AH3 User Guide

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Registering Your AH3

Please send an email to sz_cfi@163.com to register your AH3. Registering your product with CFI ensures that your contact information is up-to-date. This helps verify product ownership, can expedite warranty claims, and allows us to notify you in the event a service bulletin is published for your product. You can also optionally sign up to receive other CFI news and product announcements. CFI will not share your contact information with third parties or send you announcements without your explicit consent.

Please provide the following information when registering:

- Product model;
- Product serial number;
- Purchase date;
- Purchase location or store or distributor;
- Do you accept our service announcement for the AH3;
- Do you accept our CFI news and announcement for other products.

Limited Warranty

CFI warrants this product to be free from defects in materials or workmanship for one (1) year from date of shipment. CFI 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. The customer is, however, responsible for any transportation cost. This warranty does not cover failures due to abuse, misuse, accident, improper installation or unauthorized alteration or repairs.

THE WARRANTIES AND REMEDIES CONTAINED HEREIN ARE EXCLUSIVE, AND IN LIEU OF ALL OTHER WARRANTIES

EXPRESSED OR IMPLIED, INCLUDING ANY LIABILITY ARISING UNDER WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE, STATUTORY OR OTHERWISE.

IN NO EVENT SHALL CFI 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.

CFI retains the exclusive right to repair or replace the instrument or firmware 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.

CFI' products incorporate a variety of precise, calibrated electronics. Except for external accessories, this device does not contain any field/user-serviceable parts.

Units that have been found to have been taken apart may not be eligible for repair under warranty.

Revision History

Revision category	Revision Date	Description
Ordinary	2020-09-10	Supplement about the reference barometric adjustment method.

Table of Contents

1. Safety information

Lithium battery related safety incidents are much more likely to occur during the charging process or transportation. With this consideration, we do not supply the AH3 with batteries. Batteries, if needed, can be purchased by users from professional battery suppliers. It is recommended to use power banks with capacity greater than 1000 mAh – preferably those with clear indication of the remaining capacity. A full capacity of 1000 mAh can keep the AH3 working for at least one hour. The USB port on the back of the AH3 can be used to connect to a power bank. We enclose a USB cable for connection and a bag to hold the power bank. The power bank and its bag should be placed in a safe place on the aircraft - such as the side of the cockpit , i.e., anywhere the batteries can be easily found and taken off the aircraft for recharging but will not fall off or be thrown out involuntarily.

The normal usage of the AH3 only needs the power supply on aircraft, 10 ~ 30 VDC voltage. It is only when the power supply on aircraft fails, the AH3 will switch to source power from the standby battery/power bank.

2. Product Profile & Installation

The AH3 LCD Attitude Indicator & Standby Instruments System has integrated a GPS system, an attitude gyroscope and a MEMS pressure sensor, together with a 3.5 " LCD display.
The AH3 can display the following parameters:

- ATTITUDE(Pitch & roll)
- SLIP
- HEADING(GPS track)
- ALTITUDE
- AIRSPEED
- VERTICAL SPEED

Factory mode is set to use barometric to determine altitude and airspeed, not at the GPS altitude and ground speed. This default setting is considered more suitable for conventional flying usage. Static and dynamic barometric needs to be connected to the AH3 in this case. The AH3 can also be set to GPS altitude and ground speed mode. Heading, GPS altitude and ground speed are all derived from GPS therefore depend on the correct functioning of GPS.

The AH3 uses MicroSD card as the storage solution - enabling large data storage capacity and can store flight records for tens of thousands of hours. Stored flight records can be exported via USB portal.

It is an n-in-1 gauge. As a backup instrument, it integrates attitude indicator, altimeter, airspeed indicator and compass. It also has vertical speed and slip indication.

The AH3 can be used as a digital supplement to the traditional aircraft dashboard. It not only adds the artificial horizon, but also has more accurate altimeter, airspeed indicator, vertical speed indicator, compass and slip indicator as backup and reference. It also enables the aircraft to store flight records and stride into the era of digital display.

As the AH3 does not have CTSO, TSO etc authorization from the CAAC, the FAA or other regulatory body, it can not be used to replace any required flight instruments in type certification aircraft unless the AH3 is certified together with the aircraft or subsequently certified for this purpose.

If the AH3 is set to ground speed, GPS altitude and GPS vertical speed mode, these parameters are GPS-derived, so their indications WILL BE DIFFERENT from the airspeed, altimeter, VSI, and heading instruments in your aircraft panel. The AH3's GPS-based indications should not be considered replacements for any of these primary aircraft instruments.

