



AV-20-E

Pilot's Guide



Legal Notices

© 2019 – 2024 uAvionix Corporation. All rights reserved.

Except as expressly provided herein, no part of this guide may be reproduced, transmitted, disseminated, downloaded or stored in any storage medium, for any purpose without the express written permission of uAvionix. uAvionix grants permissions to download a single copy of this guide onto an electronic storage medium to be viewed for personal use, provided that the complete text of this copyright notice is retained. Unauthorized commercial distribution of this manual or any revision hereto is strictly prohibited.

uAvionix® and Ping® are registered trademarks of uAvionix Corporation and may not be used without express permission of uAvionix.

AV-20, AV-20-S, AV-20-E, and AeroVonics are trademarks of uAvionix Corporation and may not be used without express permission of uAvionix.

Patent uavionix.com/patents

Warnings / Disclaimers

uAvionix is not liable for damages arising from the use or misuse of this product.

This equipment is classified by the United States Department of Commerce's Bureau of Industry and Security (BIS) as Export Control Classification Number (ECCN) 7A994.

These items are controlled by the U.S. Government and authorized for export only to the country of ultimate destination for use by the ultimate consignee or end-user(s) herein identified. They may not be resold, transferred, or otherwise disposed of, to any other country or to any person other than the authorized ultimate consignee or end-user(s), either in their original form or after being incorporated into other items, without first obtaining approval from the U.S. government or as otherwise authorized by U.S. law and regulations.

Document Revisions

Revision	Date	Description of Change
A	6/28/2024	Initial Release

Table of Contents

Legal Notices	2
Warnings / Disclaimers	2
1. System Description	5
2. Unit Functionality	6
2.1. BeaconX Transponder Control (Optional)	6
2.2. Angle of Attack	6
2.3. G Meter	6
2.4. Attitude & Slip/Skid	7
2.5. Clock/Run Time	7
2.6. Outside Air Temperature	7
2.7. Bus Voltage	7
2.8. Dual User Timers	7
2.9. Engine Run Timer	7
2.10. Flight Timer	8
2.11. User Setup	8
2.12. Battery Operation	8
2.13. Model Functionality	9
2.14. Demo Mode	9
3. Operating Limits	10
4. Power-On Stabilization	11
5. User Interface Overview	11
5.1. User Interface Controls	11
5.2. Page Navigation	11
5.3. View Button	12
5.4. Left & Right Push	12
5.5. Splash Screen	12
5.6. Screen Brightness	12
5.7. Demo Mode	13
6. Main Pages	15
6.1. Clock Combo Page	15
6.2. FE Time – Flight and Engine Time Page	16
6.3. User Timer Pages	17
6.3.1. Count-Up Mode	17
6.3.2. Count-down Mode	17
6.3.3. Mode Transition	19
6.4. AOA/G Meter Page	19
6.4.1. Large AoA Display Mode	19
6.4.2. Large G-Meter Display Mode	20
6.4.3. Dual Graph Mode	21

6.5.	Attitude Page	22
6.6.	BeaconX Transponder Control.....	22
6.7.	Setup Pages	24
6.7.1.	Setup – Top Level Menu	24
6.7.2.	Setup – System Info.....	25
6.7.3.	Setup - Page Enable	25
6.7.4.	Setup – Audio Alerts	26
6.7.5.	Setup – Audio Volume	26
6.7.6.	Setup – OAT Trim	27
6.7.7.	Setup – Miscellaneous Options.....	27
6.7.8.	Setup – AoA Limits	28
6.7.9.	Setup – G Limits	32
6.7.10.	Setup – Hard Calibration.....	32
6.7.11.	Setup – BeaconX Ground Test Mode	33
6.7.12.	Setup – Installation Items.....	33
7.	Audio and Visual Alerts.....	34
7.1.	Alert Prioritization	34
7.2.	Clearing Alerts	35

1. System Description

The uAvionix AV-20-E Multi-Function Display provides a wide array of supplemental flight information.

Features Include:

- BeaconX transponder control
- AoA Display (Voice Alerting & Peaks)
- G-Meter Display (Voice Alerting & Peaks)
- Attitude (Roll / Pitch)
- Slip / Skid
- Clock (GMT / Local)
- Outside Air Temperature (C / F)
- Bus Voltage Display
- Dual User Timers (Count Up / Down)
- Engine Run Timer
- Flight Timer
- Density Altitude Display
- True Airspeed Display (kts / mph)
- Internal Battery Operation

The unit incorporates a full color sunlight readable display, bezel-mounted light sensor for automatic display brightness, and an internal battery for operation in the event of power loss.



Figure 1 - AV-20-E

2. Unit Functionality

2.1. BeaconX Transponder Control (Optional)

The AV-20-E 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.



The transponder is not powered by the AV-20-E internal battery. Transponder operations will be unavailable during a power loss.

2.2. Angle of Attack

Angle of Attack is derived from pitot and static pressure measurements combined with internal inertial reference measurements. No dedicated external probes or other aircraft modifications are required for AoA functionality.

AoA is computed based on the difference between aircraft pitch angle, and the aircraft's path angle through the air, and current G loading.

An upper “near-stall” calibration point is set by the pilot and represents the desired alerting / maximum scale point. A lower calibration point represents the nominal “cruise” AoA and is used to set the lower boundary of the AoA scale. The amount of pre-warning for an AoA alert prior to the certified aircraft stall point is based on pilot preference.

