1.2 SV-BUTTON-APDISC Autopilot Disconnect Button

It is recommended that a button be mounted to the control yoke or stick to be used to disconnect the Autopilot. If this is not possible, the SV-BUTTON-APDISC can perform this function. At least one AP Disconnect button of some form is required to be installed.

The SV-BUTTON-APDISC is a panel-mounted button for SkyView HDX Systems with Autopilot. The button's purpose is to immediately disengage the Autopilot.

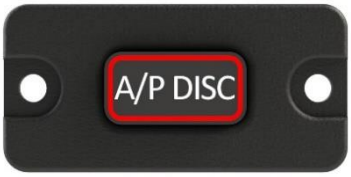

Figure 27: SV-BUTTON-APDISC

6.1.3 SV-BUTTON-LEVEL Autopilot Level Button

The SV-BUTTON-LEVEL is a panel-mounted button for SkyView HDX systems with Autopilot. The button’s purpose is to activate/deactivate Level Mode. Level Mode (or Straight and Level Mode) will immediately command the Autopilot to pitch the airplane to zero vertical speed and roll it to zero degrees of bank. It will not attempt to fly the airplane to any previous altitude or track, and it will not respect any bug inputs. When activated, Level Mode will cause the Autopilot to engage if it was not already engaged.

Figure 28: SV-BUTTON-LEVEL

6.1.4 Autopilot Servos

The Autopilot roll, pitch, and yaw (if applicable) servos provide the electro-mechanical means by which the Autopilot moves the airplane's controls. Installation of Autopilot servos is airplane-specific, designed and documented by Dynon Avionics, and certified by the FAA per aircraft. Consult the STC Airplane Model List (AML) to see if an airplane has an approved Autopilot installation. See Figure 29 for a typical Autopilot servo, and Figure 30 for an example of a pitch and yaw servo installation.

Figure 29: Typical SkyView Servo

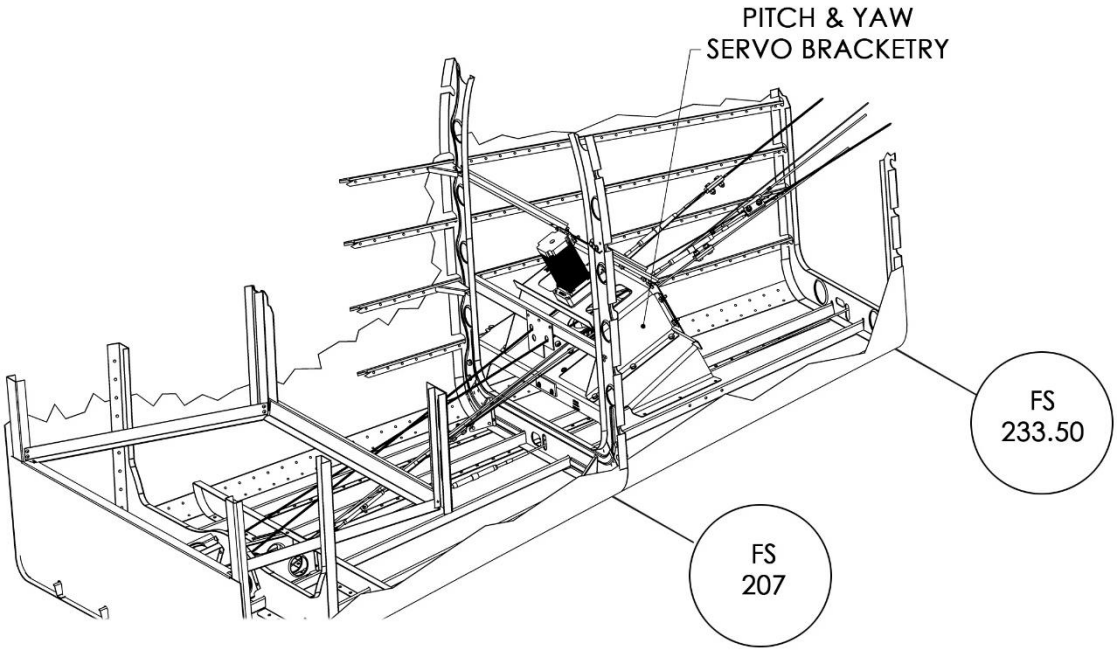

Figure 30: Example Autopilot Servo Installation

6.1.5 SV-AP-TRIMAMP Trim Motor Adapter

The SV-AP-TRIMAMP trim motor adapter, in conjunction with the SV-AP-PANEL, allows system integration with electric trim systems in certified airplanes. The SV-AP-TRIMAMP provides the following functions:

