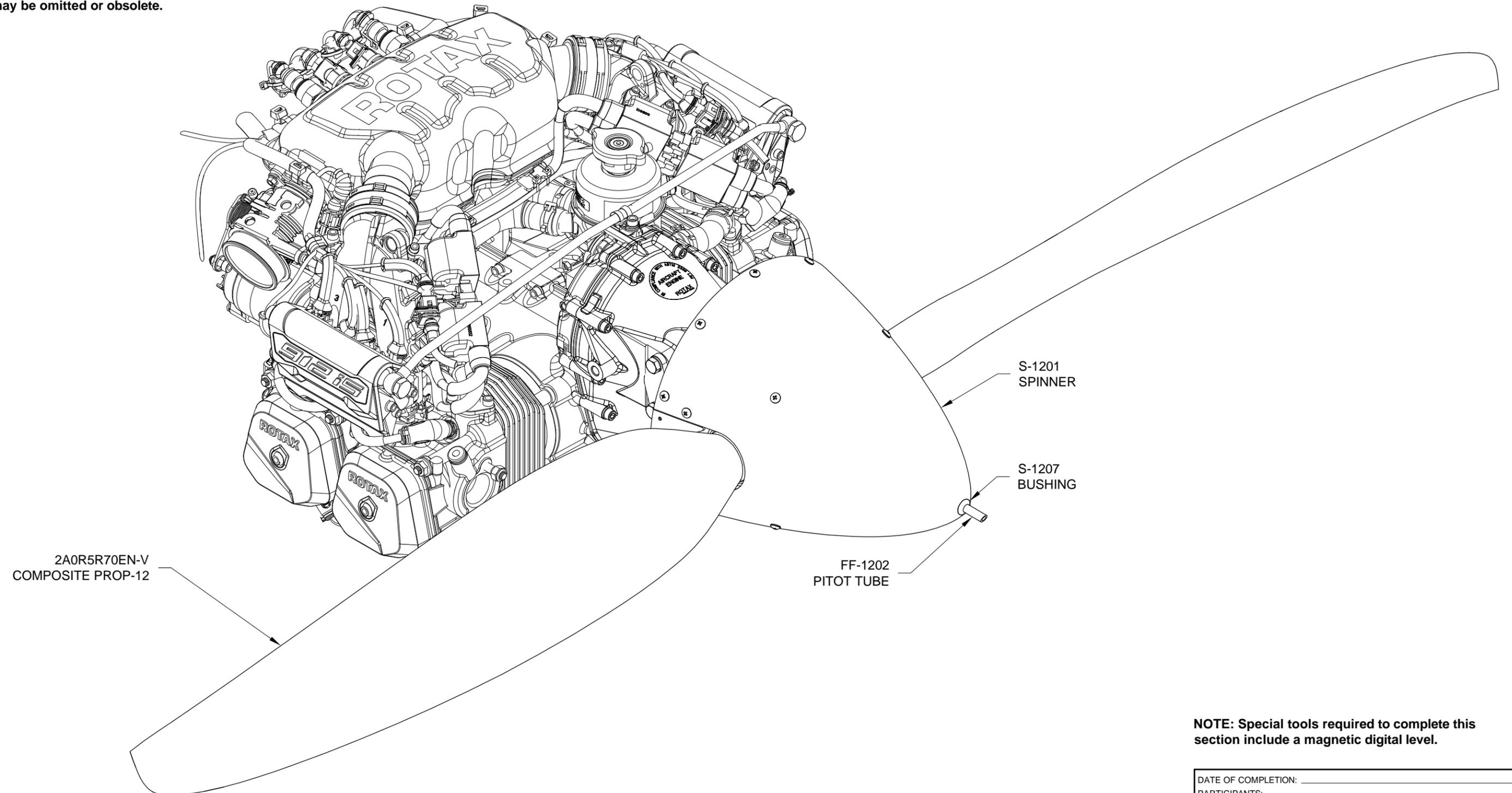




# SECTION 47iS/U: SPINNER & PROPELLER

NOTE: Engine installation shown for reference only as some details may be omitted or obsolete.



NOTE: Special tools required to complete this section include a magnetic digital level.

DATE OF COMPLETION:	_____		
PARTICIPANTS:	_____		
DATE: 05/01/18	REVISION: 0	RV-12iS	PAGE: 47iS/U-01

**Step 1:** Mark the FF-1202 by wrapping with masking tape as shown in Figure 1. Insert the FF-1202 into the FF-1201 Pitot Block up to the edge of the tape. The threaded portion of the pitot block is aft.

Flip the FF-1202 and FF-1201 over on a flat surface. Align the most forward point of the FF-1202 with the top of the FF-1201 block and make a small scratch to use as an alignment mark on the FF-1202 and FF-1201 as shown in Figure 1.

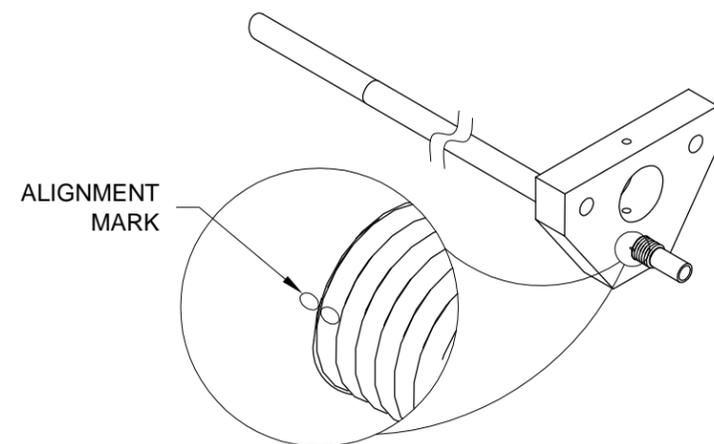
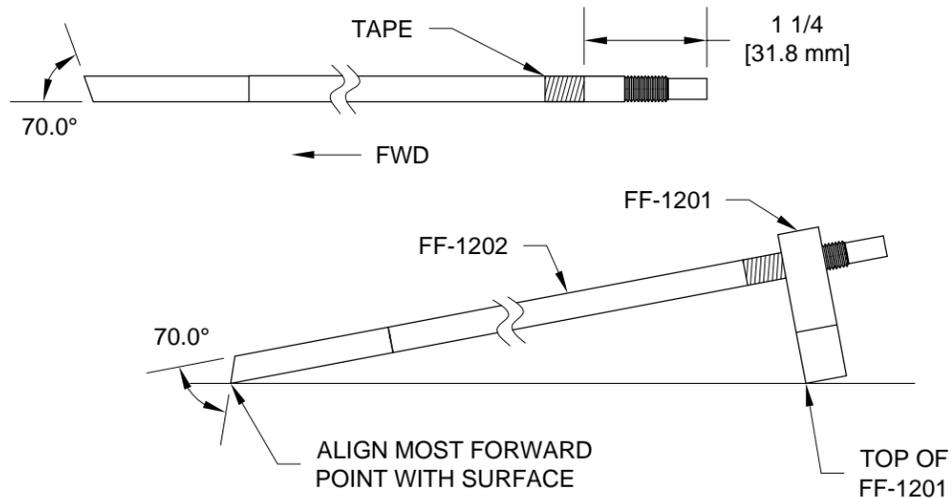
**Step 2:** Install a #36 drill bit into the hole in the top of the FF-1201. Press the bit down until it just contacts the FF-1202.

Slip as many washers over the bit as necessary to cover the flutes on the drill bit. At least one of the washers should be a NAS1149F0332P.

Slide a drill chuck over the drill bit and press until the drill chuck is firmly seated against the washers. Tighten the drill chuck.

