



NATIONAL TRANSPORTATION SAFETY BOARD

Office of Aviation Safety
Central Region

November 19, 2019

ENGINE EXAMINATION SUMMARY

CEN19LA290

A. ACCIDENT

Location:	Monroe, Wisconsin
Date:	8/27/2019
Aircraft:	N6245V; Beech V35
NTSB Investigator-in-Charge:	Joshua Lindberg

B. PARTICIPANTS

NTSB IIC – Joshua Lindberg
Continental Motors – Chris Lang
Continental Motors – Phillip Grice
Continental Motors – Lisa Jersild
Continental Motors – Randy Bryant
Textron Aviation – Jennifer Barclay
Transportation Safety Institute – Patrick Causey

C. EXAMINATION SUMMARY

The engine was transported to the Analytical Department at Continental Motors and locked in bonded storage. On November 19, 2019, the investigative team convened at Continental Motors to complete the engine examination and tear down.

The oil filter and bottom spark plugs contained a significant amount of metallic debris. Oil pressure relief valve was screwed in most of the way which would have yielded a higher oil pressure in the oil system. There was only about one thread showing on the relief valve adjustment screw.

The engine exhibited a hole in the top of the case above the No. 6 cylinder. The Nos. 5 and 6 cylinder connecting rods were broken so the engine could not be rotated through. The team then disassembled the engine and components. There was repeated impact marks and damage to the inside of the case around the Nos. 5 and 6 cylinders. The Nos. 1-4 connecting rods remained attached to the crankshaft, but all exhibited significant heat distress from a lack of oil lubrication. The Nos. 5 and 6 connecting rods had fractured at the bearing and sustained damage from impacting the crankshaft, cylinder walls and the inside of the case. The ends of the Nos. 5 and 6 connecting rods and their rod bearings were not found or identified within the available metallic debris. Since they were not found, no assessment could be made about their condition or functionality. The Nos. 5 and 6 pistons remained attached to the connecting rods via the piston pins. The No. 6 rod had impacted the bottom of the cylinder wall and made a ~1-inch detent in the side. There was also a corresponding detent in the piston under the rod arm.

No. 6 piston pin plug had separated from the pin and was found into two pieces. Those pieces had rolled around on the outside of the piston next to the cylinder wall and wore into one round and one oblong shaped piece. The piston pin was identified as a Superior Air Parts (SAP) piston

pin which differed from the Continental piston pin. A Continental pin is a full floating pin with permanently pressed-in aluminum end plugs. The SAP pin was to two different pieces of metal pressed in as end plugs.

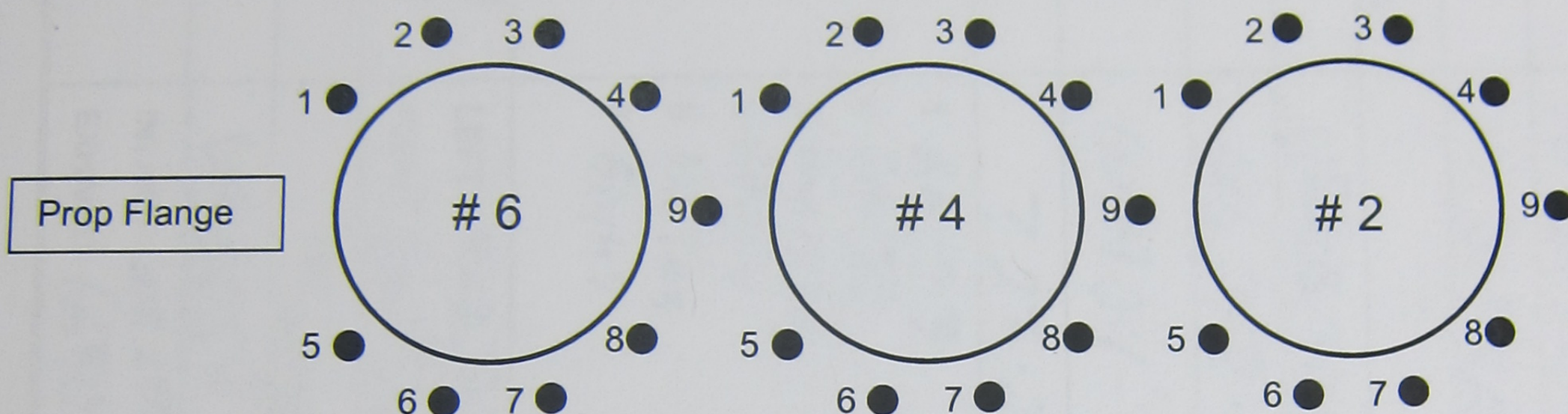
The damaged pin parts and an exemplar piston pin were sent to the NTSB Martials Laboratory for metallurgical analysis.

The Nos. 5 and 6 connecting rods failed due to a lack of oil lubrication.

