



NATIONAL TRANSPORTATION SAFETY BOARD

Office of Aviation Safety
Western Pacific Region

November 9, 2019

AIRFRAME AND ENGINE EXAMINATION

WPR20FA019

This document contains 16 embedded photos.

A. ACCIDENT

Location: Upland, CA
Date: November 7, 2019
Aircraft: Cirrus SR22, Registration N220MT, Serial #2748
NTSB IIC: Samantha Link

B. EXAMINATION PARTICIPANTS:

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C. SUMMARY

Examination of the airframe and engine was conducted on November 9, 2019 at the facilities of Southwest Aircraft Transportation and Recovery in Chino, California. No anomalies were noted during the examination.

D. DETAILS OF THE INVESTIGATION

1.0 Airframe Examination

- Most of the airframe was consumed by the post impact fire. The engine cowling, forward fuselage, cabin fuselage, aft cabin, aft fuselage, most of the left and right wings, the horizontal and vertical stabilizers were not present.
- The empennage was laid out:
 - Both elevators were present and exhibited thermal damage.
 - The rudder was present and exhibited thermal damage.
 - The horizontal and vertical stabilizers were not present.
- The left wing root structure was present and exhibited heavy thermal damage.
 - The inboard portion of the left wing spar was present and attached to the wing root structure. The spar exhibited heavy thermal damage.

- The left main landing gear leg was present and still secured.
 - In addition, the front pilot and passenger seat frames remained attached to the left wing spar tunnel.
 - Both seat frames exhibited heavy thermal damage.
 - The fuel selector was located in between the two front seats and exhibited heavy thermal damage; the selector handle was not present, but the shaft leading up to it was.
 - The fuel lines leading into and out of the fuel selector were present and remained attached to the selector.
- The left wing tip was present and exhibited some thermal damage. The left aileron remained attached.
 - The left flap was mostly not present. The outboard end of the left flap and its outboard hinge remained.
 - The left flap torque tube and actuator were present.
 - The actuation fittings from the right and left flaps remained attached to the torque tube linkages.
- The instrument panel remained mostly intact but exhibited heavy thermal damage.
 - The MFD And PFD were found attached and were mostly intact.
 - The PFD was sent to the NTSB laboratory for further examination.
 - The rudder pedals for both the pilot and front passenger seat were mostly present and remained attached to the torque tubes.
 - The control yoke assemblies exhibited impact and thermal damage, but the remaining linkages remained intact.
- The parachute enclosure cover remained intact.
 - The rocket's impact pad was present and unremarkable.
- The Avidyne DFC 90 autopilot unit was removed from the instrument panel and cut open. The memory card holder was removed and opened; the SD card was sent to the NTSB recorders laboratory.
- Flight control continuity:
 - The left aileron control cable was continuous from the crossover pulley to the left hand turnbuckle. The left ball swage remained captured at the aileron actuation bulley, however, impact damage was present in this area.
 - The right aileron control cable was continuous from the crossover pulley to the right turnbuckle.
 - The forward aileron control cable ran forward from both turnbuckles into the instrument panel.
 - These cables were cut by recovery personnel.
 - Extending from the cuts, the ball swage was captured in the counsel aileron actuation pulley.
 - Impact related damage was present in the area.

- o Rudder control cable continuity was established from the turnbuckles to the rudder pedal stanchions.
- o Elevator control cable continuity was established from the turnbuckles to the bellcrank weldment.

1.1 Airframe photos



Figure 1: Left Wing Root (photo 1), Front Two Seats, and Fuel Selector



Figure 2: Left Wing Root (photo 2) and Remaining Left Spar



Figure 3: Rudder and Elevators



Figure 4: Left Wingtip

2.0 Engine Examination

- The engine remained attached to the firewall and instrument panel.
 - It was covered in fire related debris.
- The intake system exhibited some thermal damage and fire debris was noted within some of the tubing.
 - The throttle body was removed from the engine and the throttle arm moved freely from stop to stop.
 - Corresponding motion was observed on the butterfly valve.
- The rocker covers were removed from the engine:
 - The valves, rocker arms, and springs exhibited thermal damage on cylinders number 1, 2, 3, and 5.
 - The valves, rocker arms, and springs on cylinder number 4 exhibited minor thermal damage.
 - The valves, rocker arms, and springs on cylinder number 6 appeared almost consistent with normal.
- The fuel pump remained intact and was removed from the crankshaft.
 - The pump was seized and would not rotate freely by hand. It exhibited heavy thermal damage.
 - The fuel pump was disassembled, and all components exhibited thermal damage, but were otherwise consistent with normal operations.
 - The drive coupling was intact
 - The mixture arm moved when manipulated by hand. Although there was resistance consistent with the thermal related damage.
- The upper spark plugs were removed and exhibited normal operating wear signatures.
- The crankshaft was rotated by hand and thumb compression and valve continuity was established throughout.
- The ignition harness was mostly intact but exhibited thermal damage.
- The magnetos were inspected for their timing marker. The right magneto timing marker was present; however, the left magneto gear was not visible in the window.
 - The right magneto was removed from the engine and rotated; spark was obtained on all terminals
 - The left magneto was removed from the engine and disassembled.
 - The timing gear was melted, otherwise the internal components were consistent with normal
- The fuel manifold remained intact but exhibited thermal damage. The fuel manifold lines remained attached and the nozzles were clear of debris with the exception of the #5 cylinder.
 - The #5 nozzle was emptied and burned debris exited.
- The fuel manifold was disassembled
 - The screen was clear of debris.
 - The internal components exhibited significant thermal damage, but the wear was otherwise consistent with normal operation.