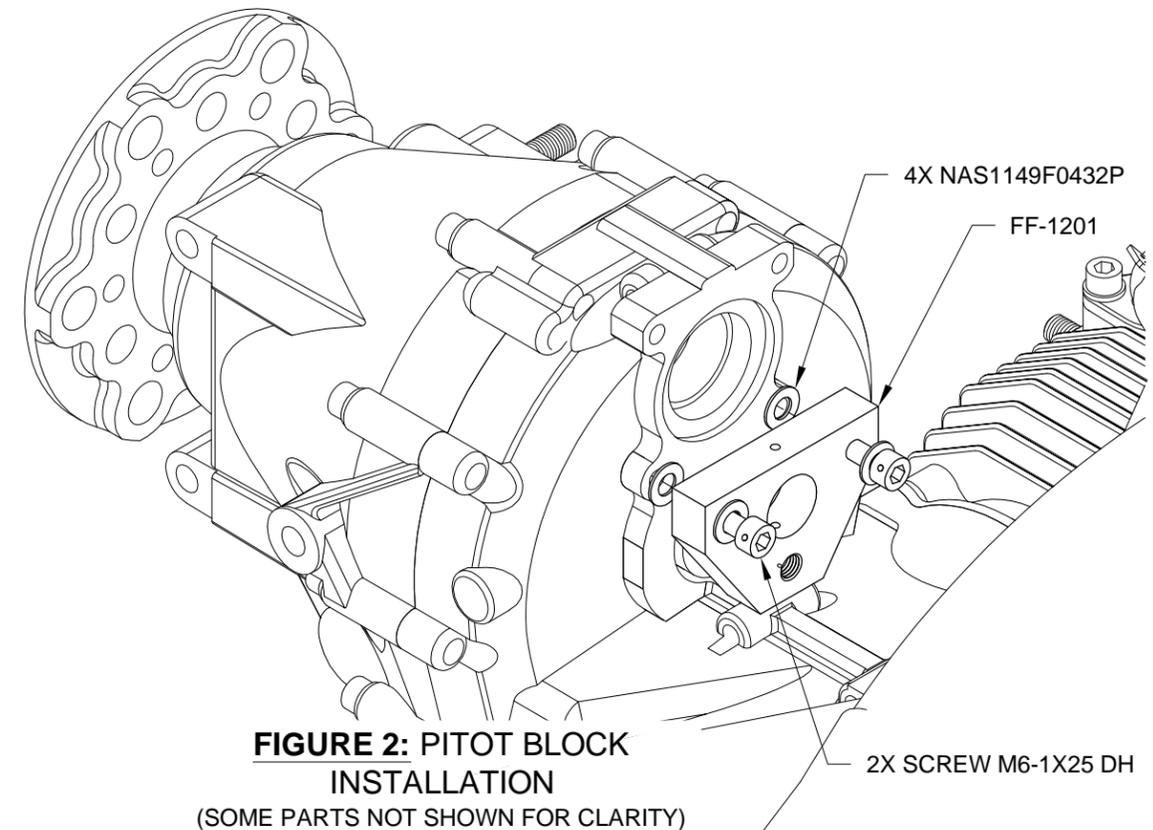
**Step 3:** Remove the drill and bit from the FF-1201. Remove one of the NAS1149F0332P thick washers. Insert the drill bit with the remaining washers into the hole in the FF-1201 and drill #36 the FF-1202 using light pressure. Do not distort the FF-1202.

**NOTE:** These steps are designed to create a dimple in the FF-1202 without drilling through the inner wall of the tube. If the tube is breached, apply a small amount of RTV to the end of the MS51957-36 screw during installation. Check to make sure the RTV has not blocked the airflow path through the FF-1202 before proceeding.



**FIGURE 1: DRILLING THE PITOT TUBE**

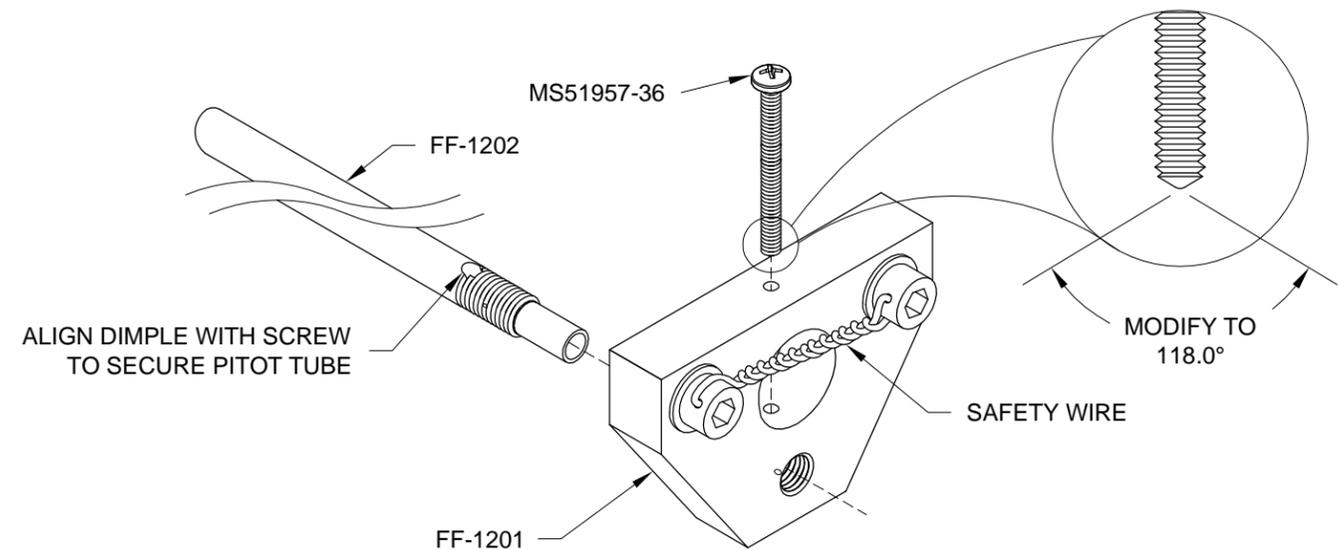
**Step 4:** Mount the FF-1201 with the hardware called out in Figure 2. The FF-1201 should be mounted with the threaded half aft. Turn the cap screws until they touch the surface of the washers, turn an additional 1/4 turn and stop. Safety wire the cap screws together as shown in Figure 3.



**FIGURE 2: PITOT BLOCK INSTALLATION**  
(SOME PARTS NOT SHOWN FOR CLARITY)

**Step 5:** Modify the end of the MS51957-36 screw to be pointed as shown in the detail view of Figure 3. A belt sander works well here.

**Step 6:** Insert the MS51957-36 shown in Figure 3 to "tap" the #36 hole in the FF-1201. Remove the screw and insert the FF-1202 through the prop shaft and into the FF-1201. Turn the FF-1202 until the marks made on the FF-1202 and FF-1201 align. Insert the MS51957-36 as shown in Figure 3 and tighten by hand until it just bottoms on the FF-1202. Check that the front of the FF-1202 is properly oriented. The head of the MS51957-36 will not be in contact with the pitot block.



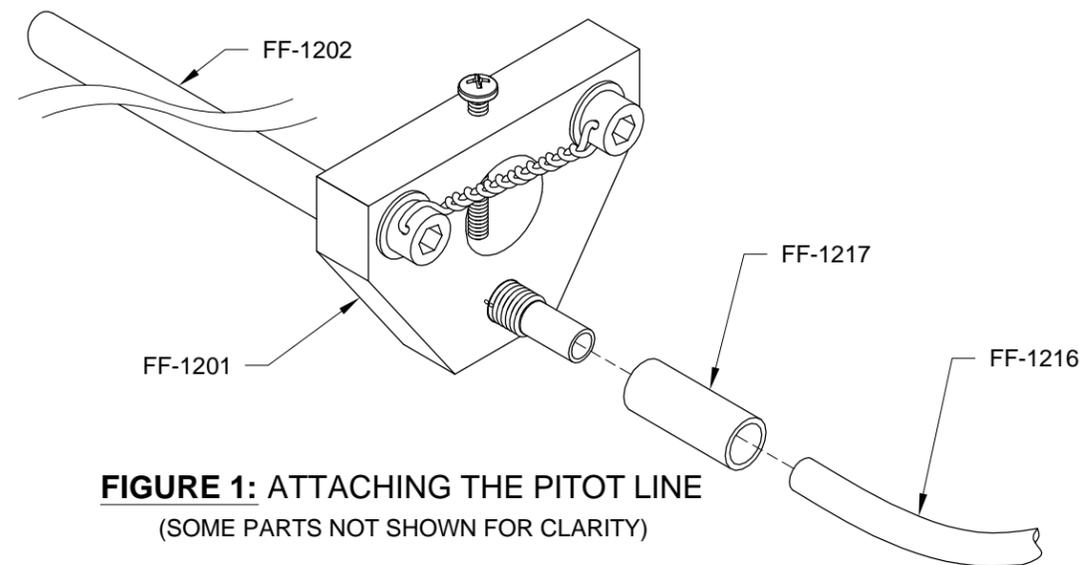
**FIGURE 3: ATTACHING THE PITOT TUBE**  
(SOME PARTS NOT SHOWN FOR CLARITY)

