# INSTALLATION INSTRUCTIONS

## Aircraft: PA-18 Series

# ALUMINUM LIFT STRUTS

Release Number: B
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AIRFRAMES ALASKA

907.331.4480 // AIRFRAMESALASKA.COM // 81 E. COMMERCIAL DRIVE, PALMER, AK, 99645

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## Record of Revisions

| Rev Level | Date | Page | Author | Explanation of Revisions |
|---|---|---|---|---|
| IR | 10/16/2019 | - | Doug Keller | Initial Release |
| A | 4/15/2020 | 6 | Doug Keller | Added powder coating caution statement |
| B | 5/21/2020 | - | Jon Earl | Update of company information, cover page, and back cover. |
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## Distribution of Changes

A current copy of this manual will be maintained on the Airframes Alaska, LLC. website.

# Table of Contents

# 1 Background

This lightweight aluminum replacement lift strut utilizes an aluminum extrusion with open ends, corrosion will not be an issue as with the non-sealed OEM steel struts. This therefore negates the need to comply with AD 99-01-05 (no periodic inspection for corrosion required).

This STC is compatible with the Wipline, Inc. “2000 Lbs., Gross Weight Increase STC” # SA00997CH.

# 2 Installation Instructions (to accomplish lift strut removal and installation properly, two people will be required)

***If the aircraft has steel lift struts in place, they need to be removed as outlined below:***

1. Remove the wing root panels.
2. Disconnect the aileron control cable running to the upper aileron horn.
3. Remove the inspection plate under the wing near where the aileron cable penetrates the underside of the wing. Also remove the upper aileron cable pulley cover on top of the wing
4. Remove the upper aileron cable pulley.
5. Remove the upper aileron cable in the internal wing so that it free at the upper front strut.
6. Remove the aileron pulley aft of the upper front strut.
7. Remove the cable fairleads on the front lift struts and remove the aileron cable so that it is free from the front lift strut.
8. Remove the jury struts from the aircraft, they will be reused with the new aluminum struts so do not damage them and mark which one goes on the front strut and which one go on the rear strut.
9. Remove the front and rear strut fasteners from the fuselage by removing the bolts, nuts, and cotter pins at the lower end of each strut.
10. With one person at the wing tip holding the wing tip up. Disconnect the rear lift strut from the wing panel by removing the bolt, washer, and nut.
11. Pull the rear strut off the fuselage and place it out of the way in a safe location.
12. While one person is still holding the wing tip up, disconnect the front lift strut from the wing panel by removing the bolt, washer, nut, spacer, and pulley housing.
13. Pull the front strut off the fuselage and place it out of the way in a safe location.
14. It may be necessary to prop the wing tip up with a stand if the new aluminum struts are not prepared and immediately ready for installation.

***Installation of the new aluminum lift struts*** *(if the aircraft flew straight and level and was properly rigged prior to removal of the steel struts, adjust the new aluminum forks exactly like the forks on the steel struts. Note: there must not be more than 15 threads showing external to the strut.)*

***Caution: Powder coating of heat-treated Aluminum struts could alter their strength; therefore powder coating is not acceptable. These aluminum struts must be finished with conventional liquid paint or left in their bare aluminum state only.***

