TKS ANTI-ICE PROPELLER - MAINTENANCE PRACTICES

1. General

A. The TKS anti-ice propeller maintenance practices consist of propeller anti-ice feed shoe removal and installation procedures, and the spinner bulkhead anti-ice components removal, installation and adjustments procedures.

2. Propeller TKS Anti-Ice Feed Shoes Removal/Installation

- NOTE: The TKS Anti-Ice Feed Shoe removal and installation procedures that follow are for airplanes that have a McCaulley propeller installed. For airplanes that have a Hartzell propeller installed, refer to the Introduction, List of Publications. The Hartzell manual number 183 has the procedures necessary for the removal and installation of anti-icing boots.
- A. Remove the Propeller Anti-ice Feed Shoes (Refer to Figure 201).
 - WARNING: Cement and solvent vapors are toxic and extremely flammable. Use these chemicals only in a well ventilated area away from sparks and vapors. Excess exposure could cause injury or death. If dizziness or nausea occur, get to fresh air immediately. Avoid contact with skin or eyes. Use solvent-resistant gloves to minimize skin exposure. Use safety glasses to protect your eyes from chemicals. If you get chemicals in your eyes, flush your eyes with water for 15 minutes and see a physician immediately. If you get chemicals on your skin, wash thoroughly with soap and water. If you swallow chemicals, do not induce vomiting. See a physician immediately.
 - CAUTION: The jaws of any tool (vise grips, pliers, etc.) that you use to pull on the feed shoe must be cushioned to prevent damage to the feed shoe, unless the feed shoe is to be scrapped.
 - (1) Make sure all electrical power switches are in OFF position.
 - (2) Remove the spinner screws and fiber washers from the spinner, and remove the spinner from the spinner bulkhead.
 - (3) If the feed shoe is to be discarded, remove it from the propeller blade without solvent.
 - NOTE: The feed shoe can tear or come off in pieces.
 - CAUTION: When you remove feed shoes from a propeller assembly, be careful not to let solvent leak into the propeller hub and cause damage to the seals. The blade that is being worked on must be pointed down so all excess solvent will run to the outboard tip of the blade. As an extra precautionary measure, the hub and blade area must be masked. Do not use any sharp objects which might scratch the blade when you remove the feed shoe.
 - (4) Use Methyl n-Propyl Ketone (MPK) to soften the adhesion line between the anti-ice feed shoe and the propeller blade. Start at one corner and loosen enough of the feed shoe to grasp it with vise grips, pliers, or similar tools.
 - (5) Apply a steady pull to remove the feed shoe; pull the feed shoe from the blade slowly and carefully while you continue to use Methyl n-Propyl Ketone (MPK) to soften the adhesion line.
 - (6) Remove all residual cement from the blade. Use solvents with caution as mentioned above.
 - (7) Visually do an inspection of the propeller blade for damage or deterioration. Look for corrosion, cracks, dents or nicks. If defects are found, the propeller must be repaired by an authorized propeller repair station.
- B. Install the TKS Anti-ice Propeller Feed Shoes (Refer to Figure 201).
 - (1) Prepare the Propeller Blades for the Feed Shoe Installation.
 - (a) Trim each propeller blade feed shoe if necessary.
 - (b) Mark the inboard center line on the leading edge of the propeller blades.
 - (c) Use a template or hand fit the anti-ice feed shoe to the blades so that the feed shoe center line is on the leading edge center line of the propeller blade. Refer to Figure 201.
 - (d) Mark an area 1/2 inch outside the feed shoe perimeter on the propeller blade with a red pencil. Refer to Figure 201.
 - (e) Use the red pencil line as the perimeter of the area on each propeller blade to be masked.
 - (f) Install masking tape around the outline.
 - CAUTION: It is necessary that the masking steps described be followed so the sealer will be applied to both the cement and 1/8 inch of bare metal. If the cement line and sealer line start at the same point, water will seep under the cement line and cause an unserviceable seal. Refer to Figure 201.

