Republic of the Philippines
CIVIL AVIATION AUTHORITY OF THE PHILIPPINES

AIRCRAFT ACCIDENT INVESTIGATION AND INQUIRY BOARD

FINAL REPORT

RP-C1906
TEXTRON AVIATION INC. 172M

OPERATOR: HI-TONE CONSTRUCTION AND DEV'T. CORP.

TYPE OF OPERATION: GENERAL AVIATION

DATE OF OCCURRENCE: OCTOBER 30, 2024

PLACE OF OCCURRENCE: GABAWAN-MARIAWA RD., BARANGAY. MARIAWA, LEGASPI CITY, ALBAY, PHILIPPINES

TABLE OF CONTENTS

(Textron Aviation Inc. 172M Final Report)

FOREWORD

This report was produced by the Aircraft Accident Investigation and Inquiry Board (AAIIB), Civil Aviation Authority of the Philippines, MIA Road, Pasay City, Philippines.

The report is based upon the investigation carried out by the AAIIB in accordance with Annex 13 to the Convention on International Civil Aviation, Republic Act 9497 Section 42, and Philippine Civil Aviation Regulation Part 13.

Readers are advised that the AAIIB investigates for the sole purpose of enhancing aviation safety. Consequently, AAIIB reports are confined to matters of safety significance and may be misleading if used for any other purpose. It should be noted that the information in AAIIB reports and recommendations is provided to promote aviation safety, and in no case is it intended to imply blame or liability.

Furthermore, no part of the AAIIB report or reports relating to any accident or investigation shall be admitted as evidence or used in any suit or action for damages arising out of any matter mentioned in such report or reports.

FINAL REPORT

TITLE: A serious incident involving a Textron Aviation Inc. 172M type of aircraft with Registry Number RP-C1906, operated by Hi-Tone Construction and Development Corp. had a forced landing event at Gabawan-Mariawa road, Barangay Mariawa, Legaspi City, Albay, Philippines, on October 30, 2024, at around 1236H.

Notification of Occurrence to National Authority

The serious incident was reported by the CAAP Bicol International Airport to the CAAP Operations Center, which relayed the information to the CAAP AAIIB on October 30, 2024.

Identification of the Investigation Authority

The Aircraft Accident Investigation and Inquiry Board (AAIIB), the mandated accident investigation organization within the Civil Aviation Authority of the Philippines (CAAP) as the state of Occurrence/Registry/Operator conducted the investigation.

Organization of the Investigation

In accordance with the provisions of the Philippine Civil Aviation Regulation (PCAR) Part 13, an Investigator-In-Charge was appointed.

Authority Releasing the Report

The Final Investigation Report was released by the Aircraft Accident Investigation and Inquiry Board (AAIIB) and published on the CAAP website on 13 March 2025.

Synopsis:

On or about 1236H of October 30, 2024, a Textron Aviation Inc. 172M aircraft with registry number RP-C1906 sustained substantial damage following a forced landing due to a loss of engine rpm at Gabawan-Mariawa Road, Barangay Mariawa, Legaspi City, Albay, Philippines. The aircraft was operated by Hi-Tone Construction and Development Corp. with a base of operations at Lidong, Sto. Domingo, Legaspi City, Albay. The aircraft came from Virac Airport to ferry company personnel when it encountered a loss of engine power during its approach to Bicol International Airport. The pilot and two (2) passengers safely exited the aircraft without injuries. The investigation determined that the probable cause of the serious incident was magneto failure.

LIST OF ACRONYMS AND ABBREVIATIONS

AAIIB	:	Aircraft Accident Investigation and Inquiry Board
AMT	:	Aircraft Maintenance Technician
ATO	:	Approved Training Organization
BIA	:	Bicol International Airport
CAAP	:	Civil Aviation Authority of the Philippines
CoA	:	Certificate of Airworthiness
CoR	:	Certificate of Registration
CPL	:	Commercial Pilot License
CRM	:	Crew Resource Management
DME	:	Distance Measuring Equipment
IATA	:	International Air Transport Association
ICAO	:	International Civil Aviation Organization
OFSAM	:	Office of the Flight Surgeon and Aviation Medicine
PAPI	:	Precision Approach Path Indicator
RFFS	:	Rescue and Firefighting Services
RPM	:	Revolution Per Minute
NM	:	Nautical Miles
POH	:	Pilot's Operating Handbook
SOP	:	Standard Operating Procedure
VFR	:	Visual Flight Rules
VOR	:	Very High Frequency Omni-Directional Range

1. FACTUAL INFORMATION

Aircraft Registration No.	:	RP-C1906
Aircraft Type/Model	:	Textron Aviation Inc. 172M
Operator	:	Hi-Tone Construction and Development Corp.
Address of Operator	:	Lidong, Sto. Domingo, Legazpi City, Albay, Philippines
Place of Occurrence	:	Gabawan-Mariawa Road, Barangay Mariawa, Legaspi City, Albay, Philippines
Date/Time of Occurrence	:	October 30, 2024, at about 1236H/0436 UTC
Type of Operation	:	General Aviation
Phase of Flight	:	Landing
Type of Occurrence	:	Reciprocating engine – non-mechanical failure

1.1 History of the Flight

On or about 1236H of October 30, 2024, a Textron Aviation Inc. 172M aircraft with registration number RP-C1906 had a forced landing incident after losing engine power at Gabawan-Mariawa Road, Barangay Mariawa, Legaspi City, Albay, Philippines.

The aircraft was operated by Hi-Tone Construction and Development Corp. It departed from Virac Airport as a private flight to ferry company personnel where one (1) pilot and two (2) passengers were onboard.

According to interviews with the pilot and one of the passengers, the flight to Virac was uneventful, with no issues reported with the aircraft. After delivering company documents at Hi-Tone's Virac office, they took off again for Bicol International Airport, accompanied by one (1) additional company personnel.

At about 9 nautical miles (NM) from Bicol International Airport and at an altitude of 2,500 ft., the pilot observed an abrupt decrease in engine power output from 2,300 rpm to

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1,500 rpm without any prior adjustment to the throttle. The pilot attempted to compensate for the power loss by adjusting the throttle but to no avail. As the aircraft continued to lose power and altitude, the pilot requested priority landing clearance from the Bicol International Airport Tower, which was granted. However, due to strong, gusty headwinds on approach, it became evident that reaching the runway would not be feasible, even while maintaining the best glide speed. The pilot then decided to look for a suitable alternative landing spot.

The pilot managed to land the aircraft on a newly constructed road, carefully maneuvering it away from electrical cables and bystanders in the area before it finally came to a full stop after its right-wing tip made contact with a part of the heavy equipment parked along the road.

1.2 Injuries to Person (s)

Injuries	Crew	Passengers	Others	TOTAL
Fatal	0	0	0	0
Serious	0	0	0	0
Minor	0	0	0	0
None	1	2	0	3

1.3 Damage to Aircraft

The aircraft sustained substantial damage.

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Figures 1 and 2 – Damage on the aircraft's right-hand wing tip.

Figure 3 – Damage on the aircraft's right-hand wing root.

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Figure 4 – Damage on the aircraft's right-hand wing flaps.

Figure 5 – Broken right-hand side passenger window.

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1.4 Other Damages

There were no reported other damages due to of this incident.

