

Kansas City Flight Standards District Office

Airworthiness Facts

Date FY18 4nd Quarter



Federal Aviation
Administration

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FAA Safety Team Airworthiness, Topic of the Quarter

Reciprocating Engine Ignition Systems

The General Aviation Joint Steering Committee has identified several concerns with in-flight loss of power. Their study has resulted in several focus areas where it is possible to improve safety and reliability.

One of these areas is loss of power due to full or partial magneto failures.

The purpose of this article is to increase awareness of new engine ignition technologies and their ability to enhance engine performance, reliability and safety.

As we all know, the goal of any ignition system in a four-stroke engine is to start the combustion process at peak pressure, which occurs between 10 & 17 degrees after top dead center (ATDC) of

the piston travel. Piston aircraft engines accomplish this with magnetos.

Piston aircraft engines have used magnetos for years, and are reliable and simple. Aircraft magneto are engine driven electrical generators that uses permanent magnets and coils to produce high voltage to fire the aircraft spark plugs, often in pairs.

The magneto ignition system of the engine is completely separate from the airplane's electrical system. The magneto ignition system installed on most reciprocating aircraft engines consists of two separate magnetos so that in the event of failure of one the engine will continue to run on the second so a safe landing can be made.

There are various models of aircraft magnetos, so understanding which one your engine requires is important. Two of the most common are the Slick Magneto by Champion Aerospace and the Bendix Magneto by Teledyne. These aircraft magnetos are well known across the industry and come from trusted and reputable manufacturers.

But magnetos have two big limitations: one, they produce a relatively small amount of energy; and two, they can only provide that energy (or spark) at a fixed time point in the crank-shaft rotation. Magnetos typically can provide 12,000V through about 5 degrees of crank rotation at the spark plug – less during the start sequence (6,000-8,000 volts during starting). The fixed time point where the spark occurs means that the magneto cannot adjust the spark event to compensate for variances in fuel/air mixtures. As fuel/air mixtures varies (either because of altitude, air density, fuel density, etc.), the time required to develop peak pressure from combustion also changes. If the ignition event timing doesn't change, then the time where peak pressure occurs MUST change. When this happens, the experience is typically a loss of power.

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Recently Electronic Ignition System (EIS) have come into play. The main difference between EIS and conventional ignition is the substitution of electronic components and circuitry for mechanical devices. EIS replaces conventional breaker points, condenser, coil, breaker cam, and spark advance assembly. Instead of a distributor cam, breaker plate, points, and condenser, an electronic ignition system has an armature a pickup coil, and an electronic control module.

There are two principle differences between a magneto and EIS. One is an EIS is able to deliver much higher energy to the spark plug for a long period of time (70,000V through about 20 degrees of crank rotation) at any RPM; and two, an EIS is able to vary the ignition timing based on changes in the fuel/air mixture. The very large voltage supplied to the spark plugs comes from using larger coils. The EIS's ability to deliver that voltage at any RPM is because the output from the EIS is NOT dependent on engine RPM, but the battery supply. The high energy voltage from the EIS allows for a larger gap in the spark plug – ensuring a big, long duration, high quality spark. This spark will then have the ability to ignite typically any kind of fuel/air mixture that passes by the spark plug. This is particularly important for hot-start applications, where the fuel/air mixture is corrupt in some way, caused by the high temperature, poor fuel quality, or any combination

Electronic ignition systems have greater spark energy as well as variable spark timing. These two basic changes can improve fuel efficiency on an average 6 to 15%.

The EIS looks at Manifold Absolute Pressure (MAP), and adjusts timing based on this to optimize the location (or degree of crank position) for the spark event to occur.

NO OTHER MODIFICATION TO YOUR AIRCRAFT WILL HAVE AS MUCH EFFECT

AS UPGRADING TO ELECTRONIC IGNITION!

Whether you own or operate a certified or experimental aircraft, electronic ignition systems have greater spark energy as well as variable spark timing. These two basic changes can improve fuel efficiency on an average 6 to 15%.

Changed your N number?

Most people that change their N number do so for a number of reasons. This request is a Special Registration Number.

A special registration number is an N-Number that you select from the [List of Available N-Numbers](#) for immediate use on a specific aircraft or to reserve in your name for future use.

The fee for reservation or assignment of a Special Registration Number is \$10.00.

