

# Single or Twin Motors?

## Are two really better than one?

With all the variety you see in boats, both in size and application, it's not surprising that the question of how many motors are best is a common one. Visit any launching ramp early on a weekend morning and you're bound to see a variety of outboard powered boats with either a single large motor or twin medium sized ones.

Are there advantages or disadvantages? Or is it just superstition, even old habits, that cause some people to favour twins over a single, or vice versa. To answer these questions, let's look at some recent data published on boat tests comparing single engines and twins, on the same type of hull. The three boats we'll use as an our guide are all from US Magazine boat tests where full performance and fuel figures are available to allow a fair comparison.

These three craft are relatively large for outboard power (and just barely trailerable in some states), but they do have a variety of motors so will be a good guide to how other boats may perform with similar differences. Here are the basic specifications of these boats -

Brand	Regulator	Boston Whaler	Stratos
Model	23	24 Outrage	2260 WA
Layout	Centre Console	Centre Console	Half Cabin
Hull Type	Deep V	Deep V	Deep V
Length	7.7 m (25' 4")	7.3 m (23' 10")	8.0 m (26' 2")
Beam	2.5 m (8' 4")	2.6 m (8' 6")	2.7 m (9')
Weight (hull)	1727 kg (3800 lb)	1410 kg (3100 lb)	1910 kg (4200 lb)
Max HP	300	400	300
Single Motor	175 HP	225 HP	250 HP
Twin motors	2 x 130 HP	2 x 150 HP	2 x 140 HP

When you ask most boating people what are the important issues when it comes to what engine or engines to fit, you will almost always get 3 main issues, Safety, Performance and Economy. Let's evaluate these three issues using our boat tests as examples.

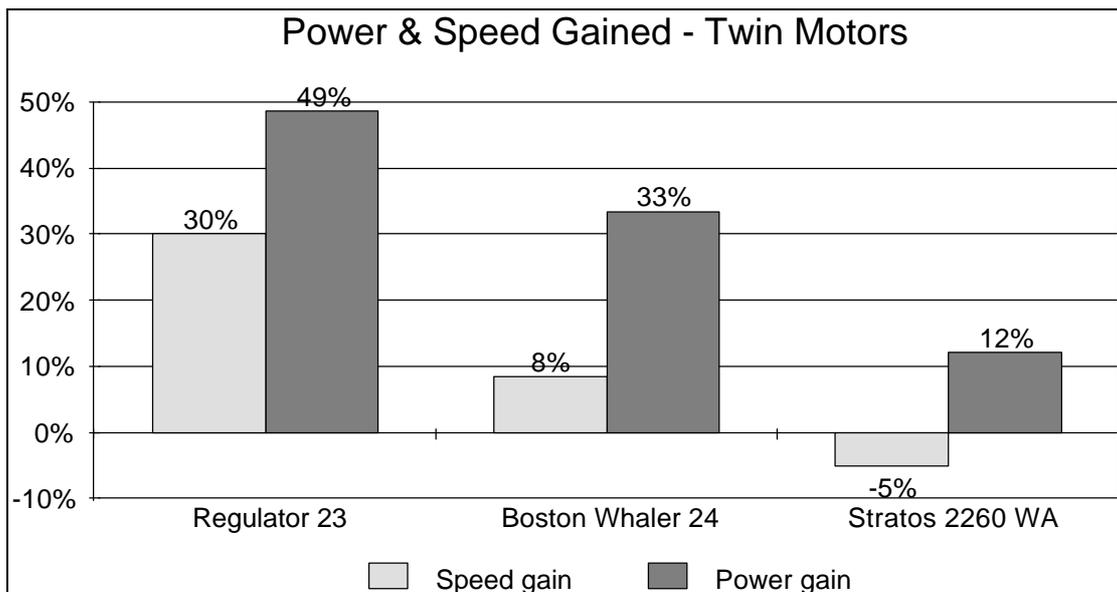
**Safety.** Generally people expect a twin engine boat to be safer, because there is a "spare" in the event that one motor should fail. Pretty hard to argue against that, except that relying on using one motor to get you home in a hurry can be a problem. You may remember from previous articles how important propeller size selection is to the health of marine motors. It is critical to ensure any rig has the right size props to match the power to the load. This is very simply done by driving at wide open throttle and noting the maximum rpm. When max. rpm falls inside the correct range, the prop size is right, and potential damage from overloading (if prop is too large) or from over revving (if prop is too small) is avoided.

