Flight Test Report - Groppo Trail, G-RPPO

Description

The Groppo Trail is a high wing monoplane with a tail wheel undercarriage and steerable tail wheel. The two seats are in tandem. Main wheel toe brakes were fitted in the front cockpit only. The Trail was powered by a Rotax 912 ULS piston engine of 100 hp driving a fixed pitch Woodcomp SR305 propeller of 730 mm diameter.
The Trail's wings fold to reduce hangar and storage space requirements. The wings can be folded without draining fuel from the wing tanks. The machine could be modified to tow light gliders. G-RPPO had been imported from Italy as a kit and built in the UK by the agent, Sprite Aviation.

Purpose of the Tests

The flight tests of the Trail were required by the Light Aircraft Association to support the approval of a permit to fly for the type. .

Aircraft Loading

The maximum AUW of the Trail was 520 kg. .However, the flight tests were flown with a maximum take- off weight of 500 kg because the results were awaited of a stress test submitted by the kit manufacturer to the LAA for approval. The CG limits of the Trail were 240 mm to 426 mm AOD. However, the practicable limits of loading were 271 mm to 392 mm AOD and the tests were flown as close to these limits as practicable – these were: Forward 273.5 mm and Aft 365.2 mm. It was understood that the more rearward aft limit (426 mm AOD) was to allow the fitting of a ballistic parachute. Loading calculations for the forward and aft CGs used for the tests are attached.

Conditions for Tests

The tests were flown from Bicester grass airfield on 27, 29 and 30 September 2011 in ideal weather conditions for test flying. Flight time totalled 4 hr 06 min.

Tests Made

The tests were based on the the CS-VLA Flight Test Schedule dated 15 April 1992 issued by the LAA. A completed Flight Test Schedule is attached. …….

Results of Tests

Longitudinal Stability. Static longitudinal stability was comfortably positive at aft CG in the configurations specified in CS – VLA 181. At forward CG, as expected, it was more noticeably positive

Lateral and Directional Stability. Directional stability was positive at aft CG at all test points and met CS – VLA 177. Lateral stability was generally positive at all test points, no doubt at least partially due to dihedral effect. Together lateral and directional stability were well-balanced and enabled accurate handling in roll and yaw to be achieved in all the configurations, and throughout the flight envelope. Precise side slipping was easily flown in either direction.

Speed Stability. Speed stability was very good. Consequently, at both aft and forward CG, accurate approach speeds could be flown with the aircraft in trim with flaps up or down.

Stall Characteristics

An approaching wings level stall was indicated by slight buffet 2-3 KIAS above the stall which could be felt through the stick and airframe. With flaps up and idle power the stick was on the rear stop before the stall occurred and the warning could only just be felt. Subsequent behaviour was a descent at 40 KIAS during which the wings could be held level without difficulty. With flaps down at any setting and idle power, the stick was near the rear stop when the stall occurred. In all cases, at the point of stall, the aircraft remained under control in yaw and roll, with only a slight tendency for either wing to drop. At any point the nose could be pitched forward and recovery was immediate with a height loss of less than 100 ft. These benign features were clearly of considerable safety benefit. With 75% power, the only significant difference was with flaps down at all stages when a slow wing drop to the right occurred. There was little or no tendency to yaw as the wing slowly dropped. Toa large extent these features also characterised stalls in turning flight.

Wings Level Stalls

The following speeds in knots were recorded using the mechanical ASI readings. The MGL Avionics EFIS airspeed readings were some 2 – 3 KIAS lower than the mechanical ASI.

Aft CG

Level flight stalls were made with a take- off weight of 500 kg and the CG at 370 mm AOD. This was the rearmost CG practicable with the weight limit of 500 kg. KIAS. Observations were:

Power	Flaps	Warning	Stall	Behaviour
Idle .	Up	44	-	Stick on rear stop. Descent at 40
Idle	Stage 1	42	40	Nose drop only
Idle	Stage 2	41	39	Nose drop only
Idle	Full	40	38	Nose drop only
75% (4300 rpm)	Up	37	33	Slow right wing drop
75% (4300 rpm)	Stage 1	32	30	Slow right wing drop
75% (4300 rpm)	Stage 2	30	28	Slow right wing drop
75% (4300 rpm)	Full .	28	26	Slow right wing drop

Forward CG

Stalls at forward CG were made with one pilot seat and the rear seat empty. The AUW at take off was 425 kg. The CG was 270 mm AOD; the farthest forward practicable. Observations were:

