### GlaStar Heated Pitot/Static System Option Instructions

#### Parts List

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<thead>
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<th>Part Name</th>
<th>Qty</th>
<th>Part No.:</th>
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**TOOL LIST**

1. Rule, 12"
2. Fine-point marking pen
3. Offset aviation snips
4. Center punch
5. Belt sander (optional)
6. Electric or pneumatic drill motor, with #40, #30 and #27 bits
7. Clecos, 3/32", 4, with pliers
8. Unibit or hole cutters, 7/16", 1/2", 11/16" and 1"
9. Assorted flat and round files
10. Die grinder with rotary cutting tool (recommended)
11. Hacksaw
12. Hole deburring tool
13. Rivet gun, air compressor and bucking bars
14. Universal-head rivet sets, 3/32" and 1/8"
15. Phillips screwdriver
16. Wire cutters
17. Wire strippers
18. Soldering pencil
19. Tubing bender (recommended)
20. Tubing flaring tool (AN 37°)
21. Small adjustable wrenches, 2
22. Utility knife
23. Blind rivet puller
24. Drill stops, #40 and #30 (recommended)
25. AMP pin crimping pliers (available from Stoddard-Hamilton; order P/N 810-9004-001)
26. Long straightedge
27. Electrical crimping pliers
ADDITIONAL MATERIALS

1. Wide masking tape or duct tape
2. Small scrap wood block
3. Corrosion-proofing materials
4. Lead/silver solder
5. Soldering flux
6. RTV silicone sealer
7. Promoted vinyl ester resin and catalyst
8. Q-cell
9. Anti-seize thread lubricant

HEATED PITOT/STATIC SYSTEM OPTION

This option kit contains all the parts and hardware necessary for a pitot/static system installation suitable for IFR operation except for the pitot tube assembly itself. The kit includes two static ports, installation hardware and all necessary tubing and fittings to connect an airspeed indicator, altimeter, vertical speed indicator and altitude encoder. The kit also includes the basic electrical items needed for the pitot heat system, but it does not include a switch or circuit breaker for this purpose, since most builders like to insure that all their panel switches and breakers are of the same design. The 1/4" nylon tubing supplied with the kit is color coded to distinguish pitot from static system lines, and the "flareless" nylon fittings provide solid, leak-free connections that can be certified to IFR standards. The kit also includes a low-point drain for removing moisture that may collect in the system.

Note The heated pitot tube assembly itself is not included because we have difficulty keeping it in stock for timely shipment (we order such small quantities that we are low on our supplier's priority list). You can try ordering the pitot tube (P/N 120-5812-001) from us, but expect delays. The pitot tube is a standard, AN part (ANSS 12-12 for 12 Volt systems) that is readily available elsewhere, however. When ordered from us (and probably from other sources, as well), the pitot tube includes the following parts needed to complete the installation:

- 1 each AN3115-1 receptacle,
- 4 each MS35207-266 screws (6-40 dome head, 1/4" long),
- 4 each MS35338-41 lock washers (#6 spring type).

You will need to acquire these parts if your pitot tube does not come with them.
Although it's not difficult to retrofit this option to an already completed GlaStar, it's preferable to integrate the installation of the pitot/static system with the basic construction of the wing and fuselage assemblies. Therefore, these instructions are loosely keyed to the relevant portions of the GlaStar Assembly Manual. Refer to that manual first and follow the instructions given there. When you come to a place in the main assembly sequence at which you need to take different or additional steps in order to install the pitot/static system, the Manual will instruct you to turn to these instructions. If you are retrofitting the pitot/static system to a completed or partially completed GlaStar, simply follow these instructions sequentially; special note will be made of any differences in procedure that apply to a retrofit.

These instructions are divided into the following four sections:

1) Pitot Mast Installation
2) Pitot Tube Plumbing and Wiring
3) Static Port Installation
4) Final System Connections
Option Step 1: Fabricate the Pitot Mast Mounting Doubler

The pitot tube is mounted on the pilot's side of the aircraft—usually the left. This placement minimizes the length of the pitot line run to the flight instruments.

