NATIONAL TRANSPORTATION SAFETY BOARD

Office of Research and Engineering
Materials Laboratory Division
Washington, D.C. 20594

April 13, 2015

MATERIALS LABORATORY FACTUAL REPORT Report No. 15-042

A. ACCIDENT INFORMATION

Place	:	Guntersville, Alabama
Date	:	September 8, 2013
Vehicle	:	Piper PA-32R-300
NTSB No.	:	ERA13LA407
Investigator	:	Timothy W. Monville, AS-ERA

B. COMPONENTS EXAMINED

Bendix Ignition System D6LN-300 magneto with attachment hardware from a Lycoming IO-540-K1G5D engine.

C. DETAILS OF THE EXAMINATION

An overall view of the submitted dual magneto and attachment hardware is shown in figure 1. The attachment flange for the magneto was fractured at the upper side of the magneto as indicated in figure 1, and the fractured piece of the magneto flange is also shown. A piece of the magneto gasket remained adhered to the fractured flange piece. Hardware from the upper magneto attachment is also shown in figure 1, including a closer view. The NTSB investigator reported the hardware for the lower attachment point was missing and not recovered.

Lycoming Service Instruction (SI) 1508C, dated February 10, 2011, describes the attachment of magnetos on all Lycoming engines with dual magnetos. An illustration from Lycoming SI 1508C is captured in figure 2 of this report (with added annotations) showing the relative positions and shape of parts used in the magneto installation. The correct parts for attaching the magneto as described in SI 1508C are a nut (part number STD-1410), lock washer (part number STD-475), magneto clamp (part number 66M19385), and magneto gasket (part number LW-12681). Lycoming SI 1508C states that compliance with SI 1508C is mandatory and that failure to comply can cause loss of engine power. The time of compliance as stated in SI 1508C is at the next oil change, not to exceed 50 hours of engine operation or at each magneto timing check or service.

As shown in figure 1, the hardware installation for the upper magneto included a nut, a lock washer, a flat washer, and a clamp. Wear patterns corresponding to the teeth of the lock washer were observed on the faces of the nut and the flat washer as indicated in the lower image in figure 1. As shown in figure 2, no flat washer is included in the correct installation of the magneto in accordance with Lycoming SI 1508C.

As shown in figure 2[1], the correct magneto clamp part number 66M19385 has rounded corners, and the face that clamps against the accessory housing has a step feature at the outside portion of the clamp. The magneto clamp on the incident airplane had more pointed corners as indicated in figure 2 and had no step feature on the face that clamped to the accessory housing.

Lycoming SI 1508C shows diagram of correct and incorrect gaskets for use in attaching the magneto. As shown in figure 1 of SI 1508C, the correct gasket has a round outer diameter, and incorrect gaskets have ears at the top and bottom with holes for the magneto attachment studs. The gasket in the incident airplane had a round outer diameter. According to a representative of Lycoming Engines, gasket part number LW-12681 has a thickness of 0.015 inch new, and when in the installed and clamped condition, should have a thickness of approximately 0.010 inch. The thickness of the gasket from the accident airplane had a thickness of 0.034 inch.

A view of the lower side of the magneto showing the attachment flange at the lower attachment point is shown in figure 3. Wear was observed on the clamping face of the magneto flange corresponding to contact with the attachment clamp. The wear was present across the width of the face from the edge of the flange inward to the fillet radius between the flange and the magneto body. As indicated in figure 3, wear was also observed on the magneto body adjacent to the clamping face.

A view of the upper side of the magneto showing the fractured area of the attachment flange is shown in figure 4 with the mating sides of the fracture gently placed together. A band of wear was observed on the contact face of the flange as indicated with a bracket in figure 4. Paint remained present at the outer edge of the clamping face on the fractured piece, also as indicated in figure 4.

The fractured piece from the magneto flange was cleaned using soapy water and a soft-bristle brush. The fracture surface after cleaning is shown in figure 5. Concentric crack arrest lines emanated from an origin area near the middle of the fractured piece, features consistent with fatigue fracture. The fatigue origin and a crack arrest line on the fracture surface are indicated in figure 5.

Matthew R. Fox
Senior Materials Engineer

[1] See also figure 3 of Lycoming SI 1508C.

