INSTRUCTIONS

FOR

CONTINUED AIRWORTHINESS

FOR

GROVE BRAKE ASSEMBLIES

WITH

FAA-TSO APPROVAL

DOCUMENT 13046-12
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INTRODUCTION

This document provides installation and continued airworthiness instructions for Grove Brake assemblies with FAA-TSO approval. These articles have been tested to meet the requirements of TSO-C26d but do not have installation eligibility for specific aircraft.

As such, this is not an FAA approved document, but rather a guide for aircraft manufacturers and others who obtain installation eligibility on their aircraft. The information contained herein will be helpful to these persons as a basis to amend and include in their approved installation and continued airworthiness documents.

The following paragraphs detail the inspection and repair processes for these articles. Information regarding specific part numbers and tolerances can be found at groveaircraft.com under FAA Certified Parts

Figure 1 below shows the main components of a typical Grove Main Wheel & Brake assembly.

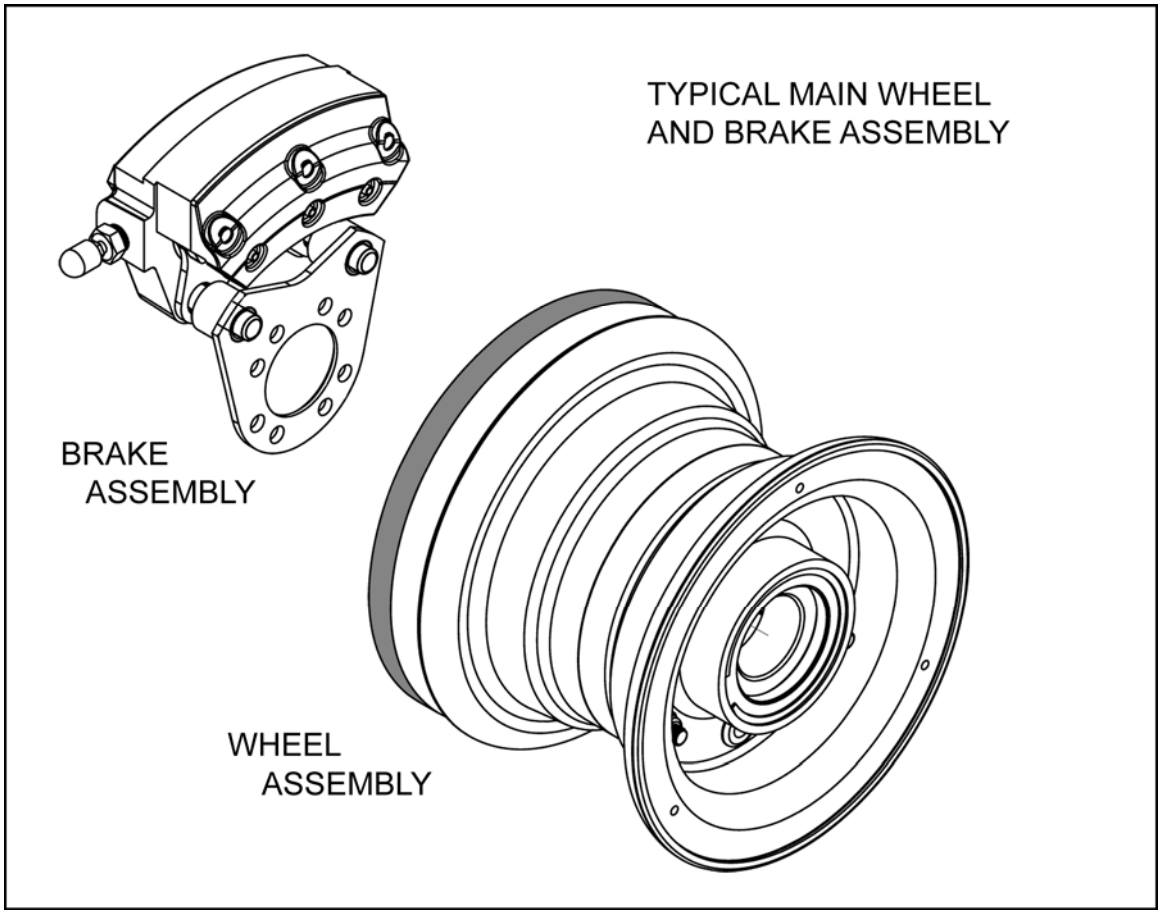


Figure 1

BRAKE CALIPER INSPECTION AND MAINTENANCE

The brake linings and caliper can be inspected, maintained and repaired without raising the aircraft or removing the wheel. Instructions for installation on the aircraft can be found in section 3.3. Failure of any of the following inspections will require maintenance and/or repair as detailed in the following sections.

