

Evinrude - Repower E-TEC G2 300s



Captain's Report



We follow a '07 center console as she gets a new life thanks to a pair of Evinrude E-TEC G2 300s.

Repowering

Recently, we followed a repower that took a pair of '07 Evinrude 250's and replaced them, along with the controls and gauges, with a pair of brand new Evinrude E-TEC G2 300's. In effect, this boat went from a 3.3L older technology outboard putting out 250-hp to a 3.4L all-new technology engines putting out 300-hp. Let's take a look at one man's journey toward getting the boat of his dreams... again.



The old engines served their purpose, but it was time to move on after 1200 hrs.

A Journey Begins with a First Step

The boat to be repowered was a 2007 Hydrasports 2900 CC, a premium level center console that was in meticulous shape, inside and out. For the owner, the decision to invest money in his boat was an easy one. He loved the boat, used it a lot -- 1200 hours in eight years -- and kept it in great shape. There wasn't so much as a blemish on the upholstery, and the gelcoat looked like it just came from the factory.



The old props did not have any significant dings, but, nevertheless, they were showing their age. Note that with the conventional external steering, the engines could not be trimmed out of the water.

The HydraSports 2900 CC is a big boat. She has a 9'8" beam, a high freeboard, and had a test weight of over 10,000 lbs.

But its performance was not keeping up with the newer kids on the block. Its handling was sometimes difficult, acceleration was okay but not remarkable, and top speed was on the low side. Worse still, the fuel burn was negatively impacted by years of use and older technology. Let's take a look at how she fared in a preliminary performance evaluation.



The old Evinrude 250s used conventional hydraulic external steering rams with connection hoses that cluttered the outboard well.

Test #1 -- With old Power

Our test boat had a pair of Evinrude 250s with 1,200 hours. They were turning a set of 14 $\frac{3}{4}$ x 19 Viper 3-bladed SS props.



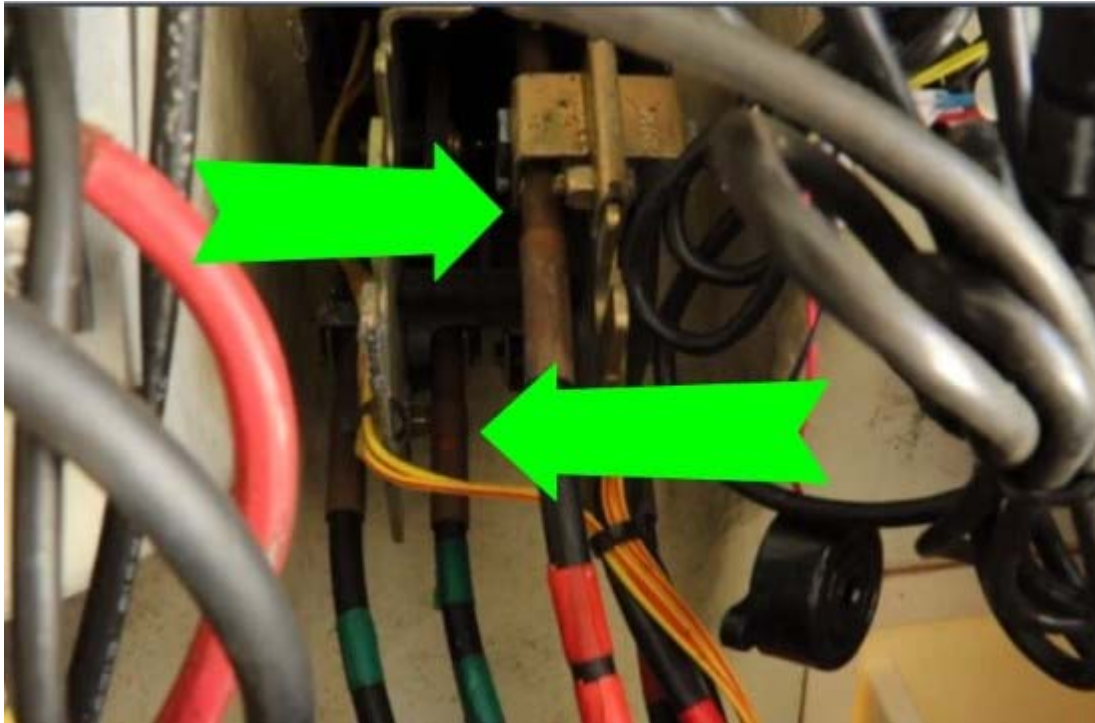
The cables were so sticky that our test captain had to pull up as much as to push forward to operate the throttles. Obviously, this is not desirable.