1.5 Personnel Information

1.5.1 Pilot

Gender	:	Male
Date of Birth	:	June 30, 1995
Nationality	:	Filipino
License	:	120549 CPL, valid until July 19, 2028
Type rating	:	Airplane: Single and Multi-Engine Land – Instrument C172, BE55, PA23-250, C414
Medical Certificate	:	Class 1, valid until October 14, 2025
Date of last medical	:	October 08, 2024
Total flying time	:	1,282 + 42 Hours as of October 31, 2024
Total flying time on type	:	253 + 48 Hours as of October 31, 2024

1.6 Aircraft Information

The Textron Aviation Inc. 172M, a popular variant in the C172 Skyhawk series, is an American-built, four-seat, single-engine, high-wing, fixed-wing aircraft produced by Textron Aviation Inc. (formerly Cessna). First flown in the 1950s and built upon the success of the Cessna 170, the 172 series have become one of the most produced aircraft in history due to its simplicity, reliability, and versatility.

The 172M model, introduced in the early 1970s, features several improvements over previous versions. Key upgrades include the "Camber-Lift" wing with a drooped leading edge, which enhances low-speed handling and improves takeoff and landing performance. This wing modification allows for better lift at lower speeds, making the aircraft safer and easier to control, especially for flight training and recreational flying.

Other improvements in the 172M include an upgraded instrument panel layout for easier readability, a larger baggage compartment, and enhanced internal fittings and seating comfort. Additionally, Cessna added features like dual landing lights and an improved electrical system. The 172M is powered by a Lycoming O-320-E2D engine producing around 150 horsepower, which gives it a cruising speed of approximately 122 knots and a range of about 640 nautical miles.

Due to these enhancements, the 172M remains a popular choice for flight schools, private owners, and flying clubs, known for its durability, straightforward handling, and ease of maintenance.

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1.6.1 Aircraft Data

Registration Mark	:	RP-C1906
Manufacturer	:	Textron Aviation Inc.
Country of Manufacturer	:	USA
Type/Model	:	172M
Operator	:	Hi-Tone Construction and Development Corp.
Serial No.	:	17262077
Year of Manufacture	:	1974
Certificate of Airworthiness	:	Valid until March 20, 2025
Certificate of Registration	:	Valid until October 16, 2027
Category	:	Normal
Gross Weight	:	1,451.6 kgs.
Number of Flight Crew	:	1
Number of Passengers	:	3
Airframe total time	:	3,227 + 38 Hours since last C of A

1.6.2 Engine Data

Manufacturer	:	Lycoming
Type	:	Reciprocating
Model	:	O-320-E2D
Engine Serial No.	:	L-35093-27A
Engine TBO	:	2,000 Hours
Engine TSO	:	773 + 31 Hours as of Oct. 12, 2024
Engine Total Time	:	3,042 + 08 Hours as of Oct. 12, 2024

1.6.3 Propeller Data

Manufacturer	:	McCauley
Type	:	Fixed Pitch
Model	:	1C160-CTM7553
Propeller Serial No.	:	722450
Propeller TBO	:	2,000 Hours
Propeller TSO	:	247 + 25 Hours as of Oct. 16, 2024
Propeller Total Time	:	3,042 + 08 Hours as of Oct. 16, 2024

1.7 Meteorological Information

The actual METAR provided by the Bicol International Airport Tower was as follows:

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Wind Condition	Sky Condition	Visibility	Temperature	Dewpoint	QNH	Remarks
230° at 13 knots	FEW 018, CB, BKN 200	9 km	30°C	25°C	1006hPa	CB NNW

1.8 Aids to Navigation

The flight was carried out under Visual Flight Rules (VFR). Likewise, the airport was equipped with VOR/DME, PAPI and runway edge lights.

1.9 Communications

The aircraft was equipped with a standard radio transceiver. Communications were carried out between the pilot and Bicol International Airport Tower.

1.10 Aerodrome Information

Bicol International Airport (BIA) (IATA: DRP, ICAO: RPLK) serves the vicinity of Legazpi, the capital city of Albay and the regional center of the Bicol Region in the Philippines. The airport is located in Daraga, a neighboring municipality of Legazpi, and replaced the old Legaspi Airport, which was only 2 to 3 kilometers (1.2 to 1.9 miles) from BIA.

Inaugurated on October 7, 2021, BIA is expected to handle approximately 2.2 million passengers annually. Although the airport is designated as an international airport, it is classified as a Class 1 principal domestic airport by the Civil Aviation Authority of the Philippines.

The airport has a single runway, runway 05/23, that is 2,500 meters (8,200 ft) long and 45 meters (148 ft) wide. Additionally, it is equipped for nighttime operations.

1.11 Flight Recorders

The aircraft was not equipped with any flight recorders and existing Philippine Civil Aviation Regulation does not require such for that type of aircraft.

1.12 Wreckage and Impact Information

The pilot managed to land the aircraft on the newly constructed Gabawan-Mariawa road located at Brgy. Mariawa, Legaspi City, Albay, which was approximately 3.35 km. (1.8 NM) from Bicol International Airport. The aircraft's final resting position was

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recorded at coordinates 13° 06' 34.44" N, 123° 42' 43.74" E, which was approximately 61 meters from its touchdown point.

The aircraft sustained damage to its right wingtip cap, leading edge, and flaps. Additionally, a leak was detected in the right-wing fuel tank, and the right-side passenger window was broken. These damages were caused by the aircraft's contact with heavy equipment parked at the landing site.

Figure 6 – The aircraft at its final stopping point.

Figure 7 – The aircraft's touchdown spot and the heavy equipment parked at the side of the road.

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1.13 Medical and Pathological Information

The pilot underwent medical check-ups and mandatory drug and alcohol testing at the local hospital and clinic. The results were later endorsed to CAAP OFSAM for the required post-accident medical examination. The pilot was eventually issued a medical clearance by the mentioned CAAP office.

1.14 Fire

No reports were received regarding any post-incident fires.

1.15 Survival Aspects

The incident was survivable as the aircraft's fuselage remained intact, and all occupants were secured by their individual seat harnesses. Additionally, the aircraft's speed during touchdown and roll was already low due to the power loss, and its momentum was further reduced by the uphill orientation of the landing site. As a result, the impact with the parked equipment did not cause major damage to the aircraft's fuselage structure, which might have led to injuries for the pilot and passengers.

Furthermore, as the incident site was within a residential area, bystanders were able to immediately assist the aircraft occupants. Similarly, the Bicol International Airport RFFS and medical team responded promptly to the site to provide additional support.

1.16 Test and Research

Under the supervision of the assigned CAAP AAIIB Investigator, Hi-Tone maintenance personnel conducted several tests, particularly on the aircraft's engine, to identify the issue reported by the pilot.

The first test involved conducting a ground run of the engine to replicate the scenario encountered during the incident flight. Various engine power settings were performed to evaluate engine performance. During this test at varying engine rpm, parameters such as oil pressure, oil temperature, and suction were all observed to be within normal limits. However, the engine showed rough performance at 1,700 rpm during magneto checks, especially when operating on the left magneto alone. Despite this, the rpm drop remained within the recommended allowable range for the specific engine type and model.

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Figure 8 – The aircraft during engine run-up at Hi-Tone's hangar located beside BIA.

Note: The aircraft's wings were removed before transport from the incident site to the operator's hangar. During the subsequent engine run-up conducted at the hangar, the aircraft remained without its wings.

After the engine ground run, hot compression checks were performed on the engine's four (4) cylinders to evaluate their condition and the state of other internal components. The test results indicated that the engine components were functioning within Lycoming's specified acceptable limits.

Figure 9 – Hot compression checks on the aircraft engine's 4 cylinders.

