



NATIONAL TRANSPORTATION SAFETY BOARD

Office of Aviation Safety
Washington, D.C. 20594

August 27, 2022

EXAMINATION SUMMARY

ERA22FA384

A. ACCIDENT

Location: Osteen, Florida
Date: August 24, 2022
Time: 1639 EDT
Airplane: MXR Technologies MX2, N263MX

B. INVESTIGATION PARTICIPANTS

Lynn Spencer - IIC
Eastern Region Aviation (ERA)
National Transportation Safety Board
Ashburn, VA

James Childers
Air Safety Investigator
Lycoming Engines
Williamsport, PA

Michael Loehlein
Aviation Safety Inspector
Federal Aviation Administration
Orlando, FL

C. ACCIDENT SUMMARY

On August 24, 2022, at 1639 eastern daylight time, an amateur built MXR Technologies MX2, N263MX, was substantially damaged when it impacted terrain in Osteen, Florida. The private pilot and foreign national passenger were fatally injured. The airplane was operated by the Mondiale Aircraft Sales and Services, Inc. as an aerobatic training flight conducted under the provisions of Title 14 Code of Federal Regulations Part 91. Visual meteorological conditions prevailed, and no flight plan was filed for the local flight which originated from the Spruce Creek Airport (7FL6), Daytona Beach, Florida, at 1632.

The airplane impacted a wooded marshy area about 145 ft and 234° of the of the last track data point and came to rest inverted, oriented on a 98° heading at coordinates 28.92148°, -81.06446°. The wreckage was intact, and there was a strong fuel odor but no evidence of fire. Broken plastic canopy pieces were adjacent to the canopy area. The engine with propeller hub attached remained attached to the firewall and was mostly submerged in the soil with the lower engine cowling resting forward of the engine. The empennage was fractured aft of the rear pilot seat, aligned with the fuselage and canted inverted-left-elevator down (if turned upright, the empennage was canted slightly clockwise to the fuselage when looking from the tail). The top of the vertical stabilizer was embedded in the soil. The debris field was limited to within one foot of the perimeter of the airplane. Examination of the trees and shrubs in the immediate vicinity of the wreckage revealed no upset or damage, indicative of the airplane impacting the marsh in a near vertical, inverted, flat attitude.

The wreckage was recovered to Florida Air Recovery, where the examination took place on August 27, 2022. The wreckage was viewed again and additional photos taken on August 29, 2022.



Photo 1 - Wreckage from front before layout and examination



Photo 2 - Wreckage from rear before layout and examination

D. EXAMINATION SUMMARY

Airframe examination could not establish elevator and left aileron control continuity. Engine examination revealed no preimpact anomalies that would have precluded normal operation.

1.0 Airframe

As first viewed at recovery, the airplane fuselage was resting upright on the main landing gear at the facilities of Florida Air Recovery. The engine remained attached to the firewall through the tubular engine mount and was resting nose down on the floor. The fuselage was fractured aft of the firewall and the airplane's nose section remained partially attached to the fuselage through hoses, control cables, tubes, and hoses. The wings had been removed for recovery, and a bent elevator tube near the empennage fracture area reportedly separated when the airplane was being recovered. The empennage was inverted at the location of the fuselage fracture, with one rudder cable still attached to the empennage section. Cables and wires had been cut during recovery when the battery began to spark.

Airframe Examination

The lower fuselage structure was intact to the just aft of the rear pilot seat and bulkhead, and the canopy frame and other pieces of the canopy were fractured along the bond line to the lower

fuselage. Canopy pins were present as were a few pieces of the plastic canopy. The cockpit seats and parachute packs were present although not in the cockpit.

The empennage was intact although fractured along the bond line of its upper and lower surfaces and separated from the fuselage aft of the rear bulkhead. The elevators remained attached to the horizontal stabilizer and the rudder remained attached to the vertical stabilizer at the bottom attachment point. The top front section of the vertical stabilizer was missing forward of the top rudder attachment point.