Idle	Up.	43.	-	Stick on rear stop. Descent at 42
Idle	Stage 1	41	39	Nose drop only
Idle	Stage 2	39	37	Nose drop only

Idle	Full	39	35	Nose drop only
75% (4300 rpm)	Up.	32	30	Nose drop only
75% (4300 rpm)	Stage 1	27	25	Right wing drop 5 deg
75% (4300 rpm)	Stage 2	25	21	Right wing drop 10 deg
75% (4300 rpm)	Full	24	20	Right wing drop 10 deg

Stalls in Turning and Accelerated Flight

The following speeds in knots were recorded using the mechanical ASI readings. The MGL Avionics EFIS airspeed readings were some 2-3 knots lower than the mechanical ASI. There were no significant differences between the speeds and aircraft behaviour in turning and accelerated flight stalls. Tests were flown at 75% (4300 rpm) and aft CG.

Flaps Up

	Left Turn	Right Turn	Behaviour
Warning/Stall	42/38	42/39	Slowly rolled out of turns by maximum 10 deg No height loss in recovery

Flaps Down

	Warning/Stall		Behaviour
	Left Turn	Right Turn	
Stage 1	40/35	31/28	Slowly rolled out of turns by maximum 10 deg.
Stage 2	35/31	28/26	No height loss in recovery
Full	32/30	28/26	

MGL Avionics EFIS Display

The MGL Avionics EFIS displayed a very clear visual warning in red, in the screen centre as low indicated airspeeds were approached. This was the first EFIS display used by the test pilot that gave such a dominant warning. The warning was assessed as a most useful safety benefit.

Taxiing and Wheel Brakes

Taxiing was straightforward. Small radius turns could be made easily. The wheel brakes operated smoothly and efficiently.

Take-Off and Landing

Normal take-off handling techniques for tail wheel types were used without difficulty. The steerable tail wheel combined with ample rudder control enabled accurate direction to be maintained with light pressures on the rudder pedals. Despite torque from the 100 hp engine, there was little tendency to swing during take-off.

In addition to normal three point landings using full flap, landings were made at forward CG with the flaps at Stage 1, Stage 2, and fully retracted. No difficulties were identified, and no changes to the approach and landing techniques widely used to fly tail wheel aircraft were required. The tests were flown from a grass surface in light winds, and there was no opportunity to explore take-off and landings in cross winds.

Performance

At 500kg AUW + 27 deg C and a headwind component estimated as 7 – 10 knots, on dry grass, the following uncorrected take off and landing performance was recorded:

TOR 65 metres

TOD 195 metres

LD 400 metres

LR 140 metres

Climb

At 500 kg and full throttle the rate of climb was measured as 790 fpm. The OAT was +22 deg C. Simulating a baulked landing, a climb was made with full flap and full throttle - the rate of climb at 55 KIAS was 612 fpm.

Roll Rates

Rate of roll tests were made in accordance with CS-VLA 157. Rates of roll averaged some 20 deg /sec.

Controllability and Manoeuvrability

Control and manoeuvrability throughout the flight envelope, including take-off and landing, were excellent. The aircraft was a pleasure to fly. Pitch yaw and roll were well-harmonised. No particular handling difficulties were identified, and throughout the tests the Trail exhibited the characteristics of a small classic tail wheel light aircraft with outstanding flying qualities. The requirements of CS- VLA 143, 145 and 155 were met.

Trim

The Trail could be trimmed accurately throughout the flight envelope.

Cockpit

The front cockpit seat was comfortable and the view was good, particularly over and round the sides of the nose. Inevitably, however, the high wing posed the usual restrictions for this layout. The seats were not adjustable. The instruments, switches, circuit breakers, and all ancillary controls could be reached easily, and were well laid out. A few minor changes, including the fitting of a cockpit fresh air vent, were suggested to the builder. None of these should hold up the issue of a permit to fly.

Conclusion

The Trail has impressive flying qualities coupled with excellent short field performance. It shows benign behaviour at low speeds close to and following a stall, both in level and turning flight. Operation of the Trail from grass strips should present few difficulties and pilots familiar with light tail wheel aircraft should quickly learn to fly it with confidence. The folding wings reduce considerably the hangar and storage space required. The Trail should prove very popular in the UK where short farm strips

abound. On the Cooper-Harper rating scale for the class of machine the Trail earns an overall assessment of 8.

Recommendation

The issue of a permit to fly for the Groppo Trail is recommended.

John Brownlow

John Brownlow
Test Pilot

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