



Rolls-Royce

Engine Investigation Report



Model 250-C30P

**Allison Model 250-C30P
Engine CAE 890513**

**Bell 206L3
Registration: N207DS**

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Air Safety Investigator**

**Delta Bravo Sierra Inc.
Silt, CO**

**Accident date: 27 January, 2014
Investigation date: 28 – 29 January, 2014
Report date: 1 December, 2014**

Background

On January 27, 2014, approximately 11:18 AM local time, a Bell 206L-3 helicopter, N207DS, was involved in an accident near Silt, Colorado. The helicopter was registered to Delta Bravo Sierra Inc. The weather conditions were reported to be VFR. The flight originated from Garfield County Regional Airport (RIF) in Rifle, Colorado and the crew was performing aerial surveillance of power transmission lines when the accident occurred approximately 3 miles east of RIF. The accident helicopter was on its second flight of the day after refueling at RIF. The power lines that were being surveyed by the helicopter at the time of the accident ran in a north-south direction. Another set of power lines running in an east-west direction crossed above the lines being surveyed. Two static wires ran parallel to and above the east-west power lines. The helicopter was flying south bound when it struck and severed the southernmost static wire and subsequently impacted the ground. The helicopter was destroyed. The pilot and two passengers were fatally injured.

Wreckage and Impact Information

Examination of the accident site revealed that the helicopter impacted the ground in a valley just south of the severed static wire. The helicopter was found on its left side and sustained substantial damage **Fig 1**. The tailboom was separated from the main wreckage and broken into two pieces. The forward portion of the tail boom to include the horizontal stabilizer was located approximately 150 feet from the main wreckage. The aft portion of the tail boom including the tail rotor gearbox and tail rotor was located near the main wreckage **Fig 2**. All other major structural components were located within or near the main wreckage **Fig 3 & Fig 4**. Scoring marks consistent with a wire strike were observed on one of the main rotor blades and the main rotor mast. The engine was located within the engine compartment of the helicopter positioned on its left side with all engine mounts intact **Fig 5**. The aircraft fuel filter bowl sustained impact damage and was dented inward on the aft side with a portion of the o-ring protruding from the housing. The 'B' nut on fuel line to the engine was also loose at the filter bowl housing, likely due to impact. The majority of visible impact damage to the engine was isolated to the left side air discharge tube and outer combustion case **Fig 6**. The wreckage was transported to Beegles Aircraft Service in Greeley, Colorado for further examination.

Engine Information

Engine Model	Allison 250-C30P
Rating:	650 HP
Serial Number	CAE890513
Engine Total Hours	12,478.3
Last 150-Hour Inspection	22.9 Hours
Last 300-Hour inspection	169 Hours

Engine Records

Component	Serial Number	Part Number	TSO	Total Time
Engine	CAE890513	23004545	12478.3	12478.3
Gearbox	CAG95381	23035178	1043.7	7029.4
Compressor	CAC91370	23052270	1043.7	11043.6
Turbine	CAT98298	23035128	1043.7	4968.6
Fuel Control	BR55197	23070613	1043.7	UNK
PTG	BR36148	23070106	1043.7	UNK
Fuel Pump	JG07AKW0304	23074706	1043.7	1043.7
Fuel Nozzle	1UR07585	23077067	1043.7	UNK
Bleed Valve	FF40253	23073353	1043.7	UNK

Engine information was obtained from the engine logbook and operators maintenance records

Engine Examination

On 30 January, 2014 representatives from Rolls-Royce, NTSB, and Bell helicopters gathered at Beegles Aircraft Service in Greeley, CO for a detailed examination of the engine and aircraft wreckage. The engine was removed from the main wreckage and the following engine observations were noted: **Fig 7, Fig 8, Fig 9, & Fig 10**

There was no visible damage to the compressor **Fig 11**. The N1 drive train could be rotated by hand and was continuous to the starter generator. As previously noted the left side air discharge tube displayed impact damage. It was dented and pushed upward, but remained attached at both the scroll and outer combustion case. The right side air discharge tube had a small dent, but was otherwise unremarkable and connected at both ends.

The outer combustion case has heavily damaged from impact. It was dented/pushed inward on the lower and left sides. The engine fuel line between the check valve and fuel nozzle remained in position and attached at both ends. The line was removed from the fuel nozzle and a small amount residual fuel drained out. The fuel nozzle was removed for examination and found undamaged and normal in appearance.