- Signal amplification for integration with high-current DC motors.
- Compatibility with motors with and without a clutch.
- Hardware interrupt via disconnect switch to remove power from trim motor.
- Provides monitoring feedback to SkyView HDX for Flight Crew Alerting:
  - Motor moving when not supposed to (Trim Runaway).
  - Motor not moving when supposed to (Trim Malfunction).

Figure 31: SV-AP-TRIMAMP

6.2 System Features, Functions, and Controls

Operating the Autopilot requires selection of the correct control mode to complete the desired Autopilot task. The servos can be engaged individually or simultaneously. The servos can be engaged using the Autopilot Control Page (see Figure 32), located on the display, or by using the Autopilot Control Panel (see Figure 26). Both controls provide the same buttons and functions, with two exceptions:

- The Autopilot Control Menu does not provide the Level Button or function.
- The Autopilot Control Panel does not provide the Yaw Damper button or function.

Figure 32: Autopilot Control Page

The Autopilot Information Bar (AP Info 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 is in the upper left corner of the PFD (see Figure 33). Touching the bar will open the Autopilot Control Menu.

Figure 33: Autopilot Information Bar

Table 1 identifies and describes the visual indications provided in the AP Info Bar. The layout of the bar is standardized to always show Autopilot (AP) status in the center with roll servo indication immediately to left, and pitch servo indication immediately to the right, of AP status. Additionally, lateral control modes and values are always shown left of AP/servo status, and vertical control modes and values are always shown to the right of AP/servo status.

Table 1: AP Info Bar – Autopilot Indications

INDICATION	STATUS SHOWN	NOTES
AP	Autopilot is OFF. Flight Director is OFF.	'AP' is white and no other indications are shown.
HDG005 AP ALT 2500	Autopilot is OFF. Flight Director is ON with HDG and ALT modes active.	'AP' is white and active lateral and vertical modes and pilot-set values are cyan.

	Autopilot is ON with pitch servo engaged and roll servo disengaged. Flight Director is ON with ALT mode active.	'AP' is green and pitch servo arrow is green.
	Autopilot is ON with pitch and roll servos engaged. Flight Director is ON with HDG and ALT modes active.	'AP' is green and roll and pitch servo arrows are green.
	Autopilot recently disconnected.	'AP' and servo arrows are yellow and flash (i.e., highlight on/off) for 10 seconds after disconnect.
	Autopilot is ON with pitch and roll servos engaged. Flight Director is ON with HDG and ALT modes active. Auto Trim has commanded pitch trim.	Pitch servo arrow scrolls up or down to indicate Trim activity. Arrow scrolls up to indicate Nose Up trim; arrow scrolls down to indicate Nose Down trim.
	Autopilot is ON with pitch and roll servos engaged. Flight Director is ON with HDG and VS modes active. ALT mode is armed.	Armed lateral and vertical modes are white with white arrows, indicating automatic mode transition when capture value is met.
	Autopilot is ON with pitch and roll servos engaged. Vertical mode recently changed.	Lateral and vertical modes and pilot-set values flash (i.e., highlight on/off) for 10 seconds after mode transition from armed to active.

6.2.1 Autopilot Control Modes

LEVEL Mode: Rolls wings to level and simultaneously returns nose to horizon, then holds zero vertical speed.

HDG Mode: Turns toward and holds compass heading as selected by HDG/TRK bug.

TRK Mode: Turns toward and holds ground track as selected by HDG/TRK bug.

ROLL Mode: Holds current bank angle, within bank angle limits.

This mode can only be activated when Autopilot is activated and no other lateral mode (HDG, TRK, or NAV) is selected at time of engagement.

NAV Mode: Follows SkyView's Flight Plan or third-party connected NAV radio or GPS guidance.

ALT Mode: Holds the commanded altitude in Autopilot status bar.

When activating this mode, the commanded altitude is automatically set to the current indicated altitude.

VS Mode: Maintains the selected vertical speed as aircraft performance allows, until approaching the altitude bug, then transitions to ALT mode.