1. With one person at the wing tip holding up the wing, install the new aluminum front strut to the wing panel. Note: The new aluminum front and rear lift struts are interchangeable so there is not a dedicated left-hand or right-hand strut. Use the same bolt, nut, washer, spacer, and pulley housing that was removed from the front steel strut. Secure the nut onto the bolt.
2. The person holding up the tip will need to raise the tip up so that the fork end of the front strut can be guided and aligned to the front strut hole on the fuselage strut fitting (be careful not to damage the strut during the installation process).
3. Once the new front strut in in place, replace the fork bolt, nut, and use a new cotter pin to secure it in place at the fuselage strut fitting. The wing will now be stable and the person holding up the tip can release it without fear of the wing panel dropping.
4. Mount the new aluminum rear strut to the rear hole on the fuselage strut fitting.
5. With one person holding the wing tip trialing edge, mount the rear strut to the wing panel. The person holding the wing tip trailing edge will likely have to either raise or lower the tip to mate the rear strut to the wing panel.
6. Using the same bolts, nuts, and washers removed from the steel strut, reinstall and secure with a new cotter pin. If the aircraft flew straight and level and was properly rigged prior to removal of the steel struts and the fork positions were replicated proceed to the next step. If not, the aircraft will need to be properly rigged, go to the rigging instruction below prior to proceeding any further.
7. Install the old jury struts using the new front and rear jury strut clamps.
8. Route the free aileron cable through the front strut cable fairleads, through the pulley at the upper front strut, and through the wing to the upper aileron cable pulley.
9. Reinstall and secure the aileron pulleys using new cotter pins.
10. Reinstall and secure the aileron cable to the upper aileron horn.
11. Adjust the aileron cable tension and secure the turnbuckle.
12. Install and secure three cable fairlead assemblies to each of the front struts.
13. Install the wing panel inspection panel under the wing panel and the upper aileron pulley cover.
14. Install the wing root panels.
15. Check for proper aileron movement. Move the control stick to the left, the left aileron should raise, and the right aileron should lower. Move the control stick to the right, the right aileron should raise, and the left aileron should lower.

***After the new aluminum struts are properly installed check for proper wing and aileron rigging as follows:***

1. Level the aircraft laterally and longitudinally. (See Figure 1, Jacking and Leveling the Aircraft). Jack the aircraft as indicated in the Figure. Attach a plumb bob to the screw on the top channel door frame directly above the rear enclosure door hinge as illustrated in the Figure 1. Adjust the plumb bob so that it clears the hinge and so that its supporting string centers over the screw head. Level the aircraft longitudinally by raising or lowering the tail until the plumb bob is laterally in line with the punch mark on the rear enclosure door hinge. Level the aircraft laterally by raising or lowering either of the jacks supporting the landing gear until the plumb bob is centered over the punch mark on the rear enclosure door hinge as shown in Figure 1. (Note: if the airframe has damage history this method may not be acceptable. Alternatively, the airframe can be leveled by using a spirt or digital level. To level longitudinally, place the level on the lower door frame and raise or lower the tail as needed to center the level. To level laterally, place the level on the front spar carry through and raise or lower the jacks under each landing gear until the level centers.)