**NOTE:** This page refers to components provided in the Avionics Kit, denoted by (\*).

**Step 1:** Fabricate the FF-1216 Pitot Line by cutting 54 1/2 in. [138.4 cm] from the PT-030X1/4X55 tube.

**Step 2:** Fabricate the FF-1217 Pitot Interconnect by cutting 1.0 in. [25.4 mm] from the PT-062X3/8X1.5 tube.

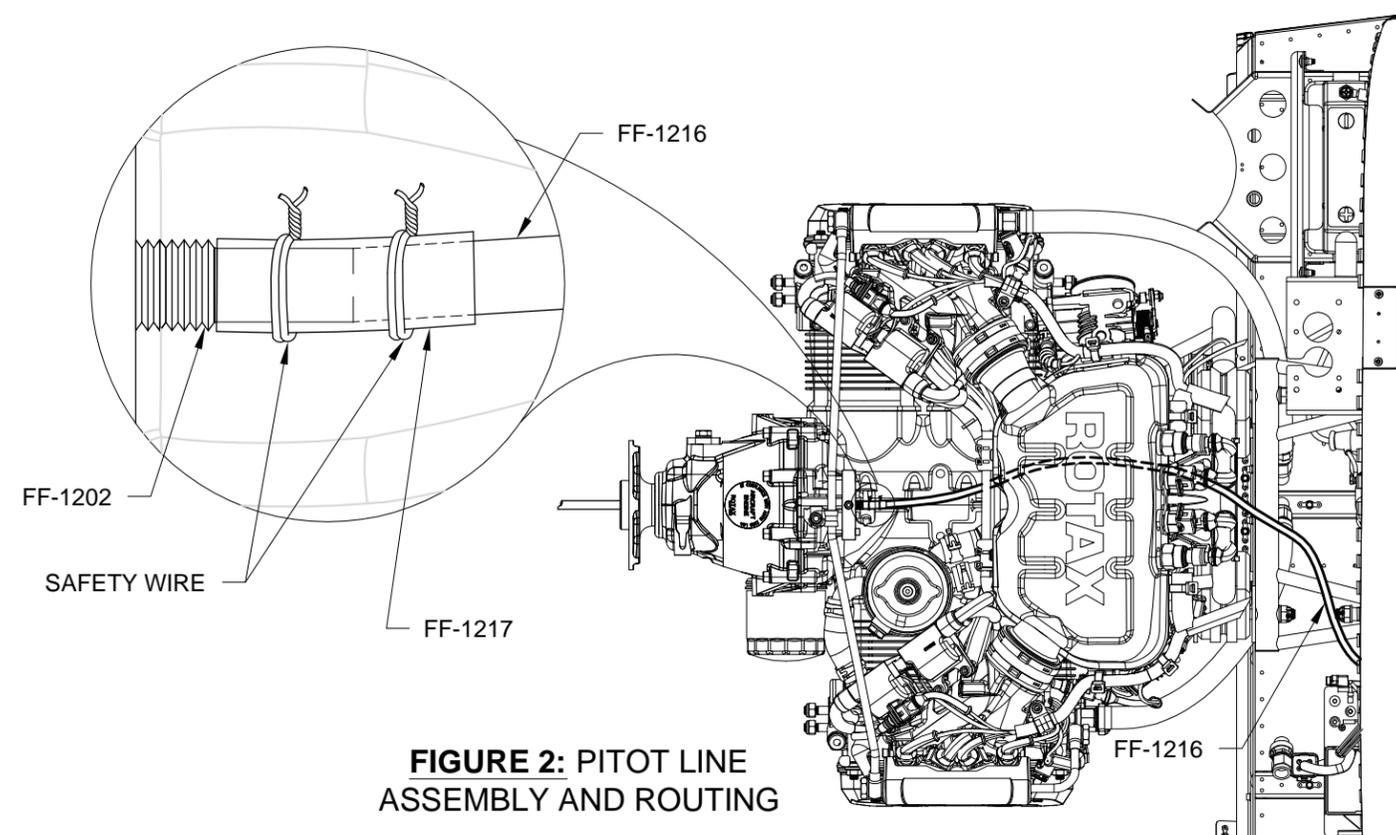
**Step 3:** Place the FF-1217 over the aft end of the FF-1202 and over the FF-1216 as shown in Figures 1 and 2. The FF-1216 and FF-1202 should butt against each other.



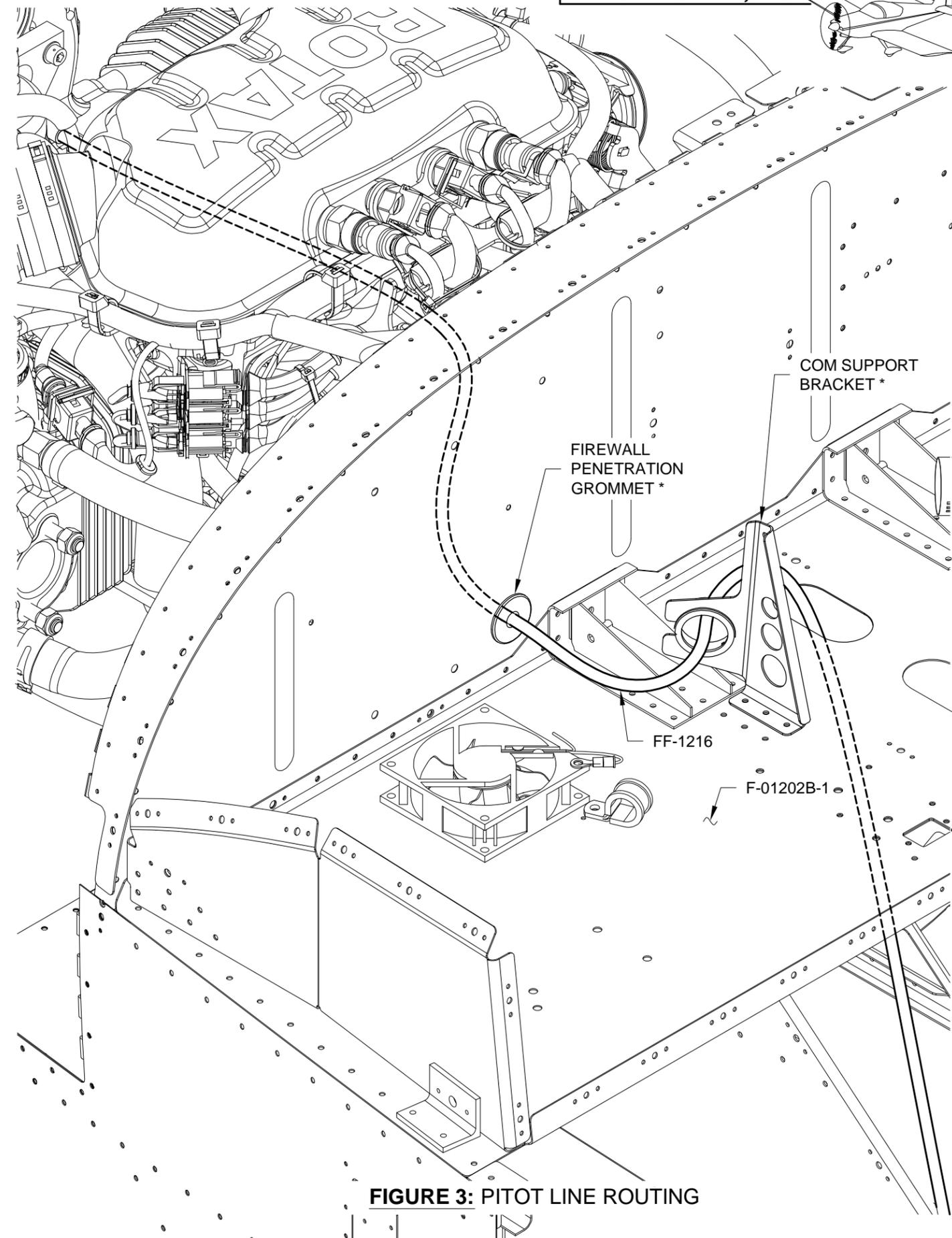
**FIGURE 1: ATTACHING THE PITOT LINE**  
(SOME PARTS NOT SHOWN FOR CLARITY)

**Step 4:** Double wrap safety wire around the FF-1217 as shown in Figure 2.

**Step 5:** Route the FF-1216 as shown in Figure 2 and Figure 3. Temporarily cover the aft end of the FF-1216 to keep debris from entering the line and temporarily secure the tube until it is connected during the avionics installation.



