



Hydraulic Brake Wheel & Caliper Assembly - Inspection & Maintenance

Wheel Assembly

I. INSPECTION

Failure of any of the following inspections will require maintenance and/or repair as detailed in the following sections.

1. Insure that the wheel tie bolts are secure and have not worked loose.
2. Visually inspect the wheels for corrosion, cracks, or other visible damage.
3. Inspect the brake disc for evidence of cracks, corrosion, deep grooves, excessive wear, or other visible damage.

II. MAINTENANCE AND REPAIR

1. Removal of the wheel assembly

- a. Remove wheel hub cap (if so equipped).
- b. Remove brake caliper back plates. It is not necessary to disconnect the hydraulic line.
- c. Jack and secure the aircraft in accordance with manufactures instructions.
- d. Ensure that the aircraft is stable.
- e. Deflate the tire by depressing the valve stem plunger until no more air escapes.

CAUTION: Do not attempt to remove valve stem core, loosen the axle nut, or disassemble the wheel halves until all tire pressure has been released. Failure to do so can result in severe personal injury

- f. Remove the valve stem core.
- g. Remove the axle cotter pin and axle nut.
- h. Carefully slide the wheel assembly off of the axle.

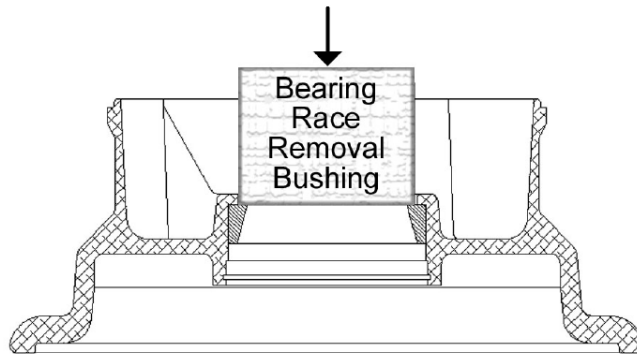
2. Disassembly of the wheel

- a. Place the wheel assembly on a suitable working surface. Care must be taken to prevent damage to the wheel such as scratches and/or nicks which will destroy the corrosion resistant protection of the wheel.
- b. Separate the tire beads from the wheel halves using a tire bead breaker or other suitable tool. Do not pry between the tire and wheel flange as damage to tire and/or wheel may occur.
- c. Remove the nuts, washers and bolts that hold the wheel halves together.
- d. Separate and remove the brake disc from the inner wheel half.
- e. Separate each wheel half from the tire using care to not damage the inner tube or its valve stem
- f. Remove the retaining snap rings, washers, felt grease seals and wheel bearings using care to prevent damage to the wheel or bearings.



3. Inspection and Repair

- a. Inspect the bearing races for scoring, corrosion, signs of over heating or other physical damage. Loose bearing races are cause for rejection of the wheel half. If replacement of the race is necessary carefully press it out using a press and properly sized bushings as illustrated.



