Hodge Flight Services

Cessna 172R N9520D Avionics Manuals

GARMIN
GTX 327 MODE A/C TRANSPONDER

GARMIN

GTX™ 327

Mode A/C Transponder

pilot's guide

GARMIN

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Part Number 190-00187-00 Rev. D

This manual is written for software version 2.10, and is not suitable for earlier software versions. Information in this document is subject to change without notice. Visit the GARMIN web site (www.garmin.com) for current updates and supplemental information concerning the operation of this and other GARMIN products.

Software License Agreement

BY USING THE GTX 327, YOU AGREE TO BE BOUND BY THE TERMS AND CONDITIONS OF THE FOLLOWING SOFTWARE LICENSE AGREEMENT. PLEASE READ THIS AGREEMENT CAREFULLY.

GARMIN grants you a limited license to use the software embedded in this device (the "Software") in binary executable form in the normal operation of the product. Title, ownership rights and intellectual property rights in and to the Software remain in GARMIN.

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***CAUTION:** The GTX 327 should be turned off before starting or shutting down aircraft engine(s).*

***NOTE:** Contact a Garmin authorized dealer for software updates.*

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Limited Warranty

This GARMIN product is warranted to be free from defects in materials or workmanship for one year from the date of purchase. Within this period, GARMIN will at its sole option, repair or replace any components that fail in normal use. Such repairs or replacement will be made at no charge to the customer for parts or labor, provided that the customer shall be responsible for any transportation cost. This warranty does not cover failures due to abuse, misuse, accident or unauthorized alteration or repairs.

THE WARRANTIES AND REMEDIES CONTAINED HEREIN ARE EXCLUSIVE AND IN LIEU OF ALL OTHER WARRANTIES EXPRESS OR IMPLIED OR STATUTORY, INCLUDING ANY LIABILITY ARISING UNDER ANY WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE, STATUTORY OR OTHERWISE. THIS WARRANTY GIVES YOU SPECIFIC LEGAL RIGHTS, WHICH MAY VARY FROM STATE TO STATE.

IN NO EVENT SHALL GARMIN BE LIABLE FOR ANY INCIDENTAL, SPECIAL, INDIRECT OR CONSEQUENTIAL DAMAGES, WHETHER RESULTING FROM THE USE, MISUSE, OR INABILITY TO USE THIS PRODUCT OR FROM DEFECTS IN THE PRODUCT. Some states do not allow the exclusion of incidental or consequential damages, so the above limitations may not apply to you.

GARMIN retains the exclusive right to repair or replace the unit or software or offer a full refund of the purchase price at its sole discretion. SUCH REMEDY SHALL BE YOUR SOLE AND EXCLUSIVE REMEDY FOR ANY BREACH OF WARRANTY.

To obtain warranty service, contact your local Garmin Authorized Service Center. For assistance in locating a Service Center near you, call Garmin Customer Service at one of the numbers shown below.

Garmin International, Inc.
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***NOTE:** It is the responsibility of the GTX 327 owner to obtain proper licensing before using the transponder.*

***NOTE:** The coverage expected from the GTX 327 is limited to line of sight. Low altitude or aircraft antenna shielding by the aircraft itself may result in reduced range. Range can be improved by climbing to a higher altitude. It may be possible to minimize antenna shielding by locating the antenna where dead spots are only noticed during abnormal flight attitudes.*

*The GTX 327 transponder is powered on by pressing the **STBY**, **ALT**, or **ON** keys, or by a remote avionics master switch (if applicable). After power on, a start-up page is displayed while the unit performs a self test. If the unit detects an internal failure, the screen displays SELF TEST FAILED.*

Mode Selection Keys

OFF — Powers off the GTX 327. Pressing **STBY**, **ON,** or **ALT** key powers on the transponder displaying the last active identification code.

STBY — Selects the standby mode. When in standby mode, the transponder will not reply to any interrogations.

ON — Selects Mode A. In this mode, the transponder replies to interrogations, as indicated by the Reply Symbol (®). Replies do not include altitude information.

