

5 GAP 26 (PITOT/AOA PROBE) INSTALLATION

This section contains information for the GAP 26 Pitot/AOA (Angle of Attack) probe. Use this section to install the GAP 26.

5.1 Equipment Description

The GAP 26 Pitot/AOA (Angle of Attack) probe is an air data probe intended for use in non FAA certified aircraft, including light sport and home-built aircraft. This air data probe is intended to be used as part of the G3X™ system.

The function of the GAP 26 is to provide pitot and AOA pressures to the GSU 25 for the purpose of displaying airspeed and AOA to the pilot as part of the G3X system. The GAP 26 does not provide a static pressure source to the GSU 25. There are three different versions of the GAP 26, the -00 (unheated), the -10 (heated, for ice protection), and the -20 (heated, with ice protection and regulated temperature limit). All versions of the GAP 26 have identical aerodynamic performance including identical internal water separation/baffling chambers, drain holes, pressure port locations and pneumatic tubing. The -20 version of the GAP 26 includes a heater control box, that is mounted separately from the probe ([Section 5.5.3](#)).

5.1.1 Moisture Protections

Both pitot and AOA pressure chambers have internal baffling and dedicated drain holes to provide moisture protection.

5.1.2 Ice Protection

The heated version of the GAP 26 (010-01074-10) has dual internal electro-thermal heating elements to provide ice protection to the areas of the probe where surface impingement of icing elements is expected to occur. In addition to the same level of ice protection (as the -10 probe), the heated/regulated version of the GAP 26 (010-01074-20) limits the maximum tip temperature to make the probe safer if powered on the ground and to provide a discrete output that indicates when the heater is powered and providing sufficient heat.



NOTE

The pneumatic tubing for pitot pressure is the longer of the two tubes extending out of the probe (Figure 5-1).



Figure 5-1 GAP 26 Unit View (-10 version shown)

5.2 Equipment Available

Table 5-1 GAP 26 Part Numbers

| Model | Assembly Part Number | Unit Only Part Number | Heater Control Box Part Number |
|--------------------------------------|----------------------|-----------------------|--------------------------------|
| GAP 26 Adjustable Mount | 010-01380-00 | 011-03609-00 | N/A |
| GAP 26 Probe Only | 010-01074-00 | 011-02964-00 | N/A |
| GAP 26 Probe Only, Heated | 010-01074-10 | 011-02964-10 | N/A |
| GAP 26 Probe Only, Heated, Regulated | 010-01074-20 | 011-02964-20 | 011-02965-00 |

5.2.1 Required Equipment

- GAP 26 Pitot/AOA Probe (010-01074-00, 010-01074-10, or 010-01074-20)
- Electrical and pneumatic connectors per installer preference. For heated probe installations where the installer desires to shorten the provided aluminum tubing, a minimum of 8 inches of aluminum tubing should remain between the probe and any transition to non-metallic tubing to protect the non-metallic tubing from excessive heat.
- Mount: Standard AN5812 pitot tube mount.
- #6-32 screws (4 pcs), required length (.218" min - .312" max), recommend screws with nylon patch on threads for thread locking for mounting probe.
- #4 or #6 (4 pcs) pan or hex head screws for mounting heater control box.

5.2.2 Additional Equipment

The connector kit in Table 5-2 can be used to install the unit, it is not provided with the GAP 26 unit.

Table 5-2 Contents of GAP 26 Adjustable Mounting Kit (011-03609-00)

| Item | Garmin P/N | Quantity |
|---------------------------------------|--------------|----------|
| GAP 26 Adjustable Mount, Washer Plate | 115-02075-00 | 1 |
| GAP 26 Adjustable Mount, Tube Bracket | 117-00659-00 | 1 |
| GAP 26 AN5812 Mount Tube, Aluminum | 117-02013-00 | 1 |

5.3 General Specifications

See [Section 2.2](#) for power/current specifications, and [Section 2.4.1](#) for dimension/weight specifications.