The left wing with aileron and aileron spade blade intact displayed no fractures or leading edge damage. The right wing with aileron and aileron spade blade intact displayed a tear-fracture mid-span with deformation to the second most outboard aileron attachment point. Recovery personnel stated that they cut through all rods, hoses, and spars when they removed the wings for recovery and that a total of 10-15 gallons of fuel drained from the wings (in total). About 1/2 gallon of fuel drained from the right wing fuel line when the wing was turned upright during the examination.

Flight Control System

Flight control cable continuity was partially established due to numerous fractures and a cable cut and tube fracture at recovery. Only rudder continuity could be confirmed.

Left rudder continuity was confirmed from the cockpit rudder controls to the control surface. Right rudder continuity was confirmed from the cockpit to the control surface thru a cut made for recovery. Examination of the tailcone revealed damage to the left empennage where the rudder control cable exited the empennage to attach to the rudder control horn. Examination of the rudder control horns revealed chipped paint and deformation on the left rudder control horn and chipped paint on the right rudder control horn resulting from empennage contact. The rudder cables had detached from their interior empennage attachment points.

Right aileron continuity was confirmed from the cockpit to control surface through the cut at the wing root for recovery. Left aileron continuity was confirmed from the control surface to the wing root, where the push/pull tube was cut for recovery. There were no left aileron tube or rod present from the wing root cut to a fractured rod end thread at the aileron torque tube bell crank in the cockpit. Recovery personnel indicated that they cut this aileron tube to remove the wing and this missing section may have fractured and been lost during recovery in the marsh.

Elevator control continuity was confirmed from the cockpit control column to just aft of the lower bulkhead behind the rear pilot seat, where there was a bend fracture 17 1/2 inches aft of the elevator torque tube end fitting. Recovery personnel stated that this torque tube was very bent but still intact until they attempted to load the fuselage onto the trailer for recovery. There was a 40-inch span of torque tube leading to a second fracture about 20.5 inches forward of the aft bell crank. This fracture corresponded to where the torque tube was positioned at the aft bulkhead opening with the elevator control surface in the full upward position. The torque tube passed through the bulkhead opening 16 inches forward of the aft bell crank with the elevator control surface in the full down position. Examination of the aft fracture surface revealed deformation of

the torque tube and paint transfer 5-6 inches aft of the fracture. Examination of the center span of the fractured torque tube revealed a “dent” with chipped paint about 7 inches forward of the aft fracture, and abrasion damage about 3 inches farther forward. All three sections of the fractured elevator torque tube were sent to the NTSB Materials Lab for more detailed examination.

Airframe Fuel System

The fuel selector handle was found in the left position. Fuel drained from both wings at recovery with no water or debris present. The forward fuselage fuel tank was breached and fragmented.

Landing Gear

The tailwheel and fixed landing gear remained attached. Examination revealed impact damage to the lower rudder immediately above the tailwheel steering arm.

Seats and Seatbelts

The front and rear seats were detached from their mounts for pilot recovery. The pilots remained in their seats with seat belts fastened until recovery.

Instrument Panel/Cockpit Controls/Switches

The instrument panel sustained significant impact damage. The altimeter reading was 820 ft at an altimeter setting of 1014 millibars.

The propeller and mixture control knobs were fully forward. The cockpit throttle control lever was detached and observed.