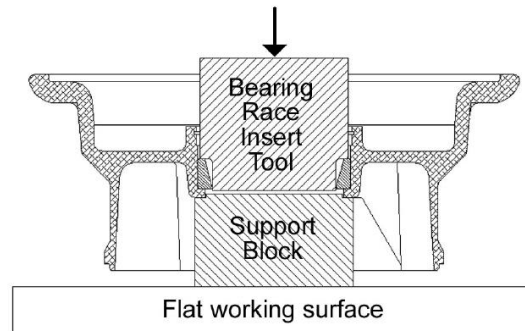
- b. Visually inspect each wheel half for cracks, nicks, corrosion or other damage. Particular attention should be paid to the tire bead seat area. Obvious cracks and severe corrosion are cause for rejection of the part. A further inspection using the dye penetrant method should be performed on any part whose serviceability is questionable. Small nicks, scratches and pits may be blended out and polished with fine (400 grit) sandpaper and then painted and/or treated for corrosion resistance.
- c. Clean the wheel bearings in a suitable solvent and air dry using compressed air being careful to not allow the compressed air to spin the bearings.
- d. Inspect the bearings for pitting, cracks, evidence of overheating, or excessive corrosion, any of which is cause for rejection of the part.
- e. Inspect the felt grease seals. Excessively worn, hardened or contaminated seals are cause for replacement. Serviceable seals should be cleaned in solvent, air dried, and set aside in a clean, protected environment until required for reassembly.
- f. Inspect the felt seal retaining washers and snap rings for distortion, excessive corrosion or other physical damage which is cause for rejection.
- g. Inspect wheel tie bolts for cracks, bending, thread damage, or excessive corrosion, any of which is cause for rejection. The tie bolts are subjected to fatigue type loads and should be replaced whenever there is any question as to their serviceability.
- h. Test the wheel tie bolt nuts by installing them onto the bolts. If the nut can be turned by hand past the self-locking section, it must be replaced.
- i. Inspect brake disc for excessive wear, scoring, or corrosion, cracks, warpage, or other physical damage which is cause for rejection of the part. Replace the disc if the disc thickness has worn more than 0.025" from new. These dimensions can be found by emailing sales@klsoaring.com. Minor corrosion and surface irregularities can be blended using 220 grit sandpaper. Any corrosion on the non-braking part of the disc should be removed and then painted and/or treated for corrosion resistance.



4. Reassembly of the Wheel

Reassembly of the wheel is basically the reverse of the disassembly process. Assemble the wheel on a clean, flat surface being careful to not nick, scratch, or damage the protective finish of the wheel.

- a. Reinstall the bearing races if applicable. Heating the wheel and/or cooling the bearing race is of minimal benefit in the installation process.
 - (1) Clean the wheel bearing race bore and apply a thin coat of wheel bearing grease.
 - (2) Place the bearing race in the wheel bore, being careful to ensure that it is aligned properly and not cocked.
 - (3) Place the wheel half in the press as shown in the following figure being sure to support the wheel half at the bottom of the bearing seat. Failure to do this may result in breakage of the wheel casting if too much force is applied.



- (4) Press the bearing race into the wheel until it is fully seated.
- (5) Remove the wheel from the press and visually check to see that the race is fully seated and that it is tight in the wheel.
- b. Mount the tire on the wheel
 - (1) Ensure that the wheel is clean and dry. Particular attention should be paid to the bead area to ensure that it is clean, dry and free of grease or other contamination which may cause the tire to spin on the wheel as the brakes are applied.
 - (2) Insert the inner tube into the tire. Align the red dot on the tire (its lightest point) with the white or yellow dot on the tube (its heaviest point). If the tube does not have a white dot, align the red dot on the tire with the valve stem of the tube. In order to allow the tube to move freely within the tire, it is recommended that you coat the tube and inner part of the tire with talc powder.
 - (3) Inflate the inner tube to approximately 10 psi, allowing it to take the shape of the tire. Deflate the tire to the point that it just retains its shape.
 - (4) Place the tire and tube onto the outer wheel half carefully inserting the valve stem through the hole in the wheel half.
 - (5) Insert the inner wheel half into the tire with the tie bolt holes aligned and using care not to pinch the inner tube.
 - (6) Place the wheel and tire assembly on a flat working surface with the inner side of the wheel facing up. Install the brake disc in the inner wheel half and align the bolt holes with the wheel half. Insert the tie bolts through the brake disc and wheel.



