

INSTALLATION INSTRUCTIONS

Aircraft: PA-12/14 Series

ALUMINUM LIFT STRUTS

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Record of Revisions

Rev Level	Date	Page	Author	Explanation of Revisions
IR	08/24/2021	-	Jon Earl	Initial Release

Distribution of Changes

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

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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 STC is compatible with the Crosswinds STOL (SA689AL) and M R Borer Aircraft Svc (SA190AL) "1,935 Lbs., Gross Weight Increase STC".

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 all jury strut clamp fasteners and completely remove the existing door catch clamp.
2. 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.
3. 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.
4. Pull the rear strut off the fuselage and place it out of the way in a safe location. You will need to bend the jury strut clamp open to release the strut.
5. While one person is still holding the wing tip up, disconnect the front lift strut from the wing panel by removing the bolt, washer, and nut.
6. Pull the front strut off the fuselage and place it out of the way in a safe location. You will need to bend the jury strut clamp open to release the strut.
7. Remove the jury strut clamps from the jury strut tube.
8. 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 with the jury strut clamp loosely attached. 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, and washer 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. Line up the jury strut clamp so that it slides into the jury strut tube.
4. Once the new front strut is in place reinstall the same bolts, nuts, and washers removed from the steel strut. But be sure to use a new cotter pin for the fuselage attach bolt. The wing will now be stable and the person holding up the tip can release it without fear of the wing panel dropping.
5. Mount the new aluminum rear strut to the rear hole on the fuselage strut fitting with the jury strut clamp loosely attached.
6. With one person holding the wing tip trailing 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.
7. Line up the jury strut clamp so that it slides into the jury strut tube.
8. 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.
9. Reinstall all jury strut clamp bolts from the original steel strut set.
10. Install the new door catch clamp on the right front strut in a way that it mates with the door.
11. Make sure all lift strut and jury strut clamp bolts are tightened to published torque values.

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 spirit 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.)

Per FAA AC 43-16

If the original leveling marks cannot be found, the airplane can be leveled by deviating from Step 1 of Piper Aircraft Corporation Service Memo No. 8 for the PA-12 and PA-12S, or from Step 1 of Piper Aircraft Corporation Service Memo No. 9 for the PA-14, as follows: Level the airplane laterally by placing an 18 inch spirit level on top of the member that supports the front edge of the rear seat and adjusting the heights of the jacks under the main landing gear axles to bring the bubble to center. Level the airplane longitudinally by placing an 18 inch spirit level on the cabin floor between the front and rear main landing gear attachment points. Position the level outboard of the front seat(s) on one side of the cabin, so that it is facing directly fore and aft, and place a 33/64 inch block under its rear end. Raise or lower the tail to bring the bubble to center. Repeat the procedure with the level positioned outboard of the front seat(s) on the other side of the cabin. If any difference in the tail height required to bring the bubble to center exists between the two sides, adjust the tail height so as to divide the difference evenly. An 18 inch digital level may be substituted for the spirit level. If a digital level is used, level the airplane laterally by placing the level on top of the member that supports the front edge of the rear seat and adjusting the heights of the jacks under the main landing gear axles until the level reads zero. Level the airplane longitudinally by placing the level on the cabin floor between the front and rear main landing gear attachment points. Position the level outboard of the front seat(s) on one side of the cabin, so that it is facing directly fore and aft, and place it flat against the floor. Raise or lower the tail until the level reads not less than +1.6 degrees nor more than +1.7

degrees (front end of level higher than rear end). Then position the level outboard of the front seat(s) on the other side of the cabin, so that it is facing directly fore and aft, and place it flat against the floor. Observe the reading displayed by the level. If it is less than +1.6 degrees or more than +1.7 degrees, adjust the tail height until the average of the readings taken on the left and right sides of the cabin is between +1.6 degrees and +1.7 degrees (the actual value, expressed to the nearest thousandth of a degree, is +1.665 degrees, but most digital levels read to the nearest tenth of a degree).