Both visual and aural alerting is provided when the AoA is approaching or exceeds the upper calibration point. AoA information is not for primary aircraft control and is provided for supplemental situational awareness only.

2.3. G Meter

G Load is determined via the internal inertial sensors and will measure up to 8G in either direction. Independent positive and negative G limits are configurable, with both visual and aural alerting being provided. Peak negative and positive G Loads are also measured for display.

The range of the color-coded G scale is automatically scaled based on the pilot configured limits such that the maximum indication (positive or negative) represents the maximum value configured. G Load information is not for primary aircraft control and is provided for supplemental situational awareness only.

2.4. Attitude & Slip/Skid

Attitude (Roll & Pitch) and slip/skid is determined from the internal inertial sensors. AoA and slip/skid can be overlaid on the attitude indicator page. A pitch-zero feature allows the current pitch angle to be trimmed to zero, allowing synchronization with other on-board instrumentation.

Attitude accuracy is better than 1° under stable conditions and better than 2.5° under dynamic flight conditions. Airspeed is utilized to help stabilize pitch during takeoff, landing and extended accelerations. Attitude information is not for primary aircraft control and is provided for supplemental situational awareness only.

2.5. Clock/Run Time

Clock functions include display of time in local and GMT time zones and can be set by the pilot. A local offset value determines the difference between the GMT and local time zone. The clock is internally backed up via an internal battery which automatically recharges during flight.

2.6. Outside Air Temperature

OAT is measured by an external temperature probe and is displayable in either Celsius or Fahrenheit.

OAT data is also utilized in the computation of True Airspeed (TAS) and Density Altitude (DALT). Pitot and Static inputs must be connected for those data parameters to be displayed because these parameters also require pressure measurements. A compatible OAT probe must be installed for OAT related features to be enabled.

2.7. Bus Voltage

Bus voltage is measured directly from the power supply lines and displayed on the clock combo page.

2.8. Dual User Timers

Dual independent timers are available for general purpose usage. Each timer can be configured as a count-up or count-down timer, with both a visual and aural alert when the count-down goes to zero. Resolution of the timers is 1 second. Timer values are saved even if the AV-20-E is powered off.

2.9. Engine Run Timer

The engine run timer initiates counting based on bus voltage increasing above the no-load battery voltage (alternator running), and special switching logic accommodates both 12V and 24V aircraft. The timer can be reset by the pilot.

The engine run timer is not maintained between power-cycles, and does not represent a HOBBS type function.

2.10. Flight Timer

The flight timer initiates counting based on airspeed above 40 kts and can be reset by the pilot. The timer will stop counting when the speed is below the threshold. The flight timer is reset when the AV-20-E is powered off.

2.11. User Setup

The pilot accessible setup menu can be used to easily configure an array of instrument parameters. All parameters are configurable by the pilot, with certain functions being inhibited during flight.

Options include background color, page enable/disable, audio alerts enable/disable, audio volume, OAT trim, indicated airspeed (IAS) trim, altitude (ALT) trim, temperature units, time units, airspeed units, alert popup behavior, AoA thresholds, G alert limits and sensor calibration.

2.12. Battery Operation

The unit incorporates a small Li-Po battery that can operate the unit for up to 30 minutes, depending on conditions. If external power is lost and airspeed is above 40 kts, the unit will automatically transition to internal power with no pilot action required. When airspeed drops below 40 kts, a normal shutdown will occur.

This battery is also utilized to maintain the clock time. Therefore, if battery operation continues to the point of battery depletion, the clock may need to be reset on the next power-up.

The battery is automatically recharged during normal operation.

2.13. Model Functionality

The AV-20-E and AV-20-S (NORSEE) have slightly different capabilities:

- The AV-20-E model includes the AV-20-S functions, plus BeaconX transponder control and a higher altitude ceiling.

Feature / Model	AV-20-E	AV-20-S
Clock	✓	✓
OAT	✓	✓
Bus Voltage	✓	✓
Dual User Timers	✓	✓
Engine Run Timer	✓	✓
Flight Timer	✓	✓
AoA	✓	✓
Attitude	✓	✓
Density Alt	✓	✓
Ceiling	35,000'	25,000'
True Airspeed	✓	✓
Slip / Skid	✓	✓
G-Meter	✓	✓
Battery Operation	✓	✓
BeaconX Control Head	✓	x
Audio Alerts		
Timer Alert	✓	✓
AoA Alert	✓	✓
G Limit Alert	✓	✓

Table 1 - Functional Dependencies



The unit model and associated part number is shown on the splash screen on power-up.

2.14. Demo Mode

The AV-20-E can be placed in Demo Mode to simulate sensor inputs and demonstrate functionality on the ground. To enable or disable Demo Mode, see Section 5.7.

3. Operating Limits



The AV-20-E is supplemental and may not be used as a substitution for a certificated aircraft system. Except where otherwise recognized, no operational credit may be taken for installation of this equipment.

The following operational limitations are applicable:

Operating Limits	
Angle of Attack Range	-10° to +30°
Angle of Attack Resolution	1°
Angle of Attack Operation	+35 to +400 Knots Indicated
Angle of Attack Accuracy	2.5°
Density Alt Range (Accuracy)	-5,4000 to +40,346 Feet (± 500ft)
TAS Range (Accuracy)	+35 to +400 Knots (± 20 kts) True
Attitude Angle	No Limits
Attitude Rate Limit	±250 Degrees / Second
Attitude Accuracy	1° Static, 2.5° Dynamic
G Alert Limits	± 8 g
OAT Range	-40°C to + 70°C
OAT Accuracy	±4°C
Slip / Skid Range (Accuracy)	±7° (±2°)
Bus Voltage Range	7 to 35 Volts
Bus Voltage Accuracy	±1.0 Volt
Clock Accuracy	± 1 Second/Day
Timer Accuracy	± 1 Second/Hour

Table 2 - Operating Limits



Refer to the AV-20-E Installation Manual for Instructions for Continued Maintenance & Operation.

