

DYNON AVIONICS

AOA/Pitot Probe

P/N 100141-000

Heated AOA/Pitot Probe

P/N 100667-000

Installation Guide

*This product is not TSO'd and cannot be installed into traditional
FAA Part 23 and similarly type-certificated aircraft*

Document 100740-001, Revision C

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These instruments are not intended for use in type certificated aircraft at this time. Dynon Avionics makes no claim as to the suitability of its products in connection with FAR 91.205.

Dynon Avionics' products incorporate a variety of precise, sensitive electronics. SkyView products do not contain any field/user-serviceable parts. Units found to have been taken apart may not be eligible for repair under warranty. Additionally, once a Dynon Avionics unit is opened up, it is not considered airworthy and must be serviced at the factory.

Dynon Avionics Returns and Warranty web page can be found at <http://support.dynonavionics.com>.

Revision History

Revision	Revision Date	Description
A	February 2007	Initial release P/N 100740-000
B	February 2007	Changed references to the tube being sealable to note the likelihood of a leak. Document number remains 100740-000
C	October 2014	Combined AOA/Pitot Probe Installation Manual and Heated AOA/Pitot Probe Installation Manual. Extensively updated concurrent with release of redesigned Heated AOA/Pitot Probe. Document number changed to 100740-001.

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1. INTRODUCTION



The symbol to the left indicates information which merits special attention.



The symbol to the left indicates a handy installation tip.

Thank you for your purchase of the AOA/Pitot Probe (Dynon Avionics P/N 100141-000) or the Heated AOA/Pitot Probe (Dynon Avionics P/N 100667-000). This guide provides some background on the concept of angle of attack and explains the steps to install both units in your aircraft.

This manual does not address installation of the Dynon Avionics AOA/Pitot *Boom* Probe, P/N 100532-000.

The two probes are compatible with the following Dynon Avionics products:

- EFIS-D6
- EFIS-D60
- EFIS-D10A
- EFIS-D100
- FlightDEK-D180
- SkyView system

(Hereafter, the EFIS-x and FlightDEK-D180 are referred to as “EFIS unit”).



AOA/Pitot Probes and AOA products from Advanced Flight Systems, Inc. (AFS)

The Dynon Avionics (DA) AOA/Pitot Probe is functionally equivalent to the AFS AF-Pitot AOA Pitot Probe. The DA Heated AOA/Pitot Probe is functionally equivalent to the AFS AF-Pitot Heated. Instructions for installation of AOA/Pitot Probe and Heated AOA/Pitot Probe with AFS products are in the AFS product manuals at <http://advanced-flight-systems.com>.

After physical installation is complete, the AOA/Pitot Probe must be calibrated for your airplane and your system. Instructions for AOA/Pitot Probe calibration are contained in the Installation manual for each compatible Dynon Avionics system. Installation manuals for these products can be found at: <http://docs.dynonavionics.com>.

The pitot function of the Dynon AOA pitot probe measures pitot pressure. This allows it to work with any standard airspeed indicator. However, the AOA functionality is designed specifically to work with Dynon Avionics and Advanced Flight Systems products. Do not expect a Dynon Avionics AOA/Pitot Probe or Heated AOA/Pitot Probe to work properly with any AOA system other than those of Dynon Avionics or Advanced Flight Systems.



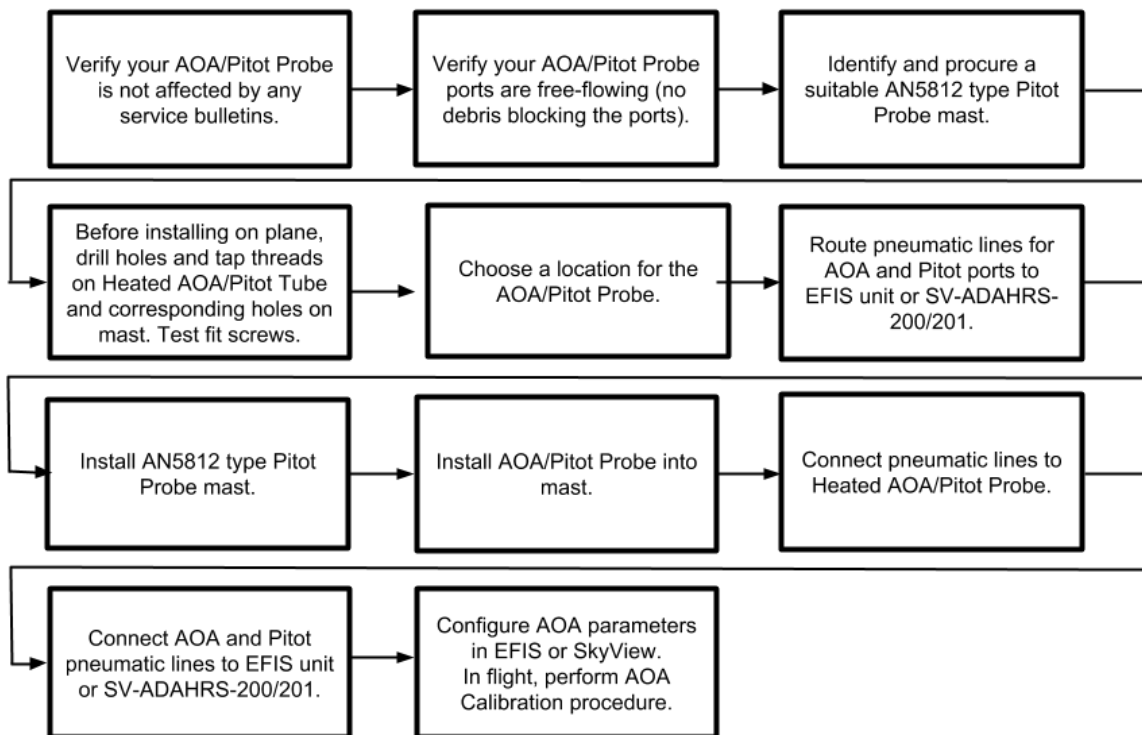
To display angle of attack on a Dynon Avionics EFIS unit or SkyView System, *only a Dynon Avionics AOA/Pitot Probe or Heated AOA/Pitot Probe is supported*. Using another manufacturer's or homemade AOA/Pitot probe may not produce accurate AOA information.



