

**ULM EUROSTAR 83 AKL N° 20103804
EXPERIMENTAL TESTS RESULTS
OF THE DURANDAL-3 V12 E-PROP PROPELLER
WITH AN 100 HP ROTAX 912 S ENGINE**

The ground and flight tests have been conducted from April 11th to April 18th on LFDU airfield, elevation 104 feet, grass runway 07/25, according to the following schedule.

These tests have been conducted by a team of experts to fly the aircraft, to take videos, register noise level results, follow the flight on the radio frequency and take notes of the comments and data transmitted by the pilot.

Ground team :

Karl and Nathalie Bahr, co-owners of the aircraft, for the preparation of the aircraft and ground tests.

Isabelle Bernardini for video and pictures reporting, redaction of the present report.

Flight tests : Roger Ricard, former production test pilot all types of aircraft from light to four engines aircraft.

Ground tests report :

1. Addition of an analogic altimeter
2. Weighting of the aircraft with precision Computer Scales for an Empty weight of 294,6 Kg
3. Three blades propeller measurements of :
 - a. ground clearance 27 cm
 - b. pitch set to 26 degrees for cruise performance.
4. Engine ground run up for identification of RPM and absence of vibrations with satisfactory results.

Flight tests reports :

Three flights have been conducted to evaluate the safety of the new propeller, take off and landing performance, stall speeds, noise level, cruise speed, IAS and corresponding TAS.

- 1. The first flight for handling familiarisation, stalls, take off and landing performance, noise level, as follows :**
 - a. QNH 1021. Wind 075 3 Kts. Tre 16°C. runway 07 in use Aircraft weight 439 Kg Cg 20,1 %. turbulence at the working altitudes**
 - b. Start up, taxi at 2000-2200 Rpm, pre take-off tests.**
 - c. Brakes released power up to 5350 Rpm**
 - d. End of ground roll at 70 Km/h in 6 seconds.**
 - e. Noise level recorded at 62 db with Voltcraft noise level meter and decibel application on Iphone.**
 - f. Climb to 2000 Feet at around 1300 feet/mn IAS 120 km/h**
 - g. Identification of stall speeds power at 2000 Rpm level :**
 - i. Clean 75 Km/h**
 - ii. 1 notch of flaps (Take-Off position) 67 Km/h**
 - iii. 2 notches of flaps (landing position) 67 Km/h**
 - iv. 3 notches of flaps (landing position) 62 Km/h**
 - h. Descent to the circuit 110 Km/h**
 - i. Normal circuit with intentional balk landing**
 - j. Normal circuit with touch down 2 notches of flaps**
 - k. Normal circuit with a PTU simulated engine failure full flaps landing and full stop.**
 - l. Back to Dragons Hangar 5. Duration of the flight 44 Minutes**

- 2. The Second flight for take off, climb, stalls, cruise, landing :**
- a. QNH 1025. Wind 075 10 Kts. Tre 17°C. runway 07 in use.**



- b. Fair turbulence at the working altitudes.**
- c. Aircraft empty weight 294,6 Kg plus full fuel 56 kg. Use of bags for luggage (15 kg) pilot 72 Kg, and right seat bag weight of 35,4 Kg up to TOW of 473 Kg**
- d. Start, Taxi and pre-take-off tests**
- e. Brakes released with power up to 5350 Rpm**
- f. End of ground roll at 60 Km/h with ground effect within 5 seconds. Ground roll for 85 meters (100 meters with head wind correction)**
- g. Take Off 15 meters within 200 Meters (240 meters with head wind correction), 9 seconds at 120 Km/h**
- h. Spiral climbing to 2000 feet, 120 Km/h, 1300 feet/mn**
- i. Identification of stall speeds at 2000 Rpm level :**
- i. Clean 76 Km/h**
 - ii. 1 notch of flaps (Take-Off position) 72 Km/h**
 - iii. 2 notches of flaps (landing position) 70 Km/h**
 - iv. 3 notches of flaps (landing position) 63 Km/h**
- j. Identification of IAS cruise speeds**
- i. 5000 Rpm 210 Km/h**
 - ii. 4800 Rpm 180 Km/h**
 - iii. 4500 Rpm 160 Km/h**
 - iv. 4000 Rpm 150 Km/h**
 - v. 3000 Rpm 110 Km/h**
- k. Simulated engine failure with PTS procedure and touch down**
- l. Circuit with a precautionary full stop landing, full flaps**
- i. 15 Meters not identified from the video**
 - ii. Ground roll 60 meters with normal sustained braking**
- m. Back to Dragons H5 Hangar. Duration of the flight 31 Mn**

- 3. The third flight covered the following :**
- a. QNH 1013 Hp, wind calm, temperature 15°C.**
 - b. Weight 417 Kg**
 - c. Take off from Full power and breakes released for a ground roll of 55 meters reaching 70 km/h**
 - d. Runs along runway 07 and 25 alternatively for a mean measurement of the TAS at heights between 300 and 500 feet. TAS red on the aircraft GPS and Ipad.**
 - e. The results were :**
 - i. IAS 210 Km/h TAS 204 Km/h**
 - ii. IAS 190 Km/h TAS 182 Km/h**
 - iii. IAS 170 Km/h TAS 163 Km/h**
 - iv. IAS 150 Km/h TAS 142 Km/h**
 - v. IAS 130 Km/h TAS 125 Km/h**
 - vi. IAS 110 Km.h TAS 108 Km/h**
 - vii. IAS 90 Km/h TAS 88 Km/h**
 - viii. IAS 70 Km/h TAS 69 Km/h**
 - f. Simulated PTU runway 07**
 - g. Back to Dragons H5 Hangar. Duration of the flight 45 mn**

4. CONCLUSIONS COMPARED TO THE PILOT OPERATING HANDBOOK

- a. Take Off performance appears better than the figures indicated in the Operating handbook**
- b. As well for the landing performance which should be independant of the propeller change.**
- c. Climb performance is sligtly higher**
- d. Stall speeds power reduced are close to the Operating handbook, with fair turbulence to be considered.**
- e. Cruise performance are about 15 % higher than in the Operating handbook. Slightly increasing with Rpm increase. This may be the result of an optimised propeller pitch setting for cruise.**
- f. The results are sufficient to confirm that the DURANDAL-3 V12 E-PROP DOES NOT decrease the flight performance of the Eurostar as they are presented in the manufacturer operating handbook, but provides better performance in the Take-Off and cruise phases. It is understood that the speeds are IAS, and that the corresponding TAS will be later on evaluated specifically for cruise performance, expecting an increase of the range with lower fuel consumption per kilometer.**

**ATTACHMENT 1 TAKE OFF AND LANDING PICTURES FROM VIDEO second flight
Take Off, Brakes released and full power**



Take Off lift Off



Take Off 15 Meters



Landing Touch Down



Landing Stop with slight turn to check runway cone position

