AV-30-C
PILOT'S GUIDE

REVISION I
UAV-1003946-001

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1 Table of Contents

2 REVISION HISTORY

Revision	Date	Comments
A	4/16/2020	Initial release
B	7/13/2020	Added AHRS/ADC startup time. Added clarification on AI/DG toggle function. Clarified power input description, air data connections, GPS interface, low speed arc operation. Modified roll alerts to not specify left or right direction. Clarified AoA description text, alert clearing (mute operation).
C	9/2/2021	Software update 2.1.2. Added Definition of Acronyms & Terms section.
D	12/6/2021	Add transponder control
E	9/29/2022	Corrected DALT to be identified as Density Altitude (was Digital Altitude)
F	3/1/2023	Updated trademarked names list to include AV-Mag and AV-Link. Add AV-Mag directional aiding. “MAG CAL” now used for missing magnetometer calibration. Updated System Interfaces diagrams to include AV-Mag. Updated flight direction indicator description of NO DATA and NO GPS. Add change of DG-ADJ behavior with AV-Mag. Add direct turn section. Updated Table 2. Added Section 13 Stored Data Integrity Check.
G	12/20/2023	Add align flag to DG Update transponder user interface Add multiple GPS waypoints on DG ARC page Add additional DG pages

		Add hectopascal baro units Add kilometers per hour IAS units Expand density altitude range Add BeaconX parallel operations Add brightness adjust
H	1/15/2024	Update Interfaces diagrams in §6.1 Add AV-Link §13 Add MFD Mode §7.9 Add AV-Link Unit interface §6.10 Add Carbon Monoxide alert §9.3 Add Carbon Monoxide data type to Table 2 Change AoA lower range to -10 degrees in Table 10.
I	10/30/2024	Global formatting update Add voltage high and low setup parameters Add G-Max and G-Min overlays Add rate of turn and standard rate bank angle Add VSI to MFD pages Add configurable number of pages Add AV-HSI, AV-APA and autopilot Update Brightness Menu to swap buttons

3 AV-30-C System Information

3.1 System Description

The uAvionix AV-30-C is a fully digital multi-mode instrument that mounts in the legacy 3-1/8” round instrument panel cutout typically found in light general aviation instrument panels. It can be field configured as either an Attitude Indicator (AI) or a Directional Gyro (DG) indicator, is fully self-contained with dual-precision inertial and pressure sensors and allows for a wide variety of pilot customization. With optional accessories, the AV-30-C can also be configured as a Multi-Function Display (MFD) or Course Deviation Indicator (CDI).

Figure 1 – AV-30-C Multi Mode AI/DG/Transponder – Basic Display

When configured as an AI, primary attitude and slip are always displayed. The unused portions of the display area can be customized by the pilot to show a variety of textual and graphical data-overlay fields. Up to three

pages may be customized by the pilot while a last page presents a fully decluttered view of only attitude and slip or control of a compatible uAvionix ADS-B transponder such as the tailBeaconX.

When configured as a Directional Gyro (DG), non-slaved direction of flight information is presented. The non-slaved direction can be manually adjusted by pilot input or may be optionally slaved to GPS track. Multiple display presentations, including compass rose, GPS HSI, and GPS arc views can be selected by the pilot. The unused portions of the display area can similarly be configured for a variety of textual data overlays.

With an optional AV-Link accessory, the AV-30-C can be configured as a Multi-Function Display (MFD) that displays traffic from ADS-B receivers. MFD and DG modes are accessible when the AV-30-C is configured as a DG. As with other operating modes, the last page provides a reversionary AI.

With an optional AV-HSI accessory, the AV-30-C can be configured as a Course Deviation Indicator (CDI). Two CDI pages are available, with the third providing a reversionary AI. As with other modes, unused portions of the display area can be configured with textual data overlays.

In all operating modes, the pilot may select from multiple visual styles which are intended to improve visual compatibility with legacy aircraft instrumentation and preserve the look-and-feel of older aircraft applications.

When installed as a non-required instrument (not replacing the existing approved AI or DG), the functional mode of the unit can be toggled between AI, DG, MFD, and CDI modes by pressing and holding the center knob for 3 seconds.

3.2 System Functions

Primary Functions

- Primary Attitude (AI Mode)
- Primary Slip (AI Mode)
- Primary Direction of Flight indication (DG Mode)
- Primary Navigation Information (with optional AV-HSI)

Supplemental Functions

- Indicated Airspeed
- Altitude
- Rate of Turn
- V-Speeds
- Angle of Attack
- Vertical Trend
- Vertical Speed
- Set Altitude
- Heading
- Bus Voltage
- G Load
- Outside Air Temperature
- True Airspeed
- Density Altitude
- GPS Navigator/Waypoint Data
- GPS Navigator Nav Data
- GPS Navigator Route Line
- Heading Bug
- Transponder Control
- Traffic Display (with optional AV-Link)

Audio and Visual Alerting Functions

- AoA Alerting
- G Limit Alerting

- Excessive Roll Alerting
- Attitude Miscompare (with optional AV-HSI)
- Set Altitude Alerting (visual only)
- Over/Under Voltage (visual only)
- Carbon Monoxide (with optional AV-Link and Sentry)

Miscellaneous Functions

- Internal Battery Operation
- Auto/Manual Brightness

4 Unit Interfaces

4.1 Aircraft Systems Interfaces

The following describes each of the AV-30-C system interconnects for AI, DG, MFD, and CDI installation configurations. Various interfaces are optional, and interface to some systems may require additional installation approval.

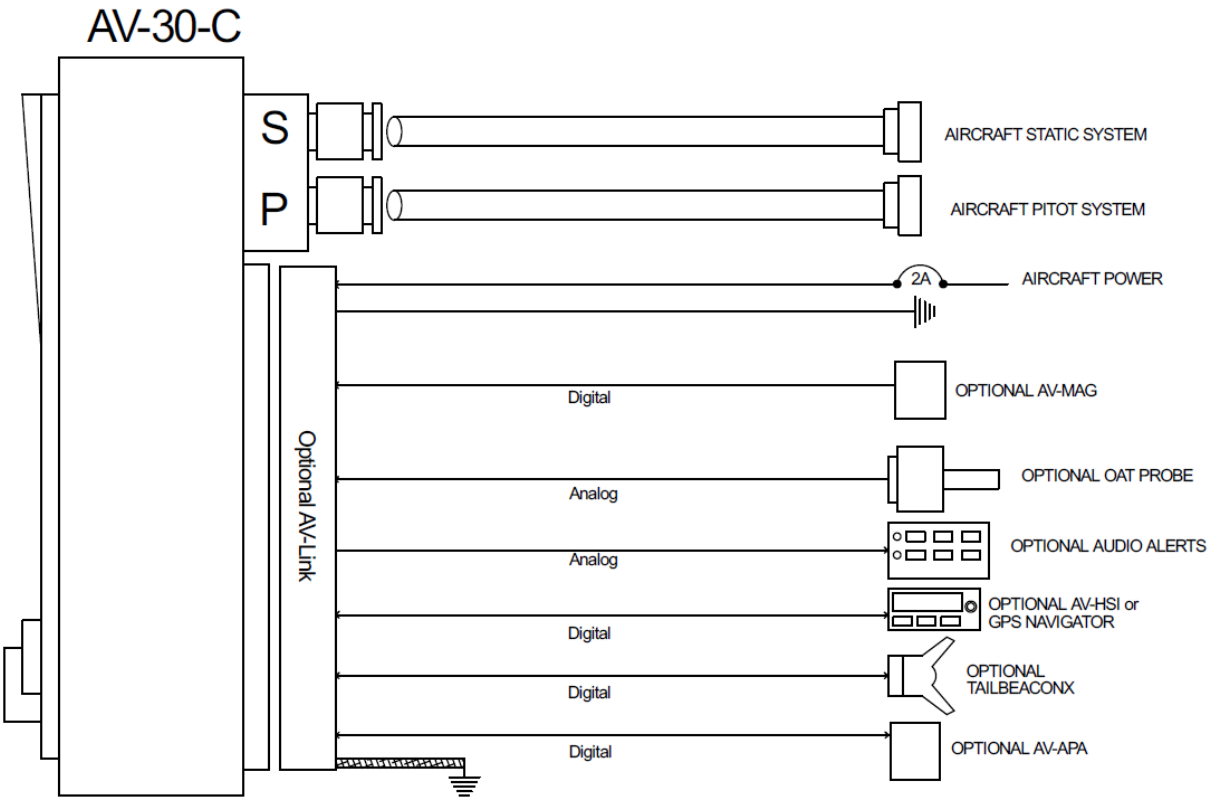


Figure 2 - AV-30-C Aircraft Systems Interfaces - AI Mode

When installed as a DG, MFD, or CDI, no audio outputs are supported, and some air data related parameters are only available when the optional OAT probe is equipped.

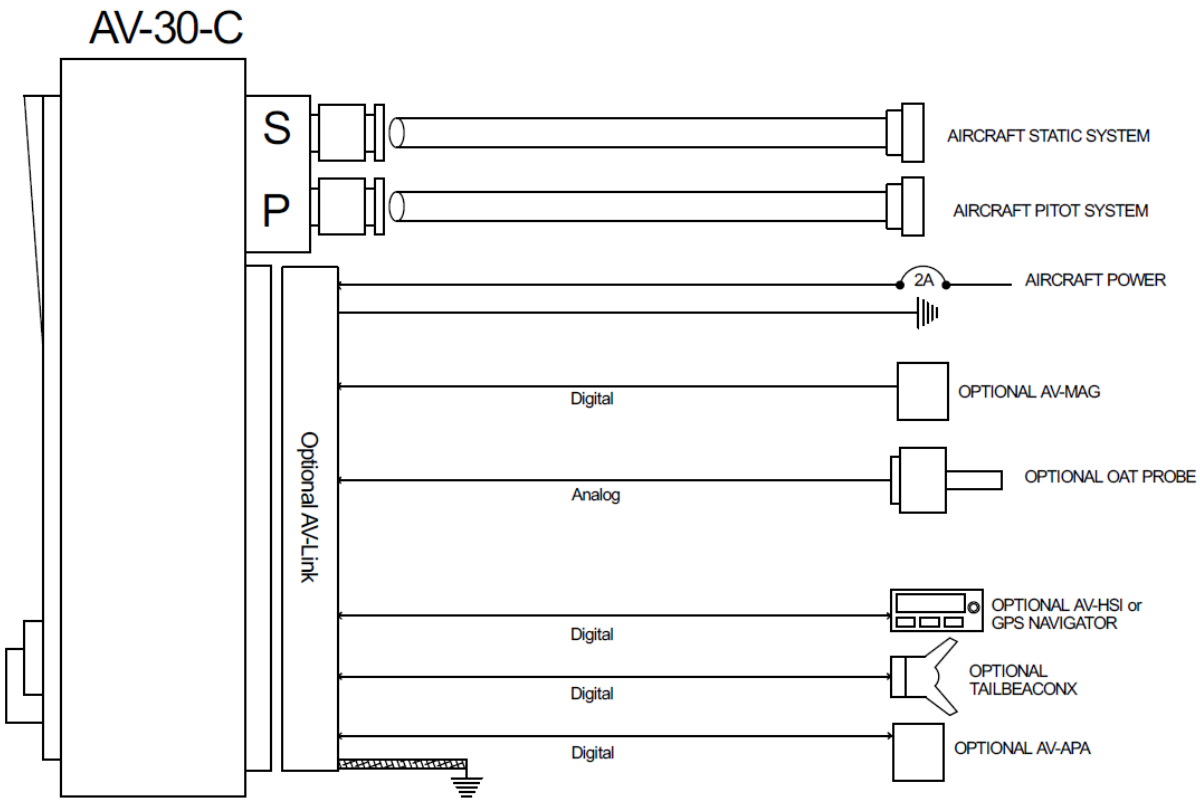


Figure 3 - AV-30-C Aircraft Systems Interfaces - DG Mode

4.2 Power Input (Required)

Power input is required in all configurations and each unit has a dedicated circuit breaker and internal backup battery. The power input is internally connected, and diode protected with the unit's internal battery via a processor-controlled switch. This architecture allows the unit to continue operation if external power fluctuates or is completely lost.

When external power is supplied to the AV-30-C, there is no mechanism to turn the unit off. When operating on battery, the unit may be forced off with by pressing the left and right buttons until the unit shuts off. See §8 - Internal Battery Operation for more information.

4.3 Pitot and Static Interfaces (Required)

Pitot and static connections are required for all AV-30-C installations.

Pitot and static data are used to populate screen overlays and aids the attitude solution.

4.4 Navigation Interface (Optional)

The AV-30-C can interface with a Global Positioning System (GPS) receiver either directly or through an optional AV-HSI. GPS connected directly to the AV-30-C do not provide IFR compliant navigation guidance. In this configuration, lateral deviation will be presented as VFR-only. No vertical guidance will be displayed.

IFR-capable navigators connected through an AV-HSI using ARINC 429 can provide IFR compliant lateral and vertical guidance for display on the AV-30-C. An AV-30-C with an AV-HSI can display navigation guidance from one GPS and one VHF (VOR/ILS) source.

The AV-30-C does not alter the data obtained from the GPS navigator and simply displays the received data in a textual or graphical format as configured by the pilot. The AV-30-C will convert units of ground speed to match units of airspeed.

The AV-30-C can use the GPS receiver from a BeaconX as a GPS source. In installations with multiple AV-30-C, only one AV-30-C acts as the BeaconX Transponder Control, though all connected AV-30-C can display GPS data from the BeaconX. See §4.9 for details.