To facilitate mounting and to extend the pitot tube into undisturbed air beneath the wing, the tube is installed in a short length of streamlined aluminum tubing [22]. This so-called "pitot mast" extends into the wing interior through a cutout in the lower skin. Since this skin is only .020" thick, it's necessary to stiffen it with a doubler plate at the mounting location. This doubler is cut from the .032" X 3" X 6" aluminum sheet [20] according to the dimensions shown in Figure 1. (Set the remaining sheet aside; it will be used later.) After cutting the doubler out and rounding the corners, mark and center punch the two hole locations shown in the figure.

Note If you've already closed your wing (i.e., riveted the upper skins in place), fabricate the doubler just as instructed above, but don't mark or center punch any hole locations.

Note Be sure to save the leftover 2-1/2" X 3" piece of aluminum sheet; you will need it in a subsequent step.

Completed: 4/10/??
Figure 1: Pitot Mast Mounting Doubler
Option Step 2: Position the Pitot Mast Mounting Doubler and Drill the Rivet Holes

The location of the pitot tube on the GlaStar has been chosen to place the opening in relatively undisturbed air and to minimize the possibility of accidental collisions between the tube and unwary pedestrians (in which both would suffer). Figure 2a shows the location of the pitot mast mounting doubler on the lower center wing skin. As can be seen, the doubler is centered between Main Rib 2 and the first hat section outboard of Main Rib 2. It is installed between the skin and the innermost lower center skin stiffener channel, with the aft end of the doubler even with the aft edge of the stiffener channel. Before drilling this stiffener, therefore, position the doubler as shown in the figure and tape it to the skin. Then position the stiffener over the doubler according to the directions given in the Assembly Manual and drill it as instructed. The center pair of holes you drill through the stiffener will also go through the doubler. Cleco these holes as you go.

**Note** If your lower wing skins and stiffeners are already riveted, you'll have to drill out the middle two rivets in the lower center skin stiffener channel. Then slip the mounting doubler into position between the stiffener and the skin and drill through it, using the two rivet holes as guides. Because of likely elongation of these holes, use a #30 bit for later installation of 1/8" rivets.

With the stiffener and pitot tube mounting doubler still Clecoed to the skin, drill through the doubler and the wing skin at the forward pair of center-punched locations with a #40 bit.

**Note** If you're retrofitting the mounting doubler to an already-closed wing, you'll have to mark the locations of the two forward holes on the outside of the skin and drill up from below. Measure forward from the stiffener rivet line, referring to Figure 1 for the relevant dimensions. Reach inside the wing through an inspection hole and back up the doubler with a block of scrap wood while drilling.

After the drilling is completed, remove the doubler from the wing.
Figure 2: Positioning the Pitot Mast Mounting Doubler and Drilling the Rivet Holes
Option Step 3: Make the Pitot Mast Cutout in the Mounting Doubler

In this step, you'll make a cutout for the pitot mast in the mounting doubler, and in the next step you'll make a matching cutout in the skin.

Place the doubler flat on your bench and orient the end of the streamlined tubing on it according to the dimensions shown in Figure 3. Be precise in positioning the tube, especially in keeping the long axis of the tube cross-section parallel with the long edges of the doubler. Trace around the circumference of the tubing, and then remove the material inside the line (the shaded area in the figure). Start this cutout with a hole cutter and finish it up with fine-toothed curved files. If you have one, a rotary cutting tool in a die grinder will also be useful.

Note Make sure that the end of the tubing you trace around is square. Use a hacksaw, files and/or a belt sander as necessary to true it up.

Finish the cutout to fit snugly around the tubing, being sure to leave smooth, completed deburred edges.

Completed: [✔]

Option Step 4: Make the Pitot Mast Cutout in the Wing Skin

Cleco the pitot tube mounting doubler in place inside the wing. (You don't need to bother with the stiffener channel for now.) Trace the circumference of the pitot mast cutout onto the inside surface of the lower center main wing skin, and then remove the doubler.

Make and finish the skin cutout using the same techniques as in the last step.
Note: If your wing is already closed, Cleco the doubler to the outside of the wing, trace the circumference there, and make the cutout from outside the wing.

Figure 3: Pitot Mast Cutout in the Mounting Doubler
Option Step 5: Cut the Pitot Mast to Length

As supplied, the pitot mast is slightly longer than necessary. Both to save weight and to ease access to the electrical and pressure connections at the top of the pitot tube, it's a good idea to cut the mast down to a final length of 3-1/4". Thoroughly smooth and deburr the cut edges at both ends when you're done.