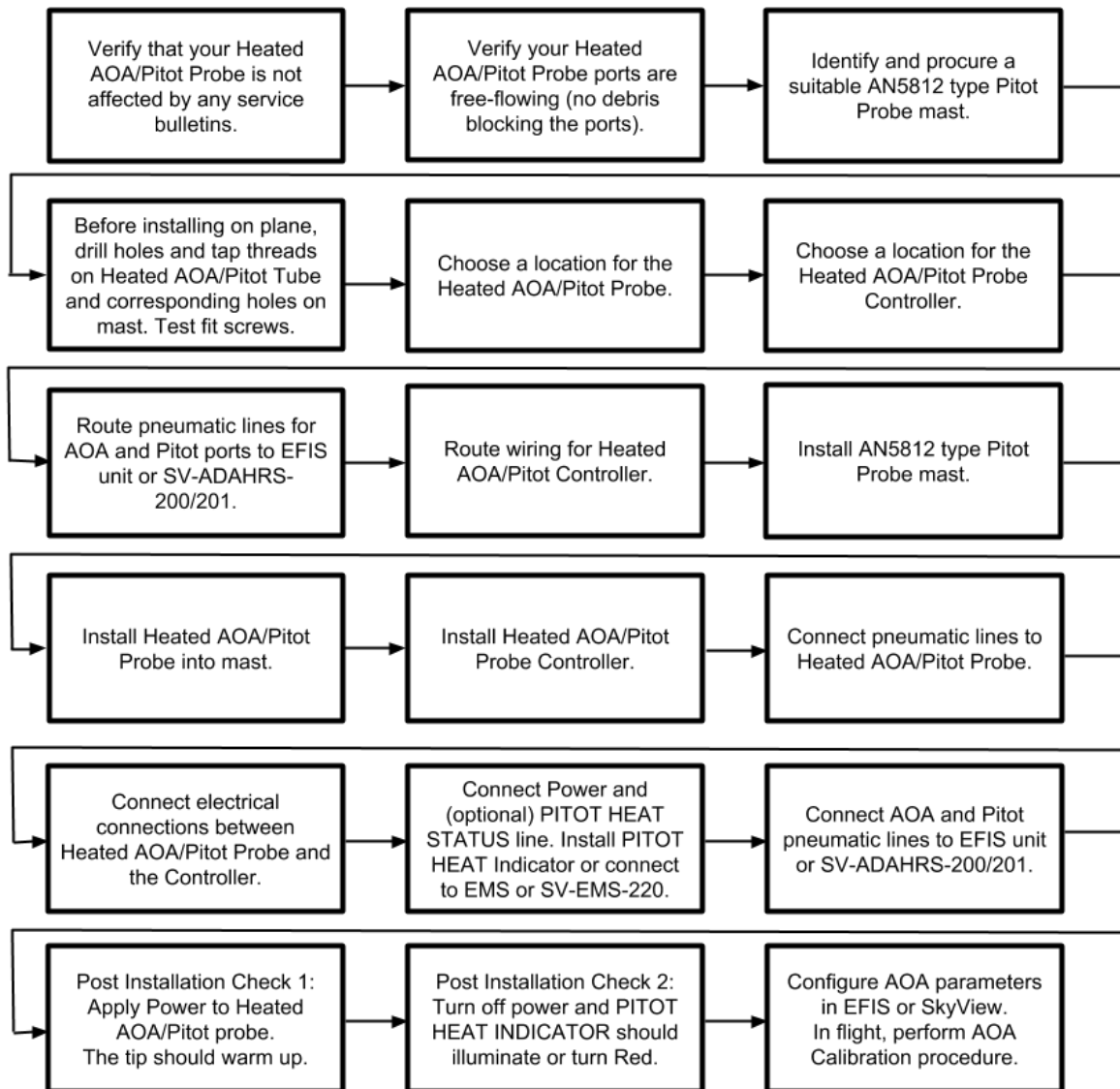
To ensure accuracy, it is very important that you install the probe correctly and perform the specified calibration steps. We recommend that you read and understand this entire manual and the corresponding calibration procedure in your EFIS unit's Installation Manual or SkyView System Installation Guide before proceeding with installation.



The exterior of Dynon Avionics' AOA/Pitot Probes and Heated AOA/Pitot Probes exterior are plated. Do not polish the probe – doing so could abrade the finish.



Block diagram of major steps for installation of AOA/Pitot Probe



Block diagram of major steps for installation of Heated AOA/Pitot Probe



AOA Calculation: Principles of Operation

Most pilots are introduced to the concept of angle of attack (AOA) during their initial flight training. However, as most GA aircraft do not provide a way to directly measure this critical flight parameter.

WHAT IS ANGLE OF ATTACK, WHY IS IT IMPORTANT, AND WHO USES IT?

Angle of attack is quite simply the angle between the wing chord and the oncoming air that the wing is flying through. This is an important concept, as aircraft wings stall when angle of attack gets too large, at a value known as the “critical” angle of attack. As pilots are taught in flight training, an aircraft can stall at ANY speed if this critical angle of attack is exceeded. Hence, a great way to avoid stalls is to not let the angle of attack reach critical, and the best way to avoid critical angle of attack is to know what your angle of attack is in the first place.

Navy pilots know angle of attack well. On carrier approach, they use angle of attack measurement almost exclusively to determine if they are set up correctly for their “trap”. If their angle of attack is too high, they risk stall before reaching the carrier. If it is too low they will be carrying too much speed to land safely on the small patch of available deck space.

Airliners also rely on angle of attack information. Some make it directly available to the pilot via a dedicated gauge or readout. Others incorporate it into the data that it uses to warn pilots about impending stalls via stick shakers and other annunciators. In both cases, the pilot is able to make better decisions because they are able to incorporate information about the measured performance of their aircraft.