ALT — Selects Mode A and Mode C. In **ALT** mode, the transponder replies to identification and altitude interrogations as indicated by the Reply Symbol (®). Replies to altitude interrogations include the standard pressure altitude received from an external altitude source, which is not adjusted for barometric pressure. The **ALT** mode may be selected in aircraft not equipped with an optional altitude encoder; however, the reply signal will not include altitude information.

Any time the function **ON** or **ALT** is selected the transponder becomes an active part of the Air Traffic Control Radar Beacon System (ATCRBS). The transponder also responds to interrogations from TCAS equipped aircraft.

Code Selection

Code selection is done with eight keys (**0 – 7**) providing 4,096 active identification codes. Pushing one of these keys begins the code selection sequence. Digits that are not yet entered appear as dashes. The new code is activated when the fourth digit is entered. Pressing the **CLR** key moves the cursor back to the previous digit. Pressing the **CLR** key when the cursor is on the first digit of the code, or pressing the **CRSR** key during code entry, removes the cursor and cancels data entry, restoring the previous code. The **CLR** key may be pressed up to five seconds after code entry is complete to return the cursor to the fourth digit. The numbers 8 and 9 are not used for code entry, only for entering a Count Down time and for adjusting contrast and display brightness.

Keys for Other GTX 327 Functions

IDENT— Pressing the **IDENT** key activates the Special Position Identification (SPI) Pulse for 18 seconds, identifying your transponder return from others on the air traffic controller's screen. The word IDENT will appear in the upper left corner of the display during this time.

VFR— Sets the transponder code to the pre-programmed VFR code selected during installation configuration (this is set to 1200 at the factory). Pressing the **VFR** key again restores the previous identification code. If the VFR key is pressed when disabled (dependent upon installation configuration) a VFR Key Disabled message appears, to indicate that no operation took place.

FUNC— Changes the page shown on the right side of the display. Display includes Pressure Altitude, Flight Time, Count Up, and Count Down timers.

START/STOP— Starts and stops the Count Up, Count Down, and Flight timers.

CRSR— Initiates starting time entry for the Count Down timer and cancels transponder code entry.

CLR— Resets the Count Up, Count Down, and Flight timers. Cancels the previous keypress during code selection and Count Down entry. Returns cursor to the fourth code digit within five seconds after entry.

8— Reduces Contrast and Display Brightness when the respective fields are displayed (dependent upon installation configuration) and enters the number eight into the Count Down timer.

9— Increases Contrast and Display Brightness when the respective fields are displayed (dependent upon installation configuration) and enters the number nine into the Count Down timer.

Function Display

NOTE: Transponder options are normally set at time of installation. For changes to the GTX 327 parameters, contact your Garmin authorized service center.

PRESSURE ALT: Displays the altitude data supplied to the GTX 327 in feet, hundreds of feet (i.e., flight level), or meters, dependent upon installation configuration.

FLIGHT TIME: Displays the Flight Time, configured during installation as MANUAL, CLEAR, or ACCUMULATE (see Timer Operation for details). Timer is controlled by the **START/STOP** and **CLR** keys when configured as Manual.

COUNT UP TIMER: Controlled by **START/STOP** and **CLR** keys.

COUNT DOWN TIMER: Controlled by **START/STOP**, **CLR**, and **CRSR** keys. The initial Count Down time is entered with the **0 – 9** keys.

CONTRAST: This page is only displayed if manual contrast mode is selected during installation configuration. Contrast is controlled by the **8** and **9** keys.

DISPLAY: This page is only displayed if manual backlighting mode is selected during installation configuration. Backlighting is controlled by the **8** and **9** keys.

Altitude Trend Indicator

When the PRESSURE ALT page is displayed, an arrow may be displayed to the right of the altitude, indicating that the altitude is increasing or decreasing. One of two sizes of arrows may be displayed depending on the vertical speed rate. The sensitivity of these arrows is set during transponder installation.