- Propeller blades
 - All three propeller blades remained attached at the hub, but were separated at the blade roots
 - One blade was completely gone and only the balance tube was present. It was bent at about a 45-degree angle.
 - The second blade was also completely gone with only the balance tube remaining, which was only slightly bent.
 - About 1/3 of the blade root remained on the third propeller.
 - The blade root exhibited heavy thermal damage.
 - The outboard about 2/3rds was not present.
 - The spinner remained attached and mostly whole, although it exhibited some crush damage and heavy thermal damage.
- The exhaust system was examined and exhibited heavy thermal damage.
- The turbochargers remained attached to the engine:
 - The right-side compressor housing was fracture separated.
 - The compressor rotated only a few degrees consistent with impact damage to the housing.
 - The compressor blades exhibited rotational damage.
 - The turbo was mostly intact and exhibited thermal damage.
 - The left-side compressor was heavily covered in fire related debris, which slightly restricted the compressor, but it rotated when manipulated by hand. The turbine rotated accordingly.
 - The turbo was mostly intact and exhibited thermal damage.
- The oil filter was removed from the engine and opened. The case and filter screen exhibited heavy thermal damage; no metallic debris was noted.
- The cylinders were borescoped. The piston heads, cylinder walls, valves, and lower spark plugs were all consistent with normal operating signatures
 - Two of the cylinders exhibited some rusting consistent with firefighting efforts.
- The oil sump exhibited crush damage consistent with impact.
 - The sump was partially removed; oil was present within the sump and the oil pick up screen was clear of debris.
- The propeller governor was removed from the engine
 - It rotated freely by hand and moisture was heard inside.
 - The drive remained intact and oil was present.
 - The governor was disassembled. The internal components were well lubricated and consistent with normal operations.

Please proceed to the next page.

2.1 Engine Photos



Figure 5: Top of Engine



Figure 6: Right side of Engine (Cylinders 1, 3, 5)



Figure 7: Left side of Engine (Cylinders 2, 4, 6)



Figure 8: Right-side Compressor and Turbo



Figure 9: Left-side Compressor and Turbo



Figure 10: Upper Spark Plugs



Figure 11: Magnetos

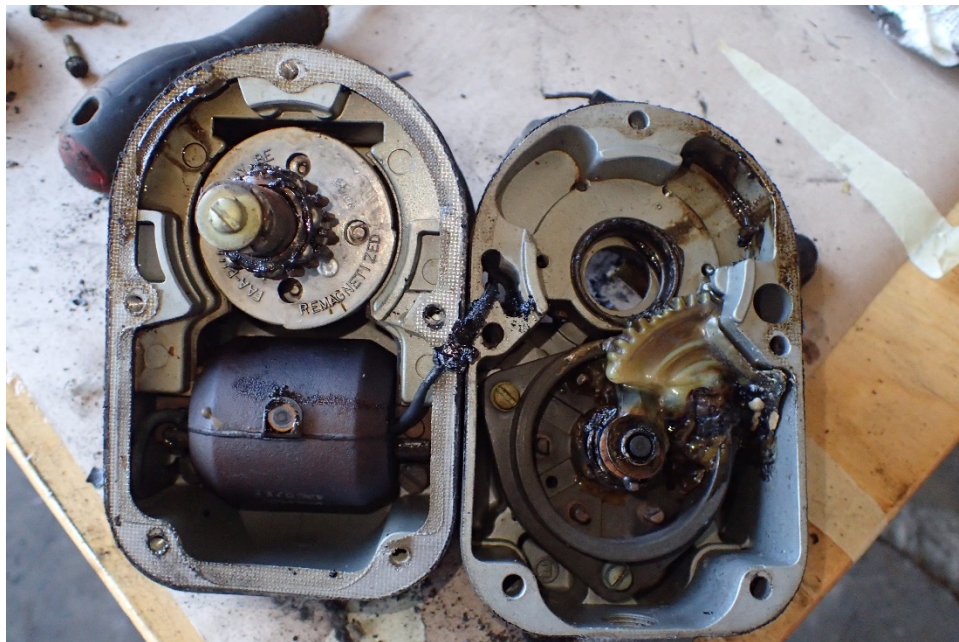


Figure 12: Left Magneto



Figure 13: The Fuel Manifold



Figure 14: The Fuel Pump



Figure 15: Oil Filter



Figure 16: Spinner and Propeller Blades

END.

Submitted by: Samantha Link