**FIGURE 2: PITOT LINE ASSEMBLY AND ROUTING**



**FIGURE 3: PITOT LINE ROUTING**



**WARNING: Before continuing, read the documentation concerning propeller installation included with your propeller and engine.**

**Step 1:** Copy the lines marked around the perimeter of the S-1201 opening onto the inside of the S-1201 with a fine point pen. Trim and sand the lower portion of the S-1201 to the scribe line as shown in Figure 1.

**Step 2:** Carefully remove the propeller cutout area on the sides of the S-1201 as shown in Figure 1. Start by drilling several holes with a step drill or plexi bit about 1/16 in. [1.6 mm] inside of the radius at the top of the propeller cutout area.

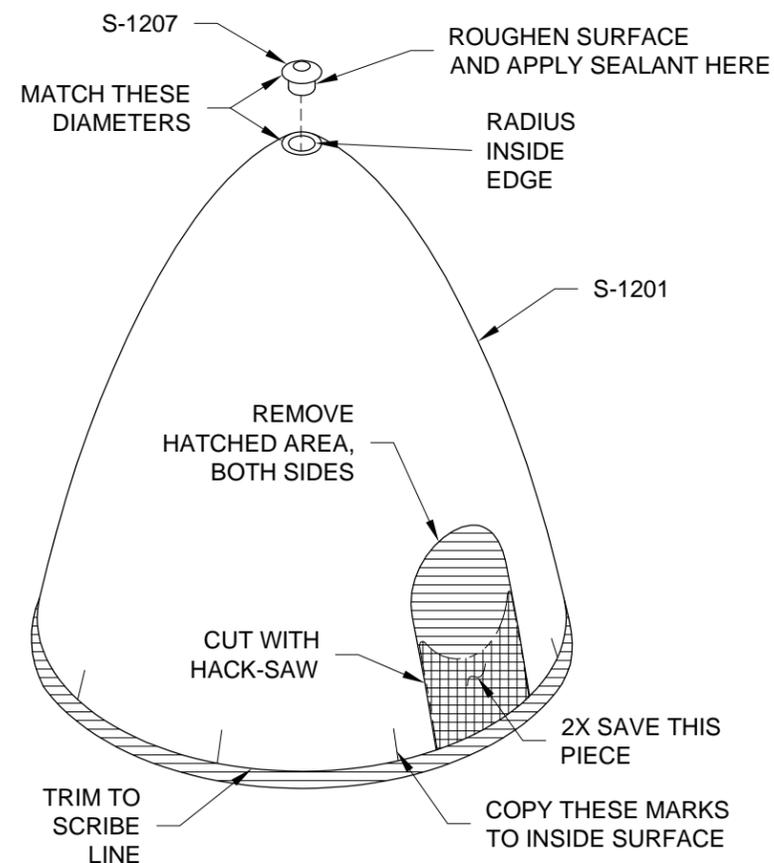
Use a fine tooth hacksaw blade to cut slits up to the curved portion of each cutout. The top portion should break away from the S-1201. A file or snips may be used to remove the material. Save the lower portion of the removed sections to make the S-1202C Gap Fillers later.

**Step 3:** Finish to the trim line with a sanding block and sandpaper wrapped around a round object such as a piece of broom handle or small can.

**Step 4:** Sand the tip of the S-1201 until the outer diameter matches the outside diameter of the S-1207 as shown in Figure 1. Remove a little at a time with a flat sanding block. Care should be taken to keep the surface level.

**Step 5:** Using sandpaper, create a small radius on the inside edge of the S-1201 opening to allow the S-1207 to mate properly. See Figure 1.

**Step 6:** Roughen the surface of S-1207 with coarse grit sandpaper where it will contact the S-1201. Apply a thin smear of fuel tank sealant to the S-1207 and insert in the S-1201. See Figure 1. Remove the excess sealant. Let the sealant fully cure before continuing.



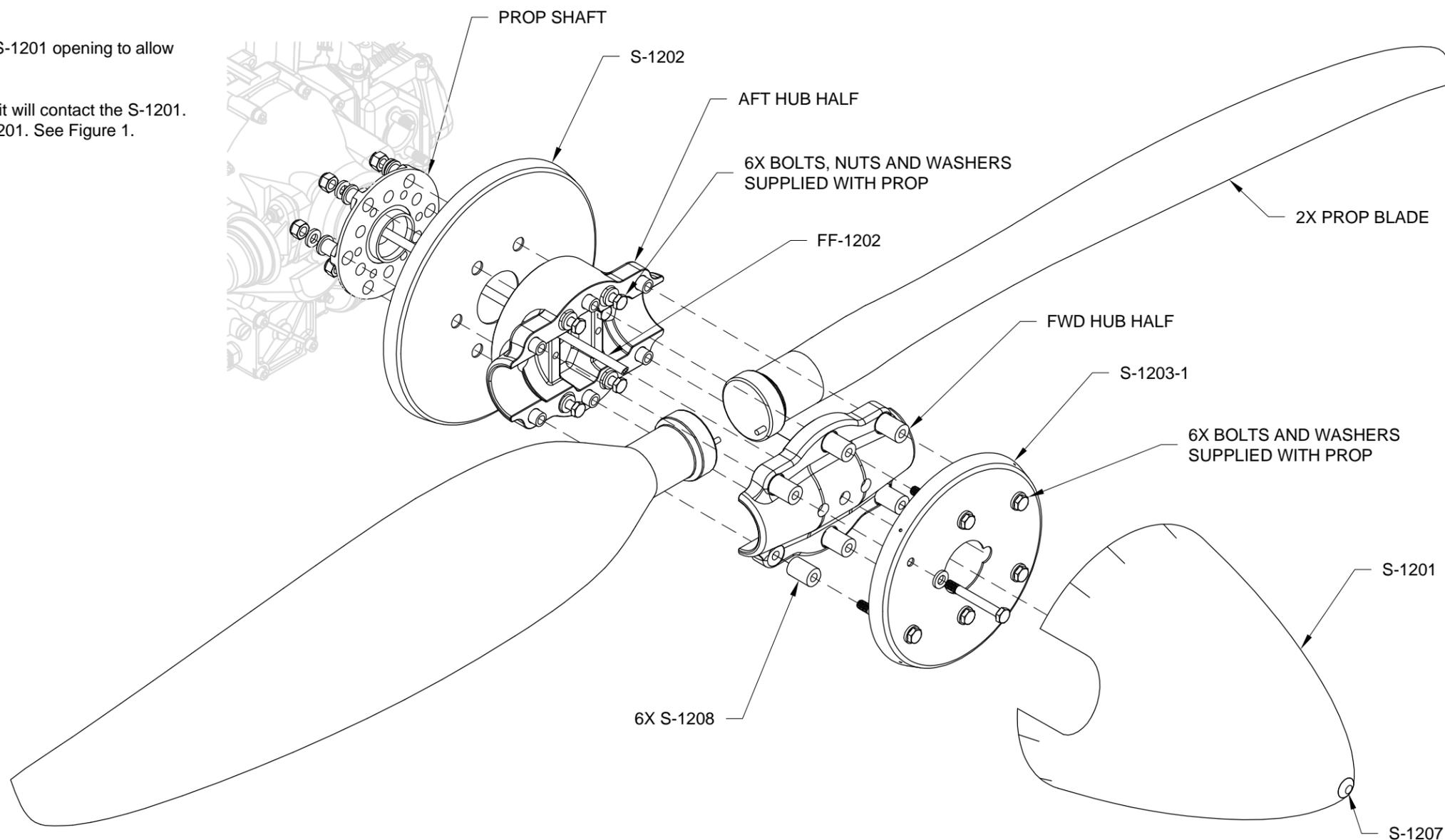
**FIGURE 1: MAKING THE PROPELLER CUTOUT**

**Step 7:** Attach the S-1202 Spinner Plate and aft hub half to the prop shaft using the hardware provided with the propeller as shown in Figure 2.