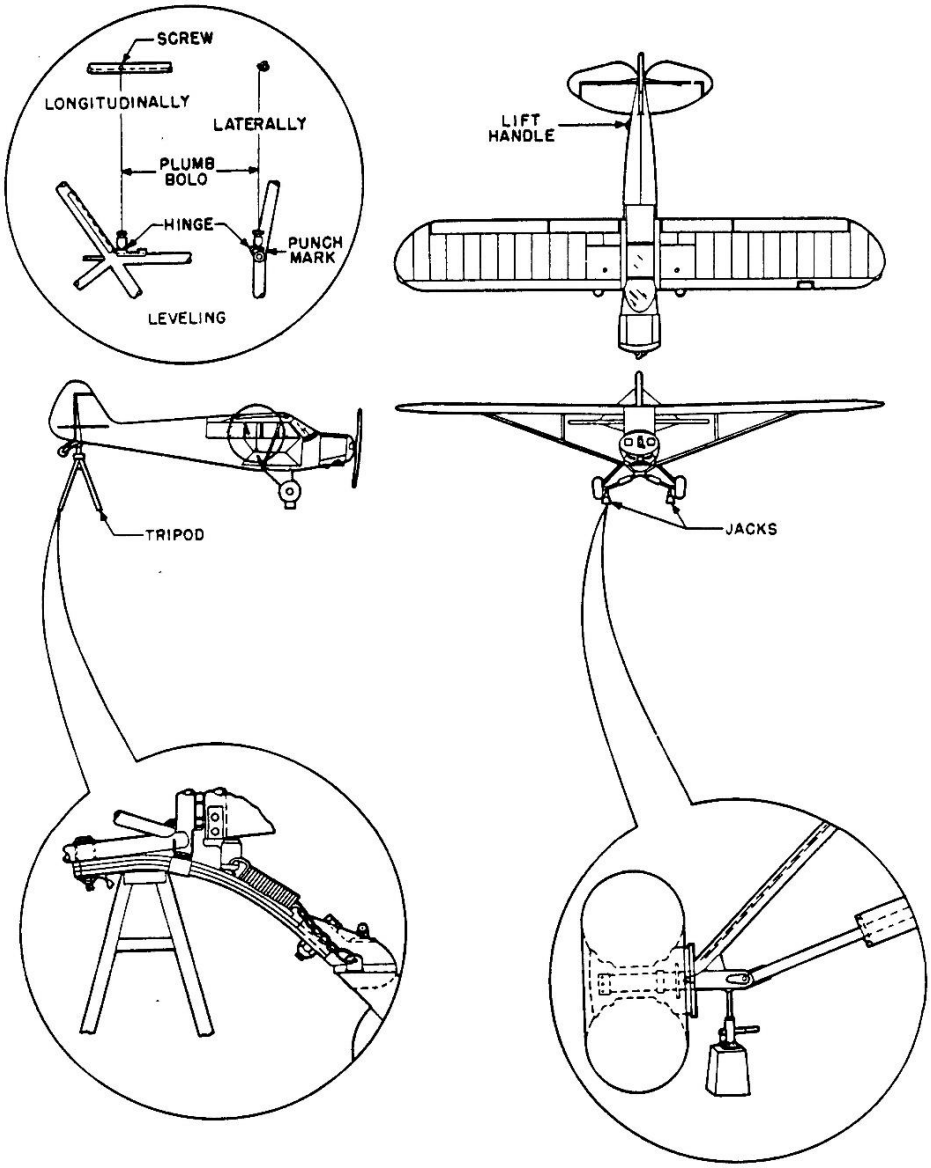



Figure 1. Jacking and Leveling the Aircraft

2. Dihedral Angle. With the wing root panels removed stretch a string from wing tip to wing tip above the front spar and measure down from the string to the top of the fuselage front spar butt hinge fitting. The measurement should be 3” +/-1/8”.

   To determine the equality of each wing panel: hold a wooden straightedge on the end of a 30” level so that one end of the straightedge protrudes 13/32” above the level (See Figure 2, Rigging Diagram). Place the combination along the front spar bottom between the lift strut and jury strut attachment fittings as illustrated in

Figure 2. The level bubble should be approximately centered. Check the opposite wing panel in the same manner.

If the dihedral angle is not equal for both wing panels, let out the threaded fork of the lower end of the strut until the dihedral angle for each panel is equalized. Be careful to let out one strut the same number of turns as the other strut is taken in. Recheck the total dihedral and readjust if necessary.