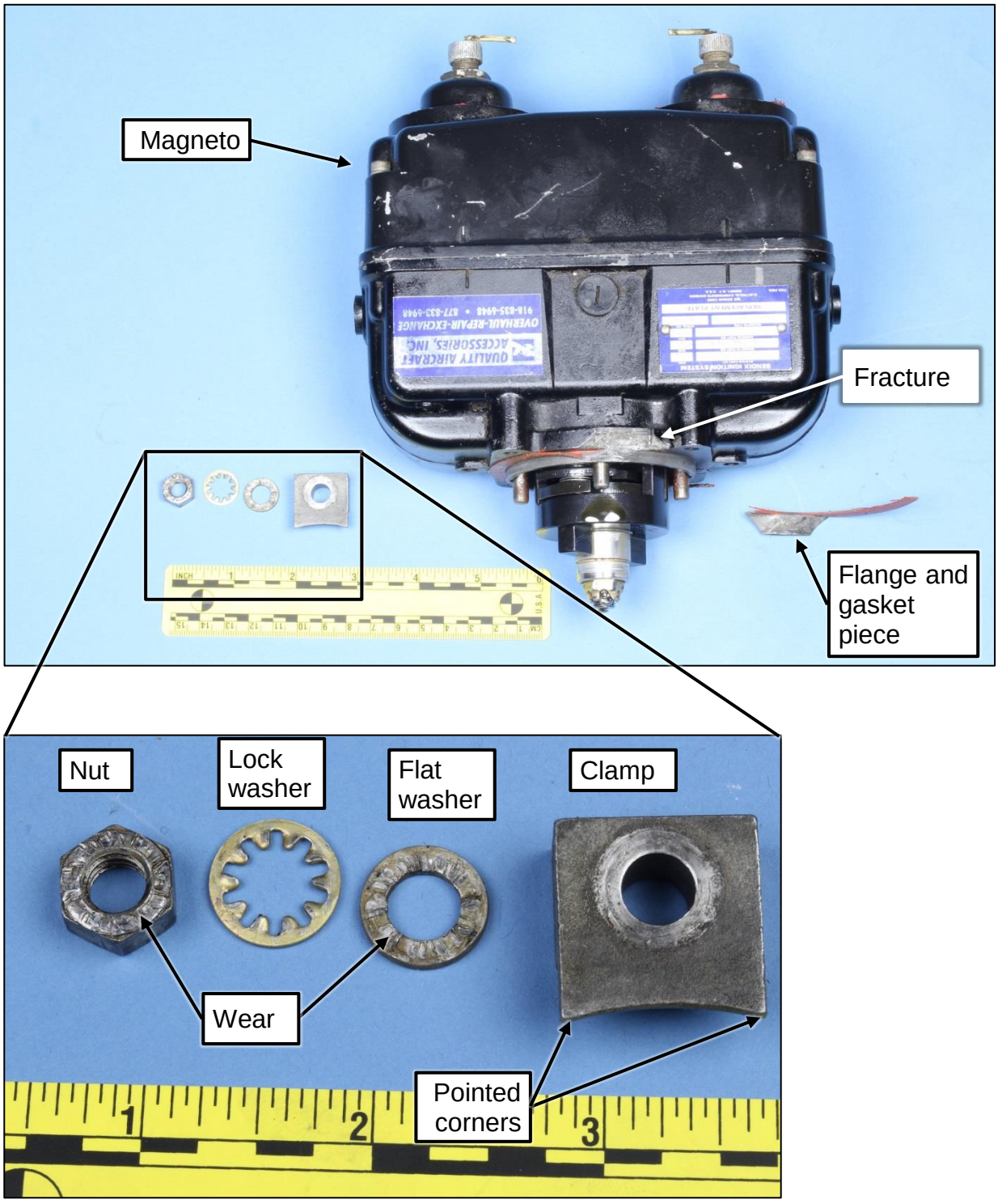

Figure 1. Overall view of the magneto and attachment hardware as received (upper image) with a closer view of the attachment hardware (lower piece).