Airframe Examination Photos

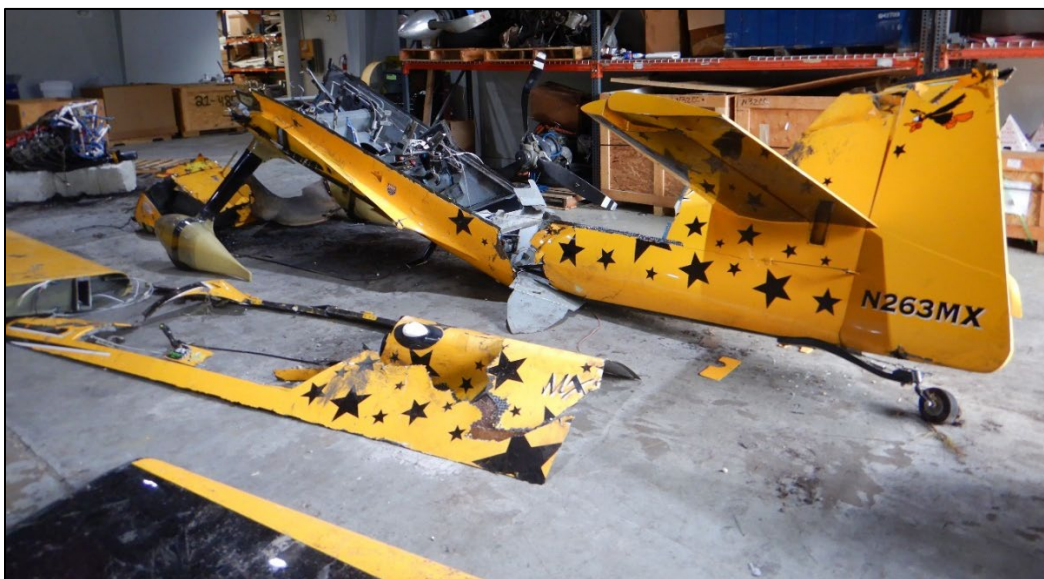


Photo 3- Fuselage, empennage and fractured canopy structure



Photo 4 - Fuselage fracture aft of rear bulkhead



Photo 5- Empennage



Photo 6 - Inverted right wing with aileron spade blade



Photo 7 - Left Wing



Photo 8 - Close-up photo of forward elevator torque tube fracture



Photo 9 - Photo of aft elevator torque tube fracture at rear bulkhead



Photo 10 - Elevator control tube with fractures after removal



Photo 11 - Aft fracture surfaces of elevator torque tube and abrasion damage



Photo 12 - View of aft elevator torque tube fracture and abrasion



Photo 13 - Close-up view of left rudder horn and empennage damage

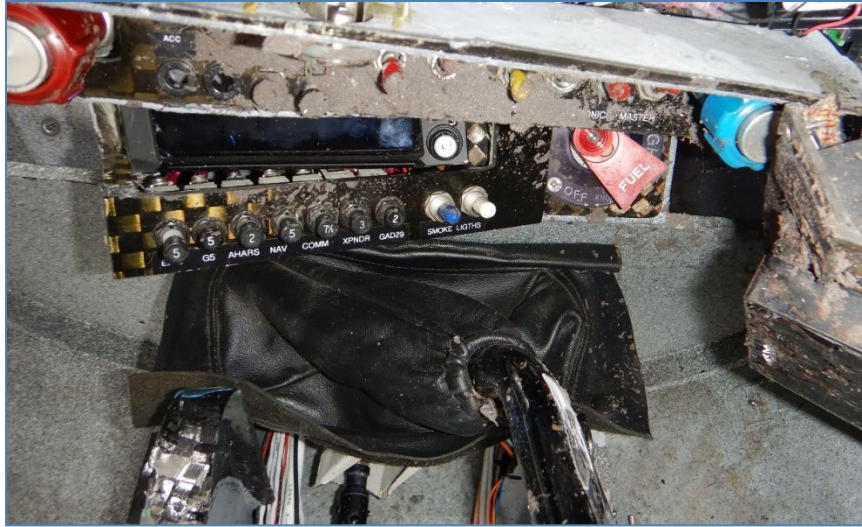


Photo 14 - Cockpit controls

2.0 Engine

A review of copies of the aircraft and engine maintenance logbooks revealed that the engine was assembled by Ly-Con Aircraft Engines and installed on the accident aircraft on September 25, 2006, with 0 operating hours since new. The engine was removed on February 28, 2021, with 446 hours in service and sent for a "Inspect and Repair As Necessary" inspection, where it was repaired using serviceable parts and new parts from various manufacturers. The engine was reinstalled on the accident aircraft on October 4, 2021, with 458 hours of time-in-service. The final entry in the engine logbook detailed an oil change performed on January 1, 2022, when the engine had accumulated 467 hours of time-in-service since new.