5.4 Mounting Requirements

- The GAP 26 pitot/AOA probe is intended to be installed in the same location as an existing non-structural inspection panel on the aircraft wing. A replacement mounting plate that meets the minimum requirements listed in this section may be fabricated to replace the existing inspection panel or the existing inspection panel may be used with an added doubler plate (if needed) to meet the minimum strength requirements listed below. If it is desired to use a structural panel to mount the GAP 26, or to create a new mounting location by making a hole in the aircraft skin, a structural analysis will be required to evaluate the affects of the installation on existing structure and the installation will no longer be considered a minor alteration.
- The minimum thickness of the replacement mounting plate or inspection panel shall be .063". If the existing inspection panel is to be used, and it does not meet this minimum thickness requirement, then a doubler plate shall be added between the inspection panel and the GAP 26 adjustable mount such that the combined thickness meets or exceeds the minimum thickness requirement.
- A sheet metal template for the cutout and mounting holes has been included. Using this template will ensure required clearance to make the five degree adjustment after installation if needed. To make the five degree pitch down adjustment, remove the leading edge mounting bolt where the AN5812 Mast connects to the mounting bracket (see [Figure 5-2](#)). Loosen the aft side mounting bolt and rotate the mast downward until the leading edge mounting hole aligns with the offset hole provided on the mounting bracket. Install the leading edge mounting bolt with the mast in this position and tighten the aft side bolt.
- If a doubler plate is required for the installation, refer to AC 43.13-1B, Chapter 4 for appropriate fabrication and riveting methods. Recommend ensuring doubler plate perimeter be no further than 1.5" from the centerline of the inspection panel mounting screws (see [Figure 5-3](#)).
- The maximum hole spacing for the mounting plate screws shall be 2-3". If the existing inspection panel hole spacing is greater, a nut plate and screws (to match existing) shall be added to accommodate this maximum spacing requirement.
- Screws of appropriate length for the specific installation shall be used to fasten the GAP 26 adjustable mount to the inspection panel (or combination panel and doubler). Required screw size is #8-32. Screws shall meet MS24693 or equivalent. Locking nuts shall meet MS21044 or equivalent. Washers shall meet NAS 1149 or equivalent.
- The GAP 26 is intended to be mounted in the supplied adjustable mount. If other mounting methods are to be used the installer must follow installation guidance in AC 43.13-2B Chapters 1 and 3. In addition, the installer must show that the installation is adequate for expected loading and does not affect the surrounding structure of the aircraft.

- The GAP 26 probe and mount shall be installed as shown following:

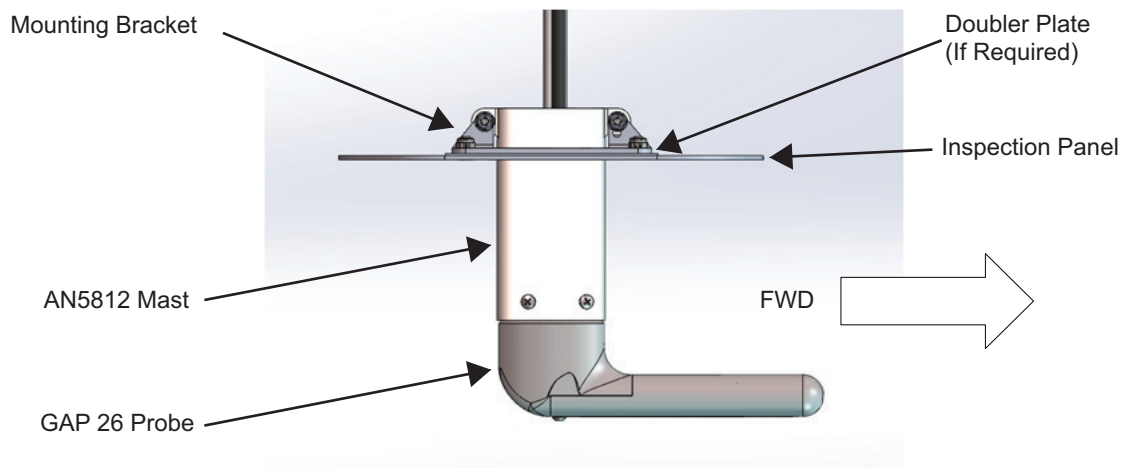


Figure 5-2. GAP 26 Probe and Mount (Side View)