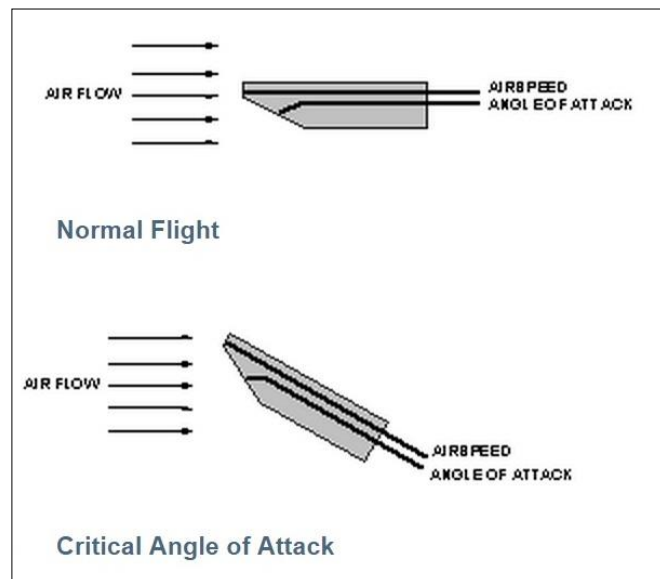
DYNON AVIONICS' AOA/PITOT PROBE

Dynon Avionics was the first manufacturer of affordable EFIS products to offer a way to measure angle of attack. Through extensive wind tunnel testing, Dynon is able to offer an angle of attack (AOA) / Pitot Probe that allows both angle of attack and airspeed to be measured when connected to the EFIS unit or SkyView system. AOA can be shown graphically on Dynon displays and optionally listened to via audible alerting that intensifies as the critical angle of attack (stall) approaches.

AIRFLOW: PRINCIPLES OF OPERATION

The concept behind Dynon's design is illustrated in the diagrams at right. The Dynon Avionics AOA/Pitot probe performs two functions: airspeed sensing and angle of attack sensing. These functions require having two pressure ports on the tip of the probe. The normal pitot pressure port is on the front face of the probe and is designed to be insensitive to angle of attack. The second pressure port is located on an angled surface just under the pitot port and is designed to be very sensitive to AOA.

The pressure from each port is delivered via separate pneumatic lines to the EFIS unit or SkyView System's ADAHRS module(s). Those pressures are compared to previously calibrated scenarios specific to that aircraft to calculate the current angle of attack.



EASY INSTALLATION AND CALIBRATION

Unlike other AOA instruments available to homebuilders, the Dynon Avionics AOA/Pitot probes do not require you to drill special ports in wing skins. It also does not have any moving parts such as vanes. It is simply an AN5812-style pitot tube with an additional pressure port to measure AOA. Simply use it as a normal pitot tube. The only difference is a second plumbing line which runs back to the EFIS products or the SkyView SV-ADAHRS-200/201(s) for AOA calculation.

Once installed, the AOA/Pitot is calibrated to the individual aircraft by performing a series of pitch oscillations and stalls in various flight configurations. All calibration procedures are performed via button pushes on the EFIS unit or SkyView display.

PRESENTATION

As shown on the right, angle of attack is displayed as a vertical color-coded tape with

- Red (down arrow at top)
- Yellow (down / horizontal lines in middle)
- Green (horizontal lines at bottom).

Once calibrated, critical angle of attack will be indicated with the pointer positioned in the red area of the tape.



An audio alarm can also be generated as AOA becomes critical. It can be set as either a steady tone that sounds very near the critical AOA, or alternatively as a progressive beeping tone that



starts as AOA becomes moderately high and increases in frequency until it is a solid tone very near the critical AOA.

Heating: Principles of Operation

Dynon Avionics Heated AOA/Pitot Probe utilizes a heating element whose temperature is accurately measured and regulated by a microprocessor-based controller. The controller monitors a temperature sensor embedded within the pitot body to regulate the heat for the front half of the Probe to a constant temperature. There are several advantages to this, including:

- Lower power consumption,
- Increased heating element lifespan,
- Much cooler pitot on the ground when de-icing is not necessary.

This technique ensures that the pitot can be rapidly de-iced if required, but does not needlessly waste electrical power when not in icing conditions.

The controller module is remotely mounted, in the wing near the probe, or elsewhere. See Probe to Controller Wiring, and Controller Power Wiring for wiring considerations on where to mount the controller.



While the Heated AOA/Pitot Probe does not operate like a normal (when switched on, always hot) heated pitot, *it will still get hot in normal ambient temperatures.* When turned on, it will soon regulate its internal temperature to about 158° F (70° C) to 176°F (80°C). Initial temperatures can be as high as 194°F (90°C). These temperatures can cause a burn if touched with bare skin for long.

FAILURE WARNING

The controller for the Dynon Avionics Heated AOA/Pitot Probe is designed to meet the indication requirements of FAR 23.1326 by providing an output that can illuminate a PITOT HEAT STATUS warning indicator in the cockpit whenever the probe heater is turned off or is not functioning properly. While this is not required for Experimental and LSA category aircraft, this feature provides feedback that your Heated AOA/Pitot Probe's heater is working as designed.

FURTHER READING ON ANGLE OF ATTACK

Like many aspects of flight, AOA is a simple concept that needs to be well understood to be truly useful. The following are some resources that explain AOA and its application:

- John S. Denker: "See How it Flies" website, Angle of Attack Awareness and Angle of Attack Management - <http://www.av8n.com/how/htm/aoa.html>.
- AOPA Air Safety Foundation online article "The Angle's the Thing" - <http://www.aopa.org/News-and-Video/All-News/1994/August/1/The-angles-the-thing>.