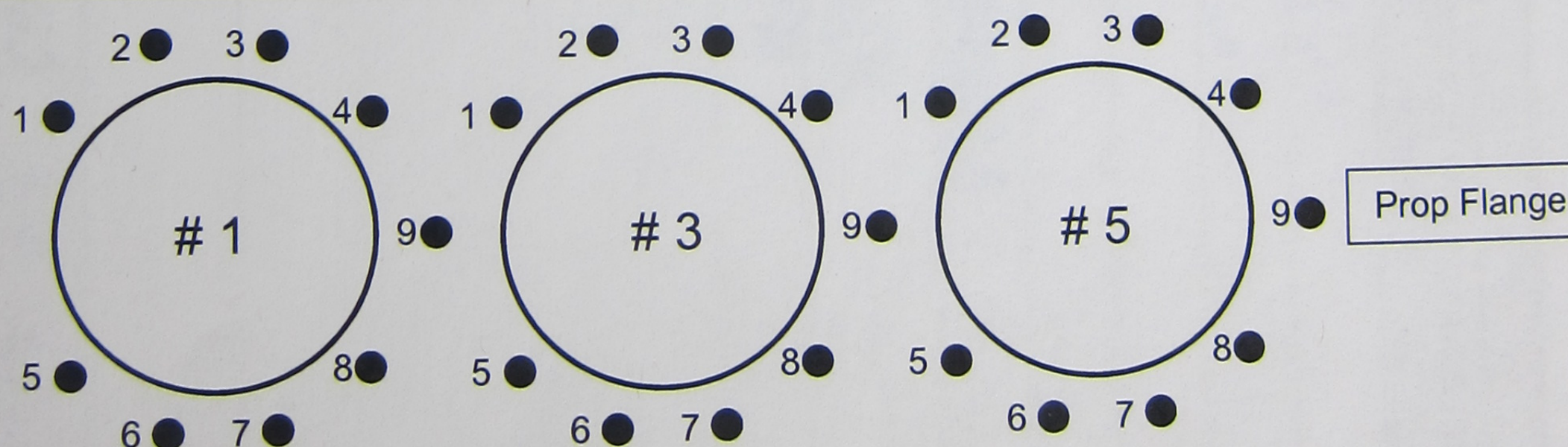
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Cylinder Through-Bolt and Deck Stud Break-Away (Tightening / Loosening) Torque Measurements (Inch-Pounds)
(Position numbers 1 and 5 are through-bolts)

12 Point Nuts on Through Bolts	Bolt 1	Stud 2	Stud 3	Stud 4	Bolt 5	Stud 6	Stud 7	Stud 8	Stud 9
	Tight / Loose	Tight / Loose	Tight / Loose	Tight / Loose	Tight / Loose	Tight / Loose	Tight / Loose	Tight / Loose	Tight / Loose
Cylinder #2	743 / 624	470 / 428	570 / 528	555 / 508	807 / 693	615 / 545	574 / 497	615 / 470	584 / 548
Cylinder #4	823 / 694	565 / 500	480 / 428	672 / 557	793 / 689	457 / 418	513 / 469	600 / 534	672 / 615
Cylinder #6	874 / 741	crankcase Busted	295 / 0	400 / 298	877 / 767	430 / 0	434 / 384	411 / 333	573 / 524



	Bolt 1	Stud 2	Stud 3	Stud 4	Bolt 5	Stud 6	Stud 7	Stud 8	Stud 9
	Tight / Loose	Tight / Loose	Tight / Loose	Tight / Loose	Tight / Loose	Tight / Loose	Tight / Loose	Tight / Loose	Tight / Loose
Cylinder #1	1128 / 924	489 / 435	603 / 535	569 / 500	1078 / 945	523 / 431	496 / 418	536 / 426	562 / 559
Cylinder #3	613 / 454	406 / 0	449 / 420	506 / 447	950 / 748	585 / 543	768 / 484	551 / 484	530 / 518
Cylinder #5	581 / 510	429 / 397	399 / 369	427 / 402	859 / 743	468 / 411	536 / 453	488 / 435	470 / 421



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ENGINE COMPONENT INFORMATION

COMPONENT	MANUFACTURER / OVERHAULER	PART NUMBER	SERIAL NUMBER / DATE or HEAT CODES / WORK ORDER NUMBERS
Magneto LEFT	Bendix	10-349220-5	A235821
Magneto RIGHT	Bendix	10-349240-6	943516
Ignition Harness	Aerolite by Skytronics		
Sparkplugs	Tempost	URMB32E	
Fuel Pump	TCM	66212-2	I159210BA
Throttle Body Metering Unit		629904-2	? 14912AR
Fuel Manifold	TCM	? 27-2A10	J149211CR
Nozzles	GAMI	1 GA173 2 GA173 3 GM15L 4 GM15L 5 No Tag 6 GA147	1 2 3 4 5 6
Crankcase	P/N 653921 P/N 653920	LEFT R02JA789 RIGHT R02JA789	
Crankshaft		FG: 649878	
Camshaft	TCM	653058	N02EA432 Heat: KAJL
Lifters		INTAKE 658088 EXHAUST 658077	

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ENGINE COMPONENT INFORMATION

COMPONENT	MANUFACTURER / OVERHAULER	PART NUMBER	SERIAL NUMBER / DATE or HEAT CODES / WORK ORDER NUMBERS		
Main Bearings	Superior	SA642839	1		
			2		
			3		
			4		
			5		
Connecting Rod Bearings	Superior	SA63082C	1		
			2		
			3		
			4		
			5		
			6		
Connecting Rods		Forging 632041	1		
			2		
			3		
			4		
			5		
			6		
Cylinders				S/N	H/D W/O
			1		
			2		
			3		
			4		
			5		
			6		

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ENGINE COMPONENT INFORMATION

COMPONENT	MANUFACTURER / OVERHAULER	PART NUMBER	SERIAL NUMBER / DATE or HEAT CODES / WORK ORDER NUMBERS
Pistons	Superior	SA631892	1 2 3 4 5 6
Turbocharger	NA		
Turbocharger Controller	NA		
Wastegate	NA		
Overboost Valve	NA		
Starter Motor	Hantzoll	646238-2R	H-N080991
Starter Adapter			
Alternator	Aero Electric	1100715	A70270
Vacuum Pump			
Propeller Governor	Tempest	AA216CW	05PP04
Oil Cooler	Aero Classics	AA216CW 8000960	05PP04 2083375
Intercooler			
Prop Gov	No Data Tag		
Oil Filter	Champion	CH48109-1	