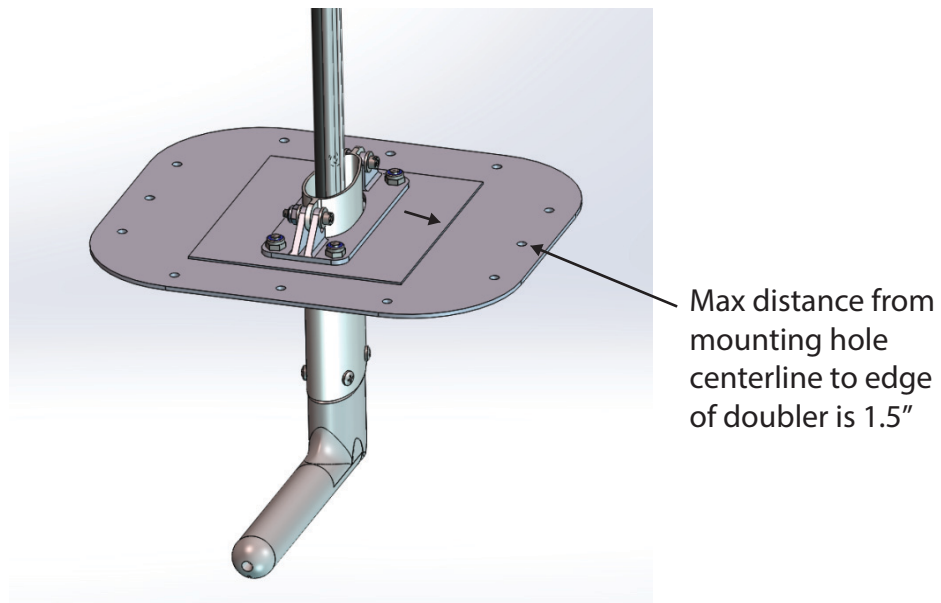


Figure 5-3. GAP 26 Shown with Inspection Panel and Doubler Plate

5.5 Unit Installation

Fabrication of a wiring harness is required. Sound mechanical and electrical methods and practices are recommended for installation of the GAP 26. Refer to [Section 2.3](#) for wiring considerations (-10 and -20 units only).

5.5.1 Mounting Location

- The GAP 26 is an under-wing mounted pitot/AOA probe, it is not intended for fuselage mount applications. For proper functionality, the GAP 26 should be mounted in a location where airflow over the probe is relatively undisturbed (typically mid-wing span).
- The tip of the GAP 26 should be located at least 4" from, but not more than 10" below the bottom surface of the wing. The probe tip may protrude up to 2" max in front of the leading edge of the wing.
- Viewed from the side, the GAP 26 probe bayonet centerline should be mounted within $\pm 5^\circ$ from parallel to the wing chord line.
- Viewed from the top, the GAP 26 bayonet centerline should be mounted within $\pm 5^\circ$ from parallel with the aircraft centerline.
- Consider using the aircraft designer/manufacturer's recommended mounting location (if specified). Optimal AOA functionality results when the tip of the GAP 26 probe is located no further back than 25% of the wing chord length from the leading edge. (See [Figure 5-4](#))
- The 3/16" diameter aluminum pneumatic tubing is intended to be hand bendable to suit various mounting configurations. Minimum allowable bend radius is 1.5". It is recommended to bend any given section only once to prevent work hardening and cracking of the aluminum tubing.
- Garmin recommends the GAP 26 not be used on aircraft where the static pressure port is located under the wing (due to the likelihood the AOA measurement will be significantly impacted). If the static port is located under the wing, it is recommended the port be moved to an alternate location as part of the GAP 26 installation. If port relocation is required, obtain guidance from the aircraft designer regarding acceptable alternate static port locations.
- Route all GAP 26 power and ground wires away from any audio wires.
- To avoid magnetic interference, do not use the airframe to ground the GAP 26 or any other high-current device. See [Section 16.4](#) for further magnetometer installation considerations.