However if your twin motor rig is correctly propped for normal operation with both

motors operating, then with one motor switched off the other will be immediately grossly over propped. This means that only small throttle openings can be used, on one motor, to avoid risking engine damage. This also means coming home at displacement speeds, like 5 to 10 knots. While lots of twin outboard rigs exist, very, very few of them can get up to the wide open throttle operating range with only one motor operating.

So why not have one large outboard and a small auxiliary? In this way you still have a spare that can get you home at reduced speed. Many boaters believe this is the best way to go. One of our example test boats, the Stratos, had a 6 HP trolling or auxiliary motor. It gave 6 knots at full throttle, which would get you home OK provided the weather is good. Most people will opt for 10 or 15 HP to ensure you get 5 to 10 knots with a stiff breeze and a few waves around.

**Performance.** Are twin motors better than one for speed? Like many things nautical the answer is "it depends...". More horsepower should mean more speed, but twin motors usually means more weight, and twins also have two underwater units creating lots more drag. Both of these slow you down. So how much more power is need to break even with the extra weight and drag. Here's the chart for our example boats -



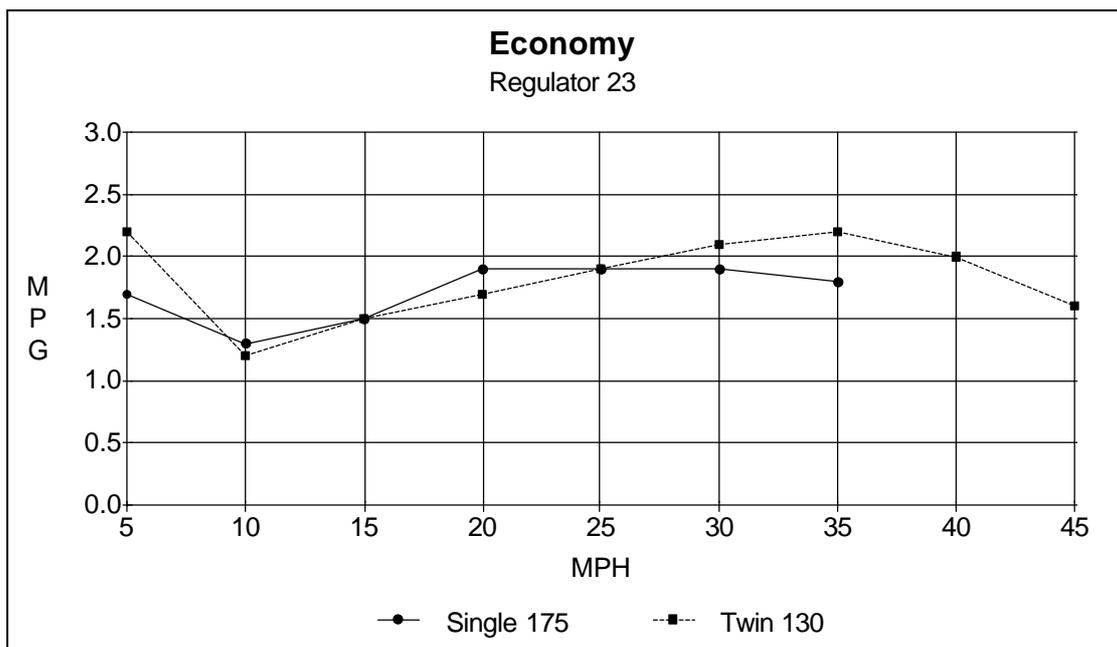
From this you can see the rig that gained nearly 50% more power in the move to twin engines also gained 30% more speed. The rig that gained 33% more power got 8% more speed, and the rig which only gained 12% more power actually went slower than it did with a single engine. So we need around 30% more power with twins just to overcome the extra weight and drag.