Completed: [✓]
4.10.98

Option Step 6: Drill the Mounting Holes in the Mast

As shown in Figure 4a, slide the pitot tube into one end of the tubing. It may be necessary to squeeze the tubing slightly or, alternatively, to file the inside of the tubing down with a curved file in order to get the pitot tube to fit. Slide the pitot tube in just until the top edges of the four mounting holes are even with the bottom edge of the tubing, as shown in Figure 4b. Mark the vertical centerlines of these holes on the tubing, and then remove the pitot tube.

Next, as shown in Figure 4c, use the centerline marks from the pitot tube holes to determine four matching hole locations on the streamlined tubing 1/4" up from the bottom. Drill each of these holes with a #27 bit, taking care to keep the holes perpendicular to the surface of the tubing as they are on the pitot tube.

Finally, mark four similarly positioned hole locations at the opposite end of the tubing. These locations do not need to be matched up exactly with the holes in the pitot tube, but do all need to be 1/4" in from the end of the tubing. Drill each of these holes with a #30 bit, again taking care to keep the bit perpendicular to the tubing surface at the point of contact.

Thoroughly deburr all eight holes.

Completed: [✓]
4.10.98
Figure 4: Drilling the Pitot Tube Mounting Holes in the Mast
Option Step 7: Fabricate the Pitot Mast Mounting Angles

The pitot mast is secured to the mounting doubler and the wing skin with four small mounting angles, which you must cut from the supplied .063" X 1/2" X 1/2" aluminum angle [2]. As shown in Figure 5, cut four mounting angles, each 1/2" long. Mark and center punch a hole location on each flange of each angle according to the dimensions shown in the figure. Drill one flange only with a #30 bit and deburr.

Completed: [✓]

Option Step 8: Corrosion-Proof the Mounting Angles and the Mast

Apply the anti-corrosion protection of your choice to the mounting angles and the mast. If you want to leave the mast in its natural aluminum finish for aesthetic reasons, you may still wish to prime the top 1/2", which will all be inside the wing.

Completed: [✓]
Option Step 9: Rivet the Mounting Angles to the Mast

Use 1/8" AN470AD4-4 universal-head rivets [29] to rivet the four mounting angles to the top of the pitot mast. As shown in Figure 6, the undrilled flange of each angle should be down, and the upper edge of the angle should be parallel with the top of the mast.

Completed: [✓]

Figure 6: Riveting the Mounting Angles to the Mast
Option Step 10: Drill the Mounting Angle/Skin Rivet Holes

Re-Cleco the pitot mast mounting doubler in place inside the wing. Slide the pitot mast (with the mounting angles riveted in place) through the cutouts in the doubler and the skin from above until the horizontal flanges of the mounting angles contact the doubler, as shown in Figure 7. Use a #30 bit to drill downward through each angle and the underlying doubler and skin at the marked location. Cleco the holes as you go.

Note If your wing is closed, drill downward through each mounting angle and the doubler just as described above, except do it on your bench, not in the wing. Then, with the four #30 mast mounting holes drilled in the doubler, Cleco the doubler to the outside of the wing skin, making sure that it is right-side up. Use it as a drill guide to drill four matching #30 holes in the skin.

After the drilling is completed, remove the mast and the doubler and deburr all the holes. Touch up the primer on the mounting angles if you wish.

Completed: [ ✓ ]

... RETURN TO ASSEMBLY MANUAL, SECTION VI: WING ASSEMBLY, "HAT SECTION STIFFENERS, FORWARD SPAR CAP STRIPS AND LOWER CENTER SKIN STIFFENERS"
Figure 7: Drilling the Mounting Angle/Skin Rivet Holes

Option Step 11: Rivet the Pitot Mast Mounting Doubler

While riveting the lower center skin stiffener channels (as instructed in the Assembly Manual) don't forget to position the pitot mast mounting doubler under the innermost stiffener channel and rivet it as well. Pay careful attention to your choice of rivet length, since the stack-up changes several times over the length of the stiffener channel.

Note If you're installing the doubler under an already-riveted stiffener channel, use 1/8" AN470AD4-3.5 universal-head rivets [28]. Also, don't forget to corrosion-proof the doubler as you see fit before installing it.

Finally, as shown in Figure 8, use 3/32" AN470AD3-3 universal-head rivets [27] to rivet the doubler to the skin through the two holes at the forward end.