Engine Examination

The nose section was suspended from a lift and separated from the fuselage. The firewall was removed from the engine tubular mount. The engine was partially disassembled to facilitate the examination. The fuel flow divider, injector lines, pushrod tubes and upper ignition leads were impact damaged. Crankshaft continuity was confirmed from the front to the rear of the engine. When the propeller was rotated, thumb compression and suction was achieved on cylinder Nos 1, 2, 3, 4, and 6. The damaged pushrod tubes and pushrods were removed from cylinder No 5, the crankshaft was turned, and compression and suction was achieved. Borescope examination of the cylinders revealed no anomalies. All piston domes exhibited normal combustion deposits and all intake and exhaust valves were intact and appeared to be in good condition with normal combustion signatures.

Propeller

The composite MT-Propeller remained attached to the engine crankshaft flange. The propeller spinner was fragmented. One propeller blade remained attached to the hub and no damage was noted. Another propeller blade was broken off about 18 inches outboard of the hub. The

remaining propeller blade was broken off about 6 inches outboard of the hub. The outboard section of one propeller blade was found among the recovered wreckage.

The propeller governor remained attached to the engine. The propeller control cable remained attached to the governor control arm and was impact damaged. The governor control arm was poisoned about $\frac{3}{4}$ travel toward full increase RPM. The governor was removed, and the drive assembly rotated freely by hand. There was no oil screen in the propeller governor mounting gasket.

Engine Fuel System

Examination of the fuel injector servo revealed that the servo remained attached to the engine with no external damage noted. The throttle control cable remained attached to the servo throttle arm, and the arm was positioned near the full throttle stop. The mixture control cable remained attached to the servo mixture control arm and was positioned near the full rich stop. The servo was partially disassembled and no damage to the rubber diaphragms or other internal components noted. The servo fuel inlet screen was unobstructed. The fuel flow divider was crushed against the top of the engine with one injector line separated from the flow divider. The flow divider was partially disassembled and no damage to the rubber diaphragm noted. Oily fuel was observed in the flow divider. The 2-piece fuel injector nozzles were unobstructed. The engine driven fuel pump remained attached to the engine and no damage was noted. The pump produced air at the outlet port when actuated by hand. The pump was partially disassembled and no damage to the rubber diaphragms or internal check valves noted. Liquid with an odor consistent with aviation gasoline was observed in the fuel hoses forward of the firewall and in the engine driven fuel pump, fuel injector servo and the fuel flow divider. The aircraft fuel strainer remained attached to the forward surface of the firewall. It was not disassembled.

Ignition and Engine Accessories

Both magnetos remained attached to the engine and no external damage was noted. Both magnetos produced spark from all ignition towers when the magnetos were rotated using an electric drill. The spark plug electrodes exhibited dark gray coloration and nearly new condition when compared to Champion Aviation Check-A-Plug Card AV-27. The Nos 4 and 6 top spark plugs were impact damaged. The No 3 top and the Nos 1, 3, and 5 bottom spark plugs were oil soaked. The ignition harness exhibited substantial impact damage and was not tested. The starter remained attached to the engine with no damage noted. The alternator was impact separated from the engine with no external damage noted.

Lubrication System

Oil was observed in the engine. No debris was observed in the oil suction screen or on the oil filter media.