2. TECHNICAL SERVICE BULLETIN FOR HEATED AOA/PITOT PROBE

On May 6, 2014, Dynon Avionics issued a Technical Service Bulletin that discussed an issue with previously-manufactured Dynon Avionics Heated AOA/Pitot Probes (P/N 100667-000). It was subsequently updated in October 2014 with instructions to obtain a redesigned probe that fixes the identified issue. Customers that have Heated AOA/Pitot Probes that are affected by this Technical Service Bulletin should not proceed with installation. Your probe should be replaced via Dynon's Heated AOA/Pitot Probe replacement program.

For details, see the latest Heated AOA/Pitot Probe Service Bulletin at http://www.dynonavionics.com/docs/support_bulletins.html.

UNAFFECTED PRODUCTS

This Technical Service Bulletin *does not affect*:

- Controller module (P/N 100640-000) for the Dynon Avionics Heated AOA/Pitot Probe
- Dynon Avionics AOA/Pitot Probe P/N 100141-000
- Dynon Avionics AOA/Pitot Boom Probe P/N 100532-000

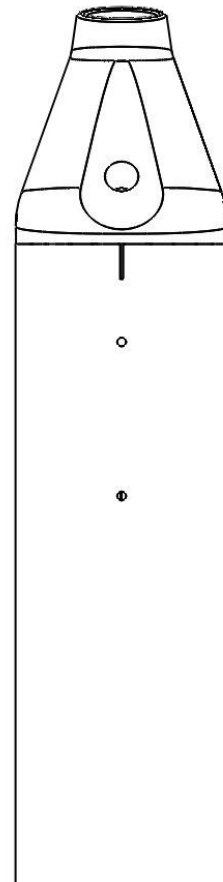
If you are installing a Dynon Avionics Heated AOA/Pitot Probe, ensure that the unit you have is not affected by the Technical Service Bulletin by comparing your probe to the illustration at right. Orient your probe snout up, looking at the bottom side of the Probe opposite the mounting "elbow".

If your Dynon Avionics Heated AOA/Pitot Probe matches the illustration at right – has two pin-size drainage holes along the centerline, directly behind the snout, your unit is not affected by this Technical Service Bulletin and no action is required; continue the installation.

AFFECTED PRODUCTS

If either of the following criteria are met, your Heated AOA/Pitot Probe is affected by this Technical Service Bulletin and should be returned to Dynon Avionics to exchange it for the redesigned part:

- Any Heated AOA/Pitot Probe sold before October 2014 is affected by this Technical Service Bulletin.
- Any Heated AOA/Pitot Probe with a serial number lower than 6000 is affected by this Technical Service Bulletin. On affected Heated AOA/Pitot Probes, the serial number is etched on the mounting flange that is normally recessed into a mounting bracket. The



**Illustration of an
UNAFFECTED Heated
AOA/Pitot Probe**



Heated AOA/Pitot Probe's controller has its own unique serial number that cannot be used to identify affected Heated AOA/Pitot Probes.



If your Heated AOA/Pitot Probe is replaced as part of the Technical Service Bulletin, after installing the replacement Heated AOA/Pitot Probe, you should re-perform the AOA Calibration procedures in your EFIS unit or SkyView System's Installation Manual to ensure correct angle of attack is displayed.

3. HEATER CONTROLLER MOUNTING AND WIRING



Please follow these instructions explicitly as improper installation can result in permanent damage to your device and/or aircraft.



The Dynon Avionics Heated AOA/Pitot Probe operates on 12V only. For aircraft with a 24V electrical system, a 24V-to-12V DC-DC converter, capable of supplying 10A, must be used to supply the required 12V at 10A.



The associated power wires and the controller for the Heated AOA/Pitot Probe will be a source of significant magnetic fields and thus can affect:

- Magnetic compass – ensure that there is reasonable separation of the wiring and the controller from a Dynon Avionics EDC-D10A remote magnetometer or SV-ADAHRS-200/201, or any other compass-type device that senses magnetic fields.
- Audio devices – ensure that there is reasonable separation of the wiring and the controller from wiring associated with audio systems, especially microphone circuits and intercoms.

Test for potential magnetic interference by turning on the Heated AOA/Pitot and check for compass deviation and interference to all audio systems.



PITOT HEAT POWER switch or circuit breaker:

When deciding when to turn the Heated AOA/Pitot Probe On or Off, remember that even when the Probe's power is On, it will only heat the probe the amount necessary to maintain temperature.

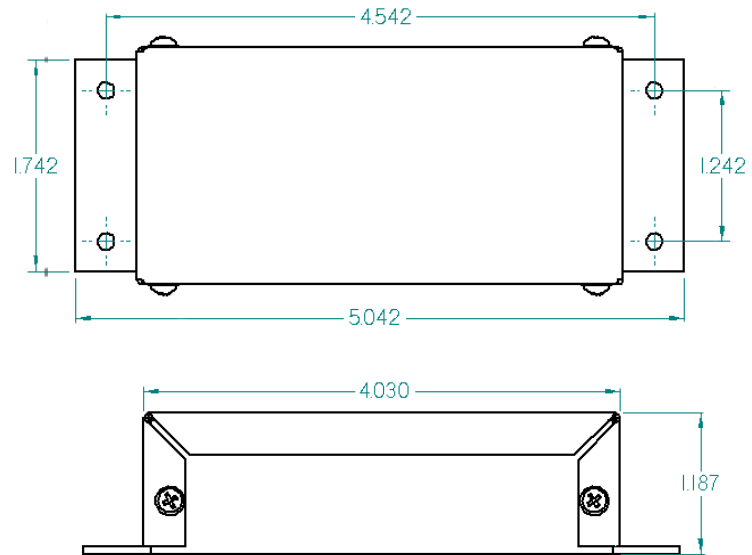
Tools and Materials Required

- Heated AOA/Pitot Probe Controller
- Appropriate fasteners
- 14 AWG, 12 AWG, or 10 AWG wire – see chart on page 3-2
- 10A circuit breaker or fuse
- PITOT HEAT POWER switch (if not using circuit breaker for switching)
- PITOT HEAT STATUS Indicator light or LED (or available Dynon Avionics EMS General Purpose Input)
- If installing in a 24V aircraft, a 24V-to-12V DC-DC converter, capable of supplying 10A

Mounting the Controller

The Heated AOA/Pitot Probe controller should *ideally* be mounted close to the Heated AOA/Pitot Probe on the underside of the wing to not require extending the included wires connecting the Probe to the controller. As with all avionics units, the controller should be mounted such that it can be accessed should service or replacement ever be required. The controller's overall dimensions are:

- Width: 5.042" (128.07mm)
- Depth: 1.742" (44.25mm)
- Height: 1.187" (30.15mm)



The mounting holes are sized for a #6 screw. Hole to hole dimensions are referenced in the diagram.