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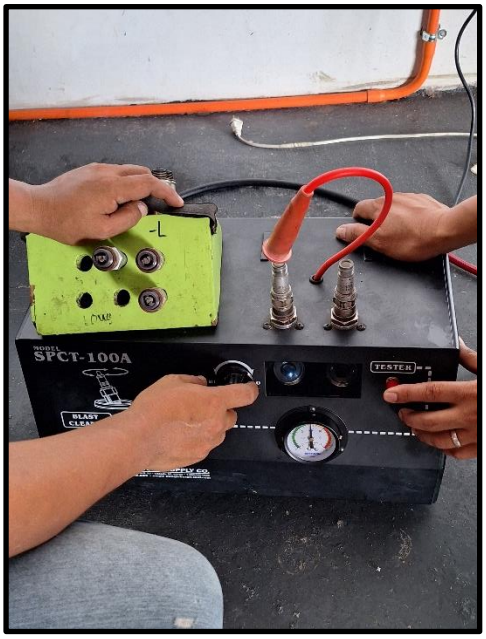
An engine ignition harness test followed the compression check to ensure all components were functioning properly. The test began with a visual inspection to identify any physical damage to the wiring or loose connections. A performance check followed, which revealed that both the upper and lower harnesses of the no. 4 cylinder had failed, while the harnesses for the remaining cylinders were functioning correctly.

Taking into account the findings from the engine ignition harness test, a spark plug test was subsequently conducted using a spark plug tester to evaluate the condition and performance of the spark plugs. During the test, it was observed that the lower spark plug on cylinder no. 4 produced only a weak spark, while the rest generated adequate sparks.



Figures 10 and 11– Tests conducted on the engine ignition harness and spark plug.

The next test involved inspecting the magneto. Only the left-hand (LH) magneto was removed from the engine, as the previous tests indicated only discrepancies or inconsistencies with the left magneto and cylinder no. 4. A spark test was performed on the magneto harness mounting, revealing a weak spark on the no. 4 connector, while the rest produced a significant spark. The magneto was then disassembled to inspect its internal components for signs of wear and tear, damage, misalignment, or the presence of deposits or debris that could hinder its operation. The inspection revealed significant erosion on the no. 4 distributor block contact point, which might have affected its ability to produce sufficient spark.

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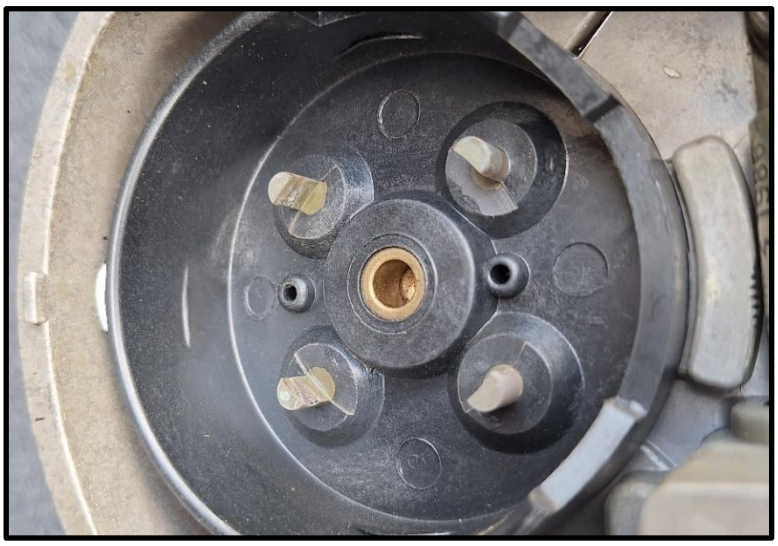

Figure 12– LH magneto distributor block.

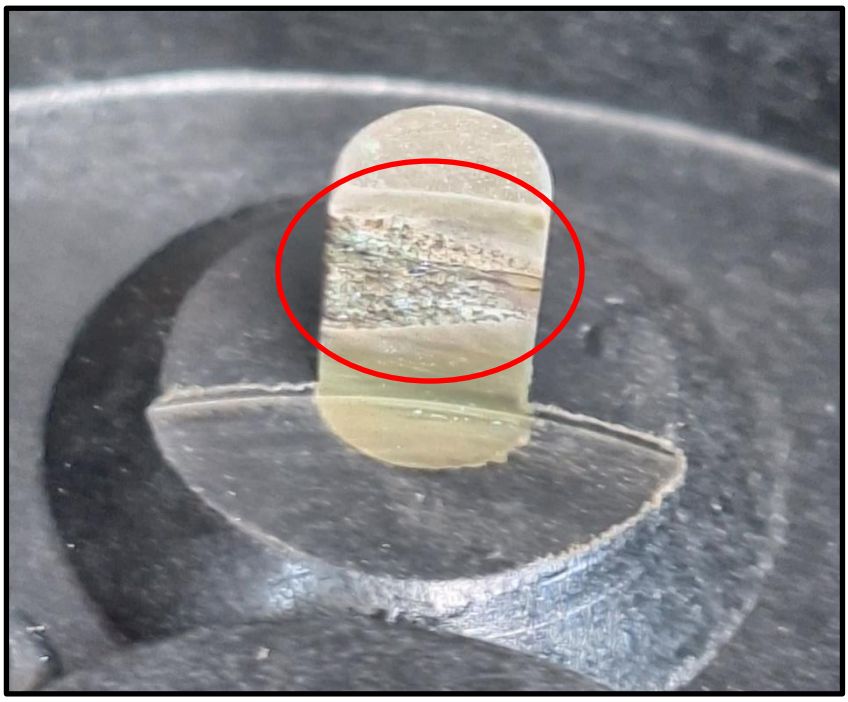

Figure 13– Noted significant erosion on the no. 4 distributor block contact point.

In addition to the above tests, oil and fuel checks were performed to identify possible contaminants that could have affected the engine's performance. For the oil check, samples were drained through the oil sump. No contaminants were found, even on the oil sump filter screen. Fuel was then tested for possible contaminants, particularly the presence of water. The test was conducted using a water-detecting paste, and the results confirmed that the sample was free of water contaminants.

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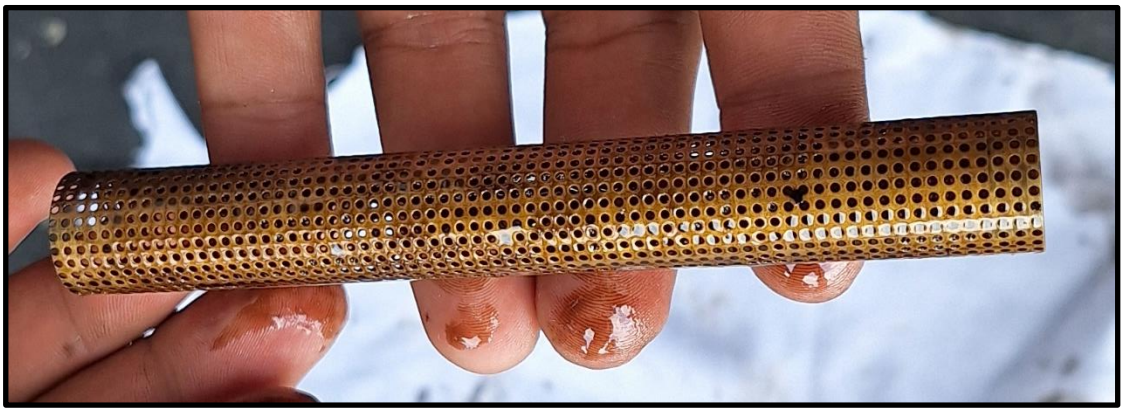

Figure 14– Oil sump filter screen was noted to be free from any contaminants.

