

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.

Bishop's Original Formula 102
Aircraft Engine Treatment
For Piston Engines up to 1000HP

TYPE INSPECTION AUTHORIZATION

PAGE 1 OF 2 PAGES
PROJECT NO.
E4709SW-D
DATE
July 14, 1980

FLIGHT (Routing Symbol) MANUFACTURING ASW-218 (Routing Symbol)

NAME OF APPLICANT: RAM Aircraft Modifications, Inc. ADDRESS (Number, street, city, state, and ZIP code): Madison-Cooper Airport, P.O. Box 5219, Waco, TX 767

1. INSPECTION AUTHORIZED FOR

<input checked="" type="checkbox"/>	AIRPLANE	OTHER (Specify)	NEW MODEL (Give model no.)	ORIGINAL T.C. DATA SHEET NO.
<input checked="" type="checkbox"/>	ENGINE			
	PROPELLER			
	ROTORCRAFT			
			<input checked="" type="checkbox"/>	ALTERED MODEL (Give name of original manufacturer and model no.) Teledyne Continental Motor TS10-520B

2. CERTIFICATION BASIS
AC 20-24A, dated 4/14/67, FAR 33, as amended on 10/31/74

3. CATEGORY - FOR AIRCRAFT ONLY (Check all applicable items)

<input type="checkbox"/> NORMAL	<input type="checkbox"/> UTILITY	<input type="checkbox"/> ACROBATIC	<input type="checkbox"/> TRANSPORT	<input type="checkbox"/> RESTRICTED	<input type="checkbox"/> OTHER (Specify)
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4. DESCRIPTION OF ALTERATION
Qualification of Formual 102 for use in Continental and Lycoming aircraft engines, and approval of chrome plated piston pin and magneto drive gear.

5. DESIGN SPEEDS - MPH (EAS) - SEE PAGE _____	5. MAXIMUM MACH NO. (DESIGN) - SEE PAGE _____	7. DESIGN WEIGHTS - SEE PAGE _____
8. MAXIMUM OPERATING ALTITUDE (Foot)	9. MAXIMUM CABIN PRESSURE DIFFERENTIAL (p.s.i.)	10. CG. LIMITS - SEE PAGE _____
11. CARGO AND BAGGAGE COMPARTMENTS - LOCATION AND MAXIMUM LOADS - SEE PAGE _____		12. STRUCTURAL/MANEUVERING LIMITS - SEE PAGE _____

13. OPERATION LIMITATIONS

ENGINE MAKE AND MODEL (FOR TURBINE ENGINE SEE PAGE _____)				ENGINE DATA SHEET NO. EBCE			
TCM TS10-520B							
ITEM	ON TAKEOFF (Specify) (Minutes)	LOW RATIO SUPERCHARGER		HIGH RATIO SUPERCHARGER		MAXIMUM ALLOWABLE TEMPERATURE °F.	
		SEA LEVEL	ALT. HEIGHT (Specify) (Foot)	ALT. (MIN) (Specify) (Foot)	ALT. (MAX) (Specify) (Foot)	CYLINDER HEAD (OR COOLANT OUTLET)	WASHER / PATONET
	5		16,000				460
						CYLINDER BASE	
IN. HG.	32	32	32			OIL INLET	240
HP	2700	2700	2700			MINIMUM CARBURATOR HEAT RISE REQUIRED AT _____ % MC POWER	
MP	285	285	285				

14. PROPELLER

MAKE AND MODEL	DATA SHEET NO.	DIAMETER
HUB MODEL NO.	BLADE MODEL NO.	
LIMITATIONS - SEE PAGE _____		

15. ROTORCRAFT	MAXIMUM	MINIMUM	16. INSPECTION REPORT	
POWER ON ROTOR LIMITS - RPM			100-HOUR INSPECTION COMPLETED	YES / NO
POWER OFF ROTOR LIMITS - RPM				

17. COMMENT LIST		18. TYPE INSPECTION REPORT		
IS EQUIPMENT LIST CORRECT AS TO WEIGHT AND AMT OF EACH ITEM	YES / NO	<input checked="" type="checkbox"/>	COMPLETE APPLICABLE PORTIONS OF TYPE INSPECTION REPORT, PART 1	
		<input checked="" type="checkbox"/>	COMPLETE APPLICABLE PORTIONS OF TYPE INSPECTION REPORT, PART 2	
EQUIPMENT LIST ATTACHED	YES / NO	<input checked="" type="checkbox"/>	SEE ATTACHED PAGES FOR INSTRUCTIONS	
		<input checked="" type="checkbox"/>	SEE ATTACHED PAGES FOR SPECIAL TESTS (Outline alterations of equipment/aircraft)	

CONCURRENCES

ORIGINATED BY	ROUTING SYMBOL	INITIALS	ROUTING SYMBOL	INITIALS	ROUTING SYMBOL	INITIALS
	ASW-214	DEG/LK	ASW-210B	RPL/SPB		
	ASW-218	WJD/B				

DATE: 7/16/80 TITLE: Acting Chief, Eng. & Manufacturing Branch SIGNATURE: C. J. Stone

I. ACCEPTANCE

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

II. THE TEST

- A. Bishop's Original Aircraft Piston Engine Treatment Formula 102 was tested in an overhauled Teledyne Continental TS10-520-KCB 285 H.P. turbo supercharged reciprocating aircraft engine prepared to simulate an engine with 700 hours flying time.
- B. Test was designed to put maximum load and wear on the engine in a relatively short time. To accomplish this:
 - a. Cylinder head temperatures ranged from 410 to 460 degrees F.
 - b. Normal cylinder head temperatures range from 320 degrees to 380 degrees F.
 - c. During test, oil temperatures ranged from 230 degrees to 250 degrees F.
 - d. 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 TBO on this engine is 1400 hours.
- E. All parts of the engine were spectrolite air-gauge micrometer measured before the test.

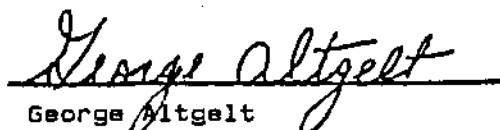
III. THE RESULTS

- 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. Turbochargers - 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.

THE RESULTS (cont'd)

6. Oil analysis showed 1 to 2 parts per million solids with Bishop's Original; normally up to 10 to 11 parts per million.
- 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."
- E. 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."


George Altgelt
FAA DER SW-246

This report was furnished in its entirety to the manufacturer and has been shown in this abbreviated short form to be concise.