The Handling Isn't Much to Write Home About Either. Most notably, the boat exhibited a tendency to porpoise. By putting the trim tabs almost all the way down and trimming the engine, that tendency could be eliminated for a smooth ride, but at some cost.

As for the helm, we have an old set of mechanical controls with push/pull cables that really offers nothing but shift and throttle. There wasn't even a function to synchronize the two engines, so the throttle levers were never really set together to get a matched speed; they're always offset from each other.

Further, the cables were so worn that it took some strength to get them to move. And they were sticky. So much so that we had to use more of a lift on the sticks than a push, considering the angle that the controls were mounted at in the first place. So these things needed to go.

There was a triple set of I-Command gauges that were still functional but an upgrade would be helpful. The steering worked fine and was connected to Sea Star hydraulic steering that felt stiff. Clearly, we had work to do.



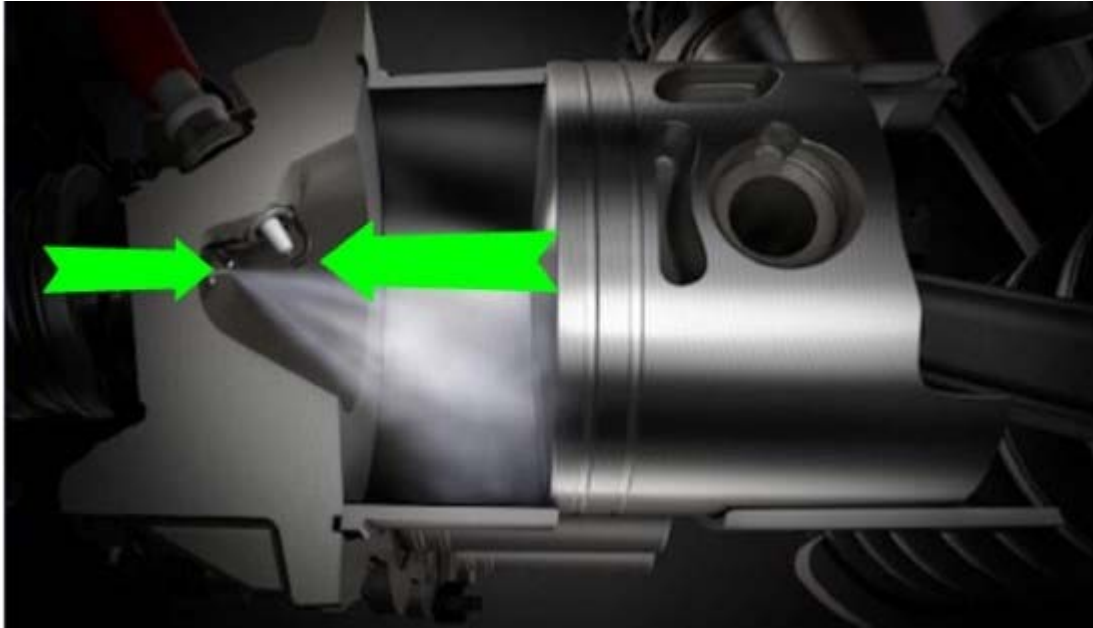
The mechanical throttle and shift cables from the old engines were “sticky” and after eight years of heavy use in a saltwater environment it is little wonder.

Which Engine to Specify?

The first step is to pick what we want for the new power. That decision all comes down to how much for how fast. After wrangling with the decision our guy settled on going from old Evinrude 250s to a set of new Evinrude E-TEC G2 300's. He came to that decision because he knew about the engineering that had gone into the all-new E-TEC G2 design.

All-New Engine Design

The new Evinrude E-TEC G2 300s were designed from scratch a couple of years ago by Evinrude working in concert with the University of Wisconsin to develop what is the most advanced and sophisticated outboard engine design on the market. Old direct-injection engines were generally re-worked versions of existing carbureted blocks. But the E-TEC G2 is a whole new block and engine designed around the direct injection system.



