

Correct Procedures for Rigging a SuperCub

Per Piper Service Bulletin 910A, Service Memo No. 19, the procedure for rigging a PA-18 and PA-19 is as follows:

Rigging Procedure: Raise the forward part of the airplane so that the wheels are just clear of the ground, and support it by props under the front landing gear fittings. Raise the tail to approximate level flight position and support it there.

Leveling: Level the airplane as follows: Drop plumb bob from P. K. Screw in door frame top channel to intersect punch mark in enclosure door rear hinge.

Dihedral Angle: To check Dihedral angle at the front spar, proceed as follows: Stretch a string along the top of the wings above the front spar, from wing tip to wing tip, and draw it tight. Check the dimension vertically from the string to top of fuselage front spar wing hinge fitting. For correct dihedral this dimension should be 3 1/8 inches.

To check for equal Dihedral in each wing, proceed as follows: Using the 30 inch level (without any spacer blocks), hold it spanwise against the bottom of the wing under the front spar in the space between the jury struts and lift strut attachments. Note the position of the bubble and do the same on the other wing. Re-adjust the front struts until both wings show the same amount off level, being careful with each adjustment to set the left strut out the same number of turns as the right one is set in, and vice versa.

Wash out: To adjust the wash out in the wings (dihedral of the rear spar), proceed as follows: Set a 3/8 inch spacer block on top of the 30 inch level at one end. Working on the rib adjacent to the outer end of the aileron, hold the level fore and aft along the bottom of the rib with the spacer block at the rear and the front end of the location of the front spar. The correct wash out will exist when the bubble is centered. Adjust the rear struts in or out to obtain this condition.

Tail Assembly: With the airplane in level position, the stabilizers should be leveled at their rear spars. The hinge line should be straight from tip to tip.

Plumb the fin at the rudder hinges.

Alternate Leveling Procedure approved by FAA AC 43-16

1. If the original leveling marks cannot be found, the airplane can be leveled by deviating from the “Leveling” step of Piper Service Memo No. 19 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 top of the bottom member of the door frame on the right side of the cabin, or by placing a spirit level up to 30 inches long along the lower window frame channel on the left side of the cabin. Raise or lower the tail to bring the bubble to center.

A 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 an 18-inch digital level on top of the bottom member of the door frame on the right side of the cabin. Raise or lower the tail until the level reads zero.

2. The “Wash Out” step of Piper Service Memo 19 instructs the rigger (or two-person rigging crew) to set the wing washout after the airplane has been leveled as follows:

Place a 3/8-inch spacer block on top of one end of a 30-inch spirit level. Place the level fore and aft along the bottom of the rib adjacent to the outer end of the aileron on one wing, with the spacer block at the rear of the level and 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. The correct washout will exist when the bubble is centered. Repeat the procedure for the other wing.

The following additional information pertains to this procedure:

- a. The rib adjacent to the outer end of the aileron is also called the outboard aileron rib or the wing rib at the outboard end of the aileron bay. It is located $166 \frac{3}{4}$ 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 Memo. 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 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 fore and aft along the bottom of the rib adjacent to the outer end of the aileron on one wing, with the rear end of the level at the rear spar location. Adjust the rear lift strut fork in or out until the level reads -0.7 degree (front end of level lower than rear end). When the level reads -0.7 degree (the actual value, expressed to the nearest thousandth of a degree, is -0.717 degree, but most digital levels read to the nearest tenth of a degree) the wing will have the correct 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 Memo, or by using a digital level, the tolerance in the angle of incidence of the outboard aileron rib is $\pm \frac{1}{4}$ of 1 degree. This is approximately equivalent to $\pm \frac{1}{8}$ -inch in the height of the $\frac{3}{8}$ -inch block used with the spirit level in the original method, or to ± 0.2 degree in the reading of the digital level.
- e. The correct wing washout of the Piper PA-18 model series and PA-19 airplanes is $2 \frac{1}{2}$ degrees, the same as that of the Piper PA-12, PA-12S and PA-14 airplanes. The PA-18 model series and PA-19 airplanes, however, have a wing angle of incidence of +1.843 degrees at the wing root (inboard end; i.e., the centerlines of the wing butt hinge bolts), while the PA-12, PA-12S, and PA-14 airplanes have a wing root angle of incidence of -0.060 degree. The negative angle of incidence at which the outboard aileron ribs of PA-18 model series and PA-19 airplanes must be set in order to produce $2 \frac{1}{2}$ degrees of washout is therefore much smaller than the negative angle of incidence at which the outboard aileron ribs of PA-12, PA-12S, and PA-14 airplanes must be set in order to produce that same $2 \frac{1}{2}$ degrees of washout. The wing span of PA-12, PA-12S, and PA-14 airplanes is also 3 inches greater than that of PA-18 model series and PA-19 airplanes. These differences in aircraft configuration account for the differences between the instructions for setting the wing washout of PA-18 model series and PA-19 airplanes at $2 \frac{1}{2}$ degrees and the instructions for setting the wing washout of PA-12, PA-12S, and PA-14 airplanes at $2 \frac{1}{2}$ degrees.