Completed: [✔]

. . . RETURN TO ASSEMBLY MANUAL, SECTION VI: WING ASSEMBLY, "RIVET THE RIBS AND THE LEADING-EDGE AND LOWER SKINS"
Figure 8: Riveting the Pitot Mast Mounting Doubler
Option Step 12: Rivet the Pitot Mast to the Wing

Insert the pitot mast through the mounting doubler and the wing skin. With 1/8" AN470AD4-4 universal-head rivets, rivet the four mounting angles to the doubler and the skin. As Figure 9 shows, the rivet heads should be on the outside of the skin. Use Clecos to help maintain alignment.

Completed: [ ]

Figure 9: Riveting the Pitot Mast to the Wing
Option Step 13: Connect the Power Leads to the Pitot Tube Heater Receptacle

Cut the supplied 30' length of **14-gauge single-conductor wire** [26] into two equal pieces. Disassemble the AN3115-1 receptacle by removing the small screw. (If you purchased your pitot tube from Stoddard-Hamilton, the receptacle comes mounted to the pitot tube. Pull the receptacle off the pitot tube before disassembling it.)

Referring to Figure 10 as necessary, solder the two lengths of wire to the two connectors in the receptacle. (Refer to ELECTRICAL WIRING AND CONNECTIONS in SECTION II of the *GlaStar Assembly Manual* for general soldering instructions. The manufacturer of the pitot tube sold by Stoddard-Hamilton specifies lead-silver solder, Federal Spec. QQ-S-571.) Reassemble the receptacle, but don't install the receptacle on the pitot tube yet. Be careful not to overtighten the receptacle screw, because the receptacle is brittle and easily broken.

**Completed:** [ ]

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**Figure 10: Pitot Heat Receptacle**
Option Step 14: Connect the Power Receptacle to the Pitot Tube

Slide a 1' length of high-temperature spiral wrap [25] over the two pitot heat power leads right down to the receptacle. Then feed the receptacle down through the pitot mast and plug it back into the pitot tube, as shown in Figure 12.

Completed: [ ]

Option Step 15: Install the Line from the Pitot Tube to the Wing Root

You will use 1/4" red nylon tubing [24] for the main pitot lines, but in order to connect to the coupling on the pitot tube, you must install a short segment of 1/4" aluminum tubing [21] between the tube and the nylon line. Begin by flaring one end of the tubing with a standard AN 37° flaring tool. Then slide onto the tubing two AN819-4D coupling sleeves [32] and two AN818-4D coupling nuts [31]; refer to Figure 11 to be sure you have the sleeves and nuts oriented properly on the tubing. When you’re satisfied, flare the other end of the tubing.

Next put a 90° bend in the tubing, making one leg about 1" long and the other about 2" long, as shown in Figure 11. The use of a tubing bender is recommended, but in any case, keep the radius of the bend at least 9/16".

Slide the pitot tube as far up in the mounting mast as possible to provide access to the AN786-1 coupling on the pitot tube. Remove the temporary cap from the coupling, and tighten the coupling nut on the shorter leg of the tubing down over it, orienting the longer leg of the tubing outboard, as shown in Figure 11.
Figure 11: Installing the Aluminum Extension Tube
Slide the pitot tube back down in the mast until the mounting screw holes line up and, as shown in Figure 12, secure it there with the four MS35207-226 mounting screws (6-40 dome head, 1/4" long) and MS35338-41 lock washers (#6 spring type). The screws and washers are included with the pitot tube sold by Stoddard-Hamilton.

**Note** Enlarge the #27 holes for the mounting screws in the pitot mounting mast as necessary to permit installation of the screws.
Figure 12: Installing the Pitot Tube
You can now route tubing from the extension tube to the wing root, where a disconnect fitting will be installed to allow future removal of the wings. Begin by threading an AN816-4D nipple [30] into the coupling nut on the longer leg of the aluminum extension tube, as shown in Figure 13. Follow this with an AN910-4D coupling [33] and the body of a nylon male connector [10]. Then slide the nut and sleeve portion of the male connector over one end of the red nylon tubing, insert a nylon connector insert [14] into the end, and then tighten the male connector nut down on the body.

**Note** Use of a thread lubricant is recommended for all metal-to-metal pipe thread connections in the pitot system. Teflon tape works well, as does anti-seize compound. Do not use a thread lubricant with nylon fittings.