4. Power-On Stabilization

The AV-20-E model incorporates air data and inertial sensors that are temperature-sensitive. These sensors are thermally stabilized by an internal heater. During power-on, the heater warms the sensors to the operating temperature; thus, they require a few moments to stabilize.

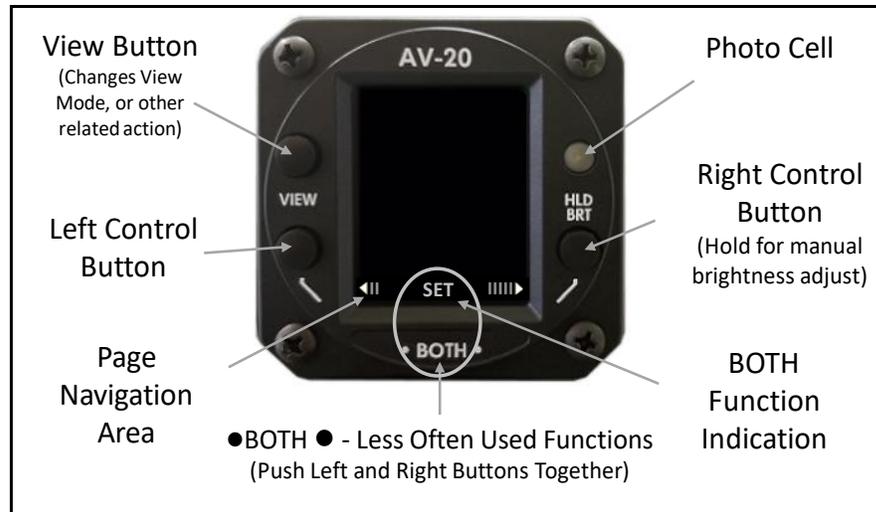
During this power-on stabilization period, AoA, Attitude and Air Data-related parameters are not available. These values will be flagged on each page, as described in the User Interface section of this document.

Typical stabilization time is between 30 seconds and 3 minutes, depending on the ambient starting temperature of the unit. At very cold temperatures, if the unit does not stabilize, let it run for 10 minutes then cycle power.

5. User Interface Overview

5.1. User Interface Controls

Controls for the AV-20 consist of three bezel-mounted momentary-push buttons. The functionality of the buttons change based on the current mode. User interface components are as follows:



5.2. Page Navigation

The Left and Right Control Buttons navigate through the different pages. The position of the displayed page is shown graphically at the bottom of the page as a set of bars on the left and right sides. The following graphic indicates that there are two pages to the “left” and five pages to the “right”.



5.3. View Button

The VIEW button selects different viewing options for the current page, or performs another function relative to the page selected.

5.4. Left & Right Push

Momentarily pushing both the LEFT and RIGHT control buttons together performs various tasks that are rarely used, such as setting values. If this option is available for a given display, the function name will be displayed centered above the ●BOTH● text on the bezel.

EXAMPLE: The following image shows that a SET function can be performed by pressing both control buttons:



If no text appears in this area, no action is assigned to the ●BOTH● command for this page.

5.5. Splash Screen

The system splash screen is displayed on power-up. The unit model (AV-20-E or AV-20-S) is shown, along with the software version number. The unit also displays the splash screen momentarily on power-down.



5.6. Screen Brightness

Pressing and holding the lower right button will display the screen brightness page. By default, the screen is set to auto brightness mode and will utilize the light detected by the photocell to set the screen brightness.

Pressing ●BOTH● or the up or down arrows will transition the unit to manual mode.



When in manual mode, pressing the up or down arrows will adjust the screen brightness. Pressing the right button will accept the value. Pressing ●BOTH● will return to auto mode.



5.7. Demo Mode

The AV-20-E can be placed in Demo Mode to simulate sensor inputs and demonstrate functionality on the ground. The AV-20-E should not be used for flight when in Demo Mode. Actual sensor data is not displayed, including attitude, AoA and G load. Calibration functions are disabled when in Demo Mode.

To turn on or off Demo Mode, go to the Setup menu page, select DEMO MODE and choose NONE. If the unit detects airspeed above 40 kts, it will automatically disable DEMO MODE.

DEMO MODE

Select Demo
Mode



Activate

6. Main Pages

6.1. Clock Combo Page

The Clock Combo Page displays multiple items of information as shown below. The VIEW button sequences through available data in the upper field. Note that the screen layout and available data will vary based on model and connected sensors.

Density altitude, true airspeed and AoA are not available until after power-on stabilization completes. Temperature units can be configured to C or F in the setup pages.

CLOCK COMBO PAGE

VIEW Toggles upper field contents:

- Local Time
- GMT Time
- Density Altitude*
- True Airspeed*

* with OAT probe connected



BOTH Sets Time (When Local or GMT is displayed)

Angle Of Attack

●BOTH● enters the clock set function when either the local time or GMT time is being displayed in the upper field. The set mode allows the current GMT time to be set, along with a local time offset. If time has been lost due to failure of the internal keep-alive battery, the time will flash.