- (7) Rotate the wheel from the working surface in order to be able to attach the nuts to the tie bolts. Hand tighten a nut with washer on each of the tie bolts. Care should be taken to ensure that the wheel halves are in contact with each other and not pinching the inner tube.
- (8) Torque the tie bolt nuts to the value shown on the wheel label. Typically this is 90 inch-pounds for 1/4" bolts and 150 inch-pounds for 5/16" bolts. Observe the amount of torque required to turn the nut due to the locking friction of the nut and add this to torque requirements to get the proper torque wrench reading.
- c. Repack the bearings using MIL-G-81322 grease such as Aeroshell 22 or Mobil 28. You may also use the newer Mobil SHC 100, but because it is not compatible with other wheel grease, the bearings and races must be thoroughly cleaned before application.
- d. With the wheel on a flat working surface, insert a wheel bearing. Lightly coat the bearing race with bearing grease before installing the bearing.
- e. Install the washers, felt grease seal and retention snap ring. A light coat of light weight oil on the felt grease seal is recommended.
- f. Turn the wheel over and repeat steps 3 and 4.
- g. Place the wheel in a protective enclosure and inflate to the pressure recommended by the aircraft POH.

5. Inspection and Repair

- a. Inspect the axle to ensure that it is clean, dry and in serviceable condition.
- b. Slide the wheel onto the axle with the brake disc side inboard.
- c. Install axle nut and hand tighten ensuring that that inboard wheel bearing is fully seated on the axle.
- d. While slowly rotating the wheel, tighten the axle nut until resistance to turning is felt. Care must be taken to ensure that the valve stem is not damaged during this process.
- e. Loosen the axle nut only enough so that the wheel runs free, or with very little drag.
- f. Align the axle nut to the nearest cotter pin alignment in the axle. If you need to move the nut for alignment, first try to tighten it. If the wheel still moves with little or no resistance, use that alignment. If there is significant resistance to rotation, loosen the nut to the next hole.
- g. Install a new cotter pin. One end of the cotter pin should fold out and bend over the end of the axle to its center. The other end should be bent back toward the wheel and shortened if necessary to avoid contact with the wheel. Extreme care must be taken to ensure that the cotter pin does not interfere with the valve stem or other parts of the wheel when the wheel is rotated.
- h. Reinstall the brake caliper backing plate. Torque the bolts to the value indicated on the label of the brake caliper and safety wire.
- i. Reinstall the wheel hub cap (if so equipped).
- j. Rotate the wheel to ensure that it is secure and rotates freely.
- k. Lower the aircraft to the ground following aircraft manufacturer's instructions.



Caliper Assembly

I. INSPECTION

1. Visually inspect the caliper for corrosion, leaking hydraulic fluid, cracks or visible damage.
2. Check back plate attachment bolts to insure that they are properly torqued/safety wired and have not worked loose.
3. Visually check torque plate for corrosion, cracks and loose bolts that attach the torque plate to the axle.
4. Visually check brake linings for wear. Linings worn to less than 0.100" must be replaced.
5. Check brake line and brake line fittings for signs of damage or leakage. If the linings have been contaminated with fluid, they should be replaced.
6. If any conditions specified in paragraphs 2 through 6 above are experienced, repair and/or replace is required as specified below.

II. MAINTENANCE AND REPAIR

1. **Removal and inspection of brake linings**
 - a. Remove back plate attaching bolts and remove back plate assembly.
 - b. Slide brake caliper out of torque plate assembly. Removal of the brake line may not be necessary. If removal of the brake line is necessary, cap or plug the hydraulic lines to prevent entry of contaminants. After reinstallation of the brake caliper, bleed the brakes in accordance with paragraph 5(c) of the Master Cylinder Inspection and Maintenance Section.
 - c. Slide press plate assembly off of torque pins.
 - d. Remove old linings by removing the rivets with a small drift punch or 1/8" diameter drill. Use care to prevent elongating the holes in the back plate or press plate. De-burr the holes after drilling if necessary.
2. **Installation of new linings**
 - a. Clean back plate and press plate surfaces before installing new linings.
 - b. Inspect back plate and press plate for excessive corrosion, visible damage, or excessive warpage. Straighten or replace press plate if warped in excess of 0.010".
 - c. Rivet new linings onto back plate and press plate using rivet tool #824 or equivalent. Refer to parts manual for proper linings and rivets. Small cracks in the tubular rivets are allowed after forming, providing that no cracks extend beyond the crest of the rounding. There may be no more than two cracks in any 90 degree segment and no more than three cracks total.
 - d. Check to ensure that pads are tight to the back plate and press plate, and free of any movement.
3. **Reinstallation of back plate and press plate assemblies**
 - a. Wipe dirt, grease, etc. from brake cylinder and piston and push piston back into cylinder.
 - b. Clean torque pins and lightly lubricate with a dry film such as silicon spray. Grease will attract dirt and cause excessive wear on the torque pins and press plate.
 - c. Slide press plate onto torque pins and install brake caliper assembly onto torque plate.
 - d. Position back plate between tire and brake disc. Install and tighten attaching bolts and washers using the torque value found on the caliper label. Safety wire the back plate attaching bolts.
 - e. If you have disconnected the hydraulic lines, bleed the brake system in accordance with paragraph 5(c) of the Master Cylinder Inspection and Maintenance Section.