The all-new E-TEC G2 engine design started with the injector seen at left. The proximity of the spark plug and the shape of the combustion chamber in the head of the cylinder were all designed in concert to maximize fuel efficiency, power which also resulted in very low emissions. The result is an engine that is competitive with anything on the market.

Innovative Design. Combining computer-modeling at the University of Wisconsin with its wealth of empirical engine data, Evinrude engineers were able to create a combustion chamber that could maximize power and fuel efficiency. By carefully designing the location, size, and shape of the intake and exhaust ports; the shape of the piston and cylinder head; the timing, direction and amount of the fuel spray, the spark that ignites the explosion, and the exhaust exit of the burned gas after the explosion, Evinrude was able to achieve remarkable fuel efficiency, virtually complete combustion, and the lowest emissions in the industry.

Repower Work Begins

First, it was time to pull all the old material out of the boat starting with the old engines. With those gone, we could pull the controls, cables, old control binnacle, and since the new engines have their own onboard oil, we could pull out the oil reservoirs that were mounted in the boat.

Next the re-power crew focused on the helm where they not only removed the old controls, they also ditched the old gauges. The E-TEC G2 engines have their own steering units, so the old Sea Star rams were no longer needed.



Out with the old -- and lots of weight. Because the new Evinrude E-TEC G2 300s have 3-gallon internal oil tanks, they no longer need external tanks. Heavy throttle and shift cables were replaced by wire.

The new engines were bolted on, new gauges were put in that included a pair of new Icon Pro 3.5 units and a 4" (10.16 cm) Simrad digital unit. New Icon II Premium controls were added that incorporates a whole host of features that includes cruise assist, engine sync, and single lever operations.

By the time the job was done, there was a cleaner looking console, and an even cleaner looking engine well.



The old boat with her new engines installed looks like a new boat. And her performance was remarkably better.



The old gauges.



The new panel has a pair of digital gauges that are more accurate and easier to read as well as a Simrad display for selectable engine parameters.



The new digital shift and throttle binnacle control is installed with wires running from it instead of cables.



The new controls are easier to use and much more functional than the old. With automatic sync and drive by wire, RPM settings can be exact.



Out with the old...



...and in with the new. With the all-new E-TEC G2 engines integrated steering, the old-technology Sea Star steering rams, shown by the arrows above, are no longer needed.



With the external steering gear removed the engine well is significantly cleaner. The engines can now be tilted up 81 degrees and be completely out of the saltwater.



With the engines tilted completely out of the water we can see the tremendous surface area of the 4-bladed 20” props.

Test Ride #2

Now it's time to see if it was all worth it. Let's see the results.

BEST CRUISE FUEL CONSUMPTION

1.1 MPG to 1.5 MPG

36.3% Improvement

RANGE at BEST CRUISE

301 S. MILES to 406 S. MILES

34.9% Improvement

And Now for Best Cruise. We went from 26.9 mph at 4000 RPM burning 24.1 gph to 19 mph at 3000 burning 12.7 gph. While best cruise was not as fast 19 mph vs 26 mph -- speed is not the objective when successful bluewater fishing trips often depend on range. And with the new E-TEC G2 300s her max cruising range increased from 301 statute miles to 406 statute miles, both with a 10% fuel reserve.



The repowered Hydra-Sports 2900 CC (now a 3000 CC) was designed for bluewater fishing where range is an important consideration.

Remarkable Range. 406 statute mile range means most of the Bahamas are within range from Nassau, and that anglers from Miami can go over to The Tongue of the Ocean, troll around for a day or two, stay at a nearby resort, and come back on a single load of fuel. The boat looks great with the new E-TEC G2's hanging off the transom, and the excitement level grows as the boat rides the forklift towards its re-launch.