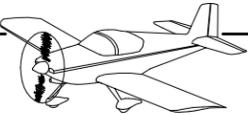
**Step 8:** Attach the propeller blades, fwd hub half, and S-1203-1 Front Spinner Bulkhead with the remaining hardware and S-1208 Spacers as shown in Figure 2. Do not final torque the hardware at this time. Temporarily pitch the propeller using the #3 setting of the Sensenich metal Pitch Setting Gage supplied with the propeller. The propeller will be final pitched on Page 47iS/U-08.

**Step 9:** Tape magnets to the pilot holes in the S-1203-1 in preparation for match drilling the S-1201. Refer to Section 5.18.

**Step 10:** Tape around the the propeller blades to prevent scratching during S-1201 installation. Slide the S-1201 over the assembly with the FF-1202 extending through the S-1207 in the front of the S-1201. Be sure the S-1201 is seated firmly on the S-1203-1 and S-1202 (any overhang of the S-1201 beyond the S-1202 will be trimmed after the S-1201 is drilled and clecoed in place). Clamp the S-1201 to the S-1202.



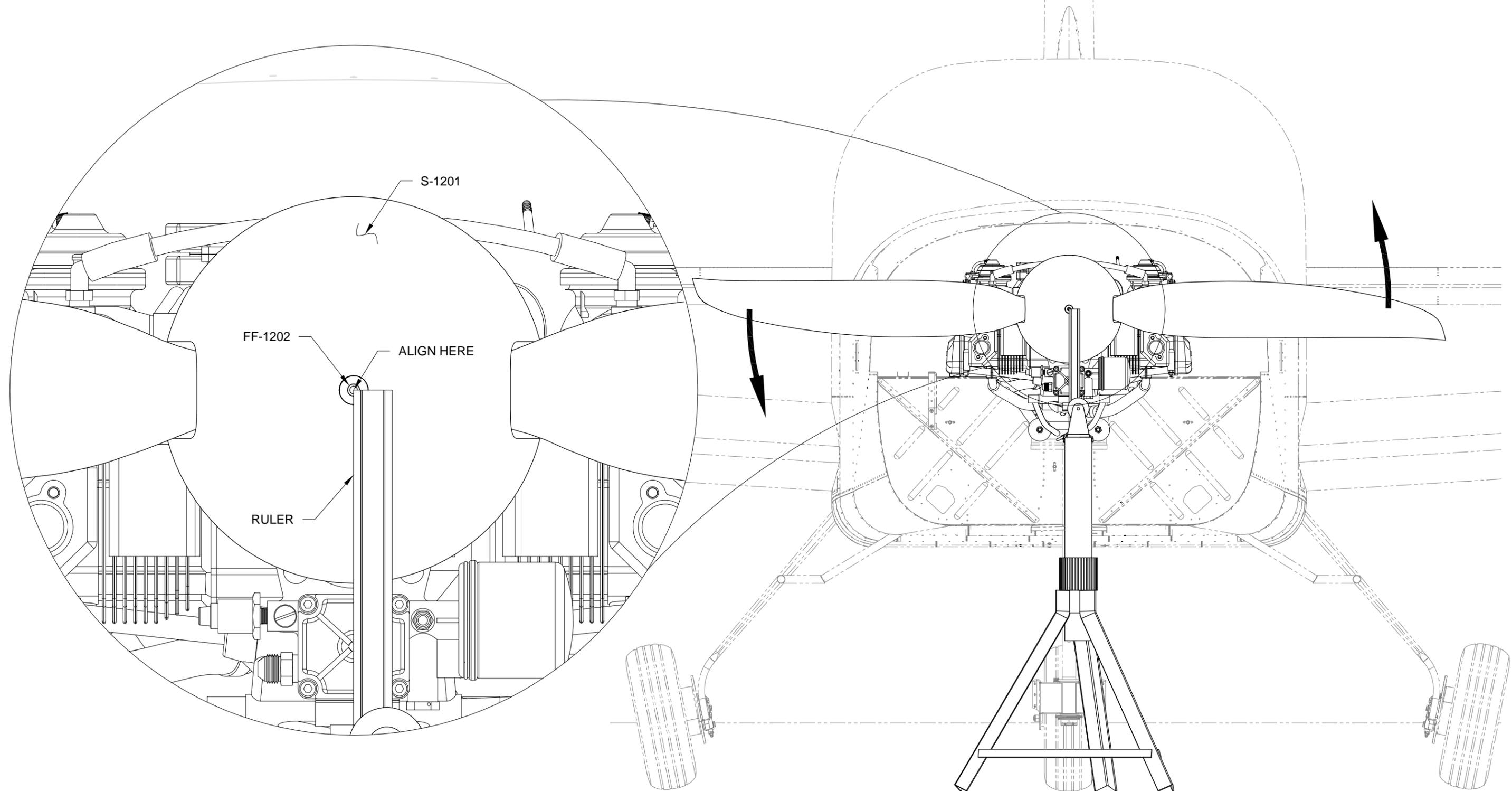
**FIGURE 2: SPINNER ASSEMBLY**



**Step 1:** Attach a ruler to a chair, step ladder, or other support so that the end of the ruler is centered vertically and horizontally at the end of the FF-1202 as shown in Figure 1. The ruler and support should be clear of the FF-1202, the propeller, and the S-1201.

**Step 2:** Remove the lower spark plug on each cylinder to allow the propeller to turn easily by hand. Verify that the ignition is disabled (battery disconnected or switches off).

**Step 3:** The end of the FF-1202 will track with the angle of the S-1201. Turn the propeller by hand while looking aft as shown in the detail view of Figure 1. Adjust the S-1201 until the end of the FF-1202 remains centered on the corner of the ruler within 1/16 in. [1.6 mm].



**FIGURE 1: SPINNER ALIGNMENT**



NOTE: Clear drill shavings as required before continuing to the next hole.

Step 1: Match-Drill #30 the pilot holes for the four screws that secure the S-1201 to the S-1203-1 Front Spinner Bulkhead. Refer to Section 5.18 for information on match-drilling opaque fiberglass parts. Cleco the drilled holes.

Step 2: Using a fine tip felt pen, mark the edge of the S-1202 Spinner Plate on the inside of the S-1201. Remove the S-1201. At each perpendicular mark on the inside of the S-1201 (see Figure 1 on Page 47iS/U-04), measure forward from the marked edge of the S-1202, as shown in Figure 1. Drill #40 pilot holes at these screw hole locations.

Step 3: Reinstall the S-1201 and cleco to the S-1203-1. Match drill #30 the screw holes from the S-1202 into the S1201 and then cleco them. To prevent "pillowing" of the S-1201 between the screws, start drilling midway between the propeller blade cutouts, working outward toward the cutout. See Figure 1.

Step 4: Trim any overhang of the S-1201 beyond the S-1202. A sanding block works well here.

Step 5: Make two S-1202C Gap Fillers out of the pieces trimmed from the S-1201 using the template at the end of this section. Test fit the S-1202C and trim as needed to clear the propeller by 1/16 in [1.6 mm] to 1/8 in [3.2 mm].

Step 6: Remove the S-1201 and make alignment marks on the inside of the S-1201, the S-1202, and the S-1203-1 so that they can be aligned later. Remove the S-1203-1, fwd hub half, S-1208 spacers, and propeller blades. Reinstall (cleco) the S-1202. See Figure 1.

Step 7: Clamp the two S-1202C to the S-1202 and drill #40 four holes on each side. See Figure 1. Cleco each hole as it is drilled. Remove the clecos and both S-1202C.

