

LAB NUMBER: K20144
REPORT DATE: 5/15/2018

**CODE:** 20/32

UNIT ID: N421SM-LH CLIENT ID: 125279 PAYMENT: Verbal, Tlb

LINI

MAKE/MODEL: Continental GTSIO-520-L

FUEL TYPE: Gasoline (Leaded)

ADDITIONAL INFO: Cessna 421C, S/N: 421C1213

OIL TYPE & GRADE: Aeroshell W100 Plus (AD)

OIL USE INTERVAL: 51 Hours

Z L

TLB LEGACY AVIATION 9101 ALTA DR

#106

LAS VEGAS, NV 89145

PHONE:

FAX:

ALT PHONE:

EMAIL:

OMMĖNTS

TLB: Universal averages show typical wear levels for this type of engine after about 35 hours on the oil. Metals are high, but only copper and nickel are high enough to take note of. Copper shows wear at brass/bronze parts. Nickel is typically from exhaust valve guides. If ay nickel cylinders are in use, some extra nickel may be normal. Any excess metal in the oil filter? How were compressions at the last annual? Fuel at 1.0% can show a fuel system problem, but it's right at the cautionary mark. Some of it could just be from normal use. Check back in 40 hours to monitor.

	MI/HR on Oil	51		The state of the state of	-01-02/05 NO STATE	Service of the servic	escentile before	1970	
	MI/HR on Unit	691	UNIT /		UNIVERSE	I MILTHE	PERMIT	La Salata	UNIVERSAL
	Sample Date	5/2/2018	LOCATION AVERAGES		10.1000多数	<b>対応</b> の2004 マク開発	\$2509FA-8539	27-27-28	AVERAGES
	Make Up Oil Added	7 qts	AVERAGES	Separation for the principle	parenting may	1	Kend Harry		
ON			- 213 (85)479						年,中国南海红
$\exists$	ALUMINUM	10	10						6
MILL	CHROMIUM	9	9						以下《新疆图》
Σ	IRON	50	50						39
2	COPPER	14	- 1720 hp 14						·4
PE	LEAD	6645	6645						4691
	TIN	4	1-01-28834						<b>电影性人类</b>
TS	MOLYBDENUM	6	12/46						3
PAR	NICKEL	32	32						15
P/	MANGANESE	1	1						0
Z	SILVER	0	0						0
	TITANIUM	1	1						-0
S	POTASSIUM BORON SILICON SODIUM	0	0						0.587:02
Z	BORON	1	1						上地:
Ψ	SILICON	8	8						6
- <b>6</b> -	SODIUM	1	1						alifornium dalle
급	CALCIUM	2	2						5
	MAGNESIUM	0	0						<b>电影性多数形式</b>
	PHOSPHORUS	1189	1189						288
	ZINC	3	restray 1 mg						4
	BARIUM	0	T-47-76-00						0

## Values Should Be\*

	SUS Viscosity @ 210°F	95.7	86-105			
	cSt Viscosity @ 100°C	19.35	17.0-21.8			
ES	Flashpoint in °F	440	>460			
Ë	Fuel %	1.0	<1.0			
2	Antifreeze %	-	45 July - 100			
PE	Water %	0.0	0.0			
0	Insolubles %	0.5	<0.6			
H H	TBN		Below Contract			
	TAN		in the west			
	ISO Code					

\* THIS COLUMN APPLIES ONLY TO THE CURRENT SAMPLE

416 E. PETTIT AVE. FORT WAYNE, IN 46806

(260) 744-2380

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LIABILITY LIMITED TO COST OF ANALYSIS



LAB NUMBER: K20485

**REPORT DATE:** 5/16/2018

UNIT ID: N421SM-RH CLIENT ID: 125279

CODE: 20/32

PAYMENT: Verbal, Tlb

JNIT

MAKE/MODEL: Continental GTSIO-520

FUEL TYPE: Gasoline (Leaded)

ADDITIONAL INFO: Cessna 421C, S/N: 421C1213

OIL TYPE & GRADE: Aeroshell W100 Plus (AD)

OIL USE INTERVAL: 52 Hours

TLB LEGACY AVIATION 9101 ALTA DR

9101 ALTA DR #106

LAS VEGAS, NV 89145

PHONE:

FAX:

ALT PHONE:

EMAIL:

**DMMENTS** 

TLB: Note that N421SM's left engine type was listed with the "-L" suffix, while the right was not - that does make a difference as far as the universal averages are concerned. If we need to update any records, just let us know. This RAM-built Continental looks fine with wear metals all reading in average ranges. Chrome's on the high side of average, but if the cylinders used in the rebuild were chrome or Millenium steel it may be normal for this engine. Insolubles were high and show the oil filter's capacity was about used up. Good report, so just check back in ~45 hours.