Figure 15– Fuel test conducted using a water-detecting paste.

1.17 Organizational and Management Information

Hi-Tone Construction and Development Corp. is a private company engaged in the commercial and institutional building construction industry. Established on February 9, 2007, and with head office in Lidong, Sto. Domingo, Legazpi City, Albay, Philippines. The company has an aviation section, Hi-Tone Aviation, which currently operates a fleet of four (4) aircraft, exclusively for company operations.

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2. ANALYSIS

2.1 Human Factor

2.1.1 Personnel Training and Competence

The pilot holds a valid Commercial Pilot License (CPL) issued by the CAAP, with an appropriate rating for the type of aircraft operated at the time of the incident. During the interview, it was learned that he completed his flight training in 2016 and subsequently gained operational experience in fish cargo operations from 2017 to 2021, flying BE55 and PA23-250 aircraft. In May 2021, he joined Hi-Tone and has since been serving as one of its company pilots, assigned to its fleet of fixed-wing aircraft. In July 2023, he successfully completed his most recent Pilot Proficiency Flight Test on a C172 aircraft under a CAAP-assigned Check Pilot.

As for the maintenance personnel who released and assisted in the inspection of the aircraft before its flight, records revealed that they held valid CAAP-issued AMT licenses with ratings on airframe and powerplant. Records also show that they had relevant maintenance training specific to the aircraft involved, as well as with other aircraft in Hi-Tone's fleet.

2.1.2 Fatigue and Health Factors

A review of the pilot's schedule for the past two (2) months revealed that he had flown fifteen (15) times from September to October, including the incident flight. His schedule shows no pattern that would suggest excessive workload or fatigue. In September, there were only two instances where he flew for three (3) consecutive days, while the rest of his flights were evenly spaced throughout the month. In October, his schedule was even lighter, with only five (5) flights conducted over the entire month.

Based on the above information, including the records and results of the medical tests conducted on the pilot by a local hospital in Bicol, as well as the evaluation by the CAAP OFSAM, it can be concluded that fatigue or the pilot's physical condition, in general, was not a factor in this incident.

With regard to the involved maintenance personnel, it was found during the interview that their workload has been relatively light, as they primarily cater only to the needs of their company's operations. Their tasks are generally limited to supporting flights or conducting major repairs on the aircraft. Over the past few months, there have been no major repairs, and the number of flights has been minimal, further indicating a manageable workload for the maintenance team.

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2.1.3 Situational Awareness and Decision Making

A sudden loss of engine rpm during flight could have compromised the safety of the aircraft and its passengers. However, interviews with the pilot and one of the passengers revealed that the pilot demonstrated remarkable situational awareness by quickly identifying the problem and assessing the next course of action.

Exercising sound judgment, the pilot adhered to established emergency SOPs, ensuring the aircraft remained within safe operating parameters by adjusting power settings and maintaining control. Simultaneously, he communicated effectively with the onboard maintenance personnel and air traffic control to ensure that necessary preparations were in place for a possible emergency landing.

Through calm and focused decision-making, the pilot was able to achieve the safety of everyone on board while minimizing potential risks to the aircraft and surrounding areas. This can be attributed to his knowledge of the aircraft and his flying experience, which enabled him to land the aircraft outside of the airport safely.

2.2 Operations

2.2.1 Flight Execution

The flight last October 30, 2024, was a normal scheduled company flight. The itinerary for that day was to deliver needed documents to the Hi-Tone office in Virac and then pick up company personnel who would be returning to Legazpi. This route was in accordance with their filed Flight Plan.

During interviews with the pilot and relevant Hi-Tone personnel, it was confirmed that the aircraft's departure for Virac followed a standard pre-flight check, which included a magneto check and engine run-up. A review of the available Pre-Flight Inspection Checklist further verified that no irregularities or limitations on the aircraft were noted, and the scheduled flight proceeded as planned. Additionally, the flight crew stated that they obtained relevant weather information both before departing Bicol International Airport and prior to the return flight from Virac Airport. Based on the information gathered, no significant weather conditions were identified that could impact the scheduled flight.

Upon arrival at Virac, the documents intended for the Hi-Tone staff were delivered. Preparations were then made for the return journey to Bicol International Airport, with the additional Hi-Tone personnel joining the flight.

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The aircraft departed Virac at around 1000H, however, a sudden decrease in the engine rpm was detected shortly after takeoff (from 2,500 rpm to 2,300 rpm). In response, the pilot opted to return and land to inspect the engine. After landing and parking at the apron, the onboard maintenance personnel conducted an inspection and performed engine run-ups to replicate the issue encountered during the flight. With all systems and parameters operating again within the normal range, the pilot and mechanic decided to conduct a test flight before returning to their home base. The aircraft took off again at about 1144H, completing one flight pattern over the airport and a touch-and-go. After confirming that no further issues were detected, they decided to proceed with their scheduled return.

The flight was uneventful from that point onward, with no observed irregularities in engine performance or aircraft systems. However, as the aircraft approached its destination airport, engine rpm issues resurfaced, where there was again an abrupt decrease in engine power parameters from 2,300 rpm to 1,500 rpm without any pilot input on the throttle. In light of this, the pilot swiftly referred to the aircraft's emergency procedure checklist and consulted with the onboard mechanic to determine the appropriate course of action. The pilot attempted to compensate for the rpm loss by adjusting the throttle, but the aircraft continued to experience a steady loss of power and altitude. Faced with the situation, the pilot was forced to request priority landing clearance from the airport tower, as the circumstances required an immediate landing. Fortunately, the request was promptly accommodated, and the pilot prepared for his approach. However, the strong, gusty headwind (wind at 230^{o} at 13 knots) during their approach posed a significant challenge for the aircraft to reach the airport's runway despite the pilot's efforts to maintain the best glide speed. Recognizing this, the pilot opted to identify other potential suitable emergency landing areas. Ultimately, the flight concluded with a landing on the newly constructed road, as it was the closest flat and viable area for a safe emergency landing, making it the pilot's optimal choice under the circumstances.

Based on the above actions taken and information shared by the pilot during the interview, it can be summarized that the SOPs outlined in the aircraft's emergency procedure checklist and Pilot's Operating Handbook (POH) were adhered to and appropriately applied during the unforeseen engine issue. Despite the efforts exerted to address the situation, no further actions could have prevented the need for the emergency landing.

2.3 Organizational Factor

2.3.1 Safety Culture and Management Support

Interviews and interactions with the personnel available at the Hi-Tone hangar gave the assigned investigator the impression of a safety-minded group. One could noticeably see that each member embodied a sense of awareness through the way

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they performed their individual functions and how responsible they were for their actions. This sense of awareness and responsibility is a reflection of the unit's organizational structure, where each personnel's task and responsibility were clearly defined

This commitment to safety and responsibility was further corroborated during the review of the unit's documentation. Records revealed that issues found on the aircraft were properly reported, with corresponding actions promptly taken by the responsible personnel. Additionally, interviews highlighted strong management support, as the unit was consistently provided with the necessary resources to meet its requirements.

Furthermore, there were no signs of any operational pressure within the unit, as their operations focused solely on the company's needs. This created a relaxed working atmosphere, which was reflected in the positive mood of each Hi-Tone Aviation staff member. This positive environment fostered collaboration and camaraderie among them, ultimately translating into a good work output.

2.3.2 Company Training Programs

During interviews and review of personnel files, records indicate that training opportunities were made available to the unit's staff. Notably, since the hangar location is shared with a CAAP Approved Training Organization (ATO) and both organizations mutually support each other's operations, Hi-Tone has taken advantage of this opportunity to participate in and benefit from the training courses undertaken by the ATO.