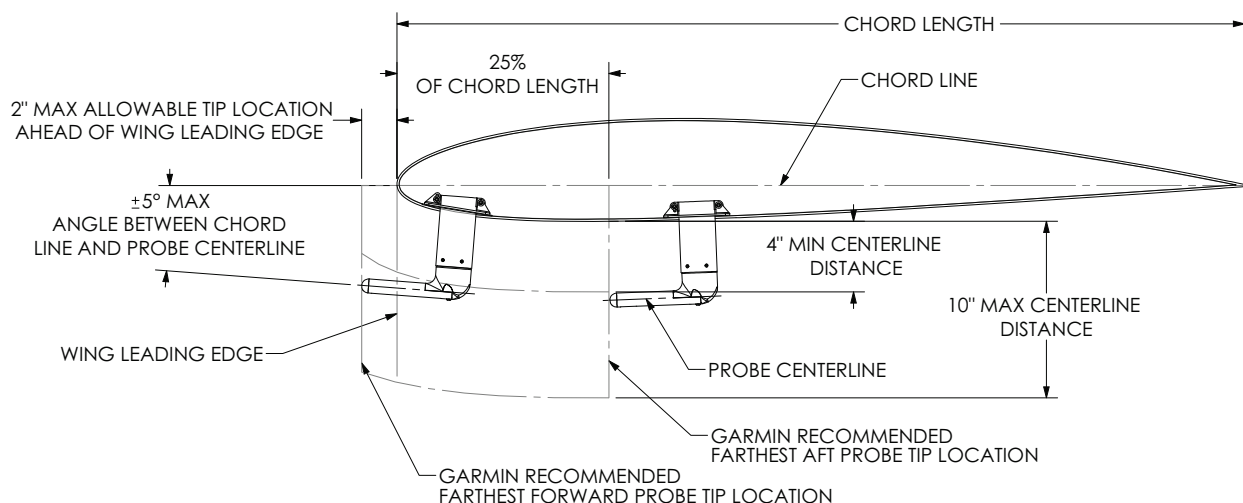


Figure 5-4 GAP 26, Mounting Location Guidance

5.5.2 Heater Wiring Configuration

The GAP 26 uses two internal heaters that may be powered by 14 or 28 volt systems. Each of the heaters has two wires, one of these two wires is “banded” (Figure 5-5) to help identify individual heaters. These heaters can be connected to a power source as shown in Figure 5-6 and [Figure 5-7](#).

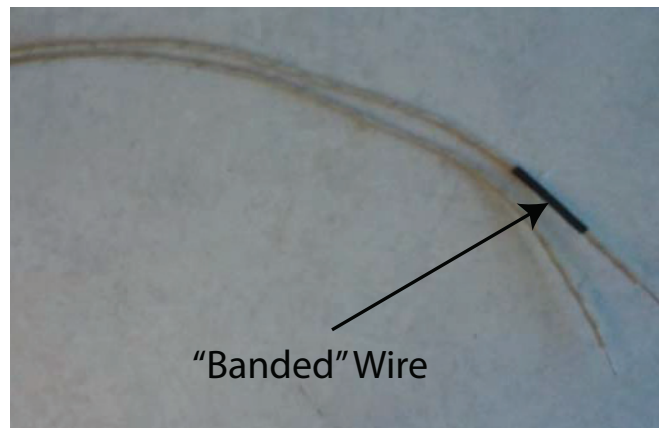


Figure 5-5 GAP 26 Banded Wire



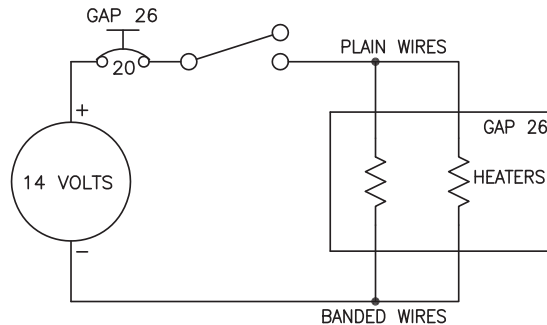
CAUTION

Do not use the heated/regulated version of the GAP 26 (010-01074-20) in 28V installations. The heated/non-regulated version of the GAP 26 (010-01074-10) may be used in either 14V or 28V installations when connected as per Figure 5-6 or Figure 5-7.



