

Oil the News that's Fit to Print!

Everyone's favorite part of the newsletter is the Report of the Month, so we thought this month we'd give you what you really want to see -- interesting reports and problems that you don't have to deal with! We'll start with this sample from a Meyers/Aero Commander 200D with an IO-550-F engine. Can you tell what's wrong with this sample just from looking at the numbers? We'll give you a hint -- it has to do with potassium and boron, and the owner reported using Rev-X.

Report of the Month

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

COMMENTS

Unless you know that Rev-X (shown at potassium/boron) is an ashless dispersant additive, we'd advise against using it. Non-AD oils can cause build-up and that can lead to detonation. Wear metals are quite high in this sample, and this is enough metal to show a possible problem in the cylinder area, or maybe at brass/bronze parts. We advise a few short oil changes to flush the engine. Monitor closely, and also do a compression/borescope test if you haven't already. Try just 20 hours next time to monitor.

			UNIT / LOCATION AVERAGES		UNIVERSAL AVERAGES	
	MI/HR on Oil					
	40		28			
	215		175			
Sample Date	7/1/2018		9/10/2017			
Make Up Oil Added	1 qt		0 qts			
ELEMENTS IN PARTS PER MILLION						
ALUMINIUM	24	23	21			10
CHROMIUM	34	44	54			8
IRON	192	262	332			52
COPPER	17	15	13			5
LEAD	7513	5812	4110			5280
TIN	2	3	4			1
MOLYBDENUM	15	22	29			4
NICKEL	18	17	15			9
MANGANESE	3	5	7			1
SILVER	0	0	0			0
TITANIUM	0	0	0			0
POTASSIUM	844	422	0			1
BORON	511	256	1			1
SILICON	12	11	9			6
SODIUM	9	6	2			1
CALCIUM	22	11	0			27
MAGNESIUM	1	1	0			1
PHOSPHORUS	171	594	1017			309
ZINC	8	7	5			5
BARIUM	0	0	0			0

Values Should Be*

			VALUES SHOULD BE*	
SUS Viscosity @ 210°F	94.5	86-105	97.5	
cSt Viscosity @ 100°C	19.05	17.0-21.8	19.77	
Flashpoint in °F	435	>430	490	
Fuel %	<0.5	<1.0	<0.5	
Antifreeze %	-		-	
Water %	0.0	0.0	0.0	
Insolubles %	0.6	<0.6	0.3	
TBN				
TAN				
ISO Code				

* THIS COLUMN APPLIES ONLY TO THE CURRENT SAMPLE

Report of the Month

Note the change in aluminum. What's going on in this Superior XPIO-360 engine?
This is a hard one to figure out.

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



OIL REPORT

LAB NUMBER: K36632 UNIT ID:
REPORT DATE: 7/16/2018 CLIENT ID:
CODE: 80/32 PAYMENT: CC: Visa

UNIT	MAKE/MODEL: Superior XPIO-360-B1CC2	OIL TYPE & GRADE: Aeroshell W100 Plus (AD)
	FUEL TYPE: Gasoline (Leaded)	OIL USE INTERVAL: 32 Hours
	ADDITIONAL INFO: Van's RV-7	

CLIENT The owner bought a set of aftermarket valve covers. Unfortunately the manufacturer of the covers did not realize that Superior cylinders have taller rocker arms, which interfered with the covers. He discovered the problem when he spotted hairline cracks on the outside of the covers at oil change time. In the photo you can see the grooves cut in the covers by the rockers, and the burnished marks on the rockers themselves. He went back to stock steel covers.

COMMENTS You hit the nail on the head with this sample -- aluminum did read high. It read unusually high compared with past trends, and we were just starting to wonder what would cause that when we read your note. The good news is that the aluminum didn't appear to make the oil abrasive -- everything else looks very good compared to both averages and trends. We'll look for aluminum to improve over the next couple of samples, since it sounds like you already figured out what was going on. If you have any pictures, we'd love to see. No fuel/water found.

ELEMENTS IN PARTS PER MILLION	MI/HR on Oil	32	UNIT / LOCATION AVERAGES	37	52	35	30	27	UNIVERSAL AVERAGES
	MI/HR on Unit	649		577	500	448	388	358	
	Sample Date	6/29/2018		2/13/2018	10/1/2017	6/30/2017	9/30/2016	5/24/2016	
	Make Up Oil Added	1 qt		1 qt	3 qts	1 qt	1 qt	0 qts	
ALUMINIUM	19	4		3	2	2	2	2	4
CHROMIUM	4	6		5	3	4	3	3	8
IRON	11	14		10	12	16	10	10	16
COPPER	5	8		9	6	4	4	4	8
LEAD	3251	2891		4475	336				
TIN	0	1		1					
MOLYBDENUM	0	0		0					
NICKEL	1	1		1					
MANGANESE	0	0		0					
SILVER	0	0		0					
TITANIUM	0	0		0					
POTASSIUM	1	1		0					
BORON	0	0		0					
SILICON	6	8		5					
SODIUM	1	1		0					
CALCIUM	1	1		0					
MAGNESIUM	0	1		0					
PHOSPHORUS	1233	205		1204	16				
ZINC	4	5		6					
BARIUM	0	0		0					



PROPERTIES	Values Should Be*			
	95.3	86-105	93.4	94
SUS Viscosity @ 210°F	19.25	17.0-21.8	18.80	19.1
cSt Viscosity @ 100°C	505	>460	465	45
Flashpoint in °F	<0.5	<1.0	<0.5	T
Fuel %	-	-	-	-
Antifreeze %	0.0	0.0	0.0	0
Water %	0.3	<0.6	0.4	0
Insolubles %				
TBN				
TAN				
ISO Code				

* THIS COLUMN APPLIES ONLY TO THE CURRENT SAMPLE

Report of the Month

Wow, look at all that metal! Is this a problem or not? Go to the next report to see what the subsequent samples looked like.