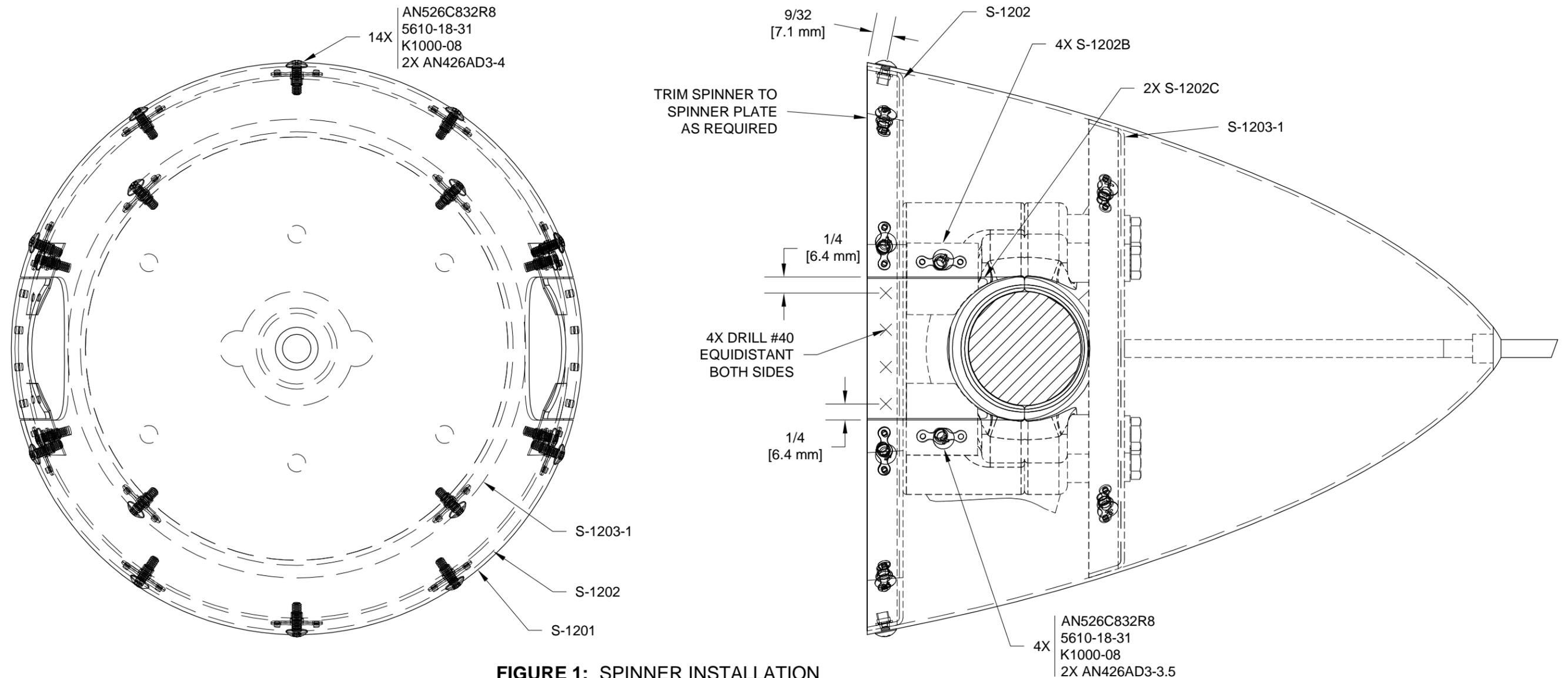


FIGURE 1: SPINNER INSTALLATION



**Step 1:** Bend the AS3-032 1 1/4 X 7 aluminum sheet around a curved object so that the material conforms to the curve of the S-1201. Cut four squares from the aluminum sheet to make the four S-1202B Back Plates. See Figure 1.

**Step 2:** Position the four S-1202B on the two S-1202C Gap Fillers as shown in Figure 1. Clamp the parts together and drill #40 the two holes in each S-1202B. Cleco the holes.

**Step 3:** Use a felt tip pen to trace the propeller clearance cut in the S-1202C onto the four S-1202B. Separate the parts and trim the S-1202B to the traced line. Radius the corners and deburr the S-1202B.

**Step 4:** Cleco the S-1202B to the S-1202C, then cleco the S-1202C to the S-1202 Spinner Plate. Drill #30 pilot holes in the S-1201 and S-1202B for the screws that will secure the parts together using the dimensions shown in Figure 2.

**Step 5:** Reinstall the forward hub half, the S-1208 spacers, and the S-1203-1.

**Step 6:** Final-Drill #19 all the holes common to the S-1201 and the S-1203-1, S-1202, and S-1202B as shown on Page 47iS/U-06, Figure 1.

**NOTE:** To locate the nutplate rivet holes, the nutplate is held in place with a mounting screw and the nutplate is used as a drill template. Cleco the first rivet hole to prevent the nutplate from rotating while locating the second rivet hole. It is important on curved surfaces that the nutplate is match-drilled from the side of the part on which it will later be installed.

**Step 7:** Remove the S-1202C/S-1202B, S-1201, S-1203-1, fwd and aft hub halves, and S-1202. Drill #40 holes in the S-1202, the S-1203-1, and the S-1202B for the rivets used to attach the nutplates called out on Page 47iS/U-06, Figure 1.

**NOTE:** Machine countersinks into fiberglass that are up to .005 too shallow are acceptable, even preferable, to countersinks which are too deep. Rivets should be slightly under set where installed in fiberglass parts.

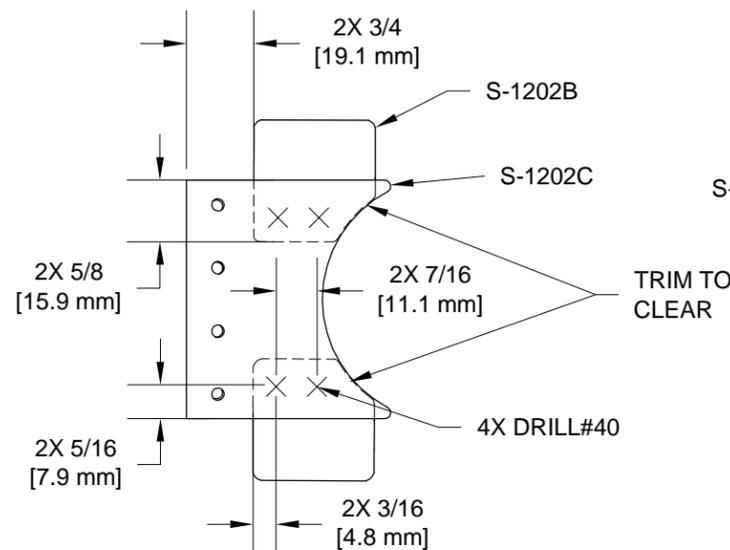
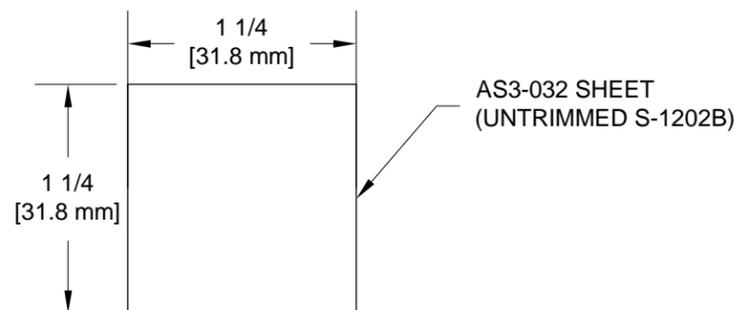
**Step 8:** Machine countersink all #40 holes in the S-1202C for flush rivets.