- (g) Remove all paint inside of the masked off area on propeller blades painted with lacquer. On propeller blades painted with polyurethane, lightly sand inside the masked off area with 400 grit sandpaper.
- (h) Clean all of the masked area on the propeller blades thoroughly with methyl n-propyl ketone or acetone. Quickly clean the solvent from the propeller blades with a clean, dry, lint-free cloth so that you do not leave a film.
- (i) Apply a second layer of masking tape on the propeller blades to cover an additional 1/8 inch of bare metal area inside of the previously masked area. Refer to Figure 201.
 - CAUTION: The metal and rubber parts must be clean. Only very clean surfaces will cause maximum bond of the cement.
- (2) Apply Cement to the Feed Shoes and the Propeller Blades.
 - (a) Lightly sand the bond surface of the feed shoe with sandpaper to cause maximum bond.
 - (b) Moisten a clean cloth with methyl n-propyl ketone or acetone. Clean the bond surface of the anti-ice feed shoe. Change the cloth frequently to avoid contamination of the clean area.
 - NOTE: You can use masking tape to prevent any curl of the anti-ice feed shoe edges when you apply cement to the back side of the feed shoe.
 - (c) Apply masking tape to the breeze side of the feed shoe edges. Let approximately 1/4 inch of the tape overhang the edge of the feed shoe.
 - (d) Lay the feed shoe on a piece of cardboard with the bond side up. Tape the feed shoe onto the cardboard with the 1/4 inch overlap of masking tape.
 - (e) Make sure to thoroughly mix the cement.
 - (f) Apply one even brush coat of 1300L or EC1403 cement to the clean, masked surface of the propeller blade and to the fabric impression side of the anti-ice feed shoe. Apply cement at the room temperature of 60. 75.
 - (g) Allow the cement to air dry for a minimum of one hour at 40 F or above, when the relative humidity is less than 75%. If the humidity is 75% to 90%, additional drying time will be necessary to cure the cement. Do not apply cement if the relative humidity is higher than 90%.
 - (h) After the cement is dry (not tacky), apply a second even brush coat to the anti-ice feed shoe. Then immediately apply an even brush coat of cement to the clean masked off area of the propeller. Timing is important because the cement on both surfaces must reach the tacky stage at the same time.
- (3) Install Feed Shoes to the Propeller Blades.
 - (a) Remove the anti-ice feed shoe from the cardboard, and the masking tape from the anti-ice feed shoe before you start the installation.
 - (b) When the cement is tacky on both the propeller blade and feed shoe surfaces, put the anti-ice feed shoe center line to the center line on leading edge of the blade. Start with the inboard end of the blade and work toward the tip.
 - <u>1</u> If the cement dries, use Methyl n-Propyl Ketone (MPK) as necessary until the cement is tacky.
 - <u>2</u> If the feed shoe is off center, pull it up with a quick motion and install it again.
 - 3 Use Methyl n-Propyl Ketone (MPK) as necessary when you have to install the feed shoe again.
 - (c) When the feed shoe is correctly in place, use a rubber or wooden hand roller and press firmly on the full length of the leading edge to form a tight bond.
 - (d) Gradually push the roller over each side of the leading edge contour to avoid trapping air. Roll from the leading edge of the propeller blade toward the tip. Work all excess feed shoe material out to the perimeter before you move to the next section. If there is excess material at the feed shoe edges that tends to pucker, use your fingers and carefully work puckers smooth.
 - (e) Remove the masking tape from the propeller blades.
- (4) Apply Sealer to the Feed Shoes and Propeller Blades (Refer to Figure 201).
 - (a) Mix two parts of Sunbrite 78U1003 brushable black enamel with one part of enamel catalyst U-1001-C.
 - CAUTION: It is necessary that the masking steps described be followed so the sealer will be applied to both the cement and 1/8 inch of bare metal. If the cement line and sealer line start at the same point, water will seep under the cement line and cause an unserviceable seal. (Refer to Figure 201.)

- (b) Apply one, even, brush coat of sealer to the area around the feed shoe and make sure you cover the 1/8 inch of bare metal and adhesive along with the masked off area of 1/8 inch of the anti-ice feed shoe. Remove the masking tape as the sealer is brushed on, otherwise, the sealer will pull up along with the tape. Let the sealer dry.
- (c) Feed shoes installed on a propeller as a result of repair activity must be allowed to cure a minimum of 12 hours at room temperature before starting the engine.