CLOCK SET MODE

Left upper and lower button increment or decrement the current field (Hours, Minutes, Seconds, Local offset)

Holding either will clear field to zero

Currently highlighted field will flash

Right button increments flashing field to next position



BOTH Accepts Value

6.2. FE Time – Flight and Engine Time Page

The FE Time page displays (F)light Time and (E)ngine Run Time. These timers are automatically started and stopped based on measured data. The Flight Time counter runs when the airspeed speed goes above 40 Kts. The Engine Run Time counter runs when the bus voltage goes above the basic battery float level (alternator is running).



Either timer can be independently set to zero by selecting it and clearing the value.

6.3. User Timer Pages

Two identical user timers are available. Each operates independently of the other and each can be configured for counting up from zero or counting down from a user-set value.

6.3.1. Count-Up Mode

In the power-on default state, each timer is a count-up timer. The timer is started by pressing the VIEW button with the adjacent start icon . When running, this icon changes to a pause indicator . Pressing the VIEW button again will pause the timer.

When the timer is paused, pressing and holding the VIEW button will clear the timer to zero.



6.3.2. Count-down Mode

Count-down Mode is activated by setting a user-defined value to count down from. This is accomplished by pressing •BOTH• to set a value.

When a non-zero value has been set by the user, the timer automatically becomes a count-down timer. If the set value is changed back to zero, the timer automatically becomes a count-up timer again.

TIMER SET MODE

Left upper and lower button increment or decrement the current field (Hours, Minutes, or Seconds)

Holding either momentarily will clear all fields to zero

Currently highlighted field will flash

Right button increments flashing field to next position

BOTH Accepts Set Value

Once the set value is accepted, this value is loaded into both the upper (active) and lower (Set Value) fields on the timer page.

The lower Set Value allows the same timer value to be reloaded without having to manually set the value again.



When the timer is stopped, holding the VIEW button will reload the previously set count-down time.

**TIMER PAGE
COUNT-DOWN MODE**

VIEW Starts or pauses the counter

When stopped, holding VIEW will reload the set value shown here

Timer Number

Timer Mode

Reload allows previously set value to be used again

Once the timer is started and the value runs down to zero, a timer alert will be generated.

The last entered timer value will be saved even when the device is powered off.

6.3.3. Mode Transition

Once in the count-down mode, the timer can be changed back to a count-up timer by setting a value of zero. This can be done manually, or a shortcut can be used by entering the set mode and holding either of the left buttons down momentarily. This will clear the HH:MM:SS value to all zeros, making the timer a count-up timer again.

Timer 1 and Timer 2 operate completely independently of each other and can be set with different values and operate as either a count-up or count-down.

6.4. AOA/G Meter Page

The AoA/G Meter Page has four view modes, selected by pressing the VIEW button:

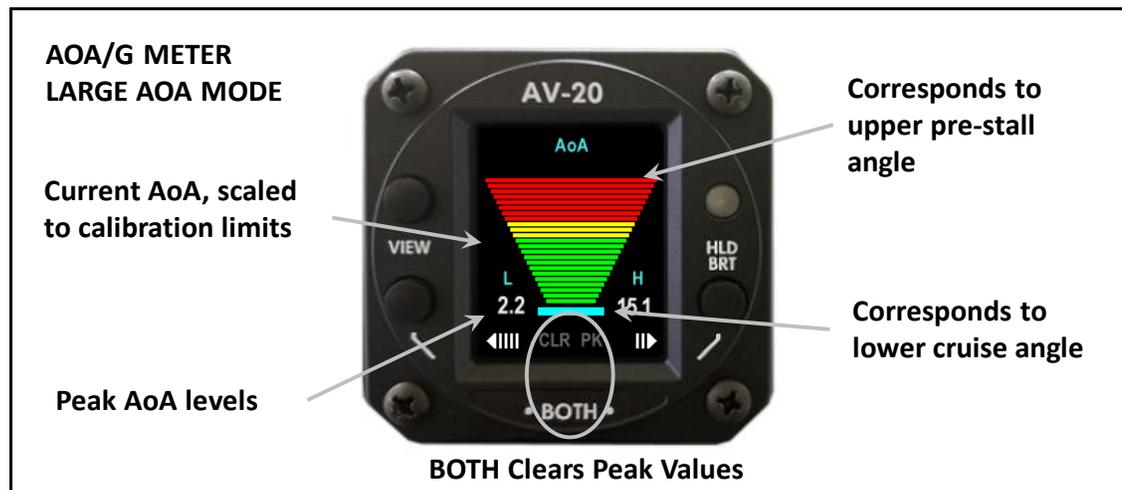
- Large AoA Display
- Large Graphical G-Meter Display
- Large Textual G-Meter Display
- Dual Graph Mode

6.4.1. Large AoA Display Mode

The Large AoA Display mode shows a highly visible indication of the current AoA, scaled by the configured upper and lower AoA limits (calibration points).

EXAMPLE: If the upper AoA limit has been configured to +12 degrees (near stall), the upper bar on the display will correspond to this value. If the lower (normal cruise) AoA limit has been set to +3 degrees, the lower bar will correspond to this value.

The calibration points are different for each aircraft and are configured in the setup pages.



During power-on stabilization, the cyan lower bar will blink, indicating that no valid AoA can be determined. This applies to all color-coded AoA indications provided on different pages.

Alerts will be generated just prior to the AoA reaching the upper calibration point.

This display can be configured to automatically pop up when the AoA limit alert occurs.

