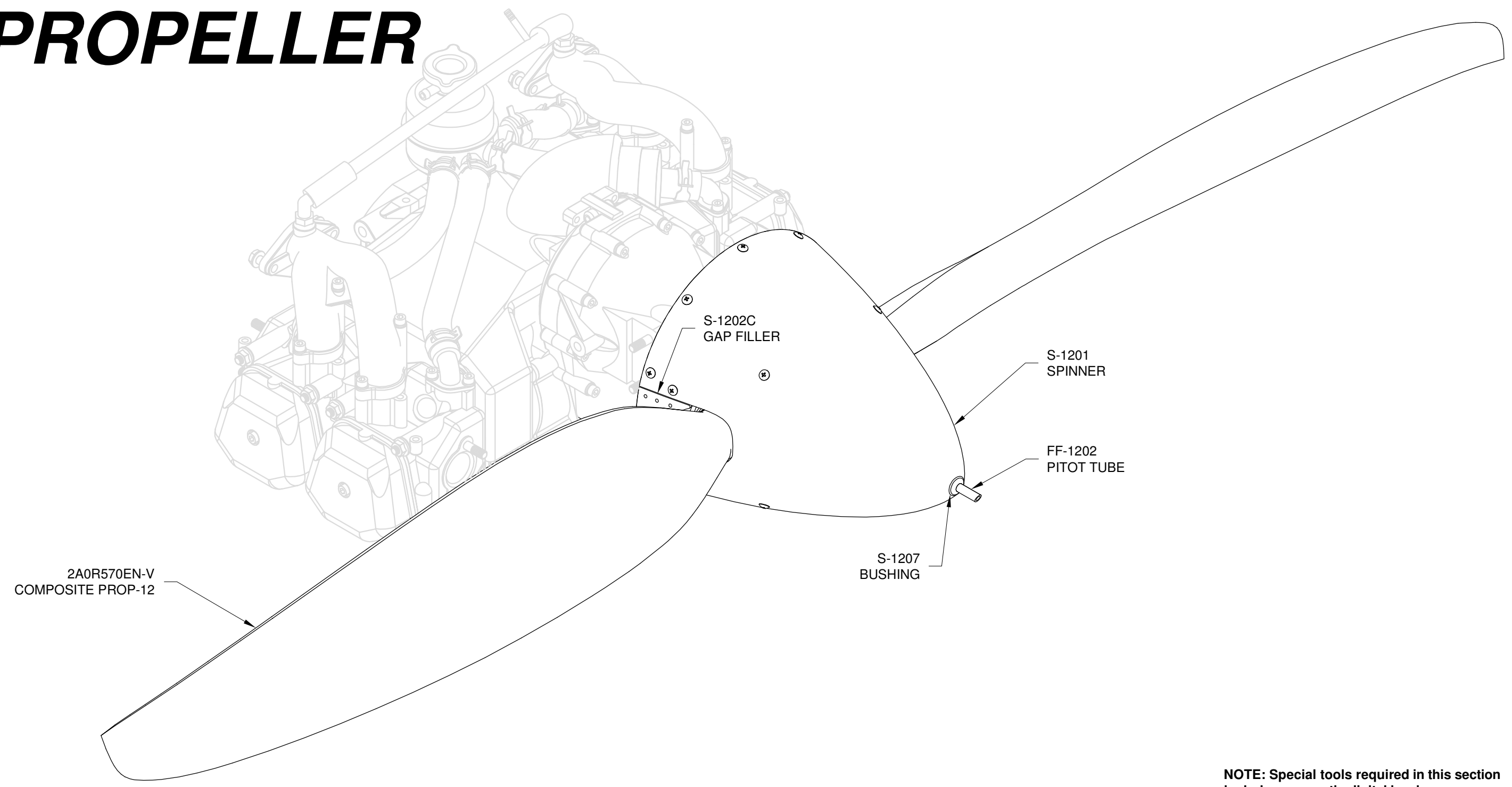
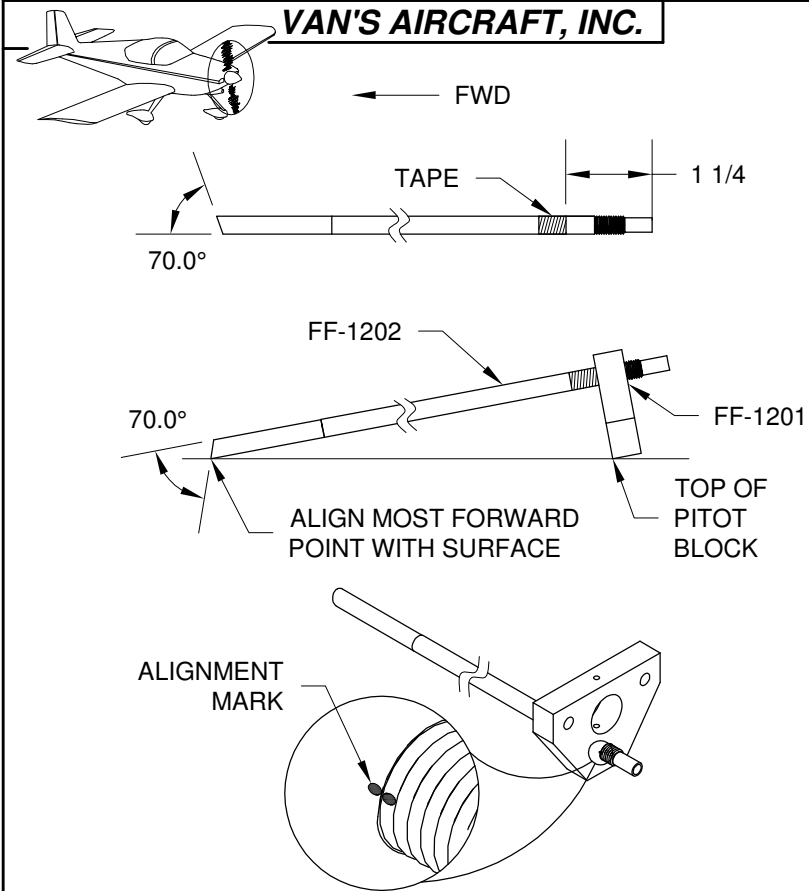


# SECTION 47: SPINNER & PROPELLER



**NOTE: Special tools required in this section include a magnetic digital level.**



**FIGURE 1: DRILLING THE PITOT TUBE**

**Step 1:** Mark the FF-1202 Pitot Tube by wrapping with masking tape 1 1/4 inches from the aft end as shown in Figure 1. Insert the pitot tube into the FF-1201 Pitot Block up to the edge of the tape. The threaded portion of the pitot block is aft.

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

**NOTE:** The following steps are designed to create a dimple in the FF-1202 Pitot Tube without drilling through the inner wall of the tube. If the tube is breached, see corrective measures detailed in Step 6.

