Aviation Investigation Final Report

Location:	CLEBURNE, Texas	**Accident Number:**	FTW99LA160
Date & Time:	June 4, 1999, 21:15 Local	**Registration:**	N4774K
Aircraft:	Cessna P210N	**Aircraft Damage:**	Substantial
Defining Event:		**Injuries:**	2 Minor
Flight Conducted Under:	Part 91: General aviation - Personal		

Analysis

During the night forced landing, following a total loss of engine power, the airplane, maneuvered by the pilot to avoid telephone poles, struck crops & nosed over. At a cylinder overhaul (166.5 hours prior to the accident), the owner requested the installation of used serviceable components. A serviceable exhaust valve & piston were installed in the #4 cylinder. Following the accident, metal pieces were found in the intake tubes, engine & oil pump. The #4 cylinder piston was broken into numerous pieces, and the exhaust valve head was separated from the valve stem. Damage to the #4 cylinder valves & piston precluded metallurgical examination to determine the mode of failure. The #4 connecting rod was separated from the crankshaft. The connecting rod bearings were found coated with oil and without evidence of lack of lubrication. Testing of both front lap belts, which failed during the accident, and both front shoulder harnesses found the belts and shoulder harnesses did not meet manufacturer's specifications.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be: The total loss of engine power resulting from a failure of the #4 cylinder exhaust valve and/or piston. Factors were the dark night conditions and the lack of suitable terrain for the forced landing.

Findings

Occurrence #1: LOSS OF ENGINE POWER
Phase of Operation: CRUISE

Findings
1. (C) ENGINE ASSEMBLY,VALVE,EXHAUST - FAILURE,TOTAL
2. (C) ENGINE ASSEMBLY,PISTON - FAILURE,TOTAL

Occurrence #2: FORCED LANDING
Phase of Operation: EMERGENCY DESCENT/LANDING

Occurrence #3: IN FLIGHT COLLISION WITH TERRAIN/WATER
Phase of Operation: LANDING - FLARE/TOUCHDOWN

Findings
3. (F) TERRAIN CONDITION - NONE SUITABLE
4. TERRAIN CONDITION - CROP
5. OBJECT - POLE
6. OBJECT - WIRE,TRANSMISSION
7. (F) LIGHT CONDITION - DARK NIGHT

Occurrence #4: NOSE OVER
Phase of Operation: LANDING - ROLL

Findings
8. MISC EQPT/FURNISHINGS,SEAT BELT - FAILURE
9. MISC EQPT/FURNISHINGS,SEAT BELT - UNAPPROVED PART

Factual Information

On June 4, 1999, at 2115 central daylight time, a Cessna P210N, single engine airplane, N4774K, sustained substantial damage during a forced landing following a loss of engine power near Cleburne, Texas. The airplane was owned by the pilot and operated under 14 Code of Federal Regulations (CFR) Part 91. The private pilot and the pilot rated passenger received minor injuries. Dark night visual meteorological conditions prevailed for the local personal flight and a flight plan was not filed. The flight departed the Fort Worth Spinks Airport, near Fort Worth, Texas, at 2055.

During a telephone interview, conducted by the NTSB investigator-in-charge (IIC), and on the Pilot/Operator Aircraft Accident Report (NTSB Form 6120.1/2) the pilot reported that the flight was cruising at 2,700 feet msl. The pilot was conducting a check of his navigation radios for an upcoming cross country flight when the engine "started loosing power and started running extremely rough." The pilot performed the emergency procedures; however, the engine power did not increase. The pilot diverted toward the Cleburne Municipal Airport which was 6 miles away. Realizing that the airplane would not make the airport, the pilot established an approach to a road, and completed the landing checklist by extending the landing gear and full flaps. When the pilot turned on the landing light at approximately 50 feet agl, he saw telephone poles along the road. During a left turning maneuver to avoid the poles and align the airplane with the crops in an adjacent field, the left main gear struck the crops and terrain. Subsequently, the nose gear collapsed and the airplane nosed over to the inverted position. The pilot and passenger exited the aircraft. The pilot reported that structural damage was sustained to the vertical stabilizer and wings. The propeller, engine, and landing gear were also damaged.