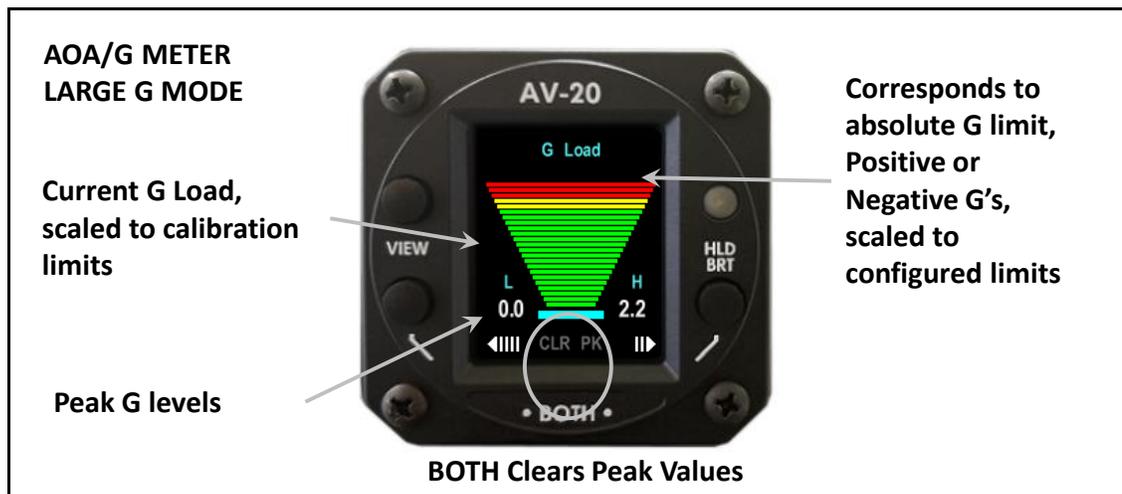
6.4.2. Large G-Meter Display Mode

The Large G-Meter Display Mode shows an easily readable indication of the current G load, scaled by both the configured upper and lower G limits. Both positive and negative values are displayed on the same graph, making the visible indicator an “absolute” G limit indication.

*EXAMPLE: If the upper G limit has been configured to +4 G, the **upper** bar on the display will correspond to +4 G. If the lower G limit has been set to -2 G, the **upper** bar on the display will correspond to -2 G as well.*

The display is scaled appropriately (and differently if needed) for positive and negative G operations. From the pilot’s perspective, when the meter indicates near-maximum values, operational limits are being approached.

The positive and negative G limits are configured in the setup pages.



Alerts will be generated just prior to the G load reaching the upper calibration point.

This display can be configured to automatically pop up when the G-limit alert occurs.

A large textual version is also available showing the current G load:

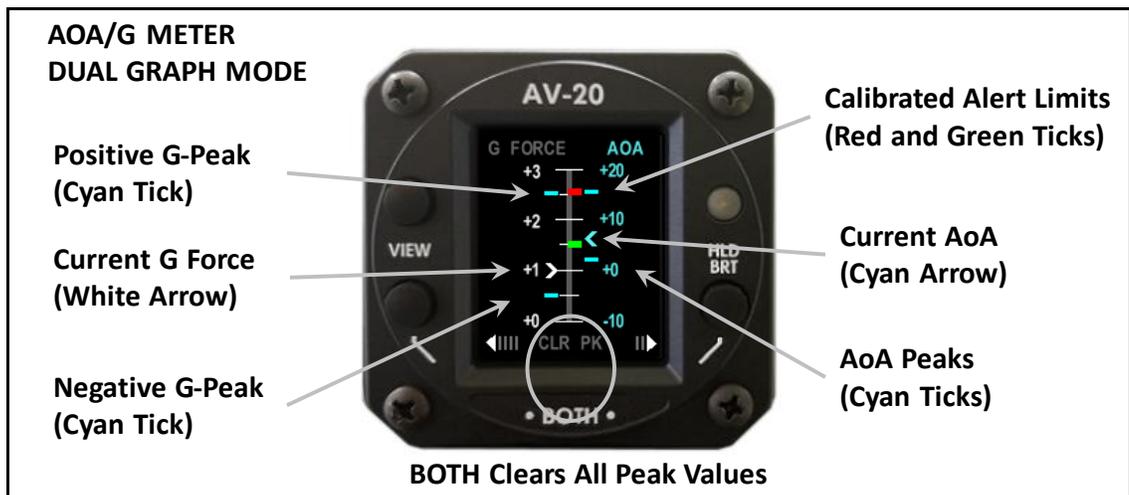


6.4.3. Dual Graph Mode

The dual graph mode is primarily utilized for determining the best upper and lower AoA calibration points and can be helpful for fine-tuning those thresholds.

The left side of the display shows the current G load, along with the peaks experienced during the current flight.

The right side of the display shows the current AoA, along with the peaks experienced during the current flight. Additionally, the configured upper and lower calibration limits are shown as red and green tick marks. This indicates where the aircraft's current AoA is relative to those calibration points.





To utilize the dual graph mode as an aid for determining pre-stall calibration, the peaks can be cleared while slowing and approaching the pre-stall condition. For more information, reference Section 6.7.8.

6.5. Attitude Page

The Attitude Page provides a small thumbnail presentation of roll and pitch, with a slip/skid and AoA overlay option.

The PSYNC will set the current pitch angle to indicate as zero pitch, and can be used to trim out pitch offsets relative to other equipment on the aircraft.