When mounting the controller close to the probe, ensure that it is close enough for its wires to mate with the probe's, with room for strain relief. If you find it difficult to mount the controller in the wing, or simply wish for the controller to be mounted closer to the battery, you must extend the wires using the correct wire gauge per the chart below.

When the desired location is selected, secure the heater controller via the 4 mounting holes. Route the wiring between the probe, controller, panel, and power source, as described below.

Wiring the Controller



For all electrical connections, use correct wiring techniques, taking care to properly insulate any exposed wire. A short circuit between any of the wires may cause damage to the Heated AOA/Pitot Probe, controller, or your airplane. Make all connections to the harnesses before plugging it into any of the components of the system. Do not make connections while power is applied at any point in the system.



Do not connect the Black (Ground) wire to the airframe as a Ground connection. Doing so will introduce high currents (10A) into the airframe. This can introduce a significant voltage drop, and potentially cause engine instrumentation, avionics, and audio system electrical problems.



All wires associated with the Dynon Avionics Heated AOA/Pitot Probe should have Tefzel insulation (Mil Standard M22759/16). To purchase such wire, specify M22759/16-xx where xx is the AWG size. For example, M22759/16-10 is 10 AWG wire with Tefzel insulation. We recommend that all wire used in your airplane have Tefzel insulation.

The included wires on the Heated AOA/Pitot Probe and the Heated AOA/Pitot Probe controller are appropriately sized (18 AWG) for their current requirements and lengths. It is preferable that the Heated AOA/Pitot Probe controller be mounted near enough to the probe that the 5 wires between the Probe and the controller can be connected without adding extension wiring between the two units. Route all wiring through the aircraft such that there are no spots where it could chafe or break. Use appropriate strain relief at all junctions between wires and connectors. Secure all wires at regular intervals along wiring runs to accommodate vibration effects. Use correctly-sized wire for the length of runs between the electrical distribution bus, controller, and probe, as shown in the chart to the right.

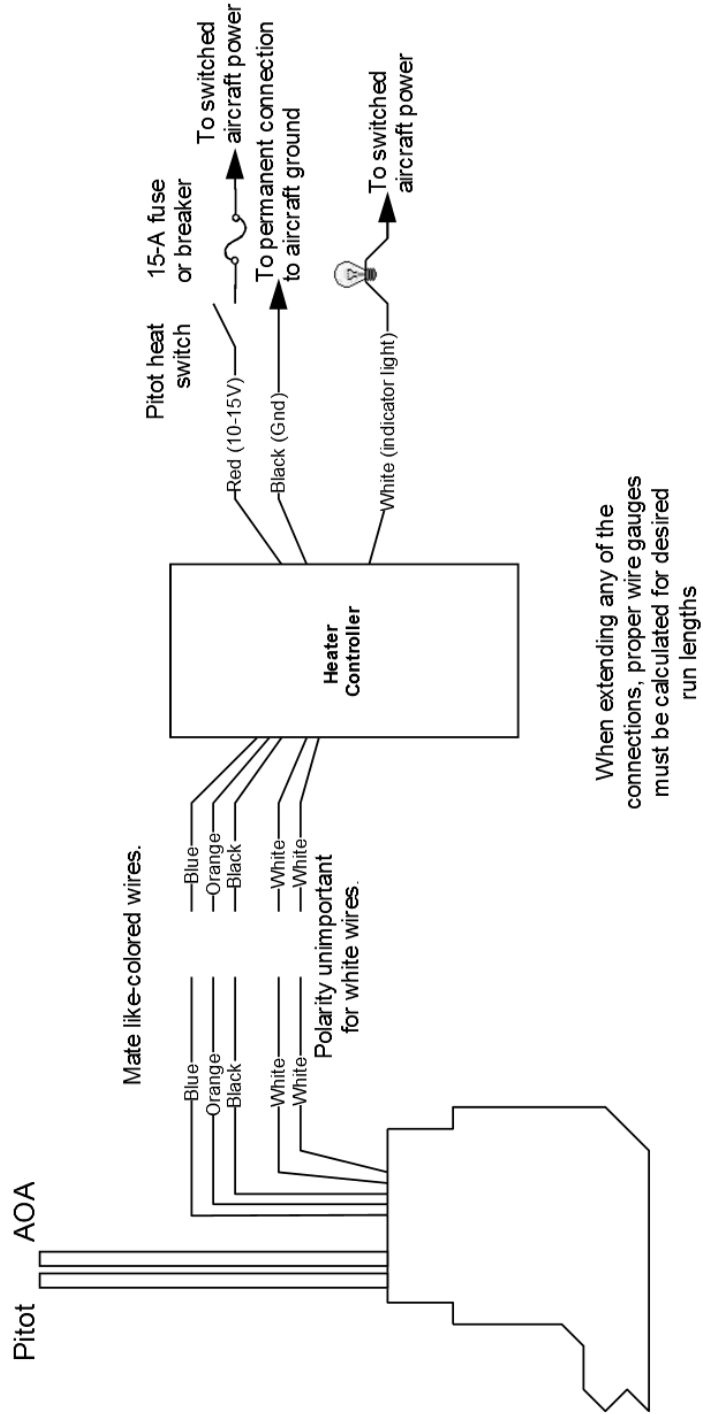
Recommended wire gauge for runs, given 10-amp peak current	
Run length	Gauge
~3.5' wiring included with units	
4' – 16'	14 AWG
17' – 24'	12 AWG
25' – 40'	10 AWG
Based on recommendations in FAA AC 43.13-1B, page 11-30	



In the recommended wire gauge chart above, the lengths shown are for the *entire run of wire*. Thus, the approximately 3.5' of wire included as part of the Heated AOA / Pitot Probe and the controller, should be taken into account. Example – if an additional 13.5' of wire is required to connect the controller to aircraft power, the overall run of wire is 17', which dictates the use of 12 AWG wire.