The 4th stage turbine wheel, as viewed through the exhaust collector, was undamaged **Fig 12**. The N2 drive train was free and continuous from the 4th stage turbine wheel to the power takeoff gear during manual rotation. Both the gas producer and power turbine supports were normal in appearance and displayed no impact damage. The number 6/7 and 8 bearing oil delivery tubes were removed for examination **Fig 13 & Fig 14**. Both were oil coated and normal in appearance. The oil pressure screen was clean and unremarkable. The outer combustion case and combustion liner were removed to facilitate further inspection. The combustion liner was dented inward due to impact, but was otherwise normal in appearance with no unusual damage or streaking **Fig 15**. Examination of the 1st stage turbine nozzle and visible portions of the 1st stage turbine wheel did not reveal any signs of damage **Fig 16**. The gas producer turbine rotated smoothly when the compressor was turned by hand.

The accessory gearbox was undamaged and normal in appearance. The upper and lower chip detectors were removed and visually examined. Both chip detectors were free of metallic debris. The oil filter was removed and was clean **Fig 17 & Fig 18**. All accessories were removed for inspection. The fuel control unit and fuel pump were undamaged. The fuel control drive shaft rotated freely and the throttle arm had full, smooth travel from stop to stop. All three mounts on the power turbine governor were fractured, separating the governor from the accessory gearbox. The governor drive shaft rotated freely. The governor arm had full travel from stop to stop. The PC air line "T" fitting at the power turbine governor was fractured and broke away at the governor **Fig 19**. The "B" nut on the same fitting going to the fuel control was loose. All other pneumatic lines and associated fittings were secure when checked by hand with no cracks noted. All remaining external oil and fuel lines were undamaged and secure.

Summary of Findings

[REDACTED]



