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Mandatory Service Bulletin

Date: 6/18/2007

Topic: Timing Reference

Models Affected: Some (not all) Series 113 Ignitions

We've studied reports of a few ignitions that appear to lose their timing reference, and have found two (unrelated) causes for the condition. The first is a simple hardware issue. The other issue deals with some (but not all) versions of our operating code under specific conditions. The rate of occurrence in the field is low, so the data sample is quite limited. But we've modeled conditions in our lab that provide a strong correlation to the conditions reported in the field.

Both of these issues (along with corrective actions) are described below.

I Hardware – Sensor Magnet

Engine position is relayed to the ignition by way of a magnet mounted to the back of the ignition shaft. We've seen a few instances where the magnet has come loose in its mount and moved. If this happens, the ignition can lose its timing orientation.

Units Affected:

Earlier series 113 units [generally those with serial numbers 330 thru 600] are more suspect. More recent assemblies, using different materials and manufacturing processes are performing well.

Action Required:

The ignition will signal a sensor magnet out of position (axially) by lighting the built-in LED YELLOW when the ignition switch (p-lead) is ON (ungrounded). A sensor magnet out of position (rotationally) is evidenced by the Ignition Index (GREEN LED) lighting at a position other than TDC, where it was set when the ignition was timed. If either condition is observed, call our shop for further instruction. *[A basic pilot training reminder: If you suspect an ignition issue in-flight, alternately turn OFF (P-lead - not 12 volt power) one side and then the other to see if the symptom goes away.]*

II Operating Reset with firmware version 19-24

When first powered ON, the ignition loads operating and configuration data from memory. Once in operation, there are built-in safety (watchdog) timers and hardware monitors that will reset the processor if the normal routine has been interrupted for any reason. This is called an "Operating Reset". Operating Resets are not part of a regular routine and are relatively uncommon.

Recent testing has shown that Operating Resets are not as trouble-free with later firmware versions as they were in earlier versions, depending on how the units are set-up. More specifically, an Operating Reset can overwrite data that was stored during the initial startup. With version 19, we added Quick-Set, the popular blow-in-the-tube timing setup method, and began storing data in a location that an Operating Reset attempts to overwrite. In short, it can create a memory conflict. Fortunately, a field remedy is at hand for most users. Simply clearing the Quick-Set memory block (see below) avoids the memory conflict.

To clarify, the Quick-Set routine itself is performing well, but an Operating Reset, under the right circumstances, can result in a loss of position information.

Units Affected – Required Action:

Version 24 firmware is already installed in the majority of ignitions now in service. These units can be configured, in the field, to avoid the memory conflict (see Alternate Timing Method attached).

Identification: New ignitions that have never been sent in for update do not have update markings. When firmware is updated, we write the version number on the side of the case or attach a tag showing the version number. In either case, removal from the engine may be required in order to read these markings. The current firmware version can also be viewed on EICAD, if you are setup for it. The firmware can also be identified by its operating capabilities.

1. Units with V18 and under don't use the Quick-Set memory block and are not affected. If you don't have Quick-Set - you are in this series. We nevertheless encourage updating these units to current firmware.
2. Units with firmware version 19 thru 23 are affected and should be updated. Units supporting Quick-Set will momentarily blink green at power up in setup mode. If you have Quick-Set but can't zero the memory - you are in this series. (See attached - Alternate Timing Method step 4 to see if you can zero Quick-Set memory.
3. Units with firmware version 24 should zero the Quick-Set offset memory and set timing using the alternate method – see attached “Alternate Timing Method”.
4. Firmware version 25 has been updated to resolve the memory conflict and allows full use of all the E-MAG features, including the Quick-Set timing routine. Version 25 provides additional protection by testing the position sensor during its startup diagnostics. If it detects a misaligned (z axis only) sensor, the LED indicator will flash yellow and further operation will not be allowed. Eventually, all units should be upgraded to V25.

Note: ALL units (new or update/repair) are shipped with Quick-Set data loaded in memory, as this is part of our pre-shipment operational inspection. So even if you haven't used Quick-Set and you have an affected unit, you must follow the instructions described in order to clear the memory.

If Service Is Required

E-MAG will perform any/all service that may be required under this Service Bulletin at no charge. However, the population of ignitions has grown such that we do ask that you pay for shipping to and from our facility. Please include a note with your name, address, and phone number. Our standard shipping method is UPS (Ground). If you require different or more urgent routing (UPS or US Post Office only), you must specify your request with a note included in your shipment. There is no need to remove the drive gear. Just unplug the main (6 pin) connector and ignition harness.

Shipments requiring signature for pickup may be returned (by the courier – not us) as we are not always available for receiving. Please note our new address as we have move into a newer and larger facility.

Ship To:
E-MAG Ignitions
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Alternate Timing Method (Firmware version 24)

This was our standard timing routine prior to Quick Set. While not quite as fast as Quick-Set, you should find it far easier than any competitive system. It requires no special tools and can be completed in a matter of minutes.

- 1) Pre-position your prop to the engine TDC (or TC) timing mark. By approaching this mark with the prop moving in the direction of normal rotation you can minimize play in the gears.
- 2) Connect all control wires and plug leads but don't install the ignition in the accessory case.
- 3) Enter Setup Mode by turning 12 volt buss power ON, while the p-lead switch is OFF (grounded). In Setup Mode the LED indicator (located at the base of the coil) will light solid RED (or GREEN if the ignition happens to be sitting at index).
- 4) Zero the Quick-Set memory:
 - a) Blow into the MAP tube (minimum ½ psi for one second) and the solid RED LED will start blinking RED.
Note: **If you don't get a BLINKING RED, you don't have version 24 (or later) Firmware and you cannot zero the Quick-Set memory.**
 - b) Turn 12 volt power OFF, and then back ON. You will then again see a solid RED LED.
- 5) Remove the ignition from the engine if it's not already out. Turn the drive gear with your fingers slowly until you see the solid RED LED turn solid GREEN. You will be looking for a single (very precise) point in the ignition's rotation, so turn the gear slowly. The GREEN LED signals the ignition's internal crank angle sensor is at index.

CAUTION If you turn the ignition switch ON at any time, the ignition will leave Setup Mode and go into run mode. **In run mode the ignition will fire the plugs if it senses a firing position.** In order to re-enter Setup Mode you must turn the ignition switch (p-lead) OFF and 12 volt power OFF. You can then apply 12 volt power WHILE the p-lead switch is OFF (grounded), in order to re-enter Setup Mode.

- 6) Position the gasket on the E-MAG flange and install the ignition in the engine accessory case. You will engage the ignition gear with its mate inside the accessory case. Don't be too concerned if you bump the gear and lose your GREEN light at this point, but try to avoid moving the gear very far.
- 7) After the ignition is positioned in the case, install your mounting clips, washer and nut (or bolt as the case may be). Tighten only finger tight at this time.
- 8) Reacquire the GREEN LED indicator by slowly rotating the ignition. If you don't have sufficient adjustment range to reacquire the GREEN LED, you can remove the ignition, rotate the gear a distance equal to one tooth width, and reinsert the ignition. This should put the index (GREEN) position within your adjustment range.
- 9) Once the GREEN LED is reacquired, secure the position by tightening the mounting clips.