

Rigging the Europa Aircraft Ailerons

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This procedure was developed to shorten a very frustrating and lengthy trial and error process encountered by many builders. I have developed this procedure at Custom Flight Creations as a result of 5 years of rigging 12 different Europas, all built by amateurs. We have indicated below where our procedures do vary slightly from the manual.

To rig the ailerons on the XS/Classic or Motor Glider please note the following:
Start with the wings de rigged.

1. To initially set up the aileron for rigging install the aileron without its chord wise rod attached.
2. Bolt the hinges on to the wing securely with at least two of the fasteners on the inner hinge and one each on the outer.
3. Move the aileron up and down to ensure you have slightly in excess of maximum throw and that the upper wing skin clears the aileron by about 3/32 inch for filler and paint.
4. Clearance the weight boxes, counter weights and wing as required for proper movement and fit. You will find it is necessary to cut down the weights to get the weight arm to allow the aileron to give full trailing edge down. Remember to allow for paint and filler, plus a 1/16 inch so as to prevent the weights from slapping the boxes.
5. Remove the ailerons and install the chord wise pushrods.
6. Install the pushrod to allow the aileron to achieve the full trailing edge up limit minus one degree measured across the hinge with an adjustable protractor. Do not bother using a digital level as the throw is determined from measuring the angle at the lower surface, adjacent to the hinge. You are measuring the hinge deflection.
7. The reason for the minus one degree is experience, there is a bit of slop in the vertical measurement of the quick disconnects and the stick cannot meet the actual up limit due to the pilot's knees. A perfectly built aircraft can achieve the limit, but it is rare.
8. Adjust the opposite wing in the same manner.
9. Also note that the right up stop limit for the right wing sets the desired down limit of the left wing. So setting the down limit is only an exercise during fitting the wings and checking the aileron throw. It should be fine if the up limit is fine.
10. Next, clamp the aileron in the level position. Adjust the inner push rod (running span wise) as appropriate to set the quick disconnect bell crank at the root rib precisely 90 degrees to the line running from main wing pin inner and outer bushings.
11. Next adjust the fuselage quick disconnect to as close to vertical as possible.

12. Rig the wings. A small amount of play between the two quick disconnect (QD) bell cranks at the root is desired as opposed to a firm fit which means that the mounting bolts through the bell cranks are being bent at their base. Normally the ailerons will have about 1/8 of play. This is noted by the aileron being moved up and down by hand 1/8 of an inch and the QDs will tap lightly together with the wing QD moving and the stick held firmly so the inboard QD does not move. A phenolic spacer of 1/32 inch should be added to just take up the play at the level position. We use modeling clay as the device to determine the spacer size needed. Rig the plane, slightly move the aileron a few degrees. Then de-rig the wings and measure the thickness of the clay remaining. If the clay is too sticky, lightly oil the opposite bell crank to prevent it from sticking. Clean off the clay and insert a spacer.

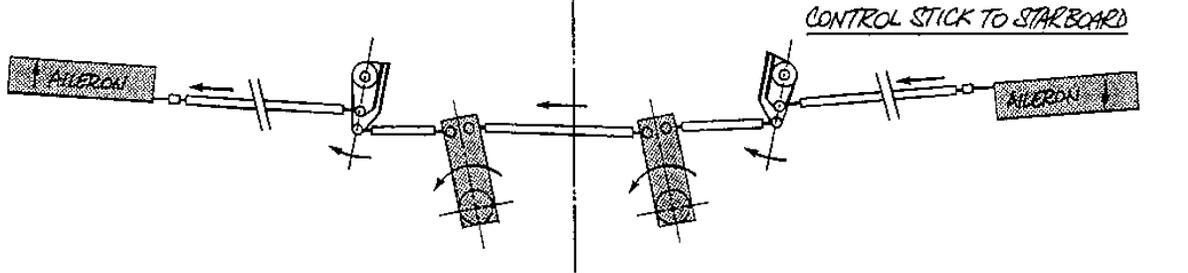
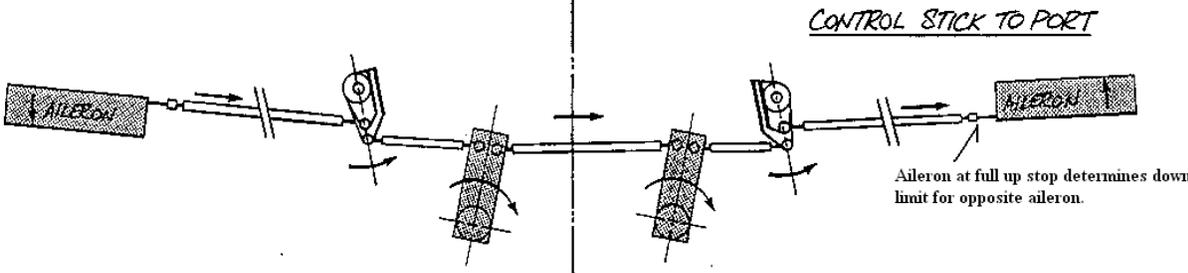
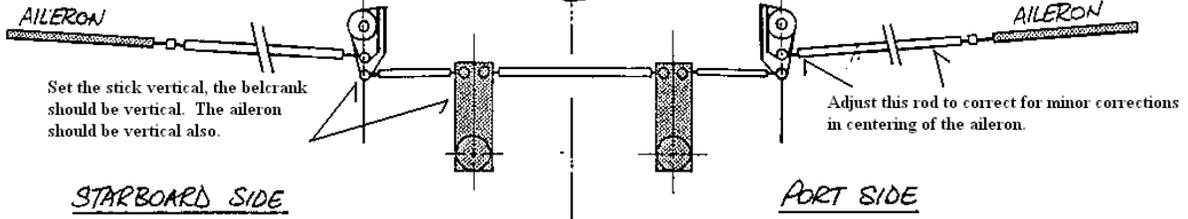
13. In a perfect world your ailerons will now be rigged with the stick perfectly vertical. But unlikely.

