

A New Engine for an Antique Centurion



A New Engine for an Antique Cessna

By Mike Jones

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As life rolls on, the observant pilot of an uncertain age may notice faint patterns emerge from the woodwork of the world. People who are good at counting on their fingers call these paradigms “Laws of Nature.” I thought there were just a few but now that I’m older there seem to be thousands of them, sprouting from scientific journals and *Cosmopolitan* magazine, coaching us on how to live better, longer, smarter.

As a personal observation, very few of these so-called Laws seem to be truly cosmic. I think big “Laws” should be reserved for hair-on-fire theories, like Einstein’s special theory of relativity (that’s the $E=mc^2$ trick), Newton’s three laws of motion, and the law that states you can never be in the same room as your reading glasses. You know, the important stuff.

Other so-called “laws” are less profound but offer the whimsey of quirky names. Who hasn’t loaded the wife and kids on to the plane just when Mr. Murphy slaps you upside the chin? (“Anything that can go wrong will go wrong, and always at the worst possible time.”) Another one: “Never teach your wife to drive or to play golf.” If I have to explain that, clearly you need medical supervision.

Did you know it's statistically true that buttered-toast actually does fall butter-side down? That's another law. But I digress.

I offer this discourse into the laws of nature is there is one such law which pertains to me, and me alone. It goes like this: if I suddenly am in a situation where I feel the need for a tool, I must resist said urge, pick up the phone, and call an expert.



It seems I was born without the “how-to-fix things” gene. In high school wood shop, the only thing I mastered was duct tape. I drool when I read articles about the tools and spare parts people carry in their airplanes; oh, to have such skill and such

confidence! My buddy Dick builds kitplanes for fun, riveting and welding and bending sheet metal. My wonderful neighbors, Marc and Tom, can disassemble a car and put it back together better than new. Another friend, gimpy Dave, was in my house the other day assembling a beautiful new bookcase. His woodworking skills are so advanced all I could do was fetch things for him. It really hurt my feelings when he wouldn't even let me hold one end of the tape measure.

In a movie long ago, Dirty Harry said, “A man's got to know his limitations.” I am resigned to my fate. You'll never see mechanical magic from these two hands. I may be a wizard with multivariate regressions, but you would never want to fly in a plane I had assembled. You wouldn't even want to be on the ground below it. I am in awe of people like Paul New and Mike Busch

who speak the language of rachets and lapping valves. To me, it's not another language. It's a blank wall. My only mechanical skill is writing checks to my A&P. That's my limitation.

Time's Up

Which brings me back to my favorite aeronautical steed, Centurion N7591N. I've owned this bird for 24 years and have loved every minute of it (except those minutes when the insurance renews). I've flown coast to coast, sailed over a thunderstorm near Atlanta at 27,000 feet; caught the Jetstream and raced from Omaha to near Boston in four hours, and flopped into a grass strip in a thousand feet. One would be hard-pressed to find a more reliable, versatile or capable wingman.

But 24 years is a long time. Like my waist and my hairline, the Cessna's numbers were moving in the wrong directions. Oil consumption creeping up. Compressions drifted down. Take-off rolls stretched longer. Cruise speeds faded slower. Nothing major, nothing dramatic, certainly nothing unsafe. Just the passing of many years and many miles.

A couple of years ago the mighty Continental's TBO came and went. Like an old wine past its prime, or an autumn garden facing the first frost, I could see the end was near.

The only question was, would I pull the trigger or would the engine pull it for me?

Which brings me back to my complete lack of mechanical ability. If the Continental blew a cylinder or threw a valve at some isolate destination, I'd be completely stuck. Assuming I even survived the experience, I'm not going to be replacing a magneto in the outback. I'd be flying mechanics to the scene and maybe hiring a truck to haul a disassembled plane out. Big hassles, big money, big complaints from she-who-must-be-obeyed.

To me, the better idea was to fix the little problem before it became a big problem.

My good friend Paul New, Cessna guru who frequently appears in these pages, cautioned against this decision. “We’ll need to have a talk about euthanizing a perfectly good-running engine in favor of a new one,” he said. “You know that new/rebuilt/overhauled engines have a MUCH higher failure rate than engines that have 2,000 hours?”

Actually, I didn’t know.

