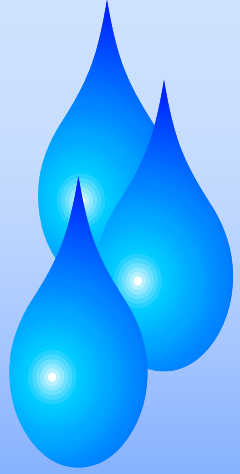
Unleaded AVGAS
Friedrichshafen 2011

HJELMCO OIL AB

Lars Hjelmberg

Executive director.



Aviation Gasoline

A speciality product.

estimated w/w production

~ 1.600.000 ton/year

In volume

< 0.5 % of automotive gasoline

or

< 1/4 of automotive gasoline system

<u>evaporation</u>

Unleaded AVGAS available today

- Hjelmco 91/96 UL for all 91/96, 80/87 octane, Rotax and Kalisz (radial) engines
- UL 91 for Rotax Engines and 80/87 octane engines
- 82 UL for certain 80/87 octane engines (Mogas without ethanol)
- **Nothing for 100/130 octane engines**

From the beginning all Avgas was unleaded

EUROPE 1981

Unleaded Avgas used in

- **all Eastern Block countries**
- **Sweden**

Production sites:

Germany (Böhlen)

Czechoslovakia (Litvinov)

+ more

Sweden 1988

Unleaded Avgas 80/87

used by

Royal Swedish Airforce

+

c:a 30 % of GA fleet.

Sweden 1991

Hjelmco Oil introduced

Avgas 91/96 unleaded

Reason:

80/87 UL potential market c:a 30 %

91/96 UL potential market c:a 70 %

Germany 1992

Unleaded Avgas production in Böhlen (Leipzig) ceased

Petition of maintaining production to the responsible German minister left without action

USA 1995

Textron Lycoming

recognizes

Avgas 91/96 unleaded

as an approved alternate

Avgas for ~ 70 % of the GA fleet

in

Service Instruction 1070 L

1995

Textron Lycoming SI 1070

TABLE OF SPECIFIED FUELS (CONT.)

Engine Models	SPECIFIED FUELS		Alternate Military and Commercial Grades
	Certificated For Use With Grade	Commercial Grade Designation	
O-320-B,-D; IO-320-B,-D; LIO-320-B1A; AEIO-320-D; AIO-320-A,-B,-C; O-480-A; O-360-A,-C; IO-360-B, -E; AEIO-360-B,-H; VO-360-A,-B; IVO-360-A; HO-360-A,-B; HIO-360-B; O-435-A2; GO-435-C2*; O-540-A,-D,-E,-F,-G,-H; IO-540-C,-D,-N,-T; AEIO-540-D	91/96	100LL or 100	91/96 UL or ④100/130 or ④115/145

AVGAS 91/96 UL

Piper PA-23
IO-540-C

Piper PA-30
IO-320-B

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AVGAS 91/96 UL

Piper PA-28-161
O-320-D

Robin 100 R
O-360-A3

Rockwell 114
IO-540-T

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AVGAS 91/96 UL

Cessna 172
O-300

Cessna 150
O-200

HJELMCO OIL AB

Germany 1995
Meeting LBA - Hjelmco Oil

PROJECT:
unleaded Avgas for Germany

PROJECT FAILED

Reason:
No political support

Political support failed

Unleaded Avgas requires new Airport infrastructure – i.e. tanks

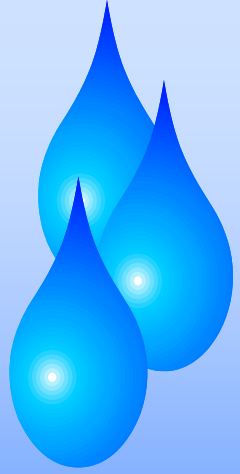
When introduced
unleaded car gasoline got tax break
but
Why not unleaded or Avgas ???

Avgas 91/96 UL

Swedish CAA safety review

1999

Fuel is and has been safe to use



Unleaded Avgas 91/96

Fuel is transparent to Avgas 100 LL

- **made of similar components but of higher purity and quality**
- **100 % mixable with leaded Avgas**
- **just refill and fly**
- **follow Lycoming SI 1409 (correct engine oil)**

Unleaded Avgas under development

Not meeting current AVGAS standard

SWIFT ~ 85 % aromates, ~ 15% isopentane

GAMI unknown formula

86-87 MON super car gasoline (no ethanol)

Meeting current AVGAS standard

100 VLL	100 LL with less lead
94 UL	“similar” to Hjelmco 91/96 UL but of US origin

Avgas under development

not meeting current AVGAS standard

Uphill battle to prove suitability

Parameters in current standard are there for known reasons (trial and error)

If going outside D910 standard concessions in:

performance

safety

reliability

Avgas under development

meeting current AVGAS standard

100 VLL: concession to the US EPA to reduce overall lead in the air (~50 % reduction is researched)

Problem: octane numbers don´t tell the whole story

Unleaded AVGAS 98

performed better than a 100 LL AVGAS

Contradicts earlier data of the need to add about 3 MON in a 100 unleaded AVGAS.

