

15 - PREPARATION FOR FLIGHT

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PREPARATION FOR FLIGHT

INTRODUCTION

OK, you've built an airplane. It's sitting on the hanger floor before you in all of its majestic glory. What next? At this point you need to ignore your enthusiasm and slow down. If you set yourself a date for the first flight, forget about it. This is the most critical part of your project. Mistakes and skipped steps here can be both costly and fatal.

CONTROL SURFACE RIGGING

The rudder is fairly self explanatory. Center the pedals, center the rudder, done. The ailerons are not as easy, but not too bad either. Don't rush this step and make sure you Loctite all your jam nuts as you go.

1. **RUDDER:**
The rudder adjustment is built into the cables. One end has three holes in a straight line. These are for rough adjustment and are located at the forward end of the cables. The fine adjustment is at the rear of the cable. Here you will find 4 staggered holes. Adjust the forward end first, and make your fine adjustments last. See **FIGURE 15-01**. No stops need to be set; they are built into the control horns.
2. **STABILATOR:**
Refer to **FIGURE 15-02**. Push-pull tubes were set to length during Fuselage assembly. Refer back to Fuselage Figure Drawing Manual if needed to verify. Pin the Bell Crank Assembly, behind the baggage area, in position. Fine adjust the Forward Push-Pull Tube until the Control Sticks are perpendicular (90 deg) to the Forward Longeron. Fine adjust the Aft Push-Pull Tube until the Stabilator is level (0 deg) to the Forward Longeron. Leveling the Stabilator may be aided by fabricating a Stabilator Leveling Jig. Refer to **FIGURES 15-02A** thru **15-02F** for details. Remove the pin. Adjust and lock the Stop Bolts on the Control Stick Torque Tube to obtain the travel shown. See **FIGURE 15-02**.
3. **ANTI-SERVO / TRIM TAB:**
With Stabilator adjusted and locked as in preceding step. Verify Trim Servo to be in the center of its travel. Check that the orientation of the horn, which attaches to the Servo, of the Trim Torque Tube is forward and 90-degrees to Bulkhead #5. Adjust Trim Tab Push Pull Tube to align Anti-Servo / Trim Tab with trailing edge of Stabilator. Verify that Trim Indicator is within "Take-off" position. Remove locking pin.
4. **FLAPS:**
Set Flap Handle to lowest position. Adjust each Flap Push Rod until the bottom of each flap is level with the bottom of the wing. See **FIGURE 15-04**.

5. AILERONS:

Refer to **FIGURE 15-05**. Push-pull tubes were set to length during Wing assembly. Refer back to Wing Figure Drawing Manual if needed to verify. Pin the Outer Aileron Bell Cranks. Fine adjust the Push-pull tubes until Control Sticks are perpendicular (90 deg) to the Spar Carry-thru. Adjust bottoms of the ailerons level with the bottoms of the wings. Remove the pins. Adjust and lock the Stop Bolts to obtain the travel shown on **FIGURE 15-05**.

FLUIDS**OIL:**

Fill the bottle and cooler and prime the engine by spinning the engine over with the starter until oil pressure is present. **NOTE:** *Do this with the lower spark plugs removed.*

COOLANT:

Fill the cooling system at the expansion bottle on the top of the engine. Burp the system by squeezing the hoses. Most of the air should be purged to the expansion bottle this way. Refill the bottle and replace the cap. Fill the coolant reservoir half way. **NOTE:** *Squeeze a hose to apply some pressure to the system and check for leaks.*

BRAKE:

This is the part of final assembly that causes the most stress. This is due mainly to brake fluid's ability to hold microscopic bubbles in suspension. This usually causes the procedure to be repeated more than once. You do have an advantage; you have clear brake lines and can see the bubbles. In our experience, we have found that it is easier to push the bubbles up-hill to the reservoir than to try to pump them down-hill using the cylinders. To accomplish this we use a clean pump type oil can. (The kind that has an internal piston pump that is driven by a lever over the handle) We fasten a 1/8" tube to the end of the spout and slide the other end over the brake bleed valve on the caliper. Open the valve, remove the reservoir cap, and pump the fluid into the system. Stop when you have fluid just past the cylinders and approaching the reservoir. Wait a few hours for the bubbles to settle out and push some more fluid up to the reservoir. If you get lucky you won't have to remove any fluid from the reservoir. **IMPORTANT:** *Be sure you have used the correct type of brake fluid.*

FUEL:

Fill a gallon a side and check for leaks. Repeat until full. Check with your fuel gauge manufacturer as this may be a good time to calibrate the sender.

INSPECTION

Follow the checklist in the appendices and verify every nut, bolt, washer, cotter pin, etc. In fact, double and triple check just to be sure.

RUNUP

Look again at your fluid levels, verify that your Ignition Switches are grounded, and have continuity to the leads on the engine.

Check the throttle arrangement; verify that it is in the “**IDLE**” position.

Turn the prop over by hand a few times to verify that there is no fluid in the cylinders and to prevent hydro lock.

Get out your ROTAX owners manual and verify that you have complied with everything.

Tie the airplane down in a clear area, lock open the canopy, remove the cowlings, and chock the wheels. Plan a route in case it pulls loose from the tie downs.

Get a friend to observe the run-up and man a fire extinguisher.

Buckle yourself in.

Verify the locations of critical valves and switches. (Starter, Main fuel valve, Fuel pump, Master, Mags)

Clear the area. Start and run in accordance with the instructions in the ROTAX owner's manual. (**Check oil pressure immediately on start up**) If there is no immediate oil pressure, turn the engine off.

Bring the engine up to operating temperatures. You may not be able to accomplish this at idle.

Turn off the engine and allow to cool. Check for leaks and repair if needed. Check all fluid levels and top-off as needed.

Repeat run-up and repair until satisfactory results are obtained.

DESIGNATED AIRWORTHINESS REPRESENTATIVE

Present the airplane to the Designated Airworthiness Representative (DAR) in ready to fly condition. Be sure your weight and balance documentation is complete and ready to present to the DAR. Be ready to answer any questions about the building of the airplane. If you have documentation of building your airplane, present this to the DAR. It may prevent a game of 20 questions. A list of DAR's by region is available on the FAA website.

FIRST FLIGHT

Now is the time to search your soul and decide if being a test pilot is right for you. Are your skills sharp enough to save you from unexpected flight issues? Have you studied and familiarized yourself with the Operations Manual for the S-19 VENTERRA?

There are pilots that specialize in first flights and flight testing, and can be hired to do this for you. Some also give instruction in your airplane after the testing is complete.