4.5 OAT Probe (Optional)

The optional Outside Air Temperature (OAT) probe interface is compatible with the industry standard “Davtron” (C307PS) probe which is mounted external to the aircraft. OAT data is available as a textual data overlay and is used to compute temperature dependent data such as True Airspeed

(TAS) and Digital Altitude (DALT). Each AV-30-C requires a dedicated probe. A single OAT probe cannot be shared between multiple units.

The OAT probe is automatically detected by the system, and when present, allows temperature related parameters to be selected for display. If the OAT probe is not detected, display of these parameters is inhibited.

4.6 Audio Output (Optional)

The optional audio output provides audio alerts for the various alerting conditions. This output is typically connected to the aircraft's non-switched audio input on the audio panel. Audio alerting thresholds and alert enablement are configured by the pilot in the Setup Menu.

Audio alerting is only supported when configured as an AI.

4.7 Internal Magnetometer (Optional)

The internal magnetometer, when available, is detected in software version 2.1.1 or later. It is currently disabled by configuration.

4.8 AV-Mag External Magnetometer (Optional)

Support for the AV-Mag external magnetometer is available in software version 2.3.9 or later and requires an AV-Mag to be installed in the aircraft. The AV-Mag provides high quality aiding data to the DG and requires calibration before use. See §10.3.11 of *AV-30-C Installation Manual UAV-1003947-001* for details on how to calibrate the magnetometer.

NOTICE

The AV-Mag is powered by the AV-30-C. During a power loss, the AV-Mag will be powered by the AV-30-C internal battery and continue to provide aided heading data.

4.9 Transponder Control (Optional)

The AV-30-C has the option of being the control interface for select uAvionix transponders (including the BeaconX family). This provides

pressure altitude, mode, squawk code, and IDENT information to the transponder, and displays status and annunciations from the transponder. See §5.11.

NOTICE

The transponder is not powered by the AV-30-C internal battery. Transponder operations will be unavailable during a power loss.

The BeaconX output can be shared in parallel between two AV-30-C devices. One device must act as the Transponder Controller and the other may use the BeaconX as a GPS-only input.

4.10 AV-Link (Optional)

The AV-30-C has the option of displaying ADS-B traffic using AV-Link as an integrated Wi-Fi bridge that allows for communication between AV-30-C and Wi-Fi capable ADS-B receivers. The AV-30-C will display a separate navigational page with traffic when configured and connected to a supported receiver.

If a Sentry ADS-B receiver is connected to the AV-Link-C, carbon monoxide data will be available as an overlay and as an alert on the AV-30-C.

NOTICE

The AV-Link accessory is not powered by the AV-30-C internal battery. Wi-Fi traffic data provided to the MFD mode will be unavailable during a power loss.

The AV-Link can be connected directly to an AV-HSI, sharing traffic and CO alerts to all connected AV-30-C. Additionally, this configuration enables software updates of the AV-HSI and all connected AV-30-C from a single AV-Link.

If multiple AV-Link modules are installed in the aircraft, no more than two may be enabled.

4.11 Autopilot (Optional)

The AV-30-C has the option to control analog or digital autopilots. Analog autopilots are controlled through the optional AV-APA accessory. Digital autopilots can be controlled using ARINC 429 through the AV-HSI.

4.11.1 AV-APA – Analog Port Adapter (Optional)

The optional AV-APA enables direction control input to S-TEC 20/30/40/50/55/55X/60-1/60-2/65 autopilots. The AV-APA and AV-30-C are connected to one another via RS-232 serial.

The AV-30-C sends heading commands to the AV-APA which converts them to analog signals for the S-TEC autopilot. The pilot controls these via the center knob PUSH-SET menu. Information is displayed via graphical or text overlay fields.

NOTICE

To process steering commands from the AV-APA, the S-TEC autopilot should be set to heading mode. S-TEC navigation and approach modes function independently of the AV-APA.

The AV-30-C and AV-APA support six autopilot control modes. Each mode uses a different combination of desired direction and current direction to achieve different types of flight goals as shown in Table 9 - Autopilot Modes. For further details on Autopilot control see §12 Autopilot.

Altitude is not controlled through the AV-APA. The altitude functions of your S-TEC, if equipped, are controlled through the autopilot control head.

4.11.2 Digital Autopilots – ARINC-429 (Optional)

When equipped with an AV-HSI and an Advanced Autopilot Software Unlock, the AV-30-C can control AeroCruze and Pro Pilot autopilots using ARINC 429.

The AV-30-C and AV-HSI sends the heading bug and Set Altitude (SALT) to the autopilot. Additionally, with an optional Advanced Autopilot Unlock and an ARINC-429 GPS Navigator, GPS Steering commands are

forwarded to the autopilot. The pilot controls autopilot mode, heading bug, and set altitude via the center knob PUSH-SET menu and displays the data via graphical or textual overlay fields.

There are two autopilot control modes used with ARINC 429 autopilots – heading bug and GPSS. For further details on Autopilot control see §12 Autopilot.

4.12 AV-HSI – Horizontal Situation Indicator (Optional)

The optional AV-HSI accessory can be connected to one GPS navigator capable of IFR enroute navigation and approaches to LPV minimums and one VHF navigator capable of VOR enroute and ILS approaches.

5 User Interface

5.1 Startup and Common Controls

The initial power-on splash screen presents the company logo, unit model number, and the currently installed software version.

Figure 4 – Splash Screen

Operation in AI, DG, MFD, and CDI modes share the following common user interface controls.

Figure 5 - Common User Interface Components

When installed as a non-required instrument (not replacing the existing approved AI or DG), press and hold the center knob to switch between AI, DG, MFD, and CDI modes when the Function Lock feature is disabled. If the Function Lock feature is enabled, then the pilot may not switch between AI and DG modes. However, the DG can be switched into MFD (Traffic) mode. See *AV-30-C Installation Manual UAV-1003947-001* for configuring the Function Lock feature.

5.2 “PUSH-SET” Control

Activate the PUSH-SET window for accessing context menus and settings by momentarily pushing and releasing the center knob.

This activates a window along the bottom of the display to allow various parameters to be adjusted with the center knob. Momentarily push and release the knob to scroll through each option.

When you reach the option to change, rotate the knob to scroll through all available values for this option. If the range setting has reached a limit, the left or right indication arrows will indicate which direction the center knob will change the setting. Both arrows are visible when the setting can be increased or decreased.

Momentarily push and release the knob to save the updated option value. The settings window will disappear, and the new setting is saved.

NOTICE

The parameters that can be adjusted will vary, based on the mode of the unit and the current configuration of the display. Figure 6 shows how the barometric setting is adjusted when altitude has been configured for display.

Figure 6 - Push-Set Example – SET BARO

5.3 Direct-Turn

Commonly used parameters may be adjusted quickly by simply turning the center knob.

In AI mode, the barometric pressure setting is adjusted by simply turning the knob to bring up the ‘SET BARO’ window.

In DG mode, the heading bug is adjusted by simply turning the knob to bring up the ‘HDG BUG’ window.

All adjusted values are active immediately. After adjustment, push and release the center knob to dismiss the window. If after 30 seconds the knob is not pressed, the window will be dismissed automatically.

5.4 User Interface Customization

Each display mode is customizable to display data in a format and position on the screen according to pilot preference. Each display mode has multiple, customizable pages that the pilot may switch between during flight. Each page can be customized to show different sets of data. For example, AI page 1:3 (first of three) may be configured to show different types of air data, while page 2:3 (second of three) is configured to show Angle of Attack and Vertical trend, while page 3:3 (third of three) is configured to show GPS navigation waypoints and related data.

Figure 7 - Page 1 of 3 showing Air Data and DG Heading

Figure 8 – Page 2 of 3 showing GPS Ground Track, AoA, and Vertical Trend

Figure 9 - Page 3 of 3 showing Waypoint Data and SALT

Note that the fourth page is a simplified reversionary page and is not configurable. It only displays minimally required information.

Many pilots use each page for a different phase or type of flight. For instance, page 1 could display data necessary for run-up and page 2 could display information used enroute.

5.4.1 AI Mode Customization

Pressing the lower left options MENU button will bring up the first menu, which is the user interface customization menu. In this mode, the cursor can be moved to each customizable area by rotating the center knob.

Figure 10 – UI Customization, Menu Entry

The currently selected field will be indicated by a darkened block with a cyan bracket. Rotating the knob left and right will change the currently selected field. To edit the overlay value presented in the currently highlighted field, push the center knob.

Figure 11 – UI Customization - Field Selection

A second push of the lower left options MENU button will bring up the second menu. Menu options related to the current screen are displayed.

5.4.2 Edit Presented Data

The following shows the display when the edit mode is active. Rotating the knob left and right will then select from the various overlay values that can be presented in the selected field.

NOTICE

When the desired data type is presented, pressing the knob in will accept the current value, and the edit mode will remain active

Figure 12 - Display Edit Value

Take note that not all data values can be presented in each editable field area. For example, airspeed will only be displayed on the left main area and altitude will only be displayed on the right side. Additionally, when operating in the DG mode, the available data displayed is different than when operating in the AI mode.

5.5 AI Mode Display Components

5.5.1 Basic Components

Figure 13 – Basic AI Mode User Interface shows the basic AI with all customizable data overlay fields turned off.

The data shown cannot be disabled or customized:

Figure 13 – Basic AI Mode User Interface

5.5.2 Customizable Data Overlay Fields

Figure 14 - AI Mode, Customizable Field Locations shows the locations of the inner and outer customizable fields when operating in the AI mode.

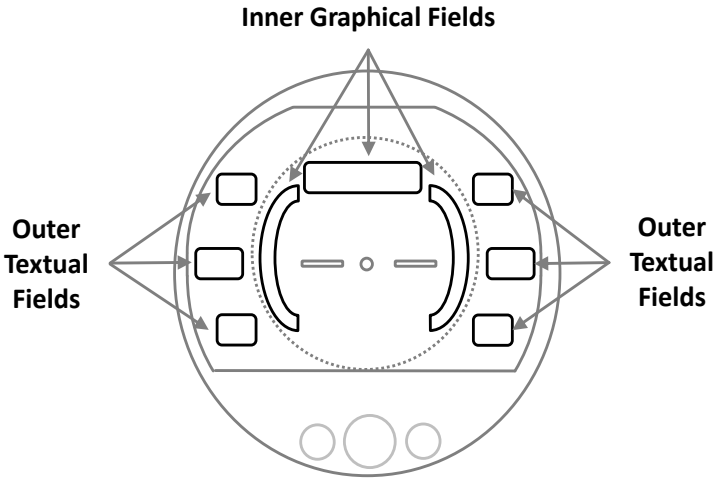


Figure 14 - AI Mode, Customizable Field Locations

There are up to three independent pages on this screen that may be custom configured as desired by the pilot. Unneeded pages may be disabled in the Installation Menu. Refer to *AV-30-C Installation Manual UAV-1003947-001* for installation menu information.

Figure 15 – Data Overlay Examples shows an example of the pilot customizable data overlays (both textual and graphical), located in the non-utilized areas of the display area.

Figure 15 – Data Overlay Examples

When in AI mode, there are three independently customizable pages which are selected round-robin fashion by momentarily pushing and releasing the

right button repeatedly. The active page is displayed as 1:3, 2:3 and 3:3 on the lower right corner of the display.

A fourth, fully decluttered page allows all supplemental information to be hidden, leaving just attitude and slip displayed. This is accessed by momentarily pushing and releasing the right button a fourth time. Return to page 1 by momentarily pushing and releasing the right button.

5.5.3 Attitude / Slip

The aircraft should be held as motionless as possible during the alignment process.The basic display of attitude and slip consists of a traditional attitude indicator display and slip-ball as follows:

Figure 16 - AI Mode, Attitude Indicator

On initial startup the red ALIGN flag will flash, indicating that the attitude is still stabilizing. The ALIGN flag will flash when in AI or DG Mode.

If power is removed from the unit during the alignment phase the unit will remain on battery power until it has aligned.

When the ALIGN annunciator is displayed, the presented attitude may be incorrect. If ALIGN annunciator does not extinguish after 3 minutes, please contact uAvionix support.

5.5.4 Turn Coordinator

Two turn coordinator options can be configured for display near the top of the screen, a Rate of Turn indicator and a Standard Rate Bank Angle indicator. Configuration of this option is in the setup menu.

The Rate of Turn indicator consists of a flag that grows left or right from the zero-roll indicator. Alignment with the extended 30-degree roll mark indicates a 2-minute standard rate turn.

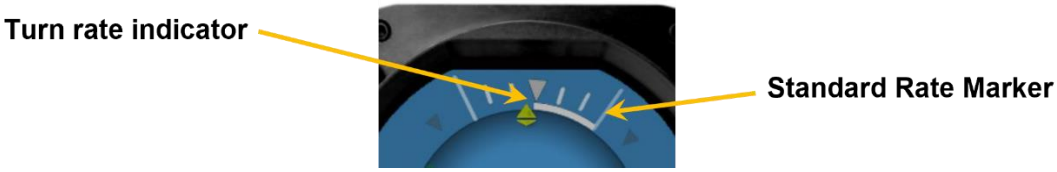


Figure 17 – AI Mode, Rate of Turn Indicator

The Standard Rate Bank Angle indicator consists of a small airplane shape that is positioned at the bank angle necessary to fly a standard rate turn at the current true airspeed. Because this indicator is dependent on true airspeed, an OAT probe is required.