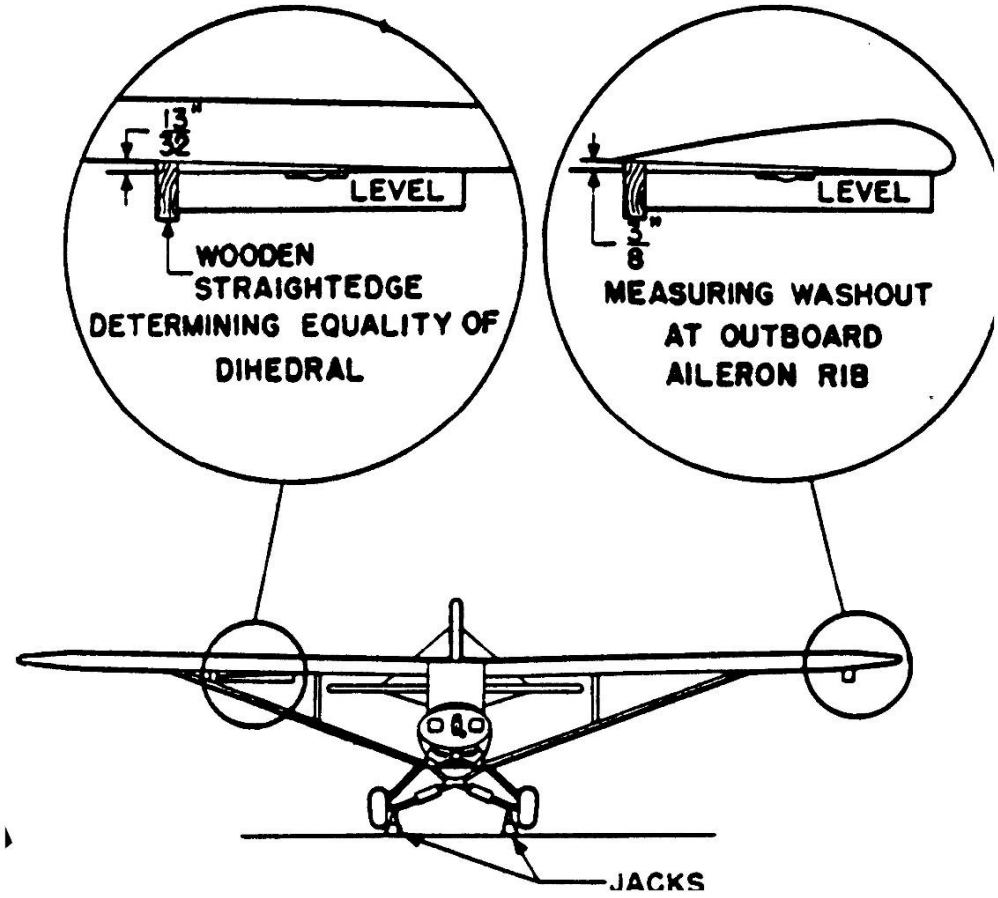



Figure 2. Rigging Diagram

3. Washout. Check the washout of each wing by holding a wooden straightedge on the end of a 30” level so that one end of the straightedge protrudes 3/8” above the level (See Figure 2, Rigging Diagram). Place the combination along the underside of the full rib next to the outer end of the aileron. The level end with straightedge spacer should be to the rear of the rib while the other end of the level should be placed under the front spar. Correct washout exists when the bubble is centered.

   To obtain the proper washout, let out the threaded fork at the lower end of the strut at the fuselage end until the bubble is centered.

4. Ailerons. The ailerons must be rigged so that their trailing edges do not extend more than 1/8” above or 3/8” below the wing trialing edge with control stick in center position. These adjustments are accomplished by taking up on the turnbuckles running to the upper aileron horns and simultaneously letting out the turnbuckles running to the lower aileron horns to raise the aileron trialing edge. The aileron trailing edge may be lowered by reversing the procedure. Adjust the aileron stops on the fuselage floor near the rear control stick until the clearance between stop bolts and torque tube aileron arm is 3/32” when ailerons reached the limits of their travel. Check that the control cables are properly adjusted. Tight cables make stick action stiff while loose cables result in stick action that is too free and uncertain. Properly adjusted cables should not slap or wobble when stick is moved back and forth in rapid succession.

# 3 Weight and Balance

The replacement PA-18 aluminum lift strut exchange weight is significant and will require changes to the aircraft Weight and Balance after installing this STC.

If replacing OEM Piper Struts, the aircraft weight is reduced by: 11.5 Lbs.

If replacing Univair sealed struts, the aircraft weight is reduced by: 12.5 Lbs.

If replacing Airframes sealed steel struts, the aircraft weight is reduced by: 16.3 Lbs.