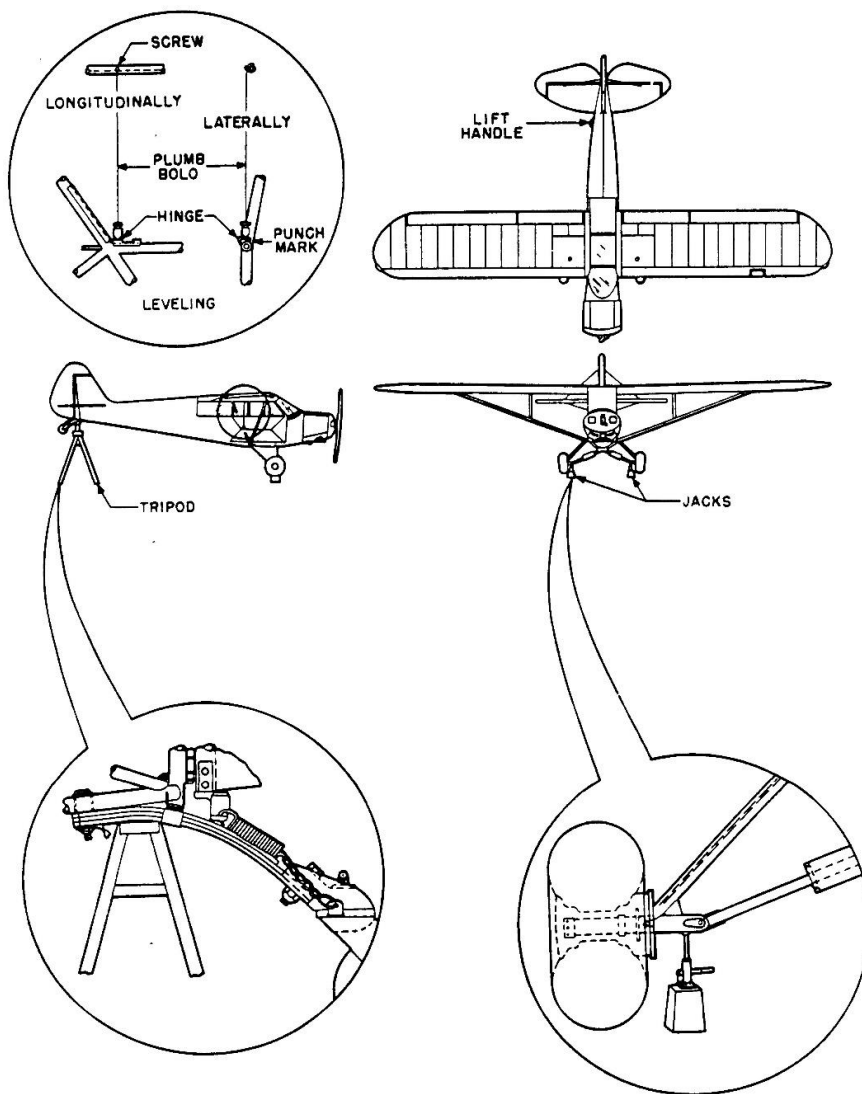


Figure 1. Jacking and Leveling the Aircraft

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.