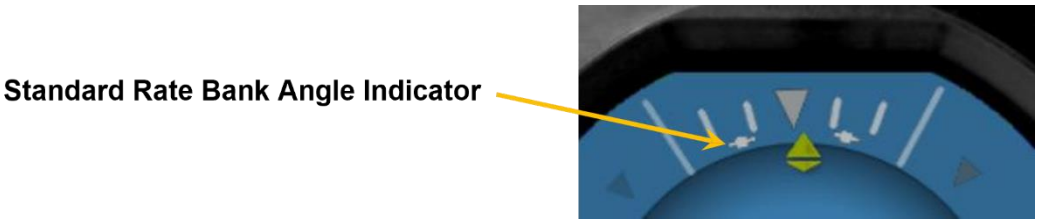


Figure 18 – AI Mode, Standard Rate Bank Angle Indicator

5.5.5 Airspeed Indicator

Indicated airspeed is configured for display on the left side of the screen. The configured units of knots (KTS), miles per hour (MPH), or kilometers per hour (KPH) are displayed below the speed value.

Figure 19 – AI Mode, IAS Indicator

The inner arc is a color-coded V-Speed band that rotates to show the configured V-Speed limits against the non-moving white tick mark. The lower arc portion below V_{S1} provides a red colored slow-speed band that is only displayed when the airspeed has been above V_{S1} for a given flight. If configured during installation, V_{MC} and V_{YSE} appear as red and blue radial tick marks, respectively.

The color of the indicated airspeed numerals will turn yellow when operating in the yellow speed arc, red when operating in a red speed arc, but are otherwise white.

Figure 20 - AI Mode, V-Speed Limits

NOTICE

On initial startup, the airspeed field will display dashes while sensor stabilization occurs.

Airspeed display units and V-Speed limits are configured during installation and are not pilot accessible

5.5.6 Flight Direction Indicator

The upper portion of the AI can be configured to display direction of flight in the form of either directional gyro heading (DG HDG) or GPS track (GPS TRK).

Both modes support a magenta heading bug (HDG BUG), and the GPS track mode supports a green bearing-to indicator. The heading bug is for reference and may also interface to an installed autopilot.

If this field is configured to display GPS track, and no GPS receiver is detected (e.g. it is powered off or disconnected), an amber “NO DATA” will be displayed. If a GPS receiver is detected but it has not achieved a fix or is otherwise not providing useful data, “NO GPS” will be displayed.

If either the heading bug or the bearing to bug is off the left or right side of the screen, a colored arrow will show the shortest-turn direction to the corresponding bug. To quickly align the heading bug to the current heading, select HDG BUG, then push and hold the center knob.

Magnetometer aiding for DG heading is normally invisible to the pilot, however, there are two red warning flags that can occur. The first is “MAG CAL” which indicates a problem with the magnetometer calibration. The second is “NO MAG” which indicates that magnetometer sensor data is absent (e.g. connection failure). If either of these occur, refer to *AV-30-C Installation Manual UAV-1003947-001* for more information.

Figure 21 - AI Mode, Direction Indication, Bearing-To Off-Screen

5.5.7 Barometric Corrected Altitude Indicator

Barometric corrected altitude (ALT) can be configured for display on the right side of the screen and shows the barometric altitude in feet. When this

field is configured for altitude display, the lower right field will be locked to the barometric setting (BARO) and cannot be modified to display a different parameter.

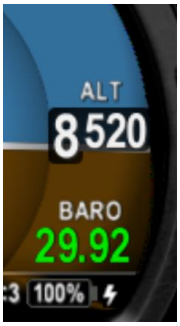


Figure 22 - AI Mode, Altitude Indicator

Adjust the barometric setting by turning the center knob or going into the PUSH-SET menu. See §5.2 - “PUSH-SET” Control for additional details. Barometric setting in inches of mercury (INHG), millibars (MB), or hectopascals (HPA) are selected during installation and is not adjustable during ordinary operation.

NOTICE

On initial startup, the field will display dashes while sensor stabilization occurs.

On unit power-down, the current field elevation and barometric pressure are stored in internal non-volatile memory. On the next power-up, the saved field elevation is used to compute an estimated barometric setting, potentially reducing the required adjustment amount required by the pilot. During this process, the barometric value will be shown in light grey.

5.5.8 AoA Indication

Derived Angle of Attack can be configured for display in the inner left area of the screen and consists of a series of colored stacked bars that indicates the current AoA relative to the configured minimum and maximum limits.

The lowest green bar corresponds to a current AoA matching the configured lower limit point. The first red bar corresponds to a current AoA matching the configured upper limit.

NOTICE

AoA limit points are pilot selectable and are set in the Setup Menu

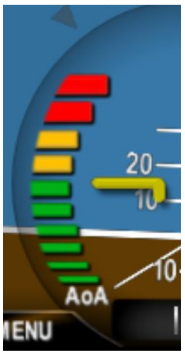


Figure 23 - AI Mode, AoA Indication

AoA is determined by the difference between the aircraft's pitch angle and the path through the air. See §9 - AoA Operation and Configuration for additional details on the AoA operation and setup.

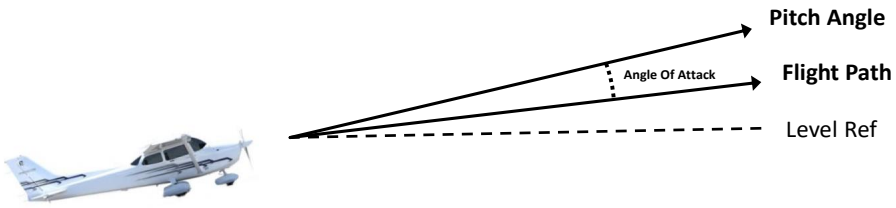


Figure 24 – AoA Computation

5.5.9 Vertical Trend Indicator

Vertical trend can be configured for display in the inner right area of the screen and consists of a white tick mark on a background scale. The upper and lower limits of the scale correspond to ±1000 feet per minute. This

display augments the existing vertical speed in the aircraft but does not replace its functionality.

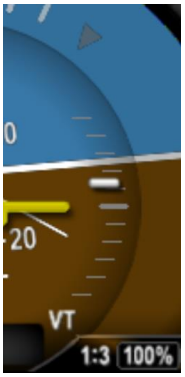


Figure 25 - AI Mode, Vertical Trend Indication

5.5.10 G-Load Indicator

The current G-Load can be configured for display on the inner right or left area of the screen and consists of a ball marker on a background scale. The upper and lower limits of the scale correspond to the upper and lower G limits set in the Setup Menu.

Figure 26 - AI Mode, G-Load Indication

The centermost tick mark represents 1.0 G. Values above the center mark represent positive G, while those below represent less than 1.0 G levels. The scale markers will change on G limits set in the Setup Menu.

Horizontal bars represent the maximum and minimum G-Load experienced. These bars automatically reset on power cycle and can be manually reset in the Setup Menu.

See §7 - Alerts and Alert Limits for additional G limit alerting details.

5.5.11 Course Deviation and Glideslope Indicator

When connected with an AV-HSI, course deviation and glideslope from a GPS or VHF navigation source can be displayed on the AI.
These indicators can be enabled or disabled in the Setup Menu.

Figure 27 - AI Mode, Course Deviation and Glideslope Indication

When enabled the course deviation indicator bar will always be present. The arrow points upward to indicate “TO” and downward to indicate “FROM.” Magenta is used to indicate the data is from a GPS source. Green is used to indicate the data is from a VHF nav source.

Figure 28 - AI Mode, ILS Course Deviation and Glideslope Indication

To declutter the screen, the glideslope indicator will only appear when vertical guidance is being provided by your navigator. Depending on your GPS navigator and approach type, this occurs at varying distances outside the final approach fix. Refer to your GPS navigator's manual for details. For ILS approaches, the glideslope indicator will be present when a valid glideslope signal is received by your navigator.

If the screen location under the glideslope indicator was configured for vertical trend or G-load, those indicators will be suppressed while the glideslope is displayed.

When displaying GPS guidance and the GPS detects a Loss of Integrity, a yellow "GPS LOI" flag will appear above the lateral deviation bar. This indicates that the GPS data is not reliable and other means of navigation should be used.

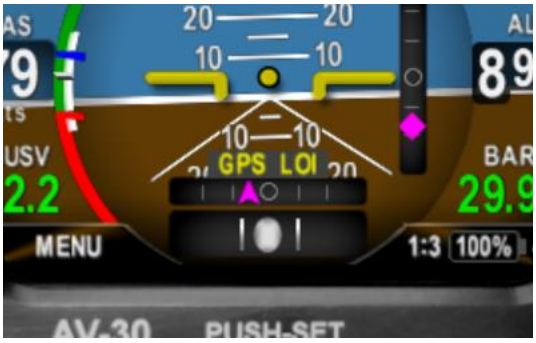


Figure 29 - AI Mode, GPS LOI Indication

When approaching a waypoint, a gray "WPT" indicator will appear. Similarly, when the navigator has a message for the pilot, a gray "MSG" indicator will appear.

Figure 30 - AI Mode, Waypoint Indication

Navigation mode and approach type can be displayed on the AI using the “Nav Mode” overlay. See §5.7 AI / DG Displayable Parameters for details.

5.5.12 Text Fields

The four corners of the display screen can be configured to show various textual parameters. In this example, distance to destination, next waypoint identifier, set altitude, and barometric pressure are displayed.

Figure 31 - AI Mode, Text Fields

If a given parameter value is invalid or currently unavailable, it will be presented as dashes “---". See §5.7 - AI / DG Displayable Parameters for a list of parameters that can be configured for display in these fields.

5.5.13 Accessing Reversionary AI

A reversionary style display of attitude and slip is available from the traffic page. Push and release the right button multiple times to engage this page. Push and release the right button again to disengage. When a transponder is connected, this page allows control and monitoring of the transponder as detailed in §5.11.

The Reversionary AI page cannot be customized by the pilot.

5.6 DG Mode Display Components

5.6.1 DG Mode Customization

The DG customization mode is like the AI customization and the same method is utilized to enter and exit the customization mode.

The uppermost field selects the base direction indication. The options are a compass rose, Horizontal Situation Indicator (HSI), and arc. Prior to software version 2.4.1, the rose display was limited to DG heading and the HSI and arc display were limited to GPS Track. Software Version 2.4.1 enabled the option for each to be driven by DG heading or slaved to the GPS ground track.

DG mode has three customizable pages plus a reversionary AI page for transponder control.

5.6.2 Non-Slaved Heading Mode

Figure 32 – Basic DG Mode User Interface shows the non-slaved DG heading mode (DG HDG). Six textual fields are available for customization.

Figure 32 – Basic DG Mode User Interface

The external magnetometer (AV-Mag) provides a source of high-quality data to aid heading stability. When configured for AV-Mag aiding, long term heading stability will be excellent, but the device is still non-slaved, meaning the user can adjust the DG heading.

5.6.3 GPS-Slaved Heading Rose Mode

Provides the same compass rose presentation as Figure 32 – Basic DG Mode User Interface, but is slaved to GPS Track instead of the DG.

5.6.4 Non-Slaved HSI Mode

When in non-slaved HSI (HDG HSI) mode, the outer compass ring displays DG heading while the center of the page shows GPS navigation data when connected to an external GPS navigator. GPS Navigation data is displayed in magenta.

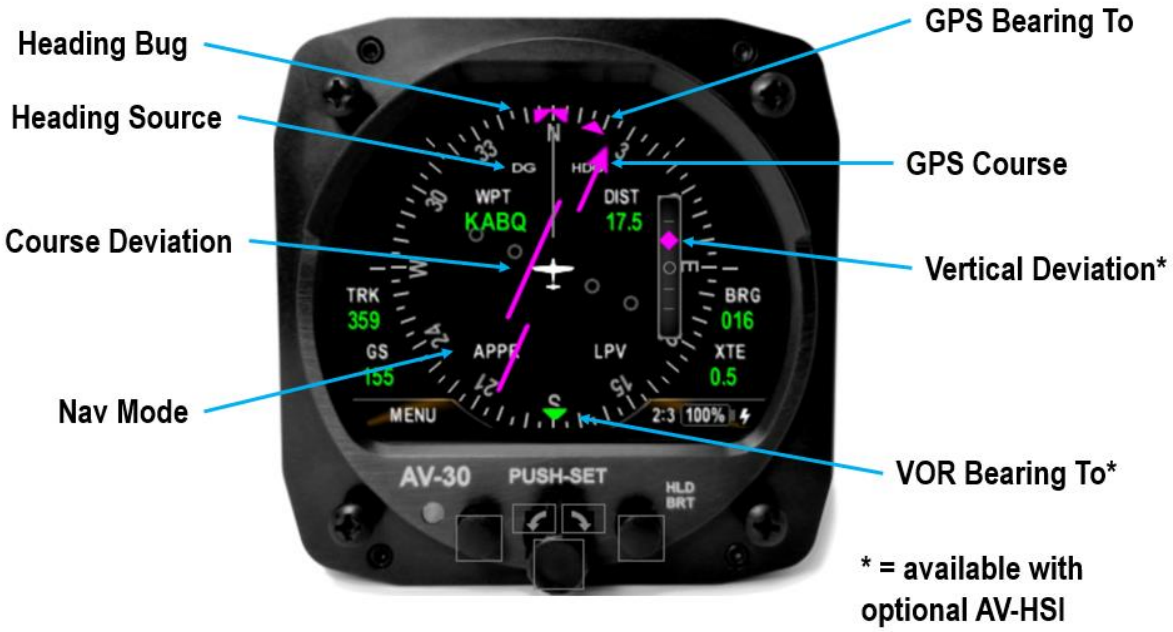


Figure 33 – Non-Slaved DG HSI User Interface

If an AV-MAG is installed and configured, the DG heading is aided by the AV-MAG.