During the on scene examination by the FAA inspector and the Teledyne Continental Motors (TCM) representative, two holes in the engine crankcase were noted above the #3 cylinder attachment area. Both front seat belts were found to have failed at the web stitching. A Cessna data tag (part number S2275-CC-3) was found on the left shoulder harness. The engine, shoulder harnesses and seat belts were photographed and retained for further examination.

On June 24, 1999, under the surveillance of the NTSB IIC, the engine was examined at Air Salvage of Dallas, Lancaster, Texas. The through bolts for the engine were torqued below the manufacturer specifications. Teledyne Continental Aircraft Service Bulletin (SB) M85-10, issued July 18, 1985, calls for the utilization of the beveled seat nut at the 7th stud hold-down positions and the flat seat nut at the other cylinder nut positions. The 7th stud hold down nut is zinc plate color coded. During the engine examination, it was found that flat seat nuts (part number 531001) were installed in the 7th stud hold down positions. The six 7th stud flange nuts (part number 646312) were found installed at various other cylinder hold-down positions.

During the engine teardown, pieces of metal were found throughout the intake tubes, engine, and the oil pump. Deformation was noted of the numerous pieces of the #4 cylinder piston, the exhaust valve head, and the intake valve head. The #4 exhaust valve head was found separated from the valve stem. Deformation precluded metallurgical examination of the #4 cylinder valves and piston for the mode of failure. On the spark plugs for #4 cylinder, the electrode area was destroyed. Connecting rods for cylinders #3 and #4 were separated from the crankshaft at the rod cap end with deformation of the rods. The rod cap bearings were coated with oil. The manufacturer's representative stated, "there was no physical evidence on the rod bearings of heat distress or lack of lubrication." See the manufacturer's report for additional details of the engine examination.

The maintenance records were reviewed by the NTSB IIC. The 1979 model airplane was issued its original FAA airworthiness certificate on June 9, 1979. The Continental Engine model TSIO-520-P5B, serial number 278606-R, was rebuilt on May 28, 1992 by TCM and shipped to Visalia, California. On December 3, 1997, Corporate Aircraft, Inc., at Fresno, California, replaced the #2 and #4 cylinders with TCM cylinder/piston kits. The aircraft was registered to its current owner on May 21, 1998. The maintenance record entry for the last annual inspection, performed on November 4, 1998, by an individual A & P (airframe and powerplant) mechanic, stated "COMPLETE TOP O/HAUL." At the time of the accident, the total engine time was 1,292.5 hours (166.5 hours since the top overhaul). There were no maintenance record entries found pertaining to the seat belts and shoulder harnesses.

During a telephone interview, conducted by the NTSB IIC, the owner/pilot reported that the top overhaul of the cylinders in November 1998 was performed by Sentry Aircraft Cylinders, Inc., at Fort Worth, Texas. The owner stated that he requested installation of used serviceable components. Serviceable exhaust valves and pistons were listed on the owner's copy of the work order #29815 from Sentry Aircraft Cylinders, Inc., dated November 29, 1998.

Repair station personnel at Sentry Aircraft Cylinders, Inc., were interviewed by their FAA Principal Maintenance Inspector (PMI). Repair station personnel reported that the overhaul of the cylinders was performed under work order #29815. Each cylinder was identified by the work order number, the aircraft owner's initials [JC], followed by an arbitrarily assigned number from 22 through 27. Cylinder #4 was identified with the number 29815.JC.25. Under the work order number, repair data cards were maintained for each cylinder; however, the part numbers on the repair data cards were not specific to the part numbers on the actual cylinder components. Personnel who prepared the repair data cards entered part number 637781 for each serviceable exhaust valve supplied by Sentry Aircraft Cylinders, Inc, and they did not check the actual valve part numbers used in the cylinders. Maintenance personnel stated that the #4 cylinder exhaust valve [part number SA 643873 T-T 89] was a serviceable exhaust valve supplied by Sentry Aircraft Cylinders, Inc.

Two of the cylinder pistons, supplied by the aircraft owner, were used during the overhaul, and four serviceable pistons were supplied by Sentry Aircraft Cylinders, Inc. The #4 cylinder piston was one of these serviceable pistons. On the repair data cards, personnel entered part number

646303 for each serviceable piston supplied by Sentry Aircraft Cylinders, Inc. Following the accident, damage of the #4 cylinder piston precluded a determination of the actual part number.