IAS Mode: Maintains selected airspeed (if not limited by aircraft performance) until selected altitude approaches, then transitions to ALT to maintain selected altitude.

VNAV Mode: Intercepts and tracks a glideslope or glidepath.

NOTE: Only the AP and the LEVEL buttons will engage the Autopilot servos.

6.2.2 Auto-Trim

The Auto-Trim feature allows SkyView HDX to automatically trim the pitch axis of the airplane while the Autopilot is engaged. When Auto-Trim is active:

- The Trim system is commanded to maintain a near zero elevator control load force to the pitch servo.
- The Autopilot Information Bar will indicate when the Trim system is operating.
- The Autopilot Disconnect Button will interrupt all Trim commands for conditions such as a Trim Runaway.
- The pilot or co-pilot Trim switches on the yoke always override the Autopilot trim commands to the airplane's electric Trim system. Additionally, pilot switches override co-pilot switches.

7 Communication System

Up to two Communication (COM) Systems can be installed in a SkyView HDX system. When two COM systems are installed the SkyView HDX system, they are designated COM1 and COM2. Only one radio can provide frequency data to the Top Bar on the SkyView HDX display.

7.1 System Equipment

The COM System requires installation of the Primary Flight Information system (see Section 3) or the Engine Monitoring System (see Section 5). In addition to the required equipment for the major system(s), the following is the minimum equipment required to provide COM functionality:

- At least one – SV-COM-T25 or SV-COM-T8 COM transceiver (see Section 7.1.1),
- One per transceiver – SV-COM-PANEL (vertical or horizontal version) COM control panel (see Section 7.1.1).

7.1.1 SV-COM-X25 and SV-COM-X83 COM Radio Kits

The SV-COM-X25 and SV-COM-X83 are integrated VHF COM radios consisting of two components: the SV-COM-PANEL control panel (see Figure 34) and the SV-COM-T25 or SV-COM-T8 transceiver (see Figure 35). The control panel is installed on an instrument panel, and the transceiver is installed remotely in the airplane. The control panel is available in horizontal and vertical orientations.

The SV-COM-X25 operates at 118.000 MHz to 136.992 MHz with 25 kHz channel spacing. The SV-COM-X83 operates at 118.000 MHz to 136.992 MHz with configurable 8.33 kHz or 25 kHz channel spacing. Both COM radios provide button-touch and number-dial frequency tuning. Up to two COM radios can be installed in a SkyView HDX system. If two COM radios are installed, only one can provide frequency information to the SkyView HDX display unit for presentation on the Info Bar.

Figure 34: SV-COM-PANEL (Horizontal and Vertical Configurations)

Figure 35: SV-COM-T25/T8 Transceiver

7.2 System Functions and Controls

The COM System provides two-way voice communications with both air and ground stations across the aviation frequency spectrum. It communicates with the SkyView HDX system to receive aviation database information to assist with frequency tuning.

The COM System provides more than just frequency tuning, it can tune frequencies by airport. By selecting an airport designator on the COM control panel, all frequencies associated with the airport become selectable by simply pushing the appropriate buttons on the COM RADIO Menu (see Figure 36) or the COM control panel (see Figure 34). Additionally, the SkyView HDX flight planning function can "push" an airport to the COM System.

COM info (see Figure 37) is presented on the right side of the Top Bar on the SkyView HDX display screen. It shows selected Active and Standby frequencies, along with their associated airport designators. The Active frequency color is *Green*, and the Standby frequency color is *Cyan*.

Figure 36: COM Control Menu

Figure 37: COM Info in Top Bar

8 Transponder System

Up to two SV-XPNDR-261 transponders can be installed in a SkyView HDX system.

8.1 System Equipment

The Transponder System requires installation of the Primary Flight Information System (see Section 3) or the Engine Monitoring System (see Section 5). In addition to the required equipment for the major system(s), the following is the minimum equipment required to provide Transponder functionality:

- One – SV-XPNDR-261 Transponder.

8.1.1 SV-XPNDR-261

The SV-XPNDR-261 transponder (see Figure 38) is a Class 1, Technical Standard Order (TSO), remote-mounted, Mode-S transponder. It emits/receives TIS Traffic (U.S. only) and is compliant with FAA 2020 ADS-B Out mandate (14 CFR § / FAR 91.227).