CAUTION

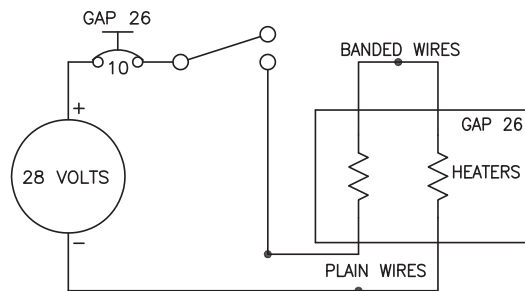
Do not connect the heaters in parallel to 28V. See Figure 5-7 for use on 28V aircraft. The heaters will be damaged if connected incorrectly to 28V.



NOTES FOR 14V INSTALLATION

1. AIRCRAFT POWER WIRING TO PROBE SHOULD BE MINIMUM 14 AWG UP TO 12 FT, 12 AWG FROM 13 TO 20 FT, AND 10 AWG FROM 21 TO 30 FT. (AC 43.13-1B)

Figure 5-6 GAP 26, 14V Installation Configuration (010-01074-10 only)



NOTES FOR 28V INSTALLATION

1. CAUTION: 28V INSTALLATIONS MUST FOLLOW THIS GUIDANCE AND CONNECT HEATERS IN SERIES AS SHOWN OR PROBE WILL BE DAMAGED.
2. AIRCRAFT POWER WIRING TO PROBE SHOULD BE MINIMUM 18 AWG UP TO 12 FT, 16 AWG FROM 13 TO 20 FT, AND 14 AWG FROM 21 TO 30 FT. (AC 43.13-1B)
3. CONNECT BANDED WIRES WITH INSULATED MS25181 22-18 AWG BUTT SPLICE CONNECTOR OR EQUIVALENT. BANDED WIRES MAY BE SHORTENED IF DESIRED.

Figure 5-7 GAP 26, 28V Installation Configuration (010-01074-10 only)

5.5.3 Control Box Installation (-20 version only)

Mount the control box ([Figure 5-11](#)) to a suitable mounting location within two feet of the GAP 26 using (4) #4 or #6 pan or hex head screws (choose screw length that is appropriate to mounting location).

Connect the white connector from the probe to the white connector from the control box (this allows the control box to sense probe temperature). Connect the red connectors from the probe to the red connectors from the control box, ([Figure 5-9](#)) this provides power and ground to the heaters. The red wires with red connectors from the control box connect to the plain wires with red connectors from the heater and the black wires with red connectors from the control box connect to the banded wires with red connectors from the heater ([Figure 5-8](#), [Figure 5-9](#)). The bare red and black heater wires from the control box should be connected to 14 VDC as shown in [Figure 5-8](#). The bare blue wire from the control box can be run to a spare discrete input ([Section 5.5.4](#)).