WIRING SYSTEM OVERVIEW

The following block diagram depicts the basic layout of the electrical connections between the probe and controller. This diagram should be used in conjunction with detailed instructions on the following pages. Read the specific instructions for each connection prior to installation.



**PROBE TO CONTROLLER WIRING**

As mentioned above, it is preferable that the Heated AOA/Pitot Probe controller be mounted close enough to the probe that 5 wires between the controller and probe can be connected without adding extension wiring. The three mating¹ pairs of colored wires – terminated with Faston connectors – are used to carry the current to the heating element in the probe. The 2 white wires are for temperature measurement, and can thus be small. If you have mounted the heater controller near the probe and do not need to extend the wires between the two, simply plug each wire on the controller into its corresponding like-colored wire from the probe.

If you do need to extend the wires between the probe and the controller, use the recommended wire size (see chart on page 3-2) to choose the correct size of wire. When extending the wires between probe and controller, we recommend the use of a secure, solid electrical connection such as a crimped butt splice connector. The white wires are not polarity-dependent and do not carry any significant current, thus you can use wire as small as 26 AWG, or larger, for any run length.

CONTROLLER POWER AND PITOT HEAT STATUS INDICATOR WIRING

Color	Function	Notes
Red	12-15V Power (+)	Connected through a pilot-accessible PITOT HEAT switch to 10–15V supply (via 10A circuit breaker or fuse). Wire must be sized to conduct 10A with minimal voltage drop – See Page 3-3.
Black	Ground (-)	Constant connection to ground (not routed through a switch or fuse / circuit breaker). Must be sized to conduct 10A with minimal voltage drop. Ground connection must be constant FOR PITOT HEAT STATUS LINE (White wire) to operate when the controller is powered Off or not functioning.
White	PITOT HEAT STATUS	Connected to a PITOT HEAT STATUS indicator light or indicator on a Dynon Avionics EMS. This line is grounded when the controller is powered Off or not functioning. This circuit can handle a maximum of 1A.

PITOT HEAT STATUS

The Dynon Avionics Heated AOA/Pitot Probe controller is designed to meet the indication requirements of FAR 23.1326 by providing an PITOT HEAT STATUS output that can illuminate a PITOT HEAT STATUS warning indicator in the cockpit

¹ In newer Heated AOA/Pitot Probes shipped after October 2014, the Blue and Orange wires are now White with a short length of Blue and Orange heat shrink tubing.



whenever the Probe's heater is turned Off or is not functioning properly. While this is not required for Experimental and LSA category aircraft, this feature provides feedback that your Heated AOA/Pitot Probe is working as designed. The Heated AOA/Pitot Probe functions properly whether or not you make this connection - it is merely a status output for your convenience.

The PITOT HEAT STATUS line (White wire) is grounded when the controller is turned off or not functioning properly. The PITOT HEAT STATUS line (White wire) can be connected to an indicator on the panel, whose other terminal is connected to Switched 12V². When the Heated AOA/Pitot Probe is switched on and functioning properly, the PITOT HEAT STATUS line will be open (not grounded), leaving the indicator light turned off (no current is flowing). The PITOT HEAT STATUS line (White wire) can handle a maximum of 1A current, so choose the type of indicator carefully.

Aircraft Spruce P/N 17-410 is an example of an Indicator light that will work for this application. An LED and resistor in series will also suffice. If you use an LED as the indicator, you must choose a resistor that delivers the appropriate current to the LED, and can accommodate the power required for its current and voltage drop.

If you own a Dynon Avionics Engine Monitoring System (EMS-D10, EMS-D120, FlightDEK-D180), you can use one of the two Contact Inputs to display the state of the controller Status line (White wire). If you own a SkyView system with a SV-EMS-220 module, you may use one of its General Purpose Inputs, configured as a Contact Input, to display the state of the controller Status line (White wire). Connect the White wire to the desired EMS or SV-EMS-220 input pin with no additional resistors or indicators. You will need to configure the contact display as described in your EMS product's Installation manual / SkyView System Installation Guide.

² If connected to always-on 12V, the PITOT HEAT STATUS indicator will always be on when the Heated AOA/Pitot Probe is switched Off)

4. MOUNTING AND PLUMBING

Tools and Materials Required

- Dynon Avionics AOA/Pitot probe or Dynon Avionics Heated AOA/Pitot Probe.
- AN5812 type mast for under-wing mounting
 - Models known to work can be found at [http://wiki.dynonavionics.com/AOA Pitot Brackets and Parts](http://wiki.dynonavionics.com/AOA_Pitot_Brackets_and_Parts)
- Appropriate fasteners
- Adapters as required connect with the 3/16" aluminum tubing from the Probe to the plumbing lines are installed in the airplane
 - AN919-2D for 3/16" to 1/4"
 - AN819-4D sleeve and AN818-4D nut
 - AN819-3D sleeve and AN818-3D nut
- Two plumbing lines (usually 1/4" soft aluminum or plastic tubing) routed from the AOA/Pitot Probe to the EFIS unit or the SkyView system's SV-ADAHRS-200/201
- Appropriate drill and tap

Mounting

The Dynon Avionics AOA/Pitot Probe (P/N 100141-000) and Dynon Avionics Heated AOA/Pitot Probe (P/N 100667-000) are designed to be suspended vertically on the underside of a wing; the beveled face should be at the 6:00 position.



There is no provision in these products for horizontal mounting; the tip of the Probe is permanently installed and *cannot* be rotated.