2.3.3 Maintenance Program

Records and interviews with personnel revealed that aircraft maintenance schedules for RP-C1906 were consistently followed in accordance with regulatory and manufacturer requirements. Scheduled periodic inspections, such as the 50-hour inspection, were completed on October 25, 2023, while the annual/100-hour inspection was carried out on January 4, 2024.

An evaluation of the aircraft flight and maintenance logbook also showed that noted defects were addressed promptly and appropriately. Interviews confirmed that issues were effectively communicated between maintenance personnel and pilots.

As for the issue observed during the post-incident inspection, the investigation focused on evaluating the engine magneto inspection process. A review of the 100-hour inspection requirements outlined in the C172 series service manual revealed that the task includes checking the magneto's external condition, security, and the condition of its electrical leads. It also involves verifying engine timing, and internal timing, with adjustments made if necessary. Notably, the inspection does not cover

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the condition of the magneto's internal parts. During the most recent inspection, no issues were identified, as all components included in this check were within operational limits.

Following this, an additional review was undertaken to determine whether any specific inspections beyond the standard 50 and 100-hour checks were required for the magneto to detect signs of part deterioration, such as the wear observed on the number 4 distributor block contact point. Upon further examination, it was noted that the inspection of the magneto's internal components was only required during special inspections or at the 500-hour inspection interval. However, the aircraft had not yet reached the 500-hour threshold due to its low utilization, averaging only around 30–40 hours of flight annually, and, as a result, an internal inspection was not conducted. Likewise, the aircraft service manual further revealed that magneto inspections beyond the 100-hour requirement were limited to compliance with the Lycoming Mandatory Service Bulletin No. 516A, dated September 9, 2016. This special inspection applies only to specific Lycoming engines equipped with TCM and Bendix S-20 or S-1200 series impulse coupling magnetos. Since the Slick model 4250R impulse-coupled type S4LN-21 installed on the RP-C1906 Lycoming engine was not covered by the bulletin, no additional inspections were performed on the magnetos.

In light of the above information, it appears that the current maintenance procedures do not include provisions for detecting erosion on the distributor block contact point. This limitation, combined with the absence of an internal inspection due to the aircraft not meeting the 500-hour threshold, may have contributed to the engine performance issues experienced by RP-C1906 during its flight on October 30, 2024.

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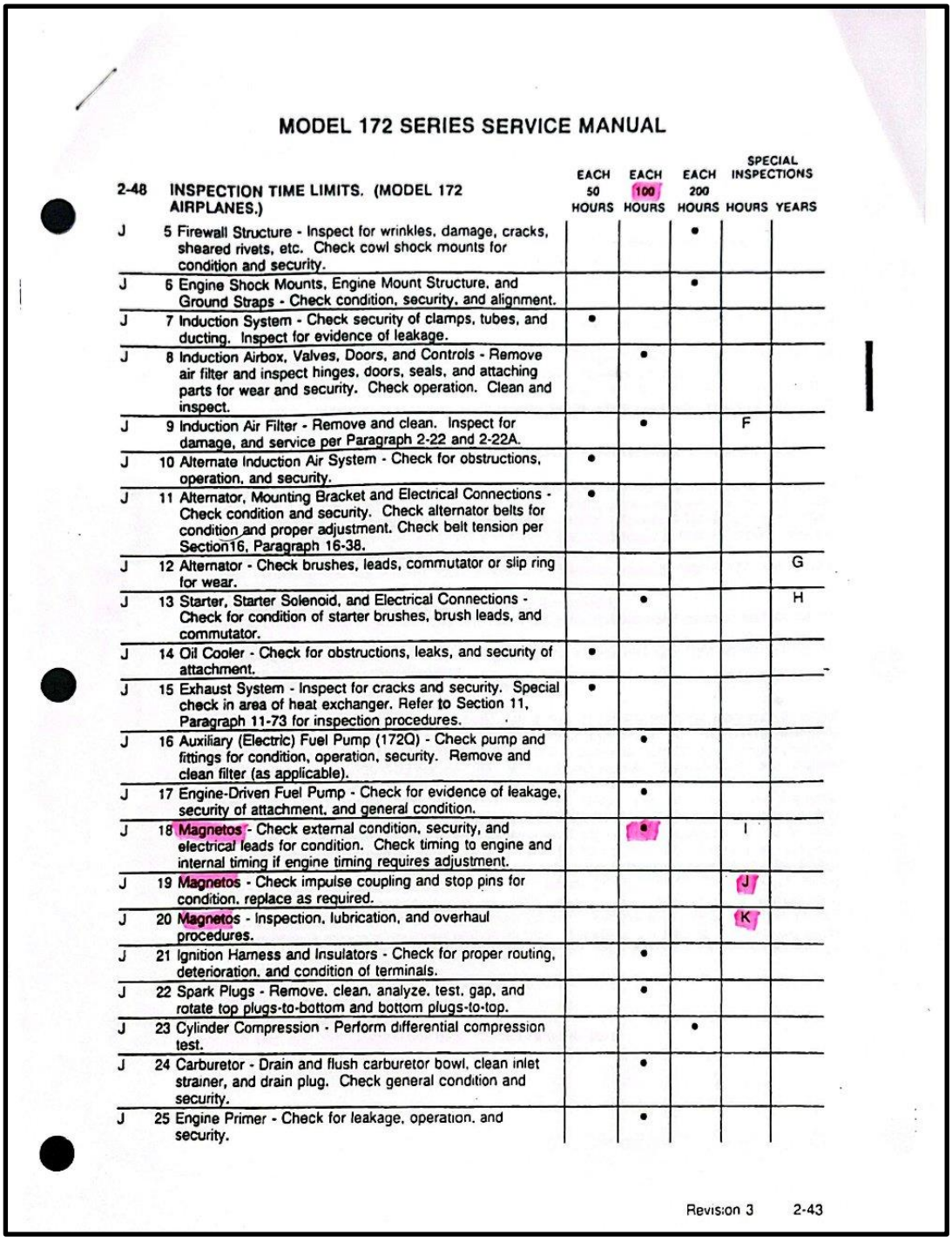
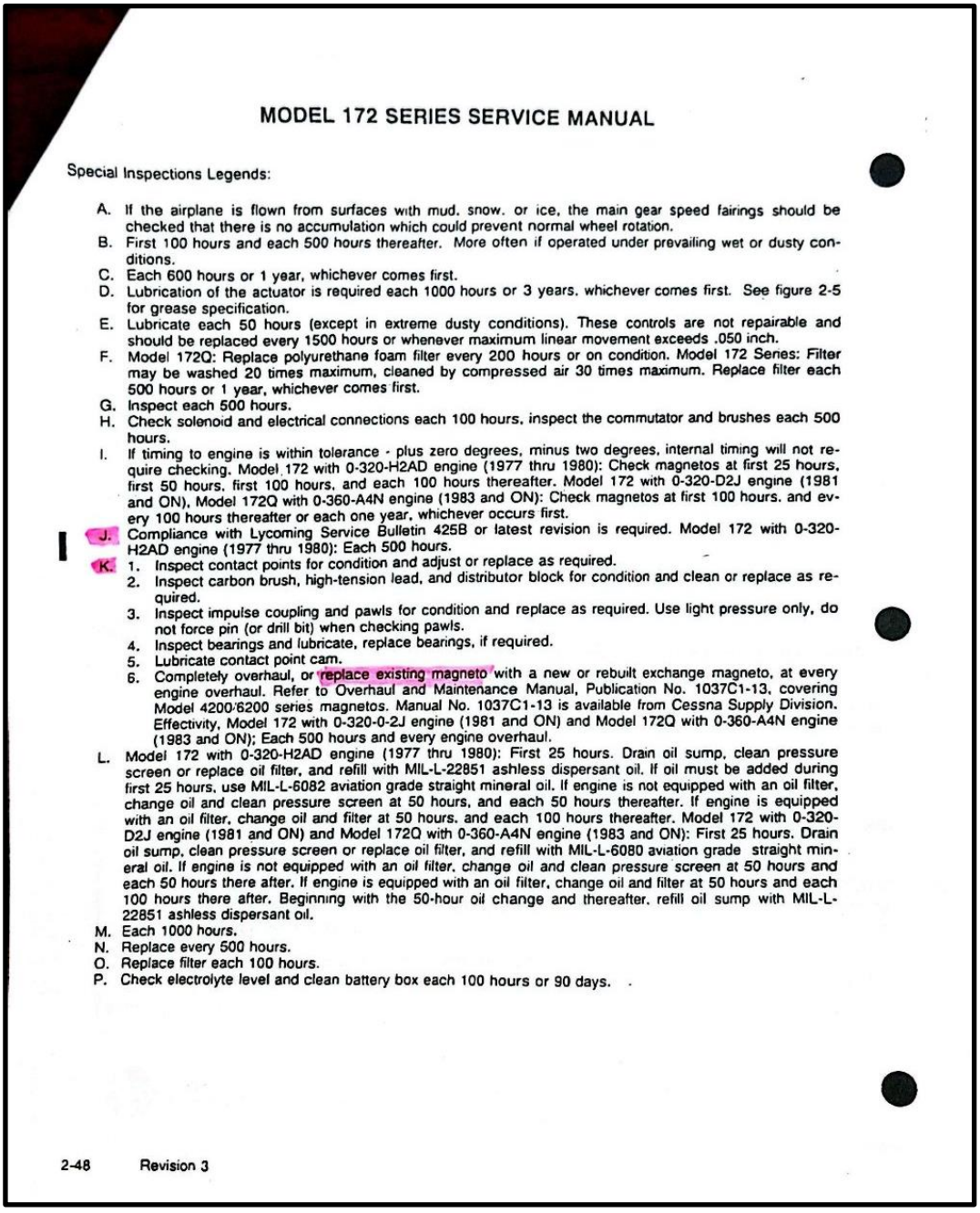