Figure 38: SV-XPNDR-261

8.2 System Functions and Controls

The Transponder System is controlled using the Transponder Control Menu (see Figure 39). Transponder status information appears in the Transponder Info Bar located at the top of the display screen (Figure 40).

Figure 39: Transponder Control Menu

Figure 40: Transponder Information Bar

9 IFR Navigation Integration System

The IFR Navigation Integration System allows the SkyView HDX system to interface with TSO IFR GPS Navigators. The system consists of the remotely-mounted SV-ARINC-429 module.

9.1 System Equipment

For the IFR Navigation Integration System to function effectively, the Primary Flight Information System (see Section 3) must be installed. In addition to the required equipment for the Primary Flight Information System, the following is the minimum equipment required to provide IFR Navigation functionality:

- One – SV-ARINC-429 Converter module,
- One – Third-Party TSO IFR GPS and/or NAV Radio navigators.

9.1.1 SV-ARINC-429 Converter Module

The SV-ARINC-429 converter module converts the ARINC-429 protocol from third-party devices to the Skyview Network protocol, allowing a SkyView HDX to present IFR GPS Navigator information.

Figure 41: SV-ARINC-429 Converter Module

9.2 System Functions and Controls

There are no system functions or controls specific to the IFR Navigation Integration System. Functions and controls are native to the third-party device. When installed, the IFR Navigation Integration System creates a new tab in the SkyView Flight Plan Page for the third-party device as a selectable source. Additionally, Flight Plan information from third-party devices can appear on the Map.

10 Traffic and Weather Information System

The Traffic and Weather Information System receives ADS-B traffic information via 978 MHz (UAT) and 1090 MHz and weather information from the FAA's network of ADS-B ground stations. With this system installed, a SkyView HDX display can present traffic information on the PFD (if installed) and traffic and weather on the Map (if installed).

10.1 System Equipment

The Traffic and Weather Information System requires installation of the Primary Flight Information System (see Section 3). In addition to the required equipment for the Primary Flight Information System, the following is the minimum equipment required to provide Traffic and Weather Information functionality:

- One – SV-ADSB-472 module (see Section 10.1.1).

10.1.1 SV-ADSB-472 Module

The SV-ADSB-472 module (Figure 42) is a dual band ADS-B IN receiver. It receives weather and TIS-B data via 978 MHz UAT (U.S. only) and 1090 MHz ES. In the U.S., it receives free weather and airspace restriction information (FIS-B) from the FAA's network of ADS-B ground stations. FIS-B information is also available if the SV-ADSB-472 is paired with an SV-XPNDR-261 transponder.

Figure 42: SV-ADSB-472 Module

10.2 System Functions and Controls

When Synthetic Vision is enabled, traffic information is presented on the PFD using the indicators shown in Figure 43. Airport-specific METARs and TAFs are available on the Airport (APT) page in the INFO Menu.

Figure 43: Traffic Information Displayed on the PFD

Traffic information is presented on the Map using the same indicators as the PFD, but with direction arrows to indicate heading and speed, values to indicate altitude, and UP/DOWN arrows to indicate if the target is climbing or descending as shown in Figure 44. Corresponding traffic alert annunciations are also generated.

