

FEDERAL AVIATION ADMINISTRATION ACCEPTANCE TEST

(20-24A and FAR 33.49)

Performed by RAM Aircraft Modifications, Inc., using BOP Aircraft Formula 102

FAA Conclusion: "All parts indicated little to no wear."

This type of engine test 150 hours at elevated power output at maximum oil temperature as specified by the FAA-TIA, is equal to a full TBO on the engine used in the test.



RAM AIRCRAFT MODIFICATION, INC.

Waco - Madison Cooper Airport

150 HOUR ENDURANCE TEST A.C. 20-24A

All requirements to comply with **FAR 33.49** with specific variables for TS10-520B engine.

BOP Formula 102

Aircraft Engine Protection for Piston Engines up to 1,000 HP

I. ACCEPTANCE

- A. BOP Aircraft Piston Engine Treatment Formula 102 was accepted for use in aircraft piston engines in the fall of 1981.
- B. To be accepted, BOP Aircraft Formula had to pass the 150 hour endurance test A.C. 20-24A.

II. THE TEST

- A. BOP Aircraft Piston Engine Treatment Formula 102 was tested in an overhauled Teledyne Continental TS10-520-KSB 285 HP turbo supercharged reciprocating aircraft engine prepared to simulate an engine with 700 hours flying time.
- B. The test was designed to put maximum load and wear on the engine in a relatively short time.

To accomplish this:

1. Cylinder head temperature ranged from 410 to 460 degrees F.
 2. Normal cylinder head temperatures range from 320 degrees to 380 degrees F.
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3. During test, oil temperature ranged from 230 degrees to 250 degree. *Normally, oil temperatures range from 145 degrees to 195 degrees F.*
- C. Simulated critical altitude was 16,000 feet - was done by restricting the air intake.
- D. Completed test produced conditions which were equal to 1400 hours of normal wear on a mid-time engine. Normal T.B.O. on this engine is 1400 hours.
- E. All parts of the engine were spectrolite air-gauge micrometer measured before the test.

III. THE RESULTS

- A. After the test, the engine was disassembled and all parts were spectrolite air-gauge micrometer measured.
- B. Some of the findings:
 1. Crankshaft maximum net wear at any measurable point was 4 ten thousandths of an inch (0.0004").
 2. Turbo chargers - 1 ten thousandths (0.0001") wear maximum at any measurable point.
 3. Camshaft - 0.0000: journal wear.
 4. Valve stems - 0.0000" wear.
 5. Complete compatibility with oil, gaskets, miscellaneous greases and sealant used in engine construction.
 6. Oil analysis showed 1 to 2 parts per million (PPM) solids after protection with Formula 102; normally up to 10 to 11 PPM.
- C. Friction test results - "From this data it is assumed that engine friction at take off and cruise RPM's is lowered 25 to 30 percent.

Engine friction in this engine is approximately 15 percent of net horsepower. A reduction in friction of 30 percent would mean a reduction in total friction from 15 percent of net horsepower to approximately 11 percent of net horsepower."
- D. Oil consumption - "Normally acceptable oil consumption under full power averages one quart per two hours. Oil consumption after ten hours of testing was only one pint."

Independent inspection report - "This type engine test - 150 hours at elevated power out put at maximum oil temperature as specified by the FAA TIA - is **equal to a full T.B.O.**"

"I would consider all findings to be better than acceptable standards."

Note: Full test is available for slight charge SaveGas@MoreMPG.com (2" thick document)

The above is only a partial listing of official tests conducted on BISHOP'S ORIGINAL PRODUCTS unique lubrication formula, there have been millions of applications by individual and commercial users.