3. Propeller Feed Tube and Propeller Nozzle Bracket Removal and Installation (McCauley Propellers)

- A. Remove the Propeller Nozzle Bracket and Propeller Feed Tube. Refer to Figure 203.
 - (1) Make sure all electrical power switches are in the OFF position.
 - (2) Remove the right hand nose cap assembly. Refer to Chapter 71, Engine Cowling and Nose Cap Maintenance Practices, Nose Cap Removal/Installation.
 - (3) Mark the propeller spinner position to the bulkhead.
 - (4) Remove the propeller spinner to get access to the propeller spinner bulkhead. Do not remove the bulkhead mounting plate. Refer to Chapter 61, Propeller (McCauley) Maintenance Practices.
 - NOTE: Take precautions to protect the spinner, propeller blades, bulkhead, and surrounding components when accessing the propeller nozzle bracket and propeller feed tube.
 - NOTE: Before drilling out rivets, note the rivet head direction on the propeller feed tube mounting plate.
 - (5) Carefully drill out the existing rivets that attach the propeller feed tube mounting plate to the bulkhead. Refer to the Model 208 Series Structural Repair Manual, Chapter 51, Standard Practices and Structures General.
 - (6) Separate the propeller feed tube mounting plate from the bulkhead.
 - (7) Remove the bolts, nuts and washers attaching the propeller nozzle bracket to the bulkhead.
 - (8) Remove the propeller nozzle bracket and feed tube assembly.
 - (9) Carefully drill out the existing rivets that attach the feed tube clamping plate to the propeller nozzle bracket. Refer to the Model 208 Series Structural Repair Manual, Chapter 51, Standard Practices and Structures General.
 - (10) Separate the propeller feed tube from the clamping plate and bracket.
 - B. Install the Propeller Nozzle Bracket and Propeller Feed Tube Refer to Figure 203.
 - (1) Align the holes in the propeller nozzle bracket with the holes in the bulkhead and install bolts, nuts and washers. Torque bolts to 15 - 20 lnch pounds (1.69 - 2.25 N-m).
 - (2) Locate the clamping plate on the propeller nozzle bracket so that the clearance holes remain open.
 - (3) Align the mounting holes in the propeller feed tube with the mounting holes in the bulkhead.
 - (4) Fay seal the propeller feed tube mounting plate using A-1664-31 sealant.

NOTE: Make sure that the 0.1875 inch (4.7625 mm) hole through the bulkhead remains open. Seal all potential leak paths, especially around the area where the propeller feed tube exits the mounting plate. After the sealant has cured, use shop air to check for leaks, and make sure the propeller feed tube remains open.

- (5) Position the propeller feed tube between the clamping plate and the propeller nozzle bracket.
- (6) Install the propeller feed tube using MS20470-AD4 or AN470-AD4 rivets. Refer to the Model 208 Series Structural Repair Manual, Chapter 51, Standard Practices and Structures General.
- (7) Fay seal the propeller feed tube where it contacts the clamping plate and propeller nozzle bracket.
- (8) Do the Slinger Ring and Feed Nozzle Alignment Check in this section.
- (9) Do the Feed Tube to Propeller Blade Alignment Check in this section.
- (10) Install the right hand nose cap assembly. Refer to Chapter 71, Engine Cowling and Nose Cap Maintenance Practices Nose Cap Removal/Installation.
- (11) Install the propeller spinner. Refer to Chapter 61, Propeller (McCauley), Maintenance Practices.
- (12) Perform a dynamic balance of the propeller and spinner assembly. Refer to Chapter 61, Dynamic Balancing (McCauley) Adjustment/Test.
- 4. Slinger Ring and Feed Nozzle Alignment Check

NOTE: The installation of the slinger ring and feed nozzle for both the McCauley and Hartzell propellers is typical. The alignment check is the same for both propeller installations.

- A. Examine the TKS Feed Nozzle to Slinger Ring Alignment (Refer to Figure 202).
 - (1) Measure the distance between the slinger ring feed nozzle and the slinger ring channel.

NOTE: The feed nozzle must extend into the slinger ring channel 0.1 to 0.15 inches and have an edge distance of 0.1 to 0.15 inches from the slinger ring. (Refer to Figure 202.)

- (2) Adjust the slinger ring feed nozzle to direct the fluid stream to land in the slinger ring channel as necessary.
 - (a) Bend and rotate the feed nozzle at the fitting to align the nozzle with the slinger ring channel.
 - (b) Extend the feed nozzle into the slinger ring channel 0.1 to 0.15 inches with and edge distance of 0.1 to 0.15 inches from the slinger ring. (Refer to Figure 202.)
- (3) Rotate the propeller slowly by hand and make sure the distance between the slinger ring and the feeder tube is in alignment tolerance. Adjust the feed nozzle as necessary to get good alignment.

5. Feed Tube to Propeller Blade Alignment Check

A. Adjust the propeller feed tubes to direct the anti-ice fluid stream on to the propeller blades. (Refer to Figure 203.)

NOTE: The feed tubes are inside of the propeller spinner.

- (1) Make sure that each feed tube is over the second groove of the adjacent feed shoe with the propeller in full fine pitch.
- (2) Perform an engine run and cycle the propeller through a range of movement to verify that each tube has a 3/16 inch clearance from the propeller boot.
 - (a) For the dimensions for TKS on a McCauley propeller, refer to the Spinner and Bulkhead examination in Chapter 61, Propeller (McCauley) Inspection/Check, McCauley Propeller Functional Check.
 - (b) For further adjustment of the Hartzell propeller, refer to the applicable Hartzell Maintenance Manual.



Figure 201 : Sheet 1 : Install the TKS Propeller Anti-ice Feed Shoes





Figure 202 : Sheet 1 : Slinger Ring and Feed Nozzle Alignment Check



Figure 203 : Sheet 1 : Propeller Feed Tube Installation