Automatic ALT/STBY Mode Switching

If the GTX 327 is configured with Automated Airborne Determination, ALT mode selection occurs when lift-off is sensed. When the aircraft is on the ground, the transponder automatically selects and displays STBY. The transponder does not respond to ATCRBS interrogations when STBY is annunciated. When a delay time is set (dependent upon installation configuration), the GTX 327 waits the specified length of time after landing before changing to STBY mode.

ADS-B Control (GDL 90)

Automatic Dependent Surveillance-Broadcast (ADS-B) technology improves situational awareness and flight safety. With ADS-B capabilities, position, velocity, and heading information are automatically transmitted to other aircraft and ground stations. The GTX 327 provides mode control for the optional GDL 90 Universal Access Transceiver (UAT) datalink. The GDL 90 provides ADS-B capabilities.

Timer Operation

To operate the Flight Timer:

1. Press the **FUNC** key until FLIGHT TIME is displayed.
2. If the GTX 327 Flight Timer is configured as ACCUMULATE or CLEAR, the timer will begin automatically when the unit senses that the aircraft has become airborne. The timer may be reset to zero at every liftoff (CLEAR), continue accumulating time at liftoff (ACCUMULATE), or may be controlled manually (MANUAL).
3. If desired, press **START/STOP** to pause or restart the timer.
4. Press **CLR** to reset the timer to zero.
5. If the timer is configured to start automatically it will pause when the Automated Airborne Determination senses that the aircraft is on the ground.

To operate the Count Up timer:

1. Press the **FUNC** key until COUNT UP is displayed.
2. If necessary, press **CLR** to reset the Count Up timer to zero.
3. Press **START/STOP** to begin counting up.
4. Press **START/STOP** again to pause the timer.
5. Press **CLR** to reset the timer to zero.

To operate the Count Down timer:

1. Press the **FUNC** key until COUNT DOWN is displayed.
2. Press **CRSR** and use the **0 - 9** keys to set the initial time. All digits must be entered (use the **0** key to enter leading zeros).
3. Press **START/STOP** begin to counting down.
4. Press **START/STOP** again to pause the timer.
5. When the Count Down timer expires, the COUNT DOWN banner is replaced with a flashing EXPIRED, and the time begins counting up.
6. Press **CLR** to reset the timer to the initial time value.

Hodge Flight Services

Cessna 172R N9520D Avionics Manuals

GARMIN
ANGLE –OF-ATTACK (A.O.A) SYSTEM

AOA System

Owner's Manual

GARMIN

This manual reflects the operation of System Software version 2.10 for the GI 260, or later. Some differences in operation may be observed when Comparing the information in this manual to later software versions.

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CE

September, 2014 190-01773-00 Rev. A Printed in the U.S.A.

LIMITED WARRANTY

All Garmin avionics products are warranted to be free from defects in materials or workmanship for: two years from the date of purchase for new Remote-Mount and Panel-Mount products; one year from the date of purchase for new portable products and any purchased newly-overhauled products; six months for newly-overhauled products exchanged through a Garmin Authorized Service Center; and 90 days for factory repaired or newly-overhauled products exchanged at Garmin in lieu of repair. Within the applicable period, Garmin will, at its sole option, repair or replace any Components that fail in normal use. Such repairs or replacement will be made at no charge to the customer for parts or labor, provided that the customer shall be responsible for any transportation cost. This warranty does not apply to: (i) cosmetic damage, such as scratches, nicks and dents; (ii) consumable parts, such as batteries, unless product damage has occurred due to a defect in materials or workmanship; (iii) damage caused by accident, abuse, misuse, water, flood, fire, or other acts of nature or external causes; (iv) damage caused by service performed by anyone who is not an authorized service provider of Garmin; or (v) damage to a product that has been modified or altered without the written permission of Garmin. In addition, Garmin reserves the right to refuse warranty claims against products or services that are obtained and/or used in contravention of the laws of any country.