Main technical parameters:

- Monitor size: 93 x 84.6 x 34.2mm;
- Monitor weight: 0.35kg;
- Active display area: 70.08×52.56mm2(3.5");
- Resolution: 320×240;
- LCD: TFT;
- Brightness: 450 cd/m2;
- Viewing angle: 60° left & right& up, 40° down;
- Working voltage: 10~30 VDC;
- Power: ＜5W;
- Storage: MicroSD card;
- Operating temperature: -20~+70°C;
- Storage temperature: -30~+80°C;
- Humidity: ≤ 40°C, 85%RH M

Figure 1

Figure 1 shows the back of the AH3. The USB port is used to connect the standby power supply (battery / power bank). It can also be used to transfer the flight data stored on the MicroSD card. There are two barometric ports on the right hand side. The upper one is the dynamic barometric port, and the lower one is the static barometric port. There is also a DB9 power supply socket on the right side. The golden part on top of the AH3 is the GPS antenna. Please do not shield it.

Note: There are also a very small number of LSA with metal skins on the nose. In this case, the GPS signal will be completely shielded, and the AH3 cannot be used, or there will be no heading indication when using the AH3. When the AH3 is set to ground speed, GPS altitude and GPS vertical speed mode, there will be no corresponding indication. The corresponding indication would be '- - -'.

Figure 2 shows the front and main display of the AH3. The micro USB port on the top is for data transfer only. This USB port is not for connecting to the standby power supply (battery/power bank). In the middle of the upper is the power switch of the AH3. When the switch is toggled to the left, neither the power supply on the aircraft nor the standby power supply (battery / power bank) is used. Click on the settings symbol in the upper left corner of the interface to enter the settings menu.

Figure 2

Installation information: The AH3 adopts the installation dimension of traditional instruments - can be installed directly on an empty standard 3-1/8" instrument hole(diameter 80mm).   Note: There are two mounting screws attached to the mounting holes - at the left and right hand side of the instrument below the display screen. The screw-in depth of the two screws is strictly limited. The screw-in depth should not exceed 3 mm from the end of the screw hole. Excessive length and forced screw-in may cause permanent damage to the display screen located behind the screw hole.

BD9 power socket： 7# pin —— positive;   9# pin —— negative

3. Instructions for use

Put the switch on the top of the interface to ON and wait a moment for the AH3 to initialize.

3.1 Graphic Elements

Figure 3 shows the main screen of the AH3. On the left of the screen is the airspeed indicator. The current speed is shown in the black box. The airspeed units are km/h or mph or knots. The GPS-based speed indicator can also be selected. When the speed is the ground speed, 'GS' will appear above the black speed indicator box.

On the right of the screen is the altimeter and the vertical speed indicator. The black box shows the current altitude. The altitude unit can be switched between m and ft. The pink horizontal ▲ is the vertical speed indicator, the

Figure 3

corresponding units are m/s and kft/min. Below the altimeter is the reference barometric. The reference barometric unit has a choice of mbar or inHg. Click on the reference barometric box and ⊞ ⊟ buttons will pop up on the top of it. Press them to adjust the reference barometric value. The altimeter and vertical velocity indicator can also be selected as GPS-based. When based on GPS, there is no reference barometric displayed and 'GPS' appear above the altitude black indicator box.

In the middle of the main screen is the pitch indicator area, the black ⌐•⌐ is the aircraft sign, the upper part is the roll indicator dial, and the yellow ▲ is the roll indicator. The black ball and two white vertical lines at the bottom of the main picture are slip/skid indicators.

The upper part of the main screen is the heading scale, and the black box shows the current heading. The heading is based on GPS's track heading. it is displayed when the AH3 built-in GPS module is well positioned by satellite and moving speed is greater than 0.3 m/s, otherwise '- - -' will be shown.

The upper right corner shows the strength symbol for the satellite signal. When the satellite positioning is not successful, there is a red ✕ on the symbol. When the satellite positioning is successful, ✕ disappears, and the strength symbol is filled from left to right according to the strength of the satellite signal.