How About More Cruising Speed? For coastal cruising when maximizing range is not so important, most anglers we know would like to be going faster than 19 mph. When we compare the old engine's best cruising speed of 26.9 mph with the new E-TEC G2s at 26.7 mph, we once again see that the new E-TECs blow away the old engines by a wide margin in fuel consumption - 1.1 mpg to 1.4 mpg for an improvement of 36.4%

SPEED UP THE NEW ENGINES UP TO MATCH THE OLD BEST CRUISE

OLD ENGINES 4000 RPM -- 26.9 MPH -- 1.1 MPG

NEW ENGINES 3500 RPM -- 26.7 MPH -- 1.5 MPG

36.4% Better Fuel Economy

The Evinrude E-TEC G2 engines have special alloys and coatings and an extensive use of stainless steel parts in critical areas designed to reduce saltwater corrosion.

Why Did These Engines do so Well?

The reasons why we are seeing such improvements are several.

- 1. The larger engines -- 100 hp more in total -- struggle less to do the same work
- 2. The new engines were turning 5500 RPM vs 5200 for the old engines
- 3. We went from 19" (48.3cm) 3-bladed props to 20" (51cm) 4-bladed props
- 4. The old props, while they did not have any dings, were showing their age
- 5. We went from 1200 hour engines to brand new engines
- 6. We did not have to have the trim tabs down to avoid porpoising
- 7. The ability to trim engines out more when running
- 8. Auto engine sync
- 9. The new engines were set 4" farther back, putting the prop in cleaner water

- 10. The new E-TEC G2 engines are a technologically advanced outboard. They maximize 2 stroke power with industry leading efficiency proven by their extremely low emissions output

What About Handling?

As it turns out, the handling was greatly improved as well. That porpoising habit that the boat had that required heavy use of tabs was gone. Now, because we were able to actually apply engine trim to the boat, we were able to achieve a whole new level of speeds and performance. It's literally handling like a new boat.

We attribute the improved stability to the fact that the total engine weight went from 1,006 lbs. (456.31 kg) to 1,074 lbs. (487.16 kg). The new engines are offset another 4" (10.16 cm) further back on the transom, and the 4'-bladed props are giving more of a bite. All that combined help keep the bow up and more stable.



The new engines are offset 4" (10.16 cm) further back from the transom than the old engines.

New Control System

The **engine controls** made RPM adjustment considerably smoother. The steering still had the nine turns from lock-to-lock but that was more of a function of the steering system that still existed at the helm. The internal hydraulic steering on the engines themselves served to eliminate the clutter in the engine well and also allowed us to adjust the feedback to desired parameters. For our application, it got stiffer as lower speeds and eased up at higher speeds.

So What's All This Cost?

Of course, none of this makes sense unless we can justify the expenditure and for that, we have to know the cost. Evinrude offers control packages at several price points. For this application the MSRP was \$62,912 and with dealer incentives (-\$13,435) the price was lowered to \$49,477.

For that, our repower boat owner got a whole new performance experience and much better fuel burn. Of course, these are the top-of-the-line engines, so they're the most expensive. Smaller 150-hp G2s will run between \$16k and \$17k each, so there's definitely some room for doing math before the process begins.



Three different binnacle options for the Evinrude E-TEC G2 outboard engines.

Options

Things that can drive the price up are the options. Some to consider are the controls.

If you're not happy with the controls on your boat, you have three choices:

- 1. The new Evinrude Icon II control is a basic option for a single engine boat. It has digital connectivity, tension adjust that gets progressively more stiff as we advance the throttle and a neutral detent-adjust. At a retail of \$1065 this digital control is only slightly more than standard mechanical controls.



The basic controller is for adding digital controllability to a single engine installation.

- 2. Moving up to the premium single engine, Icon II Premium controls, will add a neutral-only button, cruise adjust that allows incrementally increasing or decreasing the engine speed, gear indicator lights and chromed trim. The throttle lever is also $\frac{1}{2}$ " (1.27cm) longer. It retails for \$1,900.



The Premium single engine controller (the one in the middle) adds some much sought after features.

- 3. When moving to a twin-engine, more features are necessary than a basic control can offer so the Icon II Premium Dual engine binnacle control is needed. This control features everything that Evinrude's digital controllability can allow; individual engine trims, individual neutral starting, engine sync, cruise adjust, indicator lights, chromed trim, and single stick operation. It retails for \$2,900.



When moving to twin engines, there is no basic controller option, just the premium. And rightly so.

What if I Want to Keep my Own Controller?