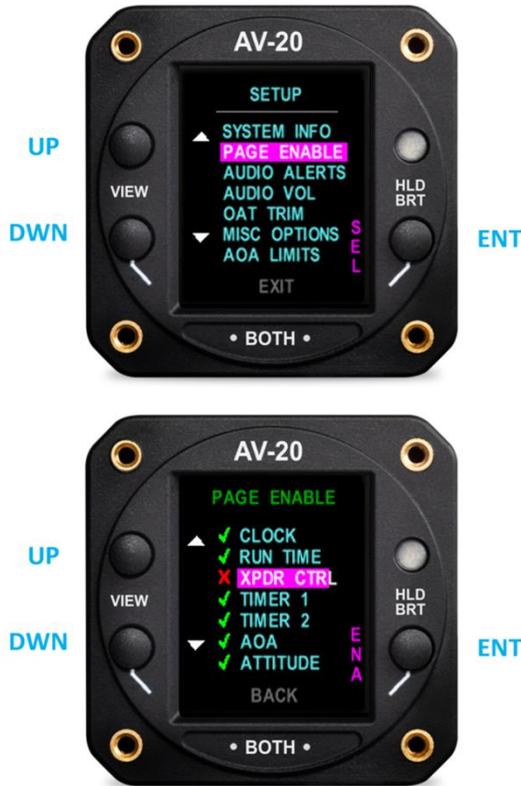
VIEW toggles presentation of AoA and slip/skid on and off. During power-on stabilization, the aligning message appears.



This display can be configured to automatically pop up when power is lost during flight.

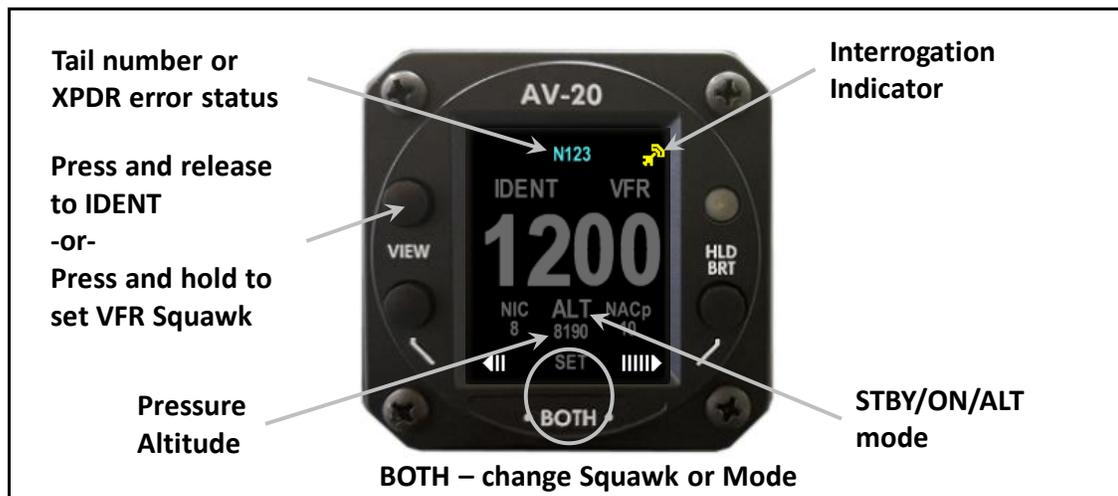
6.6. BeaconX Transponder Control

Enable the BeaconX transponder control function by navigating to the SETUP page, press ●BOTH● to enter the menu, scroll down to PAGE ENABLE, then press SEL.



In the PAGE ENABLE sub menu of SETUP, activate the XPDR CTRL page by pressing ENA. A green check mark indicates enabled and a red X indicates disabled.

Exit the PAGE ENABLE menu by pressing ●BOTH● the exit the setup menu by pressing ●BOTH●. Scroll to the XPDR CTRL page by pressing either the left or right lower buttons.



To Change Squawk

- Select SET by pressing ●BOTH● bottom buttons
- Navigate highlighted cursor to desired digit by pressing the right button
- Press either Up or Down buttons to change
- Press both bottom buttons to set new code

To Change Mode

- Select SET by pressing ●BOTH● bottom buttons
- Press right button to navigate cursor to mode selection
- Press Up or Down buttons to change
- Press both bottom buttons to set mode

To Ident

- Press the top button

Quick Squawk 1200 (or the default squawk code saved in the tailBeaconX)

- Press and hold the top button

If the AV-20-E is not communicating successfully with the tailBeaconX, a red 'X' will cover the screen and TMOU will appear at the top of the page.

6.7. Setup Pages

The Setup Pages allow an assortment of options to be configured by the pilot.