Avgas under development

meeting current AVGAS standard

UL 94 : TCM project, final parameters not set

However – first aircraft already certified – Cirrus 22 T

315 HP turbocharged TIO520 TCM engine.

engine initially rated for AVGAS 100 LL

Hjelmco AVGAS 91/96 UL

in production since 1991 (20 years)

meets or exceeds performance of UL 94

Developments summer/autumn 2010 in Europe.

Air TOTAL launches UL 91 AVGAS

ROTAX approves UL 91 AVGAS both meeting US standard D7547

EASA issues SIB 2010-31 for ”orphaned” aircraft.

Swedish CAA to propose lower fuel taxes in Sweden on unleaded AVGAS.

Avgas UL 91


ALL ABOUT
THE NEW AVGAS UL 91
Total will launch a new, high-quality aviation fuel during the second half of 2010, specially designed to meet the needs of microlight pilots: AVGAS UL 91. We take a closer look at the reasons behind the development.
91

Rotax-SI -912-016-R3
Rotax-SI-914-019-R3
July 13 2010

	Usage / Description	
	912 UL / A / F	912 ULS / S - 914 UL /F
AVGAS		
leaded	AVGAS 100 LL (ASTM D910)	AVGAS 100 LL (ASTM D910)
unleaded	UL91 ASTM D7547	UL91 ASTM D7547
released brand-name		
	HJELMCO AVGAS 91/96 UL [5)]	HJELMCO AVGAS 91/96 UL [5)]
	HJELMCO AVGAS 91/98 UL [5)]	HJELMCO AVGAS 91/98 UL [5)]

What will be the future AVGAS?

A dual AVGAS situation ?

Keeping AVGAS 100 LL for a/c that really need 100 LL and

UL 94 (Hjelmco AVGAS 91/96 UL)

UL91 for the rest of the fleet.

Requires an agreement with EPA and industry.

Air-quality will rule

(amount of lead in the air next to major GA-airports)

Dual AVGAS

Benefits:

- Drop in replacements fuels for 100 LL
- Cheap to produce
- Known products
- Allows for slow elimination of leaded AVGAS during xx-years.
- Allows for new a/c to be certified on UL94.

Dual AVGAS

Disadvantages:

- Production of 2 AVGAS
- Logistics – storage and distribution
- costs for 2 products
- cost for 2 fuel-tanks at the airport

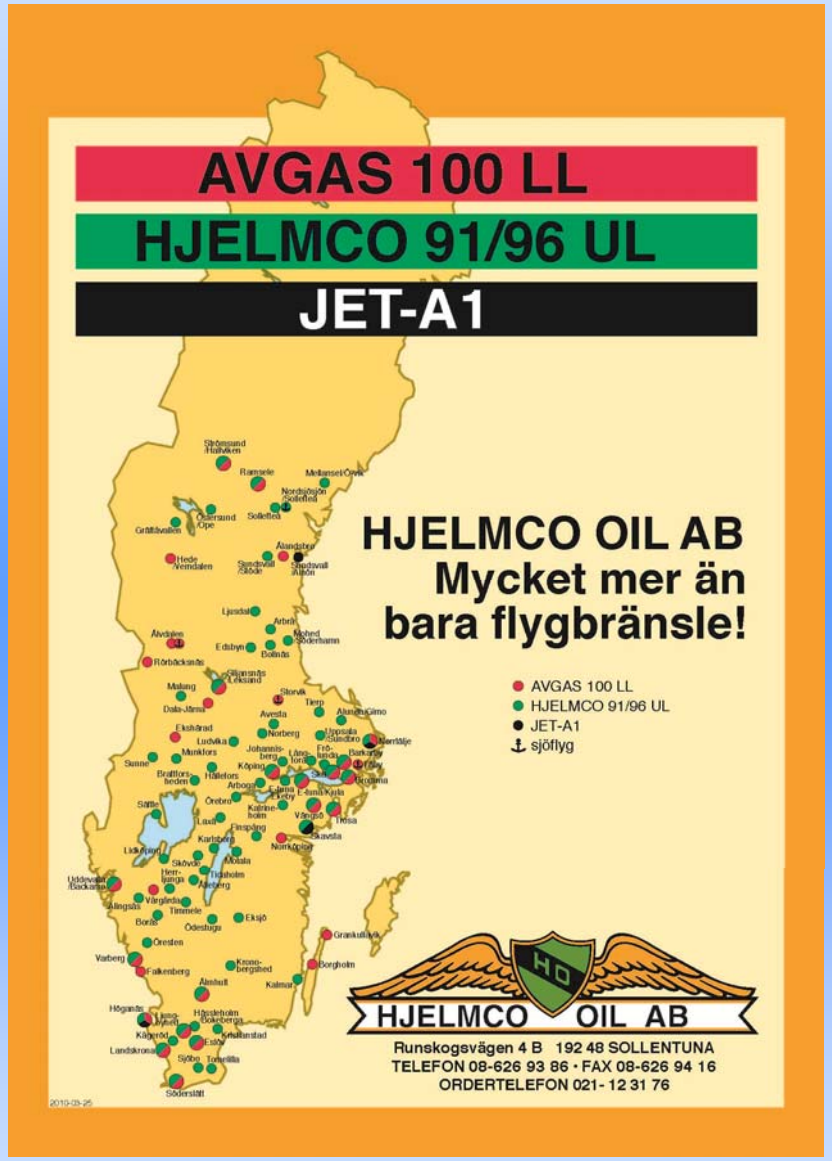
New fuel tank not necessary extra investment for unleaded AVGAS – old 100 LL tank might only be good for xx years allowing for a transition to UL fuel