See the TOOLS AND MATERIALS REQUIRED section above to obtain a suitable "pitot mount" for the Dynon Avionics AOA/Pitot Probe or Dynon Avionics Heated AOA/Pitot Probe; Dynon Avionics does not sell this part.

MOUNTING LOCATION

The Dynon Avionics AOA/Pitot Probe / Heated AOA/Pitot Probe will work correctly only when mounted in a location where the airflow over the probe is relatively undisturbed by the aircraft. In general, we recommend you mount it at least 6 inches (150mm) below the wing and with the tip of the probe between 2 inches (50mm) and 12 inches (300mm) behind the leading edge of the wing. Typically a pitot probe is mounted about mid-wingspan to minimize the effects of both the propeller and the wing tips. Testing during the development of the Dynon Avionics AOA/Pitot Probe / Heated AOA/Pitot Probe confirmed that the standard mounting locations for the pitot probe in the Van's Aircraft RV series of aircraft work well for a Dynon Avionics AOA/Pitot Probe / Heated AOA/Pitot Probe.

MOUNTING INSTRUCTIONS

After the mounting location has been determined, you will need to mount the pitot mounting kit per the included instructions or fabricate your own mount. In either case, mount the Dynon Avionics AOA/Pitot Probe / Heated AOA/Pitot Probe securely to rigid structure of the airframe. The body of the probe must be parallel to the wing chord.



Use caution when drilling the holes, ensuring that you avoid drilling into the pitot and AOA pressure lines. As long as you do not penetrate these lines, you may drill all the way through the outer metal without affecting the probe's waterproofing. As it is sometimes hard to control penetration depth when drilling with a hand drill, we recommend using a drill press to drill the holes only through the metal wall, and no further.

Some examples of Dynon Avionics AOA/Pitot Probe installation can be found on the web³ at:

- RV-7A - John Harrell:
<http://johnsrv7a.wordpress.com/category/wings/pitot-tube-mounting/> (many photos, including wing interior)
- RV-9A – Mike Hoover:
<http://www.aclog.com/rv-9a/index.php?c=2> (search on the page for “Pitot” to find relevant descriptions and photos)
- RV-10 - Conrad Booze:
<http://www.mykitlog.com/users/category.php?user=conrad&project=666&category=4589>
- Zenith STOL CH 750 - Victor Menkal:
<http://www.zenith.aero/photo/dynon-heated-pitot-aoa-probe>

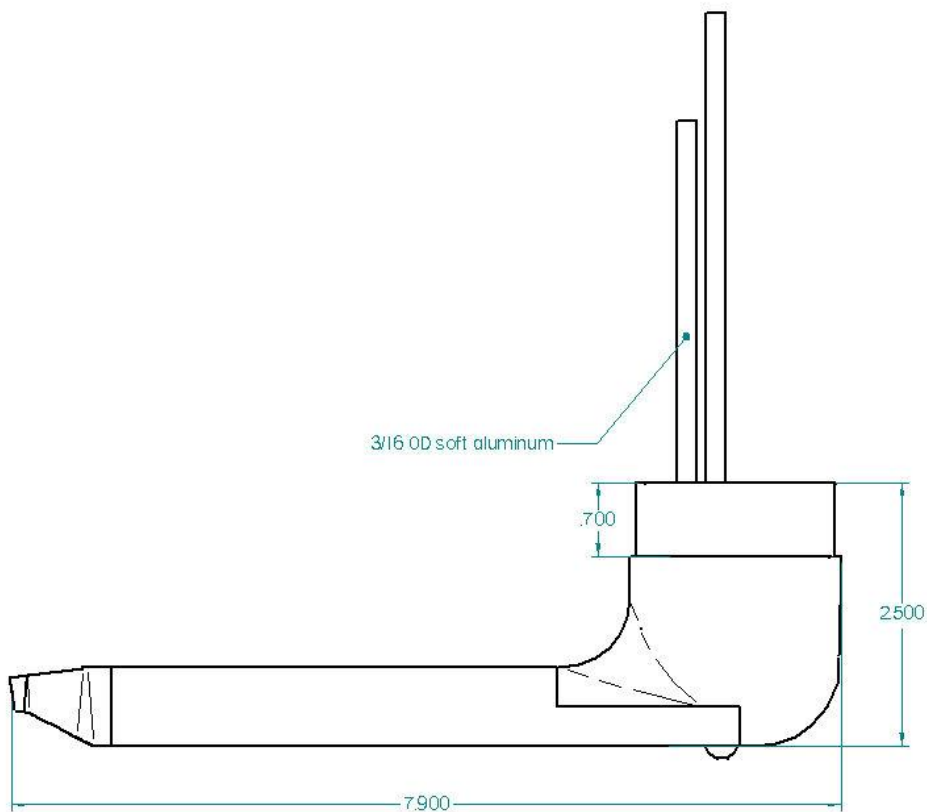
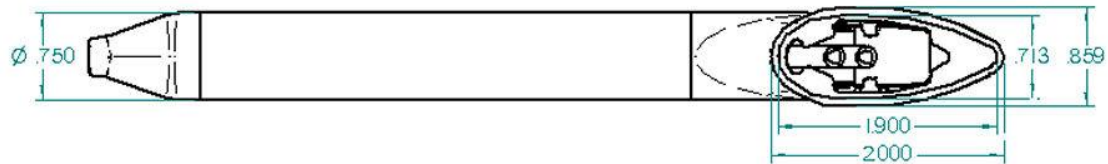
Note that these links are from third party websites and may expire. Comments and installation particulars contained on those web pages are those of the authors, and do not represent the views of Dynon Avionics.

³ Search engine keywords: Dynon Avionics AOA/Pitot



Dimensions

In the following illustrations, only the pneumatic lines are shown for clarity. The external dimensions of the AOA/Pitot Probe and Heated AOA/Pitot Probe are identical.



Plumbing



Because the pitot and AOA plumbing tubes have not been annealed, they work-harden rapidly when manipulated. Make gentle bends, and only bend any given section *once*.



