Electronic Ignition Commander

Question and Answers
Version: 2.9
January 18, 2019

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EICommander
Question and Answer

Q1:   Should I reduce power when sending a new configuration to the P-mags in flight?

A: While the EICommander allows you to send different timing configurations to the P-mags in flight, if you choose to do this, throttle back and reduce RPM's below 2,000 before performing this operation.

The EIC32 prohibits configuration changes above 2,000 RPM's.

Q2:   What is the difference between the "A" and "B" curve?

A: The P-mags have two memory locations; one is labeled "A" and the other is "B". The "A" location, otherwise known as the "A Curve" is fixed and cannot be adjusted. The "B Curve" is fully programmable. The EICommander takes advantage of this and with the EICommander installed, the P-mags operate on the "B" memory location. When sending a configuration, be it the "A", "B", "CCC", or another custom configuration to the P-mags, it is loaded into the "B" memory location. That is another reason you do not want to put a jumper between P-mag pins 2 and 3 with the EICommander installed, you want the P-mag to run on the "B" memory location.

Q3:   With the EICommander installed, is there any reason to perform a "mag check"?

A: Yes, the EICommander cannot tell if the P-mags are being powered by their internal generator or off of ship's power. It is highly recommended that a preflight includes operating the ignition without ship's power. This will identify a failure of the P-mag's internal generator. Additionally, performing a mag check as part of the routine pre-flight is direct verification of a critical aircraft system. ECIommander cannot catch every conceivable ignition failure.

Q4:   While installing the EICommander, should I put the "jumper" between pins 2 and 3 to force my P-mags to the "A" curve?

A: No, the EICommander must communicate with the P-mags via those pins. However, after installing the EICommander, you should send the "A" configuration to the P-mags, if that is the configuration you wish to run.

Q5:   Can you clarify the 20º setting for me. If I had regular mags the timing would be hard wired to 20º BTDC regardless of RPM/MAP; correct?

A: You are correct. Traditional Mags have set timing, regardless of the power setting. Lycoming parallel valve engines are typically set to 25 degrees before top dead center and angle valve engines are typically 20 degrees before top dead center; however, there are

many unique engines out there so make sure you use the correct setting for your engine. With traditional magnetos, this is set by simply turning the crank to the appropriate position and clamping down the magnetos. With the P-mag ignitions this is controlled via software.

Q6: In the P-mag manual they show a curve that fires at 20° at very low power settings, settings that I only see during idle. If I set my curve to start at 25° will my P-mags fire at 25°?

A: At low idle speeds, the P-mags move the timing up to 19.6° BTC to help the engine idle smoother and allow for much lower than normal idle RPM. Once you increase the engine speed, the P-mags will set the advance based on the configuration you are running. 26 degrees BTC for the "A" curve and 30 degrees BTC for the "B" curve. This 19.6 degrees timing happens, regardless of which configuration you select. If you create a custom configuration that starts at 20° BTC, then when you power up, it will hold the timing at 20 degrees until you reduce power by pulling back on the throttle or by climbing to altitude and your MAP drops off.

Q7: I read that I should "clock" the ignition to make starting easier with my lightweight prop, is this true?

A: P-mags have a starting mode and with Version 40 or higher they fire the plugs at 4 degrees PAST top dead center while below 200 RPM. That is why engines equipped with these ignitions start so easily. Once the RPM rises above 200, the P-mags will move the timing to 19.6° or higher, depending on your RPM and configuration. (P-mags with earlier firmware versions fire at Top Dead Center for starting. If you are running P-mags with earlier version, contact Emag Ignitions regarding upgrading your ignitions.)

Q8: How do I create a custom configuration for my angle valve engine and send it to my P-mags?

A: First things first, verify the correct timing for your engine.
Second, get a pad and pencil so you can write down any values before changing them.

To reduce the timing for an angle valve engine you will need to create a custom configuration or "curve".