The seat belts and shoulder harnesses were examined by the NTSB IIC, the FAA Aircraft Certification Office, Wichita, Kansas, and Cessna Aircraft Company, Wichita, Kansas. The shoulder harnesses and lap belts did not meet the manufacturer's build and material specifications and were determined not to be manufactured by Cessna. See the enclosed Cessna Aircraft Company Report for details.

The aircraft was released to the owner.

Pilot Information

Certificate:	Private	**Age:**	33,Male
Airplane Rating(s):	Single-engine land	**Seat Occupied:**	Left
Other Aircraft Rating(s):	None	**Restraint Used:**	
Instrument Rating(s):	Airplane	**Second Pilot Present:**	No
Instructor Rating(s):	None	**Toxicology Performed:**	No
Medical Certification:	Class 3 Valid Medical--no waivers/lim.	**Last FAA Medical Exam:**	July 24, 1997
Occupational Pilot:	No	**Last Flight Review or Equivalent:**	
Flight Time:	402 hours (Total, all aircraft), 316 hours (Total, this make and model), 375 hours (Pilot In Command, all aircraft), 51 hours (Last 90 days, all aircraft), 10 hours (Last 30 days, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Make:	Cessna	**Registration:**	N4774K
Model/Series:	P210N P210N	**Aircraft Category:**	Airplane
Year of Manufacture:		**Amateur Built:**	
Airworthiness Certificate:	Normal	**Serial Number:**	P21000305
Landing Gear Type:	Retractable - Tricycle	**Seats:**	6
Date/Type of Last Inspection:	November 4, 1998 Annual	**Certified Max Gross Wt.:**	4000 lbs
Time Since Last Inspection:	161 Hrs	**Engines:**	1 Reciprocating
Airframe Total Time:	3805 Hrs	**Engine Manufacturer:**	Continental
ELT:	Installed, activated, did not aid in locating accident	**Engine Model/Series:**	TSIO-520-P5B
Registered Owner:	JOHN F. CAMBELL IV	**Rated Power:**	310 Horsepower
Operator:		**Operating Certificate(s) Held:**	None
Operator Does Business As:		**Operator Designator Code:**	

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual (VMC)	**Condition of Light:**	Night/dark
Observation Facility, Elevation:	FTW ,710 ft msl	**Distance from Accident Site:**	55 Nautical Miles
Observation Time:	20:53 Local	**Direction from Accident Site:**	10°
Lowest Cloud Condition:	Clear	**Visibility**	10 miles
Lowest Ceiling:	None	**Visibility (RVR):**	
Wind Speed/Gusts:	13 knots /	**Turbulence Type Forecast/Actual:**	/
Wind Direction:	150°	**Turbulence Severity Forecast/Actual:**	/
Altimeter Setting:	29 inches Hg	**Temperature/Dew Point:**	29°C / 22°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	FORT WORTH , TX (FWS)	**Type of Flight Plan Filed:**	None
Destination:		**Type of Clearance:**	
Departure Time:	20:55 Local	**Type of Airspace:**	Class G

Airport Information

Airport:		**Runway Surface Type:**	
Airport Elevation:		**Runway Surface Condition:**	
Runway Used:	0	**IFR Approach:**	
Runway Length/Width:		**VFR Approach/Landing:**	Forced landing

Wreckage and Impact Information

Crew Injuries:	1 Minor	**Aircraft Damage:**	Substantial
Passenger Injuries:	1 Minor	**Aircraft Fire:**	None
Ground Injuries:	N/A	**Aircraft Explosion:**	None
Total Injuries:	2 Minor	**Latitude, Longitude:**	32.34901,-97.330795(est)

Administrative Information

Investigator In Charge (IIC):	Roach, Joyce
Additional Participating Persons:	JIM MINTER; FORT WORTH , TX
Original Publish Date:	June 21, 2000
Last Revision Date:	
Investigation Class:	Class
Note:	
Investigation Docket:	https://data.ntsb.gov/Docket?ProjectID=46461