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Garmin retains the exclusive right to repair or replace (with a new or newly-overhauled replacement product) the product or software or offer a full refund of the purchase price at its sole discretion. SUCH REMEDY SHALL BE YOUR SOLE AND EXCLUSIVE REMEDY FOR ANY BREACH OF WARRANTY.

Online Auction Purchases: Products purchased through online auctions are not eligible for warranty coverage. Online auction confirmations are not accepted for warranty verification. To obtain warranty service, an original or copy of the sales receipt from the original retailer is required. Garmin will not replace missing Components from any package purchased through an online auction.

International Purchases: A separate warranty may be provided by international distributors for devices purchased outside the United States depending on the country. If applicable, this warranty is provided by the local in-country distributor and this distributor provides local service for your device. Distributor warranties are only valid in the area of intended distribution. Devices purchased in the United States or Canada must be returned to the Garmin service center in the United Kingdom, the United States, Canada, or Taiwan for service.

To obtain warranty service, contact your local Garmin Authorized Service Center. For assistance in locating a Service Center near you, visit the Garmin web site at http://www.garmin.com or contact Garmin Customer Service at 866-739-5687.

WARNING: *For safety reasons, this AOA System's operational procedures must be learned on the ground.*

CAUTION: *This AOA System does not contain any user-serviceable parts. Repairs should only be made by an authorized Garmin service center. Unauthorized repairs or modifications could void both the warranty and the pilot's authority to operate this device under FAA regulations.*

NOTE: *All visual depictions contained within this document, including screen images of the GI 260 displays, are subject to change and may not reflect the most current GI 260 software. Depictions of equipment may differ slightly from the actual equipment.*

NOTE: *This product, its packaging, and its Components contain chemicals known to the State of California to cause cancer, birth defects, or reproductive harm. This notice is being provided in accordance with California's Proposition 65. If you have any questions or would like additional information, please refer to our web site at www.garmin.com/prop65.*

NOTE: *This AOA System is non-required and is to be used only as supplemental information to the pilot. This AOA System is not to be used or substituted for a certified stall warning system. No operational credit may be taken for reduced approach speed and shorted landing distances.*

NOTE: *The approved Pilot's Operating Handbook (POH) or Airplane Flight Manual (AFM) always supersedes this Owner's Manual.*

NOTE: *Refer to the AOA System Installation Manual for calibration instructions.*

NOTE: *This AOA system is designed to be accurate in the calibrated aerodynamic configuration. When the aircraft experiences changes in the airfoil shape (e.g., flap extension or icing accumulation), the AOA indicator may no longer accurately represent the angle of attack.*

Record of Revisions			
Part Number	**Revision**	**Date**	**Description**
190-01773-00	A	09/2014	Initial release

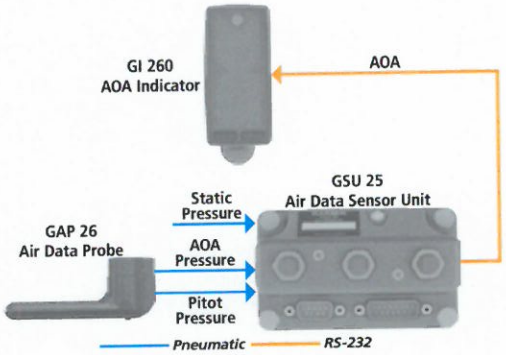
OVERVIEW

The Garmin AOA (Angle of Attack) System is designed to improve the pilot's awareness of the approximate available remaining lift of the aircraft's wings. The system calculates the approximate AOA (acute angle between the wing chord line and the relative wind) using pitot, AOA, and static air pressure inputs.

When correctly calibrated, the system provides a visual approach AOA reference, as well as increasing caution and warning annunciations as the AOA approaches the wing's maximum coefficient of lift (CLmax).