Make sure both P-mags are powered up

Start by pressing **B5** until you get to the "EIC Mode screen". Then in sequence press the following buttons:

Press **B1-EP Conf** (E/P-mag Configuration)

Press **B2-EIC>EPI** (Select an ignition configuration from displayed list to send the E/P-mags)

Press **B3** to move the arrow down (**B1** will move it up) to the *CCC* configuration

Press **B5** and you will get a message that says you are "*Loading Config Data *CCC*"

Press **B3** to move down to the ADV Shf (Advance Shift) field. This will be highlighted with a white box.

Press **B2** or **B4** to increase or decrease the *ADV Shf* values.

An advance shift of zero equals a timing of 26.6 degrees Before Top dead Center (BTC). A negative offset of negative 5.6 (-5.6) degrees will set the P-mags to fire at 21.0 degrees BTC. A negative offset of negative 7.0 (-7.0) degrees will set the P-mags to fire at 19.6 degrees BTC.

If you set the Advance Shift to negative 5.6 (-5.6), then we recommend you setting the Max Advance to 29.4 and if you set the Advance Shift to negative 7.0 (-7.0), we recommend setting the Max Advance to 28.0.

Press **B5** to bring up the "*Conf Action*" (Configuration Action) screen.

Press **B1-Save>EIC** (Save the configuration to the EICommander)

This will save the CCC setting for future use (if you do not wish to save it, you can ignore this step and press **B3 Send>EPI**). If you saved the CCC configuration, then press **B2** to reacquire the new configuration – then after confirming your configuration, press **B5** to exit the review and then press **B3-Send>EPI** to send the selected configuration to both P-mags.

That should load the CCC configuration to both P-mags. To verify this, follow these steps:

Press **B5** until you get to the **EPI Conf** screen

Press **B1-EIC<EPI** (Get the data from the E/P-mags and send it to the EIC. This may take a few seconds). After "Data Acquired" message, the data is ready for viewing.

Press **B2**. This will display the second screen and you should see a max advance you set above, if you set it, and the negative offset you entered for the Advance shift. (You can press B1, B2, & B3 to look at all the screens.)

Press **B5** to exit the setup mode. (You may need to press this a few times to get back.)

Test run your engine and make sure everything is how you want it.

You can create a "D" and "E" configuration and change more settings than allowed in the CCC configuration. You must first create a name for the *X____* configurations. A naming function will be provided if you select *X___* file location. The *X___* configuration may then be named with up to three letters.

Just make sure to write down what you change, prior to making any changes.

Q9: **Why won't my P-mags advance to the Max Advance limit I set in my custom configuration?**

A: The P-mags will only advance a limited number of degrees from the Advance Shift setting. Thus, if the Advance Shift is set at 0, the P-mags will only advance to 35.0 degrees. The Max Advance setting can be used to reduce the maximum advance but not increase it. For example, if the Advance Shift to 0 and the Max Advance to 26.6 and the P-mag would act like a fixed timed magneto.

On the other hand, if you tried to expand the total timing limits by increasing the Max Advance to 40 degrees, the P-mag will stop advancing at 35 degrees.

Q10: **Can I use the EI Commander with just one P-mag?**

A: Yes, however, some functions will not be available as they require input from two P-mags. Note if you are using only one P-mag, check the instructions for proper wiring for the RPM function. The Timing Divergence Alarm function requires two P-mags and will not be available with only one P-mag installed and connected. In some screens only data from the installed P-mag will be displayed while fields reserved for the second P-mag display "XXXX".

Q11: **Can I upgrade the EI Commander Software / Firmware?**

A: Yes, however, the process is slightly different for the legacy (round) EICommander and the newer (rectangular) EIC32.

See the EICommander manual for details on how to upgrade your EICommander.

Q12: **I notice the Timing Divergence Alarm (TDA) value will sometimes displays show a value such as "4.0" but the timing advance Values displayed are both reading the same 28.0 degrees. Why do the advances not differ by 4.0 degrees also?**

A: The EICommander compares the trailing edge of the P-mag tachometer pulse to determine the timing difference between the two ignitions. The 28 degrees before TDC displayed on the EICommander screen is a value sent by the P-mag based on the P-mags relative TDC mark, not the actual TDC of the engine. If one P-mag's TDC mark is miss-timed, then the EICommander will display a Timing Divergence Alarm but both P-mags will display the same advance.