My nearly-sainted wife also questioned my wisdom. And my sanity. “Why don’t we just sell the plane?” I remember her asking. But she asks that ten times a day before breakfast, so I didn’t pay no never mind, as they say here in the Carolinas.



By January 2024 I had decided the old engine had sung its last song. Yes, I could have replaced a couple of cylinders. Yes, I could have tolerated the jump in oil consumption. Yes, I could have ignored the slower airspeeds. But it no longer felt *right*. Too much was (very slowly) going too wrong. I felt like Mike Campbell in the “The Sun Also Rises” who, when asked about his bankruptcy, responded it happened in two ways: “Gradually, and then suddenly.”

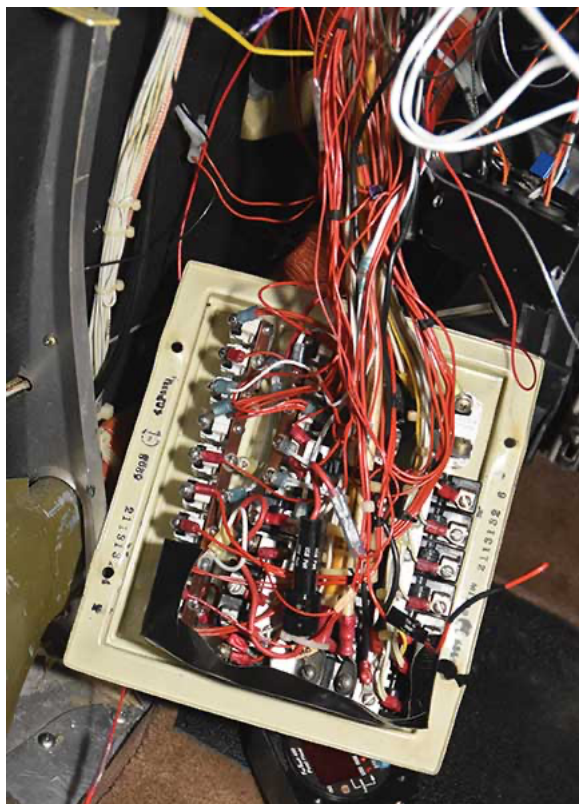
I’ve been in airplanes when things suddenly went wrong. It is most uncomfortable. I don’t want to do it again.

Now comes the complicated calculus of replacementology. Here I caution the reader, “Your mileage may vary.” Everybody approaches these decisions in different ways; your answers will be different than mine.

Question 1 was easy; time for a new engine. But which one? Which cylinders? After looking at the options, Brandon Smith of Pinehurst Aviation Services and I voted for a factory-reman engine, straight from Continental. 520 turbocharged cubic inches, 310 horsepower. Continental ships the engine with new magnetos, new oil cooler, and a new controller. We opted to keep the turbocharger (it had been overhauled just a few years before) and the alternator which only had 200 hours on it.

Question #2 was much tougher: While we have her all opened up, was there anything else which needed to be replaced?

Oh, yes, baby, yes!



New Toys for Baby

N7591N had an early digital engine monitor which wasn't very smart, hard to read, and couldn't store any engine history. Sometime before COVID I had added a digital fuel gauge to replace the unreliable Cessna float gauges. Of course, the tach, the manifold pressure, and the fuel flow also were all Cessna originals. This would be a good time to eliminate all those extra dials, hoses, wires and knobs, if it could be done conveniently.

But A&P Smith urged a complete refresh. My plane was built in 1979. Digital technology basically didn't exist back then, so the instruments are needle-waving analog types. Oil pressure and oil temp are measured by plumbing a tiny pipe with boiling hot oil flowing through the firewall and into the gauge. An amp meter measured the performance of the alternator, although the pointer was so fat the gauge was hard to read. Another needle by my left knee measures the cylinder head temperatures, but with just one probe on one cylinder it leaves you in the dark about the other five. Smith and I agreed we could do better. In the end, everything on the co-pilot's side of the panel will be replaced except the Hobbs meter and a cupholder, which is about all the technology my co-pilot can handle anyway.

Another improvement needed: With my new G5 displays, the airplane had three altimeters. Now I'm a "belt and suspenders" kind of guy, but three altimeters seems a bit much.

