Duke

FLYERS ASSOCIATION NEWS

Number 07-1 **February 2007**

REMEMBER: **THE NEXT FLY-IN IS OCTOBER 5-7, 2007**
SHREVEPORT, LA (Downtown Airport)

HOSTED BY: **GLEN AND ELLEN ADAMS**

Their company, Royal Air, probably maintains more Dukes than anyone else.

PRESIDENT
Earle Olson
P-352

VICE PRESIDENT
Ralph Cohen
P-412

NEWSLETTER
Jim Gorman
P-596

SPARE PARTS FOR YOUR DUKE

(2) Generators
(2) Starters
(2) Flap Motors
(1) Tach Generator
(2) Magnetos
(2) Landing Gear Motors

Above are located at Aircraft Systems, 5187 Falcon Road, Rockford, IL 61109. They will ship item to you by UPS or Federal Express. You return your part (same day) to them. They will overhaul, charging you for work done, and then item becomes Association emergency part. Phone 815-399-0225.

Cowl Flap Actuator
Electric Boost Pump
Exhaust Transition Pipe
Lycoming Exhaust Pipe #77429
Prop Brush 3E1206-2
Recognition Bulbs DN25-5
A/C Door Actuator
Overhauled Turbo
Oil Cooler (new)
Nose Wheel Tire
Main Gear Tire
Prop Spinner (Less Back Plate)

Above - contact Earle Olson @ P. O. Box 1043, Medina, OH 44258
Phone 330-723-3210 (O) 330-723-9977 (FAX)

Windshields - Contact Gary Bongard @ 952-944-2628

WELCOME NEW MEMBERS

Bernd Ludwig P-563
N181BD
Gruenwald, Germany

Dallas Collins P-88
N7292D
Spring Branch, TX

Robert West P-434
N408FA
Concord, CA

Ralph Markson 56TC
N7QG
Weston, MA

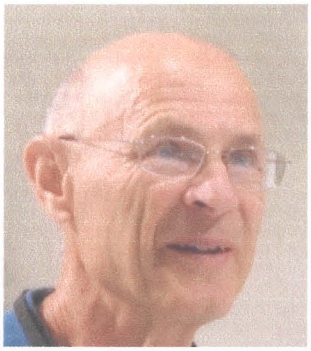
Scott Farrell
(Looking for Duke)
Seattle, WA

Stephen Carter P-260
N51CL
Pocatello, ID

Buddy Miller P-186
N505GE
Mexia, TX

Christopher Ross P-439
N111WK
Adamstown, MD

Rob Irwin P-24
N125CR
Littleton, CO



Comments from our President:

Winter has finally blown into Ohio bringing the coldest temperatures in three years. I've seen some comments on trickle charging batteries to help with cold weather starting. Let's not forgot that Lycoming says that any time the temperature is below 30 degrees Fahrenheit, you need to preheat your engines. I would say that should be 40 degrees and particularly if you haven't flown in more than one week and/or you have summer weight oil in the engines. If you have Tannis type engine heaters to keep your engine warm, they should not be on all the time and only turned on to heat the engine prior to starting. When they are left on all the time, you will get condensation in the engine.

In all the 25 years that I have flown my Dukes, I have never had a problem with low battery power for starting, even when the plane has set for more than a month. I still have the original NiCad battery system.

Winter flying gives you some outstanding take off and climb performance as well as some marvelous winter scenes. It is fun—watch out for ice on the plane and icing in the air. Remember that when you are climbing in ice, do not let your indicated air speed get below 140 knot. You can build up a lot of ice under the wings and it can bite you real fast. Even though our planes are placarded for flight into known icing conditions, it is prudent to get out of it as soon as you can.

We have one of the most beautiful airplanes ever built; let's fly and enjoy them year round.

Safe flying

Earle

There were three different air conditioner belts used on the Duke, all manufactured by Dayco of Dayton, Ohio, who went out of business.