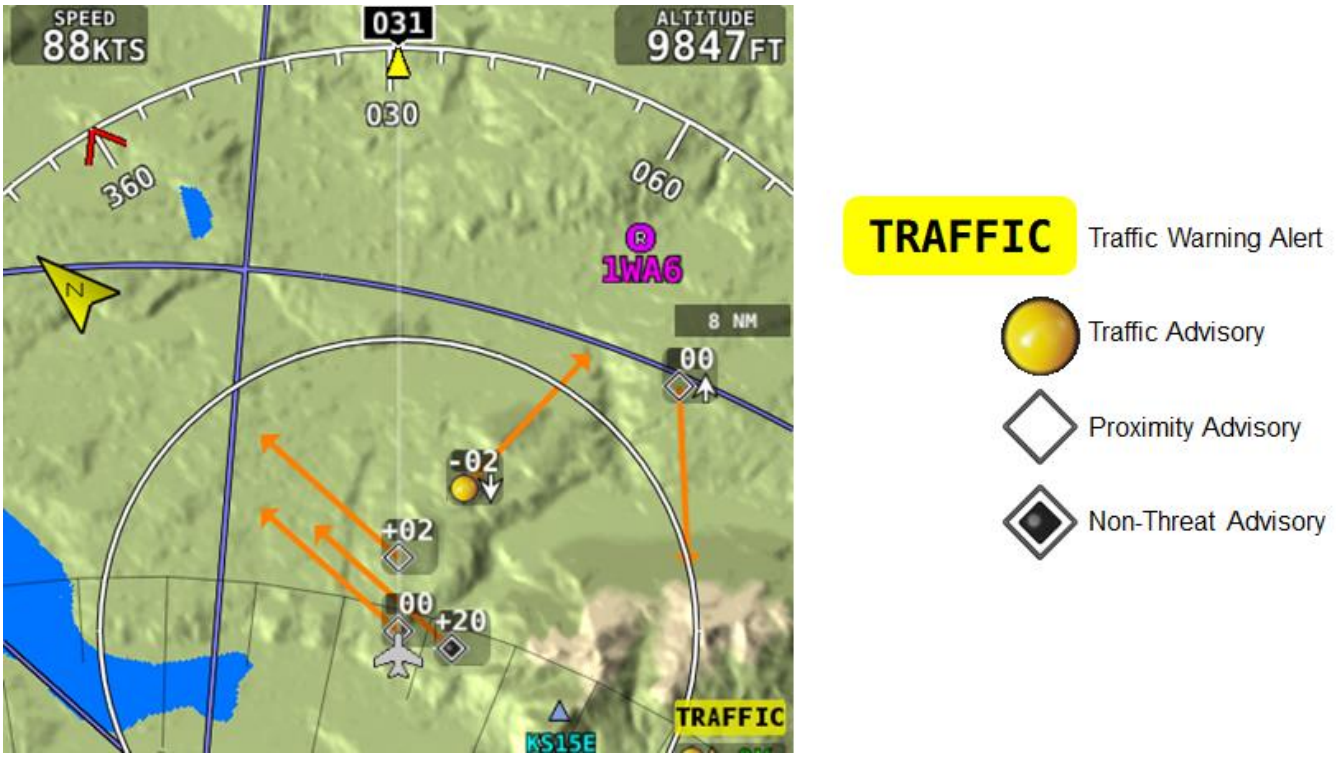

Figure 44: Traffic Information Displayed on the Map

Weather information is presented on the Map using colors that indicate precipitation and severity as shown in Figure 45. Weather controls are in the Weather Options menu (see Figure 46 and Figure 47).