	MI/HR on Oil	52		AND MICH.	425,4309,250998	Berto Control of	Water Charles	でいた。	
	MI/HR on Unit	204	UNIT /	Manager Land	<b>然为证的教</b>	55672.3766	Best	10000	UNIVERSAL
		5/2/2018	LOCATION	principle states	medichining (spring)	1-15 TH 950000	Sales and American	100	<b>AVERAGES</b>
	Sample Date		<b>AVERAGES</b>	distance of	and the state of the state of		Market W	3/43	
Z	Make Up Oil Added	8 qts	20.5-1	aftic andres to.					125 NAR (0)
0			Danie very eth						10
Ì	ALUMINUM	9	9						21 - TORREST
MIL	CHROMIUM	20	20						56
Σ	IRON	58	58						40
8	COPPER	13	13		· ·				
PE	LEAD	5006	5006						5109
	TIN	3	3						2
IS	MOLYBDENUM	11	whether the 1						4
8	NICKEL	29	29						15
A	MANGANESE	1	1						1000年100日
Р	SILVER	Ó	0						0
Z		1 1	1						0.0
(0	TITANIUM	<del>                                     </del>	0						0
TS	POTASSIUM	1 2	2						0
Z	BORON	13	13						on the Williams
¥	SILICON SODIUM		2						· · · · · · · · · · · · · · · · · · ·
<u>-ш</u>	SODIUM	2							4
급	CALCIUM	6	6						- Observable (Co.
	MAGNESIUM	1	1						354
	PHOSPHORUS	998	998						7
	ZINC	6							0
	BARIUM	0	-0						U

Values Should Be\*

SUS Viscosity @ 210°F	95.4	86-105		
cSt Viscosity @ 100°C	19.27	17.0-21.8		
Flashpoint in °F	490	>460		
Fuel %	<0.5	<1.0		
Antifreeze %	-	n duronty do		
Water %	0.0	10.0 m		
Insolubles %	0.6	<0.6		
TBN		1 1995 - 14 20 E		
TAN		4 11 1		
ISO Code				

\* THIS COLUMN APPLIES ONLY TO THE CURRENT SAMPLE

416 E. PETTIT AVE. FORT WAYNE, IN 46806

(260) 744-2380

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LAB NUMBER: K48087

**REPORT DATE: 8/24/2018** 

UNIT ID: N421SM-LH **CLIENT ID: 77676** 

CODE: 20/32

PAYMENT: CC: Visa

FUEL TYPE:

ENT

Continental GTSIO-520-L MAKE/MODEL:

OIL TYPE & GRADE: Gasoline (Leaded)

Aeroshell W100 Plus (AD)

**ADDITIONAL INFO:** 

OIL USE INTERVAL:

66 Hours

Cessna 421C, S/N: 421C1213, 294470-P,

PHONE: (702) 281-9173

SCOTT BULLOCK **APEX AVIATION - HENDERSON** 

1410 JET STREAM DRIVE

ALT PHONE:

**STE 100** 

HENDERSON, NV 89052

EMAIL: scott@apexaviation.aero, info@apexaviationlv.com,

tim@apexaviationlv.com

SCOTT: Usually we like to compare twin engines, but the other side is much newer so we'll evaluate each on its own. This side looks really good, considering the oil has almost 70 hours on it. The only place the engine had a hard time keeping up with the long oil change is insolubles. Those are the solids that collect from heat, use, and blow-by. They should improve next time, especially if the next oil change is a little shorter than this one. Blow-by looks good and no fuel is present. A good report overall.