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

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.

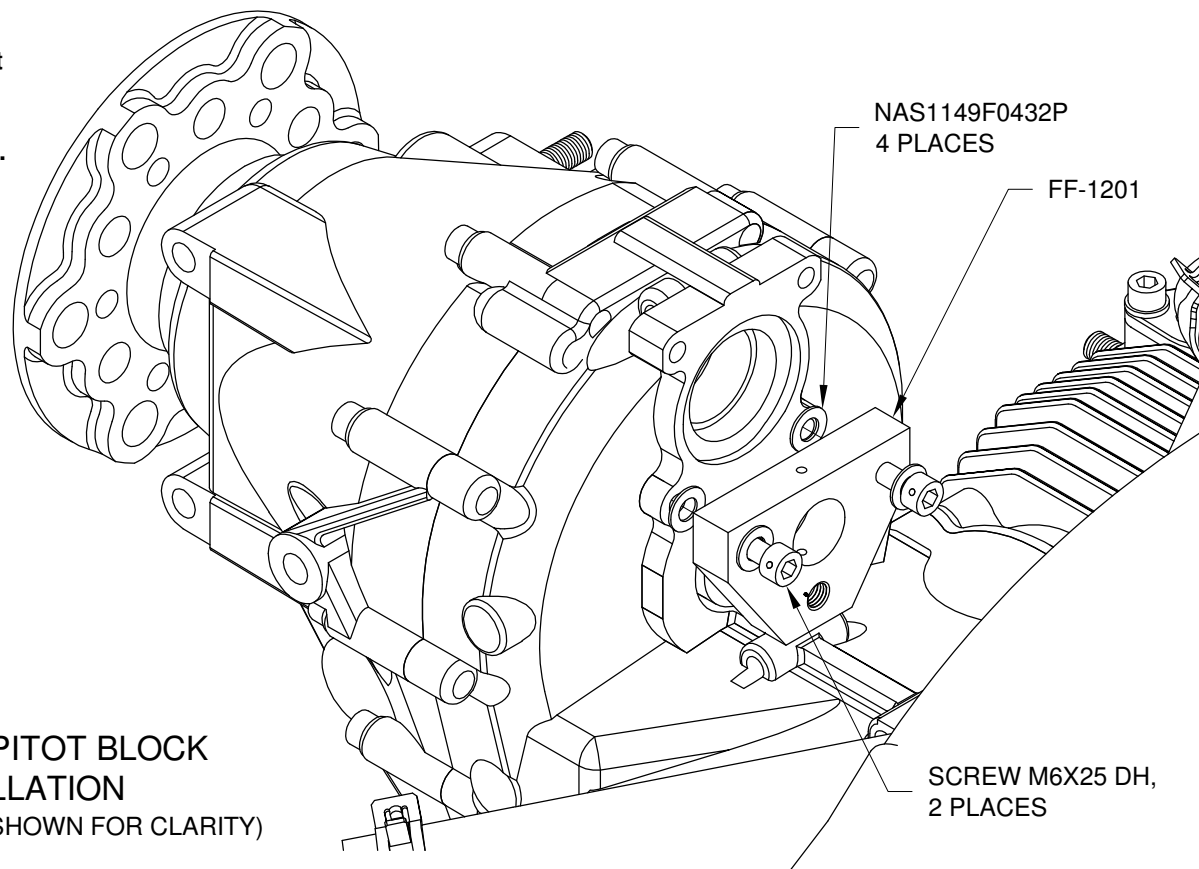
Slide the drill chuck over the drill bit and press until the drill chuck is firmly seated against the washers. Tighten the drill chuck.

**Step 3:** Remove the drill and bit from the FF-1201 Pitot Block. Remove one of the NAS1149F0332P thin washers from the bit. Insert the drill bit with the remaining washers into the hole in the pitot block and drill #36 the FF-1202 Pitot Tube.

**Step 4:** Remove the FF-1202 Pitot Tube from the FF-1201 Pitot Block and remove the masking tape from the pitot tube. Carefully drill #29 the pitot dimple created in Step 3. Check progress frequently by sighting down the center of the pitot tube. Stop drilling when a small bump appears on the inside wall.

**NOTE:** The FF-1201 Pitot Block may be trimmed if it interferes with the FF-1207 Cooling Shroud.

**Step 5:** Mount the FF-1201 Pitot Block with the hardware called out in Figure 2. The pitot block should be mounted with the threaded half of the pitot block aft. Turn the cap screws until they touch the surface of the washer, turn an additional 1/4 turn and stop. Safety wire the cap screws together as shown in Figure 3.



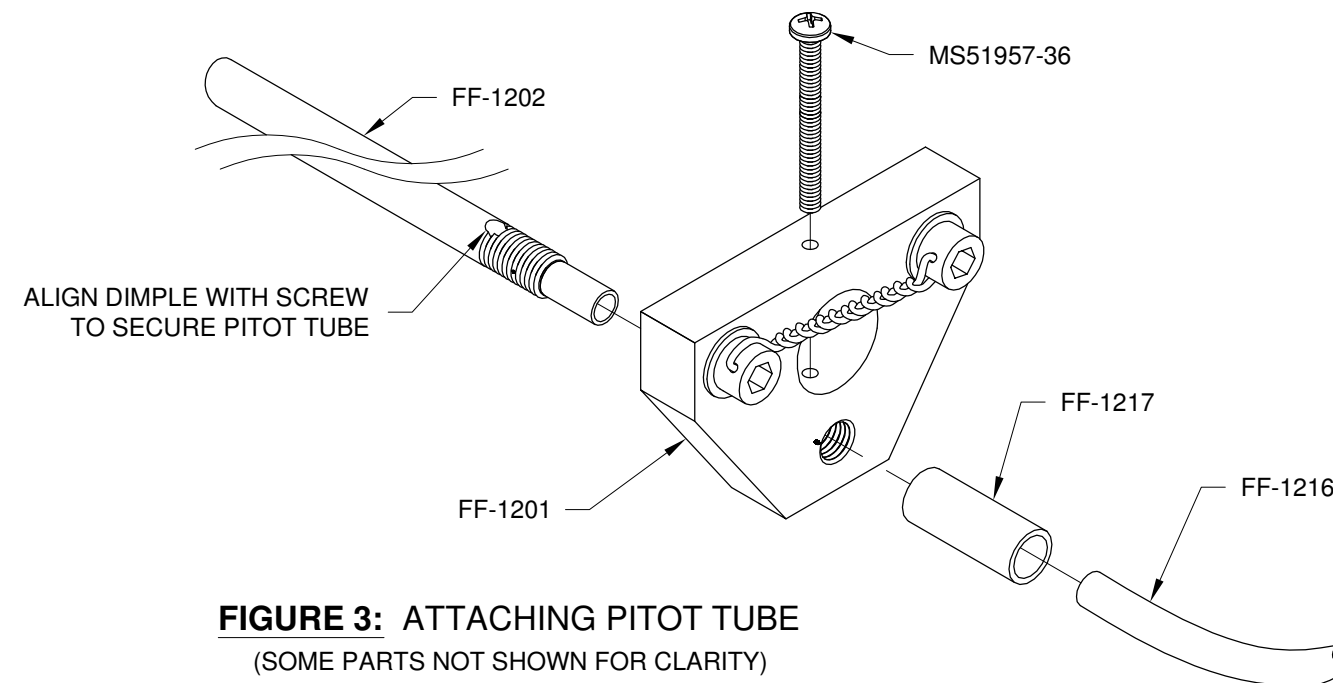
**FIGURE 2: PITOT BLOCK INSTALLATION**

(SOME PARTS NOT SHOWN FOR CLARITY)

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

A small amount of RTV sealant may be applied to the end of the locking screw before installation if the inner wall of the pitot tube was breached. Check to ensure that the sealant has not blocked the airflow path before proceeding.