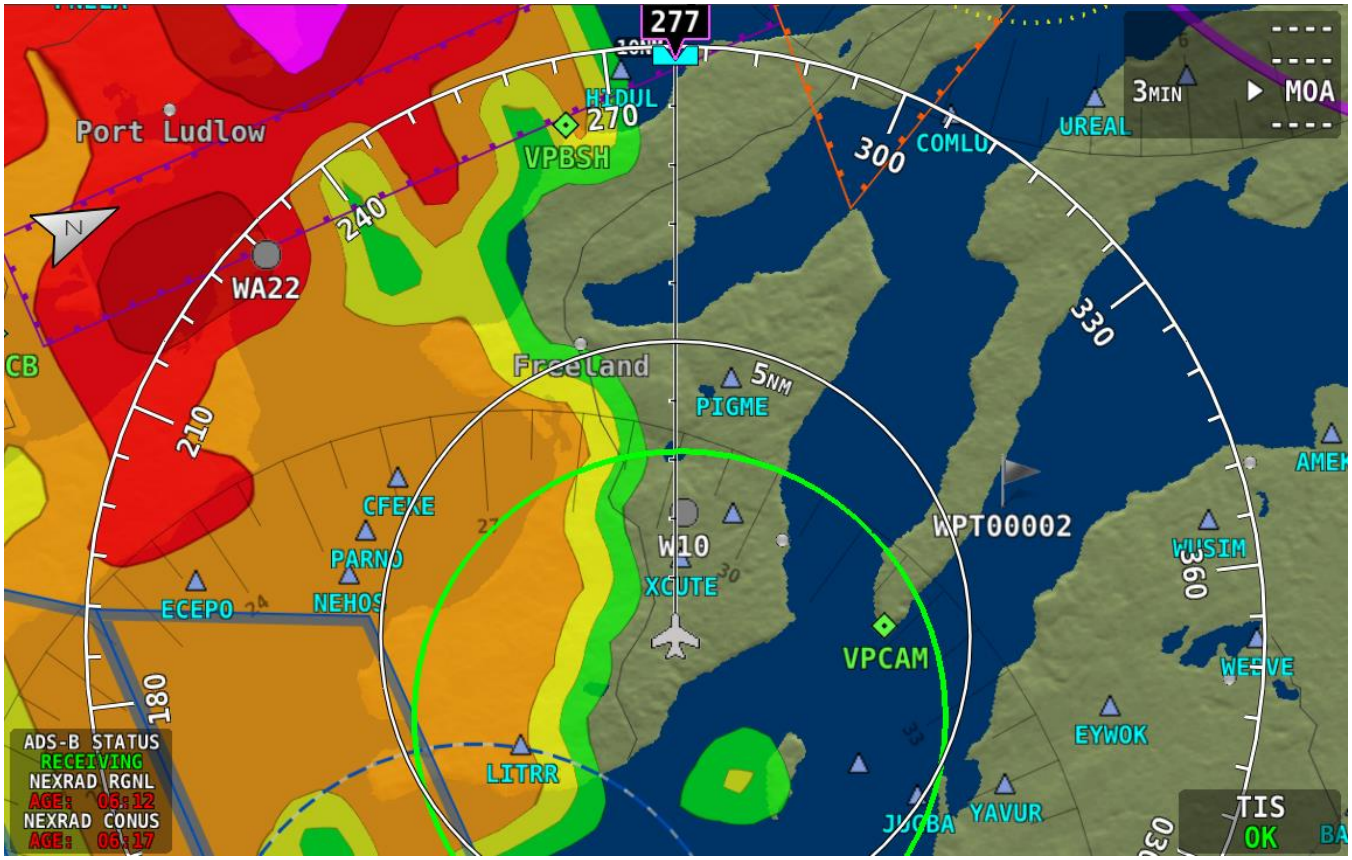

Figure 45: Weather Information Displayed on the Map

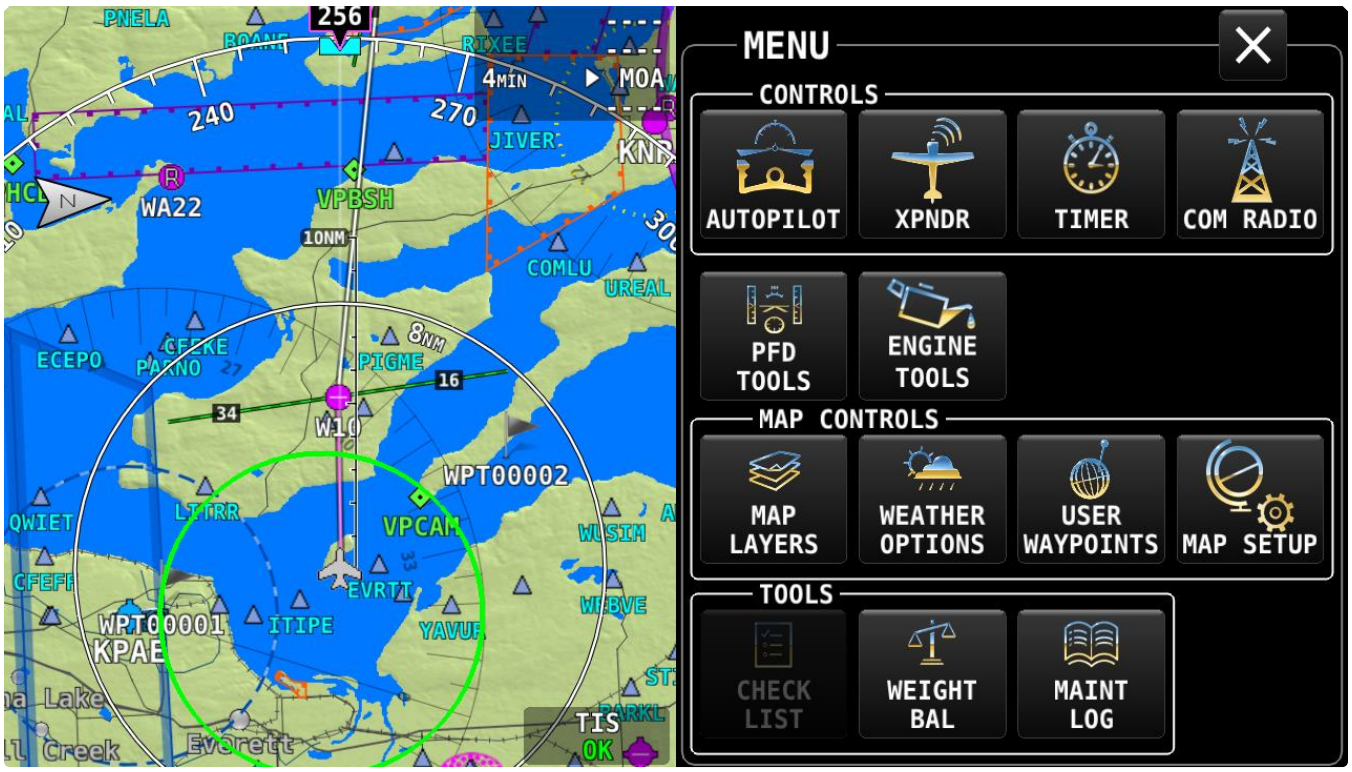

Figure 46: Menu with Weather Options Control Button

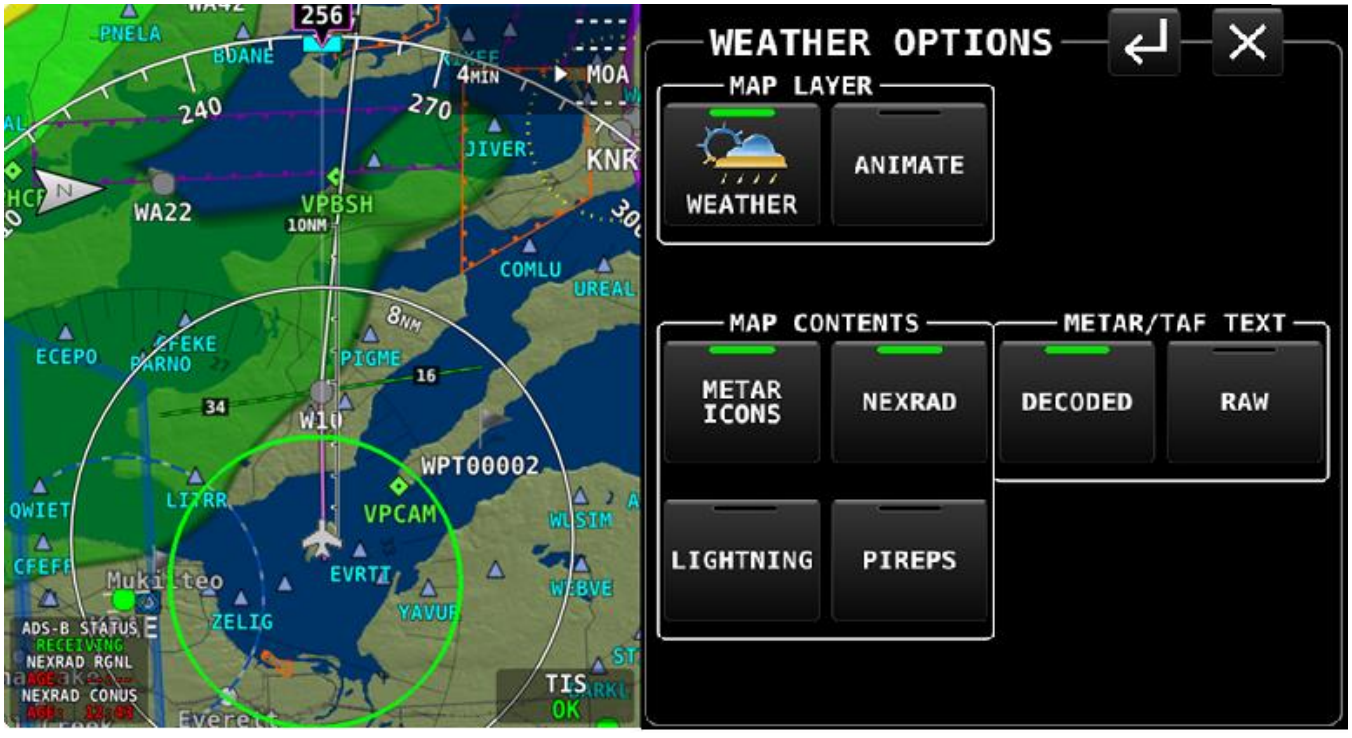

Figure 47: Weather Options Control Menu

11 Angle of Attack Indicating System

The Angle of Attack (AoA) system consists of a remotely-mounted AoA probe (Figure 48) on the airplane's exterior. Because mounting methods vary from aircraft to aircraft, the installation will require the fabrication or acquisition of an appropriate sensor mount.