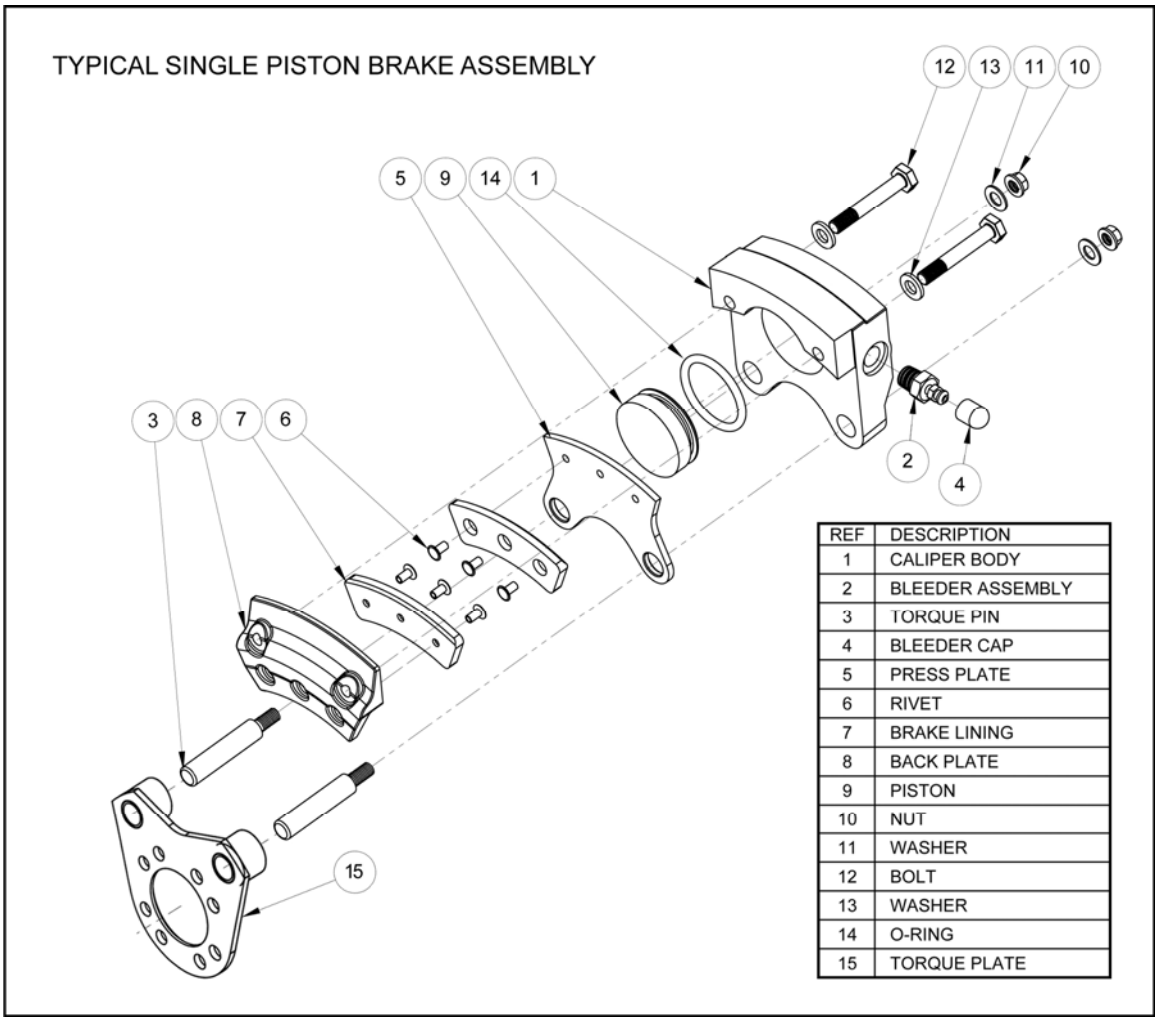
1. VISUAL INSPECTION

1.1. Visually inspect the caliper for corrosion, leaking hydraulic fluid, cracks or visible damage.

1.2. Check back plate tie bolts to insure that they are properly torqued, safety wired and have not worked loose.

1.3. Visually check torque plate for corrosion, cracks and loose bolts that attach the torque plate to the axle.

