

National Transportation Safety Board

Office of Aviation Safety

Washington, DC 20594



ERA25LA127

ENGINE EXAMINATION

March 28, 2025

Exam Information	
NTSB ID:	ERA25LA127
Accident Location:	Mayo, MD.
Accident Date:	2/22/2025
Aircraft Registration:	N781FM
Exam Location:	Anglin Recovery, Clayton, DE.
Exam Date(s):	3/25/2025

Exam Participants	
Name	Organization
Lucas Winn	National Transportation Safety Board

Engine Information					
			Source		
Make	Lycoming		Dataplate	Mx Logs	Other
Model	O-360-A4M		☒	☐	☐
Serial Number	L-30169-36A		☒	☐	☐
# Cylinders	4	Horsepower	180	Engine Position	Front
Notes					
An examination of the airplane and engine was performed. Examination of the engine found no abnormalities that would have prevented normal operation, apart from the impact-damaged propeller. A slave propeller was installed, and an engine start was initiated on the test stand. The engine started immediately, idled, accelerated, and ran smoothly at full power for several minutes without interruption and no anomalies noted. A magneto check was performed with no anomalies noted and oil pressures indicated were in the normal range. Engine power was reduced to idle where the engine ran smoothly without interruption and with no anomalies noted. Magneto grounding check was normal, and a slight rpm rise was heard when mixture was pulled to idle cutoff. Engine was stopped with the mixture placed at the idle cutoff position. A post-run inspection of the engine revealed no leaks and no abnormalities.					

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Left / Dual Magneto

	Yes	No	
Dual Magneto?	☐	☒	
Destroyed?	☐	☒	
Electronic?	☐	☒	
Hold down nuts secure?	☒	☐	
Impulse Coupling?	☒	☐	
Impulse Working?	☒	☐	
Timing Checked	☒	☐	25# Degrees
Sparked all Leads?	☒	☐	
Notes			
Magneto to engine timing was checked and found to be within tolerance.			

Right Magneto

☐ Not Applicable

	Yes	No	
Destroyed?	☐	☒	
Electronic?	☐	☒	
Hold down nuts secure?	☒	☐	
Impulse Coupling?	☐	☒	
Impulse Working?	☐	☐	NA
Timing Checked	☒	☐	25# Degrees
Sparked all Leads?	☒	☐	
Notes			
Magneto to engine timing was checked and found to be within tolerance.			

Starter

☐ Not Applicable

	Yes	No		Yes	No
Bendix Drive Engaged?	☐	☒	Rotational Scoring?	☐	☒

Notes

Starter was undamaged and functional.

Alternator / Generator

☐ Not Applicable

#1			#2		
	Yes	No		Yes	No
Belt / Drive Shaft Intact?	X		Belt / Drive Shaft Intact?	☐	☐
Drive Type	Belt Drive		Drive Type	Choose an item.	

Notes

Alternator and Drive belt were undamaged and functional.

Vacuum Pump

☐ Not Applicable

#1			#2		
	Yes	No		Yes	No
Pump rotates by hand?	☐	☐	Pump rotates by hand?	☐	☐
Drive Shaft Intact?	☐	☐	Drive Shaft Intact?	☐	☐
Carbon Vanes Intact?	☐	☐	Carbon Vanes Intact?	☐	☐

Notes

The vacuum pump was secured to the engine accessory housing. It was not removed.

Sparkplugs

Brand	Part Number	Type
Champion		Massive Electrode

TOP PLUGS

#	Normal	Worn Out Normal	Worn Out Severe	Lead Fouled	Carbon Fouled	Oil Fouled
1	☒	☐	☐	☐	☐	☐
2	☒	☐	☐	☐	☐	☐
3	☒	☐	☐	☐	☐	☐
4	☒	☐	☐	☐	☐	☐
5	☐	☐	☐	☐	☐	☐
6	☐	☐	☐	☐	☐	☐

BOTTOM PLUGS

#	Normal	Worn Out Normal	Worn Out Severe	Lead Fouled	Carbon Fouled	Oil Fouled
1	☒	☐	☐	☐	☐	☐
2	☒	☐	☐	☐	☐	☐
3	☒	☐	☐	☐	☐	☐
4	☒	☐	☐	☐	☐	☐
5	☐	☐	☐	☐	☐	☐
6	☐	☐	☐	☐	☐	☐

Notes:

The spark plugs displayed coloration consistent with normal engine operation and the electrodes were normal when compared to the Champion AV-27 Check-a-plug chart.

Induction System

Air Filter(s)					Comments
Pre-Filter Condition	Missing Pieces NOT present in induction sys or carb				Not present for the engine examination.
Air Filter Condition	Unknown				Not present for the engine examination
#	Attached	Separated	Impact Damage	Fire Damage	Comments (leaks,staining, cracking)
1	☒	☐	☐	☐	
2	☒	☐	☐	☐	
3	☒	☐	☐	☐	
4	☒	☐	☐	☐	
5	☐	☐	☐	☐	
6	☐	☐	☐	☐	

Notes:

There was no evidence of fuel or manifold leakage. The carburetor air box was partially crushed with the carb heat valve seized in the mostly open position.