Is it worth it? Well if you're carrying heavy loads the answer is definitely yes. There is one place where the extra weight and drag of having two propellers is an advantage, when you carry heavy loads. Commercial fisherman, water taxi's, and other commercial users need to have their rigs set up to handle the heaviest loads possible. With two propellers, the load per prop blade or per square centimetre of

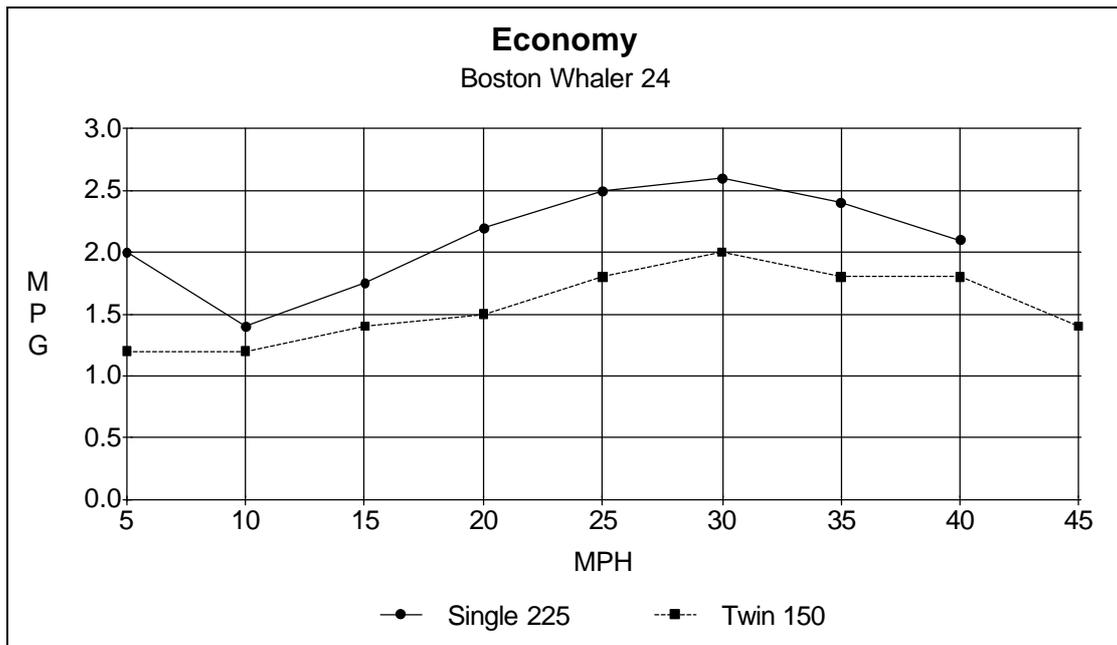
blade area is lower so more can be carried, and even more importantly the affect on performance between having a half load or full load is less, so with twin motors you can carry a wider variety of loads without worrying about getting into overloading or over revving situations.

An example from NSW oyster farmers might serve to illustrate the point. Traditionally the oyster farmers used a tug to tow barges from the processing plant to the oyster beds, work on the beds, then bring back the crop. If the beds were any distance away, one round trip per day was normal. When they first started using outboard motors on the barges they went a little faster, but only when empty, so there was little advantage except each barge then had it's own power. Today they use large aluminium flat bottom punts, up to 14 metres (45') long with twin (sometimes triple) large outboards. Now the punts can achieve planing speeds even with 10 tonnes on board and two or more round trips per day are possible. That's a big increase in productivity.

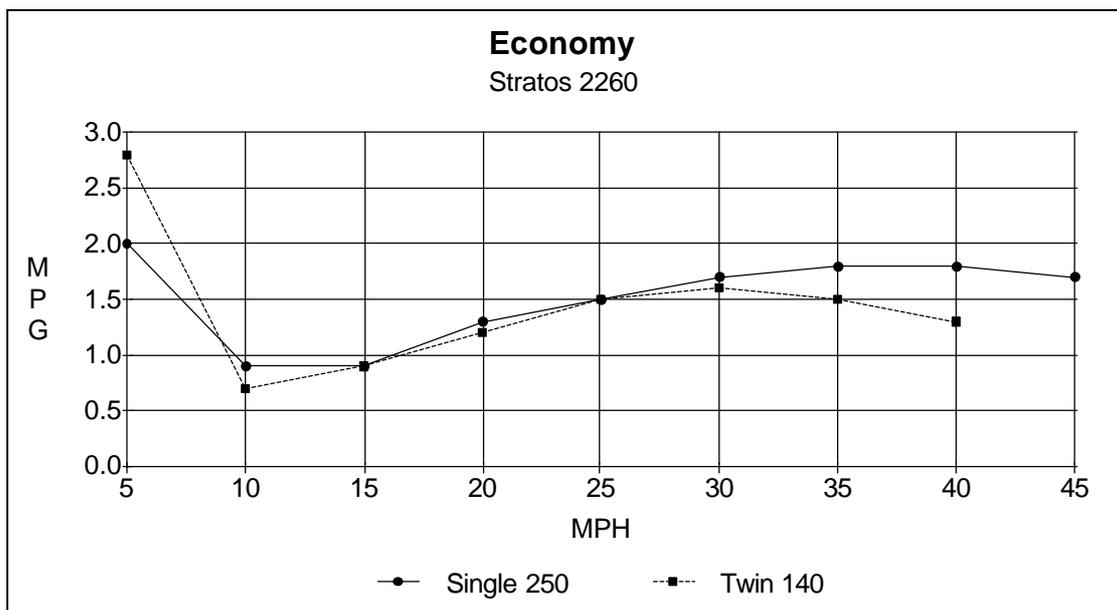
**Economy.** Can twins get as good economy as a single? Sometimes yes. One engine costs less to buy, install and service, so initial cost of the rig is in favour of the single. Operating costs though can favour either type depending how well the motor, hull and its application are matched. Let's look at our three example boats -



