

Ultra-Prop Pitch Optimization

Ultra-Prop I

If the original Ultra-Prop I, as pitched, does not reach the desired RPM, the pitch (pitch blocks) should be changed. Increasing the pitch will lower the RPM and decreasing the pitch will increase the RPM. A “rule of thumb” for the U/P I is that a one degree pitch change will change the engine RPM by 200-300 RPM.

If lowering the pitch is not feasible, because you are already at 8 degrees on an airboat or 10 degrees on a higher speed flying machine, cutting a half-inch off each blade (one-inch prop diameter change) will have the same effect as a one degree pitch change. That is, reducing the diameter will increase the engine/prop RPM by 200-300 RPM and one degree is equivalent to one inch diameter. We have pitch blocks from 8 to 18 degrees in one-degree increments. For the U/P I, generally 10 degrees is the lowest recommend pitch for flying vehicles as the 8 and 9 degree blocks may limit the forward speed. On airboat type applications, the 8 and 9 degree pitch may be appropriate. You may cut off less than a half inch on the blades to effect a smaller RPM increase. Remember, you can't add diameter if you screw up!

Ultra-Prop II

The U/P II pitch block settings are not limited to 8 degrees at the lower end and a precise change in RPM with diameter is not yet established. The trends shown for the U/P I are not as linear on the U/P II.

When using the Ultra-Props on a governed engine, the optimum engine RPM for best thrust and best forward speed is to pitch the prop to get as close to the governed speed (usually 3600 RPM) as possible, without wanting to go over that RPM if it could. A governor will limit the RPM even though you open the throttle wide open. So, if you are opening the throttle and the engine reaches maximum governed RPM before wide open throttle (WOT) you need to increase the propeller pitch to load the engine more. Conversely, if you go to WOT and the RPM is lower than the governed speed, you need to lower the pitch to decrease the load on the engine and bring the RPM up and closer to the governed RPM.

As a fixed pitch propeller powered vehicle increases forward speed, with the throttle at a fixed position, the engine/propeller will increase in RPM. For higher cruise speed vehicles, this fact may necessitate an increase in desired blade pitch over the lower pitch used on slower vehicles. This pitch setting increase will usually decrease the available static thrust. We call this prop pitch setting a “cruise propeller” as opposed to a lower pitched “climb prop” setting that would give higher static and climb thrust.