**Note** The red and blue nylon tubing supplied with the kit is identical, but we recommend always using red for pitot lines and blue for static lines. This minimizes the chance of making improper connections that could damage expensive instruments or cause erroneous readings.

Figure 14 shows the suggested routing of the pitot line and heat leads. These can be bundled together along their entire route through the wing. To avoid kinking or flattening the tubing, make sure that the turn back toward the wing root is a gentle, large-radius one. The tubing and wiring should pass through the rear spar through the second lightening hole outboard of Main Rib 2, and then through the lightening holes of the flap cove ribs, passing under all the control cables and pulley brackets.

**Note** The optimum routing for the pitot line and heat leads in the area of the inboard flap track cannot be determined until after all the control cables have been routed and tensioned. At that time, make sure the pitot line and heat leads do not interfere with the control cables.
Figure 13: Connecting the Main Pitot Line to the Extension Tube
**Nav/Strobe Light Option** If you are installing Stoddard-Hamilton's Nav/Strobe Light Option Kit (P/N 912-03000-01), then we recommend routing the pitot plumbing and wiring through the 3/4" polyethylene conduit provided with that kit. This conduit is illustrated in Figure 14 with the dashed lines. Refer to the option instructions for details on the routing and securing of the conduit, as well as for directions on cutting an entrance hole in the conduit for the pitot line and pitot heat leads. It may be necessary to very lightly lubricate the outside of the pitot line and wires in order to slide them through the conduit. If you do use a conduit, you can **skip the next paragraph**.

Use 5" cable ties [3] to secure the plumbing and wiring to every flap cove rib through which they pass. The tooling hole at the lower, forward corner of each rib web is a convenient pass-through for the ties. To protect the tubing and wiring from chafing against the edges of the lightening holes, apply a blob of RTV silicone sealer between them and the hole edge at each location and let it cure before tightening the tie.

Once everything is secured, use a sharp utility knife to cut off the inboard end of the tubing approximately 14" beyond the wing root. Use wire cutters to cut the wires off about 16" beyond the root. Set the remaining tubing and wire aside.

Completed: [ ]

... RETURN TO *ASSEMBLY MANUAL, SECTION IX: SYSTEMS INSTALLATION, "WING PLUMBING, WIRING AND OTHER MISCELLANEOUS STUFF"*
Figure 14: Suggested Routing of the Pitot Line and Pitot Heat Power Leads
Option Step 16: Fabricate the Pitot Drain Mounting Doubler

Because the pitot system has a low point between the tube and the airspeed indicator, moisture can get trapped in the lines, where it can cause your indicator to give erroneous readings or even to fail completely. Therefore, it's necessary to install a drain at the lowest point in the pitot system. Every preflight should include opening this drain in case any water has collected.

The drain requires a mounting doubler. The doubler can be made from the piece of .032"-thick aluminum sheet left over from making the pitot mast mounting doubler (Option Step 1). Round the corners, drill the center hole with a 7/16" hole cutter, and drill the corner holes with a #30 bit, as shown in Figure 15. Corrosion-proof the doubler as you see fit.

Completed: [ ]
Figure 15: Fabricating the Pitot Drain Mounting Doubler
Option Step 17: Drill the Drain Hole in the Fuselage Floor

Because the pitot line is routed down the pilot's-side door post, the drain should be located on the fuselage floor just inboard and forward of the tricycle main gear socket on that side. As shown in Figure 16, use the drain mounting doubler to locate the drain hole.

Position the doubler so that its long axis is parallel to the aircraft centerline and its aft corners are tangent to the cage tubes shown in the figure when viewed from above. This placement doesn't need to be overly precise. With the doubler in position, mark the approximate center point of the 7/16" doubler hole on the fuselage floor. Remove the doubler and drill all the way through the floor at this point with an 11/16" hole cutter.

Caution Do not drill through the doubler with the 11/16" cutter—just the fuselage!

After the hole has been drilled, use sandpaper to smooth the edges on both the inside and outside skins. Then seal the foam inside the hole with a small amount of thin-mix Q-cell and resin applied with the tip of your finger.