Keeping the old control binnacle is another option, but there's a caveat. The new engines are controlled by digital inputs, not push/pull cables. But not to worry, Evinrude has created a work-around.

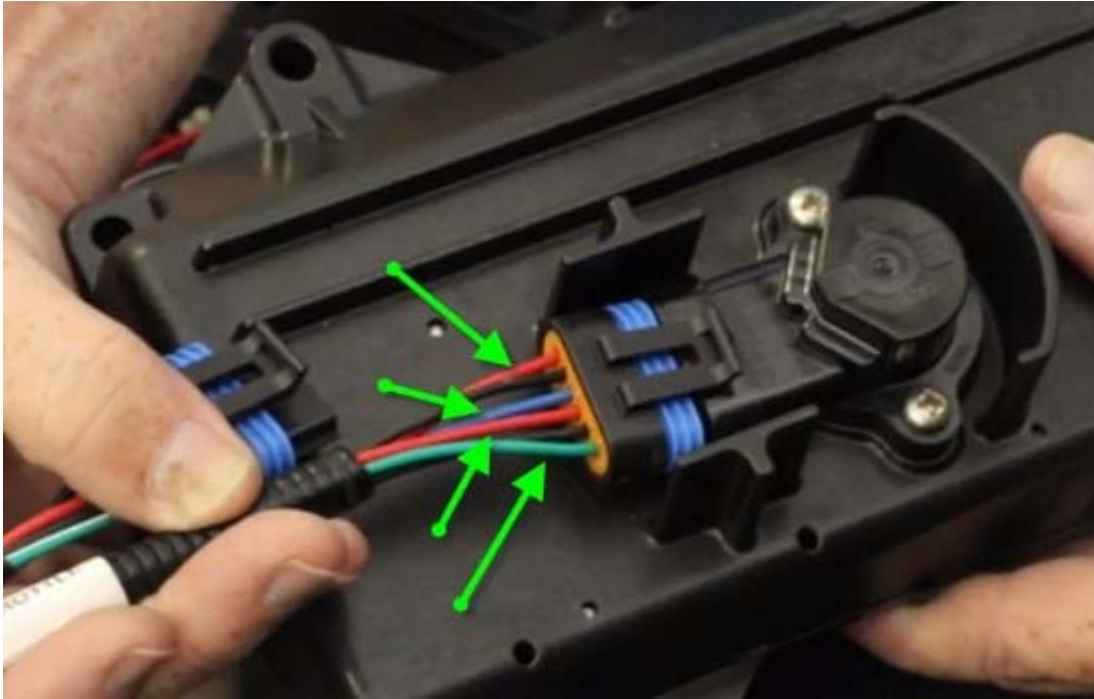
The existing cables are taken out of the engine and moved to the interior of the boat where they then connect to a digital controller. It allows for a push/pull cable to attach to a slider that then sends a signal to a sensor. Connect that sensor, actually sensors... one for shift and one for throttle, to the engine with plugs and just like that, your old mechanical controller is directing your digitally controlled engine. And it works so well that we even lose the feedback from our old controller. This new control box retails for \$950 per engine.



When keeping the old engine control binnacle with cable actuators Evinrude can provide a clever converter box. Our test captain is pointing to where the cables are attached which...



...move in and out next to an electro-magnetic device that converts the movement into digital impulses that are...



...transmitted from the underside of the converter box where six wires send digital signals to the engine. By locating the converter box close to the binnacle, friction, and the likelihood of sticky cables is greatly reduced.

Observations

This entire process was done by a man that puts a LOT of hours on his boat, upwards of 150 hrs/yr. And that alone made the decision to upgrade the power plants an easy one. He'll reap the benefits in fuel savings alone in a matter of years. On top of that, he has far greater speed and better handling.

For others, the math has to work, but whatever the case may be, it's still far less expensive than getting a new boat. And for most of us, that's the deciding factor right there. Further, it is hard to put a price tag on the joy of having a sweet running boat with an engine that is low maintenance (no scheduled maintenance for 5 years), auto winterization/storage, and has a 5-year warranty, among other attributes.

Greater Resale Value. Obviously the general condition of the boat is important and this one was in fine condition, making her an ideal candidate for repowering. For all practical purposes she is actually *better* than new.