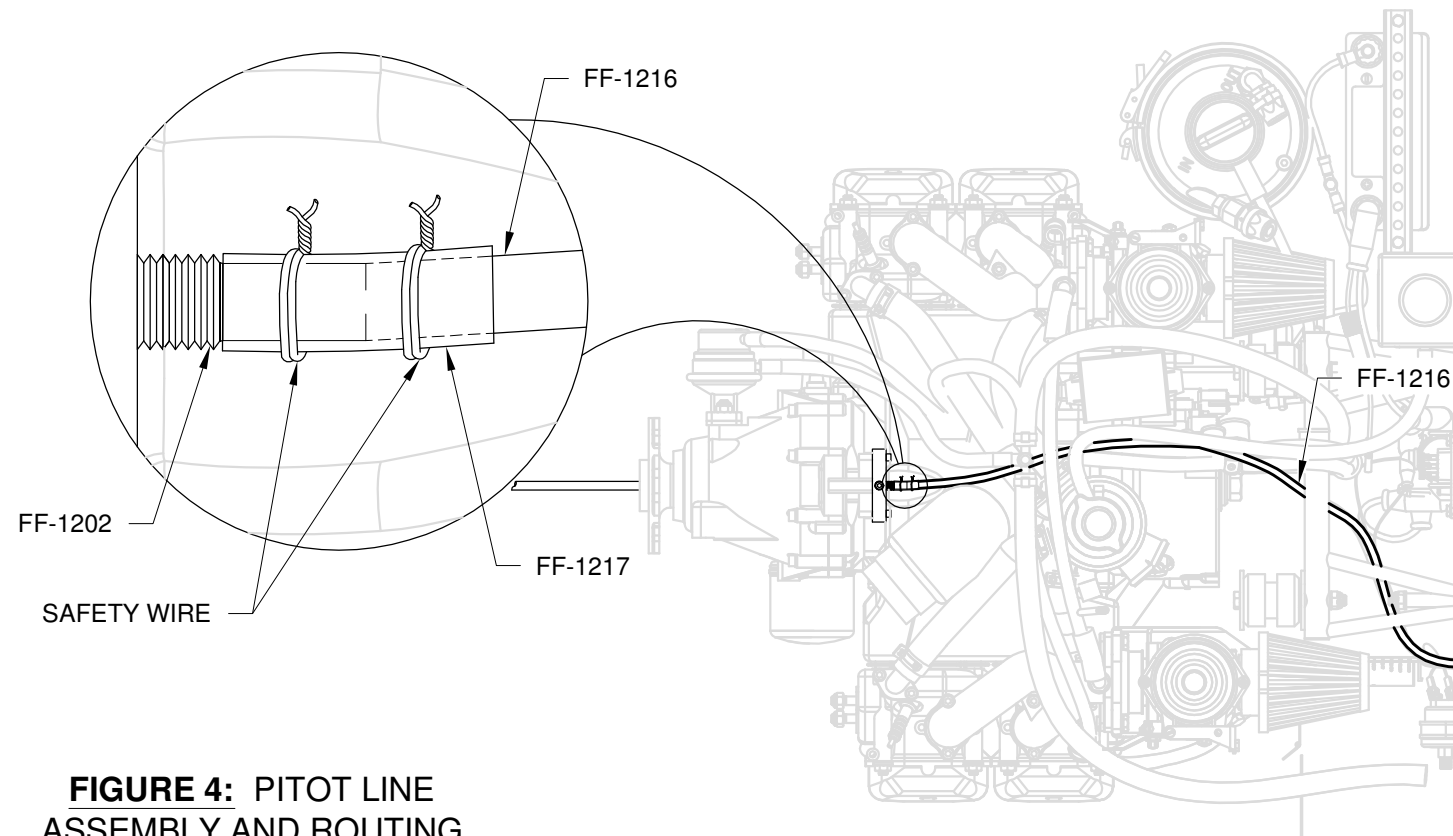
**Step 7:** Route the FF-1216 Pitot Line as shown in Figure 4. Cut a one inch piece of .062X3/8 104-0375062 TUBE to make the FF-1217 Pitot Interconnect and slip it over the end of the pitot line and the aft end of the FF-1202 Pitot Tube as shown in Figures 3 and 4. The pitot line and pitot tube should butt against each other.



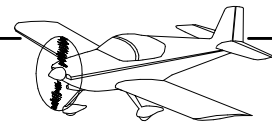
**FIGURE 3: ATTACHING PITOT TUBE**

(SOME PARTS NOT SHOWN FOR CLARITY)

**Step 8:** Double wrap safety wire around the FF-1217 Pitot Interconnect as shown in Figure 4.



**FIGURE 4: PITOT LINE ASSEMBLY AND 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 Spinner opening onto the inside of the spinner with a fine point pen. Trim and sand the lower portion of the spinner to the scribe line as shown in Figure 1.