Part	#8114-3355	P247 – P506, P508, P510
Part	#8114-1736	P507, P509, P511 – P596
Part	#8114-3765	P151 – P246

Does anyone have a cross reference chart from Dayco to Gates or another belt manufacturer? Advise Jim Gorman so we can be ready for next summer.

TWO ITEMS OF VERY GOOD NEWS

1) George McCrillis, Oilamatic, is home continuing his recuperation and doing very well. As you can imagine, he has a large back order for his pre oilers; but he is taking orders for April shipment. 303-793-0493

2) Jerry Burnham received both PMA and STC for his lifters. He too is in a back log situation of six weeks or so. Gary Bongard (612-281-5158) is handling orders $4800 per engine. They also have redesigned push rod seals at $256 per engine.

   WITH BOTH JERRY'S LIFTERS AND GEORGE'S PRE OILERS INSTALLED IN THE 541 ENGINE, THERE IS NOW NO REASON WHY 1600 HOURS WILL NOT BE A VERY COMMON OCCURRENCE.

OTHER GOOD NEWS ITEMS

Mike Lilja, Precision Airmotive, Shreveport, LA, one of our members, has two 541 engines for sale. One his company overhauled; the other by Lycoming. He also supplies the alternator conversion kits.

318-222-1611

Trim-Aire of Mexia, TX (KLXY) is another top rated shop (see newsletter 04-2, page 3). They have two Duke trained pilots on staff for ferrying needs. Currently servicing five Dukes. Contact member Buddy Miller at 254-562-2857.

Dismantling Duke's for Parts

Royal Air	318-868-0030	P69, P103, P137, P202
Dodson	785-878-4000	P32, P120, P125, P273
White	800-821-7733	P53, P54, P107, P264, P287, P324, P325, P337, P452
Atlanta	800-237-8831	P104, P106, P113, P151
SVA	530-279-2111	P59, P71, P72, P80, P135, P155, P539
Global	800-561-6448	P73, P134
Aviation Heaven	248-288-6800	A60
Select	800-318-0010	Inventory by Part Number

The Savvy Aviator #40: Checking the Dipstick

January 17, 2007
By Mike Busch, Columnist

The Savvy Aviator

We've been doing it since our earliest days as student pilots. Now that we're aircraft owners, we still do it as part of our standard preflight ritual. But are we doing it right?

It turns out that there's a lot more to checking the engine's oil dipstick properly than just making sure that the oil level is above the minimum-for-flight level listed in the POH. If we really pay attention, we can learn a lot about the condition of our oil and of our engine.

How Much Oil Is Needed?

The engines on my Cessna 310 have 12-quart sumps -- 13 quarts if you include the quart in the spin-on oil filter. When I first acquired the airplane, my mechanic would fill the sump to its maximum capacity at each oil change. It didn't take me long to discover that the engines didn't like that, and promptly tossed several quarts out the engine breathers.

My POH states that the "minimum for flight" oil level is 9 quarts. So I asked my mechanic to service the sump to 10 quarts (instead of 12), and I'd add a quart of make-up oil when the level got down to 9 quarts. That worked better, but I was still seeing a fair amount of oil on the underside of the engine nacelles and the outer gear doors.

After I became a mechanic myself and learned about such things, I checked the Type Certificate Data Sheet (TCDS) for my TCM TSIO-520-BB engines, and found that an oil level of 6 quarts was sufficient to make good oil pressure in all flight attitudes from 23° nose-up to 17° nose-down. Armed with this information, I decided to experiment with lower oil levels.

What I discovered was that oil consumption (and the oily mess on the airframe) was drastically reduced if I maintained the oil level at around 8 quarts on the dipstick. Since then, I've avoided filling the sump to more than 9 quarts, and I normally do not add make-up oil until the dipstick reads about 7.5 quarts. (This still gives me a 1.5-quart "cushion" above what the engine needs to operate reliably in all flight attitudes.)