Exhaust System

#	Attached	Separated	Impact Damage	Comments (broken bolts, missing gaskets, etc.)
1	☒	☐	☐	
2	☒	☐	☐	
3	☒	☐	☐	
4	☒	☐	☐	
5	☐	☐	☐	
6	☐	☐	☐	
Condition of Exhaust Cone:				NA
Condition of Heater Muff:				Undamaged
Condition of Cross Tubes:				NA
Condition of Muffler Baffling:				Undamaged
Notes:				
The exhaust system was attached and undamaged. 5 inches of the exhaust pipe had been cut by the recovery company due to impact damage. No other damage was found to the exhaust system.				

Ignition Harness

	Yes	No		
Tested Harness?	☐	☒	Condition:	Intact - Undamaged
Notes:				
The engine was run with ignition harness installed.				

Engine Fuel System

Fuel System Type:	Carburetor			
Inspection Items	Yes	No		
Destroyed?	☐	☒		
Fuel present at fittings?	☒	☐	Note location(s) you are saying yes for.	
Throttle plate binding?	☐	☒		
Throttle arm engages shaft?	☐	☒		
Diaphragm condition (fuel injector)	Choose an item.			
Fuel Screens	Condition			
Carb. / Injector Inlet	Choose an item.		Not checked	
Aircraft Main Strainer / Gascolator	Unknown			
Cables	Attached		Full Travel	
	Yes	No	Yes	No
Throttle	☐	☒	☐	☐
Mixture	☐	☒	☐	☐

Notes:

The engine fuel system was intact. There was no damage to primer lines, the carburetor was undamaged, and the throttle and mixture arms moved freely through their full range of travel. The engine controls were disconnected at the time of transfer of the engine from the airplane to the test stand.

Engine Driven Fuel Pump

☐ Not Applicable

Pump Type:	Diaphragm						
	Yes	No					
Destroyed?	☐	☒					
Gear Driven Pump - spins freely	☐	☐					
Diaphragm pump – inlet suction present?	☒	☐					
Fuel present at fittings?	☐	☒	Note location(s) you are saying yes for.				
Diaphragm(s)	Upper: Intact		All diaphragms remained intact				
	Lower: Choose an item.						
Notes							
The fuel pump remained secured to the accessory housing and was undamaged. The inlet and outlet hoses were disconnected during transfer from the airplane to the test stand and reconnected once on the stand.							

Flow Divider & Injector Nozzles

☒ Not Applicable

Nozzle Type:	Choose an item.				
	Yes	No			
Injector lines secured?	☐	☐			
Restrictor (orifice) present?	☐	☐			
Blocked fuel nozzles?	☐	☐			
Flow divider lines secured?	☐	☐			
Fuel Manifold Diaphragm Condition	Choose an item.				
Notes:					

Engine

	Date	Hours	Performed By													
Annual Inspection																
Last Overhaul																
Inspection Items	Yes	No	Borescope Results													
Camshaft to crankshaft continuity?	☒	☐														
Crankshaft rotation 720°	☒	☐														
Cylinders																
# Cylinders	1		2		3		4		5		6		7		8	
	Y	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y	N
Thumb Compression	☒	☐	☒	☐	☒	☐	☒	☐	☐	☐	☐	☐	☐	☐	☐	☐
Valve Action Observed	☒	☐	☒	☐	☒	☐	☒	☐	☐	☐	☐	☐	☐	☐	☐	☐
Notes																

Performed borescope inspection of all cylinders. Valves on all four cylinders showed uniform heating with no evidence of overtemperature or hot spotting. Cylinder bores were smooth with uniform crosshatching and no scrape marks on the cylinder walls. All four pistons were dry with normal lead buildup and no evidence of valve strikes or damage. Cylinders 2 and 4 displayed clean, crankcase oil residue in each cylinder likely due to the resting position of the airplane and the engine at both the crash site and its initial recovery site. Thumb compression and suction was confirmed on all cylinders. The intake and exhaust valves opened and closed normally during crankshaft rotation, and there was no damage or abnormalities to the rockers. The crankshaft had freedom of movement through the entire firing order. The magnetos provided adequate spark for ignition.

Lubrication System

Oil Suction Screen:		Not Checked	
Oil Pressure Screen:			
Oil Filter:	Unobstructed		
Notes			

The oil sump was undamaged and contained 6 quarts of oil as indicated on the dip stick. The Oil filter was removed, inspected for contaminants and/or blockages and found unobstructed and absent of debris. The oil filter was then reinstalled for the engine run.

Propeller

Manufacturer:	Hartzell	Part Number:	
Type:	Fixed Pitch	Blade Type:	Metal
# Blades:	2		

Notes

A serviceable 2 blade Hartzell Propeller was installed on the engine to facilitate the engine run.

Governor

☒ Not Applicable

Manufacturer:		Part Number:	
Type:	Choose an item.	Blade Type:	Choose an item.
Inspection Items	Yes	No	
Does the drive rotate?	☐	☐	Gasket Screen Condition?
			Choose an item.

Notes

Submitted by:

Lucas Winn

Aviation Accident Investigator

Engine Examination

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