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

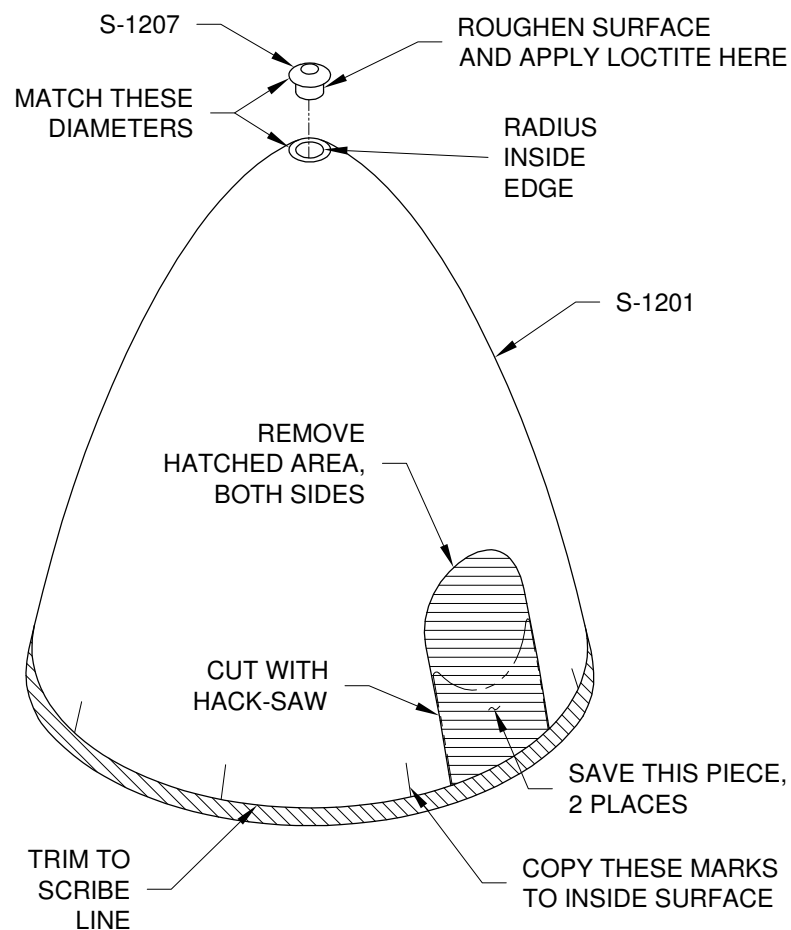
Use a fine tooth hacksaw blade to cut slits up to the curved portion of each traced cutout. The top portion should break away from the spinner. A file or snips may be used to remove the material between the drilled holes if needed. Save the lower portion of the removed sections to make the S-1202C Gap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

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 3:** Sand the tip of the S-1201 Spinner until the outer diameter matches the outside diameter of the S-1207 Bushing 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.

Using sandpaper, create a small radius on the inside edge of the spinner opening to allow the bushing to mate properly with the spinner. See Figure 1.

**Step 4:** Roughen the surface of S-1207 Bushing with coarse grit sandpaper where it contacts the S-1201 Spinner. Apply blue Loctite or equivalent to the bushing and insert in the spinner. See Figure 1.



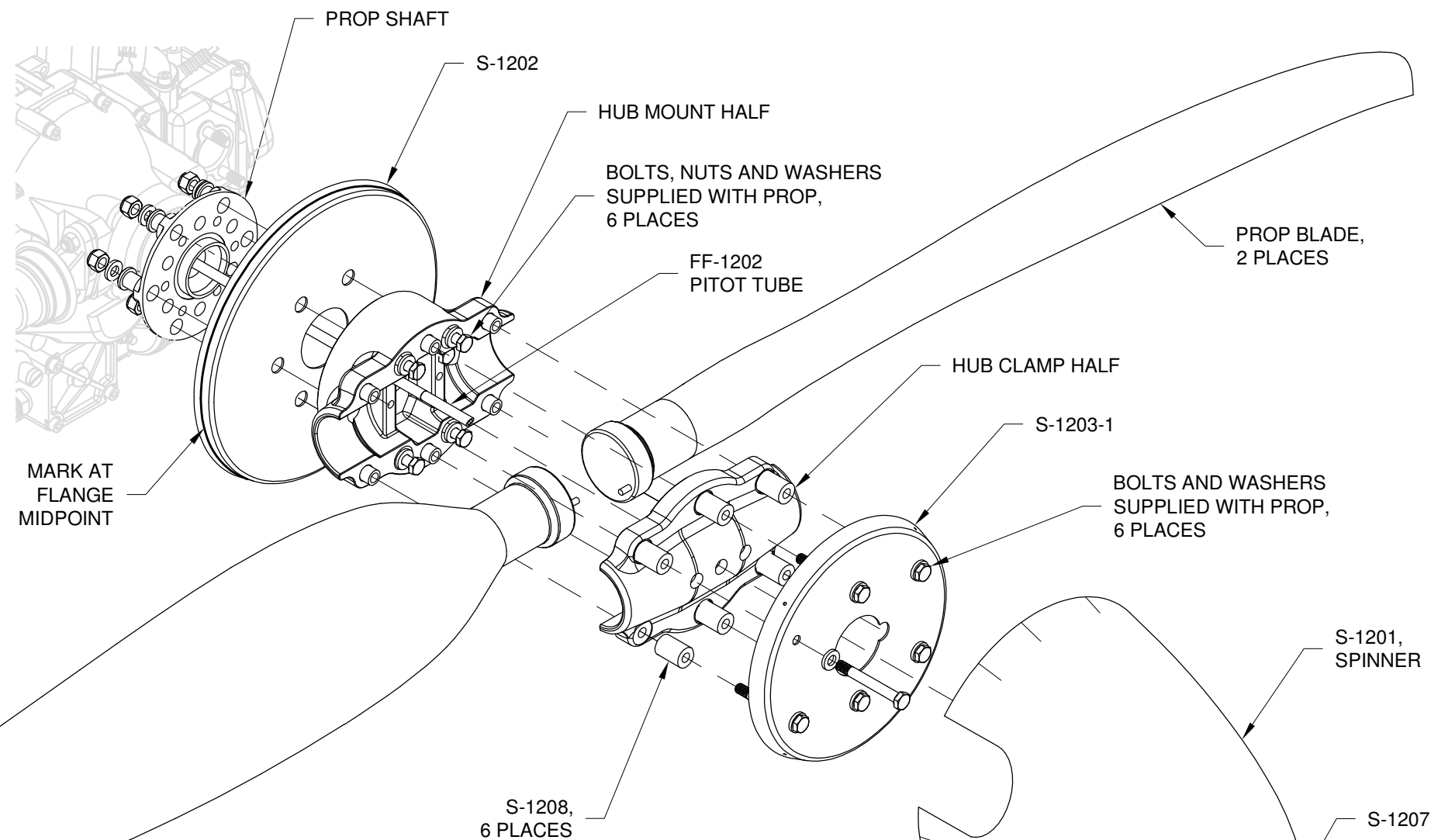
**FIGURE 1: MAKING THE PROPELLER CUTOUT**

**Step 5:** Using a fine point felt tip pen draw a centerline on the flange of the S-1202 Spinner Plate as shown in Figure 2.

**Step 6:** Attach the S-1202 Spinner Plate and Hub Mount Half to the Prop Shaft using the hardware provided with the propeller as shown in Figure 2.

**Step 7:** Attach the Propeller Blades, Hub Clamp Half, and S-1203-1 Front Spinner Bulkhead with the remaining hardware and S-1208 Spacers as shown in Figure 2. Temporarily pitch the propeller using the #3 tool supplied with the propeller. The propeller will be final pitched on Page 47-07.

