Neil Dunstan:

Props & Stuff

Ebb & Flow. . . The Trojan Resurrection

When I started to get to the position of fitting a motor to the Dehavilland Trojan which I am restoring, I was not sure what to do.

I had a 25 hp Parsun four stroke engine on a stand in the shed, and a 50 hp Suzuki four stroke on my Quintrex 4.45 metre dory as the options.

My original idea was to fit the Parsun, but then my wife Dorothy pointed out her concern that the 25 hp engine might be too small for the Trojan if I had to get home in severe weather. She made a valid point, so I decided to use the 50 hp Suzuki.

The first thing that must be emphasised, is that I had always set out to configure the Trojan as only a displacement boat, so the Parsun would be sufficient for that, but as I've said previously, I plan to use the Trojan for some long distance trips up to fifty miles out to sea, and a little extra speed might come in handy.

When first considering the displacement set-up, I did some preliminary calculations using well known formulas, and figured that the most efficient displacement speed for the 6.4 metre hull would be 5.1 knots. This was ok, but I was hoping to run at around six knots as at this speed I can cover a surprising distance in a day's steaming, be very comfortable and achieve (hopefully) low fuel burn figures.

So eventually I installed the 50hp Suzuki, and on the first trial run which was only an hour or two and covering about five n. miles I achieved some pretty good performance figures:

2000 rpm = 6 knots.
3000 rpm = 9.5 knots.
4000 rpm = 13.5 knots
5000 rpm = 16.6 knots.

This was achieved using the original Solas YC2509 11.6/13hq prop which is a 13 inch pitch prop.

However, as the motor would only rev out to 5,000 rpm it was obviously too much pitch for the engine and would have done serious damage if run for any length of time at high throttle settings, although I was very pleasantly surprised at the ability of the little Suzuki to get this rather large boat up on the plane!

Admittedly, the boat was not much more than an empty shell at this stage, but it augured well for the future.

I decided to carry on with the fitting out of the boat, and predictably, as the boat got progressively heavier, the performance dropped off to the point where it was struggling to do more than 12 knots.

However, if I stayed down at displacement speeds, it cruised along effortlessly at around 5.5 knots and returned about 4.5 n. miles per litre which I thought was pretty good. As we had the surprising ability to travel at planing speeds albeit fairly low speeds, I thought that if we could match the prop to be able to cruise at displacement speeds with a low fuel burn and also get up on the plane if I needed to go a bit faster to catch the tide or beat a weather front home then that could be a useful attribute - even though the fuel burn would be much higher per mile.

A discussion with Steve Evans from The Propeller Warehouse, resulted in him recommending a three blade, stainless steel eleven inch prop, which he supplied for trial.

The following figures were achieved with the new prop:

2000 rpm = 4.2 knots.
3000 rpm = 5.6 knots.
4000 rpm = 8.0 knots.
5000 rpm = 11.5 knots.
6000 rpm = 14.5 knots.
6500 rpm = 14.7 knots.
6700 rpm = 15.2 knots.

These figures showed fairly conclusively that the engine was now revving to its maximum recommended rev range, or a little bit more actually, as the recommended maximum rev range for the

These blokes do some serious fishing, as John (JT) Turnbull's bar cheeked trout reveals. They fish wide offshore from their home base in Sarina in North Queensland. Trips out to through the islands to the reefs here commonly involve upwards of 150 n.miles there and back - so fuel efficiency for these pensoners, is paramount.

Suzuki is around 5,900 to 6,500 rpm. This showed up another problem, bearing in mind that this engine has a required rev range for best fuel economy of 2,000 rpm or under for displacement mode, and around 3,800 to 4,500 rpm for planing mode.

Obviously with 2,000rpm only producing 4.2 knots, this was too slow to be practical, and the revs required for a clean planing speed being 5,000 to 6,000 rpm were getting into the area of high fuel burn.

A fuel consumption test was carried out over a distance of 5.5 n.miles at 5,000 rpm with a speed of 12.5 knots and returned a disappointing 0.92 n.miles per litre with a full load and the 11 inch pitch prop, clearly because of the need to run at (too) high revs to maintain a decent planning speed.

My original hope was to be able to run at 5.2 to 6 knots at around 2,000 rpm and achieve four to five n. miles per litre and plane at around 12 or 13 knots at 1.5 to 2.0 n. miles per litre - but this prop was clearly not going to achieve anywhere near this . . . so it was 'back to the drawing board'.

Another call to Steve Evans followed. This time we decided to try a three bladed stainless steel unit with a twelve inch pitch which is in the middle range of what we had tried.

Another trip to Cape Palmerston for six days was organised (this prop testing business is the perfect excuse for getting plenty of trips in) and the boat was again fully loaded with enough fuel, ice, food, water etc, but now with the twelve inch pitch prop fitted.

A new set of figures was obtained as follows:

2000 rpm = 4.7 knots.
3000 rpm = 6.7 knots.
4000 rpm = 8.7 knots.
4500 rpm = 11.4 knots.
5000 rpm = 13.4 knots.
6600 rpm = 16.3 knots.

