

NATIONAL TRANSPORTATION SAFETY BOARD

Office of Aviation Safety
Aerospace Engineering Division
Washington, DC 20594



April 28, 2022

COMPONENT EXAMINATION FACTAL REPORT

A. ACCIDENT INFORMATION

Place : Gila Bend, AZ
Date : April 15, 2022
Vehicle : Robinson R-22
NTSB No. : ANC22FA030
Investigator: E. Swenson

B. COMPONENTS EXAMINED

	Manufacturer	Model Number	Part Number	Serial Number or Lot Number
Left Magneto	Continental	S4LSC-200	10-600614-1	6109909E
Right Magneto	Continental	S4LSC-204T	10-600644-201	86320123
Governor Control	RHC	--	B286-2 Rev I	4046
Governor Motor Assembly	RHC	--	B247-5	Lot No. FK
Governor Motor	--	--	B247-2	Lot No. 84

C. DETAILS OF THE EXAMINATION

Visual Examination

The left magneto appeared undamaged (Photo 1). The ignition leads had been clipped off at the ignition wire cap. The drive gear rotated freely by hand. The tach signal lead pins are straight with no damage or corrosion observed. The nylon distributor gear visually examined, all teeth were present, no damage noted. Overhaul date was stamped 5.16 (May 2016).



Photo 1. Left Magneto

The right magneto appeared undamaged (Photo 2). The ignition leads had been clipped off at the ignition wire cap. The drive gear rotated freely by hand. The tach point electrical connector was attached. The nylon distributor gear visually examined, all teeth were present, no damage noted. Overhaul date was stamped 5.16 (May 2016).



Photo 2. Right Magneto

Governor control box was intact and the interface between cover plate and box appears to be completely sealed (Photo 3). Slight indentation of the upper surface of the box was observed



Photo 3. Governor Control Box

The governor motor assembly was attached to the collective control tube (Photo 4). The control tube had been cut on both sides of the governor assembly. The throttle link and

friction disk were attached and undamaged. Motor and gear housing was attached, safety wired, and no damage noted.



Photo 4. Governor motor assembly

Testing

The left magneto was placed on the magneto test fixture and an ignition cap was installed. The magneto was first run up to operating speed (revolution per minute -RPM) and sparks were visible at all four posts on the test electrodes. The magneto speed was reduced to identify the minimum RPM that would produce a spark in sequence on all four electrodes. At 146 RPM (specification minimum is 150 rpm) sparks were no longer observed on all four electrodes. The gaps points were measured using a feeler gauge.

Main points gap (specification 0.018 ± 0.006 inch)	0.009 inch
Retard points gap (specification 0.018 ± 0.006 inch)	0.018 inch
Internal timing (P-lead specification "E" gap tolerance: $10^\circ \pm 4^\circ$) (Retard points specification: $39^\circ +2^\circ/-0^\circ$)	P-lead/main points "E" gap: 14° Timing stamp on case: 25° Retard points: 41°

The right magneto was placed on the magneto test fixture and ignition cap was installed. The magneto was first run up to operating speed and sparks were visible at all four posts on the test electrodes. The magneto speed was reduced to identify the minimum RPM that would produce a spark in sequence on all four electrodes. At 130 rpm (specification minimum is 150 rpm) sparks were no longer observed on all four electrodes. The tach lead output was attached to an oscilloscope and a square wave at 48 hertz (Hz) was produced at 1500 rpm. The gap points were measured using a feeler gauge.

Main points gap (specification 0.018 ± 0.006 inch)	0.009 inch
Tach points gap (specification 0.019 ± 0.003 inch)	0.005 inch
Internal timing (P-lead specification "E" gap tolerance: $10^\circ \pm 4^\circ$) (Retard points specification: $48^\circ +2^\circ/-0^\circ$)	P-lead/main points "E" gap: 18° Timing stamp on case: 30° Retard points: 33.35°

Governor Control Box

The governor control box was bench tested per Robinson guidance RPF-59 Rev F. The control box passed the acceptance test. The acceptance test sheet is attached to this report.

Governor Motor Assembly

A 12V DC power source was applied to the motor. The power source drove the motor actuator arm in both the forward and reverse directions. The friction ring allowed the motor to turn when the actuator arm was held stationary.

The power cable had a portion covered by a 1.5-inch section of heat shrink from a previous repair (Photo 5). When the heat shrink was removed it revealed a "repair" covering an area where some of outer braided shielding was frayed & the insulation had been worn exposing a small amount of inner conductor (Photo 6). Electrical continuity testing showed that the red (pin 1) could short to ground if the wire was worked back and forth when the power was routed by the controller thru pin 1. Power applied to pin 1 (red) drives the friction disk in the clockwise direction (when facing the friction disk) which equates to reducing the throttle. This would ground out the power to the motor throttle reduction. The effect would be that the governor would not reduce throttle, or it would reduce it at a slower than normal rate. Depending on the duration of the applied power pulse, a shorted wire could potentially trip the governor circuit breaker.

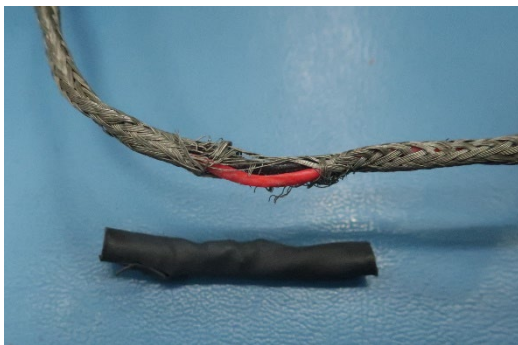


Photo 5. Power lead repair with heat shrink removed.

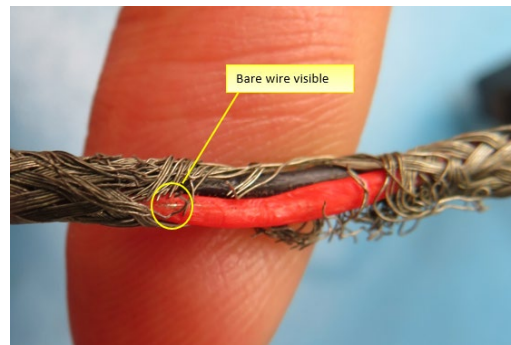


Photo 6. Bare conductor wire visible through worn red insulation and braided shielding.

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