Look at the drawings below and the comments for a quick review of how the controls work in a perfect world. Note that the stick centered position shows the bell crank QDs vertical and the aileron centered. This presumes you set the up aileron stop already on the wing.

NOTE: VIEW AFT ON AIRCRAFT

AIRCRAFT

CONTROL STICK NEUTRAL



Common problems:

1. Ailerons when rigged are both up from desired level position. **Note that I disagree with chapter 27 page 22 Aileron set up procedure.**

De-rig and adjust the root wing QDs to move the aileron down the amount it was up (or down). Not the outer chord wise pushrod as the book says, as this will change your aileron limits. Normally the aileron is only about ¼ inch or less high due to the QD not being truly vertical. There is a given of a 50/50 chance you will turn the MW4 on the wing QD the wrong way, so be patient. Pushing the rod the direction it needs to move to correct the aileron and then moving the MW4 to move the QD back to near vertical is the best way to start. Begin by noting the number of turns required to move the aileron the amount off of level. Note it and proceed to adjust one wing. If you feel lucky, do the other to match, but anticipate you will adjust one wing at a time. Never change the outer chord wise pushrod as that determines the limit stop. That will be checked later.

2. Right aileron up and left down. This can be corrected by lengthening one lateral push rod at the root and shortening the other.

3. Ailerons are springy and when the stick is released they snap one direction or the other. There are two things at play here. One is that the QDs are both too tight at the top or bottom and only off a bit. Simply put a thin clay film on the QDs and look for where it is rubbing hard and correct the inboard QD and or outboard QD to adjust them so when the stick is vertical, the aileron is horizontal and there is a bit of play. The other is that one or both QDs are hard against one another. You will need to correct that error. Hopefully you just have to sand or remove a phenolic spacer.

4. Move the stick right (or left) and the up aileron is at the limit but the down aileron counter weight is hitting or the aileron is too far down. Typically you have initially set the up aileron stop too high or failed to clearance the counter weight enough. Remember the comment above to set the up limit one degree less than full TE up, that is usually the problem. This is very rare if the limits are set initially correct and the QDs are vertical. Unfortunately you will have to de-rig, and adjust the up limit stop of both ailerons and start all over again.

5. You have built in a twist to the wing when you put the skins on. Now it gets tricky. If you do not have aileron trim tabs of 10 inches and electrically controlled from the cockpit, then you must build a wedge out of wood or go to a model airplane shop and buy trailing edge stock and tack it to the aileron which is need of flying up. Tack a 12 inch by 1.25 by ¼ stock to the bottom of the aileron which needs to go up. Go fly, come back and adjust. Many builder assistance shops add small trim tabs that must be moved many degrees to get any effect. That is just more drag than is necessary. To trim an aileron in this way, I add a wedge shaped filler of only 1/16 inch thick at the trailing edge and only 1 inch onto the lower surface to make a long small wedge that is invisible when painted and moves the aileron a minute amount creating much less drag.