These figures showed

Credit where credit is due - this is a remarkable effort by the 'little' Suzuki 50hp 4-stroke. As can be seen here, it is pushing the 6.4m Trojan along on a very sweet 'clean' plane !

that the engine was able to reach its recommended maximum revs at full throttle, but had a better speed at the critical lower rev range to make travelling at displacement speed more economical.

A fuel check showed that at a clean planing speed of 12 knots, the fuel consumption was around 1.5 n.miles per litre for the 14 n.mile trip which I thought was quite acceptable.

I was only able to do a short fuel consumption test at displacement speed but it appears to achieve around 3.5 to 4 n.miles per litre.

All in all, not too far off my hoped for speed and consumption figures.

The figures I obtained are fairly arbitrary, as I didn't have the sophisticated fuel measuring system that the editor uses for magazine articles, so I used a 25 litre caddy instead. I checked the inbuilt gauge accuracy by noting the readings as I poured a known amount of fuel into caddy, and I used my GPS to determine speeds.

To get a reasonable average speed I tried to take my measurements going in both directions with respect to the tide flow, and by trying to travel in as many different sea conditions as possible, ie, flat calm to twenty five knots.

The results suggest that I should be able to get speeds of around 5.5 knots at 2,500 rpm with a fuel burn of approx. 3.5 to 4 n.miles per litre and around 11.5 knots at 4500 rpm with a fuel burn of approx 1.5 to 2 n.miles per litre.

I reckon this is quite reasonable for a twenty one foot boat carrying a good load, and not far off my expectations, keeping in mind too, that the boat is now nearly fully fitted out with everything that I need for comfort and safety on long trips and the storage *that* all requires.

This has brought the weight of the boat up from the original weight (when just a shell) of six to seven hundred kilos, to probably closer to a tonne, now.

Earlier in this report I mentioned that I had calculated that the most efficient hull speed for this boat in displacement mode would be around 5.1 knots.

It was interesting to observe the wake of the boat when travelling.

As the boat travelled at under five knots, the water flow around the hull was very smooth and when passing the transom it just continued on in a straight line with no apparent turbulence but as the speed approached the theoretical hull speed, the water still passed smoothly along the hull but began to show signs of a slight change of direction towards the centre of the wake indicating that the hull was starting to produce a small hole in the water behind the transom.

As the speed increased over the theoretical 5.1 knots, the water instantly began to curl around the transom and at just under six knots, there was the first appearance of bubbles emanating from under the hull, and the turbulence was starting to be quite noticeable.

This is the time when a displacement hull begins to become measurably more inefficient and requires heaps more power for a lot less gain in speed until enough power is applied and the hull climbs out of the hole and begins to plane.

I guess this has all been interesting to me but probably boring to most, but I now know that if I want to get better than 5 n. miles per litre at displacement speed, I will use the thirteen inch pitch prop and not try to go any faster than six knots - but if I want the option of travelling faster (up to seventeen knots) I will fit the twelve inch prop realising that it will cost me about 30 % more in fuel costs.

Mind you, it will still be a much lower cost to run than most boats configured with very large outboards capable of speeds that are almost

never used in open sea conditions.

I've noticed they mostly come back to speeds not much more than I can do, when the chop starts to get up.

Future thoughts

What now for the future? So far I am quite happy with what I have achieved, and as I have put a fair bit of work into this old boat I have become quite attached to it, so much so that when a couple of guys came aboard to have a look at her down at the Cape they were impressed enough to offer to buy her.

I had no hesitation in saying that she was not for sale. I realise that if a professional boat builder had a look at her he would see straight away that she had been rebuilt by someone who was not a pro, but in general she looks quite presentable although trying to teach yourself all about spray painting as you go produces the obvious less-than-perfect finish!

The other thing that would give it away is the fact that I built all the inclusions such as bunks, galley, storage etc out of wood, mostly using Tasmanian oak for the frames and covering it all with 12 mm marine ply which was mostly leftovers from the replacement of the floor.

Most of the interior was painted by hand, but looks reasonable and I am pleased enough with it all to be quite proud of my efforts, although there are still plenty of bits and pieces to finish off and lots of little knick-knacks to fabricate in the shed over the next twelve months or so.

But there is no rush, as she is perfectly capable of doing all the trips I have planned in the future in her present state.

As these two pics reveal, the Trojan is now starting to load up as Neil gets into his fitting-out program. Dry hull weight has increased from about 800kg by about another 250kg.

As far as the engine is concerned I have still not decided which way to go with that.

As the transom is really wide enough to accommodate a pair of the old two strokes of the time when she was built, I am thinking of fitting the 25 hp Parsun four stroke I have, temporarily, similar to an auxiliary motor, to find out how she really does perform as a pure displacement boat. I think that could be very interesting.

The other option is to fit an engine of (say) 110-120hp and use her as she was designed, and forget about all this displacement business, but that is fairly unlikely as the cost would be too much, and I would feel that I gave in to convention - and that is not the way I operate.

So at this stage I still have a bit of finishing off to do but I am not in a hurry and it will keep me occupied for the next twelve months, but I am beginning to get a real affection for the old girl - and at this stage, I think I will just keep her and enjoy growing old together.

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