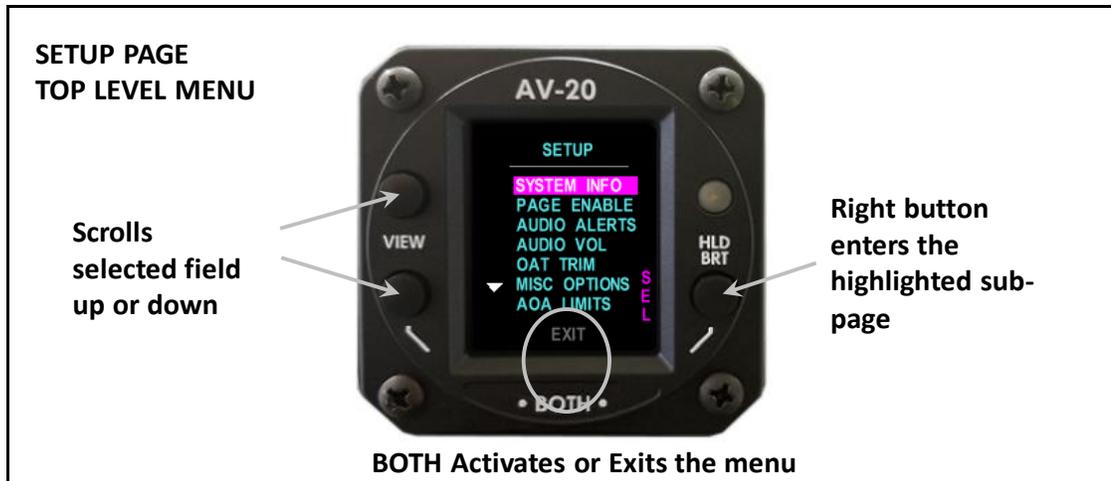
Note that some options are not available during flight and will be disabled if airspeed or ground speed is above 40 Kts. Disabled options will be shown in gray and cannot be selected.

6.7.1. Setup – Top Level Menu

The top-level menu is shown by default and is presented in a disabled state (all options grayed out).

Pressing ●BOTH● activates the menu for navigation. The left buttons scroll the highlighted field up and down, while pressing SEL will enter the highlighted setup page. (Additional menu items may be located off the lower screen area)

Pressing ●BOTH● again will disable (exit) the menu.



6.7.2. Setup – System Info

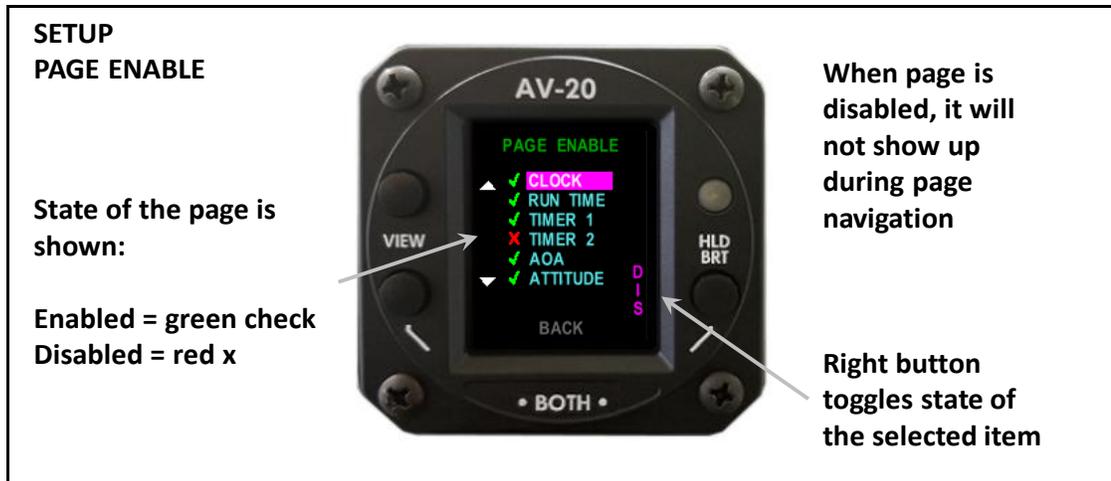
System information can be viewed via the setup menu.



6.7.3. Setup - Page Enable

The Page Enable allows each function / page of the unit to be individually enabled or disabled. When disabled, the function / page will not be shown, reducing the time required to navigate to any specific page.

EXAMPLE: A given user may not require dual timers and may disable the second timer page for convenience.



6.7.4. Setup – Audio Alerts

Audio alerts can be individually enabled or disabled. When disabled, the visual alert will still appear, but no aural alert will be generated. (See Alerts section of this document for more details on the alerting feature.)



6.7.5. Setup – Audio Volume

The Audio Volume for alerts can be adjusted to levels 1 thru 10. An aural test message will be generated until the level is accepted.



6.7.6. Setup – OAT Trim

The OAT sensor can be trimmed to account for variations in probe characteristics or to match other equipped gauges. The NEW value shows the currently measured OAT with the offset applied.



6.7.7. Setup – Miscellaneous Options

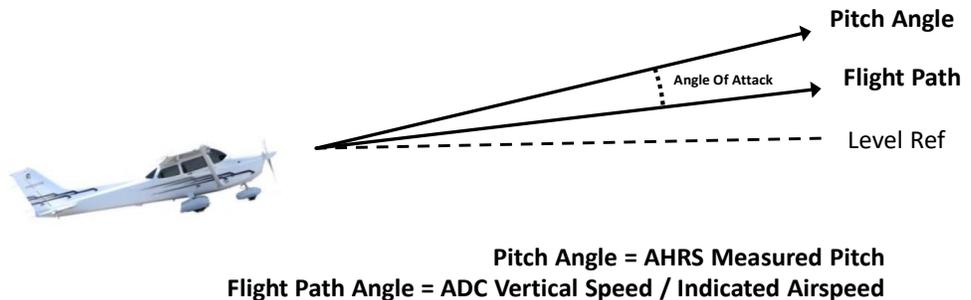
The Misc Options menu allows for miscellaneous options to be set as follows:

- Blue Background on all pages (versus a black background)
- Temperature units set to C (versus units in F)
- Time units in 24 hour mode (versus 12 hour AM/PM)
- TAS in knots (versus mph)
- G Popup enabled – Transitions to large G indicator when alert occurs
- AoA Popup enabled – Transitions to large AoA indicator when alert occurs
- AI Popup enabled – Transitions to Attitude Indicator if power lost in flight



6.7.8. Setup – AoA Limits

Angle of Attack (AoA) is estimated by comparing the aircraft pitch to the aircraft flight path angle through the air. The pitch is determined by the internal AHRS and flight path angle is determined by air-data based airspeed versus vertical speed measurements.



