



Client: Christopher Wrather
Aircraft: N100CW
Flight: 2013-01-15

A/C Type: Cirrus SR22 Normally Aspira...
Engine: Continental IO-550
Monitor: Garmin Perspective

Report Date: 2013-02-08
This is report #1 of subscription
period ending 2014-08-01

Client Comments

Please analyze this flight which includes the test flight profiles. My annual begins next week.

Summary of Findings

GAMI lean test (mixture distribution test) results indicate excellent mixture distribution. LOP mag check (ignition stress test) indicates split magneto timing with R mag advanced relative to L mag. Also the bottom spark plugs in cylinders #3 and #5 seem a bit marginal. T/O fuel flow at 29.0 GPH is a bit higher than we'd like to see; CM specifies a max of 27.3 GPH, although we'd be okay up to 28.5 GPH. CHTs during initial full-power climb are too high (390F) while EGTs are too low (1375F), indicating advanced ignition timing.

GAMI Lean Test

Satisfactory

Sweep #1

Time: 00:25:06-00:27:48
EGT4 peaked at 14.6 (L)
EGT3 peaked at 14.4
EGT1 peaked at 14.4
EGT2 peaked at 14.4
EGT6 peaked at 14.4
EGT5 peaked at 14.3 (R)
GAMI spread is 0.3

Sweep #2

Time: 00:28:00-00:33:48
EGT4 peaked at 14.6 (L)
EGT3 peaked at 14.5
EGT1 peaked at 14.4
EGT2 peaked at 14.4
EGT6 peaked at 14.4
EGT5 peaked at 14.2 (R)
GAMI spread is 0.4

Sweep #3

Not observed in data.

Observations

GAMI spread 0.3-0.4
indicating excellent
mixture distribution.

Ignition

Caution

Non-firing plug(s): None detected.
Marginal plug(s): #3 bot and #5 bot marginal.
Split mag timing: EGT rise on L greater than on R.
Add'l observations: Split timing, R advanced.

Max Power

Caution

Max power FF: 29.0 GPH (vs CM max 27.3 GPH): HIGH.
Max power RPM: 2670 RPM (vs 2700RPM redline): OK.
Maximum MAP: 28.5": OK.
Add'l observations: Recommend 28.5GPH max FF.

Temperatures

Alert

CHTs: 390F during initial full-power climb: too high!
EGTs: 1375F during initial full-power climb: low.
TIT(s): Not applicable (normally aspirated).
Add'l observations: Hi CHT + lo EGT -> adv timing!

Engine Monitor

Satisfactory

Inoperative sensors: None detected
Anomalous channels: None detected
Noisy channels: None detected
Add'l observations: Instrumentation working OK.

Powerplant Mgt

Satisfactory

Power: OK.
Mixture: OK.
Test Profile(s): Well-done.
Add'l observations: No powerplant mgmt issues.

Electrical

Satisfactory

Primary sys: 28.1 volts: OK.
Secondary sys: 28.7 volts: OK.
Other sensors: Not applicable.
Add'l observations: Electrical system working OK.

Recommendations:

Savvy recommends having magneto timing checked and adjusted to specifications ASAP, cleaning and gapping (or replacing) the bottom spark plugs in cylinders #3 and #5, and adjusting high unmetered fuel pressure at the engine-driven fuel pump to reduce T/O FF from 29GPH to no more than 28.5GPH (but no less than 27.3GPH). Once this is done, suggest flying another flight-test profile and submitting new flight data for a follow-up analysis to verify that these items have been corrected.



Explanation of Engine Monitor Data Analysis Report

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Glossary of Abbreviations

EGT - Exhaust Gas Temperature	RPM - Revolutions Per Minute	EGTn/CHTn - EGT/CHT cylinder #n
CHT - Cylinder Head Temperature	FF - Fuel flow	Cyl #1 is right rear on Continental, right front on Lycoming,
TIT - Turbine Inlet Temperature	GPH/PPH - Gallons/Pounds Per Hr.	odd #s on right, even #s on left (as seen from the cockpit).
MAP - Manifold Pressure	ROP/LOP - Rich/Lean of Peak EGT	GAMI - General Aviation Modifications, Inc.
		T/O - Takeoff

Client Comments Section

In this section, the analyst records any relevant client comments pertaining to the analysis. This might include the client's stated reason for requesting the analysis, description of the flight (including any flight test profile protocols flown), description of observed symptoms or abnormal indications (if any), etc.

Summary of Findings Section

In this section, the analyst provides a concise summary of analytical findings, with special emphasis on items that the analyst considers particularly significant, abnormal, or suboptimal. (Much more detail about these findings appears in the next section of the report.)

Analysis Detail Section

In this section, the analyst provides detailed analytical findings in each of seven specific functional areas. The findings for each of these areas are color-coded to indicate whether the analysis considers them to be Satisfactory, Caution, Alert, or Not Applicable. ("Not applicable" generally indicates that the engine monitor data necessary to assess a functional area is either missing or inadequate. Not all engine monitors are capable of capturing the data required to analyze some of these areas.)

GAMI Lean Test: An analysis of mixture distribution quality: the extent to which all cylinders are operating at the same mixture. The "GAMI spread" (measured in term of fuel flow) indicates the mixture difference between the leanest- and richest-running cylinder. (For fuel-injected engines, a GAMI spread of 0.5 GPH or less is desirable.) This test requires that the engine monitor is capable of recording fuel flow and that the flight includes one or more "mixture sweeps" performed per Savvy's flight test protocol.

Ignition: An analysis of ignition system performance: magneto condition, magneto timing, spark plug condition, and ignition harness condition. This test requires that the flight include an "ignition system stress test" (lean in-flight mag check) performed per Savvy's flight test protocol.

Max Power: An analysis of key performance-related parameters -- fuel flow, manifold pressure, and RPM -- at full takeoff power. This test requires that the engine monitor is capable of recording these parameters.

Temperatures: An analysis of key temperature parameters -- CHTs, EGTs and (for turbos) TITs -- during all phases of the flight. Significant exceedences are noted. (Temperature control is the key to engine longevity.)

Engine Monitor: A performance evaluation of the engine monitor instrumentation itself. Any faulty sensors, harness and connector problems, noisy data, and system configuration errors will be noted here.

Powerplant Management: An evaluation of the pilot's powerplant management procedures. This could include power settings, leaning technique, and compliance with Savvy's flight test profile protocols.

Electrical: An analysis of the aircraft electrical system performance, including alternators, batteries, regulators/control units, etc. (Not all engine monitors record this information.)

Recommendations Section

In this section, the analyst may offer recommendations and suggestions for actions to be taken to remediate any less-than-satisfactory items identified by the analysis. These could include engine adjustments, preventive maintenance tasks, and/or changes to the pilot's powerplant management techniques.

CAUTION: Savvy-recommended engine adjustments and maintenance actions should be made only after consultation with a certificated mechanic or repair station. Savvy-recommended changes to powerplant management techniques must be implemented in compliance with the limitations section of the aircraft's Pilots Operating Handbook (POH) or Airplane Flight Manual (AFM) and the engine manufacturer's Operators Manual (or equivalent document).