Engine Examination Photos



Photo 15 - Engine before examination

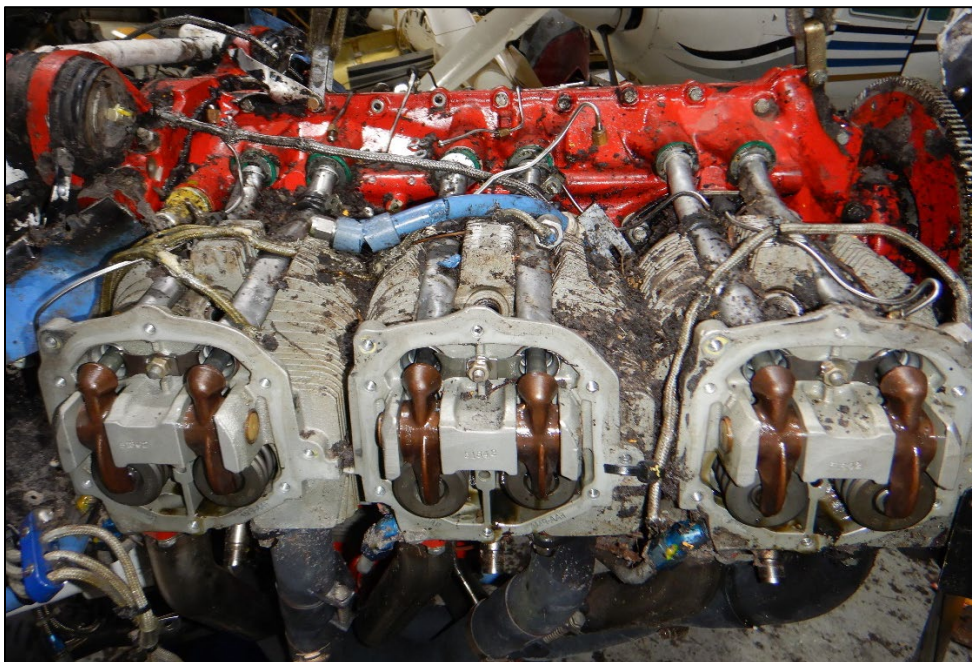


Photo 16 - Cylinder Nos 5, 3 and 1 with rocker covers removed

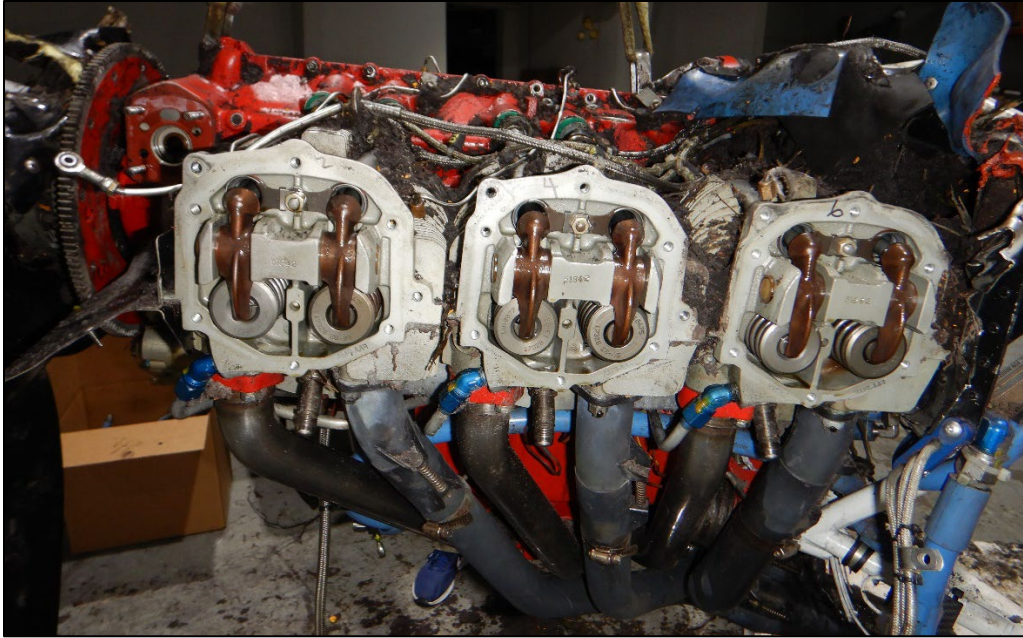


Photo 17 - Cylinder Nos 2, 4 and 6 with rocker covers removed



Photo 18 - Spark plugs, fuel servo inlet screen and fuel injector nozzles