Mike Busch is co-founder of AVweb, and served as its Editor-in-Chief for more than seven years until it was acquired by Belvoir Publications. He started flying 40 years and 7,000 hours ago, bought his first airplane (a Cessna 182) four years later, and soon became a CFII. After 20 years of owning and flying as a typical "appliance operator," he became increasingly involved in the maintenance of his third airplane, a 1979 Cessna T310R. Before long, Mike began assisting other owners to solve their thorniest maintenance problems as a member of the technical staff of the **Cessna Pilots Association**, and ultimately he earned his A&P ticket and Inspection Authorization.

A well-known aviation writer, Mike's first feature-length aviation article appeared in the May 1970 issue of Air Facts magazine. Since then, he has written hundreds of articles for Aviation Safety, AVweb, CPA Magazine, IFR, Light Plane Maintenance, and The Aviation Consumer.

Mike's latest undertaking, **Savvy Aviator Inc.**, is dedicated to helping aircraft owners become more knowledgeable, confident and empowered to manage the operation and maintenance of their aircraft. Mike conducts weekend seminars for aircraft owners at venues throughout the U.S.

You might wonder why TCM puts a 12-quart sump on an engine that requires only 6 quarts. The answer is that FAA certification requirements demand that the engine be designed to hold twice as much oil as it actually needs:

FAR §33.39 Lubrication system.

(a) The lubrication system of the engine must be designed and constructed so that it will function properly in all flight attitudes and atmospheric conditions in which the airplane is expected to operate. ***In wet sump engines, this requirement must be met when only one-half of the maximum lubricant supply is in the engine.*** *[Emphasis mine]*

There's a lot more to checking the dipstick than just noting the oil level. The appearance of the oil is at least as important as its quantity.

The TCDS for my TSIO-520-BB engines states that maximum acceptable oil consumption is about one quart per hour. If my engines actually used that much oil, then I'd need to fill the sumps nearly to their maximum capacity to ensure that I had enough oil to make a 5-hour flight without risking oil starvation. But since I know from long experience that my engines use about 0.1 quart per hour, there's no reason for me to carry anywhere near that much oil.

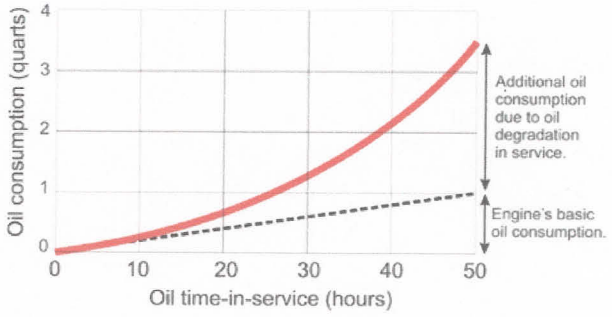
Every aircraft engine installation has an optimum oil level at which oil consumption is minimized and the engine is happiest. I would encourage you to experiment to determine what oil level works best for your airplane. Your engine will operate properly at 50% of its maximum oil capacity -- guaranteed. As long as you keep the oil level a quart or two above the 50% point, your engine will be happy.

The best time to get an accurate dipstick reading is just prior to the first flight of the day. If you check the oil level shortly after the engine has been run for awhile, the dipstick reading will be noticeably lower because a significant quantity of oil remains adhered to various engine components. Another reading taken 24 hours later will often show an oil level that is 0.5- to 1-quart higher.

Oil Consumption?

Having assured yourself that there's enough oil in the engine, your next task is to make note of how much oil your engine is using. Keeping track of oil consumption -- particularly any significant increase in oil consumption rate -- is an important tool for monitoring engine condition.

The most common method of measuring oil consumption is to record how many quarts of make-up oil are added between oil changes, and to divide the total by the number of hours in the oil-change interval. (For example, if the oil is changed after 50 hours and 6 quarts of make-up oil were added during that time, the average oil consumption rate is 50/6 or 8.3 hours per quart.)



