


How your POH, and your CFI, may be misinforming you

Adapted from Mike Busch, savvyaviator.com,
Leaning 101 webinar:



<http://www.eaavideo.org/detail/video/2274677932001/webinar--leaning-basics?autoStart=true&q=leaning>

Your POH is not up-to-date, and where it is, it's written by lawyers, not engineers.

Webinar- Leaning Basics
Mike Busch discusses Leaning without fear, the Embry-Riddle experience, a minimal leaning checklist, why full-rich is too rich, how mixture affects po...




EMBRY-RIDDLE
AERONAUTICAL UNIVERSITY



Lycoming Service Instruction #1497

- Minimum prime during engine start
- Lean to max RPM during ground ops (including run-up)
- Lean during all climbs above 3,000'
- Lean during cruise at all altitudes






172R
POH

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- Service bulletin created due to real problems experienced by Embry Riddle due to too rich operations resulting in engines not coming close to TBO.
- Don's tale of the O320 Glastar vs O320 Warrior


Simplified

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**In other words,
lean at all times
except:**

- Engine start
- Takeoff (at density altitudes below 3,000')



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- Lean for runup? YES!
- Lean for landing? YES! (Rich on downwind is lawyer-speak for pilots too dumb to put the mixture in if they have to go around).

How lean – no engine monitor?

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A minimal leaning checklist

**For cruise at any altitude,
lean to the onset of
engine roughness, then
richen just enough to
restore smooth operation**

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- If engine is smooth at peak (Don's is), leave it there. Only change if needed with an engine monitor to manage CHT)

Leaning Results – the math

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“Interesting” mixtures

Stoichiometric

- Chemically perfect ratio
- Peak EGT



Best Power

- $\approx 20\%$ excess fuel—adds $\approx 3\%$ power (1.5% TAS)
- 75°F to 100°F ROP

Best Economy

- $\approx 20\%$ less fuel—subtracts $\approx 10\%$ power (5% TAS)
- 30°F to 70°F LOP (rough?)



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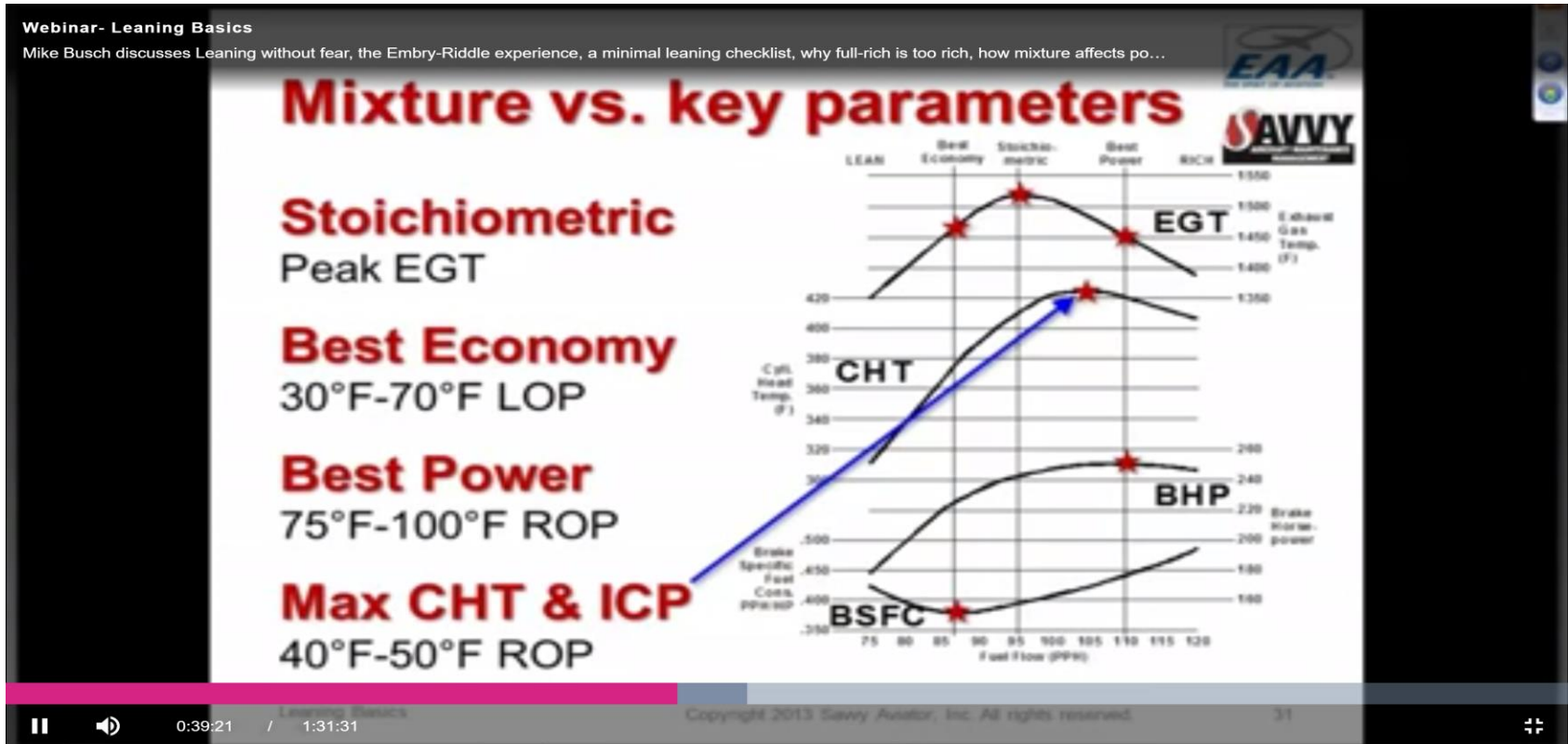
Leaning Basics

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How Things Relate to Each Other



- Stoichiometric = cleanest, best burn
- ICP = Internal Cylinder Pressure


Results

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Key takeaways...

**Best power
→stoichiometric**

**reduces FF by 20%
and TAS by 1.5%**



EAA
SAVVY

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- LEAN TO PEAK EGT. OR A BIT LEANER IF THE ENGINE DOESN'T COMPLAIN (NO ENGINE MONITOR).
- LEANER = COOLER = SLOWER DETONATION, LATER IN CYCLE (changes timing by burning slower), EASIER ON THE CONNECTING RODS, ETC.
- Don results at low altitude cruise from previous practice = -0.5 GPH, +4 kts, -60 Degrees CHT from 420 to 360 degrees.
- Mike Busch results – 2 turbocharged engines currently at 2x TBO.