

We identify your aircraft by tail number, which doesn't leave a lot of room for creativity. But we get lots of interesting monikers for people's cars, trucks, and boats. From Knockarado and Darth Tater to the Tooth Ferry, you can read more about some of the more interesting names we've come across on page 2 of this month's Gas/Diesel newsletter: <http://www.blackstone-labs.com/Newsletters/Gas-Diesel/July-1-2014.php>

Lessons From Lycoming & Continental

by Ryan Stark

Back in 2010 I learned that Lycoming conducts engine training courses near their plant in Williamsport, Pennsylvania. These classes are open to anyone, and since I was eager to hear what they had to say, I decided to attend their next open session.

The drive from Fort Wayne to Williamsport, PA is just over 7 hours. Ohio is a great state, but doesn't really offer much in the way of a view; however Pennsylvania is a different story. The hills and valleys along I-80 were some of the best scenery I've come across. After checking into my hotel, I took a drive around town and quickly figured out that Williamsport isn't really a tourist Mecca, but since I was there on business, it didn't really matter.

Lycoming's Class

Day one started out talking about the history of Lycoming, then moved on to the correspondence an engine owner might receive from Lycoming -- everything from the harmless Service Instruction to the dreaded Airworthiness Directive. Next we covered engine codes and suffixes. If you ever want to know what the J2BD code is behind the TIO-540, take the class and find out!

Day two got into the specifics on engine parts: crankshafts, camshafts, tappets, crankcases, oil pressure, connecting rods, piston-pin plugs, and cylinders. We learned how these parts are made, what their functions are, and the common problems and potential failures those parts can see. We talked a lot about leaning -- Lycoming isn't a big fan of running lean of peak. They suggested following the service instruction, which calls for leaning the engine until the RPM decreases, then making the fuel richer until the engine operates smoothly. Since then, I've decided to start doing it Lycoming's way (I had never learned much at all about leaning during my flight training prior to the class). We also talked a lot about how to run the engine while you're on the ground to avoid plug fouling.

Day three covered compression tests, valves, springs, spark plugs, and lubrication. At the start of the class, my instructor learned that I worked at an oil analysis lab, so he invited me to give a talk about the subject and I did that after lunch. While I think the subject is enthralling and had a great Power Point presentation with lots of handouts, any teacher will tell you the "after lunch" spot is a tough one and I

had a few people dozing off, including the instructor. That didn't really bother me much -- I've done my fair share of sleeping in class, so I tried to keep it short and I always appreciate the opportunity to spread the word about our service.

Another challenge for the instructor was the classroom location. It's right on the airport, so every time a plane landed or took off, everyone's head rubber-necked towards the window, including the instructor. This makes for a fun day if you like flying, but hard to proceed through the class work in a timely fashion!

Finally, day four covered the ignition, exhaust systems, air induction, carburetion, fuel injection, and turbo chargers. Then we broke for lunch and after that we got to take a factory tour, which for me was the highlight of the class.

I have taken a lot of tours of different factories and I always judge a good one by how badly I want to buy the product after I'm done. In this case, I'm glad I didn't have my checkbook with me (and also that it didn't contain many thousands of extra dollars), because I would be the new owner of an IO-360-L2A. The plane for it would come afterwards, I suppose. Moving through the factory, we got to see all the different stages of engine assembly, from the start with the case, to the test run, to the shipping dock. I was extremely impressed with the speed and efficiency of the factory, as well as how clean it was. A class operation all-around.

The Continental Side

After returning home, I wondered if Continental offered the same thing. After a quick Internet search, I found they did, so I signed up. They are based in Mobile, Alabama, which can be considered a very good vacation destination, but a bit longer drive for me -- 13 hours from Fort Wayne as the MINI drives. There are lots of things to see and do along the beautiful shores of the Gulf of Mexico. I especially liked the seafood restaurants, though unfortunately I've become addicted to crawfish, and that's a hard habit to break (or feed, living in Indiana).

Continental's training class is geared more towards the mechanic, whereas Lycoming's is a little more "common-man" friendly, but it was a great class just the same. We covered a lot of the same subjects, but tended to get into more detail about certain things, like why nuts, bolts and washers are often plated with cadmium (it's a great lubricant). Day four talked about Continental's FADEC system for ignition and mixture control, which is so impressive I hope will be in every new aircraft engine as soon as possible. In my mind, anything that simplifies the operation of a piston engine is a good thing. Removing the mixture control would only help keep engines operating as designed and free the pilot up for other things.

After lunch that day was the tour of the factory, and again, I was extremely impressed by the speed and cleanliness of their facility. The precision with which these engines are built is amazing and something everyone should see at some point. If you have any interest in learning more about aircraft engines and want to take a nice vacation, check out one of these classes. You won't be sorry!

Report of the Month

What went wrong with this IO-540?

To learn more about where the elements are coming from, [click here](#).

ELEMENTS IN PARTS PER MILLION	MI/HR on Oil	18	UNIT/ LOCATION AVERAGES	26	39	50	49	UNIVERSAL AVERAGES
	MI/HR on Unit	895		838	845	767	697	
	Sample Date	03/31/13		07/23/12	06/19/12	12/23/11	09/26/11	
	ALUMINUM	8	13	17	27	21	10	8
	CHROME	5	7	3	5	5	2	4
	IRON	20	46	35	59	62	42	29
	COPPER	20	17	16	19	15	15	9
	LEAD	2294	5578	4573	6101	7654	6190	4256
	TIN	1	3	4	0	6	3	1
	MO LYBDENUM	0	0	1	0	0	0	0
	NICKEL	2	3	2	3	3	2	2
	POTASSIUM	0	1	0	1	1	0	0
	BORON	1	1	3	1	3	4	0
	SILICON	9	7	6	10	8	6	6
	SODIUM	2	1	1	0	2	1	1
	CALCIUM	2	3	1	1	0	1	5
	MAGNESIUM	5	12	11	17	19	15	5
PHOSPHORUS	35	611	1063	1024	1236	1085	823	
ZINC	3	5	6	6	5	4	8	
BARIUM	0	0	0	0	0	0	0	

Values
Should Be*

PROPERTIES	SUS Viscosity @210°F	94.5	82-105	94.4	92.2	99.8	101.2
	cSt Viscosity @ 100°C	19.05	16.0-21.8	19.03	18.50	20.30	20.64
	Flashpoint in °F	505	>440	470	475	500	460
	Fuel %	<0.5	<1.0	<0.5	<0.5	<0.5	<0.5
	Antifreeze %	-	-	-	-	-	-
	Water %	0.0	0.1	0.0	0.0	0.0	0.0
	Insolubles %	0.7	<0.6	0.4	0.5	0.5	0.2
	TBN						
	TAN						
	ISO Code						

*THIS COLUMN APPLIES ONLY TO THE CURRENT SAMPLE

This engine had a problem with severe case fretting. The case had something like 900 hours on it when the trouble started. It had been purchased from a reputable company as a rebuild, and in 2011/2012 they noticed aluminum starting to go up in their reports. Soon after the July 2012 report they noticed a puddle of oil under the airplane. It was leaking sufficiently that they didn't feel it was safe to fly, so they shipped it back to the place that had rebuilt it and found it was fretted beyond repair. They ended up working out a deal to have the problem fixed and the bottom half of the engine rebuilt. An expensive fix, but the good news is, the engine is now back in the air and running well.