

A Thruster Thruster

Dave Bremner

The folk at Thruster have taken full advantage of the 450kg limit, as Dave Bremner has been finding out.

One of my many irritating habits is to repeat the old saw 'Doesn't time fly when you're enjoying yourself', and so when I found that it was three years (May-June 1997 MF) since we had flight tested the 503-powered Thruster T600 I had to bite my tongue to stop myself saying it yet again.

Thruster - the Background

The T600 is produced in Wantage, Oxfordshire by Thruster Air Services under owner Gordon Pill, and I flew in to meet him and the team behind this very successful redesign of the Australian original. Gordon comes from a farming family, and he learned to fly despite his father, who felt that farmer's sons weren't entitled to time off! Having moved from hang gliding in 1976 to the Eagle with Gerry Breen (who demonstrated by taking off inside the hangar and flying through the doors!) he eventually bought an Australian Thruster TST, becoming involved in importing and assembling kits after the original importer Ian Stokes.

When the Japanese pulled out of the Australian wool market, Thruster's main market (sheep farmers who fitted klaxons to the undercarriage and herded sheep with them) collapsed, as did Thruster. Gordon bought the rights to the TST and the T300 development, and continued to make them. There was a problem with the weight which caused major problems (actually it wasn't the weight but the wing area - someone in Australia had surreptitiously reduced the size of the ailerons without letting on) and Thruster Air Services took over from Tempest Aviation.

It became clear that a major redesign was required around the 390kg rules, and the T600 emerged in both nosewheel and tailwheel versions as a major improvement - better performance, better undercarriage and better access.

Today, Gordon and his brother own the family farm, with his brother looking after the farming business, while Gordon runs the microlight business from converted farm workshops. It's a sign of the times that where the farm used to employ 14, it now employs one, the farmhouse has been sold off, and the farmyard became a livery stables, and Gordon admits ruefully that it's as dubious a business proposition as making microlights! One advantage is the availability of landing strips - if the microlight one is a bit tight, Gordon will pop out with the mower to cut a strip on a larger field.



Thruster - the People



The Thruster team, from left to right: Designer Leon Eversfield, Chris Kilby, Richard Shephard (who has left the company since this photograph was taken), owner Gordon Pill and John Phillips.

Today the factory employs four - Chief Designer Leon Eversfield, and John Phillips, Chris Kirby and Richard Shepherd (who has left since the photograph was taken) doing all the manufacturing apart from fibreglass and the skins, which are still sewn by the original Australian sailmaker, Kevin Mitchell. The atmosphere appears laid back, with Gordon's golden Labrador in and out all day, but beneath this is a fierce pride in the aircraft they produce. I was shown the airframe of a T600 which had clipped some trees and landed inverted at relatively high speed. The 78-year-old occupant walked away from the accident without serious injury due to the strength of the cage surrounding him. Because the T600 was designed within the 390kg weight limit, and the lack of flexibility over occupant and fuel weights that went with the old Section S, the 503-engined result was an aircraft of adequate power, without really justifying its moniker, and (on the nosewheel version particularly) a miserly fuel capacity. Gordon decided to upgrade to the 450kg rules (an exercise which he estimates as costing £20-25,000) and this has allowed him to upgrade to the water-cooled Rotax 582 powerplant and install the 50litre fuel tank on both nose- and tailwheel versions.

Thruster - the Aircraft

I was recently allowed out to play on the nosewheel-equipped T600N recently acquired by the Mainair Flying School based at Barton airport, Manchester with FI Chris Coppull in the right hand seat to ensure fair play.

On first acquaintance the most obvious difference is the 582 engine up front, its black engine-mounted radiators squarely in the airflow. This machine also has a large tank mounted to one side - not a radiator header, but a tank for the oil injection system. Not commonly fitted on UK two-strokes, this has the advantages of not having to pre-mix fuel and oil (a particular advantage if you're touring) and a lower oil consumption, and the disadvantage that you're totally dependent on that oil pump, although the Thruster has a low level alarm fitted to the tank.

The fuel tank mounted behind the cockpit is now uprated to 50litres capacity, and the rear view window is enlarged, allowing a panoramic view of the enemy on your tail. Under the new rules, you are allowed to swap fuel for occupant weight, but it's nice to know that the Thruster can be loaded with two standard weight adults and full tanks without infringing its microlight status.

The squared-off back of the cabin on the nosewheel version is a bit rough on the eye, and creates drag and disturbs the flow over the tail surfaces. However, access to the control linkages and fuel tank is excellent - decanting fuel from cans couldn't be easier, and any spillage falls well clear of the airframe. The ladder-frame wings feel reassuringly solid, and the rubber suspension undercarriage is an immense improvement on the old TST springs. Access to the cockpit is pretty straightforward; the door conveniently jams open against the lift strut while you park your bottom on the seat and swing your feet in. I found the rotating door catch a little fiddly to operate, but it's secure and unlikely to come undone accidentally. The cockpit layout is generally as before, but with extra instruments and an electric start now

allowed within the weight limit. This latter is a particular benefit, as pulling it over with the recoil starter has to be done outside the cockpit. There is plenty of space for tall guys - Chris Coppull is well over six feet, and spends his working life in one, so he's a good guide. For the vertically-challenged, a few cushions may be required to reach the pedals, but the view out over the low pod is excellent.