	MVHR on Oil	66		51	<b>经验证证明的</b>	AND DESIGNATION	· House And Andrews	
	MI/HR on Unit	757	UNIT / LOCATION	691	With the Printers of the last	<b>海湖 新雄</b>	ALC: NAME OF	UNIVERSAL
	Sample Date	8/3/2018	AVERAGES	5/2/2018	有限されず日後の第一年の中心	NAMES AND DESCRIPTION	100	AVERAGES
	Make Up Oil Added	8 qts		7 qts	<b>有限的理論論如 學問</b>	CAMPA SERVICE	<b>经验</b> 医原生物	
			産業金属を					<b>多春季的多年</b> 公
Z	ALUMINUM	7	6	10				<b>###</b>
$\exists$	CHROMIUM	8	5	9				Taxan market
MILLION	IRON	49	26	50				39
	COPPER	12	N	14				Section and 4
E	LEAD	5778	3498	6645				4702
ā	TIN	4		4				MANUFACTURE!
ည	MOLYBDENUM	5	Management of the	6				3
RTS	NICKEL	27	Application 7	32				15 marine 15
A	MANGANESE	1	0	1				Charles Charles O
Z	SILVER	0	機関で活動的0	0				0
	TITANIUM	1	ande O	1				1.0
TS	POTASSIUM	1	2000/10/0000	0				<b>司在自己的</b>
곮	BORON	1		1				a sin with the
EMEN.	SILICON	6	6	8				6
H H	SODIUM	0	90-40 meter 2	1				THE ADDRESS OF
ш	CALCIUM	1	SAMPLY SAMPLES	2				MIN. M. M. M. S
	MAGNESIUM	0	0	0				THE REPORT OF
	PHOSPHORUS	1046	622	1189				289
	ZINC	4	编年 1世紀2	3				AND THE REAL PROPERTY.
	BARIUM	0	O	0				\$500 C 5700

Values Should Be\*

86-105 95.7 SUS Viscosity @ 210°F 95.8 19.36 17.0-21.8 19.35 cSt Viscosity @ 100°C 440 485 >460 Flashpoint in °F <1.0 1.0 <0.5 Fuel % Antifreeze % 0.0 0.0 0.0 Water % <0.6 0.5 0.7 Insolubles % TBN TAN

\* THIS COLUMN APPLIES ONLY TO THE CURRENT SAMPLE

416 E. PETTIT AVE. FORT WAYNE, IN 46806 (260) 744-2380 www.blackstone-labs.com

ISO Code



LAB NUMBER: K48088

UNIT ID: N421SM-RH

**REPORT DATE: 8/24/2018** 

**CLIENT ID: 77676** 

PAYMENT: CC: Visa

MAKE/MODEL:

Continental GTSIO-520-N

OIL TYPE & GRADE:

Aeroshell W100 Plus (AD)

**FUEL TYPE:** Gasoline (Leaded) OIL USE INTERVAL:

ADDITIONAL INFO: Cessna 421C, S/N: 421C1213, 610222

66 Hours

SCOTT BULLOCK

**APEX AVIATION - HENDERSON** 1410 JET STREAM DRIVE

FAX:

PHONE: (702) 281-9173

CODE: 20/32

**STE 100** 

ALT PHONE:

HENDERSON, NV 89052

EMAIL: scott@apexaviation.aero, info@apexaviationlv.com,

tim@apexaviationlv.com

SCOTT: We didn't even talk about how wear improved on the other side, despite this being a 66-hour oil change. Wear has improved on this side too, which is great. Any time you can run the oil longer and get less wear, that's an indication that the engine is in good shape. Iron is 2 ppm higher than last time, but on a per-hour basis it's better than last time and better than average. Insolubles are low on this side, reading down at 0.3%. No water or fuel found. Blow-by is truly excellent. Looks like a great pair of engines on this Cessna!

	MI/HR on Oil	66		52	海岭北山地市	100	<b>美国的</b>	<b>电影</b>	
	MI/HR on Unit	270	UNIT / LOCATION	204	A CONTRACT	Statuping of	State of the last		UNIVERSAL
	Sample Date	8/3/2018	AVERAGES	5/2/2018	4000年400	ないいいである	<b>美国的</b>	N ACCUPATION	AVERAGES
	Make Up Oil Added	8 qts	AVENAGES	8 qts	Secretary Sec	の中では	都統治	<b>与共同的原则的</b>	
			言語作者を必要						學學學學學
NO	ALUMINUM	5	<b>京村</b> (1000)	9					4.5
$\exists$	CHROMIUM	16	18	20					<b>秦秋</b> 夏季新期7
MIL	IRON	60	59	58					37
Σ	COPPER	10	12	13					<b>海州市海峡</b>
ER	LEAD	4970	4988	5006					4397
Ь	TIN	4	<b>新教育的的教育</b>	3					Service of Property
Ś	MOLYBDENUM	7	9	11					Table September 3
8	NICKEL	24	27	29					1000 MARCH 15
PA	MANGANESE	1	は国際で国際の	1					0
Z	SILVER	0	SERVICE OF THE O	0					O
	TITANIUM	1	1965 (1957)	1					0
TS	POTASSIUM	1	動物を対する対象	0					三年,540,000
Z.	BORON	1	2	2					Charles Spice
E	SILICON	7	10	13					6
ä	SODIUM	1	经济心态部第2	2					THE STATE OF
Ш	CALCIUM	1	Securiorista P	6					10000000000000000000000000000000000000
	MAGNESIUM	0	(100年) 100年	1					<b>建筑中的图1</b>
	PHOSPHORUS	1071	1035	998					246
	ZINC	3	5	6					4
	BARIUM	0	THE PARTY OF	0					0
			Values						