Oil consumption isn't linear; it accelerates as the oil deteriorates over time. The rate of consumption during the first 10 hours after an oil change is a good indication of engine condition.

However, this approach obscures the fact that the oil consumption is not linear. If you keep track of when you add each quart of make-up oil, you'll find that less oil is consumed at first, and progressively more oil is consumed as the oil's time-in-service increases (see chart at right).

The reason for this accelerating oil consumption is that the viscosity of the oil decreases as the oil deteriorates. Mineral oils lose viscosity due to a phenomenon called "polymer shearing" in which the long organic molecules are actually broken apart by mechanical action of the engine's moving parts. Multigrade oils also lose viscosity because their viscosity-index improvers oxidize when exposed to high temperatures.

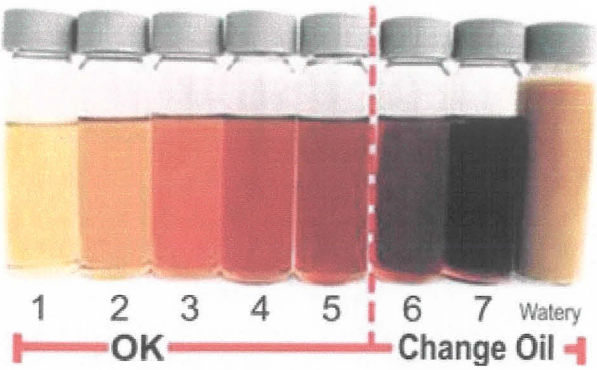
The increased rate of oil consumption provides tangible evidence that your engine oil is getting "long in the tooth" and ought to be changed soon.

What Does Your Oil Look Like?

Whenever you check the dipstick, it's also important to make note of the oil's appearance -- particularly its color and clarity. The oil's appearance offers valuable clues to its condition and that of your engine.

Fresh engine oil has a light amber color and is so transparent that it's sometimes hard to read the dipstick level. As the oil remains in service, it gradually darkens in color and becomes progressively more opaque (see photo at right).

The darkening of engine oil is caused by contamination and oxidation. Contaminants include carbon (soot), lead salts and sulfur from combustion byproducts that get past the compression rings and into the crankcase ("blow-by"), as well as any dust or dirt that gets past the induction air filter. Oxidation of the oil occurs when it is exposed to high localized temperatures at it circulates through the engine, and results in the formation of coke. Various oil additives are also vulnerable to oxidation, particularly the viscosity-index improvers used in multiweight oils.



Color and transparency are important indicators of engine condition. When oil becomes dark and opaque, it should be changed. If this happens rapidly, it suggests that the engine has too much blow-by past the rings, or that oil temperature is too hot.

Dispersant additives are blended in the oil to help keep these so-called "insolubles" in suspension in order to keep the engine clean and minimize sludge deposits. As the quantity of insolubles in suspension increases, the oil darkens and becomes opaque.

It is important to note how quickly this darkening occurs. If your oil remains relatively light-colored and translucent after 25 hours in service, you can be reasonably confident that your cylinders and rings are in fine condition and that your oil can prudently remain in service for 40 or 50 hours. On the other hand, if your oil gets dark and opaque after 10 or 15 hours, you'd be wise to change your oil more often -- perhaps at 25 hours -- and you may want to investigate the possibility that one or more cylinders are excessively worn.

Such rapid discoloration is often a good indicator that the oil is distressed. In one study, 90% of oil that appeared abnormally dark on the dipstick was subsequently found by laboratory analysis to be non-compliant with required specifications. Oil that is dark and opaque from blow-by past the rings is very likely to be rich in acids and other corrosive compounds that can attack your cam and lifters, and that's probably the #1 cause of engines failing to make TBO. Any time your oil appears dark or opaque, you would be wise to drain it and replace it with fresh oil and a new oil filter, regardless of the oil's time-in-service.

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