SYSTEM DESCRIPTION

The Garmin AOA System is comprised of three components; the GI 260 Indicator, the GAP 26 Probe, and the GSU 25 Air Data Computer. The GAP 26 sends pitot and AOA air pressure to the GSU 25. The GSU 25 measures the air pressure inputs from the probe and from an independent static source. The GSU 25 then calculates the AOA information and sends it to the GI 260. The GI 260 displays the AOA information to the pilot via ten color-coded LED annunciators. When calibrated correctly (refer to the AOA System Installation Manual for calibration instructions), the system indicates AOA during critical phases of flight. The system also provides awareness of AOA trends toward the target AOA for an approach, as well as visual alerting of critical AOA. When connected to an audio panel or compatible audio system, the GI 260 issues aural alerts of increasing frequency when the system approaches the critical angle of attack.



AOA System

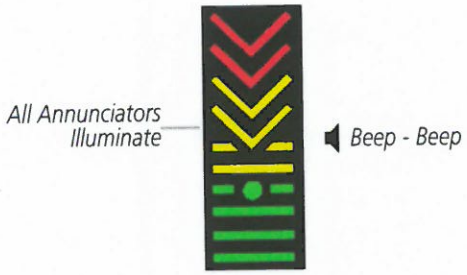
GI 260 CONTROLS

NOTE: *The **TEST** and **MUTE** functions of the GI 260 are described in this manual. Refer to the AOA System Installation Manual for information on the **CAL** (calibration) and **SET** (alert volume) functions of the GI 260.*

GI 260 Controls

SELF TEST

Press the **TEST** (CAL) button at any time to perform a self test of the GI 260. Upon successful completion of the self test, all annunciators illuminate and a "Beep - Beep" audible alert is played.



GI 260 Self Test (Pass)

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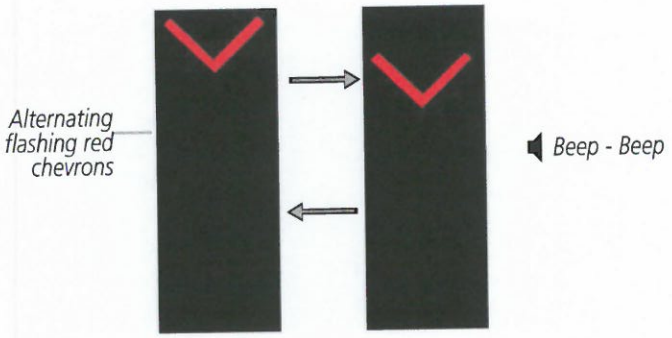
A failure is indicated by alternating flashing red chevrons and a "Beep - Beep" audible alert.



GI 260 Self Test (Fail)

MUTE

Start-Up

The system is muted by default upon start-up. The system remains muted until 15 seconds has elapsed since start-up and the Angle of Attack reaches the upper yellow chevron. The first slow audible "Beep-Beep" alert is heard when the upper yellow chevron annunciator illuminates.

Normal Operation

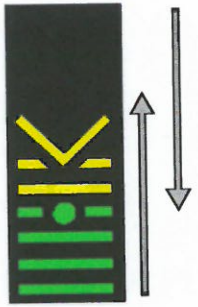
Press the **MUTE** (SET) button to mute the GI 260 audible alert. When muted manually during normal operation, the audio alert is muted for at least 15 seconds and remains muted until the upper green bar illuminates for at least five seconds.

NORMAL OPERATION

NOTE: Refer to the approved Pilot's Operating Handbook (POH) or Airplane Flight Manual (AFM) for recommended operational procedures.

POWER-UP

The AOA system is ON by default during power-up. During power-up, the unit cycles its annunciators from bottom to top and back to the bottom. For the unit to cycle its annunciators it must receive valid AOA data from the GSU 25, determine it has a valid calibration, and pass the unit self test.



GI 260 Power-Up

ARMING OF THE AOA SYSTEM

The AOA system arms automatically when the indicated airspeed exceeds 50 knots. Visual annunciations occur immediately upon arming (if applicable). Aural annunciations are delayed for 15 seconds after the system is armed.