Figure 48: AoA Probe

11.1 System Equipment

For the AoA System to function, the Primary Flight Information System (see Section 3) must be installed. The minimum required equipment necessary to provide the AoA function is one AoA Sensor.

11.2 System Functions and Controls

The system will annunciate a series of audible beeps when the airplane approaches the critical angle-of-attack (i.e., stall). The beeps will occur faster as the stall angle of attack approaches, becoming a steady tone at a configured angle at or near the critical angle-of-attack.

12 Supporting Equipment

The following is a description of SkyView HDX System supporting equipment.

12.1 SV-KNOB-PANEL Knob Control Panel

The SV-KNOB-PANEL control panel (see Figure 49) is installed on an instrument panel. It provides dedicated knobs to control the ALT, BARO, and HDG/TRK bug functions. The control panel is available in horizontal and vertical orientations. When an SV-KNOB-PANEL is installed, the knobs on a SkyView HDX display can still be used set to ALT, BARO, and HDG/TRK. Up to two Knob Control Panels can be installed in a SkyView HDX System.

Figure 49: SV-KNOB-PANEL (Horizontal & Vertical Versions)

12.2 SV-NET-HUB Network Hub

The SV-NET-HUB network hub (see Figure 50) is an optional accessory that is typically installed behind an instrument panel near SkyView HDX system components, as well as near Autopilot servo installations. The SV-NET-HUB simplifies component connection to the SkyView Network.

Figure 50: SV-NET-HUB

12.3 Panel Mount USB Port

The Panel Mount USB Port (see Figure 51) is an optional accessory that is typically installed on an instrument panel. It extends access to the USB ports on a SkyView HDX display. USB ports are used for transferring files (e.g., firmware updates/backups, database updates, configuration file uploads/downloads) to a SkyView HDX display.

Figure 51: Panel Mount USB Port

13 Appendix 1: Glossary

ACO Aircraft Certification Offices (FAA)

ADAHRS Air Data, Attitude and Heading Reference System

ADS-B Automatic Dependent Surveillance Broadcast

AHRS Attitude and Heading Reference System

AEG Airplane Evaluation Group (FAA)

ALT Altitude

AML Approved Model List

AoA Angle of Attack

AP Autopilot

ARINC Aeronautical Radio Incorporated

ATC Air Traffic Control

BARO Barometric Indication

BAT Battery

BIT Built-In Test

CDI Course Deviation Indicator

CFR Code of Federal Regulations

CHT Cylinder Head Temperature

COM Communications

EFIS Electronic Flight Instrument System

EGT Exhaust Gas Temperature

EMS Engine Monitoring System

ES Extended Squitter

FAA Federal Aviation Administration

FAR Federal Aviation Regulations

FIS-B	Flight Information System - Broadcast
FD	Flight Director
GND	Ground
GPS	Global Positioning System
GNSS	Global Navigation Satellite System
HDG	Heading
HSI	Horizontal Situation Indicator
ICA	Instructions for Continued Airworthiness
IFR	Instrument Flight Rules
LCD	Liquid Crystal Display
LOC	Localizer
LRU	Line Replaceable Unit
MAG	Magnetometer
MFD	Multi-functional Display
MHz	Mega-Hertz
NAV	Navigation
OBS	Omni Bearing Selector
OAT	Outside Air Temperature
PFD	Primary Flight Display
PFI	Primary Flight Information
STC	Supplemental Type Certificate
TIS	Traffic Information System
TIS-B	Traffic Information System - Broadcast
TRK	Track
TSO	Technical Standard Order
VFR	Visual Flight Rules

VHF	Very High Frequency
VNAV	Vertical Navigation
VOR	VHF Omnidirectional Range
VS	Vertical Speed
VSI	Vertical Speed Indicator
XPDR	Transponder