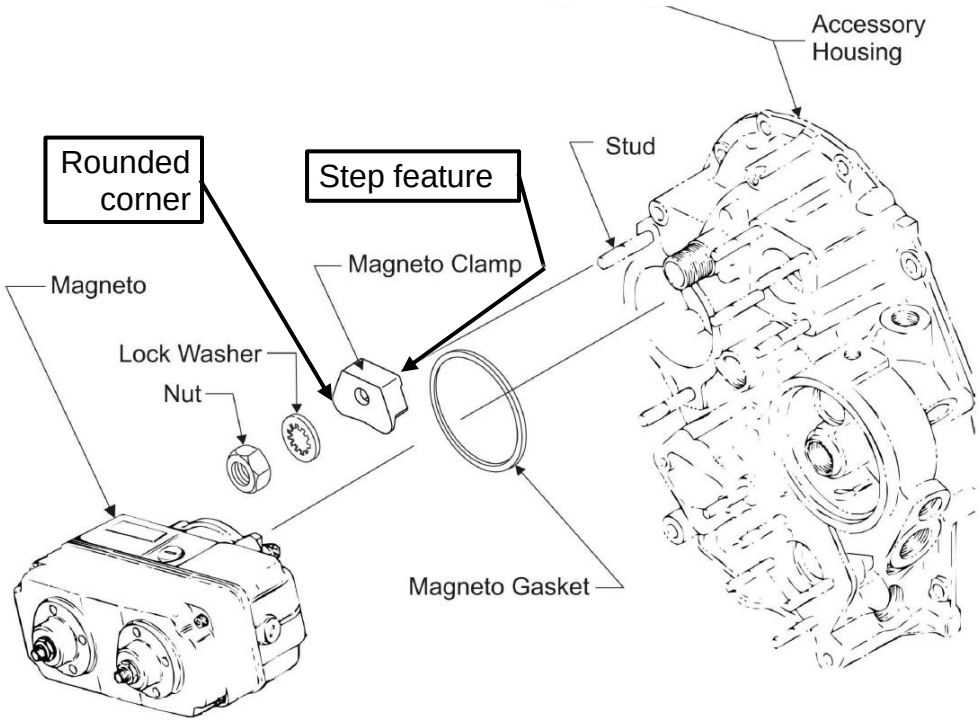

Figure 2. Illustration of the magneto installation from Lycoming Service Instruction No. 1508C with added annotations of clamp features.

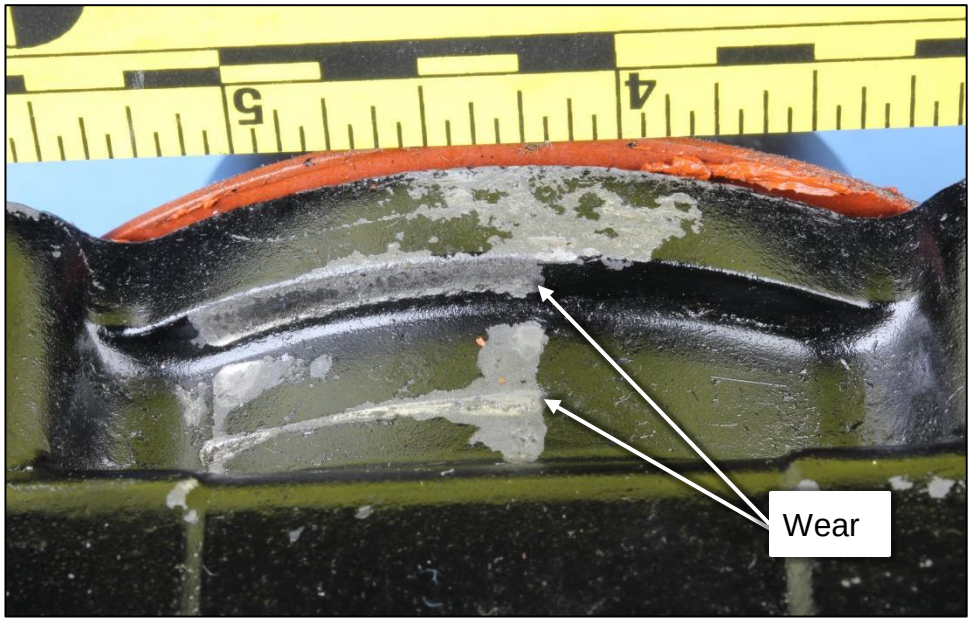

Figure 3. View of the lower side of the magneto showing wear at the clamping face of the attachment flange and the adjacent surface.