Chris was particularly keen to demonstrate the new hydraulic brakes, which have improved their effectiveness from marginally effective to startling, and with a velcro strap make a very effective parking brake. A small, but very welcome addition is a pocket fitted over the top of the instrument binnacle to hold maps, sandwiches, etc. With headset hooks on the transverse roof member, the whole feel is tidy, business-like, and confidence-building, particularly for passengers who've not flown before.

Two large adults can fit in without needing to be over-intimate, and the view all round on the ground is excellent for a high-wing machine. The enlarged rear windscreen means that you can easily check all the controls for correct movement from within the cockpit - something microlight pilots take for granted, but isn't all that common in light aircraft. With a clear view panel overhead, the vision would be among the best of any high-wing type with an enclosed cockpit.



The electric start takes all the drama out of this bit of things, and the 582 and 'E' type gearbox settle down to a civilised purr, while we wait for the water temperature gauge to stir. The tight turning circle, excellent field of vision and powerful brakes make the whole taxiing experience a pleasure, and almost before you can say CHIFTAP we're lined up and ready to go.

Thruster - the Buzz

Open the taps, and the 582 really gets itself noticed. Put simply, flying this dual is like flying the 503 version solo. Takeoff was achieved in about 50 yards, and climb out at 50kt IAS matched Thruster's claim exactly at 800fpm rate of climb on a hot day with two reasonably hefty adults. Some rudder is required to hold the ball in the middle, and the view over the nose in the climb is excellent.

Easing off into the cruise, we were able to maintain an indicated 55kt on 5,200rpm, though checking against the GPS suggested that the ASI was slightly optimistic. This is slightly lower than the manufacturer's claim, but one needs considerable time to get the aircraft set up in perfect balance, and we may not have had time to achieve this. One surprising effect is that

the controls all seem tighter - firmer and more effective. I thought maybe I was imagining it, but Chris, who has extensive experience of both, confirmed it.

Turns require a significant rudder input to keep in balance, and using the stick alone will demonstrate adverse yaw. Crossing the controls will produce a spectacular sideslip that increases the sink rate from 400fpm (better than the manufacturer's claimed 650fpm) to over 1000fpm, but the aircraft recovers immediately in both yaw and roll when you let go. Pitch stability is positive, if leisurely, and well-damped.

Translated into English, if you push the nose down until the speed increases by say 10mph, then let go, the nose will slowly rise until you're going slightly slower than trim speed, then gradually settle back to where it was. Opening the throttle will tend to raise the nose, though not as dramatically as some types I've flown. The bungee trim, famous on the TST for being spongy and ineffective, is in my opinion very good - though Chris would disagree with me. Opening the throttle fully gave an indicated 75kts straight and level - matching Thruster's claims, and a significant increase over the 503.

The stall is pretty much as before - the manufacturers claim a 2kt increase in stall speed, which is hard to discern. You wouldn't expect the relatively small addition to the weight to make a significant difference, and it hasn't. It demonstrates all the effects (reduced aileron effectiveness, occasional wing drop depending on the entry, etc.) without turning round and biting you.

We aren't allowed to try a spin of course, but one of the major costs in complying with the new regulations is the need to demonstrate satisfactory spin recovery, and this required no less than 80 different combinations of power, weight distribution and control input. I think we can therefore assume there are no major surprises here.

Landing is much as with the 503 engine - a doddle. The glide is distinctly improved over the TST, and that wonderful view over the nose ensures that you can see everything you need to on the way down. The glide path is still steep enough to ensure that you can control the touchdown point very precisely. Chris warned me to keep an eye on the speed on the way down, and I had a tendency to let it bleed off because the bulk of my experience recently has been on light aircraft with higher inertia.

The touchdown itself is very straightforward, with minimal float and effective well-damped suspension to smooth all but the most hamfisted attempts, and those awesome brakes should allow the experts to put the thing on a sixpence, although they should be used with caution by the uninitiated at anything above taxiing speed - as Chris will verify, having grabbed the stick in a hurry from a student at touchdown and gripped the brake lever as well, treating both of them to a spectacular emergency stop!

Conclusions

This is a major improvement over the earlier 503 version. Rate of climb is improved, and you can cruise faster, or at the same speed with the engine at a nice lazy speed. The fuel capacity of the nosewheel version (which is the biggest seller) is dramatically improved, and all the controls feel tighter. The electric start is safer and easier, and the engine sounds quieter and easier, as it's running significantly slower. There are few better qualified to judge than Chris Coppull, who has spent hundreds of hours instructing on the 503-engined T600, and dozens with his 582-engined version. His enthusiasm speaks volumes, and any aircraft which can withstand the rough-and-tumble of a school environment should be able to manage the relatively easy routine of private ownership.