1.4. Visually check brake linings (pads) for wear. Linings worn to less than 0.100" must be replaced.



REF	DESCRIPTION
1	CALIPER BODY
2	BLEEDER ASSEMBLY
3	TORQUE PIN
4	BLEEDER CAP
5	PRESS PLATE
6	RIVET
7	BRAKE LINING
8	BACK PLATE
9	PISTON
10	NUT
11	WASHER
12	BOLT
13	WASHER
14	O-RING
15	TORQUE PLATE

Figure 2

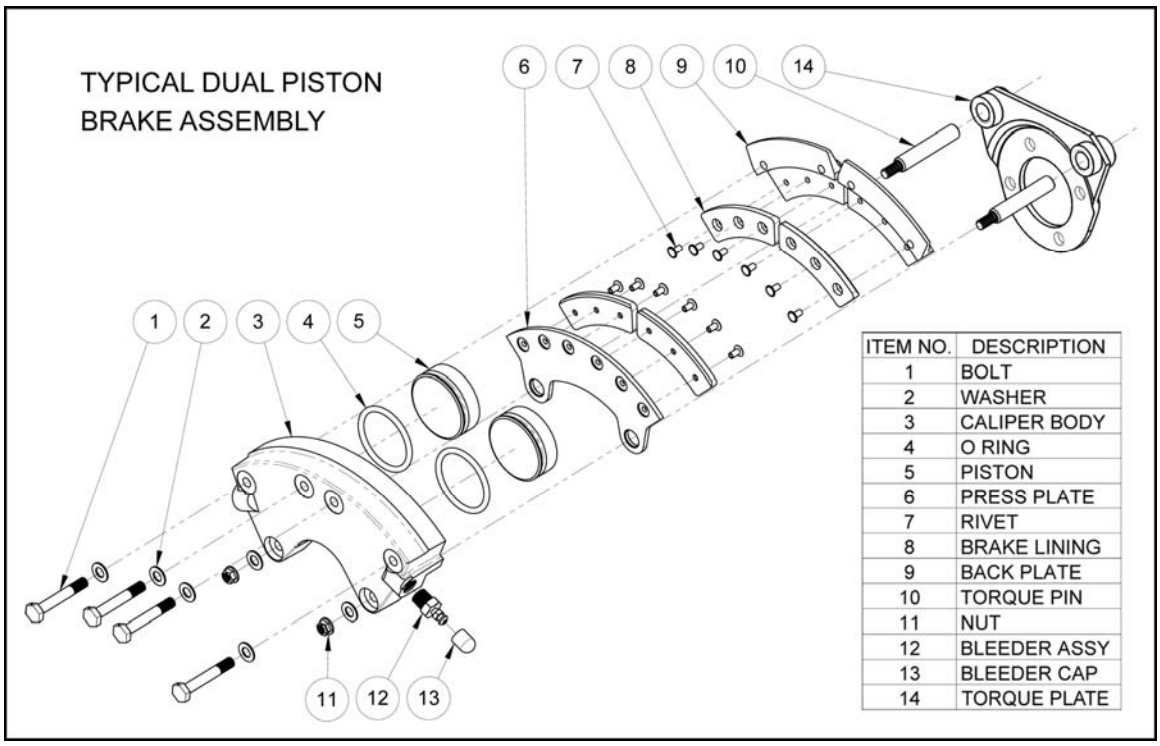


Figure 3

1.5. 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.