If the AV-30-C is used with an optional AV-HSI and IFR capable navigator, vertical deviation will be displayed when valid vertical navigation signals are available from the navigator. To declutter the screen the vertical deviation bar is hidden when no vertical navigation data is available.

The Nav Mode indicator will display the current navigation mode. When the GPS is connected over RS-232, all navigation is VFR Only. When

connected to an IFR capable navigator through an AV-HSI, IFR capable navigation is displayed. GPS Navigation mode options are as follows:

- VFR (1nm of error per dot of deflection)
- ENROUTE
- OCEANIC
- TERM (Terminal)
- APPR (Approach)

When in enroute, oceanic, and terminal mode, a TO/FROM indicator will be present on the right side of the nav mode indicator. When in approach mode, the approach type will be displayed. Supported GPS approach types are:

- LP
- LNAV/VNAV
- LNAV
- LPV

Review your GPS manual for mode definitions.

When connected with an AV-HSI and a VHF navigator, VHF Nav guidance can be selected in the PUSH-SET menu by setting NAV SRC to VLOC.

Figure 34 – Non-Slaved DG HSI User Interface with VOR Guidance

The Nav Mode indicator will display the current navigation mode. When a VHF navigator is connected to the AV-HSI, supported modes are:

- ILS (Instrument Landing System)
- LOC (Localizer)
- VOR (VHF Omnidirectional Range)

When receiving a VOR signal, TO/FROM is indicated in the right side of the Nav Mode Indicator as well as by the arrow on the course deviation bar. This arrow will be on the “pointer” side of the bar to indicate TO. The arrow will be on the “tail” side of the bar to indicate FROM. When displaying VOR, each dot of deflection equals 5 degrees of course.

No TO/FROM indication is available when tuned to an ILS or Localizer. A glideslope indication is automatically displayed when available on an ILS approach.

5.6.5 GPS HSI Mode

The GPS-slaved HSI (GPS HSI) mode uses the same HSI presentation the non-slaved HSI mode but the compass ring is slaved to GPS Track instead of the DG.

This mode is particularly useful when tracking a course because it does not require the pilot to compensate for wind drift.

Figure 35 – GPS HSI Mode

Figure 35 depicts the GPS HSI mode of an AV-30-C configured with a VFR only GPS. However, IFR capable course deviation is available in non-slaved or GPS-slaved HSI modes when used with an optional AV-HSI.

5.6.6 Non-Slaved ARC Mode

The display type can also be configured to show the current GPS flight plan in a map style presentation. In the non-slaved (DG ARC) mode the outer compass ring displays the DG heading while the center of the page shows the GPS flight plan, if connected to a GPS navigator.

As depicted in Figure 38 – GPS ARC Mode the active leg is highlighted in magenta. Subsequent legs are gray.

Note: Software Version 2.4.1 and newer display a full flight. Software versions 2.3.9 and prior display only the active leg and only allow the GPS-slaved ARC Mode.

The display scale is adjusted by rotating the center knob and represents the display distance from the ownship icon to the outer compass ring. The following scales may be selected for display:

Selectable Display Scales:
1, 2, 5, 10, 20, 50 and 100 nm

NOTICE

All GPS flight plan depiction is for advisory use only. Navigating by the moving map alone is not sufficient for IFR operations

Figure 36 – Arc Mode with Course Deviation and Glideslope

If connected to an AV-HSI and ARINC 429 navigator, IFR lateral and vertical guidance can be overlayed on the ARC display. They are enabled or disabled in the Setup menu. The Course Deviation and Glideslope deviation bars can be used for approach guidance. The moving map itself is for VFR advisory use only.

If connected with an AV-HSI and GPS navigator that supports GAMA flight plan exchange, the ARC display will depict holding patterns and DME arcs.

Figure 37 – Arc Mode with Holding Pattern

5.6.7 GPS ARC Mode

The GPS-slaved ARC (GPS ARC) mode uses the same ARC presentation as described in the prior section, but the compass ring is slaved to GPS Track instead of the DG.

Figure 38 – GPS ARC Mode

5.6.8 Operational Aspects

The following applies to operation in DG mode.

- As with the AI mode, three customizable pages can be setup by the pilot. Each page can be configured to show any of the above three display modes.
- Non-Slaved Heading mode requires the pilot to set the initial heading and correct the heading as required based on the compass. The system will initialize to the last set heading on shutdown except when an AV-Mag external magnetometer is installed. Refer to *AV-30-C Installation Manual UAV-1003947-001* for information regarding the AV-Mag calibration procedure.
- In Non-Slaved Heading Mode, the PUSH-SET menu brings up the DG-ADJ entry on the first push of the center knob. However, if an AV-Mag is installed, HDG BUG will appear first and DG-ADJ will be last.
- A pilot entered DG adjustment value can be cleared by entering the PUSH-SET menu, advancing to DG ADJ, then pushing and holding the center knob for 2 seconds. The heading will snap to the value indicated by the AV-Mag and the user entered adjustment will be set to zero. Note that this only applies when the AV-Mag is installed.
- If magnetometer aiding is configured but calibration is not complete the “MAG CAL” flag is indicated. If the AV-30-C is not receiving the magnetometer sensor data (e.g. connection failure), the “NO MAG” flag is indicated.
- GPS HSI and ARC modes are for VFR operations only. No vertical deviations are shown, and lateral deviations are not scaled for approach / IFR operations.
- Air data / temperature related parameters (TAS, DALT, OAT) are only available if an OAT is present. If multiple AV-30-C are connected to an AV-HSI, only one AV-30-C is required to have an OAT probe.
- The currently displayed GPS track may optionally be gyroscopically stabilized, allowing smoother operation when in turns. This option is configured in the Setup Menu (GPS Track Stabilization).
- When GPS Track is the base direction, GPS error conditions that might occur are as described in Table 1 - GPS Error Messages.

GPS Error Message	Meaning
NO DATA	GPS powered off or connection failure. I.e. no data/messages are being received over the serial port.
NO GPS	No GPS Fix or some other condition is preventing the GPS receiver from providing useful data.
NO COURSE	No waypoint navigation information has been received yet. This message is suppressed when BeaconX is the primary GPS. Displayed on HSI page.
NO BEARING	No waypoint navigation information has been received yet. Displayed on ARC page.

Table 1 - GPS Error Messages

5.6.9 Accessing Reversionary AI

A reversionary style display of attitude and slip is available from the traffic page. Push and release the right button multiple times to engage this page. Push and release the right button again to disengage. When a transponder is connected, this page also allows control and monitoring of the transponder as detailed in §5.11.

The Reversionary AI page cannot be customized by the pilot.

5.7 AI / DG Displayable Parameters

The following table shows which data fields can be displayed when operating in AI and DG modes.

The ‘Graphical’ presentation type indicates that the data is displayed in a graphical format (dial, tape, bug, etc.). The ‘Textual’ presentation type indicates that the data is displayed in text.

Data Type	Presentation	AI Mode	DG Mode	CDI Mode
Blank Overlay Field	N/A	✓	✓	✓
Attitude	Graphical	✓	✓	✓
Non-Slaved Heading	Graphical	✓	✓	×
Non-Slaved Heading	Textual	✓	✓	✓
Bus Voltage	Textual	✓	✓	✓
G Load Value	Textual	✓	✓	✓
G Load Max	Textual	✓	✓	✓
G Load Min	Textual	✓	✓	✓
G Load Indicator	Graphical	✓	×	×
Indicated Airspeed(1)	Textual	✓	×	×
Barometric Corrected Altitude(2)	Textual	✓	✓	✓
Barometer Setting(3)	Textual	✓	✓	✓
Angle of Attack	Graphical	✓	×	×
Vertical Trend Indicator	Graphical	✓	×	×
Vertical Speed	Textual	✓	✓	✓
Set Altitude	Textual	✓	✓	✓
Outside Air Temp(5)	Textual	✓	✓	✓
True Airspeed(5)	Textual	✓	✓	✓
Density Altitude(5)	Textual	✓	✓	✓
Direction Tape	Graphical	✓	×	×
Direction Rose	Graphical	×	✓	×
Direction ARC(6)	Graphical	×	✓	×
Direction HSI(6)	Graphical	×	✓	×
GPS Navigator Data(6)	Textual	✓	✓	✓
GPS HSI Indicator(6)	Graphical	×	✓	×
GPS Navigator Route(6)	Graphical	×	✓	×
Heading Bug	Graphical	✓	✓	×
Carbon Monoxide(7)	Textual	✓	✓	✓
Nav Mode(6)	Textual	✓	✓	✓
AP Mode(8)	Textual	✓	✓	✓
OBS(9)	Textual	✓	✓	✓
SQUAWK(10)	Textual	✓	✓	✓
Climb (ft/nm) (6)	Textual	✓	✓	✓

Table 2 - Data Overlay Types vs Operational Mode

(1) Only available in the middle-left overlay location
(2) Only available in middle-right overlay location

(3) Only available in lower-right overlay location
(4) Only available when OAT sensor is installed
(5) Only available when a GPS navigator is installed
(6) Available when a Sentry ADS-B receiver is connected to an AV-Link
(7) Only available when Autopilot is installed
(8) Only available when AV-HSI is installed
(9) Only available when BEACONX is installed

5.7.1 Bus Voltage Threshold

Bus Voltage (BUSV) is a textual overlay available on AI, DG, and CDI pages. Starting with software version 3.0.0, alerting thresholds can be set in the Setup Menu (See §10) to alert the pilot of an alternator failure or over-voltage condition. When BUS V is outside these thresholds the BUSV color changes to red to alert the pilot of the condition.

Figure 39 – BUSV Threshold Setup

5.7.2 G-Min and G-Max Reset

Starting with software version 3.0.0, the AV-30-C can display the maximum and minimum G-Load as a textual overlay and on the G-Load graphical overlay.

G-Min and G-Max automatically reset on power cycle and can be manually reset in the Setup Menu (See §10).

5.8 MFD Mode

When equipped, the AV-30-C can display real-time traffic data. To access the MFD mode page, ensure that SERIAL 3 is configured for ‘AVLINK’, and then push and hold the center button until the screen changes. If you are on the AI mode screen, you will change to the DG mode screen. If you are

on the DG mode screen, you will change to the MFD mode screen. Push and hold the button one more time to change back to the AI mode screen.

This page will be accessible and display traffic (left example in Figure 40) only when AV-Link is connected to the AV-30-C according to the *AV-30-C Installation Manual UAV-1003947-001*. If configured but not properly connected, the words “NO DATA” will be displayed in the bottom-left corner of the screen (see the right photo in Figure 40).

Figure 40 - AV-30-C Traffic Page

NOTICE

The AV-Link accessory is not powered by the AV-30-C internal battery. Wi-Fi traffic data provided to the MFD mode will be unavailable during a power loss.

Wi-Fi traffic is generated between a portable ADS-B receiver and AV-Link whenever SERIAL 3 is configured for AVLINK. In installations with multiple AV-Links installed on multiple AV-30-C, SERIAL 3 should only be set to AV-Link on the AV-30-C that is intended to be used as a traffic display. This eliminates redundant Wi-Fi traffic and will improve the performance of Wi-Fi devices in the aircraft.

5.8.1 Features

When AV-Link is installed and configured to connect to a Wi-Fi capable ADS-B receiver both airborne and ground traffic display are available.

Only Wi-Fi capable ADS-B receivers are supported. Bluetooth enabled ADS-B receivers are not supported.

ADS-B Wi-Fi receivers that have been confirmed as compatible include:

- Sentry
- Sentry Mini
- skyEcho2
- skySensor
- echoUAT
- Stratus 3 (in Open GDL Mode only)
- Dynon Avionics DRX
- Levil Aviation iLevil 3 AW
- BOM, iLevil 3 SW, and Astro Link
- SkyGuardTWX
- Stratux
- Falken Avionics FlightBox

This is not an exhaustive list.

Some of these receivers will require setting the AV-Link to a custom port value if the ADS-B receiver transmits GDL90 information on a port other than 4000 (default).

More receivers may be compatible using the AV-Link ADS-B Wi-Fi settings custom port setting. See §11.5.1 - ADS-B Receiver Settings to configure the AV-Link custom port setting.

These traffic sources are not certified. Therefore, traffic displayed on the AV-30-C is for advisory use only. Use of the AV-30-C traffic display does not replace the pilot’s responsibility to see and avoid other traffic.

5.8.2 Firmware Update

After the AV-Link and AV-30-C have been installed, a firmware update may be required to enable the AV-Link features of the AV-30-C. See *AV-30-C Installation Manual UAV1003947-001* for instructions on installing firmware. A minimum software version of 2.5.0 is required to support MFD Mode.

After the update, the AV-30-C MFD screen will display the words “NO DATA” until an attached AV-Link is installed, powered, and connected to your ADS-B receiver.

See §11.5.1 - ADS-B Receiver Settings for guidance for updating AV-Link and connecting to traffic sources.

5.8.3 Display Functions

The MFD requires ownship GPS information to display the relative positions of nearby traffic. This GPS information can come from the connected ADS-B receiver, the AV-30-C’s connected GPS navigator, or traffic targets with an ICAO address matching the configured ownship ICAO (see §5.8.9.1).

In addition to displaying “NO DATA” when the AV-Link is not properly connected, the bottom left corner of the screen may show one of the following messages to describe the status of the MFD’s position source, listed in order of descending severity and display priority:

- NO DATA – AV-Link is not connected or is not functioning.
- NO GPS SRC – None of the possible GPS sources are connected or sending position information.
- NO GPS FIX – None of the possible GPS sources have a valid GPS fix.
- NO ALTITUDE – Both barometric and GPS altitude are unavailable. Target relative altitude is unavailable.
- NO GPS HDG – Neither track nor heading are available. The display will default to a north-up orientation.