This is the chart of the Regulator 23 showing the MPG (miles per gallon) across the speed range for both single and twin set-ups. This was the boat mentioned above where a big gain in speed resulted from going to twin motors. There is not much difference in economy between single or twin motors, but the twin rig has the cruising speed advantage. A boat this size (7.7 m) with only 175 HP is borderline on being underpowered, so when twin 130 HP motors were installed it was then able to operate at it's most efficient speed with the twins throttled back more. The net result is no penalty, in fact a slight gain in economy despite more weight and drag.



The Boston Whaler was the middle boat in the speed chart above, the one with only a modest gain in speed with twin motors. This boat is relatively efficient with a single 225 HP motor so the move to twins does not provide an advantage in economy. The single rig has better economy all across the speed range.



The Stratos was the rig mentioned earlier as actually going slower with twin engines than it did with a single. The economy chart shows both single and twin rigs have very similar economy with the advantage at cruising speeds favouring the single motor. Because the twin motors are close to the same power as the single, but also heavier and have more underwater drag, economy suffers a little for the twin.

If you look at all three economy charts above you will notice the speed and MPG ranges are all the same so a comparison between all three boats is possible. Note how the boat with the best economy (the Boston Whaler) is also the lightest from the

specifications chart? This illustrates one of the often forgotten but important areas with small boat performance and economy, weight is a killer. Keeping your rig's weight down is one of the most effective ways to keep your performance and economy up.

The Stratos is the heaviest rig (to be expected with it's half cabin layout), hence it's lower economy, but it does has something to add to our story on economy. This is the rig which has a 6 HP Trolling or Auxiliary motor mounted alongside the 250 HP main motor. It's purpose is for trolling, that is moving along at about 5 knots while towing lures to attract game fish. At this speed the small motor uses less fuel, even at wide open throttle, than the big engine does at idle. The small auxiliary is also happier to run at high throttle settings for hours at a time than the main engine at idle, so you get better economy and less fumes and smoke.

One other thing you can see on all three economy charts is how all boats have their worst economy at about 10 MPH and their best up around 25 or 30 MPH. This is a common trait of all planing hulls. Just idling along at 5 MPH the boat has little resistance, but all outboard motors are not very efficient at this speed (unless it's a direct injected 2-stroke or 4-stroke, but that's a another story). Climbing onto the plane (10 - 15 MPH) is where worst economy occurs, and actually being well onto the plane (around 25 MPH) has less resistance so economy improves. As the speed gets past 30 or 35 MPH resistance starts to climb again, so economy drops.

Being able to cruise with the throttle well back at that most efficient hull speed of around 25 - 30 MPH is what gives the best economy. The Regulator and the Stratos, in our examples, are both running at 4500 rpm at best MPG. This is a little high for best economy, but still well below wide open throttle. The Boston Whaler because of it's lighter weight and high power was at 4000 rpm for the single rig and 3500 rpm for the twins.

None of these rigs I've used as an example could really be classified as a bad rig. They are quite typical of outboard powered boats everywhere that are loved and admired by their owners. It's just when you get the chance to compare similar rigs, you can see where the advantages lie.

Conclusions. The single rig, with a small auxiliary or trolling motor, is the cheaper to buy and maintain, provided it is powered sufficiently to allow cruising with the throttle well back. The twin rig though has the advantage of load carrying and if done correctly, very little if any, penalty over the single rig when it comes to economy of operation. Both types are capable of providing the safety, performance and economy we recreational boaters expect, so I guess the final decision still comes down to personal preference.