At a price of £19,863 inc. VAT for the version flown (the no-frills taildragger 582 costs £16,532), the chief competitors in the ready-built three-axis market are the Bantam and AX2000. Performance figures with the 582 fitted are broadly speaking similar all have a 50lt fuel capacity, but the Bantam, which is only cleared to 390kg, is significantly cheaper and doesn't have a closed-cockpit option. Getting into the AX2000 requires a greater degree of athleticism, and it's currently a few hundred pounds less.

For schools, ease of access is very important, and the Thruster T600 is an ideal and popular choice; for personal flying, the choice may be harder, but the T600 is selling well - many students will prefer to buy the aircraft they've trained on, and they certainly won't be disappointed with their choice if this is what they choose.

Gordon Pill knows, however, that the competition from the heavy metal is likely to be severe, and he's looking at various options to upgrade the T600 airframe. Furthest on is the floatplane version which is nearing completion of its flight testing, and should be cleared as soon as the weather picks up enough to allow testing to proceed. This is a market with no competitors in the UK, and I for one am awaiting its development with no little impatience. Those who've

been flying off water come back with the biggest, daftest grins, and I can't wait to try it for myself.

He is also impressed with the test aircraft fitted with a Jabiru engine seen at Popham this year. This certainly seems a sensible choice, offering even less noise, more power and lower fuel consumption with no weight penalty, albeit at a higher initial cost. Full testing on this development is next in line once the float version is cleared.

Latest in the line of developments, however, is a composite rear fairing, which should give a significant increase in speed, hopefully to enable it to keep up with the likes of the Rans S6. This may take rather longer to get cleared, but might should give it a significant edge over its current competitors, and find a gap in the market for a reasonably-priced ready-to-fly aircraft in the 70kt cruise speed range.

Technical Data

THRUSTER AIR SERVICES THRUSTER T600N 582 (Three Axis)

Data refers to enclosed cockpit T600N 582. Where different, open T600T 582 data also shown in parentheses.

MANUFACTURER

Thuruster Air Services, Malt House, Ginge, nr. Wantage, Oxon. OX12 8QS. Tel. 01235 833305; fax 01235 833390. Director: Gordon Pill.

SUMMARY

Side-by-side two-seat high wing monoplane with conventional three-axis control. Wings have unswept leading edges, unswept trailing edges and constant chord; conventional tail. Pitch control by elevator on tail; yaw control by fin-mounted rudder; roll control by ailerons. Wing braced by struts from below; wing profile Goettingen 387, 100% double surface.

Undercarriage has three wheels in tricycle (T600T; taildragger) formation; rubber in compression suspension on main wheels, bungee suspension on nosewheel (steel spring suspension on T600T tailwheel). Push-right go right nosewheel (T600T; tailwheel) steering connected to aerodynamic controls. Hydraulic brakes. Aluminium tube and Dacron or Ultralam fuselage, with optional enclosure. Engine mounted above wing, driving tractor propeller.

EXTERNAL DIMENSIONS AND AREAS

Length overall 5.8m, 19ft.

Height overall 2.42 (1.66)m, 7.9 (5.5) ft.

wing span 9.60m, 31.5ft.

Constant chord 1.55m, 5.1ft.

Dihedral 0°.

Sweepback 0°.

Total wing area 15.692m², 169ft².

Main wing area including lift struts 14.9m², 160ft².

Total aileron area 0.89m², 9.6ft².

Fin area 0.65m², 7.0ft².

Rudder area 0.65m², 7.0ft².

Elevator area 1.16m², 12.5m².

Tailplane area 1.02m², 11ft².

Aspect ratio 6.5/1.

Wheel track 1.71m, 5.6ft.

Wheelbase 1.52m, 5.0ft.

Main wheels dia. Overall 33cm, 13in.

Nosewheel dia. Overall 25cm, 10in. (T600T tailwheel 12.5cm, 5in).

POWER PLANT

Rotax 582 engine, water-cooled.

Max power 65hp at 6500rpm.

Propeller diameter and pitch 1.73m (68in) x 16°

Gearbox reduction ration 3.0/1.

Max. Static Thrust NA.

Power per unit area 4.1 hp/m², 0.38hp/ft².

Fuel capacity 50lt, 11 Imp gal., 13.2 US gal.

WEIGHTS AND LOADINGS

Empty weight 238kg, 441lbs.

Max. takeoff wt 450kg, 992lb.

Payload 250kg, 551lbs. Max.

Wing Loading 24.85kg/m², 5.86 lb/ft².

Max. power loading 6.92 kg/hp, 15.26 lb/hp.

Load factors NA recommended, +6, -4 ultimate.

PERFORMANCE (UNDER THE FOLLOWING TEST CONDITIONS - Airfield altitude 400ft;

Ground temperature 16oC; Ground pressure 1025mb; Ground windspeed +/-2mph; Test payload 450kg, 992lb).

Max. level speed 86mph.

Never exceed speed 92mph.

Economic cruise speed 68mph.

Stall speed 35mph.

Max. climb rate at sea level 800ft/min.

Best glide ratio with power off NA.

Landing distance to clear 15m obstacle on grass NA.

Service ceiling 12,000ft.

Range at average cruising speed 240 miles.

Noise level 74.5dB(A)LEL.

PRICE INCLUDING VAT

£19,863 (£18,567).