**Step 8:** Tape around the the Propeller Blades to prevent scratching during S-1201 Spinner installation. Slide the spinner over the assembly with the FF-1202 Pitot Tube extending through the S-1207 Bushing in the front of the spinner. Be sure the spinner is seated firmly on the S-1203-1 Front Spinner Bulkhead and S-1202 Spinner Plate (any overhang of the spinner beyond the spinner plate is trimmed after the spinner is drilled and clecoed in place). Clamp the spinner to the spinner plate.



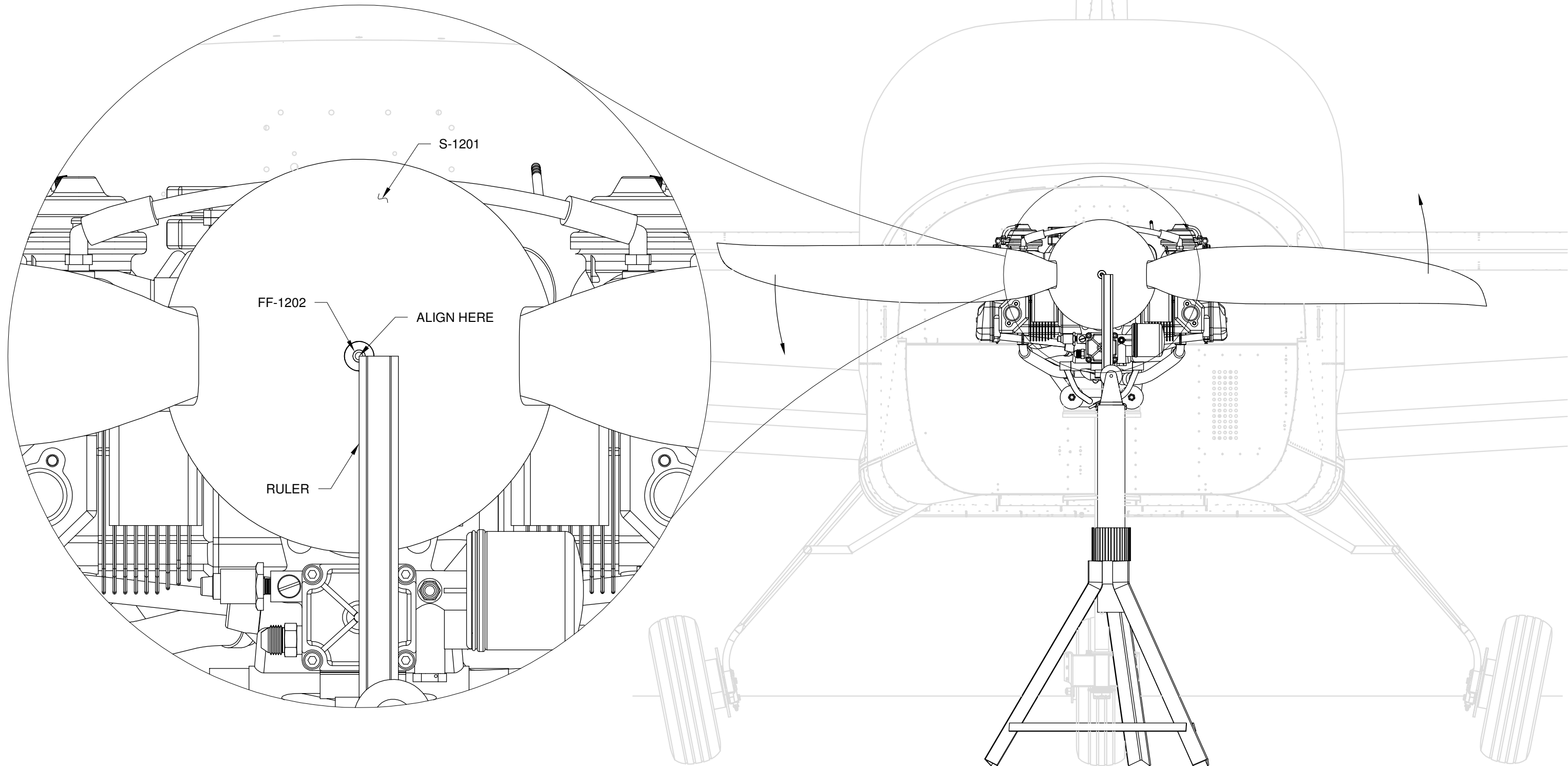
**FIGURE 2: SPINNER ASSEMBLY**



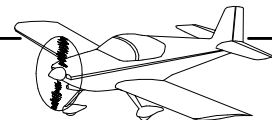
Step 1: Attach a ruler to a chair, step ladder or other support so that the end of the ruler is centered vertically and horizontally at the end of the FF-1202 Pitot Tube as shown in Figure 1. The ruler and support should be clear of the pitot tube, the propeller and the Spinner Assembly.

Step 2: Remove the lower spark plug on each cylinder to allow the propeller to turn easily by hand.

Step 3: The end of the FF-1202 Pitot Tube will track with the angle of the S-1201 Spinner. As the propeller is turned, watch the distance the end of the pitot tube moves away from the end of the ruler. Adjust the S-1201 Spinner and repeat the process until the end of the pitot tube remains centered within 1/16 of an inch.



**FIGURE 1: SPINNER ALIGNMENT**



**NOTE:** If required, refer to Section 5.18 MATCH-DRILLING OPAQUE FIBERGLASS PARTS.

**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 Spinner to the S-1203-1 Front Spinner Bulkhead. Cleco the drilled holes.

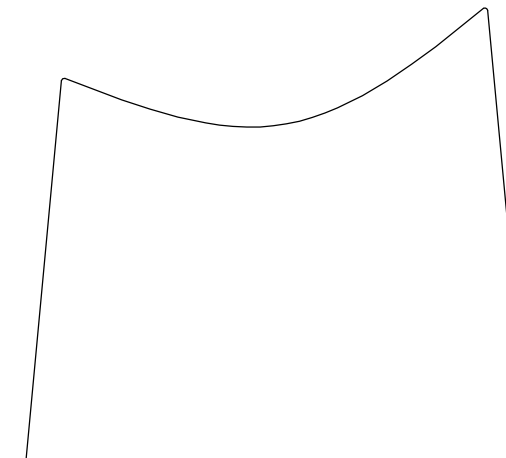
**Step 2:** Locate the screws holes to secure the S-1201 Spinner to the S-1202 Spinner Plate at the intersection of the line on the flange of the spinner plate and the perpendicular lines marked on the spinner. Drill #30 the pilot holes, then cleco them. To prevent "pillowing" of the spinner between the screws, start drilling midway between the propeller blade cutouts, working outward toward the cutout. See Figure 1.

**Step 3:** Trim any overhang of the S-1201 Spinner beyond the S-1202 Spinner Plate. A sanding block works well here.

**Step 4:** Make two S-1202C Gap Fillers out of the pieces trimmed from the S-1201 Spinner. Start by placing the pieces on the S-1202C Template with the outer surface towards you. Trace the curved line visible through the fiberglass then trim to the line. Test fit the gap fillers and trim as needed to clear the propeller by 1/16 to 1/8 of an inch.