## Should Be\*

SUS Viscosity @ 210°F	96.8	86-105	95.4		
cSt Viscosity @ 100°C	19.61	17.0-21.8	19.27		
Flashpoint in °F	475	>460	490		
Fuel %	<0.5	<1.0	<0.5	- The second second second	
Antifreeze %	- /	metric strategic	-		
Water %	0.0	0.0	0.0		
Insolubles %	0.3	<0.6	0.6		
TBN		STORY HIPPORT			
TAN		12.5% (42.5%)			
ISO Code		400 CT (1038/403)			

\* THIS COLUMN APPLIES ONLY TO THE CURRENT SAMPLE

416 E. PETTIT AVE. FORT WAYNE, IN 46806 (260) 744-2380 www.blackstone-labs.com



LAB NUMBER: K76845

UNIT ID: N421SM-LH

**REPORT DATE:** 12/10/2018

**CLIENT ID: 130021** 

CODE: 63/32

PAYMENT: CC: Visa

MAKE/MODEL:

Continental GTSIO-520-L

OIL TYPE & GRADE:

Aeroshell W100 Plus (AD)

FUEL TYPE:

Gasoline (Leaded)

OIL USE INTERVAL:

48 Hours

ADDITIONAL INFO:

Cessna 421C, S/N: 421C1213, 294470-P,

**APEX AVIATION** 2634 AIRPORT DR

STE 106

PHONE: (702) 636-6555

FAX:

ALT PHONE:

NORTH LAS VEGAS, NV 89032

EMAIL: val@apexaviationlv.com

SCOTT: Thanks for letting us know about the new push rod tube seals. Those aren't really wearing parts in the same sense as pistons or rings, but the work required in getting to them could result in some changes on our end. The repairs could account for the additional metal and silicon in this sample. We found similar changes from the right engine too, which goes along with that idea. If only one engine had shown more metal and silicon than before, another explanation would have been more likely. Look for less copper, nickel, and silicon at the next oil change.

	MI/HR on Oil	48		-66	51	100 · 100 ·	(A)	
	MI/HR on Unit	805	UNIT /	757	691	第一个一个种的一个种的是15°	中国的自然和特殊	UNIVERSAL
	Sample Date	11/21/2018	LOCATION AVERAGES	8/3/2018	5/2/2018	The second of the second of the second	and the second of the second	AVERAGES
	Make Up Oil Added	8 qts	AVEIRAGES	8 qts	7 qts	1000000	<b>《新》</b>	
			50 × 50 00 50					<b>发展</b>
ON	ALUMINUM	8	8	7	10			6
$\exists$	CHROMIUM	10	4	8	9			7
MIL	IRON	56	27	49	50			39
2	COPPER	14	6	12	14			海西美国国际4
ER	LEAD	6507	3534	5778	6645			4685
Ь	TIN	3	- 2	4	4			Commence of the second
S	MOLYBDENUM	6	中国中央共和省	5	6			3
8	NICKEL	31	16	27	32			15
PA	MANGANESE	1	0	1.	1			O THE PERSON OF
Z	SILVER	0	0	0	0			0
	TITANIUM	1	0	1	1			0
TS	POTASSIUM	0		1	0			The Average
EN	BORON	1	0	1	1			A (5) A (5)
EM	SILICON	34	9	6	8			6
Ë	SODIUM	1	2	0	1			SERVICE FOR
ш	CALCIUM	2	7	1	2			5
	MAGNESIUM	1	2 0	0	0			党的原理的
	PHOSPHORUS	1149		1046	1189			293
	ZINC	4	2	4	3			4
	BARIUM	0	0	0	0			0
			Values					