30 years of Unleaded Avgas in Sweden

Hjelmco 91/96 UL (UL94)

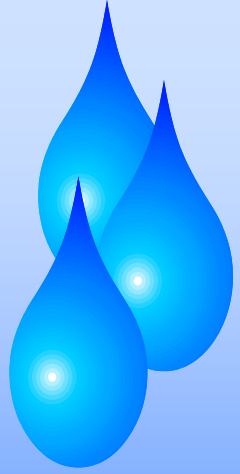
today 2011

- **Available at > 70 airports**
- **used by ~ 1000 aircraft**
- **excellent technical history**
- **approved by piston engine manufacturers covering > 90 % of the entire world piston aircraft fleet.**
- **produced by Hjelmco Oil in Sweden**


AVGAS 100 LL
HJELMCO 91/96 UL
JET-A1
HJELMCO OIL AB
Mycket mer än
bara flygbränsle!
AVGAS 100 LL
HJELMCO 91/96 UL
JET-A1
sjöflyg
HJELMCO OIL AB
Runskogsvägen 4 B 192 48 SOLLENTUNA
TELEFON 08-626 93 86 • FAX 08-626 94 16
ORDERTELEFON 021- 12 31 76

Homework for politicians

Classify aviation fuel-products based on their environmental qualities



Homework for politicians

With an environmental classification of aviation fuels

allow tax-breaks for environmentally better products

What happened with the ETBE – base AVGAS?

- Hjelmco applied for an 100 UL ETBE based AVGAS to the ASTM standardisation committee in 2006.
- this application is still in the ASTM.
- in 2010 a standard for the component ETBE aviation grade has been approved.
- with the GAMI and SWIFT fuels interest seems to have shifted away from ETBE.
- AVGAS is a “political issue

Questions ?

Why follow Lycoming SI 14009* when using unleaded AVGAS?

* engine oils such as

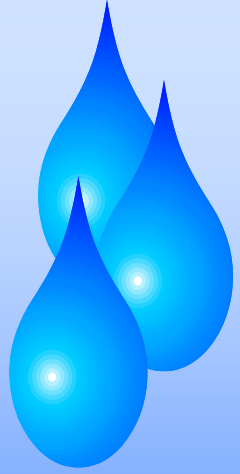
Total AD 15 W-50

Shell W 15 W-50

Shell W80+

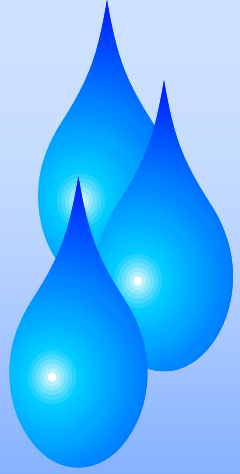
Shell W100+

Answer: TCP helps oil to be better attached to metal parts.



Unleaded Avgas is not the only future for General Aviation but one


SE-KEI
2003.03.12



More to read about unleaded AVGAS

www.hjelmco.com

Thank you

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