Fig 1: Main Wreckage On-Site



Fig 2: Main Wreckage On-Site



Fig 3: Main Wreckage On-Site



Fig 4: Main Wreckage On-Site



Fig 5: Right Hand Side of Engine As Viewed On-Site



Fig 6: Impact Damage to the Left Air Discharge Tube & Outer Combustion Case



Fig 7: Engine Removed at Recovery - Front



Fig 8: Engine Removed at Recovery – LHS



Fig 9: Engine Removed at Recovery – Right Hand Side



Fig 10: Engine Removed At Recovery – Rear



Fig 11: Compressor

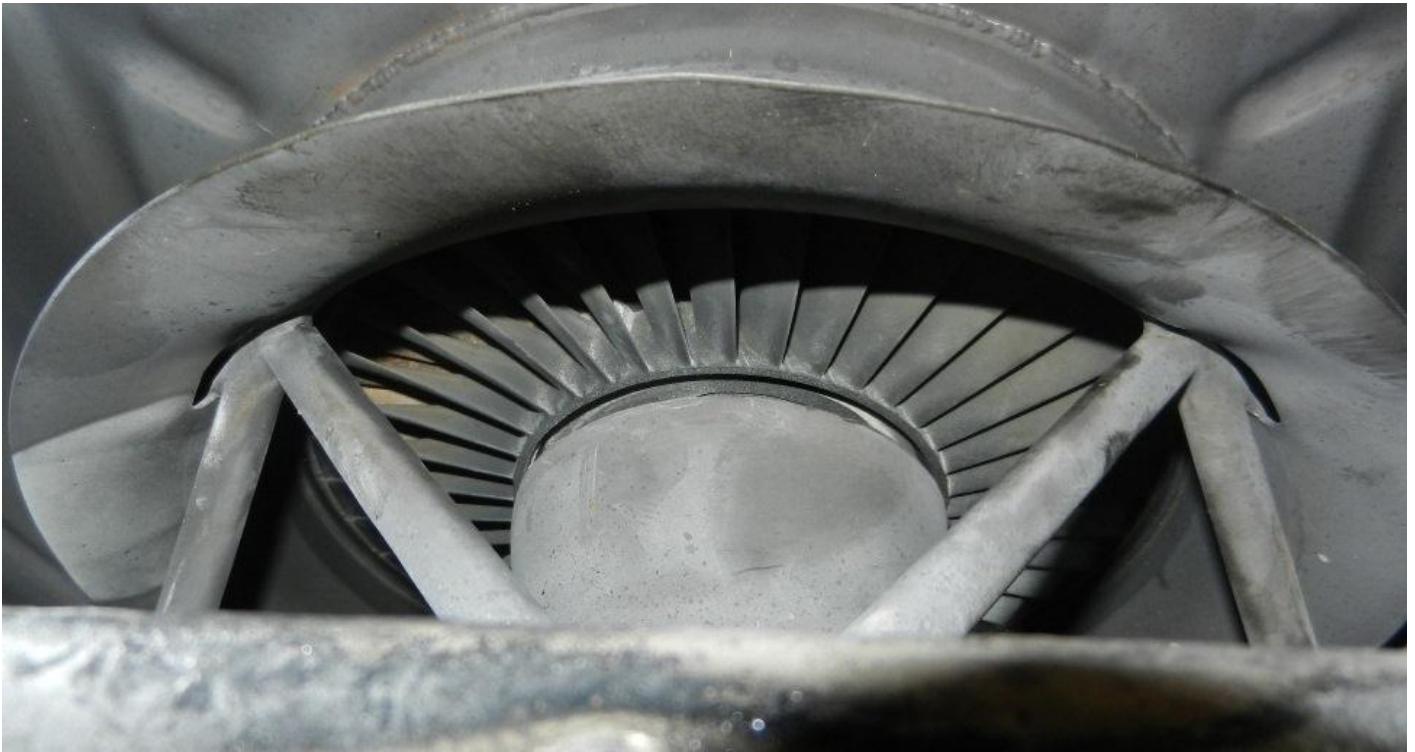


Fig 12: 4th Stage Turbine Wheel as Viewed Through the Exhaust Collector

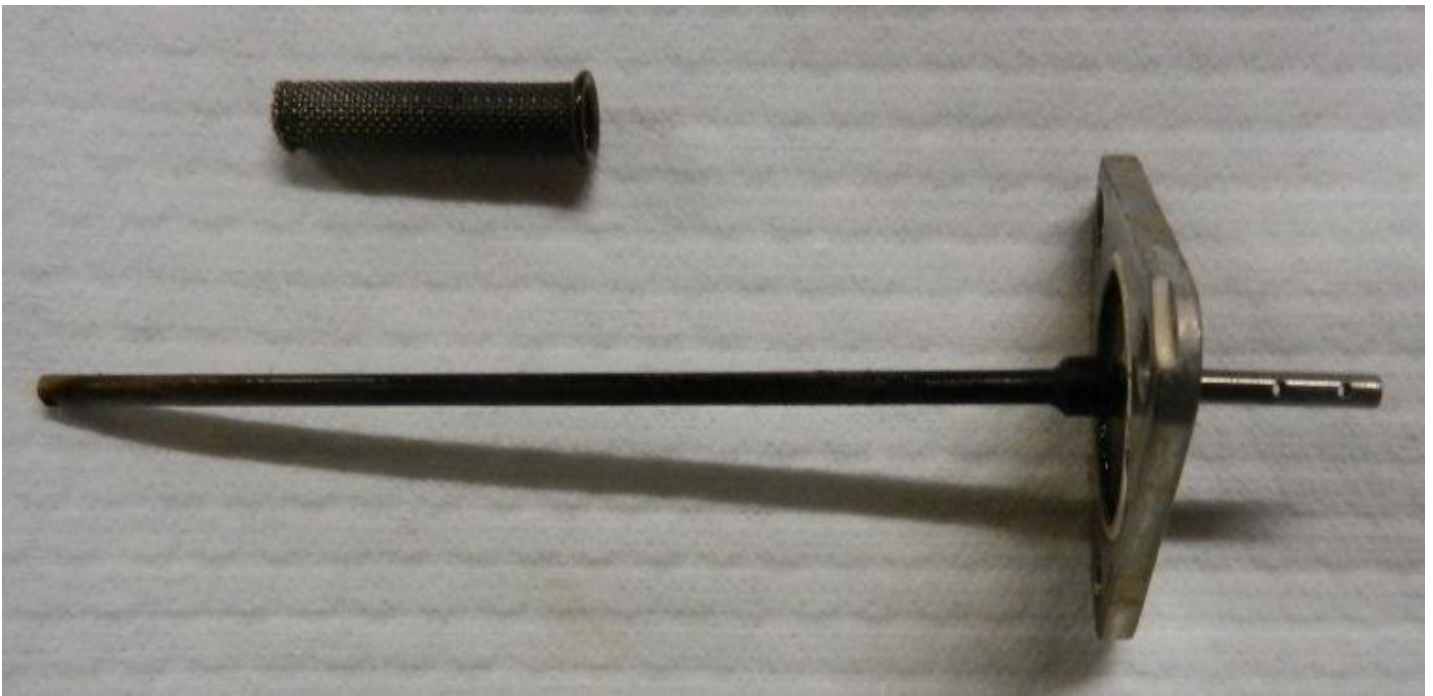


Fig 13: No. 6 & 7 Bearing Oil Delivery Tube



Fig 14: No. 8 Bearing Oil Delivery Tube



Fig 15: Impact Damage to the Combustion Liner

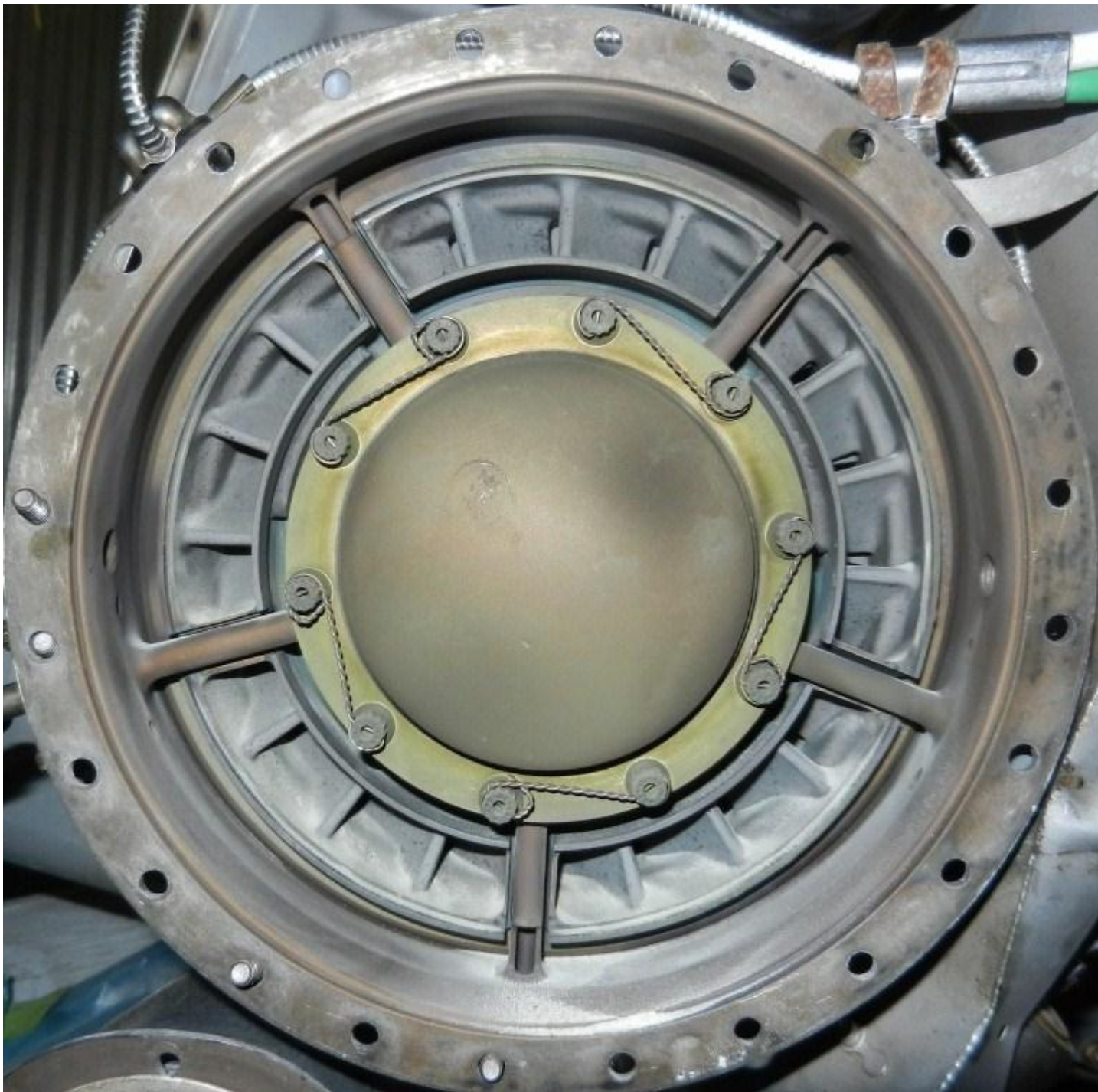


Fig 16: 1st Stage Turbine Nozzle



Fig 17: Upper Chip Detector



Fig 18: Lower Chip Detector



Fig 19: Power Turbine Governor