**Step 9:** Machine countersink all nutplate rivet holes in the S-1202, S-1202B, and S-1203-1 for flush rivets.

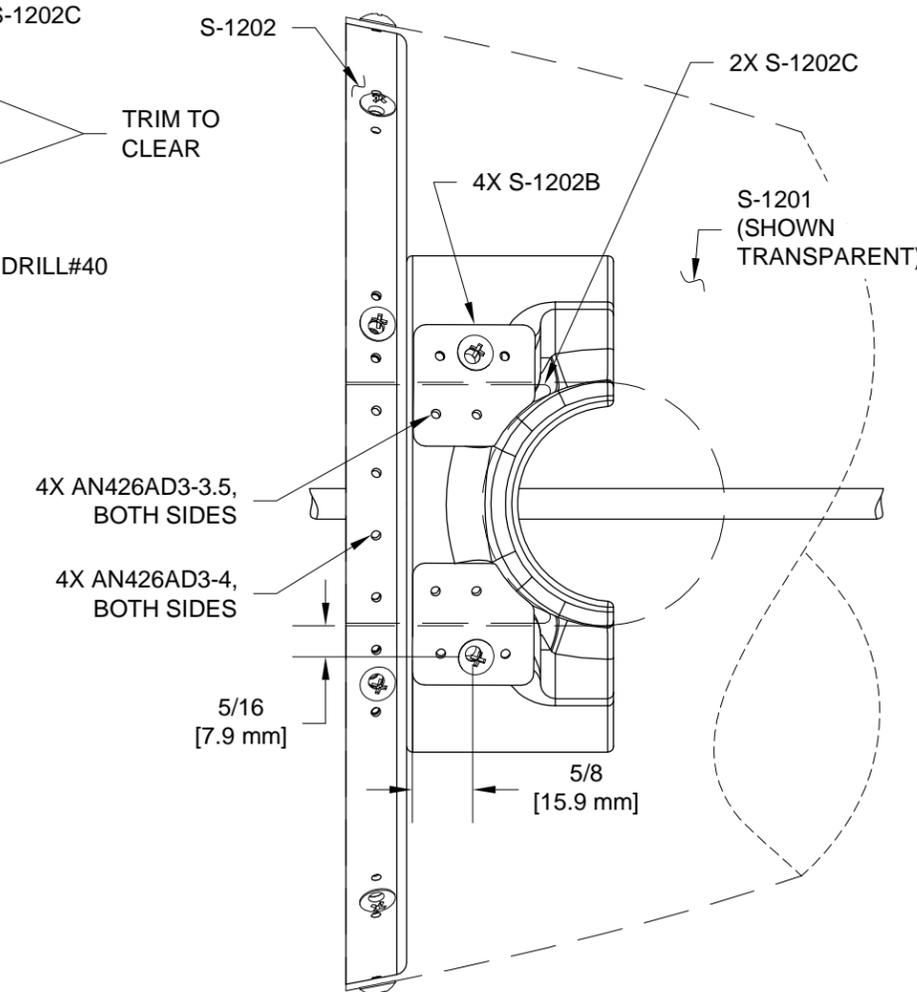
**Step 10:** Deburr all holes drilled, then rivet the nutplates called out in Figure 1 on Page 47iS/U-06 to the S-1202, the S-1203-1, and the S-1202B.

**Step 11:** Rivet the S-1202B to the S-1202C, then rivet the S-1202C to the S-1202 using the rivets called out in Figure 2.

**Step 12:** Install the S-1202, aft hub half, propeller blades, forward hub half, S-1208, and S-1203-1. See Page 47iS/U-04, Figure 2.



**FIGURE 1: BACK PLATE FABRICATION**  
(ONE SET SHOWN)



**FIGURE 2: BACK PLATE PLACEMENT**



**NOTE:** It is very important for the aircraft to remain as motionless as possible throughout the propeller pitching procedure.

**NOTE:** Before beginning the procedure, loosen the bolts on the forward face of the S-1203-1 Front Spinner Bulkhead until the pitch of the blades can be very slightly changed with two hands.

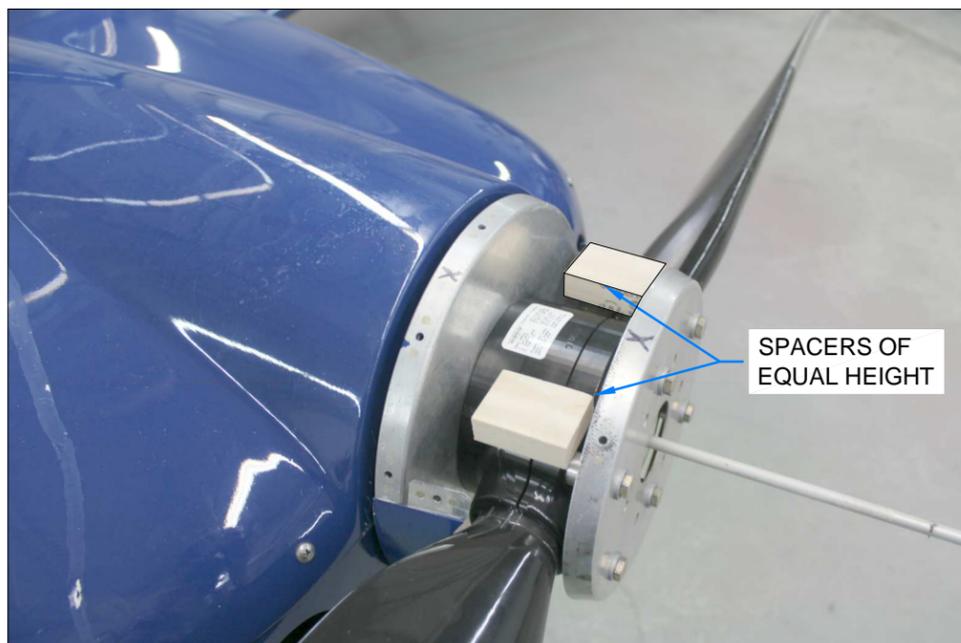
Step 1: Rotate the propeller until the blades are approximately parallel to the floor.

Step 2: Place two spacers of exactly equal height on the propeller hub where shown in Figure 1 and lay a level across them.

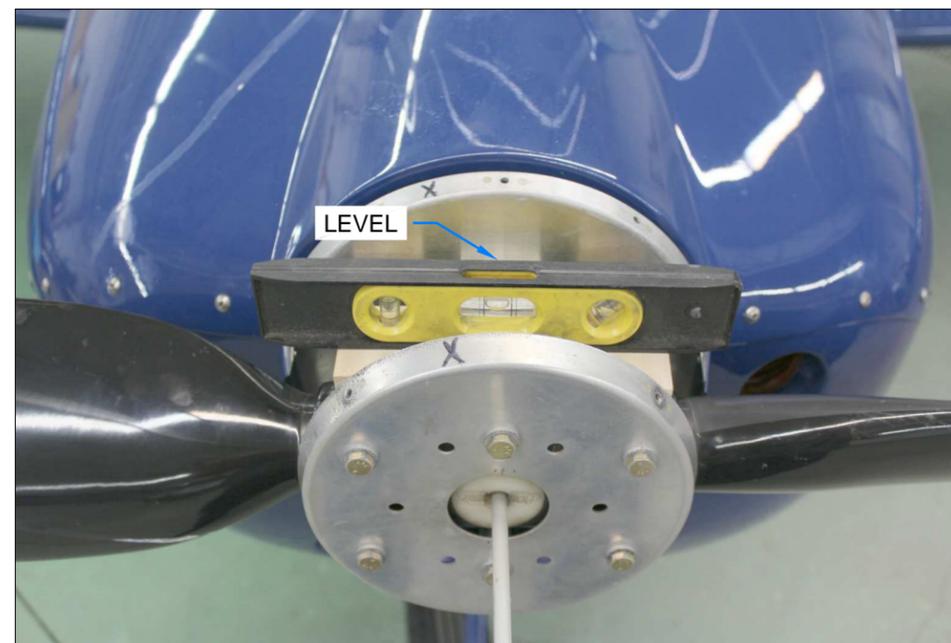
Step 3: Rotate the propeller until the level on the propeller hub indicates level. See Figure 2.

Step 4: Place a magnetic digital level on the canopy deck and zero it. See Figure 3.

Make certain that the level is resting flat against the canopy deck and not interfering with any rivet heads.



**FIGURE 1:** PLACING SPACERS



**FIGURE 2:** LEVELING THE PROPELLER



**FIGURE 3:** CALIBRATING THE MAGNETIC DIGITAL LEVEL



Step 1: Place the TOOL-00002 Prop Pitch Bracket on the trailing edge of the right side propeller blade so it hangs across the aft face of the blade. See Figures 1 and 2.

Step 2: Pick up the level resting on the canopy deck and, without changing its orientation, rotate it to attach to the TOOL-00002 as shown in Figure 4. Locate the TOOL-00002 and level on the inboard edge of the solid white portion of the blade's tip using the hole punched in the flange of the TOOL-00002 as a window. See Figure 2. With the level attached to the TOOL-00002, push against the front face of the flange of the TOOL-00002 to seat it properly. See Figure 3.