This can happen if the two P-mags are timed differently, which can happen if they are timed independently of each other. We have found it best to time them by tying their manifold pressure lines together and using the same series of "puffs" to set the TDC marks on both P-mags at the same time.

Q13: **My EICommander gave a Timing Divergence Alarm (TDA) and noticed that the values in the Advance boxes were different, why does this happen?**

A: For some reason the two P-mags have different configurations active and are firing at different times. This can happen if one ignition did not accept a new configuration when they were sent by the EICommander, which can happen if one ignition was powered off during the update process. It can also occur when reinstalling an ignition that has been returned from Emag Ignitions for maintenance. It is not uncommon for Emag to reset the ignition to the factory default settings. The solution is to send the correct settings/configuration to both P-mags.

Q14: **Does starting procedure have any impact on P-mags?**

A: It may – depending on the starting procedure. If an engine is started one ignition while the secondary ignition, a P-mag, is powered up and grounded, it is possible for the secondary P-mag to lose its Top Dead Center timing mark on P-mag with pre version 40 firmware installed.

P-mags with firmware version 40 or higher have a routine that precludes the P-mag from losing its timing mark during the starting phase. Should your ignition lose its timing mark, regardless of the reason, we highly recommend you contact Emag Ignitions.

Q15: **What are the primary considerations in electrical grounding of a P-mag?**

A: There are three areas that deserve attention in grounding of the P-mag.
1. The first is the P-lead. This operates similar to a P-lead on a traditional magneto. The ignition will not fire, if the P-lead is grounded. The P-lead wire should connect to P-mag pin 4.
2. The second ground is the electrical case ground for the P-mag. This ground is critical for a good electrical connection and it is highly recommended that the ground run from P-mag pin 1 to an engine case bolt. If a second P-mag is installed, the case ground for the second P-mag should run to a different, independent case bolt.
3. The third ground allows the EICommander to communicate with the P-mags. This ground should be connected to pin 1 on both P-mags and run directly to the DB15 EICommander connector. It should not run to a common ground as that could introduce erroneous signals to the EICommander.

Q16: How do I verify my current timing and P-mag configuration?

A: Verify the power to the P-mags is off and that they are grounded (turned off). Turn your propeller to Top Dead Center (TDC) as indicated by the timing mark on the fly-wheel.

Power up both P-mags and the EIC, while leaving the P-lead grounded (turned off).

From the EIC MODE screen press button "B1-EP CONF" to bring up the EPI CONF screen.

Press button "B1-ECI<EPI" to have the E/P-mag Electronic Ignition send data to the EIC.

Press buttons B1, B2, and B3 to verify the E/P-mag configuration.

Q17: How do I change the screen brightness?

A: Original EICommander: With the RPM or TDA screen displayed, press buttons simultaneously B2 & B3. It will step through five the brightness levels. Release the buttons when the desired level is attained.

EIC32: From the Timing Divergence Alarm Screen, press and hold button "B4". The unit will cycle through ten brightness levels. Release the buttons when the desired level is attained.

Q18: The "Temp Max" and "Temp Curr" are reading higher than expected, do I have an issue with my P-mags?

A: No, you do not have a problem with your P-mags. The temperature probes in the P-mags have never been calibrated. Thus, the numbers reported to and displayed on the EICommander are not accurate.

Q19: What do the symbols on the Timing Divergence Alarm (TDA) screen mean?

A: The bar graph on the left side, numbered 2 to 7 and the white 2.0 in the image below indicates the current timing divergence between the two ignitions. The minimum displayed is 2.0 and this should be considered normal. Numbers higher than 2.0 should be investigated.
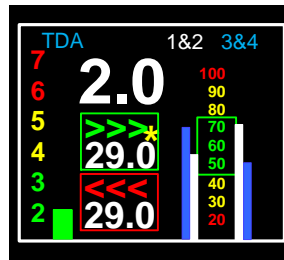
The two boxes, green and red, with 29.0 in the center indicate the current firing angle of the right (top/green) and left (bottom/red) ignitions. This number will change based on the RPM, manifold pressure, and timing configuration.