Special registration numbers may be:

- used to change the N-Number currently on your aircraft.
- assigned to a new home-built, import, or newly manufactured aircraft in preparation for registering that aircraft.
- reserved for one year. Upon reservation, we will mail a confirmation notice to the requester. A renewal notice will also be sent prior to the expiration date. An [on-line reservation request program](#) is available. Reservations may be renewed for additional periods of one year. The renewal fee is \$10 each year. An [on-line renewal program](#) is available.

Aircraft N-Number Change

To change the registration number of your aircraft, send a letter requesting the assignment of a

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different number to your aircraft. This letter must describe the aircraft by the:

- name of the manufacturer
- model designation
- serial number
- current U.S. registration number

The aircraft owner must sign the letter in ink, include his typed or printed name with his signature and show his title if appropriate. It is also helpful if a telephone number and current mailing address for the owner are included.

If you are requesting a Special Registration Number that you already hold in reserve, be sure to include the \$10.00 assignment fee.

If you are requesting a Special Registration Number at the same time you ask to change the N-Number assigned to your aircraft, be sure to include the \$20.00 fee (\$10.00 for the Special Registration number and \$10.00 for the number change) and list several acceptable and available N-Numbers in your request. The Aircraft Registration Branch will research the numbers in the order they are listed and authorize the first N-Number verified as available for the number change.

If the number change involves a Special Number reserved to one party and the aircraft is registered to a different party, then the request for the N-Number change must be accompanied by a letter from the person or party that has reserved the special number releasing it to the requesting party. The letter should describe the aircraft as outlined above and give the name of the aircraft owner to whom the special number is being released. The releasing party should sign their name in ink, show their title if appropriate and include the typed or printed name of the signer with their signature. Be sure to include the \$20.00 fee (\$10.00 for reservation to the new party and \$10.00 for the number change).

Upon approval of the N-Number change, we will mail an Assignment of Special Registration Number, AC Form 8050-64, to the aircraft owner in

triplicate authorizing the placement of the new registration number on the aircraft.

Within five days after the new number is placed on the aircraft **the owner must:**

- complete the AC Form 8050-64 showing the date the new registration number was placed on the aircraft, sign the form in ink showing their title if appropriate, and return the original AC Form 8050-64 to the [Aircraft Registration Branch](#) at the address shown on the form.
- carry the second copy of the AC Form 8050-64 with the current Certificate of Aircraft Registration, AC Form 8050-3, as a temporary authority to operate the aircraft under the new N-Number until the replacement Certificate of Aircraft Registration showing the new N-Number is received.

If 90 days have passed since the owner returned the completed Assignment of Special Registration Number, AC Form 8050-64, and the replacement Certificate of Aircraft Registration has not arrived, please contact the Aircraft Registration Branch at 1-866-762-9434.

Within ten days after the new number is placed on the aircraft, the owner must present the duplicate AC Form 8050-64 and the present airworthiness certificate to a [FAA Flight Standards District office](#) to obtain a revised airworthiness certificate showing the new N-Number.

The owner of an aircraft may reserve the old number that just came off of his aircraft by requesting this in writing anytime during the N-Number change process. The reservation fee of \$10.00 must accompany the request.

More Information can be found at, https://www.faa.gov/licenses_certificates/aircraft_certification/aircraft_registry/special_numbers/

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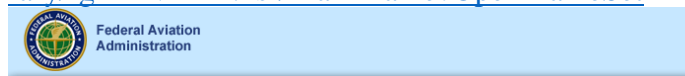
Notice of Proposed Rules

Airworthiness Directives:

Notice of Proposed Rule Making is your chance to make a difference; yes, if you go through the process you can make a difference.