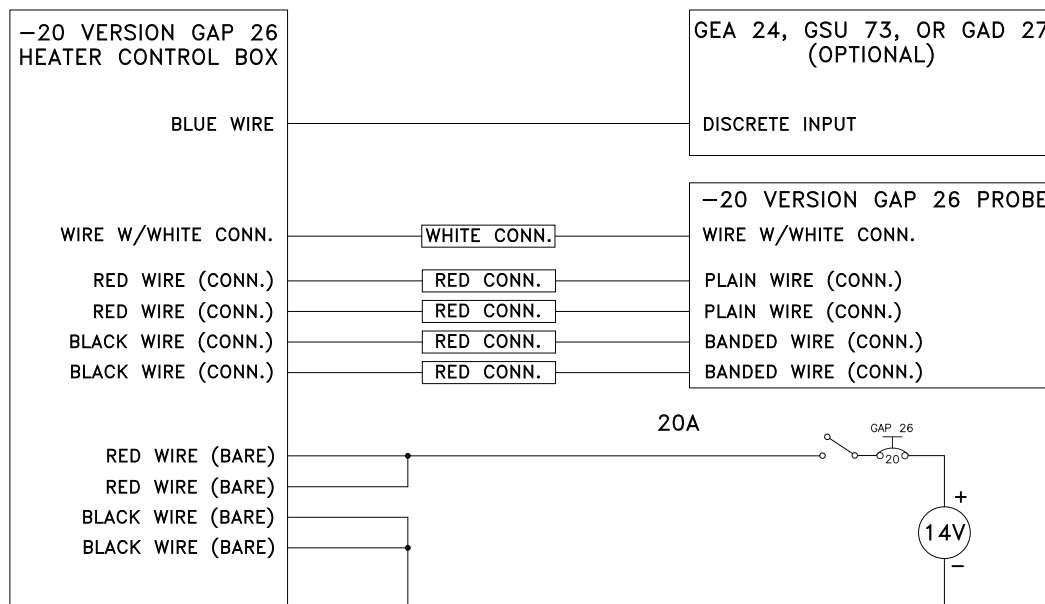


Figure 5-8 011-02964-20 Probe Wiring

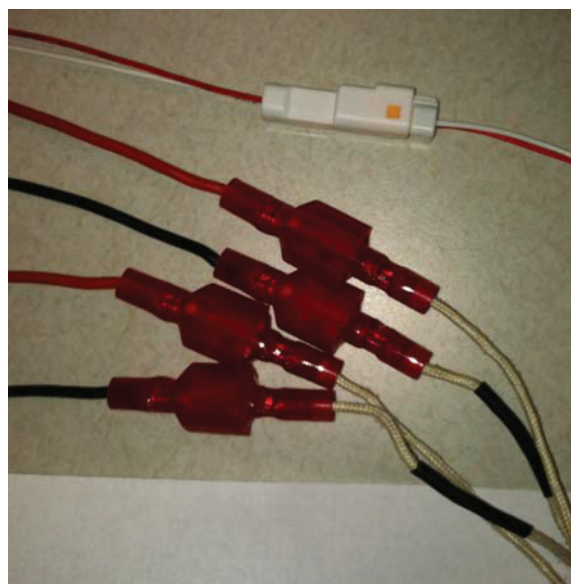


Figure 5-9 011-02964-20 Probe to Control Box Connectors

5.5.4 Discrete Output Specification (-20 version only)

The discrete output (bare blue wire) from the control box (011-02965-00) can be connected to any available discrete input. The discrete output is floating (open-circuit) when the probe is powered off, or when powered on and below 25° C. When the probe is above 25° C and powered on, the discrete output will be shorted to ground. See [GAP 26 Alert Configuration \(-20 version only\)](#) (for GDU™ 37X versions) or [GAP 26 Alert Configuration \(-20 version of GAP 26 only\)](#) (for GDU 4XX versions) for discrete input alert configuration.

5.5.5 System Leak Considerations

The AOA pitot system leak test is not a regulatory requirement. If the system experiences inconsistent performance or an inability to calibrate the AOA System, leak testing may be performed to provide assurance that any leakage is within an acceptable range.

If a pitot/static tester is used to perform this test, the recommended airspeed input applied to the probe pressure ports is 150 knots. The leak rate should be less than 5 knots/min with the probe removed from the aircraft. If the leak rate is less than 5 knots/min with the probe removed, attach the probe and perform the test with the GAP 26 in line (ensuring drain holes are fully sealed).

The guidance for pitot system tests listed in AC 43.13-1B, Section 4 are not directly applicable to this AOA pitot system. However, using it as a reference, it specifies the system shall be tested per the manufacturer's instructions but further states that if the manufacturer does not provide instructions, the default test is to apply 150 knots pressure to the system and measure the pressure loss over one minute. This loss is not to exceed 10 knots/min. While some GAP 26 probes will pass a test of this type, some may not. Garmin has determined that a leak rate of 250 knots/min or less is allowable and still ensures proper functionality.



NOTE

Both pressure chambers on the GAP 26 probe have drain holes that when open during normal operation would constitute a "designed-in" leak that is several times higher than 250 knots/min but does not add significant error.