When “NO GPS SRC” or “NO GPS FIX” are displayed, a traffic count shall be displayed in the bottom right corner of the screen to warn about nearby traffic targets even when they cannot be displayed on screen.

Traffic displays, both airborne and ground, are available. Traffic is represented by a chevron icon, pointing in the direction of travel. Traffic on the ground is colored brown and traffic in the air is colored cyan.

Traffic that has no heading is classified as an airborne obstacle and is represented by a cyan diamond icon.

In normal monitor mode, the screen will display active traffic and has a zoom function to permit the pilot to view traffic from 1 nautical mile (nm) to 40 nautical mile range. Due to the placement of the ownship icon, more distance is displayed forward of ownship than behind.

Concentric rings display hints on distance. There are three in total. Depending on the range selected, these represent the 1/3, 2/3 and full display distance. Each are marked with the current range distance. For example, at 1 nautical mile range setting, the rings are set at 0.33 nm, 0.66 nm, and nm.

Figure 41 - Traffic Display

5.8.4 Display Zoom

Target details will vary based on the current zoom level. This is to reduce visual clutter. As zoom is set to closer distances, extra target information

will be placed next to the target icon. These include relative altitude to ownship and the speed vector extending from the front of the target.

Figure 42 - Traffic Display Zoom

Selectable Display Scales:
1, 2, 5, 10, 15, 20, 30 and 40 NM

5.8.5 Target Relative Altitude

Relative altitude is determined using real-time altitude information from ownship as well as each individual target. It is possible to have two types of altitude information: traffic pressure altitude and geometric altitude.

In compliance with DO-317C §2.3.5.15.1, the traffic relative altitude is calculated by either (1) using the pressure altitude of both aircraft or (2) if valid pressure altitude is unavailable, by using the geometric altitude of both aircraft. The relative altitude shown for traffic is positive when the target is higher than ownship and negative when the target is lower than ownship. If the same altitude type is not available for both ownship and the target, then no relative altitude is displayed for that target.

Note: AV-30-C must be connected to aircraft pitot and static pneumatic connections for correct relative altitudes to be displayed.

Figure 43 - Traffic Target Relative Altitude

Some uncertified advisory display systems will use a combination of pressure altitude and geometric altitude for the calculation of the target relative altitude. This is not in compliance with DO-317C §2.3.5.15.1 and therefore may result in a difference between the relative altitude displayed on the AV-30-C and the other system.

Relative altitude is displayed in units of hundreds of feet. For example, a display of +335 indicates that the target is 33,500 feet above ownship. The "+" indicates the target is above ownship and the label is placed *above* the target icon. If the target is below ownship, then a "-" value is used, and the label is placed *below* the target icon.

5.8.6 Target Airspeed

Target airspeed is indicated by a vector line extending from the front of the target. A longer vector indicates that the target airspeed is faster than a different target with a shorter vector. This vector is visible only when the zoom range is 20 nautical miles or closer.

Tracking the target will provide detailed information about the target, including the current airspeed.

5.8.7 Target Tracking Function

Momentarily pushing and releasing the center button activates target tracking function. Use the rotary knob to select the target to track.

Information details about the target will appear at the top of the display. This information includes callsign or flight plan identifier, information source, type of aircraft, distance, altitude, and airspeed. If an information item is unavailable, then dashes “---” will appear for the item.

Figure 44 - Traffic Target Tracking Function

The screen will stay in tracking mode until disengaged with a push and release of the center button. During tracking, the zoom function is disabled.

5.8.8 Accessing Reversionary AI

A reversionary style display of attitude and slip is available from the traffic page. Push and release the right button once to engage this screen. Push and release the right button again to disengage.

Figure 45 - Traffic Reversionary AI Activation

The Reversionary AI page cannot be customized by the pilot.

5.8.9 Traffic Mode Configuration

The traffic mode has settings that can be configured for ownship identity, to prevent the ownship from being displayed as “ghost” aircraft, and traffic filtering for reducing the content displayed on the screen.

5.8.9.1 Ownship ICAO

If your aircraft is not equipped with an ADS-B Out system, Air Traffic Control (ATC) can rebroadcast your Mode C target to nearby aircraft using Traffic Information Service – Broadcast (TIS-B). TIS-B is a service that relays information derived from basic transponder equipped aircraft observed by Secondary Surveillance Radar (SSR) to ADS-B In equipped aircraft.

If you receive that transmission, it can cause your own aircraft to be displayed as a nearby target, usually slightly behind you and ± 100 to 200 feet in altitude, from the slight delay in the transmission reaching you due to the secondary surveillance radar processing and rebroadcasting delay.

Every ADS-B In system occasionally displays a ghost, even for those aircraft equipped with ADS-B Out. Entering your ownship ICAO can remove that identified ghost from the traffic screen.

Ownship ICAO can be entered manually using the OWNSHIP ICAO menu entry. Once entered, the value is saved but can be changed at any time.

If a uAvionix transponder is installed and transponder control is enabled, ownship is automatically detected and entered for you on this screen. Manual override of this value is not permitted when transponder control is enabled.

Finally, because the MFD screen requires a GPS source to draw the relative positions of nearby traffic, entering your ownship ICAO can allow the MFD screen to continue functioning even in the event of a GPS signal loss by your onboard GPS and ADS-B In systems. When configured with your ownship ICAO and the AV-30-C receives traffic data for your aircraft via ADS-B, ADS-R, or other sources, the MFD screen will use those traffic reports as a fallback GPS data source.

5.8.9.2 Traffic Filtering

Traffic can be filtered by ownship relative altitude to reduce the information displayed on the screen. Ownship altitude is collected from one of multiple sources: ownship reports, GPS altitude, ownship barometric altitude.

Traffic filter selection options are Normal, Above, Below, Only Own and None. Full descriptions of each of these are found in Table 3 – Traffic Filter Options

Figure 46 - Examples of Alternate Filter Values

Setting	Options	Description
Filter	Normal	Filter ownship, traffic above and below 2700 feet relative to ownship
	Above	Filter ownship, traffic above 8700 feet and below 2700 feet relative to ownship
	Below	Filter ownship, traffic above 2700 feet and below 8700 feet relative to ownship

	Only Own	Filter only ownship
	None	Displays all traffic
Ownship ICAO	Dependent on registration number	Press and release, then rotate center knob to select each number or letter associated with aircraft ICAO. This will allow for ownship filtering.

Table 3 – Traffic Filter Options

5.8.9.3 Vertical Speed Overlay

Some pilots may wish to have a dedicated traffic display but do not have an extra instrument hole available. A vertical speed indicator overlay is available on the MFD page to allow an AV-30-C to replace a vertical speed indicator. This indicator will graphically display to +- 1,000 ft/minute. The numeric indicator will display up to 9,999 ft/minute.

Figure 47 – MFD with VSI Overlay

5.9 CDI Mode

When equipped with an AV-HSI, the AV-30-C can display a traditional Course Deviation Indicator. This mode is accessible when the AV-30-C when the function lock on the AV-30-C is not set. To cycle through modes to the CDI mode, press and hold the center button.

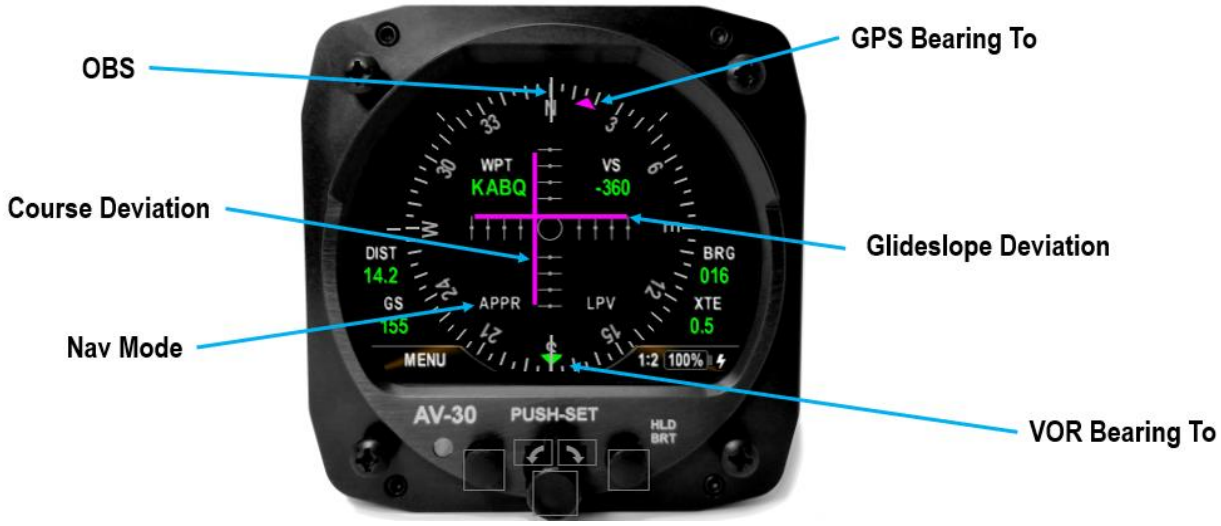


Figure 48 – CDI Mode with GPS Guidance

The CDI mode can display lateral and vertical guidance for GPS or VHF navigators. Changing navigation source and OBS is done in the PUSH-SET menu.

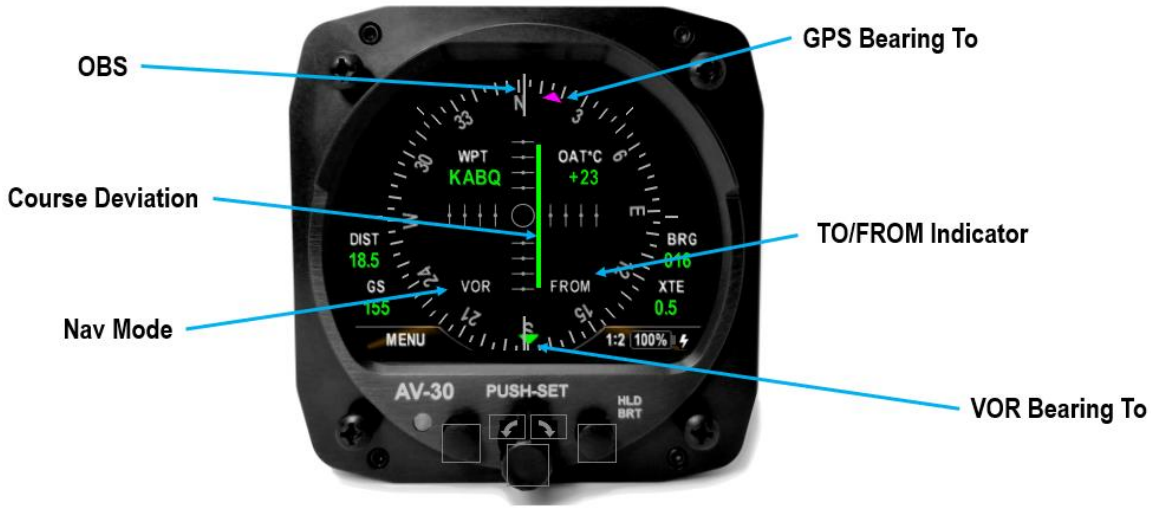


Figure 49 – CDI Mode with VOR Guidance

Like the DG HSI mode, a gray “MSG” and “WPT” indicator will appear when the GPS has a message for the pilot and when approaching a waypoint, respectively.

There are six configurable overlay positions available on the CDI. The CDI includes two independent pages and a reversionary AI.

5.10 Reversionary AI

Figure 50 - Reversionary Attitude Indicator

The fourth page of the AI and DG operating modes presents a reversionary style display of attitude and slip. When a transponder is interfaced, this page also allows control and monitoring of the transponder. This mode page cannot be customized by the pilot, but the transponder control can. See 5.11 for details on transponder control.

5.11 Transponder Control

When installed and configured, the AV-30-C can be used to control select uAvionix transponders (including the BeaconX family). The full set of transponder controls are available on the Reversionary AI page in each mode. Squawk can also be displayed and set on other pages.

5.11.1 Reversionary AI Transponder Control

The reversionary AI page is accessed by pressing and releasing the right button repeatedly until AI appears in lower right corner of the display.

5.11.1.1 Status

The transponder control user interface, as presented on the reversionary AI page, is shown below.

A	Configured Callsign / Flight ID
B	Current Squawk Code
C	Mode Selection (STBY, ON, ALT)
D	GPS NIC (integrity metric)
E	GPS NACp (accuracy metric)
F	Pressure Altitude - Green indicates radar interrogation and will change to IDT if IDENT is active
G	Transponder status

Figure 51 - Transponder Control

The current transponder status is indicated by the STAT field. The following status annunciations may be displayed.

Status	Description
OK	Status good, no fault
NOPOS	No GNSS position information, ensure clear sky view
FAIL	Transponder device failure (broadcast monitor or transmission system)
TMOUT	Timeout, unable to communicate with transponder
MAINT	Maintenance required, ensure proper configuration (e.g. ICAO address)
WAIT	Retrieving configuration from transponder
FAULT	Unknown or generic fault
XPRST	Transponder reset. Maintenance required, ensure proper power connections to tailBeaconX.

Table 4 - Transponder Status

5.11.1.2 Changing Squawk

1. Press and release the center knob to bring up the squawk edit menu. The first digit of the squawk will be highlighted.
2. Rotate the center knob to change the highlighted squawk digit.