MODEL 172 SERIES SERVICE MANUAL

2-48		INSPECTION TIME LIMITS. (MODEL 172 AIRPLANES.)	EACH 50 HOURS	EACH 100 HOURS	EACH 200 HOURS	SPECIAL INSPECTIONS HOURS	SPECIAL INSPECTIONS YEARS
J	5	Firewall Structure - Inspect for wrinkles, damage, cracks, sheared rivets, etc. Check cowl shock mounts for condition and security.			•		
J	6	Engine Shock Mounts, Engine Mount Structure, and Ground Straps - Check condition, security, and alignment.			•		
J	7	Induction System - Check security of clamps, tubes, and ducting. Inspect for evidence of leakage.	•				
J	8	Induction Airbox, Valves, Doors, and Controls - Remove air filter and inspect hinges, doors, seals, and attaching parts for wear and security. Check operation. Clean and inspect.		•			
J	9	Induction Air Filter - Remove and clean. Inspect for damage, and service per Paragraph 2-22 and 2-22A.		•		F	
J	10	Alternate Induction Air System - Check for obstructions, operation, and security.	•				
J	11	Alternator, Mounting Bracket and Electrical Connections - Check condition and security. Check alternator belts for condition and proper adjustment. Check belt tension per Section16, Paragraph 16-38.	•				
J	12	Alternator - Check brushes, leads, commutator or slip ring for wear.					G
J	13	Starter, Starter Solenoid, and Electrical Connections - Check for condition of starter brushes, brush leads, and commutator.		•			H
J	14	Oil Cooler - Check for obstructions, leaks, and security of attachment.	•				
J	15	Exhaust System - Inspect for cracks and security. Special check in area of heat exchanger. Refer to Section 11, Paragraph 11-73 for inspection procedures.	•				
J	16	Auxiliary (Electric) Fuel Pump (172Q) - Check pump and fittings for condition, operation, security. Remove and clean filter (as applicable).		•			
J	17	Engine-Driven Fuel Pump - Check for evidence of leakage, security of attachment, and general condition.		•			
J	18	Magnetos - Check external condition, security, and electrical leads for condition. Check timing to engine and internal timing if engine timing requires adjustment.		•		I	
J	19	Magnetos - Check impulse coupling and stop pins for condition, replace as required.				J	
J	20	Magnetos - Inspection, lubrication, and overhaul procedures.				K	
J	21	Ignition Harness and Insulators - Check for proper routing, deterioration, and condition of terminals.		•			
J	22	Spark Plugs - Remove, clean, analyze, test, gap, and rotate top plugs-to-bottom and bottom plugs-to-top.		•			
J	23	Cylinder Compression - Perform differential compression test.			•		
J	24	Carburetor - Drain and flush carburetor bowl, clean inlet strainer, and drain plug. Check general condition and security.		•			
J	25	Engine Primer - Check for leakage, operation, and security.		•			

Revision 3 2-43

Figure 16– 172 series Service Manual – Inspection Time Limits.



MODEL 172 SERIES SERVICE MANUAL

Special Inspections Legends:

A. If the airplane is flown from surfaces with mud, snow, or ice, the main gear speed fairings should be checked that there is no accumulation which could prevent normal wheel rotation.
B. First 100 hours and each 500 hours thereafter. More often if operated under prevailing wet or dusty conditions.
C. Each 600 hours or 1 year, whichever comes first.
D. Lubrication of the actuator is required each 1000 hours or 3 years, whichever comes first. See figure 2-5 for grease specification.
E. Lubricate each 50 hours (except in extreme dusty conditions). These controls are not repairable and should be replaced every 1500 hours or whenever maximum linear movement exceeds .050 inch.
F. Model 172Q: Replace polyurethane foam filter every 200 hours or on condition. Model 172 Series: Filter may be washed 20 times maximum, cleaned by compressed air 30 times maximum. Replace filter each 500 hours or 1 year, whichever comes first.
G. Inspect each 500 hours.
H. Check solenoid and electrical connections each 100 hours, inspect the commutator and brushes each 500 hours.
I. If timing to engine is within tolerance - plus zero degrees, minus two degrees, internal timing will not require checking. Model 172 with 0-320-H2AD engine (1977 thru 1980): Check magnetos at first 25 hours, first 50 hours, first 100 hours, and each 100 hours thereafter. Model 172 with 0-320-D2J engine (1981 and ON), Model 172Q with 0-360-A4N engine (1983 and ON): Check magnetos at first 100 hours, and every 100 hours thereafter or each one year, whichever occurs first.
J. Compliance with Lycoming Service Bulletin 425B or latest revision is required. Model 172 with 0-320-H2AD engine (1977 thru 1980): Each 500 hours.
K. 1. Inspect contact points for condition and adjust or replace as required.
2. Inspect carbon brush, high-tension lead, and distributor block for condition and clean or replace as required.
3. Inspect impulse coupling and pawls for condition and replace as required. Use light pressure only, do not force pin (or drill bit) when checking pawls.
4. Inspect bearings and lubricate, replace bearings, if required.
5. Lubricate contact point cam.
6. Completely overhaul, or replace existing magneto with a new or rebuilt exchange magneto, at every engine overhaul. Refer to Overhaul and Maintenance Manual, Publication No. 1037C1-13, covering Model 4200/6200 series magnetos. Manual No. 1037C1-13 is available from Cessna Supply Division. Effectivity, Model 172 with 0-320-0-2J engine (1981 and ON) and Model 172Q with 0-360-A4N engine (1983 and ON); Each 500 hours and every engine overhaul.
L. Model 172 with 0-320-H2AD engine (1977 thru 1980): First 25 hours. Drain oil sump, clean pressure screen or replace oil filter, and refill with MIL-L-22851 ashless dispersant oil. If oil must be added during first 25 hours, use MIL-L-6082 aviation grade straight mineral oil. If engine is not equipped with an oil filter, change oil and clean pressure screen at 50 hours, and each 50 hours thereafter. If engine is equipped with an oil filter, change oil and filter at 50 hours, and each 100 hours thereafter. Model 172 with 0-320-D2J engine (1981 and ON) and Model 172Q with 0-360-A4N engine (1983 and ON): First 25 hours. Drain oil sump, clean pressure screen or replace oil filter, and refill with MIL-L-6080 aviation grade straight mineral oil. If engine is not equipped with an oil filter, change oil and clean pressure screen at 50 hours and each 50 hours there after. If engine is equipped with an oil filter, change oil and filter at 50 hours and each 100 hours there after. Beginning with the 50-hour oil change and thereafter, refill oil sump with MIL-L-22851 ashless dispersant oil.
M. Each 1000 hours.
N. Replace every 500 hours.
O. Replace filter each 100 hours.
P. Check electrolyte level and clean battery box each 100 hours or 90 days.