Completed: [ ]
Figure 16: Marking and Drilling the Pitot Drain Hole
Option Step 18: Install the Pitot Drain

As Figure 17 shows, the drain valve [17] mounts below the mounting doubler, which in turn is riveted to the fuselage floor. Begin by inserting the valve through an AN960D616L thin aluminum washer [36] and the center hole in the doubler. The valve is secured to the doubler with one or more AN960D616 aluminum washers [35] and an aluminum AN917-1D aluminum tee fitting [34]. Use additional washers as necessary so that the tee is aligned parallel with the aircraft centerline when tightened, as shown in the figure.

Once the drain valve and tee are tightened down on the mounting doubler, center the drain valve in the fuselage hole, as shown in the cross-sectional detail view of Figure 17. Then drill through the doubler and the inner fuselage laminate only with a #30 bit at each of the marked corner locations. Deburr these holes, and then rivet the doubler to the fuselage floor with 1/8" large-head blind rivets [19]. As the Figure 17 detail view shows, the shop heads of the rivets displace the foam core under the hole, but neither the holes nor the rivets penetrate the outer laminate.

![Hint](image)

The use of a drill stop is recommended to ensure that you don't drill through the outer laminate.

Finally, thread a pair of nylon male connectors into the bosses of the tee.

Completed: [ ]
Figure 17: Installing the Drain Valve
Option Step 19: Route the Pitot Line from the Door Post to the Drain

You're now ready to run the fuselage pitot line from the wing line at the door post to the drain. Begin by installing a nylon union [12] on the end of the wing line. As shown in Figure 18, slide the nut and sleeve from one end of the union over the end of the wing tubing, and then put a nylon connector insert in the end of the line. Tighten the nut down over the insert to complete the connection.

Repeat the procedure to install the other end of the union on the remaining length of red nylon tubing, and then use cable ties to secure the line to the door post just above and just below the connection. The two ends of the union connector are interchangeable.

Route the tubing down the door post to the drain, securing it every six or eight inches with a cable tie. Cut the tubing to an appropriate length and connect it to the male connector in the aft boss of the drain tee, as shown in Figure 18.

Completed: [ ]

Option Step 20: Route the Pitot Line from the Drain to the Panel

With the remaining red nylon tubing, complete the fuselage pitot line installation from the drain forward to the instrument panel. Use the male connector in the forward boss, as shown in Figure 18, to connect the tubing to the drain tee, and then route the line forward under the left-hand door to the instrument panel area. Use cable ties to secure the tubing to the cage structure.

Warning In routing the pitot line forward from the drain, be sure to keep it higher than the drain at all points. The purpose of the drain will be defeated if you allow low points for moisture to collect.

Completed: [ ]
Figure 18: Connecting the Fuselage Pitot Lines
Option Step 21: Install Connectors on the Pitot Heat Wiring

In order to facilitate removal of the wings, it's desirable to allow quick disconnection of the pitot heat power leads. As Figure 19 shows, install female connector pins [7] and a male two-pin connector [6] on the leads coming out of the wing. The two pieces of wire left over from when you cut the wing leads to length will serve as the power leads from the wing root to the panel; install male connector pins [9] and a female two-pin connector [8] on these wires.

Note: The pins on these AMP connectors require a special crimping tool, which is available from Stoddard-Hamilton; order P/N 810-9004-001. Give each pin a good, firm test tug after crimping to make sure it's secure.

Snap the male and female connectors together.

Completed: [ ]

Figure 19: Installing Connectors on the Pitot Heat Wiring
Option Step 22: Route the Pitot Heat Wiring Forward to the Instrument Panel

From the connectors you just installed, the pitot heat power leads should be routed down the door post, forward under the door cutout and up to the panel. Use standard practices for bundling these wires with other wiring and securing them to the fuselage cage.

Warning In general, route electrical wiring separately from fuel lines, fuel vent lines and brake lines to the extent practical. Where wiring must cross flammable fluid lines, the wiring should go on top.

Completed: [ ]
**STATIC PORT INSTALLATION**

**Option Step 23: Mark and Drill the Static Port Holes in the Fuselage**

A static port [18] is installed on each side of the GlaStar fuselage. Because the ports feed into a common static line, they provide accurate pressure even in slips and other uncoordinated maneuvers, unlike systems relying on a single port.

As shown in Figure 20, the ports are located on the waterline 10" aft of the cowling joggle. This location is close to the instrument panel, simplifying routing of the static lines to the instruments, and is low enough beneath the flight instruments to keep moisture out of the lines. You should measure these locations as accurately as possible.