The struts are located 22.5” aft of the wing leading edge datum

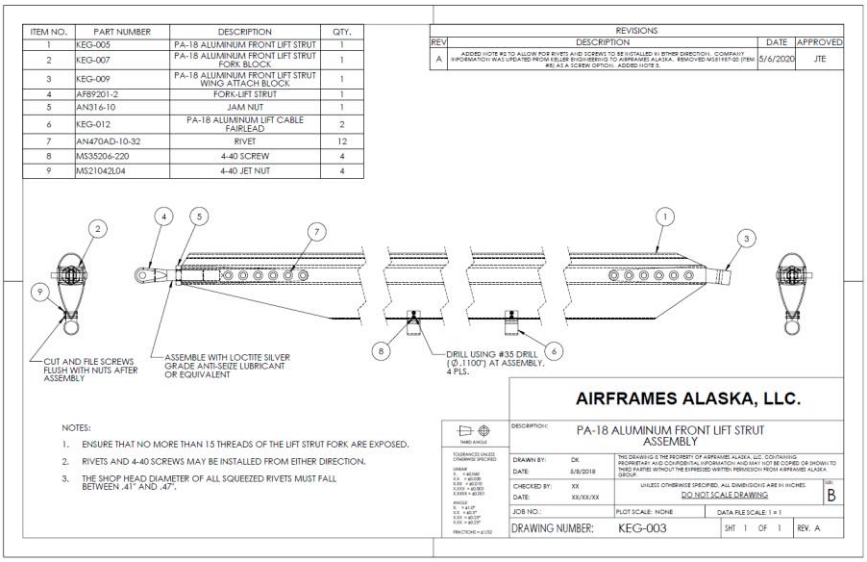
# 4 Trouble Shooting

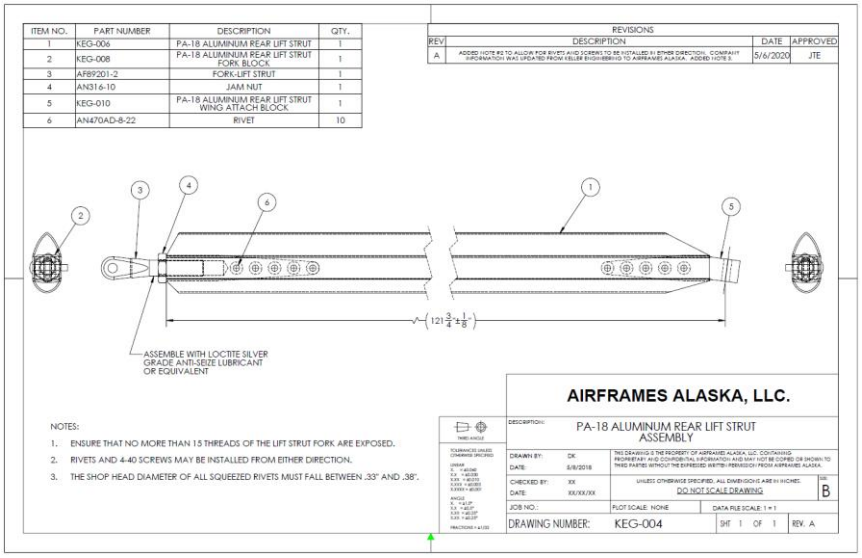
To be updated with common Problems and Corrections if necessary when and if they arise when more kits are installed in the field.

# 5 Documents and Drawings

Descriptive Data List

| Document Title | Document Number | Revision Level | Pages | Date |
|---|---|---|---|---|
| Instructions for Continued Airworthiness | Report 003 | B | | 5/18/2020 |
| PA-18 Aluminum Front Strut Assembly | Drawing KEG-003 | A | | 5/6/2020 |
| PA-18 Aluminum Rear Strut Assembly | Drawing KEG-004 | A | | 5/6/2020 |



# 6 Engineering Changes and Amendments

In the event that a change or amendment is made to the design, components, or procedures contained within this manual or STC that affect airworthiness of the installation; Airframes Alaska, LLC. will notify the recorded owners in writing of the affected element(s) and provide the necessary data for compliance.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907.331.4480 // AIRFRAMESALASKA.COM // 81 E. COMMERCIAL DRIVE, PALMER, AK, 99645