Values Should Be\*

SUS Viscosity @ 210°F	94.0	86-105	95.8	95.7	
cSt Viscosity @ 100°C	18.94	17.0-21.8	19.36	19.35	
Flashpoint in °F	475	>460	485	440	
Fuel %	<0.5	<1.0	<0.5	1.0	
Antifreeze %	- 9		-	-	
Water %	0.0	0.0	0.0	0.0	
Insolubles %	0.4	<0.6	0.7	0.5	
TBN	3	- Constant			
TAN	161	Contract Contract of the			
ISO Code	0				

\* THIS COLUMN APPLIES ONLY TO THE CURRENT SAMPLE

416 E. PETTIT AVE. FORT WAYNE, IN 46806

(260) 744-2380

www.blackstone-labs.com



K76846 LAB NUMBER:

UNIT ID: N421SM-RH

**REPORT DATE: 12/10/2018** 

CODE: 63/32

**CLIENT ID: 130021** PAYMENT: CC: Visa

MAKE/MODEL:

Continental GTSIO-520-N

OIL TYPE & GRADE:

Aeroshell W100 Plus (AD)

FUEL TYPE:

Gasoline (Leaded)

OIL USE INTERVAL:

ADDITIONAL INFO:

Cessna 421C, S/N: 421C1213, 610222

48 Hours

**APEX AVIATION** 

PHONE: (702) 636-6555

2634 AIRPORT DR **STE 106** 

FAX:

ALT PHONE:

NORTH LAS VEGAS, NV 89032

EMAIL: val@apexaviationlv.com

SCOTT: There's some extra copper and silicon in this sample, just like we noted for the left engine. Nickel is higher too, though 29 ppm is still just inside the average range for this type of Continental. Chrome is a little out of line at 18 ppm, but that's only an actual increase of a couple ppm. We'll give this engine the benefit of the doubt for now, and assume the changes in wear and silicon are just from the push rod tube seal work. Suggest a follow-up in about 40 hours, just to make sure things are headed in the right direction for both sides of N421SM.

	MI/HR on Oil	48		66	52	March 18		The state of the s	
	MVHR on Unit	318	UNIT /	270	204	4-1	of the state of th	THE MENT STORY	UNIVERSAL
	Sample Date	11/21/2018	LOCATION AVERAGES	8/3/2018	5/2/2018	THE PROPERTY OF		and the second	AVERAGES
	Make Up Oil Added	8 qts	AVERAGES	8 qts	8 qts		ACCUPY.		
			の理解できた。						A STATE OF THE STA
NO	ALUMINUM	8	7	5	9		444		- 5
$\equiv$	CHROMIUM	18	18	16	20				7
MIL	IRON	74	64	60	58				37
	COPPER	12	- 12	10	13				1000 4
ER	LEAD	5900	5292	4970	5006				4404
Д	TIN	5	_ 4	4	3				1
LS	MOLYBDENUM	8	9	7	11				3
R	NICKEL	29	27	24	29				15
ΡA	MANGANESE	1	14000	1	1				0
Z	SILVER	0	0	0	0				0
	TITANIUM	1	and the same	1	1				0
ITS	POTASSIUM	0	0	1	0				<b>包含的</b>
EN	BORON	0	1	1	2				1
EM	SILICON	34	18	7	13				6
	SODIUM	1	<b>元本的特定的</b>	1	2				N. D. W. J. W. J.
ш	CALCIUM	1	3	1	6				C 1217 1 13
	MAGNESIUM	1	全地 344	0	1				<b>二个公司公司</b>
	PHOSPHORUS	1122	1064	1071	998				259
	ZINC	4	4	3	6				4
	BARIUM	0	0	0	0				0

Values

Should Be\*

		000			
SUS Viscosity @ 210°F	92.7	86-105	96.8	95.4	
cSt Viscosity @ 100°C	18.64	17,0-21,8	19.61	19.27	
Flashpoint in °F	470	>460	475	490	
Fuel %	<0.5	<1.0	<0.5	<0.5	
Antifreeze %	-	(4) (1) (2) (4)	-	-	
Water %	0.0	0.0	0.0	0.0	
Insolubles %	0.5	<0.6	0.3	0.6	
TBN		· (************************************			
TAN					
ISO Code		1000			

\* THIS COLUMN APPLIES ONLY TO THE CURRENT SAMPLE

416 E. PETTIT AVE. FORT WAYNE, IN 46806 (260) 744-2380 www.blackstone-labs.com