Using the nicks you made in the door frame as guides, mark the waterline on the forward part of the fuselage on each side, and then make a mark 10" aft of the joggle. Use a 1/2" hole cutter to drill all the way through the fuselage shell at this point. Sand the rough edges of the hole smooth inside and out and seal the foam with thin-mix Q-cell and resin.

![Figure 20: Marking and Drilling the Static Port Hole](image)
Static port calibration flight testing on our GlaStar prototype resulted in a port design that gives accurate indicated airspeeds throughout the flight envelope. However, the beveled face of the port must be oriented precisely as shown in Figure 14 to produce accurate results. Seat the static port in the hole with the thicker edge of the disk **down and aft**, and an imaginary line through the top two holes in the disk **parallel** with the waterline.

Holding the port in its proper position, drill through the disk and the outer fuselage laminate only with a #40 bit, using one of the three outer holes in the disk as a guide. Insert a Cleco in this hole and drill the remaining two holes, each time penetrating only through the outer fuselage laminate.

**Caution** Once again, use of a drill stop is recommended. Also, be sure **not** to drill the center hole!

***Completed: Left [ ] Right [ ]***

*Figure 21: Orienting the Static Port and Drilling the Rivet Holes*
**Option Step 24: Install the Static Ports**

The static ports are fastened to the fuselage sides with 3/32" flush-head blind rivets [37], which grip the outer laminate. However, to provide supplementary strength and, especially, to make the installation watertight, we recommend also using a small amount of RTV silicone sealer.

Apply the sealer in a thin ring around the boss of the port, and then press it into position through the 1/2" hole in the fuselage. Then install blind rivets in the three outer holes in each port, as shown in Figure 22.
Option Step 25: Install Elbows in the Static Ports

The inboard end of each static port boss is threaded to take a nylon 90° elbow [13]. Thread the male end of an elbow several turns into each boss, leaving the nut end of the elbow pointing up, 10–15° aft of vertical.

Completed: Left [ ] Right [ ]

... RETURN TO ASSEMBLY MANUAL, SECTION IX: SYSTEMS INSTALLATION, "MISCELLANEOUS FUSELAGE PLUMBING AND WIRING"

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FINAL SYSTEM CONNECTIONS

FROM ASSEMBLY MANUAL, SECTION X: FINAL ASSEMBLY, "INSTRUMENT PANEL" . . .

Option Step 26: Connect the Pitot Line to the Airspeed Indicator

Thread a nylon male connector into the pitot port on the back of your airspeed indicator. Trim the red pitot line (coming up from the drain valve) to the proper length and secure it in the connector. (See Figure 23.)

Completed: [ ]
Option Step 27: Connect the Static Lines to the Instruments

Figure 23 shows schematically how the static lines, cut from the length of 1/4" blue nylon tubing [23], run from each port to a nylon union tee [11]. From the tee, the line runs in series from instrument to instrument, using the fittings shown in the figure. The union tee should be secured with cable ties somewhere behind the instrument panel. Wherever you locate it, be sure that the left and right static lines run continuously uphill from the static ports to the tee. Otherwise, moisture could enter the system through the ports and collect in low points in the lines, producing inaccurate pressure readings or complete system failure.

Completed: [ ]
Figure 23: Connecting the Pitot and Static Lines to the Instruments
If you intend to fly hard IFR in your GlaStar, you should consider installing an alternate static source in the cabin. This consists of a manually operated valve installed between the union tee and the instruments. It allows the pilot to provide an alternate source of static pressure in case the external ports become iced over in flight. If you take care to install the valve below the level of the static ports, it can also serve as a low-point drain for the entire static system.

The parts for this installation are not included in this option kit simply because few GlaStar pilots will require this level of capability. However, all the necessary parts are available from Stoddard-Hamilton. Table 1 lists these parts, their required quantities and their Part Numbers; please refer to the latter when ordering.