The AoA must be calibrated for each unique aircraft installation. 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.

The angles to set can be determined by monitoring the AoA just prior to a stall and in cruise, as described below, and then setting those values in the AoA Limits setup page.



- The upper limit (pre-stall angle) is configured to coincide with the onset of the aircraft’s existing stall warning system and is typically on the order of 10 to 15 degrees. This limit is set with the aircraft in its “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 angle selected here visually correlates to the top red bar on the AoA display.
- The lower limit (cruise angle) is configured to coincide with the aircraft’s V_A (gross weight adjusted maneuvering speed) and is set to visually correlate with the lowest green bar on the AoA display.

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
 $\pm 5^\circ$ Heading
 ± 5 Knots
 ± 50 Feet
 ± 50 Ft/Min Vertical Speed

Any offsets beyond these parameters may directly correlate with AoA errors.

6.7.8.1. Setting AoA Upper Limit

The objective is to set the upper (pre-stall angle) limit such that the top red bar illuminates at roughly the same time as the onset of the aircraft’s stall warning system. To find the upper limit, the following procedure is recommended:

- The AOA LIMITS default to a PRE_STALL angle of 15 and a CRUISE ANGLE of 0. These are approximate starting values.

- Select the Clock Combo Page (see Section 6.1)
- Select a safe altitude suitable for stalls, minimum 1,500 feet AGL
- Aircraft in “base-to-final” configuration, for example
 - 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 third 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 third 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.

6.7.8.2. Setting AoA Lower Limit

The objective is to set the lower (cruise angle) limit such that the lowest green bar illuminates roughly at V_A (gross weight adjusted maneuvering speed). To find the lower limit, the following procedure is recommended:

- Select the Clock Combo Page (see Section 6.1)
- Select a safe altitude, minimum 1,500 feet AGL
- Aircraft in cruise configuration, for example
 - 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 and to ensure consistency.

6.7.8.3. 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 1, please highlight the actual AoA presentation for the indicated phase of flight. Note that this table shows the 11 bar mini AoA from the Clock Combo Page.

Table 1 - AoA Observations

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

6.7.9. Setup – G Limits

G limits allow the desired G limits to be configured. Normal flight is 1G, not 0G.



6.7.10. Setup – Hard Calibration

Hard Calibration performs an internal recalibration of the inertial gyros and may be required from time to time.



The Hard Calibration function re-zeros the internal inertial sensors and may be required from time to time. Refer to the Instructions for Continued Maintenance & Operation in the Installation Manual for criteria on when to perform a Hard Calibration.



Note that the Hard Calibration cannot be performed in flight. This function is disabled when airspeed is above 40 Kts. The aircraft must be stationary during the calibration procedure.



6.7.11. Setup – BeaconX Ground Test Mode

The AV-20-E can command the BeaconX transponder to reply to interrogations while on the ground for ramp testing. Go to the SETUP page and scroll down to BEACONX. Press SEL to enter the Ground Test Mode menu

tailBeaconX will now respond to All-Calls on transponder test sets.

When test is complete, cycle tailBeaconX power to exit test mode.

6.7.12. Setup – Installation Items

Airspeed trim, altitude trim, speed assist, pitot zero and demo mode are documented in the *AV-20-E Installation Manual UAV-1004048-001*.

7. Audio and Visual Alerts

Audio and visual alerts are generated under various limit conditions. A visual alert appears as a colored annunciator that is displayed in the upper left corner of the screen, regardless of the unit's mode or currently displayed page. Aural alerts are implemented via the audio output and require that the unit be interfaced to the aircraft audio panel.

G-Load and AoA alerts have multiple stages, allowing pilot awareness prior to a full alert being generated. These pre-warning alerts occur slightly prior to reaching the actual set limit.

7.1. Alert Prioritization

Each alert type is prioritized as follows:

Priority	Alert Type	On-Screen Indication	Audio Indication
1	G Load Pre-Warning 1	GLOAD	Single Tone
	G Load Pre-Warning 2	GLOAD	Dual Tone
	G Load Exceeded	GLOAD	"G Limit"
2	AoA Pre-Warning 1	ANGLE	Single Tone
	AoA Pre-Warning 2	ANGLE	Dual Tone
	AoA Exceeded	ANGLE	"Angle"
3	Timer 1 Count Down	TIMER 1	Chime
4	Timer 2 Count Down	TIMER 2	Chime

If either the G Load pop-up option or the AoA pop-up option is enabled (see Misc Setup), the display will automatically transition to the dedicated AoA or G page.



Note that for the audio alert feature to function, the unit must be interfaced to the aircraft's audio system.



7.2. Clearing Alerts

When an alert condition is present, pressing the VIEW button will clear the visual alert and mute the associated audio. If there are multiple alerts occurring simultaneously, clearing one alert will then allow the lower-priority alert to be displayed.



The audio section of the unit is not powered by the internal battery; thus, in the event of power loss or removal of power to the unit, audio alerts will not be generated.