The white gear at the upper left corner is the settings symbol. Click on it to enter the settings menu.
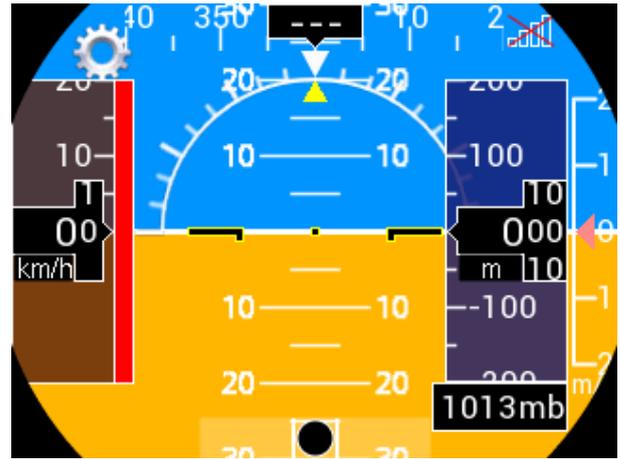
3.2 Set up

3.2.1 Settings menu

From the main screen, click on the white gear symbol at the upper left corner to enter the settings menu (Figure 4).
The following actions can be made in the settings menu:

- Switch height units. Click the first button on the right to switch the altitude unit between m and ft, and the vertical speed unit between m/s and kft/min.
- Switch the reference barometric unit. Click the second button on the right to switch the reference barometric unit between mbar and inHg.
- Altitude clearing. Click on the blue button ZERO ALT on the left, the AH3 will take the current barometric value sensed as the local barometric value. In airports without a control tower, this is a good and practical

Figure 4

method.

- The next layer settings menu. Click ASI SETUP, ATT SETUP and SYSTEM to enter the airspeed settings menu, attitude settings menu and system settings menu respectively.

The gray button in the lower left corner is the system demo status switch key. Click to switch between Demo off and Demo on, i.e., to make the system switch between normal working state and demo state.

Click RETURN to go back to the main screen.

3.2.2 Airspeed settings menu

Click ASI SETUP on the Settings menu to enter the airspeed settings menu (Figure 5).

The following actions can be made in the airspeed settings menu:

- Switch airspeed units. Click the first button on the right to switch the speed unit between km/h and mph and knots.
- Airspeed Calibration. The aircraft Pitot system may have some error, resulting in some error between the values indicated on the instrument and the actual airspeed. AH3 designed the airspeed correction function. If a constant error is observed in the Pitot system, you can click the + and - keys in the

Figure 5

Airspeed Calibration box, and click +/- once, the correction coefficient is added or subtracted by 1%. The maximum correction range is ≤30%. That is to say, the correction coefficient can be 70%-130%.

- Zero correction. If the airspeed shown in AH3 does not read 0 when the actual airspeed is 0, click on Zero AS in the lower left corner of the screen to make the airspeed display zero. Please note that while calibrating, the pressures at the 'P' and 'S' ports (Fig. Right) must be equal. It is recommended to connect temporarily the two ports with a tube.
- Adjust the airspeed colour marked. Click the ⊕ and ⊙ keys corresponding to Vs0 to Vne etc. to adjust the colour marked of each section of airspeed.
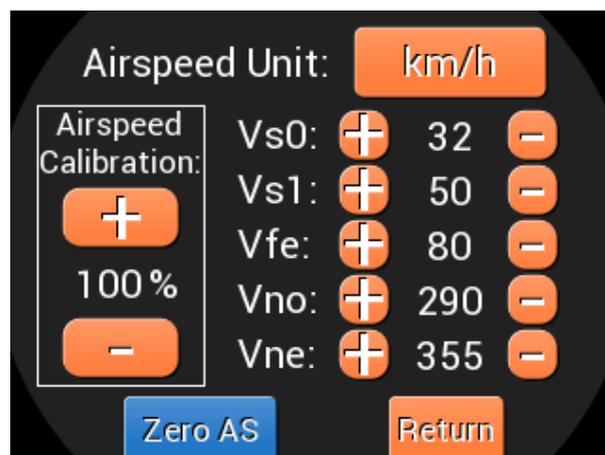
Click RETURN to go back to the previous layer screen.

3.2.3 Attitude settings menu

Click ATT SETUP on the Settings menu to enter the attitude settings menu (Figure 6).

The following actions can be made in the attitude settings menu:

- When an aircraft or AH3 is in a horizontal or required, non-horizontal but still state, click Zero Pitch to zero the pitch, click Zero Roll to zero the roll, click Zero Slip to zero the slip.

Click Reset to reset the attitude reference system.

