

# **Installation Instructions**

**for**

## **GROVE 28-4001 AND 28-4001A WHEEL AND BRAKE CONVERSION KITS**

**in all**

**PIPER AIRCRAFT INCLUDED  
IN THE FAA APPROVED MODEL LIST**

**when installed**

**In Accordance With**

**Supplemental Type Certificate SA02525LA**

**Doc No.: 13049-11 Revision IR**

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## RECORD OF REVISIONS

This “Record of Revisions” identifies all revisions to this document. When changes to this document are needed, revisions will be issued by the STC holder.

This “Record of Revisions” shall remain in this document at all times. Upon the receipt of revisions, insert the revised page(s) into this document and enter the revision number, revision date, insertion date and signature of person incorporating the revision into the document in the appropriate spaces below.

It is the responsibility of the person(s) performing installation to ensure that this document is current prior to performing this installation. The current revision number may be verified by contacting the STC holder, Grove Aircraft Landing Gear Systems Inc., 1800 Joe Crosson Drive, El Cajon, CA 92020 or on the web at [www.groveaircraft.com](http://www.groveaircraft.com).

Revision Number	Description	Pages Affected	Revision Date	Inserted By
IR	Initial Revision	All	01/30/2014	Robbie Grove, Chief Engineer

### 1.0 INTRODUCTION

This document provides installation instructions for Grove 65-1003 magnesium and 65-1003A aluminum main wheel assemblies and 29-1005A brake assemblies on aircraft listed in the Approved Model List of Supplemental Type Certificate SA02525LA.

## 2.0 INSPECT THE STC PACKAGE

Check packaging to ensure that you have all these items.

2 – Wheel Assemblies P/N 65-1003 or 65-1003A	1 – Drawing Number 28-1004 (Sheets 1-3)
2 – Brake Assys P/N 29-1005A	1 – Installation Manual Doc 13049-11
2 – Brake Line Assy P/N 007-002	1 – Instructions for Continued Airworthiness Doc 13049-10
8 – AN4-5A Bolts	
16 – AN960-416L Washers	
8 – MS21042-4 Nuts	
2 – 402x4 90° Brass Elbows	
2 – 502x4 90° Brass Elbows	
2 – MS24665-360 Cotter Pins	

### OPTIONAL HUB CAP KIT:

- 2 – Hub Caps P/N 011-013
- 6 – MS35206-242 Screws
- 6 – MS35333-38 Lock Washers

## 3.0 REMOVE EXISTING WHEELS AND BRAKES

- 3.1 Jack and secure the aircraft in accordance with manufactures instructions.
- 3.2. Remove the hub cap cover if so installed.
- 3.3. Disconnect brake line from existing brake assembly. NOTE: Have a suitable container available to collect the brake fluid as it drains from the line.
- 3.4 Remove cotter pin from axle nut and remove axle nut.
- 3.5 Slide wheel off of axle.
- 3.6 Unbolt and remove original brake assembly from the gear leg.
- 3.8 Inspect gear leg and axle for damage, corrosion, etc. and repair as required.

## 4.0 TIRE INSTALLATION

NOTE: The following tire sizes are approved for installation with this STC.

6.00-6, 7.00-6, 8.00-6, 8.50-6, and 26x10.5-6\*.

\* The 26x10.5-6 uses a 8.50-6 inner tube.

It is important that the installing mechanic insure that the load rating of the tires are adequate for the aircraft on which they are being installed.

- 4.1 Prior to mounting the tire on the wheel, ensure that the wheel is clean and dry. Particular attention should be paid to the bead seat 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.

- 4.2 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.
- 4.3 Inflate the inner tube to approximately 10 psi, allowing it to take the shape of the tire. Deflate the tube to the point that it just retains its shape.
- 4.4 Place the tire and tube onto the outer wheel half carefully inserting the valve stem through the hole in the wheel half.
- 4.5 Insert the inner wheel half into the tire with the tie bolt holes aligned and using care not to pinch the inner tube.
- 4.6 Place the wheel and tire assembly on a flat working surface with the inboard 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.
- 4.7 Rotate the wheel from the working surface in order to be able to attach the washers and 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.
- 4.8 Torque the tie bolt nuts to 150 in-lbs. This value is also shown on the wheel label. Observe the amount of torque required to turn the nut due to the locking friction of the nut and add this to get the proper torque wrench reading.
- 4.9 With the wheel on a flat working surface, remove the snap ring, washer and felt seal.

NOTE: The wheel bearings are fully packed and lubricated when shipped and need not be removed nor repacked. If repacking is necessary, refer to section 8.5.16 of the ICA manual.

- 4.10 Apply a light coat of wheel grease or light oil to the felt seals to prevent moisture from soaking the seals and transmitting moisture to the bearings.
- 4.11 Turn the wheel over and repeat steps 4.9 and 4.10.
- 4.12 Place the wheel in a protective enclosure and inflate to 25 psi. Deflate the tire by depressing the valve stem plunger and re-inflate to the pressure appropriate to the aircraft type and weight, typically 18-20 psi.

CAUTION: Under-inflation of the tire can cause the tire to slip on the wheel resulting in shearing of the valve stem.

## **5.0 INSTALLATION OF TORQUE PLATE**

Install torque plate onto gear leg using 4 AN4-5A bolts, 8 AN960-416L washers and 4 MS21052-4 nuts. Torque to 70-80 in-lbs. Refer to Installation Drawing 28-4001 Sheet 3 for proper alignment and orientation.