CRUISE CONFIGURATION ANNUNCIATIONS

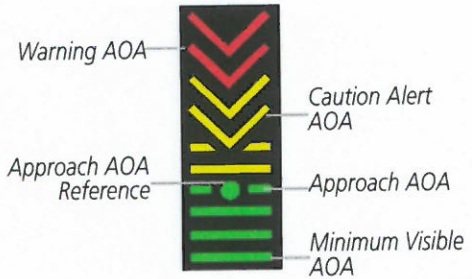
During flight at low angles of attack (cruise configuration), typically 0-1 annunciators may be illuminated.

GI 260 (Cruise Configuration)

APPROACH CONFIGURATION ANNUNCIATIONS

As the angle of attack increases beyond the cruise configuration, the Approach AOA Reference (green circle) annunciator and the green bar annunciators begin to illuminate. The Approach AOA is reached when the green bar annunciators adjacent to the Approach AOA Reference illuminate.

The first slow audible "Beep-Beep" alert is heard when the upper yellow chevron annunciator illuminates. A fast audible "Beep-Beep" alert is heard when the red Warning AOA annunciator illuminates.



GI 260 Display

APPROACH AOA REFERENCE

NOTE: *For information on calibrating the Approach AOA, refer to the calibration instructions in Appendix C of the AOA System Installation Manual.*

The Approach AOA Reference (green circle) and the adjacent green bar annunciators should be calibrated to coincide with the published approach speed (if provided), or the speed upon crossing the runway threshold that is required in order to achieve calculated (or desired) aircraft landing performance. This speed is typically equal to or greater than 1.3 times the published stall speed in the landing configuration (Vso)

LOW AOA WITH APPROACH AOA REFERENCE

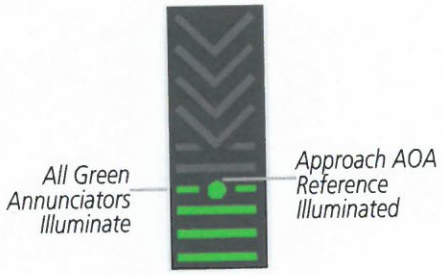
A low AOA approach is indicated by the illumination of less than four green bar annunciators and the Approach AOA Reference (green circle) annunciator.

GI 260 (Low AOA with Approach AOA Reference)

APPROACH AOA

The Approach AOA is intended to align with the landing reference speed or threshold crossing speed. In some aircraft the Approach AOA may be consistent with Vref and equal to 1.3 x Vso (stall speed in the landing configuration).

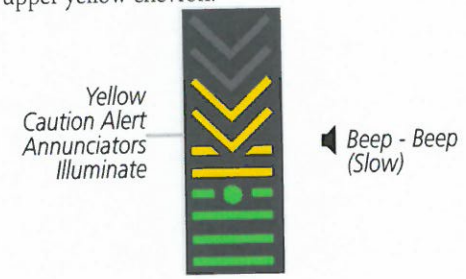
The Approach AOA is indicated by the illumination of all green bar annunciators and the Approach AOA Reference (green circle) annunciator.



GI 260 (Approach AOA)

HIGH AOA WITH AUDIBLE ALERT

A high AOA approach is indicated by the illumination of the yellow Caution Alert AOA bar/chevron annunciators. A slow audible "Beep-Beep" alert coincides with illumination of the upper yellow chevron.



GI 260 (High AOA)

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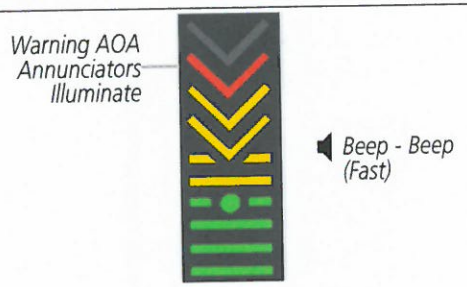
WARNING AOA WITH AUDIBLE ALERT

***NOTE:** For information on calibrating the Warning AOA, refer to the calibration instructions in Appendix C of the AOA System Installation Manual.*

The first Warning AOA chevron is intended to coincide with the calibrated flap configuration (typically the landing configuration).

