

Log 1931



National Transportation Safety Board

Washington, D.C. 20594
Safety Recommendation

Date: May 15, 1987

In reply refer to: A-87-56 through -59

Honorable Donald D. Engen
Administrator
Federal Aviation Administration
Washington, D.C. 20591

On August 28, 1986, the pilot of a Cessna Model P210N, N5135A, was seriously injured and the airplane was substantially damaged after the airplane sustained an engine failure in flight and crashed at Salton City, California. Although damage to the engine was minimal, attempts to restart it were unsuccessful during the course of the Safety Board's investigation of the accident. While the Safety Board's investigation has not yet been completed, bench tests disclosed that the airplanes' left and right Slick Model 6220 pressurized magnetos were inoperative. Each magneto had been operated for about 400 hours at the time of the accident. Upon disassembly, the magnetos were found to be contaminated with moisture, rust, and nylon particles; and the magneto frame, distributor bar, and high voltage coil on each unit exhibited evidence of severe electrical arcing. After new magnetos were installed, the engine started and operated satisfactorily.

The Safety Board has not been able to determine how moisture entered the magnetos. However, a similar moisture contamination problem was encountered several years ago on Piper Malibu Model PA-46 airplanes which utilize pressurized Slick Model 6224 magnetos. As a result, the potential for the influx of moisture was decreased and the air flow to the magnetos was increased by scarfing the pressure line pickup and extending it further into the engine's air throttle assembly. The magneto air pressure lines in the Malibu have a 0.250-inch inside diameter. Similar pressure lines on Cessna TU206, T207, T210N, and P210N airplanes are only 0.078 inch in diameter and are flush-mounted to the airplane's air induction tube assembly. Because the lines are flush-mounted and are relatively small, they may be subject to water ingestion, low pressure, and perhaps, even "reverse" air flow under certain high altitude-engine operating conditions.

The Safety Board evaluated a multitude of Service Difficulty Reports (SDR) submitted to the Federal Aviation Administration (FAA) between July 18, 1982, and February 24, 1987, applicable to Slick aircraft magnetos. Two problem areas which were noted and which merit further attention by the FAA involve loose distributor gear electrode fingers in Slick series 600, 4200, and 6200 magnetos and contamination/arcing in Slick Model 6220 and 6224 pressurized magnetos similar to that found in N5135A. Most of the contamination/arcing reports applicable to the latter models involved magnetos installed in Cessna airplanes, particularly the Cessna Model 303 with both Slick Model 6220 and 6224 magnetos. 1/

1/ Slick Model 6220 and 6224 magnetos are identical except for the direction of rotation.

The manufacturer of the magnetos, Slick Aircraft Products of Rockford, Illinois, is currently establishing a flight test program, which utilizes a Cessna P210N airplane with Model 6220 magnetos, to determine the precise cause for such magneto contamination. The program will focus on the magnetos' air flow rates and pressures for all applicable flight regimes, utilizing the existing pressure lines. If the results indicate that the design of these lines is unsatisfactory, the manufacturer will be able to determine the line size, configuration, and filtration characteristics necessary to adequately pressurize the magnetos and avoid contamination. The Safety Board believes that the FAA should participate in these tests and, if necessary, conduct similar tests of Slick Model 6220 and 6224 magnetos as installed in Cessna Model 303 airplanes. Subsequently, an airworthiness directive should be issued applicable to Cessna TU206, T207, T210N, and P210N airplanes and to Cessna Model 303 airplanes with both Slick Model 6220 and 6224 magnetos, mandating whatever system design changes are necessary to preclude contamination of these magnetos. In the interim, the FAA should require the periodic inspection of Slick Model 6220/6224 magnetos installed in these Cessna airplanes to detect and correct any existing contamination and/or electrical arcing.

Slick magnetos have a history of loose distributor gear electrode fingers. For example, in 1983, this problem was evidenced in Model 6224 magnetos installed in many Mooney M-20K airplanes. Although the cause of the loose fingers was not ascertained, the problem apparently was resolved after Slick provided exchange distributor block assemblies for this group of magnetos. Subsequently, Slick prepared Service Bulletin 1-84, "Distributor Block Assembly Replacement Program," which is applicable to certain Models 6220 and 6224 magnetos installed in Cessna T210, P210, and T303 airplanes. Slick indicated that the service problem had been isolated to a particular component (distributor block) assembly and magneto serial number range, and it recommended that affected distributor block assemblies beginning with one of the following 3-digit numbers be replaced: #101, 110, 111, 112, 201, 202, or 203; e.g., 1120045.

SDRs involving loose distributor gear fingers, in most cases, do not provide sufficient information to determine the precise cause of these malfunctions, i.e., whether the loose finger was directly related to the design of the magneto or resulted from an improper service procedure during installation of the magneto. Slick Service Bulletin 2-81A, "Magneto Malfunction That Results From Failing To Remove the T-118 Timing Pin After Installing The Magneto On The Engine," which is applicable to the 4200/6200 series magnetos, relates to this subject. As a result, the Safety Board believes that the FAA should conduct an engineering design review of Slick magnetos to determine whether any changes in design or service procedures are necessary. For example, it may be expedient to install and set the timing of Slick 4200/6200 series magnetos using an electrical procedure rather than the T-118 timing pin, i.e., by "sparking out" the magneto.

Therefore, the National Transportation Safety Board recommends that the Federal Aviation Administration:

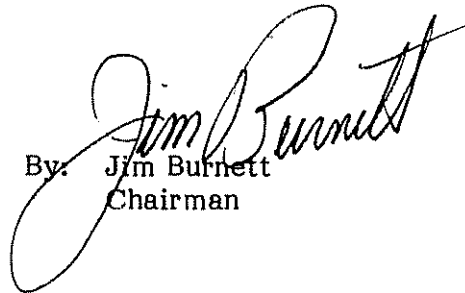
Issue an airworthiness directive applicable to Cessna Models TU206, T207, T210N, and P210N airplanes with Slick Model 6220 magnetos and to Cessna Model 303 airplanes with Slick Models 6220 and 6224 magnetos to require an inspection of these magnetos for evidence of contamination and/or electrical arcing within the next 10 hours of flight and correction of any deficiencies noted. Similar inspections of the magnetos should be conducted after each 50 hours of flight until design changes necessary to preclude magneto contamination and electrical arcing have been incorporated. (Class II, Priority Action) (A-87-56)

In conjunction with Slick Aircraft Products, conduct flight tests of Slick Model 6220 magnetos as installed in Cessna 200-series airplanes. The effects of pressure line size and configuration on magneto air pressure, flow rate, and operating characteristics should be determined for all applicable flight regimes. If necessary, similar tests should be conducted of Slick Models 6220 and 6224 magnetos as installed in Cessna Model 303 airplanes. (Class II, Priority Action) (A-87-57)

Issue an airworthiness directive applicable to Cessna Models TU206, T207, T210N, and P210N airplanes with Slick Model 6220 magnetos and to Cessna Model 303 airplanes with both Slick Model 6220 and 6224 magnetos to require the incorporation of appropriate system design changes to prevent contamination and electrical arcing in these magnetos. (Class II, Priority Action) (A-87-58)

Conduct an engineering design review of Slick aircraft magnetos to determine the cause(s) for the repeated occurrence of loose/malfunctioning distributor gear electrode fingers in these units. If appropriate, changes to the magnetos design and/or installation procedure should be required to preclude further occurrences of such malfunctions. (Class II, Priority Action) (A-87-59)

BURNETT, Chairman, GOLDMAN, Vice Chairman, and LAUBER and NALL, Members, concurred in these recommendations.

By: 
Jim Burnett
Chairman