It is acceptable to split the pitot input to both the Dynon Avionics EFIS unit / SkyView ADAHRS 200/201 and a standard airspeed indicator.

The Dynon Avionics AOA/Pitot Probe / Heated AOA/Pitot Probe does not provide a Static Port; the Static Port and its associated pneumatic plumbing must be procured and installed separately. Dynon Avionics does not supply a Static Port.

On the Dynon Avionics AOA/Pitot Probe and Heated AOA/Pitot Probe, at the base of the probe, the aluminum tube closest to the snout is the Pitot line. At the base of the probe, the aluminum tube to the rear of the Probe is the AOA line.



Before installing the AOA/Pitot Probe, verify that there are no restrictions (contaminants, dirt, debris, etc.) in the probe:

1. Blow into the Pitot port (the tip of the probe) and verify good airflow comes out of the Pitot line (closest to the tip).
2. Blow into the AOA port (underneath the tip) and verify good airflow comes out of the AOA line (closest to the rear of the probe).

Route the Pitot and AOA pneumatic lines from the EFIS unit or SkyView SV-ADAHRS-200/201 to the Dynon Avionics AOA/Pitot Probe / Heated AOA/Pitot Probe (or vice versa).



It is easy to get the AOA pneumatic line and the Pitot pneumatic line reversed during final installation. Before installing the pneumatic lines, make a positive indication on both ends of one or both lines, such as putting a tag on *each* end of *each* pneumatic line indicating which line is which - AOA and Pitot.

Install any needed adaptors to connect the probe's 3/16" aluminum plumbing lines to the pneumatic lines; example AN 919-2D for adapting the 3/16" aluminum lines to 1/4" lines. We strongly recommend using aircraft-grade fittings such as standard AN fittings. Take care to ensure that the plumbing lines will not chafe and will not interfere with any aircraft control systems.

MOISTURE DRAINAGE

The Dynon Avionics AOA/Pitot Probe and Heated AOA/Pitot Probe incorporate pin-sized moisture drainage holes on the underside of the probe. The moisture drainage holes do not affect the performance of the probe.



Although the Dynon Avionics AOA/Pitot Probe and Heated AOA/Pitot Probe incorporate a robust moisture separation and drainage design, the builder/installer should ensure that the design and installation of the overall AOA / Pitot system provides positive drainage of moisture from the *entire* AOA / Pitot / Static system.

PRESSURE CHECK

As explained above, the Dynon Avionics AOA/Pitot Probe / Heated AOA/Pitot Probe incorporate pin-sized moisture drainage holes in the AOA line and the Pitot line.

Plugging these holes on the exterior of the probe (such as applying tape over them) will *not* guarantee a pneumatic seal (although one is sometimes present). The presence of the drain holes must be taken into account when doing pressure/leak tests on your AOA / Pitot system – it may be necessary to temporarily disconnect the probe and plug the AOA and Pitot lines.

HEATED AOA/PITOT PROBE – HEATER CHECK

A simple test ensures that the Heated AOA/Pitot Probe's heater is working:

- Turn power on to the Heated AOA/Pitot Probe,
- Wait one minute for the pitot to allow the Probe to warm to operating temperature,
- Briefly (very briefly – it will likely be hot) touch the snout and verify that it is warm.

HEATED AOA/PITOT PROBE – PITOT HEAT STATUS INDICATOR CHECK (IF INSTALLED)

A simple test ensures that the Heated AOA/Pitot Probe PITOT HEAT STATUS Indicator is working:

- Turn off the switch or circuit breaker powering the Heated AOA/Pitot Probe
 - The PITOT HEAT STATUS indicator should illuminate
 - If displaying PITOT HEAT STATUS on a Dynon Avionics EMS unit or SkyView EMS page, the indicator should be Red.



For future reference, before completing the installation, be sure to record the P/N and S/N of the AOA/Pitot Probe, Heated AOA/Pitot Probe, and Heated AOA/Pitot Probe controller in the build log or the airframe log.

5. ANGLE OF ATTACK CONFIGURATION AND CALIBRATION

The Dynon Avionics AOA/Pitot Probe / Heated AOA/Pitot Probe is designed solely for use with Dynon Avionics EFIS units, Dynon Avionics SkyView system, and Advanced Flight Systems AOA and EFIS products. Installation manuals for all Dynon products can be found at <http://docs.dynonavionics.com>. Installation manuals for Advanced Flight Systems products can be found at <http://advanced-flight-systems.com>.

After installation of the AOA/Pitot Probe / Heated AOA/Pitot Probe is complete, a calibration procedure must be performed in flight. Each aircraft, each installation is unique; the AOA calibration procedure ensures that AOA will be displayed accurately for your airplane's specific flight characteristics. Instructions for AOA calibration are contained in the Installation Manual for Dynon Avionics EFIS units, the Dynon Avionics SkyView System Installation Guide, and manuals for Advanced Flight Systems products.

Similarly, options for configuring the display of the on-screen AOA indicator, optional AOA audio warnings, and other settings related to AOA vary by product and version of firmware installed on your system – see the Installation manual for configuration details related to AOA.

6. SPECIFICATIONS

AOA/Pitot Probe P/N 100141-000

Weight:..... 0.35 lb. (0.18 kg)
Tubing Connection:.....3/16" OD aluminum
Pitot Mounting:..... AN5812 type mast (*not provided*)
Moisture Protection:..... Dedicated drain hole provided for each line
Finish: Nickel-plated
Operating Temperature:..... -60°C to 100°C

Heated AOA/Pitot Probe P/N 100667-000

Weight:..... 0.4 lb. (0.18 kg)
Tubing Connection:.....3/16" OD aluminum
Pitot Mounting:..... AN5812 type mast (*not provided*)
Moisture Protection:..... Dedicated drain hole provided for each line
Finish: Nickel-plated
Operating Temperature:..... -60°C to 100°C

Heated AOA/Pitot Probe Controller

Weight:..... 0.32 lb. (0.15 kg)
Power: 100 watts @ nominal 13.8 V / 10 A
Operating Temperature: -40°C to 70°C