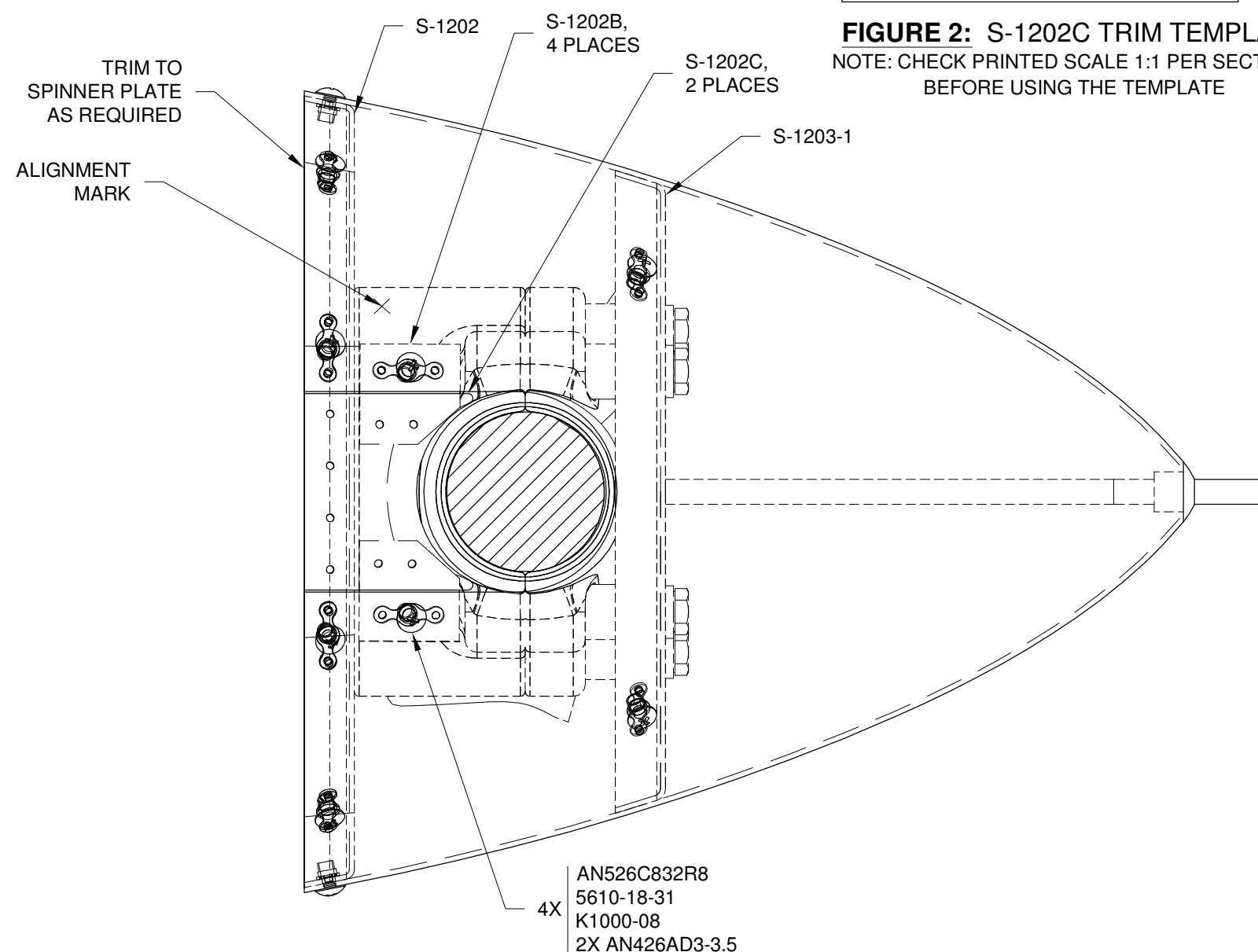
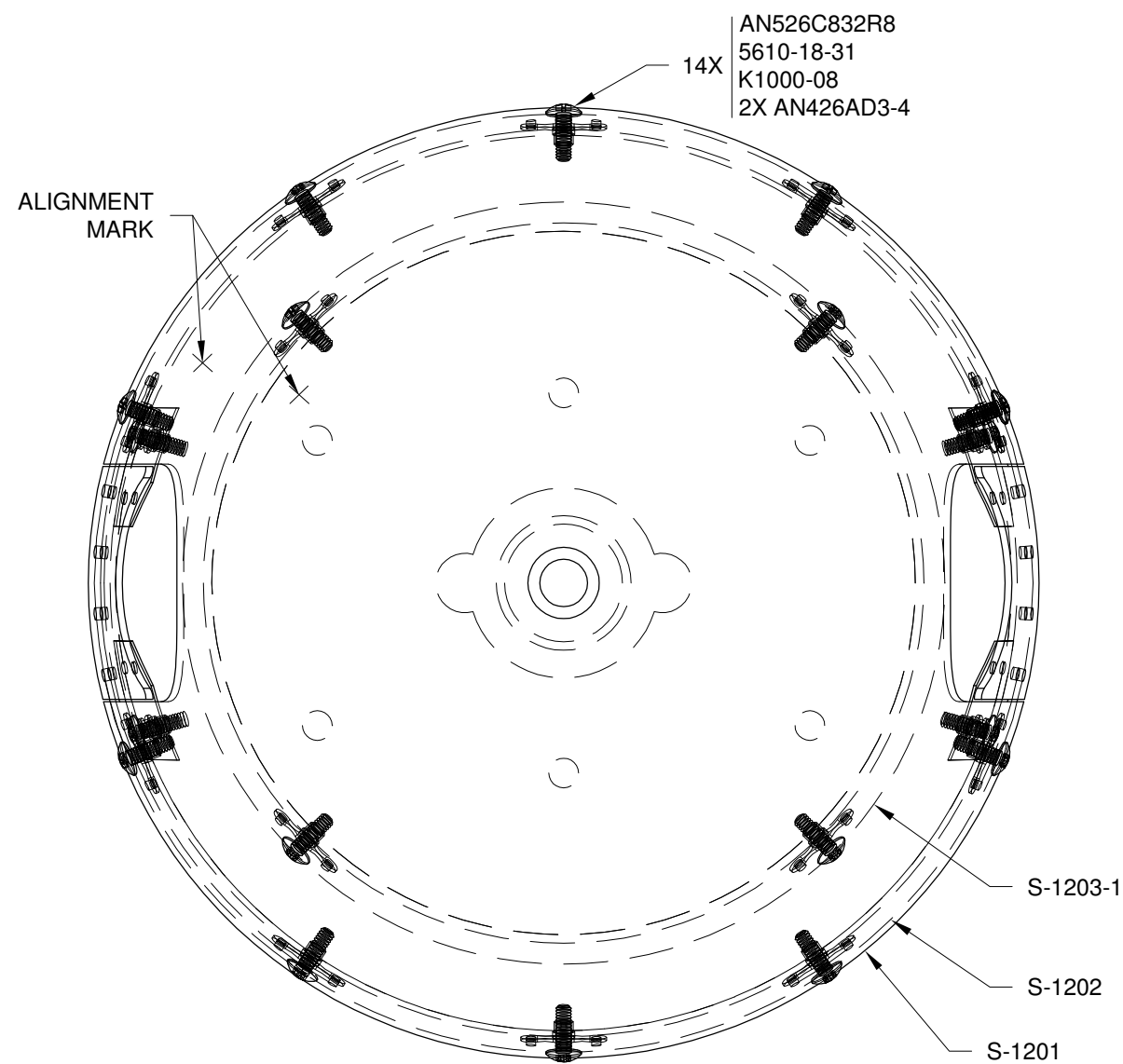
**Step 5:** Make a mark on the S-1201 Spinner and S-1202 Spinner Plate so that they can be aligned later. Remove the spinner and make an alignment mark on the inside. Make an alignment mark on the S-1203-1 Front Spinner Bulkhead. Remove the front spinner bulkhead, forward hub half and propeller blades. Reinstall the spinner. See Figure 1.