<table>
<thead>
<tr>
<th>Part Name</th>
<th>Qty</th>
<th>Part No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nylon male connector</td>
<td>2</td>
<td>320-0250-001</td>
</tr>
<tr>
<td>Nylon connector insert</td>
<td>2</td>
<td>320-0259-001</td>
</tr>
<tr>
<td>Drain valve</td>
<td>1</td>
<td>320-1550-001</td>
</tr>
<tr>
<td>Aluminum tee</td>
<td>1</td>
<td>AN917-1D</td>
</tr>
<tr>
<td>Aluminum washer</td>
<td>3</td>
<td>AN960D616</td>
</tr>
<tr>
<td>Thin aluminum washer</td>
<td>1</td>
<td>AN960D616L</td>
</tr>
</tbody>
</table>

**Table 1: Optional Alternate Static Source Parts List**

**Note** You may have a couple of these parts left over from the option kit installation, since we typically buffer quantities on small items like washers and connector inserts.

Figure 24 shows the recommended method of installing the alternate static source.

**Completed: [ ]**
Figure 24: Optional Alternate Static Source Installation
**Option Step 28: Connect the Pitot Heat Power Leads to the Electrical System**

The pitot heat power leads both terminate in ring terminals, which in turn are connected to the switches and circuit breakers that control the pitot heat circuit.

Figure 24 is a schematic illustrating the recommended circuitry. The heater system has no polarity; either of the leads can be the ground. This option kit contains #8 and #10 22–18 gauge ring terminals [4 and 5] suitable for use with popular switches, breakers and buses.

*Note* The required switches and breakers are not included in this option kit because most builders like to design a unified panel in which all switches and breakers are of the same style. Consult our *Options Catalog* for details on the selection of switches and breakers Stoddard-Hamilton offers.

![Figure 24: Schematic of the Pitot Heat Circuit](image-url)
INSTRUCTIONS
FOR INSTALLATION AND MAINTENANCE
OF
AERO INSTRUMENT CO., INC.
TUBE-PITOT, ELECTRICALLY HEATED, “L” SHAPED
AN 5812 (12 Volt D.C.)
MFG'S PART NO. P. H. 502-12

The electrically heated Pitot Tube is designed for use on aircraft to provide an accurate source of impact pressure for use with Air Speed Indicators under icing conditions.

INSTALLATION
1. The Pitot Tube is mounted in standard streamline cross section tubing of 1½" nominal diameter. Four holes (No. 24 - .152) should be drilled in the streamlined tube as shown in the outline drawing. The nose of the pitot tube shall point forward (to the front of the airplane) and “TOP” marked on the tube must be on top.

2a. Electrical Connections. — Remove the detachable receptacle assembly and separate its two halves by removing the screw. Use MIL-W-7139(Aer) wire for the connecting leads. Strip off the insulation a distance of 3/8” from the end of the leads and with lead-silver solder (Federal Spec. QQ-S-571) join each lead to a connector from the receptacle assembly. Caution should be exercised to remove all flux from this joint. Return connections to the receptacle and reassemble the receptacle. Slip the electrical receptacle over the contact pins, making sure that it is securely in place. Refer to drawing AND 10410 for further wiring information if necessary.

2b. Pressure Connections. — Apply a suitable thread compound to all threads. Attach the union to the tube coupling. Tighten the connection with a ½ inch open end wrench. Push the tube into the mounting boom and fasten it in place with the four mounting screws (MS35207-226) and lock washers (MS35338-41) supplied.

2c. For further instructions regarding installation see Specification MIL-I-6115.

Made by AERO INSTRUMENT CO., INC.
14901 Emery Ave., Cleveland, Ohio 44135
3a. The drain holes of the pitot tube shall be sealed for this test. With the instruments properly connected to the pitot pressure line, the pitot pressure opening of the pitot tube shall be suitably connected to a source of pressure. A pressure sufficient to produce approximately three-fourths of the full-scale deflection on the lowest range airspeed indicator connected to the pitot line shall be applied and the pressure cut off. After one minute, the indicated airspeed shall have decreased not more than five knots. NOTE: DO NOT APPLY VACUUM TO PITOT LINES.

3b. Electrical. — The electrical system should be tested by turning the pitot heat switch to the "on" position and noting the current drain on a test ammeter after a period of two minutes.

The PH 502-12 tube will draw between 6.4 and 8 amperes. The fuse in the pitot line should be checked.

MAINTENANCE

No maintenance is required other than a periodic check of the electrical connections and a cleaning out of the tube with air pressure after disconnecting from lines. The check of the electrical connections should include a thorough cleaning of the spigot from which the pressure tube and electrical terminals protrude. Any corrosion, dirt, or moisture should be completely removed to prevent short circuiting of the heating element.