Click RETURN to go back to the previous layer screen.
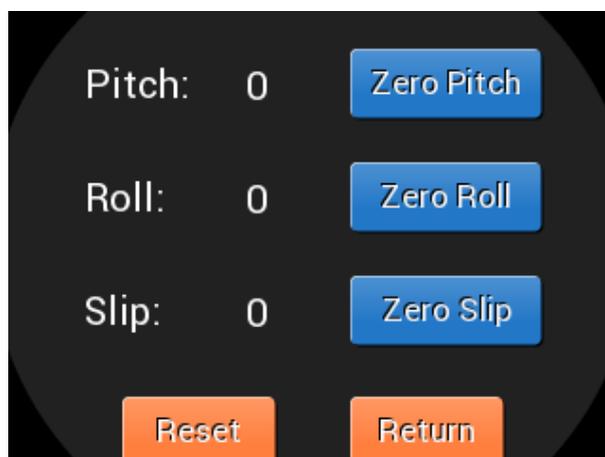
Figure 6

3.2.4 System settings menu

Click SYSTEM on the Settings menu to enter the system settings menu (Figure 7).

The UTC Time transmitted by GPS and the Local(System) Time are displayed in the system settings menu, and the Greenwich Time is indicated correctly when the GPS module is positioned effectively, otherwise, 1999-1-1···-1 will be displayed. System time will be automatically calibrated with Greenwich time.

The following actions can be made in the system settings menu:

- Time zone settings. According to your time zone, click the ⊕ and ⊙ keys to adjust the time zone, the eastern zone is +, the Western Zone is -.
- Based on Pitot and GPS. AH3 factory settings are that altitude & airspeed are based on barometric. If it needs to be changed to GPS-derived, click the buttons on the right side of AS Mode and ALT Mode, switch between Pitot and GPS.
- Screen calibration. Click the TS Cal in the lower left corner to enter the screen calibration, click the flicker point on the screen and calibrate the base point of the screen.
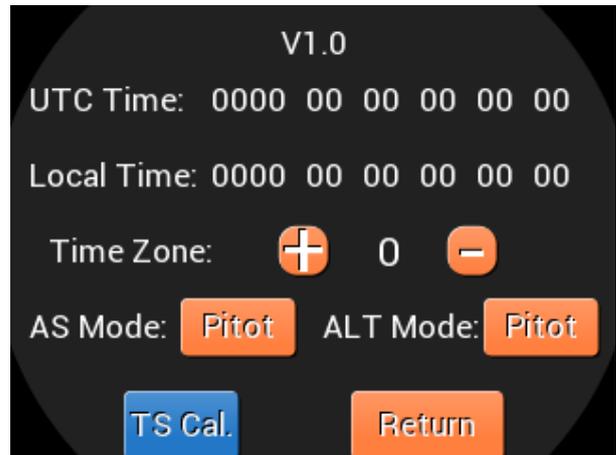
Figure 7

Click RETURN to go back to the previous layer screen.

3.3 Performance Notes

3.3.1 GPS module

3.3.1.1 When GPS starts, it takes about 100 seconds to obtain a GPS fix (without shield and with good view of the sky), and less than 5 seconds to fix again after losing fix.

3.3.1.2 When there is no displacement or less than 0.3 m/s moving speed, heading indication will either be off or not necessarily correct. When it enters a sheltered space (such as hangar and basement), though it may still show some satellite signal strength, the direction indicated is not necessarily correct.

3.3.2 Attitude reference module

3.3.2.1 Rotation rate limit

The AH3 will operate normally with rotational rates of up to 150 degree per second around any axis. If a rate of 150 degrees per second is exceeded, HORIZON RECOVERING will be displayed along the bottom of the display. The AH3 will continue to display attitude information, but it should be cross-checked against other instruments while in this recovery mode. After a few seconds of straight and level flight, the HORIZON RECOVERING message will automatically disappear when the AH3 is confident that it is showing the correct attitude.

3.3.2.2 Aerobatics and non-standard maneuvers

The AH3's attitude sensing algorithm is based on fixed wing aircraft flight dynamics. Using the AH3 during aerobatics or other maneuvers that are not encountered during normal fixed wing aircraft flight may cause the AH3's attitude indicator to lag the actual horizon or be otherwise incorrect. This will especially be true if the maneuvers being performed exceed 150 degrees per second as described above. However, once straight and level flight is resumed for a short period, the AH3 will automatically recover and display the correct attitude. Additionally, no aerobatic flight maneuver will cause any permanent damage to the D3's attitude sensing ability.

3.4 Reading of Flight Data

3.4.1 Connect the computer

Turn off the AH3 power switch, confirm that AH3 is shut down, prepare a microUSB cable to access the front microUSB interface of AH3, insert the other end of the line into the computer, then turn on the AH3 power switch, the computer will recognize AH3 as a U disk.
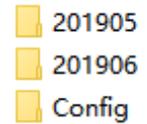
3.4.2 Data Fetch

Open the newly recognized U disk folder and see the directory similar to Figure 8.