## **6.0 INSTALLATION OF WHEEL ASSEMBLY**

- 6.1 Slide the wheel onto the axle with the brake disc side inboard.
- 6.2 Install axle nut and hand tighten ensuring that inboard wheel bearing is fully seated against the bearing stop on the axle.
- 6.3 While slowly rotating the wheel, tighten the axle nut until you feel resistance of the wheel to rotate. Care must be taken to ensure that the valve stem is not damaged during this process.
- 6.4 Loosen the axle nut only enough so that the wheel runs free, or with very little drag.
- 6.5 Check that a hole in the axle nut aligns with a cotter pin slot 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.
- 6.6 Install cotter pin to safety the axle nut to the axle. Use care to ensure that there is adequate clearance between the cotter pin and the valve stem as the wheel rotates.
- 6.7 Reinstall the wheel hub cap if so equipped.
- 6.8 Rotate the wheel to ensure that it is secure and rotates freely.

## **7.0 INSTALLATION OF BRAKE CALIPER ASSEMBLY**

- 7.1 Install the 402x4 90° Brass Elbow onto the brake caliper as shown in Drawing 28-4001 Sheet 1 using Permatex #2, Tite seal, or equivalent thread sealant. Do not use Teflon tape.
- 7.2 Slide the press plate onto the torque pins with the linings facing away from the caliper body.
- 7.3 Lubricate the torque pins on the caliper with a dry lubricant such as silicon spray. Oil and grease lubricants tend to attract dirt which can cause wear and binding.
- 7.4 Install the caliper assembly on the aircraft, from inboard to outboard, by sliding the torque pins through the bushings of the torque plate.
- 7.5 Position the back plate between the tire and the brake caliper and install the tie-bolts. Torque bolts to the value indicated on the brake caliper label and safety wire.

## **8.0 INSTALLATION OF BRAKE LINE ASSEMBLY**

Referring to Sheet 1 of Drawing 28-4001, install the 502x4 90° Brass Elbow to the existing aircraft brake line, then the 007-002 brake line assembly. After one end of the brake line assembly is attached to the aircraft, it may be necessary to slightly bend the brake line assembly to properly align with the brake caliper, allowing it to "float". This installation should apply to most aircraft on the approved model list.

However, many of the aircraft brake lines have been modified over the years which require an alternative installation method such as an aircraft quality flexible hose. Because each aircraft differs in this area, the installing mechanic will have to determine the best method.

Regardless of the method used, it is important to allow enough freedom in the brake line for the caliper to float, and that the installation is done in accordance with accepted aircraft standards.

NOTE: The brake line fitting and bleeder valve may be interchanged.

## **9.0 FINAL ASSEMBLY AND INSPECTION**

9.1 Verify that the axle nut is tight and that the cotter pin does not interfere with the tube valve stem.

9.2 Inflate the tires to 18-20 psi.

NOTE: Under inflation can cause the tire to slip on the wheel.

9.3 Lower the aircraft to the ground

## **10.0 BLEED THE BRAKES**

10.1 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.

10.2 Remove the plug from the brake system reservoir.

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

10.4 Open the bleeder valve one-half turn.

10.5 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.

10.6 Replace and tighten brake system reservoir plug.

10.7 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 in order to get a "hard pedal."

10.8 If a "soft pedal" condition exists, repeat steps 8.2. through 8.7.

## 11.0 COMPLETE THE PAPERWORK

- 11.1 Complete and process FAA form 337 for returning the aircraft to service.
- 11.2 Make an entry in the aircraft records (logbook) as to the work done and changes to the aircraft's empty weight and center of gravity if applicable.

The weights of the Grove Conversion Kit Components are:

COMPONENT	WEIGHT EACH	WEIGHT X2
65-1003 Magnesium Wheel	6.58 lb.	12.96 lb.
65-1003A Aluminum Wheel	7.65 lb.	15.28 lb.
29-1005A Brake Caliper Assembly	2.75 lb.	5.5 lb.
007-002 Brake Line & Fittings	0.16 lb.	0.32 lb.
28-4001 Magnesium Conversion Kit	9.39 lb.	18.78 lb.
28-4001A Aluminum Conversion Kit	10.55 lb.	21.10 lb.

## 12.0 CONDITION THE BRAKE LININGS

These non-asbestos organic composition brake linings 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 linings do not have this layer, it must be created by the following process:

- 12.1 Heat the linings by "dragging the brakes" while taxiing at a slow speed with moderate power. Do not use maximum braking pressure.
- 12.2 Allow the brakes to cool for 5 - 10 minutes
- 12.3 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.

## 13.0 IMPORTANT INSTALLATION FOLLOW-UP ACTION

After the break-in process described above, you should do the following:

- 13.1 Remove the brake caliper assembly in accordance with paragraph 7.2 of the Instructions for Continued Airworthiness, Document 13049-10.
- 13.2 Using a tool, such as a small flat-bladed screw driver, remove any debris that may have accumulated in the rivet hole recesses. You should not have to do this again.
- 13.3 Re-install the brake caliper in accordance with paragraph 7.2 of the Instructions for Continued Airworthiness, Document 13059-10.
- 13.4 Visually Inspect the wheel, brake line, and caliper for integrity, signs of abnormal wear, hydraulic fluid leak, security of the bolts and locking devices. The cause of any of these discrepancies should be identified and corrective action taken. The Trouble Shooting section of the Instructions for Continued Airworthiness, Document 13049-10 contains helpful information.