1.6. If any conditions specified in paragraphs 1.1. through 1.5. above are experienced, repair and/or replacement is required as specified in the following sections.

2. BRAKE LININGS — INSPECTION AND REPLACEMENT

2.1. Removal of Brake Caliper Assembly

2.1.1. Remove back plate tie bolts and remove back plate assembly.

2.1.2. 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 3.4.

2.1.3. Slide press plate assembly off of torque pins.

2.2. Inspection and Installation of New Linings

If linings are worn to less than 0.100", are excessively pitted, heat damaged, oil soaked, or exhibit other damage they must be replaced as follows:

2.2.1. 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.

2.2.2. Clean back plate and press plate surfaces with solvent and air dry before installing new linings.

2.2.3. 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”.

2.2.4. Rivet new linings onto back plate and press plate using rivet tool #824 or equivalent. Refer to groveaircraft.com FAA Certified Parts 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.

2.2.5. Check to ensure that pads are tight to the back plate and press plate, and free from any movement.

2.3. Reinstallation of Back Plate and Press Plate Assemblies

If disassembly or repair of the caliper is necessary, refer to paragraph 3, otherwise reinstall the caliper as follows:

2.3.1. Wipe dirt, grease, etc. from brake cylinder and piston and push piston back into cylinder.

2.3.2. Clean torque pins and lightly lubricate with a dry film such as silicon spray. Grease will attract dirt and may cause excessive wear on the torque pins and press plate.

2.3.3. Slide press plate onto torque pins and install brake caliper assembly onto torque plate.

2.3.4. Position back plate between tire and brake disc. Install and tighten tie bolts and washers using the torque value found on the caliper label. Safety wire the back plate tie bolts.

2.3.5. If you have disconnected the hydraulic lines, bleed the brake system in accordance with paragraph 3.4.

3. BRAKE CALIPER — REMOVAL, INSPECTION AND REPAIR

3.1. 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 parts.

3.1.1 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.

3.1.2. Disconnect brake line from brake caliper. Cap the brake line to prevent entry of foreign material.

3.1.3. Remove the back plate.

3.1.4. 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.

3.1.5. 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. Refer to groveaircraft.com | Wheels & Brakes | Maintenance Instructions for the proper O-Ring to use. O-Rings must be compatible with MIL-PRF-5606 hydraulic brake fluid.

3.1.6. If removal of the torque plate is required, first remove the wheel as described in paragraph 5.1., then unbolt the torque plate.

3.2. Inspection and Repair

3.2.1. Visually inspect caliper for cracks, nicks, corrosion, or other damage. Cracks around the torque pins are cause for replacement.

3.2.2. 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.

3.2.3. 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.

3.2.4. 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".

3.2.5. Inspect the torque plate for corrosion and cracks. Excessive corrosion or cracks are cause for rejection of the part.

3.3. Reassembly and Reinstallation of the Brake Caliper Assembly

3.3.1. Clean the brake parts, with the exception of the O-Rings and linings, in solvent and air dry.

3.3.2. Carefully install a new O-Ring, or serviceable O-Ring, on the piston using aircraft hydraulic fluid, Dow 55M O-Ring Lubricant or equivalent.

3.3.3. 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.

3.3.4. Slide the press plate onto the torque pins with the linings facing away from the caliper body.

3.3.5. If the torque plate was removed, reinstall in its original, clocked position.

3.3.6. Slide the caliper assembly onto the torque plate on the aircraft.

3.3.7. Install the back plate, torque the back plate bolts to the value indicated on the brake caliper label and safety wire.