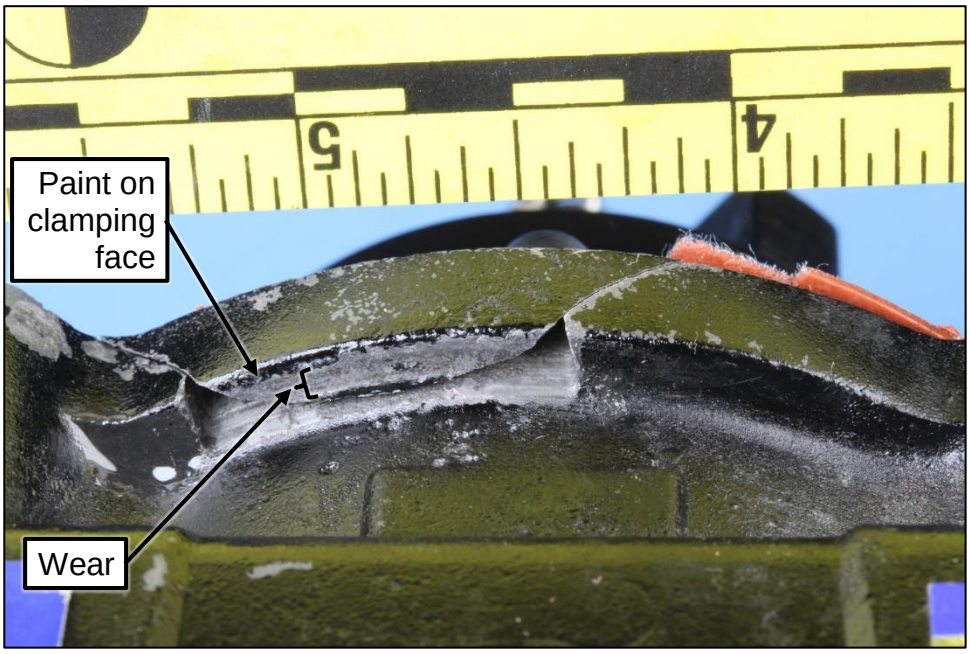

Figure 4. View of the upper side of the magneto showing the clamping face of the attachment flange.

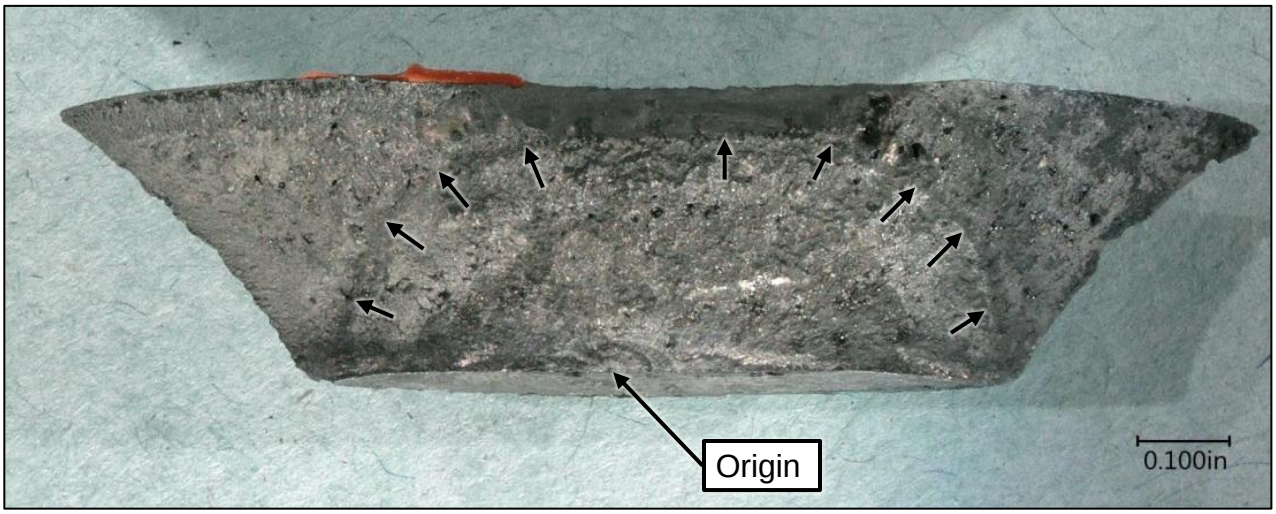

Figure 5. Fracture surface on the fractured piece of the magneto attachment flange. The fatigue origin is indicated and unlabeled arrows indicate a crack arrest mark.