**Step 6:** Clamp the S-1202C Gap Fillers to the S-1202 Spinner Plate and drill #40, cleco as you drill each of the four rivet holes. See Figure 1. Remove clecos and gap fillers.



**FIGURE 2: S-1202C TRIM TEMPLATE**

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



**FIGURE 1: SPINNER INSTALLATION**



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

Position the back plates on the S-1202C Gap Fillers as shown in Figure 1. Clamp the parts together and match-drill #40 then cleco the rivet holes.

**Step 2:** Use a felt tip pen to trace the propeller clearance cut in the gap fillers onto the S-1202B Back Plates. Separate the parts and trim the back plates to the traced line. Radius the corners and deburr the back plates.

**Step 3:** Cleco the S-1202B Back Plates to the S-1202C Gap Fillers, then cleco the gap fillers to the S-1202 Spinner Plate. Drill a #30 pilot hole in the S-1201 Spinner and back plate for the screw that will secure the two parts together as shown in Figure 2.

**Step 4:** Final-Drill #19 all the holes common to the S-1201 Spinner and the S-1203-1 Front Spinner Bulkhead, common to the spinner and S-1202 Spinner Plate, and common to the spinner and the S-1202B Back Plates as shown on Page 47-05, 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 5:** Remove the S-1202B Back Plates, S-1201 Spinner, S-1203-1 Front Spinner Bulkhead, hub mount half and S-1202 Spinner Plate. Drill #40 holes in the spinner plate, the front spinner bulkhead, and the back plates for the rivets used to attach the nutplates called out on Page 47-05, 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.

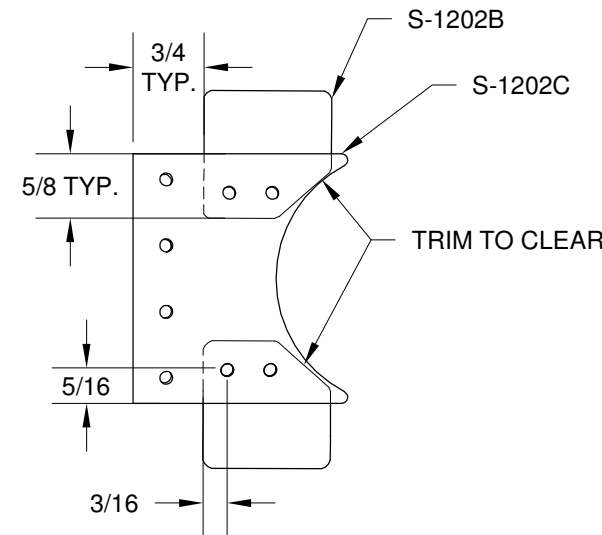
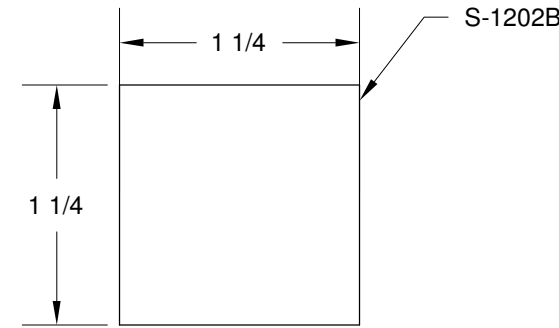
**Step 6:** Machine countersink all #40 holes in the S-1202C Gap Fillers for the heads of AN426AD3 rivets.

Machine countersink all nutplate rivet holes in the S-1202 Spinner Plate, S-1202B Back Plates, and S-1203-1 Front Spinner Bulkhead for the heads of AN426AD3 rivets.

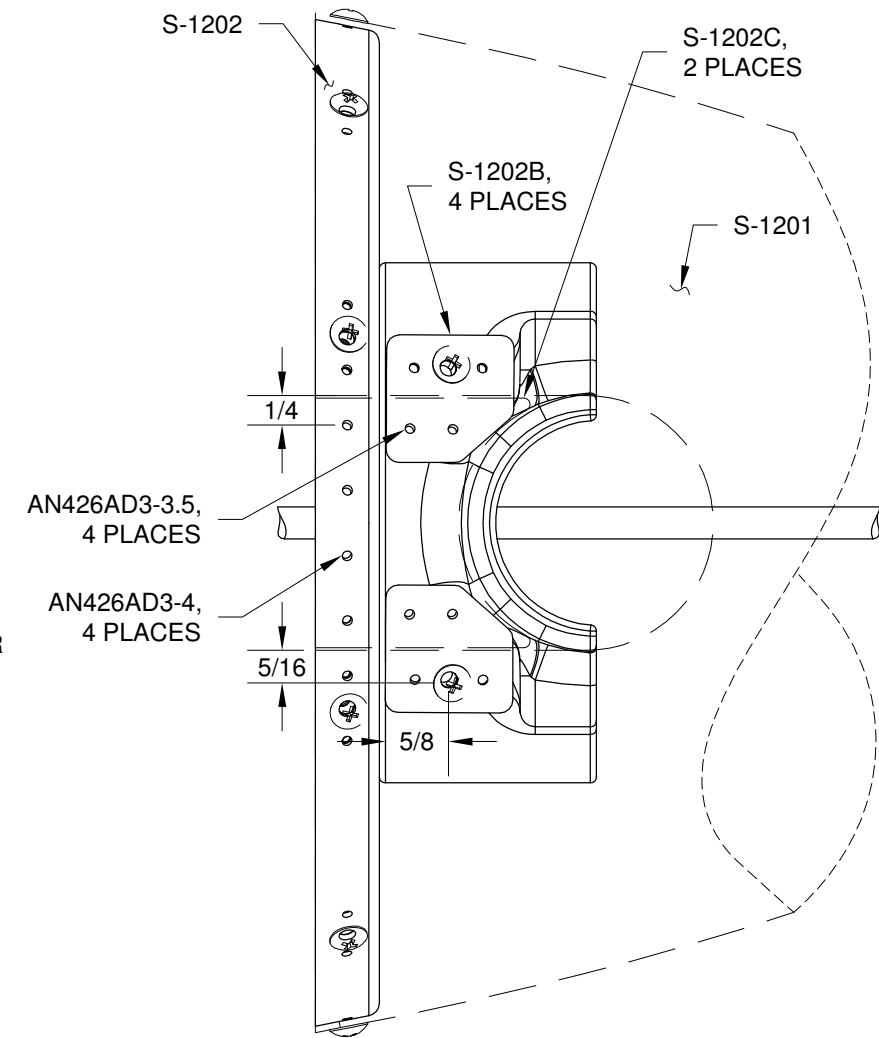
**Step 7:** Deburr all holes drilled, then rivet the nutplates called out on Page 47-05, Figure 1 to the S-1202 Spinner Plate, the S-1203-1 Front Spinner Bulkhead, and the S-1202B Backing Plates.