The flight data is a folder every month. When the folder is opened, there will be a data file as shown in Figure 9. The number before '.dat' represents the date.

📁 201905
📁 201906
📁 Config

Figure 8

📄 01.dat	2019/6/1 12:40
📄 02.dat	2019/6/2 18:28
📄 03.dat	2019/6/3 19:19
📄 04.dat	2019/6/4 19:03
📄 05.dat	2019/6/5 1:31
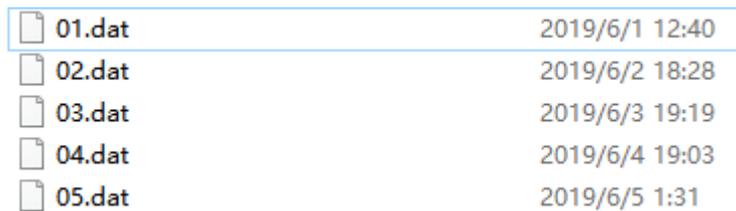
Figure 9

3.3 Data Format

Open the data file with Notepad or Excel, as shown in Figure 10:

Time	ALT	AS	VS	PITCH	ROLL	SLIP	HEAD	GPSALT	GPSGS	GPSVS	LAT	LON
10:43:45	11	6	0	-228	35721	254	18522	3	1	2	3128.59215	12016.33014
10:43:46	11	6	0	-227	35717	258	18522	3	0	1	3128.59211	12016.33012
10:43:47	11	6	0	-231	35714	254	18522	3	0	1	3128.59211	12016.33010
10:43:48	11	6	21	-232	35714	254	18522	3	0	0	3128.59211	12016.33010
10:43:49	11	7	17	-221	35720	256	18522	3	0	0	3128.59212	12016.33010
10:43:50	11	7	23	-227	35719	247	18522	3	0	-1	3128.59213	12016.33010
10:43:51	11	6	19	-240	35726	252	18522	3	0	-2	3128.59215	12016.33010
10:43:52	11	6	-23	-250	35726	254	18522	3	0	-2	3128.59216	12016.33010
10:43:53	11	5	0	-252	35727	252	18522	3	0	-3	3128.59217	12016.33009

Figure 10

Data Format:

Symbol	Name	Units
Time	Recording time	Hour: minute: second
ALT	Barometric altitude	m
AS	Airspeed	0.01m/s
VS	Vertical speed	0.01m/s
PITCH	Angle of pitch	0.01°
ROLL	Angle of roll	0.01°
SLIP	Angle of slip	0.01°
HEAD	Heading	0.01°
GPSALT	GPS altitude	m
GPSGS	GPS ground speed	km/h
GPSVS	GPS vertical speed	0.01m/s
LAT	Latitude	°, Positive numbers represent north latitude and negative numbers represent South latitude
LON	Longitude	°, Positive numbers represent the Eastern Meridian and negative numbers represent the Western Meridian

4. Troubleshooting

Problem Description	Possible Cause	Solution
The AH3 does not power on	On-board power supply failure, and standby battery are not connected or have been fully discharged.	Check the on-borne power supply and connection plug; verify that the standby battery has a power reserve and is connected to the back USB port.
The airspeed shown in AH3 does not read 0 when the actual airspeed is 0	The airspeed indicator needs zero calibration	Go to airspeed settings menu > zero calibration, see 3.2.2
Incorrect pitch, roll and slip angle	AH3 is not calibrated attitude or need to be recalibrated	After AH3 is installed, when the aircraft is in a horizontal state, go to Attitude settings menu, Pitch/Roll/Slip Adjust to align, see 3.2.3. Adjust until the displayed attitude matches the aircraft attitude
The AH3's track indication and/or ground speed, GPS altitude does not match my other aircraft instruments	This is expected behavior	That are GPS based and their indication is not entirely consistent with the other magnetic and the barometric-derived instrument that permanently-mounted in your aircraft.

5. Screen Care

Use a dry, clean, soft cloth to clean the screen. Do not use soap, chemicals, or abrasives to avoid damaging the screen. You may also use commercially available wipes that are designed specifically for LCD screen cleaning. soft cloth. Never use water or solvents when attempting to clean the display.

Avoid excessive pressure to the display to prevent damage to the LCD (Liquid Crystal Display). Take care to prevent impacts to the screen to prevent cracking the display.