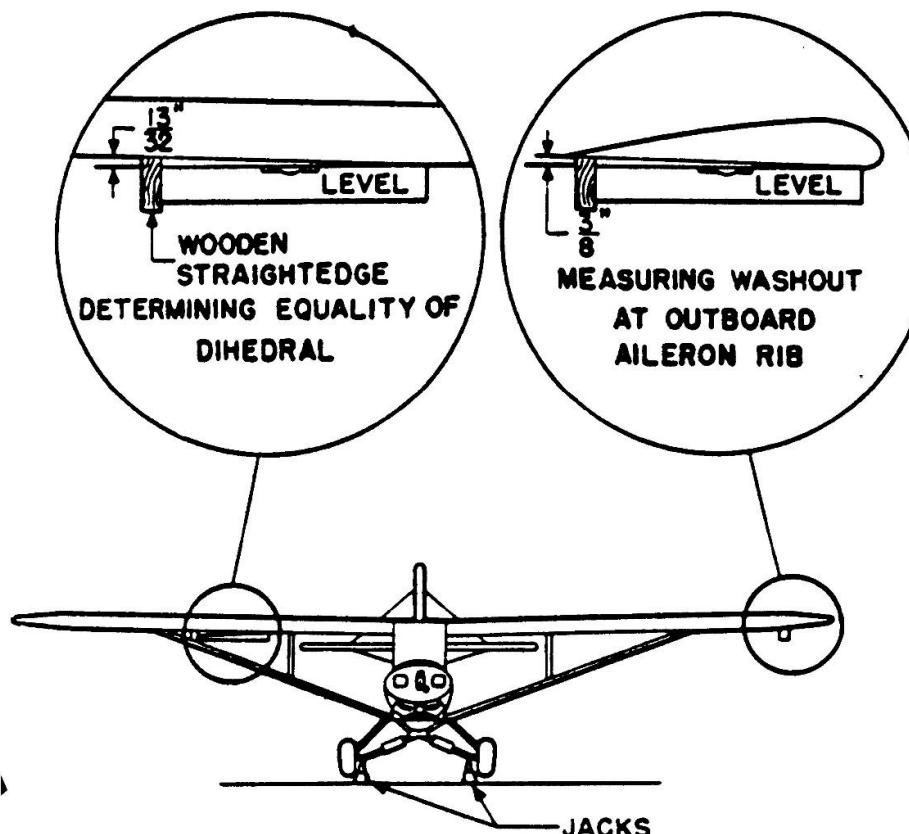


Figure 2. Rigging Diagram

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.

Per FAA AC 43-16

Step 3 of Piper Service Memo No. 8 for the PA-12 and PA-12S, and Step 3 of Piper Service Memo No. 9 for the PA-14, both instruct the rigger (or two-person rigging crew) to set the wing washout after the airplane has been leveled, as follows: Place a 1 3/8 inch block under one wing at the rear spar location at the outboard aileron rib. Place a 30 inch spirit level chordwise across this block with the front end of the level at the front spar location. Adjust the rear lift strut fork in or out to bring the bubble to center. When the bubble is centered the wing will have the proper 2 1/2 degree washout. Repeat the procedure for the other wing. The following additional information pertains to this procedure:

- a. The outboard aileron rib is the wing rib at the outboard end of the aileron bay. It is located 169 11/16 inches outboard of the butt rib.
- b. A spirit level up to 48 inches long may be substituted for the 30 inch spirit level when setting the washout using the original method described in the Service Memos. The front end of the level must be placed at the front spar location regardless of the length of the level used. Excess length will extend aft past the 1 3/8 inch block.
- c. A digital level 30 inches to 48 inches long may be substituted for the spirit level. If a digital level is used, place it chordwise under one wing at the outboard aileron rib, with the rear end of the level at the rear spar location. Excess length will extend forward past the front spar location. Adjust the rear lift strut fork in or out until the level reads -2.6 degrees FAA AC 43-16 August 1997 12 (front end of level lower than rear end). When the level reads -2.6 degrees (the actual value, expressed to the nearest thousandth of a degree, is -2.627 degrees, but most digital levels read to the nearest tenth of a degree) the wing will have the proper 2 1/2 degree washout. Repeat the procedure for the other wing.
- d. Whether the washout is set by using a spirit level according to the original method described in the Service Memos or by using a digital level, the tolerance in the angle of incidence of the outboard aileron rib is +/- 1/4 of 1 degree. This is approximately equivalent to +/- 1/8 inch in the height of the 1 3/8 inch block used with the spirit level in the original method, or to +/- 0.2 degree in the reading of the digital level.

4. Strut Alignment: Sight along the struts to see that they are not bowed. The strut eye bolt may be turned in or out of the fitting in the wing to raise or lower the center of the front lift strut. Adjustment of the jury struts, at the clamps, up or down the lift strut columns will raise or lower the rear lift strut and remove bow in or bow out.

3 Weight and Balance

The replacement PA-12 aluminum lift strut exchange weight is significant and will require changes to the aircraft Weight and Balance after installing this STC.

- Airframes Alaska Aluminum Front Strut - 8.5 lbs.
- Airframes Alaska Aluminum Rear Strut - 5.3 lbs.