The blue and white bar graphs on the right with the zero to 100 scale between them indicate the relative condition of the coil packs, ignition harness, and spark plugs. The actual numbers mean nothing but are there for trend monitoring. Should one bar graph go out of your "normal" range, you should inspect the ignition system prior to your next flight.

The white bar graphs are for cylinders 1 and 2 and the blue bar graphs are for cylinders 3 and 4. The two bar graphs on the left of the center scale are for the left ignition and the two bar graphs on the right of the center scale are for the right ignition. (Due to the P-mag employing the "lost spark" method of ignition, two cylinders are fired at the same time, one on the exhaust stroke and one on the compression stroke. Thus, the condition of all eight plugs, wires, and coil packs can be displayed with four bar graphs.)

The asterisk (*) in the upper timing window flashes to indicate the EICommander is communicating with the ignitions.

Q20: What happens to my ignition(s) should the EICoimmander fail?

A: The EICommander is designed as a passive listening device only. Should the EICommander fail, it will NOT impact the operation of any attached E or P model ignition.

Timing configurations sent to the ignition(s) are stored within the ignition's non-volatile memory. Cycling the power of the ignition, either in flight, on the ground, with the engine running or not will NOT impact the stored ignition configuration.

Q21: Why does my engine backfires on startup?

A: A backfire during startup can be the result of the Run Mode Start Delay (RMSD) being any value other than zero (0). If your RMSD is set to two (2), then the engine can pump raw

fuel into your exhaust stack and when the ignition lights the fuel charge in the cylinder and the exhaust port opens, it may light the fuel that was pumped into the exhaust on those first two revolutions.

The solution is to change your RMSD to zero (0).

Q22: My EFIS requires a five-volt tach signal. Can the EIC use a five-volt signal?

A: It is best if the EIC receives a full-strength tach signal directly from the P-mags. Because of the possibility of introducing noise on the tach line, the tach line should run from the P-mag directly to the EIC with no other systems tied into it, except at the P-mag pin #6, as depicted in the EIC wiring diagram.

Q23: Why do the EICommander and P-mags operate in 1.4 degree increments?

A: In order for the P-mags to calculate the firing angle as efficiently as possible, they operate at the bite level. Thus 360 degrees divided by 256 bites equals 1.40625, which we shorten to 1.4 degrees. Timing in increments of 1.4 degrees does not appear to degrade engine performance, so there is little to no need for the ignitions to operate in 360 degree increments.

Q24: Why do the EICommander and P-mags operate in 256 RPM increments for the Rev Limiter (Max RPM)?

A: Due to the design of the P-mags, the Rev Limiter works in 256 RPM increments. The factory default Rev Limiter stops firing the plugs at 3328 RPM. The EICommander reduces this to 3072 RPMs but the value can be raised or lowered in 256 RPM increments, if desired. Owners of engines equipped with constant speed propellers should be aware that if the MAX RPM setting is reduced to 2816 RPM's, there is a chance that the engine may surge pass the rpm limit during the preflight propeller cycle test or on the initial takeoff roll. If this happens, the ignition will stop firing.

Q25: Should I use twisted pair and/or shielded wire?

A: Using either twisted pair and/or shielded wire is not required but using either will not harm anything. However, in some "noisy" installations, it may be required.

Q26: What pin is used for the big Tach display?

A: The round EICommander uses the tach signal from the left P-mag pin 6 for the large Tach display. The number displayed is calculated by the EICommander based on the number of tach pulses received over a set time and is continually updated.

The tach readings displayed on the dual view screen is streaming data provided from the P-mag(s).

Q27: **Why doesn't the Manifold Pressure display on the EICommander match my EFIS?**

A: This typically happens when different MAP sensors are installed. Some lower quality sensors will give artificially low readings. We suggest you buy a high-quality sensor and replace the one currently installed. If the problem persists, please call us.