To my eyes, the panel on my plane was a work of art. The panel beautiful but fake walnut, custom-made by a company long out of business. Over the years the built-in lights had died, some of the plastic had broken, and other portions delaminated. Most importantly, it could not easily be cut for all the new equipment. Good-bye dear friend, time to go.

In the end, what did not get replaced? The flight instruments. I am very comfortable with my WAAS-enabled Garmin GPS and my six-pack of steam gauges. After much deliberation, I/we/she decided not to replace the other primary flight instruments — one of us felt going fully "flat-screen" was a bridge too far.

The New Configuration

In the end, Smith and I, with a blessing from the Mrs., developed a plan for old '91N.

New engine mounts were one small upgrade. The original Cessna design bolted the engine at four points onto the “keel” of the airplane, right above the nosewheel. History has shown that was insufficient for the weight it was carrying and caused “prop droop” which made even a healthy plane look like it needed some Viagra. The original Cessna mounts also transmitted vibration that made the entire airframe shiver. Years ago I had installed a set of six-point engine mounts that



beautifully resolved all of those issues. Those six-point engine mounts were now twenty-ish years old and didn't owe me any money so we bought a new set from 30 using the original STC from Aeromod. (See photo to compare an old one to a new one.) Ca-ching!

We also replaced the traditional Cessna T210 “wrap-around” exhaust system hated by A&Ps around the world. Smith had found an PMA alternative from Aerospace Welding Inc. that was smaller, lighter, improved cooling over the engine, and dramatically improved ease of access to the engine compartment. Ca-ching again!

All the replacement gauges would be combined in JPI's snappy new EDM-930 engine monitor. The EDM-930 has a big, bright digital screen with seven different displays: the tach, manifold pressure, fuel flow, fuel quantity, cylinder head temperature, exhaust gas temperature, the turbocharger, and a dozen other things I haven't figured out yet.

Importantly, the EDM-930 is certified as a primary flight instrument. That means Smith and his team could remove all of the old engine gauges and other

junk lurking behind the firewall. This is not easy. The ED-930 is tightly integrated into the airplane's other systems. Smith estimates removing all the old stuff and rewiring all the new equipment, probes and power supplies will take more than sixty hours. Ca-ching!

Lastly, I asked Smith to perform a complete annual inspection on the airplane. Since so much of the plane would be disassembled, and the annual would be due in just another month or two, it made sense to kill two stones with one bird. Smith's boss was smiling all the way to the cash register. Ca-ching! Ca-ching!



In mid-January, we pulled the trigger and my almost-sainted wife wrote the first of a whole series of checks. Big, big checks. Lots of them. Good thing I'm cute or she'd had me out on the street.

Continental estimated the lead-time for a factory remanufactured engine at 10-12 weeks. I flew the airplane during most of that time, popping up and down the East Coast. The old Continental never burped, not even once. Finally, on April 15th (ironically, tax day!) I tossed the keys to Smith. He got to work pulling out the panel, removing the accessories on the engine, and prepping for the Big Switch.

To everyone's amazement, the new engine materialized at the shop on April 29th, precisely as predicted. Sitting on its pallet, it's monstrous huge, all

shiny and copper-colored. Smith switched his attention from the old engine to the new one, waving his wrenches like a slightly oily Harry Potter.



Many questions could not be answered until the old engine was off the plane. For example, could any parts of the old exhaust system, such as the exhaust risers, be re-used? We found most could but a few needed to be ordered. A couple of turbocharger brackets

had suffered serious heat erosion. Certain hoses needed to be replaced. A broken cowl flap needed a new bushing. I also asked Smith to look at the throttle, prop and mixture cables to determine if, after 45 years, they had worn and needed to be replaced. We're already doing major surgery on the airplane, so as long as it was disassembled it made sense to check everything that could be checked.

Did It work?

As I write these words, nobody knows the answer. Everything is still in pieces but my editor, bless his blackened heart, stands by his deadlines. Next month, I'll report on the final installation, the test flight, and the break-in routine. As they say on television, "Film at 11!"

About the Author

Mike Jones is a 4,000 hour commercial-rated pilot who has more than 50 aircraft types in his logbook. His pride and joy is a Cessna T210, which has carried him to every corner of the U.S. and Canada for more than twenty years. But he was surprised when he brought the Centurion into the shop after Oshkosh. In next month's edition, he'll explain the scary discovery the maintenance guys made when they looked under the cowl.



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