If replacing OEM steel Piper Struts, the aircraft weight is reduced by 12.5 Lbs.

If replacing Univair steel sealed struts, the aircraft weight is reduced by 13.4 Lbs.

- Univair Front Steel Struts - 12.3 lbs.
- Univair Rear Steel Struts - 8.2 lbs.

If replacing Airframes heavy duty steel sealed steel struts, the aircraft weight is reduced by 16 Lbs.

- Airframes Alaska Steel Front Strut – 11.5 lbs.
- Airframes Alaska Steel Rear Strut – 10.3 lbs.

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

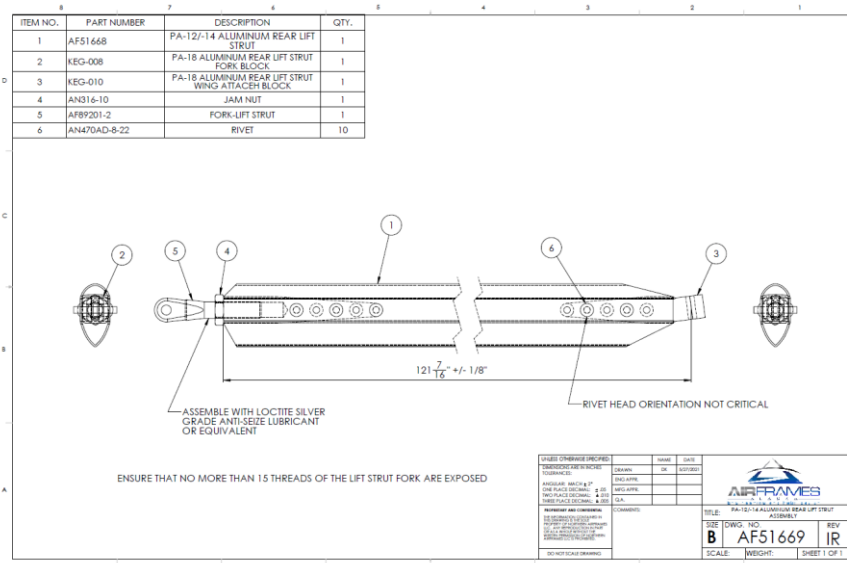
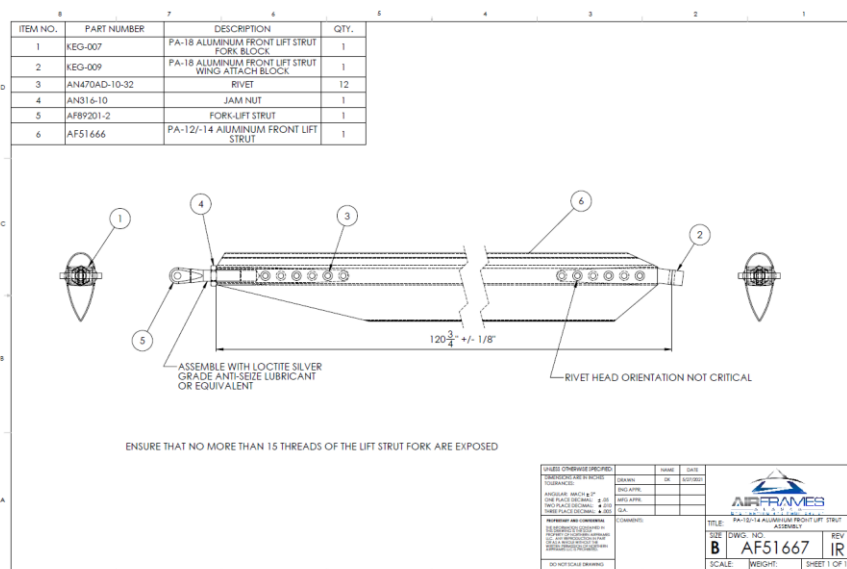
4 Trouble Shooting

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		IR		8/24/2021
PA-12 Aluminum Front Strut Assembly	Drawing AF51667	IR		5/27/2021
PA-12 Aluminum Rear Strut Assembly	Drawing AF51669	IR		5/27/2021



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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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