3. Press and release the center knob to move the highlight to the next squawk digit.
4. Repeat steps 2 and 3 until the desired squawk code has been set. The squawk edit menu will close after pressing and releasing the center knob while the last digit is highlighted or by pressing the left “Done” button.

Press and release the right button to quickly set the Squawk to 1200 (or an alternative VFR value if one is programmed into the BeaconX).

5.11.1.3 Changing Flight ID

1. Press and release the center knob to open the squawk edit menu.
2. Push and hold the center button until FLIGHT ID appears. The first character of the flight ID will be highlighted.
3. Rotate center knob to change the highlighted character.
4. When desired character appears, push the center knob to accept it and highlight the next character.
5. Repeat steps 3 and 4 until the desired flight ID is set.
6. Push and release the right button (CLEAR) at any time to clear the Flight ID completely.
7. Press and release the left button (DONE) to close the flight ID edit menu and save the setting.

No spaces are permitted in the FLIGHT ID. The highlighted character must not be blank to advance to the next character.

5.11.1.4 Changing Transponder Mode

1. Press and release the center knob to open the squawk edit menu

2. Press and hold the right button to cycle between ‘VFR’ and ‘MODE’

3. With ’MODE’ highlighted, a single press and release of the right button will cycle through each mode selection (STBY, ON, ALT)
4. Press and release the center knob repeatedly until the squawk edit menu closes or press the left ‘Done’ button to close

5.11.1.5 To Send IDENT

- Press and release the left button

5.11.1.6 Quick Squawk VFR

BeaconX transponders store a VFR squawk code internally. By default, this is set to 1200 for U.S. operations but may be set to another value via a separate transponder configuration application.

During operation, the quick way to change the squawk code to VFR is:

- Press and release the center knob to open the squawk edit menu
- Press and release the right button to quick squawk VFR

5.11.2 Squawk Overlay

The current squawk code can be displayed on screen for AI, DG, and CDI modes. See AI Mode Customization 5.4.1 for guidance on configuring overlay fields.

To change squawk on non-Reversionary AI pages, open the PUSH-SET menu and cycle through to SQUAWK. To send IDENT, push and release the right button while in the squawk edit menu. Pressing and holding the center knob will set squawk to the VFR value.

Figure 52 - Squawk Overlay Push-Set Menu

5.12 Brightness Menu

The brightness menu is activated by pressing and holding the lower right button until the brightness option appears.

Figure 53 - Brightness Menu

The MODE button toggles between AUTO BRT (automatic brightness mode), and MANUAL BRT (manual brightness mode).

When in manual brightness mode, utilizing the center knob, the display brightness setting can be adjusted from 1 to 100. When in automatic brightness mode, brightness is set automatically based on the bezel-mounted photocell.

Pressing the DONE button will exit the menu. Note that the setting goes back to AUTO BRT when power cycled.

6 User Interface and Font Style Options

Three different cosmetic styles and two different fonts are selectable by the pilot. The three UI styles are LEGACY, EFIS and VINTAGE. The two font selections are ARIAL and LCD.

Figure 54 - UI Style Options

These settings only effect the displayed colors and font style – all functional operations are identical regardless of style settings.

7 Alerts and Alert Limits

The AV-30-C supports flight envelope, altitude, and carbon monoxide alerts when configured accordingly.

7.1 Flight Envelope Alerts

Flight envelope alerts provide both visual and aural alerts on the AI mode only.

- Excessive Bank Angle Alerts.
- Excessive G-Load Limit Alerts.
- Excessive Angle of Attack (AoA) Limit Alerts.

Figure 55 shows an example how the visual alerts are displayed.

Figure 55 – Example of Alert Annunciator on Screen

The priority and warning / alert levels, from the lowest priority to the highest priority are found in Table 5.

Type	Priority	Percent	Aural	Visual
Roll	7	100%	“Roll”	ROLL
AoA	6	80%	One Tone	ANGLE

AoA	5	90%	Two Tones	
AoA	4	100%	“Check Angle”	
G Limit	3	80%	One Tone	
G Limit	2	90%	Two Tones	
G Limit	1	100%	“G Limit”	

Table 5 - Alert Types and Priorities

The thresholds for each alert are pilot adjustable, and each alert type can be independently enabled or disabled.

Pressing the center knob when an alert is active will clear alert.

7.2 Altitude Alert

The Set Altitude alert is a visual alert only. It is signaled by the Set Altitude text display changing from white to green. Green indicates that the barometric corrected altitude is within ±100’ of the Set Altitude.

7.3 Carbon Monoxide Alert

When configured with an AV-Link and a Sentry ADS-B receiver, the AV-30-C will display Carbon Monoxide status and alerts.

Carbon Monoxide (CO) Status is an overlay that is pilot selectable. It will display “OK” for CO levels below 75ppm. At CO Levels between greater than or equal to 75ppm the numerical level will be displayed in yellow. At CO levels greater or equal to 200ppm the numerical level will be displayed in red and a red alert will appear. This alert may be dismissed by pressing the rotary knob.

The CO alert will trigger even if CO is not currently displayed as an overlay. The CO alert is not user configurable.

7.4 Attitude Miscompare Alert

When multiple AV-30-C are connected to an AV-HSI, the AV-HSI continuously compares the attitude solution on each AV-30-C and will alert the pilot if the attitude solutions disagree by more than 8 degrees of pitch or 8 degrees of roll.

This case will be annunciated on the AI with an alert “CHK ATTITUDE” and an audible double beep.

This alert informs the pilot that the attitude solution may not be correct and that they should maintain a diligent cross-scan and use partial-panel techniques or visual reference to conclude the flight.

Nuisance alerts may require gyro calibration and pitot zeroization. See the *AV-30-C Installation Manual UAV-1003947-001* for details. This alert may be disabled in the Installation Menu under the State Sync submenu.

8 Internal Battery Operation

8.1 General

The internal battery consists of a rechargeable battery system with automatic recharge, self-test, and power switching capability. The internal battery capacity will provide approximately 2 hours of operation at standard temperatures and 30 minutes (minimum) of operational capacity over the operational temperature range.

8.2 Battery Transition Logic

The battery is tested, enabled, and disabled based on airspeed and aircraft bus voltage.

8.2.1 Power-On Self-Test (Pre-Flight)

On powerup, the battery charge status will show “TEST” in amber. During this process, an internal load is applied to the battery to determine general capacity capability. If the battery fails this self-test, the charge status field will show “FAIL” in red, and no battery capability will be available.

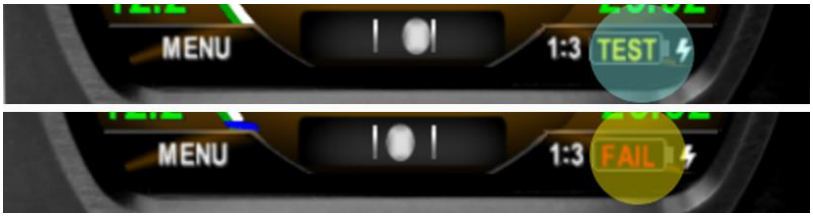


Figure 56- Battery Test Indicators

NOTICE

If the battery status shows “FAIL”, departure into actual or planned IFR conditions must not be performed.

8.2.2 Power Loss, Airspeed Above 40 Knots (In-Flight)

When in flight and the bus voltage drops below 7 VDC, the unit will automatically transition to internal battery operation; no pilot action is required for continued operation.

The “ON BATTERY” annunciation will be displayed:

Figure 57 - On Battery Operation

If bus voltage returns, the unit will automatically transition back to aircraft bus power; no pilot action is required. The “ON BATTERY” annunciation will extinguish.

8.2.3 Power Loss, Airspeed Below 40 Knots (On-Ground)

When on ground and the bus voltage drops below 7 VDC, the unit will initiate a shut-down sequence. This is the normal “on-ground” shutdown method. Pilot may discontinue the shutdown with any knob or button push.

If bus voltage returns, the shutdown sequence will automatically discontinue, and the unit will return to normal operating mode.

If bus voltage is not returned and the unit remains on, it can be shut down by pressing and holding the left and right buttons until screen goes black.

8.3 Battery Charge Status

The battery charge state is shown in percentages from 0 to 100. An internal battery charger will re-charge the battery if bus voltage is above approximately 10 VDC. The battery charge icon (presented adjacent to the battery charge state), will be illuminated during the charge cycle as shown in Figure 58 - Battery Charge Status.

Figure 58 - Battery Charge Status

It is normal for the battery charge icon to intermittently flash during the battery charge cycle.

9 AoA Operation and Configuration

The following provides a description of how the derived Angle of Attack (AoA) operates and presents the corresponding AoA information to the pilot.

One of the main advantages of an AoA system is that it can provide an early indication of a stall, bringing enhanced awareness to the pilot.

NOTICE

The AV-30-C system is supplemental in nature and does not replace the functionality provided by the aircraft's existing stall warning system.

9.1 Operational Methodology

Angle of attack is determined by comparing aircraft pitch to the aircraft flight path angle through the air. In level flight this directly corresponds to the angle at which the wing is intercepting the body of air surrounding the aircraft, with correlates to the current AoA.

Pitch is determined by the precision internal AHRS and flight path angle is determined by air-data based airspeed versus vertical speed measurements.

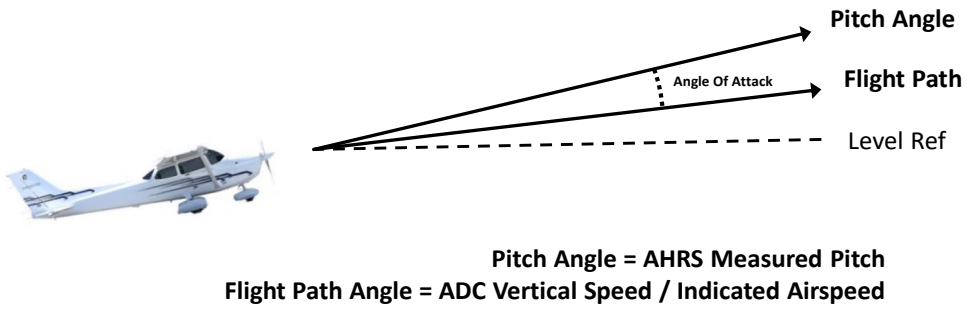


Figure 59 – AoA Computation

As an example of this relationship, during a climb, if the pitch angle is 10 degrees upward, and the aircraft's flight path through the air (forward airspeed and vertical speed) is also 10 degrees upward, the equivalent AoA is 0 degrees. If, however, the pitch angle is 10 degrees upward, and the aircrafts flight path through the air is only 5 degrees, this corresponds to a positive 5-degree AoA.

A second example is where the pitch is 0 degrees, but the aircraft is descending. The AoA is then equivalent to the descent angle, which will be a negative AoA.

9.2 Configured Limits

As each aircraft make and model has different flight characteristics and post-production modifications such as altered wing tips, performance kits and other related modifications may change the flight dynamics of the aircraft, each aircraft has unique configuration limits that must be set for proper AoA operation.

An upper and lower configuration limit is pilot adjustable and provides the scaling mechanism for individual aircraft flight characteristics as it relates to the corresponding AoA display.

NOTICE

The settling of these configuration limits is implemented with a pilot-lockout feature that prevents inadvertent modification.

The upper near-stall configuration limit is set when the aircraft is in the "base-to-final" configuration with flaps and gear set to their normal positions for this maneuver. This provides the best protection when the aircraft is low-and-slow, and the pilot may inadvertently stall based on over-corrections.

- The upper limit is configured to coincide with the aircraft's existing stall warning system and is typically on the order of 10 to 15 degrees. This visually correlates to the first red bar on the AoA display with the

second (upper most) red bar providing indication for operation between the aircrafts stall warning and actual stall point.

- A lower limit is configured to coincide with the AoA at which the aircraft flies under normal cruise conditions. This is typically on the order of 3 to 4 degrees. This visually correlates to the lowest one or two green bars on the AoA display.

The figure below shows how the configured upper and lower limits are mapped onto the color coded AoA indication.

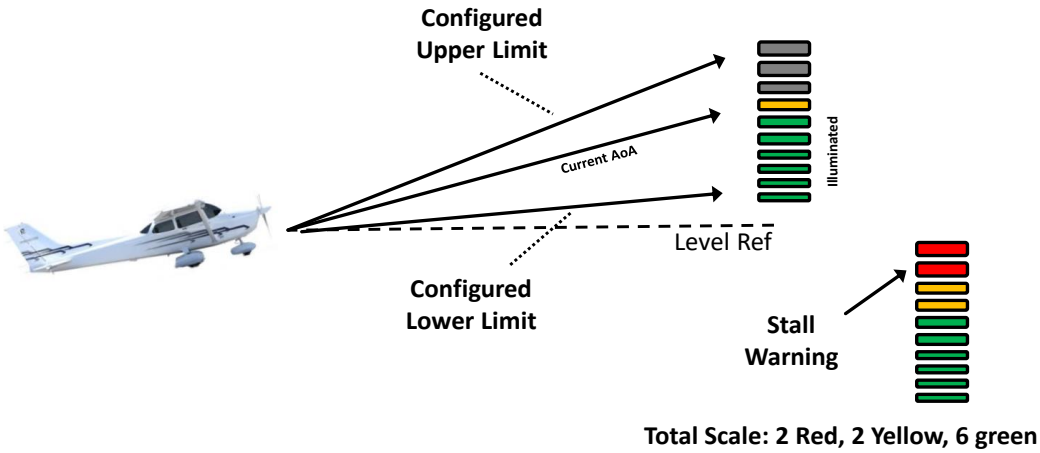


Figure 60 – AoA Upper and Lower Limits

9.3 Stable Flight Conditions

Stable flight conditions should be present when determining the upper and lower AoA limits. The in-flight procedures described should be executed when there is minimal turbulence, minimal crosswinds, and the pilot should operate the aircraft as closely as possible to the following:

Stable power setting

± 5° Heading

± 5 Knots Airspeed

± 50 Feet Altitude

± 50 Ft/Min Vertical Speed

Any offsets beyond the parameters above may directly correlate with AoA errors.