Note the measured angle on the digital level and record it. The correct angle is exactly 71.2 +/- 0.1 degrees for 912 iS engines (71.4 +/- 0.1 degrees for 912 ULS engines). If the measured angle does not match the recommended angle, gently change the pitch angle in the required direction using hands only. When the recommended pitch angle is achieved, slowly tighten the propeller bolts corresponding to that blade only. Frequently check the indicated angle while tightening the bolts to ensure the blade stays at the recommended pitch angle.

Step 3: Remove the level and spacers from the propeller hub. Place the magnetic level back on the canopy deck.

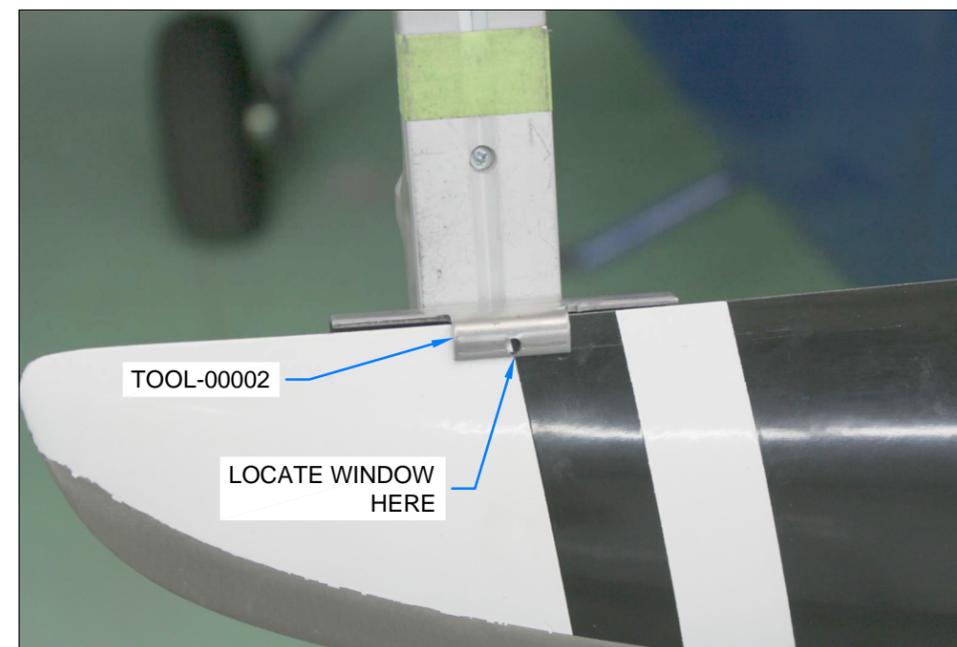
Step 4: Rotate the propeller 180 degrees and return the level and spacers to the propeller hub.

Step 5: Repeat the steps on pages 47iS/U-08 and 47iS/U-09 to set the pitch of the other propeller blade.

Step 6: When finished, the blades should be within 0.1 degrees relative to each other. Torque the propeller bolts to the propeller manufacturer's specifications.



**FIGURE 1: MEASURING THE PITCH ANGLE**



**FIGURE 2: LOCATING THE PROP PITCH BRACKET**

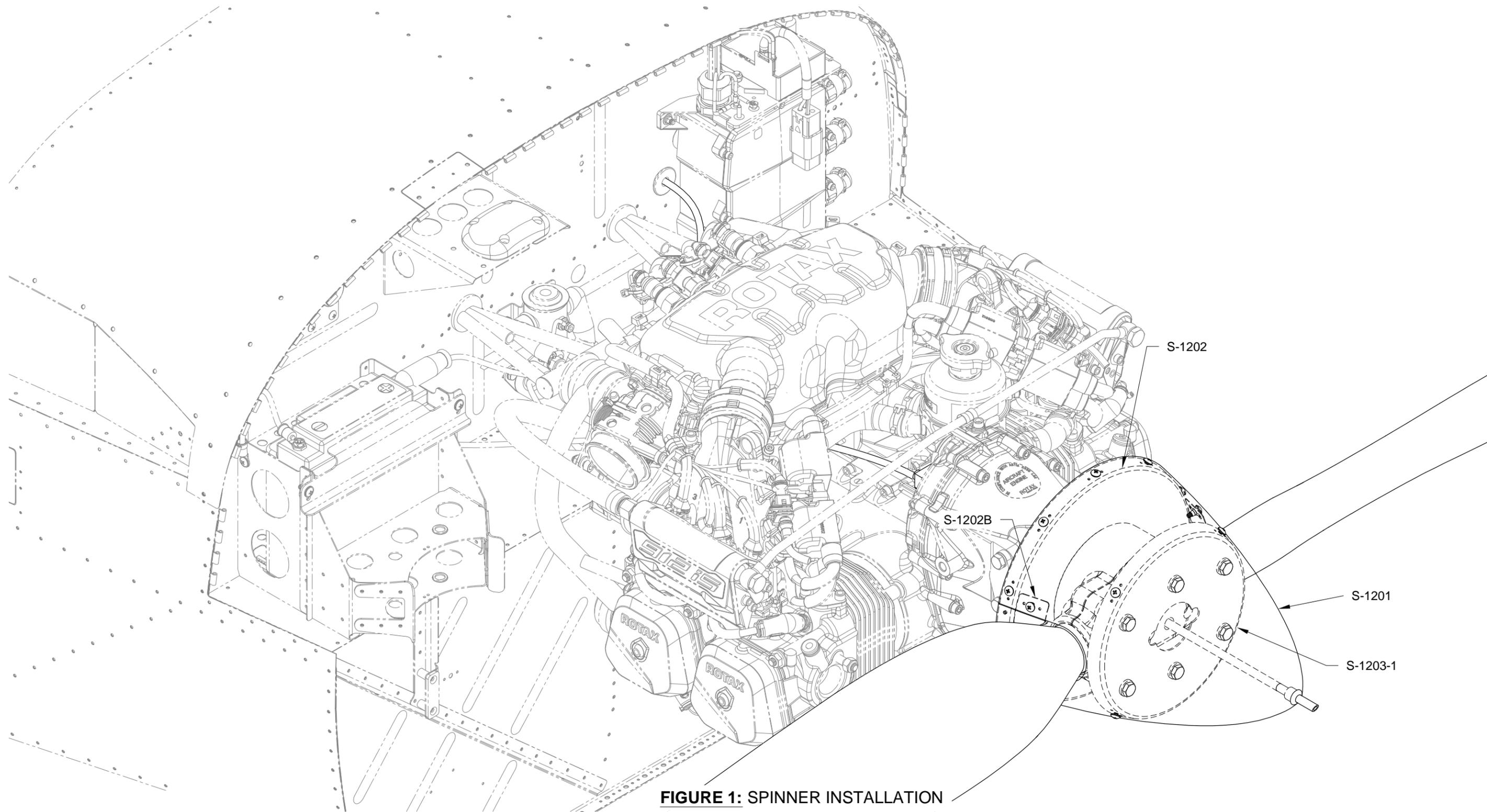


**FIGURE 3: SEATING THE PROP PITCH BRACKET**

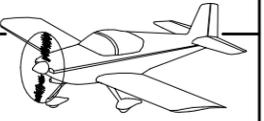


Step 1: Secure the S-1201 to the S-1203-1, the S-1202, and the S-1202B as shown in Figure 1 using the screws and washers called out on page 47iS/U-06.

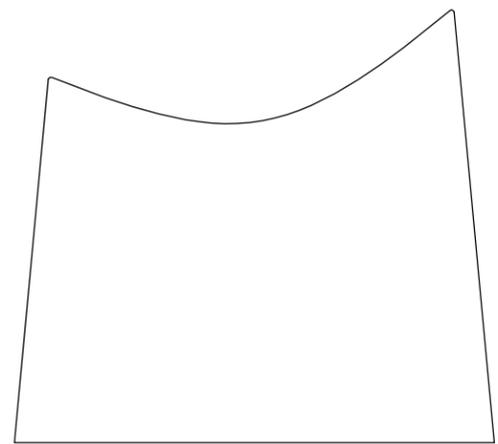
Reinstall the lower spark plugs removed on Page 47iS/U-05, Step 2.



**FIGURE 1: SPINNER INSTALLATION**



10 9/16  
[268.3 mm]



**FIGURE 1: S-1202C TRIM TEMPLATE**

(NOTE: CHECK PRINTED SCALE 1:1 PER SECTION 3 BEFORE USING THE TEMPLATE!)

16  
[406.4 mm]



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