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



OIL REPORT

LAB NUMBER: L98097 UNIT ID:
 REPORT DATE: 1/31/2020 CLIENT ID:
 CODE: 63/32 PAYMENT: CC: Visa

UNIT	MAKE/MODEL: Lycoming O-320	OIL TYPE & GRADE: Aeroshell 15W/50
	FUEL TYPE: Gasoline (Leaded)	OIL USE INTERVAL: 25 Hours
	ADDITIONAL INFO: Bellanca	

CLIENT Note in the comments that the owner mentioned two new cylinders. Other than that, you have as much info as we did when we ran this sample. So is it a problem or not?

COMMENTS There's enough metal here to show a pretty serious problem. You did mention 2 new cylinders, so wear-in is likely contributing, but that's not going to give you this much metal. Copper shows a problem at brass/bronze parts. Tin is high as well, so we can't rule out a problem at the bearings. Copper could also be a piston pin plug if those are bronze. There's enough aluminum to show poor piston wear. Chrome is from rings and iron is from steel parts. Silicon could be dirt, but is probably harmless sealer. Cut the filter open if you still have it. Caution.

ELEMENTS IN PARTS PER MILLION	MI/HR on Oil	25	UNIT / LOCATION AVERAGES					UNIVERSAL AVERAGES
	MI/HR on Unit	1,000						
	Sample Date	1/20/2020						
	Make Up Oil Added	1 qt						
	ALUMINUM	144						8
	CHROMIUM	17						8
	IRON	98						28
	COPPER	564						7
	LEAD	2540						2868
	TIN	27						1
	MOLYBDENUM	0						0
	NICKEL	4						2
	MANGANESE	2						0
	SILVER	0						0
	TITANIUM	0						0
	POTASSIUM	0						0
	BORON	2						0
	SILICON	18						7
	SODIUM	3						1
	CALCIUM	5						10
	MAGNESIUM	2						1
	PHOSPHORUS	1308						852
	ZINC	33						6
	BARIUM	0						0

Values Should Be*

PROPERTIES	SUS Viscosity @ 210°F	91.4	82-105				
	cSt Viscosity @ 100°C	18.32	16.0-21.8				
	Flashpoint in °F	485	>440				
	Fuel %	<0.5	<1.0				
	Antifreeze %	-					
	Water %	0.0	0.0				
	Insolubles %	0.3	<0.6				
	TBN						
	TAN						
	ISO Code						

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Report of the Month

The owner sent two follow up samples in quick succession Now what do you think?

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



OIL REPORT

LAB NUMBER: M11199 UNIT ID:
 REPORT DATE: 3/17/2020 CLIENT ID:
 CODE: 63/68 PAYMENT: CC: Visa

UNIT	MAKE/MODEL: Lycoming O-320	OIL TYPE & GRADE: Aeroshell 15W/50
	FUEL TYPE: Gasoline (Leaded)	OIL USE INTERVAL: 7 Hours
	ADDITIONAL INFO: Bellanca	

CLIENT Looks like it may not be a problem after all. We didn't get any info on what, if anything, was happening - just the two follow-up samples. There's still a lot of copper in the oil but 15W/50 oil does react with Lycoming's nitrated coating, causing copper (though not usually to that extent). The shorter oil changes helped bring wear down, of course, but wear rates are also improving. Clearly, an engine can have a lot of metal in the oil and not necessarily have a problem. See our March newsletter for more on what constitutes a problem and what doesn't.

COMMENTS This oil run was about the same number of hours as last time, so it's great to see less metal. Aluminum is low enough that we're no longer worried about piston wear – the quick improvement indicates that it (and iron) was mostly corrosion. Copper and tin still give pause. Those metals aren't affected by corrosion/downtime, and could show a brass/bronze part or even a bearing that isn't wearing like it should be. No confirmation of that yet, though. Copper started pretty high, so let's give it a bit more time for improvement. Check back in 8-10 hours.

ELEMENTS IN PARTS PER MILLION	MI/HR on Oil	7	UNIT / LOCATION AVERAGES	8	25	UNIVERSAL AVERAGES
	MI/HR on Unit	1,283		1,274	1,000	
	Sample Date	3/5/2020		2/14/2020	1/20/2020	
	Make Up Oil Added	0 qts		1 qt	1 qt	
	ALUMINUM	9		32	144	8
	CHROMIUM	2		5	17	8
	IRON	23		38	98	28
	COPPER	147		292	564	7
	LEAD	896		1075	2540	2868
	TIN	9		15	27	1
	MOLYBDENUM	0		0	0	0
	NICKEL	1		1	4	2
	MANGANESE	0		1	2	0
	SILVER	0		0	0	0
	TITANIUM	0		0	0	0
	POTASSIUM	1		1	0	0
	BORON	3		1	2	0
	SILICON	7		8	18	7
	SODIUM	4		2	3	1
	CALCIUM	156		121	5	10
	MAGNESIUM	1		2	2	1
	PHOSPHORUS	1699		1459	1308	652
	ZINC	12		21	33	6
	BARIIUM	0		0	0	0

Values Should Be*

PROPERTIES	90.8	82-105	94.6	91.4
SUS Viscosity @ 210°F	90.8	82-105	94.6	91.4
cSt Viscosity @ 100°C	18.18	16.0-21.8	19.07	18.32
Flashpoint in °F	480	>440	475	485
Fuel %	<0.5	<1.0	<0.5	<0.5
Antifreeze %	-		-	-
Water %	0.0	0.0	0.0	0.0
Insolubles %	0.4	<0.6	0.4	0.3
TBN				
TAN				
ISO Code				

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