Propeller mass moment of inertia

1) General

To facilitate determination of the actual mass moment of inertia of a given propeller, the following diagram has been established covering typical propellers commonly used for ultralight aircraft (assuming they are applied according to their instructions of use).

2) Procedure

2.1) Propeller suspension

Fit a suitable symmetrical suspension fixture to the propeller hub (see illustration on page 2). It should be resistant but as light as possible in order not to falsify the value determined.

Suspend the propeller on 2 thin wires of 1830 mm (72 in.) length, in a symmetrical distance of 152,5 mm (6 in.) from the propeller hub center, as per illustration overleaf.

Measure the wire length of 1830 mm (72 in.) between the connection points. Take care the wires hang down parallelly. Chose a wire diameter as small as practicable to keep the torsional and bending resistance as low as possible. Respect the indicated wire length and distance with maximum accuracy.

2.2) Determination of time factor

Turn the suspended propeller in its horizontal axis by 5 - 10° and determine with a stop watch the time for 30 horizontal oscillation cycles.

ATTENTION: One cycle means a complete oscillation, forth and back, starting to count at "zero".

Clock the time for 30 oscillations exactly in seconds - this is an essential factor for determination of mass moment of inertia.

2.3) Determination of propeller weight:

Determine the total weight of propeller (as measured) in kg (lb.).

2.4) Determination of mass moment of inertia:

Mark the propeller weight on the diagram, connect it with the respective *"time line"* and read the mass moment of inertia (in kgcm² / lb.in.²) vertically below the crossing point.

2.5) Example:

Propeller total weight: .....4,2 kg (9,3 lb.)
time for 30 oscillating cycles: .....175 sec.
resulting in mass moment of inertia: .....4500 kgcm² (1538 lb.in.²)

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