This link is for Proposed Rules Airworthiness Directives;

http://rgl.faa.gov/Regulatory_and_Guidance_Library/rgADNPRM.nsf/MainFrame?OpenFrameSet



AD NPRMs Open for Comment			
	Comment Due Date	Docket Number	Title
	11/21/2017	FAA-2017-0896	Sikorsky Aircraft C
	11/21/2017	FAA-2017-0103	Agusta S.p.A. Helic
	11/13/2017	FAA-2017-0874	Sikorsky Aircraft C
	11/09/2017	FAA-2017-0505	Zodiac Aerotechnic
	11/07/2017	FAA-2017-0826	Airbus Helicopters
	11/06/2017	FAA-2017-0911	Alexander Schleich Gliders
	11/06/2017	FAA-2017-0910	Gulfstream Aerosp.
	11/06/2017	FAA-2017-0750	Rolls-Royce Corpo
	11/06/2017	FAA-2017-0658	GE Aviation Czech
	11/03/2017	FAA-2017-0812	Airbus Airplanes
	10/30/2017	FAA-2017-0811	Bombardier, Inc.,
	10/30/2017	FAA-2017-0810	Bombardier, Inc.,
	10/30/2017	FAA-2016-9450	Honeywell Internat Engines
	10/27/2017	FA-2017-0668	General Electric Co
	10/27/2017	FAA-2017-0668	General Electric Co
	10/23/2017	FAA-2017-0867	Viking Air Limited
	10/23/2017	FAA-2017-0792	General Electric Co
	10/16/2017	FAA-2017-0807	The Boeing Compa
	10/16/2017	FAA-2017-0660	General Electric Co
	10/10/2017	FAA-2017-0805	The Boeing Compa
	10/10/2017	FAA-2017-0779	The Boeing Compa
	10/10/2017	FAA-2017-0778	The Boeing Compa
	10/10/2017	FAA-2017-0313	CFM International
	10/10/2017	FAA-2013-0024	Safran Helicopter E
	10/05/2017	FAA-2016-4219	The Boeing Compa
	10/02/2017	FAA-2017-0770	The Boeing Compa
	09/29/2017	FAA-2017-0777	Saab AB, Saab Aer Saab Aerosystems)

New Airworthiness Directives:

This link is for Airworthiness Directives, for all aircraft.

http://rgl.faa.gov/Regulatory_and_Guidance_Library/rgAD.nsf/MainFrame?OpenFrameSet

Service Difficulty Program:

When a system, component or part of an aircraft (powerplants, propellers, or appliances) functions badly or fails to operate in the normal or usual manner, it has malfunctioned and should be reported. Also, if a system, component, or part has a flaw or imperfection which impairs function or which may impair future function, it is defective and should be reported. While at first sight it appears this will generate numerous insignificant reports, the Service Difficulty Program is designed to detect trends. Any report can be very constructive in evaluating design or maintenance reliability.

The reports can be filed electronically or by paper, for electronic go to

<https://www.faa.gov/forms/index.cfm/go/document.list?omni=Forms&parentTopicID=0&display=current&subjectClassPrefix=&documentNumber=FAA+8070-1&q=FAA+8070-1>.

Service Airworthiness Information

Bulletins:

http://rgl.faa.gov/Regulatory_and_Guidance_Library/rgSAIB.nsf/FrameSet?OpenPage

Issue Date	SAIB Number	Make / Company	Subject
09/25/2017	NE-17-26	Avidyne	NAVIGATION - Traffic Advisory System - M
08/25/2017	CE-17-23	Cessna Aircraft Company Textron Aviation Inc.	ELEVATOR TORQUE TUBE - Inspections & tubes
08/25/2017	NM-17-24	HAECO Cabin Solutions	Equipment Furnishings
08/24/2017	SM-17-22	Airbus Helicopters	Fuel System
08/22/2017	CE-17-22	Air Tractor, Inc.	Flight Controls, Aileron Control System
08/18/2017	CE-17-21	de Havilland Aircraft Co., Ltd., The Moth Aircraft Corporation Robertson, Cliff c/o Gasbous Business Management Williams, Harry E.	Wing and Aileron, De Havilland DH60, DHEB Croydon Aircraft Company of New Zealand

End of data.

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Information

To include Designees, Airworthiness Representatives, Designated Mechanic Examiners, and Designated Parachute Rigger Examiners information.

Current Link:

https://www.faa.gov/about/office_org/field_offices/fsdo/mci/

Closing Question?

Did you meet the requirements to exercise your Inspection Authorization privileges for the first year of the two-year renewal cycle? If not contact your FAA Principle Inspector for help.

Next Quarter:

Service Difficulty Reports: When to file one.

Airworthiness Facts are published on a quarterly basis and available via email only. If you would like to receive Airworthiness Facts or be removed from the mailing list, contact the Kansas City FSDO FAAS Team

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