2-48 Revision 3

Figure 17– 172 series Service Manual – Special Inspection Legends.

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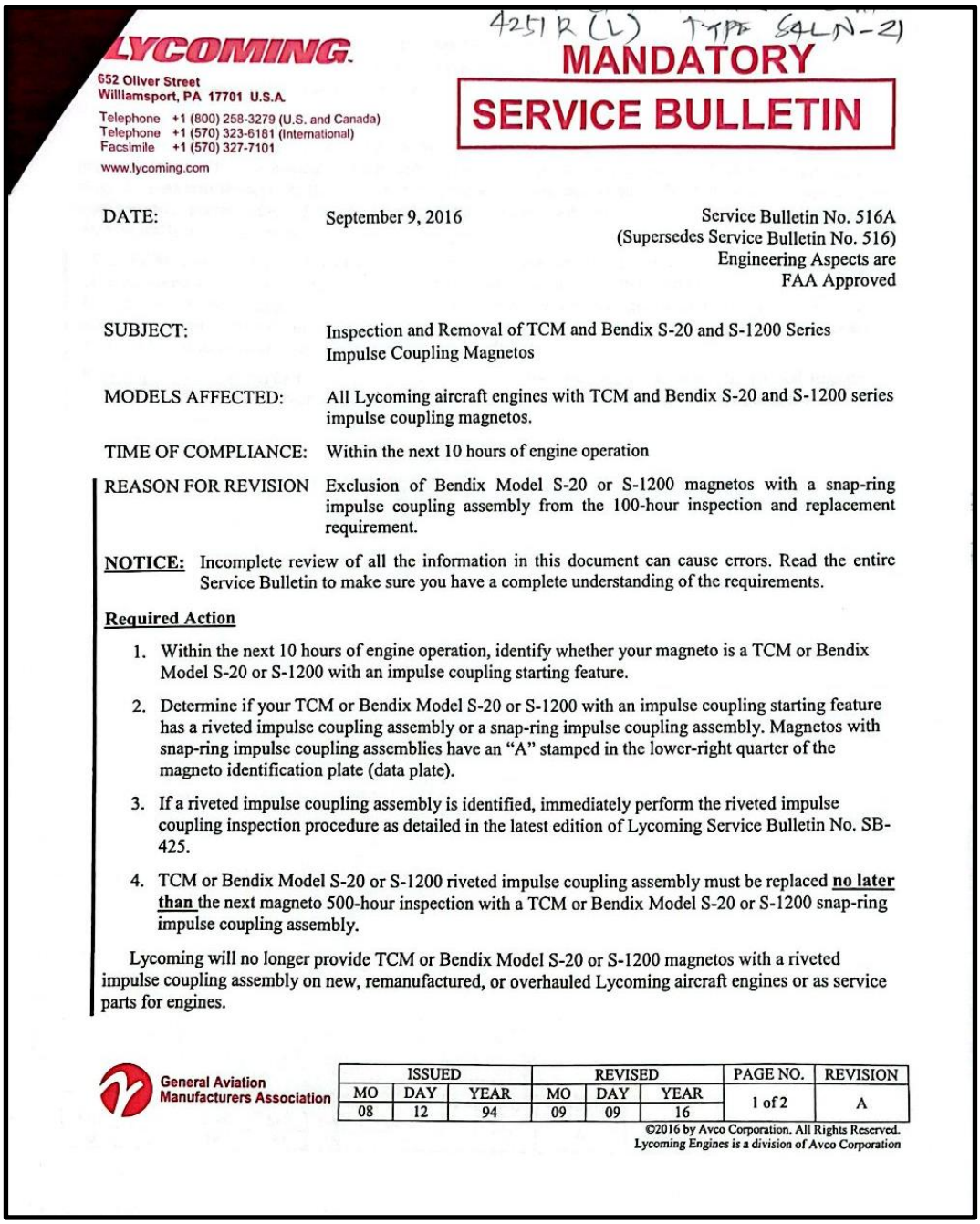

LYCOMING

652 Oliver Street
Williamsport, PA 17701 U.S.A.
Telephone +1 (800) 258-3279 (U.S. and Canada)
Telephone +1 (570) 323-6181 (International)
Facsimile +1 (570) 327-7101
www.lycoming.com

4251 R (L) TYPE S4LN-21

MANDATORY

SERVICE BULLETIN

DATE: September 9, 2016

Service Bulletin No. 516A
(Supersedes Service Bulletin No. 516)
Engineering Aspects are
FAA Approved

SUBJECT: Inspection and Removal of TCM and Bendix S-20 and S-1200 Series Impulse Coupling Magnetos

MODELS AFFECTED: All Lycoming aircraft engines with TCM and Bendix S-20 and S-1200 series impulse coupling magnetos.

TIME OF COMPLIANCE: Within the next 10 hours of engine operation

REASON FOR REVISION Exclusion of Bendix Model S-20 or S-1200 magnetos with a snap-ring impulse coupling assembly from the 100-hour inspection and replacement requirement.

NOTICE: Incomplete review of all the information in this document can cause errors. Read the entire Service Bulletin to make sure you have a complete understanding of the requirements.

Required Action

1. Within the next 10 hours of engine operation, identify whether your magneto is a TCM or Bendix Model S-20 or S-1200 with an impulse coupling starting feature.
2. Determine if your TCM or Bendix Model S-20 or S-1200 with an impulse coupling starting feature has a riveted impulse coupling assembly or a snap-ring impulse coupling assembly. Magnetos with snap-ring impulse coupling assemblies have an "A" stamped in the lower-right quarter of the magneto identification plate (data plate).
3. If a riveted impulse coupling assembly is identified, immediately perform the riveted impulse coupling inspection procedure as detailed in the latest edition of Lycoming Service Bulletin No. SB-425.
4. TCM or Bendix Model S-20 or S-1200 riveted impulse coupling assembly must be replaced **no later than** the next magneto 500-hour inspection with a TCM or Bendix Model S-20 or S-1200 snap-ring impulse coupling assembly.