3.3.8. Reconnect the hydraulic lines.

3.4. Bleeding the Brakes

3.4.1. All Grove brake systems incorporate Buna-N (Nitrile) O-Ring seals that are compatible with MIL-H-5606 (MIL-PRF-5606) hydraulic fluid or its newer replacements: MIL-PRF 83282 and MIL-PRF-87257. All of these fluids are miscible and can be used with each other.

3.4.2. Remove the vent plug from the brake system reservoir.

3.4.3. Connect a clean hydraulic pressure source such as a hydraulic hand pump to the bleeder valve on the lower end of the brake caliper.

3.4.4. Open the bleeder valve one-half turn.

3.4.5. Pump hydraulic fluid into the system observing the level in the brake system reservoir. When the reservoir is nearly full, tighten bleeder fitting and remove hydraulic pressure source.

3.4.6. Replace and tighten brake system reservoir vent plug.

3.4.7. Apply hard pressure to the brake pedal. Check to ensure that you have a "hard pedal" and that there are no leaks. You may have to pump the brake pedal several times

3.4.8. If a "soft pedal" condition exists, repeat steps 3.4.2. through 3.4.7.

3.5 Conditioning the Brake Linings (Pads)

These non-asbestos organic composition brake pads require a thin layer of glazed material at the lining friction surface in order to provide maximum braking performance. This glazed layer is produced by the heat generated during normal braking operations, and is maintained during the life of the lining. Since new brake pads do not have this layer, it must be created by the following process:

3.5.1. Heat the pads by “dragging the brakes” while taxiing at a slow speed with moderate power. Do not use maximum braking pressure.

3.5.2. Allow the brakes to cool for 5 - 10 minutes

3.5.3. Test the results at full static run-up. If the brakes hold, break-in is complete. If they fail to hold, repeat steps 1 and 2 until they do.

3.5.4. During the break-in process, debris tends to accumulate in the rivet hole recesses. To ensure maximum braking effectiveness, this debris should be cleaned out with a small scraping tool such as a small flat-bladed screw driver after removing the back plate and pressure plate as described in paragraph 2.2. Refer to paragraph 2.3 for instructions on re-installation.

3.5.5. NOTE: The brake linings will continue to "break-in" during normal operations. Typically, after several take offs and landings, the linings will have better stopping performance than when new.

TROUBLE SHOOTING

TROUBLE	PROBABLE CAUSE	CORRECTION
1. Unable to obtain sufficient hydraulic brake pressure or spongy pedal	Air in hydraulic system.	Check for source, then bleed hydraulic system IAW section 3.4.
	Brake pedal binding	Check for freedom of movement of brake pedal and master cylinder
2. Excessive pedal travel	Incorrect installation	Refer to aircraft manual.
	Leak in system—brake, master cylinder, fittings, or lines.	Locate leak and repair.
	Defective master cylinder.	Repair or replace.
	Back plate bolts loose.	Torque bolts to proper value IAW paragraph 2.3.4.
3. Brake Drag	Piston jammed in caliper	Remove caliper and repair cylinder or piston
	Foreign matter wedged in brakes	Locate and remove
	Master cylinder not releasing hydraulic pressure	Check for proper master cylinder installation. Repair or replace master cylinder.
	Foreign matter lodged between torque pins and torque place bushings.	Clean and inspect. Replace if necessary.
	Bent torque plate.	Replace torque plate.
	Bent torque pins	Replace torque pins.
4. Rapid disc and/or pad wear.	Dragging brakes	Refer to Trouble #3
	Excessive rusting, scoring, or pitting of brake disc	Clean or replace disc.
	Excessive back plate deflection caused by bent bolts or over torquing bolts.	Check torque of bolts IAW paragraph 2.3.4. and replace bolts if bent.
5. Brakes won't hold.	Improper conditioning of brake pads.	Condition pads IAW section 3.5.
	Contaminated pads.	Replace pads.
		Check rivet holes – ref. 3.5.4.
	Insufficient hydraulic pressure.	Refer to Trouble #1.
	Brake pad carburized (overheated)	Replace pads