The Warning AOA is indicated by the illumination of the red Warning AOA annunciators and a fast audible "Beep-Beep" alert.

***NOTE:** During the landing flare, the AOA and stall warning may not coincide precisely due to ground effect, mounting of probe, etc.*



GI 260 (Warning AOA)

EXAMPLE APPROACH

***WARNING:** This AOA System is non-required and is to be used only as supplemental information to the pilot, and may not be used as a substitution for the certified aircraft stall warning system.*

A correctly calibrated AOA System will provide a linear increase in the AOA indication as the aircraft slows. The bottom red Warning AOA chevron is intended to coincide with the calibrated flap configuration (typically the landing configuration). It is recommended to simulate an approach to landing at a safe altitude to ensure that the lower Warning AOA chevron illuminates concurrently or prior to the first indication of the certified stall warning horn in the landing configuration.

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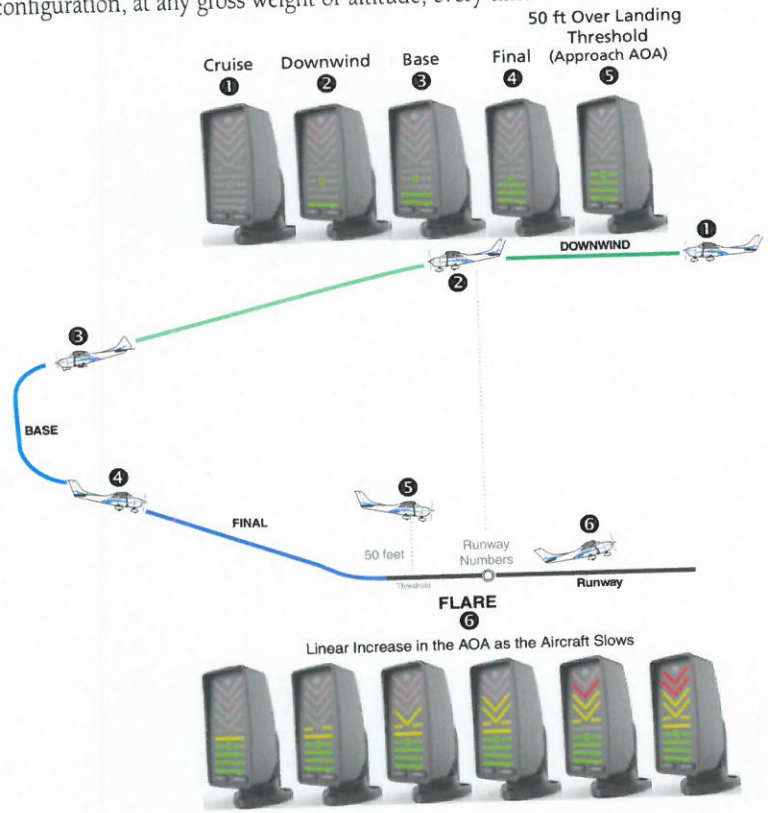
The Approach AOA should be calibrated (refer to Appendix C of the AOA System Installation Manual) at an acceptable margin above CLmax to fly an approach. As a starting point, use the aircraft manual to determine the stall speed of the aircraft at the **actual gross weight** in the landing configuration. Multiply the calibrated airspeed by 1.3, then convert from calibrated airspeed to indicated airspeed (if necessary). Once the AOA angles have been calibrated, they will be accurate in the calibrated flap configuration, at any gross weight or altitude, every time.



Example Indications for a Typical Decelerating Approach and Flare

ABNORMAL OPERATION

AOA SYSTEM FAILURE

In the event that the GI 260 or the AOA system is malfunctioning, the unit can be powered-down by pulling the associated circuit breaker.

NUISANCE ALERTS

In the event that the AOA System is providing nuisance alerts, press the **MUTE** (SET) button to mute the GI 260 audible alerts. The audio remains muted for at least 15 seconds and remains muted until the upper green bar illuminates for at least five seconds.