9.4 Setting AoA Upper Limit

The objective is to set the upper AoA limit such that the first red bar illuminates at roughly the same time as the on-set of the aircraft's stall warning system.

To find the upper limit, the following procedure is recommended:

- Ensure the AV-30-C is in INSTALLATION MODE (see §10.1).
- Select a safe altitude suitable for stalls, minimum 1,500 feet AGL.
- Aircraft Configuration:
  - Airspeed V_{FE} or less
  - Flaps 20°
  - Power as required
  - Stable flight conditions
- Slowly reduce speed at a rate of 1 knot per second and maintain a constant altitude.
- Monitor the displayed AoA as the aircrafts angle of attack increases.
- If the aircrafts stall-warning occurs prior to the indicator reaching the first red bar, the upper AoA limit needs to be numerically lowered to coincide with the aircrafts stall-warning point.
- If the aircrafts stall-warning occurs after the indicator has reached the first red bar, the upper AoA limit needs to be numerically raised to coincide with the aircrafts stall-warning point.
- Utilize the Setup Menu section and associated procedure in this manual to adjust the upper limit as required.
- Repeat the above procedure as needed and to ensure consistency.

9.5 Setting AoA Lower Limit

The objective is to set the lower AoA limit such that the first green bar illuminates at roughly V_A (Gross weight adjusted maneuvering speed).

To find the lower limit, the following procedure is recommended:

- Ensure the AV-30-C is in INSTALLATION MODE (see §10.1).
- Select a safe altitude suitable for stalls, minimum 1,500 feet AGL.
- Aircraft Configuration:
    - Airspeed V_A
    - Flaps 0°
    - Power as required
    - Stable flight conditions
- Monitor the displayed AoA.
- If no green bars are showing, the lower AoA limit needs to be numerically increased. If more than one green bar is showing, the AoA lower limit needs to be numerically decreased. A fluctuating green bar indicates that the lower AoA limit is acceptable.
- Utilize the Setup Menu section and associated procedure in this manual to adjust the upper limit as required.
- Repeat the above procedure as needed to ensure consistency.

9.6 AoA Alert Types and Thresholds

Angle of attack alerts consist of both aural and visual alerts. Three alert levels are provided and are triggered on how close the current AoA is to the configured upper limit (as a percentage).

Level	Percent	Aural	Visual
Alert 1	80%	One Tone	
Alert 2	90%	Double Tone	
Alert 3	100%	“Check Angle”	

Table 6 - AoA Alert Limits

When an alert is being generated, pressing any button will mute the alert. AoA alerts can also be completely disabled under the pilot preference settings.

9.7 Flap Setting Observations

When the upper AoA limit is configured for the “base-to-final” flap setting, and the lower AoA limit is configured for the normal “cruise” flap configuration, the indicated AoA will vary from this baseline when flaps are configured for other phases of flight. The pilot should document the actual indications provided for the various phases of flight.

In Table 7 - AoA Observations, please highlight the actual AoA presentation for the indicated phase of flight.

Flap Setting	Flaps Up	Flaps Down
Pre-Stall		
Climb Vx		
Climb Vy		
Cruise		
Best Glide Speed		
Approach		
1.3 Vs		
1.2 Vs		
1.1 Vs		

Table 7 - AoA Observations

10 Setup Menu

The setup menu allows customization of settings that are pilot-accessible. Installer-only related settings are found in *AV-30-C Installation Manual UAV-1003947-001*. Installation settings must be adjusted on the ground.

To access the Setup Menu, push the Menu (left) button twice until the SETUP is shown in the lower window. Rotating the knob left and right will access the various parameters that may be configured.

Figure 61 – Setup Menu Access

Figure 62 - AOA Alert Setting

Press and release the knob when the desired field is shown to adjust the associated setting. After adjustment, pressing and releasing the knob again will exit editing mode. Pressing DONE or a lack of user input for 30 seconds will exit the setup menu and return to the primary screen.

10.1 Pilot-Accessible Setup Menu

The Setup Menu is available on ground or in flight. Table 8 - Setup Menu Settings contains the options available in the Setup Menu.

Setting	Description	Options / Setting Range
UI STYLE.	Sets Visual Style.	LEGACY, EFIS, VINTAGE.
UI FONT.	Sets Font Style.	ARIAL, LCD.
G RESET	Rests the G Load Min and Max hold	PUSH TO RST
COURSE DEV	Enables course deviation on AI and DG ARC modes	DISABLED, ENABLED
GLIDESLOPE	Enables glideslope (when valid signals are received) on AI and DG ARC modes	DISABLED, ENABLED
AUDIO VOL.	Audio Volume for Alerts.	0 to 10.
AOA ALERT.	Enable AoA Alerts.	DISABLED, ENABLED.
AOA HIGH LIM*.	Upper AoA Limit.	-28 to 30.
AOA LOW LIM*.	Lower AoA Limit.	-30 to 28.
G ALERT.	Enable G Load Alert.	DISABLED, ENABLED.
G POS LIM.	Positive G Limit.	2 to 8.
G NEG LIM.	Negative G Limit.	-1 to -8.
ROLL ALERT.	Enable Roll Alert.	DISABLED, ENABLED.
ROLL LIM.	Roll Alert Threshold.	30 to 80.
TURN COORD	Sets the depiction used for turn coordinator – rate of turn or standard rate bank angle	TURN RATE, BANK ANGLE
MIN VOLT	Minimum voltage threshold. Below this number the BUSV indicator will turn red, indicating a charging system problem	10.0 to 32.0
MAX VOLT	Maximum voltage threshold. Above this number the BUSV indicator will turn red, indicating a charging system problem	10.0 to 32.0
TRAK STAB.	Inertial Track Smoothing.	DISABLED, ENABLED.
HOURS.	Lifetime hours of operation.	For reference.

Table 8 - Setup Menu Settings

NOTICE

(*)AoA limits cannot be changed unless installation mode is enabled. The high and low limit ranges are interdependent.

AoA limits are locked out during normal operation to prevent inadvertent modification.

To access these settings, activate the INSTALLATION MODE by pressing the center knob while initial power is being applied to the unit. See *AV-30-C Installation Manual UAV-1003947-001* for details. These settings are then available to be modified until the unit's power is cycled.

Also note that in installation mode, an additional Install Menu is available. The pilot should not make any changes to settings in the Install Menu.

10.2 Non-Pilot Accessible Install Menu

The AV-30-C also includes an Install menu that is used for configuration. This menu should not be used in flight and should only be used by authorized individuals. Additional information about the Install menu can be found in *AV-30-C Installation Manual UAV-1003947-001*.

11 AV-Link

11.1 Overview

The AV-Link is an integrated Wi-Fi bridge that allows for communication between AV-30-C and Wi-Fi enabled devices.

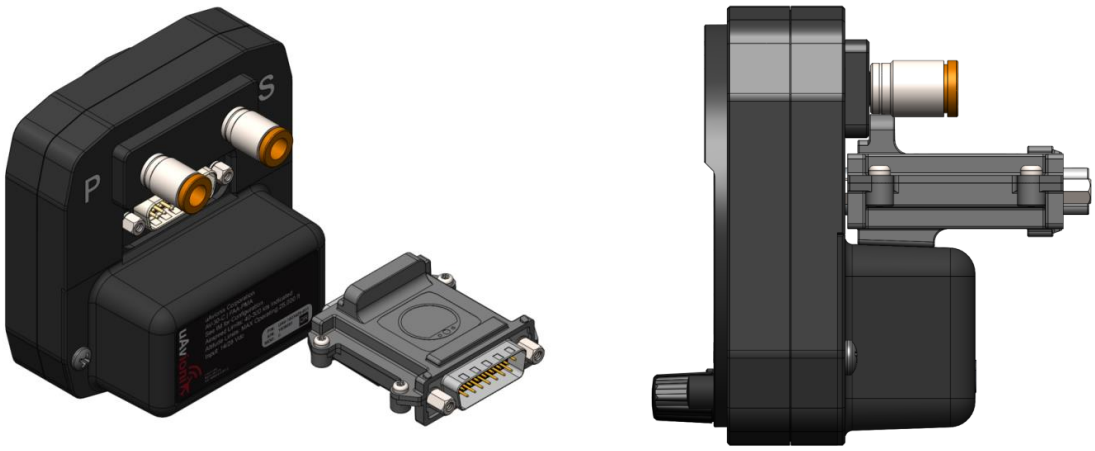


Figure 63 - AV-Link Attached to AV-30-C

The AV-Link allows for the integration of portable ADS-B devices such as Sentry and Sentry Mini to provide ADS-B traffic and GPS to an AV-30-C. Software updates for the AV-Link and AV-30-C can be performed via the embedded web page. AV-Link configuration settings and device status are also accessible through the embedded web page.

When connected to a Sentry with a Carbon Monoxide (CO) sensor, the AV-Link will display CO status and alerts on the AV-30-C.

NOTICE

The AV-Link accessory is not powered by the AV-30-C internal battery. Wi-Fi traffic data provided to the MFD mode will be unavailable during a power loss.

If multiple AV-Link modules are installed in the aircraft, no more than two may be enabled.

11.2 Additional Required Equipment

AV-Link is designed to interface with an existing Wi-Fi capable ADS-B receiver and the AV-30-C display. To fully take advantage of the AV-Link, the following equipment is required:

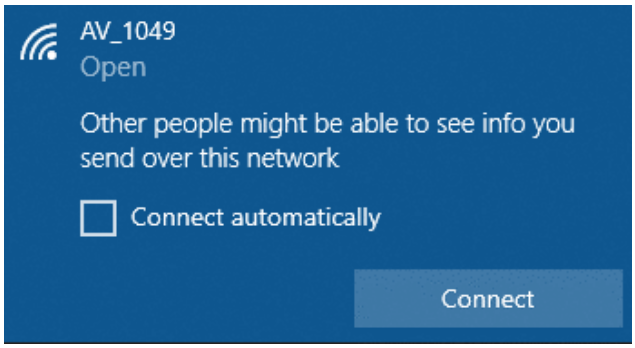
- AV-30-C Display
- ADS-B Receiver with GPS and Wireless capability

11.3 Connecting

Support for Windows, MacOS, iOS and other devices are supported, using the built-in web browser support on your computer. To connect to the AV-Link, configure your computer to connect to the AV-Link Wi-Fi connection.

1) Power the AV-Link by attaching the AV-Link to AV-30-C to provide power. See *AV-30-C Installation Manual UAV1003947-001* for details.

2) Once the AV-Link is powered, on your computer, connect to the AV-Link Wi-Fi hotspot, which will have a “AV_XXXX” SSID, where XXXX is a combination of alpha-numeric characters.

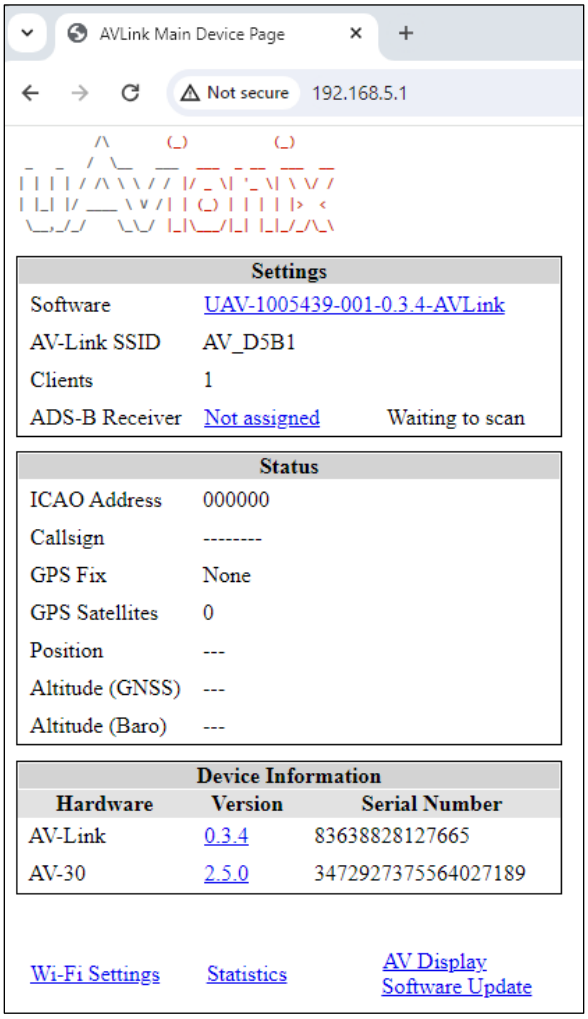


   a. *If the AV-Link Wi-Fi network does not appear in your connection list, power cycle the AV-Link and check again. As of AV-Link version 0.3.2, the AV-Link Wi-Fi access point will turn off automatically after 5 minutes if no clients connect to it and there is no connected AV-30-C configured to interface with it. Power-cycling the AV-Link refreshes this timeout.*

3) Once connected, use your web browser to navigate to 192.168.5.1. From there, you will see the AV-Link main web page.

11.4 Home Page

Note: Accessing the AV-Link web pages while in flight is not recommended and may disrupt normal operations of the AV-Link. All settings changes should be performed while on the ground.