I. REMOVAL, INSPECTION AND REPAIR OF THE BRAKE CALIPER

1. Removal and Disassembly of the Brake Caliper

Removal of the wheel is not necessary unless the torque plate is to be removed. Disassembly should be done on a clean, cushioned flat surface to prevent nicks, scratches, and gouges to the brake.

- a. Drain the fluid from the brake system by opening the bleeder fitting and pumping the brake pedal until the system is dry. Collect the discharged fluid and dispose of properly.
- b. Disconnect brake line from brake caliper. Cap the brake line to prevent foreign material to enter.
- c. Remove the back plate.
- d. Remove the piston from the caliper body. This can be done by injecting compressed air through the brake line fitting. Care must be taken to ensure that the piston does not exit at high velocity. Slowly introduce the air at low pressure and cover the piston and caliper with a rag and/or place face down on a soft surface.
- e. Remove the O-Ring from the piston. It is recommended that new O-Rings be installed. If the old O-Rings are to be re-used, care must be taken to ensure that they are not damaged during removal or re-installation. If the O-Ring is brittle, nicked, scratched or has flat surfaces, it must be replaced. Use only approved O-Rings that are compatible with aircraft brake fluid.
- f. If removal of the torque plate is required, remove torque plate, and wheel as described in paragraph (1) of the Wheel Assembly Inspection and Maintenance Section.

2. Inspection and Repair

- a. Visually inspect cylinder for cracks, nick, corrosion, or other damage. Cracks around the torque pins are cause for replacement.
- b. Inspect the caliper torque pins for excessive wear, proper tightness, cracks in the caliper body or other damage. Cracks in the caliper body or loose torque pins are cause for rejection of the caliper body.
- c. Inspect the piston bore and piston for contamination, corrosion and scratches. Light nicks and scratches can be removed by polishing. Care must be taken not to damage the protective coating which will result in increased corrosion. Deep nicks or scratches are cause for rejection of the part.
- d. Inspect back plate and press plate for excessive corrosion, visible damage, or excessive warpage which is cause for rejection of the part. Straighten or replace press plate if warped in excess of 0.010".
- e. Inspect the torque plate for corrosion and cracks. Excessive corrosion or cracks are cause for rejection of the part.

3. Reassembly and Reinstallation of the Brake Caliper Assembly

- a. Clean the brake parts, with the exception of the O-Rings and linings, in solvent and air dry.
- b. Carefully install a new O-Ring, or serviceable O-Ring, on the piston using aircraft hydraulic fluid, Dow 55M O-Ring Lubricant or equivalent.
- c. Lightly coat the piston bore with aircraft hydraulic fluid, Dow 55M O-Ring Lubricant or equivalent, and carefully place the piston into the caliper. The side of the piston with the O-



- ring closest to the surface goes in first. Insert it until the top of the piston is flush with the caliper body.
- d. Slide the caliper assembly onto the torque plate on the aircraft.
 - e. Install the back plate, torque the back plate bolts to 70-80 inch-pounds and safety.
 - f. Reconnect the hydraulic lines, bleed the brake system in accordance with paragraph 5(c) of the Master Cylinder Inspection and Maintenance Section.
 - g. If the torque plate was removed, reinstall in its original, clocked position.