CAUTION

When the GSU 25 is used in conjunction with the GAP 26 pitot/AOA probe to perform Part 43 Appendix E altimeter tests, the probe adapter from the pitot-static tester must completely cover the pitot and AOA ports and drain holes on the GAP 26 to avoid over-pressuring (and causing damage to) the internal AOA sensor of the GSU 25. If the GAP 26 is installed but AOA is unused (i.e., the AOA port of the GAP 26 is not connected to the AOA port of the GSU 25) then the GAP 26 AOA port must be connected to the same pressure port as the pitot port during pitot-static testing.

**Note: If the AOA is unused and connected to the static port (as described in the preceding Caution statement) it can remain connected to the static port for the pitot-static test.*

After the leak test is completed, ensure that all pressure ports and drain holes on the GAP 26 are open and clear of debris.

5.6 Outline and Installation Drawings

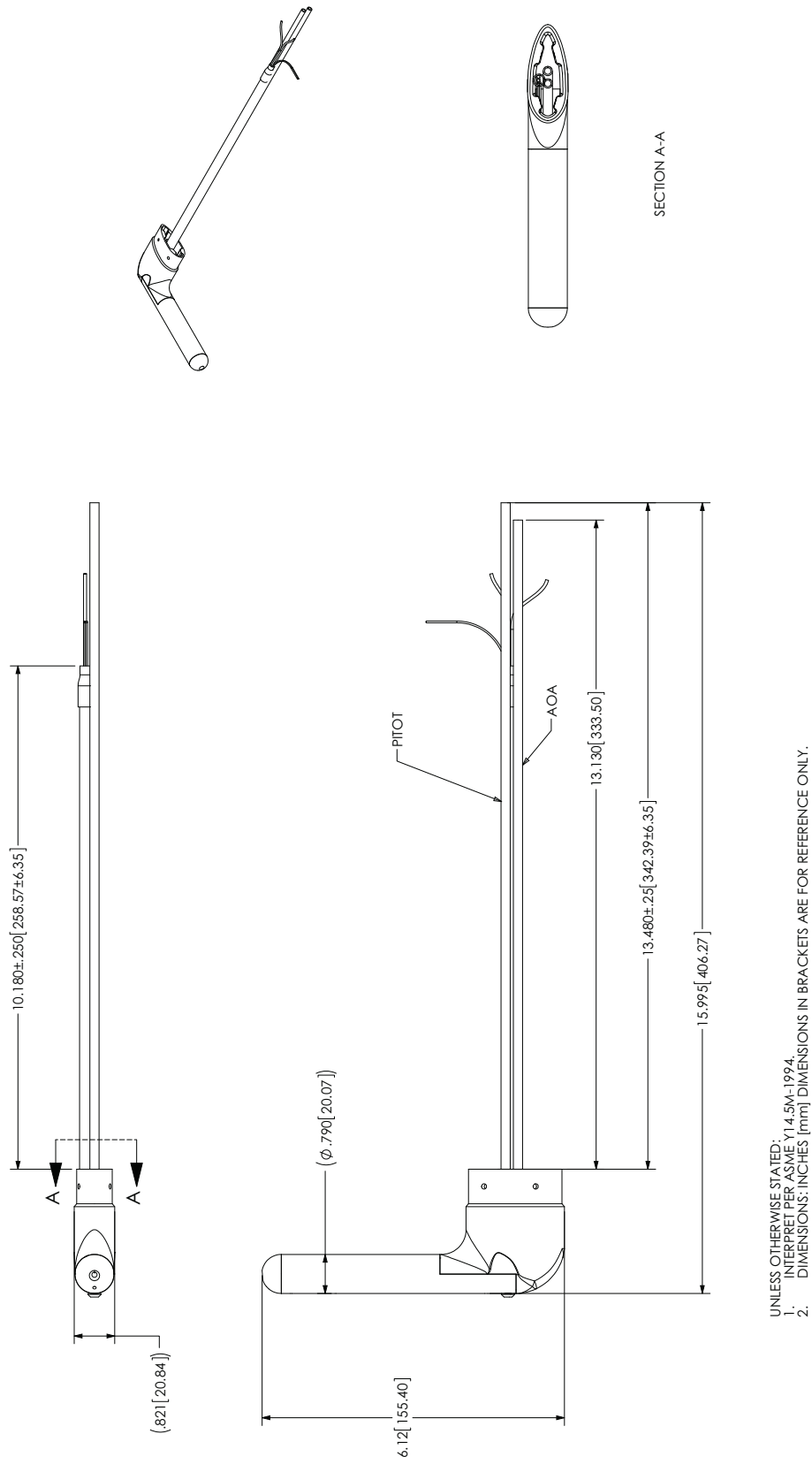


Figure 5-10 GAP 26 Outline Drawing

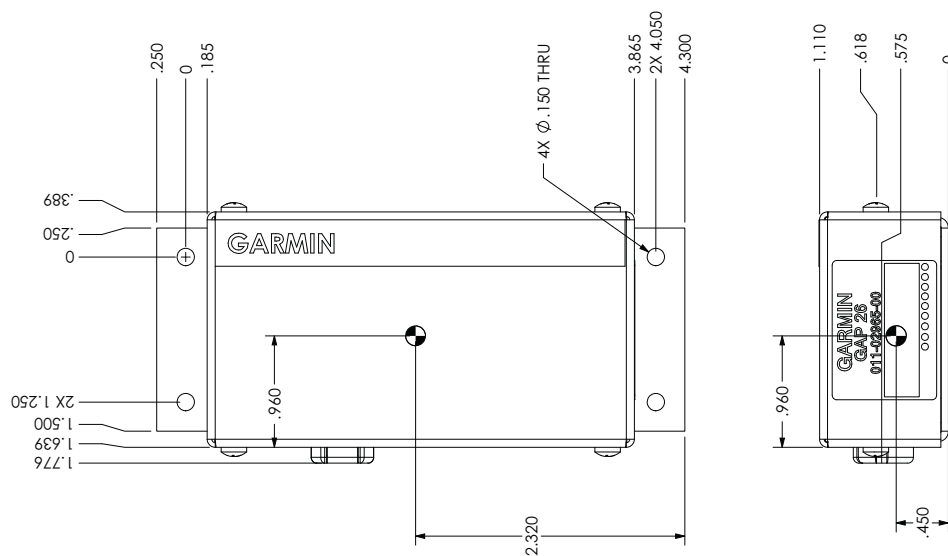
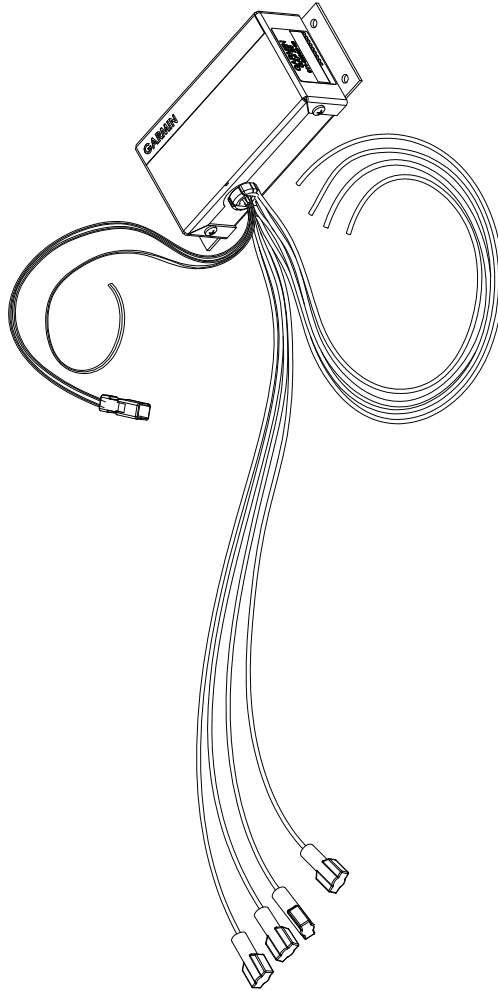


Figure 5-11 GAP 26 Heater Control Box (used with -20 unit only)