The AV-Link main web home page provides both status information and methods to control settings. The screen is separated into three sections, the *Settings*, *Status*, and connected *Device Information*.

11.4.1 Settings

The settings panel contains information about the AV-Link. The software version, AV-Link SSID, number of clients connected to the AV-Link and information about any ADS-B receiver connected via Wi-Fi.

11.4.2 Status

When connected to an ADS-B receiver, information received such as the ownship ICAO address, callsign, GPS location information as well as the current altitude is frequently updated.

11.4.3 Device Information

Connected devices, such as the uAvionix AV-30-C display or the Sentry ADS-B receiver, will be shown with the device serial number and version, if available. When the device is disconnected, it is removed from this list.

11.4.4 Navigating to Other Pages

Navigating to other AV-Link web pages is done using the web links at the bottom of the page.

Wi-Fi Settings Statistics AV Display Software Update

Wi-Fi Settings is used to configure the AV-Link and ADS-B Wi-Fi settings, Statistics is used to provide access to real-time system statistics and AV Display Software Update is used to update a connected AV-30-C display with new firmware.

11.5 Wi-Fi Settings Page

The AV-Link Wi-Fi settings page provides a way for the user to configure wireless connections. The screen is separated into two sections, the main Wi-Fi settings for the AV-Link (upper) and Wi-Fi settings for connecting to a remote ADS-B receiver (lower).

This chapter of the Pilot's Guide covers the ADS-B receiver settings section.

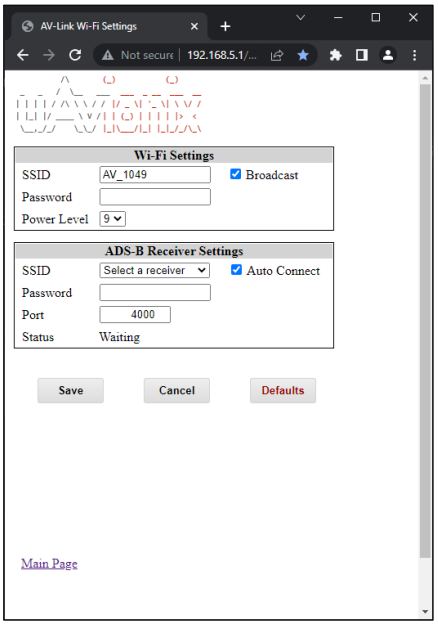


Figure 63 - AV-Link Wi-Fi Settings

11.5.1 ADS-B Receiver Settings

SSID

The AV-Link will automatically connect to any uAvionix manufactured ADS-B receiver.

If connecting to a different receiver, it is necessary to populate the Service Set Identifier (SSID) field with the name of the Wi-Fi network used by that receiver. If this value is set, the AV-Link will first attempt to connect to the named device.

When the AV-Link scans for available ADS-B receivers, the SSID drop down list is populated with the device names that it discovers.

If a custom ADS-B is desired, select ‘Enter a custom receiver’ and enter the name of the custom device.

If removing the custom ADS-B receiver is desired, select ‘Remove custom receiver’ and click Save.

AUTO CONNECT

By default, AV-Link will automatically identify preferred uAvionix ADS-B devices and connect to them, making the initial use very simple.

If AV-Link has been configured with a preferred device and the named device is not available and Auto Connect is checked, then AV-Link will attempt to connect to any of the preferred uAvionix ADS-B devices it discovers.

If Auto Connect is checked, AV-Link will attempt to discover and automatically connect to uAvionix preferred ADS-B receivers. Examples of these are:

- Sentry
- Sentry Mini
- SkyEcho
- echoUAT/echoALT
- skySensor

Unchecking Auto Connect will disable auto-discovery of uAvionix preferred ADS-B devices.

The AV-Link will not connect to any ADS-B receiver unless the MFD screen is enabled by setting the SERIAL 3 installation option to AVLINK because a connection to an ADS-B receiver is only required for use with the AV-30-C MFD. This preserves the resources of an ADS-B receiver when there are multiple AV-Links in a cockpit.

PASSWORD

If password security is used on the ADS-B receiver, entering a password into this field and clicking on Save will set this password. The password must be a minimum of 8 characters to meet security requirements.

PORT

If the ADS-B receiver being used transmits GDL90 packets on a port that is different than 4000, entering the port number and clicking on Save will set this custom port. Valid values are 1-65535.

STATUS

This status reference will frequently update with the current status of the Wi-Fi connection to your ADS-B receiver.

12 Autopilot

The AV-30-C can control select autopilots using the following interfaces:

- Digital heading, course, and altitude using ARINC 429 with the AV-HSI
- Analog heading and course using the AV-APA

When configured with the AV-HSI, ARINC 429 may be used to control a BendixKing xCruze / AeroCruze 100 / TruTrak Vizion (385 and PMA) or a Trio Pro Pilot autopilot. Heading, OBS, Set Altitude, and Autopilot Mode are selected on the AV-30-C and sent to the autopilot via the AV-HSI. The controls are available in both AI and DG modes.

With the optional AV-APA installed and configured, the AV-30-C can be used to control S-TEC 20/30/40/50/55/60-2 autopilots. Heading modes are selected on the AV-30-C in both AI and DG modes and sent to the autopilot through the AV-APA. Autopilots connected through the AV-APA analog interface do not support the Set Altitude mode.

12.1 Autopilot Modes

There are six autopilot direction modes as shown in Table 9. The PUSH-SET menu sequence will guide the pilot through all required inputs. The PUSH-SET sequence includes SET BARO, HDG BUG, SET ALT, AUTOPILOT, and DG ADJ.

The items and order of appearance will vary based on the autopilot mode and installation configuration. All six autopilot direction modes can be made available to analog autopilots connected with the AV-APA. Digital autopilots connected to the AV-HSI are limited to OFF, HDG BUG, and GPSS (if unlocked).

When using the Heading Bug autopilot mode, the AI and DG direction indicators will automatically switch to display DG heading. Similarly, using some GPS-based autopilot modes will automatically switch the direction indicators to display GPS track, as described in the table below.

	Auto Display Change

AP Mode	Desired Direction	Current Direction	Desired Altitude	PUSH-SET Sequence (DG mode(1))	Indicator	AI/DG Direction
OFF	NA	NA	NA	HDG BUG DG ADJ(2) BARO SET ALT AUTOPILOT	Heading Bug (used only for pilot reference)	NA/NA
HDG BUG	Heading Bug	DG Heading	SALT	HDG BUG DG ADJ(2) BARO SET ALT AUTOPILOT	Heading Bug	DG Tape/ DG Heading Rose
TRK BUG	Heading Bug (referenced to GPS Track)	GPS Ground Track	SALT	HDG BUG BARO SET ALT AUTOPILOT	Heading Bug	GPS TRK Tape/ GPS TRK HSI or ARC
GPSS(3)	Steering from an ARINC-429 GPS	GPS Ground Track	SALT	HDG BUG BARO SET ALT AUTOPILOT	Hollow Commanded Heading Reference	NA/NA
WPT DTRK	Desired track to waypoint	GPS Ground Track	SALT	BARO SET ALT AUTOPILOT	Hollow Commanded Heading Reference	GPS TRK Tape/ GPS TRK HSI or ARC
WPT BRG	Bearing to waypoint	GPS Ground Track	SALT	BARO SET ALT AUTOPILOT	Hollow Commanded Heading Reference	GPS TRK Tape/ GPS TRK HSI or ARC

Table 9 - Autopilot Modes

(1) In AI Mode BARO appears first followed by DG ADJ or HDG BUG
(2) DG ADJ appears last in the sequence if an AV-Mag is installed
(3) Requires AV-HSI and the Advanced Autopilot Software Unlock. See Installation Manual for details

When using the AV-APA, a red ‘NO AP’ flag will appear if the AV-30-C does not have the required data to support the selected autopilot mode. For example, the flag will appear if the pilot selects “WPT DTRK” but the GPS doesn’t have a next waypoint. The ‘NO AP’ flag will also appear if the AV-30-C loses communication with the AV-APA. Either case is an indication to

the pilot that the AV-30-C and AV-APA are not providing valid direction input to the Autopilot.

12.1.1 Heading Bug

The autopilot will fly the heading specified by the Heading Bug, relative to the directional gyro indicated heading. This heading will not compensate for wind or gyro drift. When flying with Heading Bug or Track Bug mode, the Heading Bug will be a solid magenta “bowtie” indicator.

12.1.2 Track Bug

The autopilot will fly the GPS track specified by the Track Bug. This is ground track and therefore compensates for wind.

12.1.3 GPS Steering (GPSS)

When using an AV-HSI, a panel mounted navigator, and the Advanced Autopilot Software Unlock, the autopilot can follow steering commands from the GPS. This includes joining and tracking a flight plan. Most WAAS capable GPS also provide GPSS guidance for holding patterns and course reversals.

When flying any of the GPS modes, the Heading Bug is replaced by a hollow magenta “bowtie” indicating the heading commanded to the autopilot.

12.1.4 Desired Track to Waypoint

The autopilot will fly the desired track, as specified by the GPS, to the next waypoint. If the aircraft is off course, this mode will result in the aircraft flying a path parallel to GPS magenta course line. The aircraft will continue flying on this desired track until the GPS sequences to the next waypoint, at which time the aircraft will begin a turn to the next desired track.

12.1.5 Bearing to Waypoint

The autopilot will fly the bearing to the next waypoint, as specified by the GPS, to the next waypoint. If the aircraft is off course, this mode will result in the aircraft flying a path directly to the next waypoint. The aircraft will continue flying this bearing until the GPS sequences to the next waypoint, at which time the aircraft will begin a turn to the next waypoint bearing.

12.2 Autopilot Control

12.2.1 Selecting Heading

- In AI mode, push and release the center knob multiple times until 'HDG BUG' appears
- In DG mode, either turn the center knob directly or push and release the center knob to bring up the 'HDG BUG' adjustment window
- Rotate the knob clockwise or counterclockwise to select the heading
- Push and release the center knob to advance to the next setting

12.2.2 Selecting Altitude

- Push and release the center knob to open the PUSH-SET menu
- Push and release the center knob until 'SET ALT' appears
- Rotate the center knob to set the desired SALT
- The SALT value displayed in the overlay field will change from white to green when the aircraft altitude reaches ±100' of the SALT value
- Note that SALT has a default value of 5000' on first use. On subsequent uses the AV-30-C will recall the last value entered

12.2.3 Selecting Autopilot Mode

- If not already on the ‘AUTOPILOT’ entry field, push and release the center knob until ‘AUTOPILOT’ appears
- Rotate the center knob to select the desired mode. The new mode is not engaged until you push and release the center knob
- If the knob is not pushed and released within 30 seconds, the menu window will be dismissed automatically, and the prior autopilot mode is retained
- When the new autopilot mode is selected, the display will automatically change to match the type of direction used in the mode. See Table 9. for the display changes that accompany autopilot mode selection
- It is not recommended to undo the automatic display change to display a direction type that does not match the autopilot control type. I.e. do not display a DG heading rose when GPS ground track is sent to the autopilot and vice versa

13 Stored Data Integrity Check

Configuration and calibration data stored in non-volatile memory is checked with Cyclic Redundancy Check (CRC) checksums on every power up event. If a data section is found to be corrupted, the user is notified at the power-up splash screen. In some cases, the corrupted values will be set to their defaults. Any additional restoration remedy varies with the type of data. See Table 10 for details.

Message	Data Type and Description	Remedy
"WARNING: OVERLAY reset to defaults. Reconfig required."	Overlay settings. This data is used to determine which fields are active and which data are displayed in those fields.	User to reconfigure overlay fields on AI, DG, and CDI pages as per preference or installation log.
"WARNING: CFG reset to defaults. Reconfig required."	Configuration settings. Trim settings, page selection, AI/DG mode selection, function lock, etc.	Re-set configuration items as per recorded setting in the installation log. AV-Mag calibration, airspeed trim, and altitude trim are not affected.
"ERROR: F-CAL value check failure. Verify user calibration data."	Field Calibration. Magnetometer calibration, Altitude trim calibration, pitot-static zero-point setting.	If applicable, recalibrate: • magnetometer • altitude trim • indicated airspeed • re-zeroing of the pitot-static zero point
"ERROR: PROV value check failure. Service required."	Provision settings. These are settings set at the factory.	Contact customer support. Cannot be reconfigured by the user.
"ERROR: Problem with bootloader. Factory service required	Bootloader software. Software that launches the main software after power-up.	Contact customer support. Cannot be reconfigured by the user.

Table 10 - Integrity Checked Data and Remedies

14 Operating Limits & System Specifications

Operating Limits	
Startup Time	< 3 Minutes
Attitude Rate Limit	±250 degrees per second
Attitude Operational Range	360° Roll, 180° Pitch
Attitude Accuracy	1° Static, 2.5° Dynamic
Airspeed Operational Range	40 to 300 kts
Altitude Operational Range	-1,000 to +25,000 ft
AoA Operational Range	-10° to +30°
AoA Resolution	1°
AoA Valid Speed Range	+35 to +300 kts
AoA Accuracy	2.5°
DALT Operational Range	-5,400 to +35,7000 ft
DALT Accuracy	± 500 ft
TAS Operational Range	+35 to +300 kts
TAS Accuracy	± 20 kts
G-Load Operational Range	± 8 g
OAT Operational Range	-40°C to +70°C
OAT Accuracy	±4°C
Bus Voltage Range	7 to 35 V
Bus Voltage Accuracy	±1.0 V

Table 11 - Operating Limits

15 List of Figures

16 List of Tables