Lycoming will no longer provide TCM or Bendix Model S-20 or S-1200 magnetos with a riveted impulse coupling assembly on new, remanufactured, or overhauled Lycoming aircraft engines or as service parts for engines.

General Aviation Manufacturers Association

ISSUED			REVISED			PAGE NO.	REVISION
MO	DAY	YEAR	MO	DAY	YEAR	1 of 2	A
08	12	94	09	09	16		

Figure 18– Lycoming Service Bulletin No. 516A.

3. CONCLUSIONS

3.1 Findings

3.1.1 The involved pilot holds a valid pilot license and medical certificate issued by the CAAP.

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3.1.2 The pilot holds the appropriate rating to perform his functions for that specific type of aircraft.

3.1.3 The aircraft has valid Certificates of Airworthiness and Registration.

3.1.4 The aircraft was released for flight without any recorded maintenance issues. Likewise, documentation of the aircraft maintenance is available and in proper order.

3.1.5 A spark test on the LH magneto harness mounting revealed a weak spark on the no. 4 connector. Further internal inspection of the magneto showed significant erosion on the no. 4 distributor block contact point, which may have affected its ability to produce a sufficient spark.

3.1.6 The current maintenance procedures do not include provisions for inspecting the magneto's internal components, such as the distributor block contact point, for erosion in cases where the 500-hour threshold has not been reached. This means that in such instances, deterioration of the magneto's internal components may not be detected proactively.

3.2 Probable Cause

3.2.1 Primary Cause Factors

a. Magneto failure due to significant erosion on the no. 4 distributor block contact point, reducing its ability to produce a sufficient spark and likely contributing to the engine's poor performance.

3.2.2 Contributory Cause Factor

a. Current maintenance procedures do not require internal inspection of the magneto’s components unless the 500-hour inspection threshold was met or special inspection was required.

4. SAFETY RECOMMENDATIONS

4.1 In light of the internal actions already taken by the involved operator, based on the safety actions outlined below, no further recommendations will be issued as a result of this investigation.

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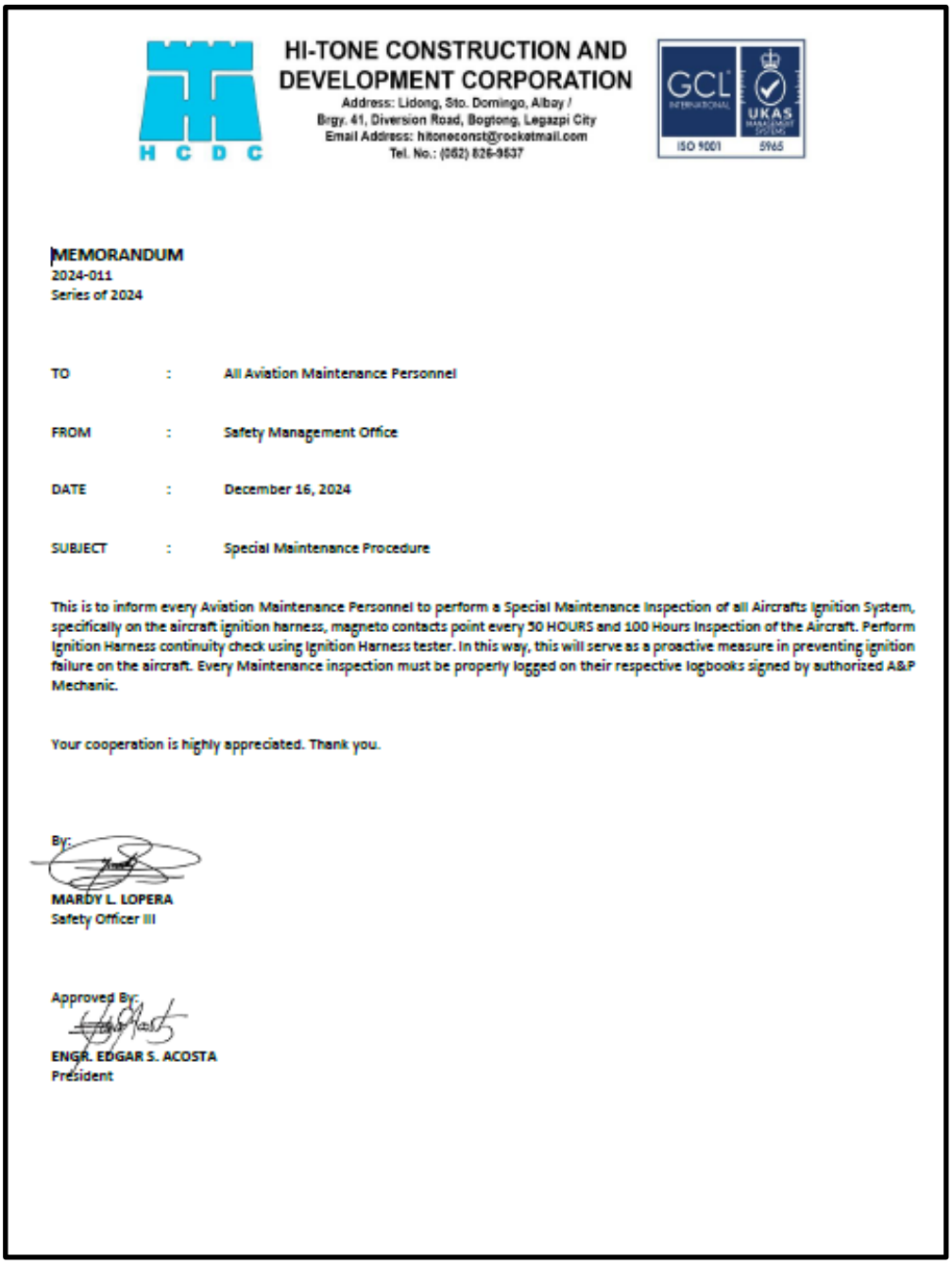
5. SAFETY ACTION

5.1 The operator has implemented (Ref: Hi-Tone internal memorandum dated December 16, 2024), as part of its internal actions, the inclusion of magneto internal inspections during periodic maintenance checks, specifically during the 50 and 100-hour inspections, as a proactive measure to detect internal issues.



HI-TONE CONSTRUCTION AND DEVELOPMENT CORPORATION
Address: Lidong, Sto. Domingo, Albay / Brgy. 41, Diversion Road, Bogtong, Legazpi City
Email Address: hitoneconst@rocketmail.com
Tel. No.: (052) 826-9637

H C D C

ISO 9001 5965

MEMORANDUM
2024-011
Series of 2024

TO : All Aviation Maintenance Personnel

FROM : Safety Management Office

DATE : December 16, 2024

SUBJECT : Special Maintenance Procedure

This is to inform every Aviation Maintenance Personnel to perform a Special Maintenance Inspection of all Aircrafts Ignition System, specifically on the aircraft ignition harness, magneto contacts point every 50 HOURS and 100 Hours Inspection of the Aircraft. Perform Ignition Harness continuity check using Ignition Harness tester. In this way, this will serve as a proactive measure in preventing ignition failure on the aircraft. Every Maintenance inspection must be properly logged on their respective logbooks signed by authorized A&P Mechanic.

Your cooperation is highly appreciated. Thank you.

By:
MARDY L. LOPERA
Safety Officer III

Approved By:
ENGR. EDGAR S. ACOSTA
President

-----End-----