**Step 8:** Rivet the S-1202B Backing Plates to the S-1202C Gap Fillers, then rivet the gap fillers to the S-1202 Spinner Plate using the hardware called out in Figure 2.

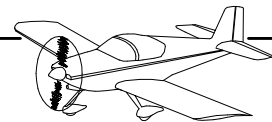
**Step 9:** Install the S-1202 Spinner Plate, hub mount half, propeller blades, forward hub half, S-1208 Spacers, and S-1203-1 Front Spinner Bulkhead. See Page 47-03, Figure 2.



**FIGURE 1: BACK PLATE FABRICATION**



**FIGURE 2: BACK PLATE PLACEMENT**



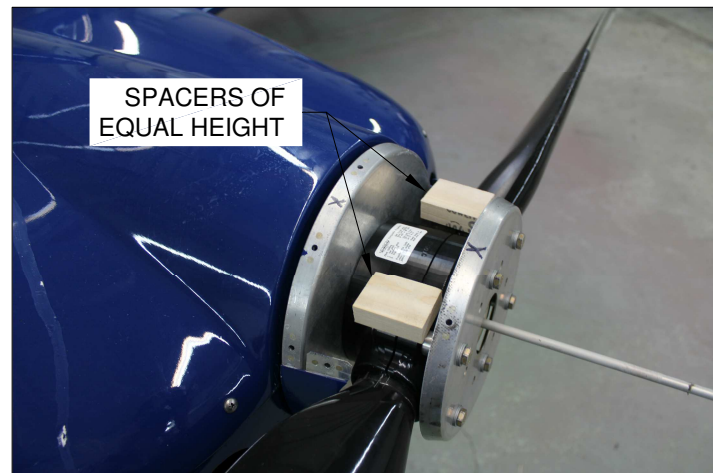
**NOTE:** It is very important for the aircraft to remain as motionless as possible throughout the propeller pitching procedure.

**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.

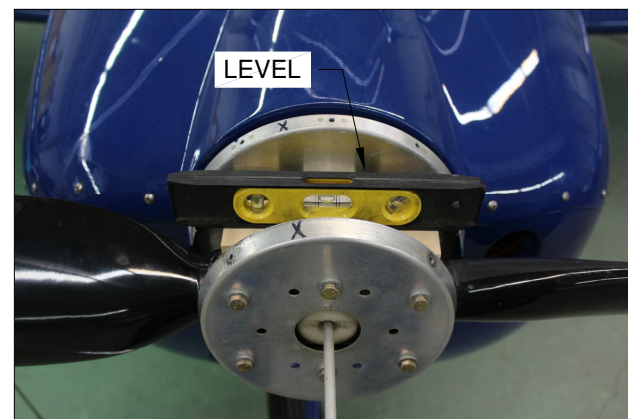
Step 1: Rotate the propeller until the blades are approximately parallel to the floor.

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

Rotate the propeller until the level on the propeller hub indicates level.



**FIGURE 1:** PLACING SPACERS



**FIGURE 2:** LEVELING THE PROPELLER

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

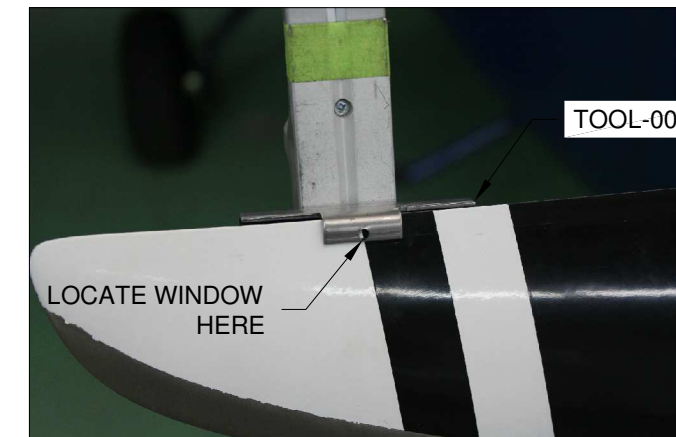
Step 4: Place the TOOL-00002 Prop Pitch Bracket on the trailing edge of the trailing edge up blade so it hangs across the aft face of the blade.

Step 5: Pick up the level resting on the canopy deck and, without changing its orientation, rotate it to attach to the prop pitch bracket as shown in Figure 4. Locate the prop pitch bracket 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 prop pitch bracket as a window. See Figure 5. With the level attached to the prop pitch bracket, push against the front face of the flange of the prop pitch bracket to seat it properly. See Figure 6.

Note the measured angle and record it. The correct angle is exactly "71.4 +/- 0.1" degrees. 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 measured, 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.



**FIGURE 4:** MEASURING THE PITCH ANGLE



**FIGURE 5:** LOCATING THE PROP PITCH BRACKET



**FIGURE 6:** SEATING THE PROP PITCH BRACKET

Step 6: Remove the level and spacers from the propeller hub. Place the magnetic level back on the canopy deck.

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

Repeat Step 2 through Step 5.

Step 7: When finished, the blades should be within 0.2 degrees relative to each other. Torque the propeller bolts to the propeller manufacturer's specifications.

Step 8: Secure the S-1201 Spinner to the S-1203-1 Front Spinner Bulkhead, the S-1202 Spinner Plate, and the S-1202B Backing Plates using the screws and washers called out on Page 47-05, Figure 1. Reinstall the lower spark plugs removed on Page 47-04, Step 2.



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