

EICommander

EIC32



Installation and Operating Guide

Version: EIC32.1.02

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EIC32

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Thank you

Thank you for purchasing the EICCommander32 (EIC32). Our goal is to surpass your expectations and provide you with a product that is easy to install, easy to operate and provides valuable crucial information regarding your ignitions.

Information Regarding this Document

The first time you read this document may result in questions popping up in your head. Below are some points that may help you better understand the information being conveyed.

- The [Installation and Configuration](#) section of the Appendix contains the installation guide, wiring diagrams, drawings, and initial configuration instructions.
- The [Glossary / Definitions](#) section of the Appendix contains all the abbreviations and will be useful the first few times you read the abbreviations in this document.
- The [Screen Definitions](#) section of the Appendix contains every single screen displayed by the EIC32 and will allow you to visualize the information being conveyed in a paragraph. If you choose to view this document electronically, it may be helpful to open two windows so you can easily absorb the information by comparing the picture and words.
- While we try our best to deliver error free software, occasionally we miss a bug or better yet, come up with additional functionality. The [Performing Software Updates](#) section of the Appendix describes how to update the EIC32's internal code. This is a simple and painless process that should take minutes to accomplish.

Gotchas and Things to Know

The following information may reduce your headaches in the future. Reasoning will be explained throughout the document.

- An initial configuration MUST be sent by the EIC32 to the ignitions prior to first engine start. Page [10, Initial Timing Configuration](#).
- Apply power to your ignitions prior or at the same time as power is applied to the EIC32, if you want the initial timing configuration written to the .CSV log file. Page **XX** section **XX**.
- On-The-Fly (OTF) changes do not automatically save to the internal EIC or the ignitions and will not be available after powering down the EIC and ignitions. Page **XX** section **XX**.
- OTF changes can only be made to one ignition at a time. . Page **XX** section **XX**.
- The A configuration cannot be changed. However, it is the basis for creating custom timing configurations. Page **XX** section **XX**.
- An easy way to remember if the information displayed is for the Left, Right or Both ignitions is by remembering your NAV lights. Green on specific displays means Right; Red means Left and White is means Both.

Experimental – Amateur Built Aircraft Only

The EIC32 is not certified for aviation use and is not certified and/or approved for installation and/or use on any aircraft. It is designed and manufactured for use in aircraft certified in the "Experimental, Amateur Built" category only.

Use of this product entails certain risks; misuse can result in destruction of property, injury, including death, to you, and/or others. As the operator of this device, it is up to you to understand the dynamics of flight, engine operation, and the effect that changing ignition parameters on an internal combustion engine may have on the safe outcome of flight.

Warranty

Your EIC32 is warranted against manufacturer's defect for a period of one (1) year from the date of purchase.

Prior to returning any unit for service, contact EICommander for return authorization.

EICommander will repair or replace defective products within the warranty period that, in EICommander's sole opinion, have not been subjected to abuse or any attempted field repairs. This warranty is limited to the purchase price of EIC32 hardware only and does not cover the engine or engine components that may be affected by defects or failure of the EIC32, loss of use of the aircraft, and/or any other inconveniences or loss as a result of the failure of the EIC32 system.

CAUTION

Caution

The aircraft operator has the SOLE responsibility of determining how to appropriately and safely control engine operation. Nothing stated by EICommander, its employees, owners, agents or affiliates should be construed as overriding or invalidating the engine manufacturer's instructions (including engine timing, RPM operation, warnings and limits, etc.).

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Overview

The EIC32 is designed to monitor and manage E-MAG Ignition's four-cylinder electronic ignitions. Any other use is not authorized nor recommended.

The EIC32 is designed to provide a pilot with information regarding the status of any combination of P-mag ignition(s) installed in their experimental aircraft. The EIC32 unit is capable of providing limited management of the 114 series electronic ignitions. The EIC32 is designed to work with the standard features and functions of the P-mag ignitions and will not allow a user to exceed any operational limits of the ignition(s). However, safe operation within these limits is the sole responsibility of the user.

Data displayed by the EIC32 originates within the ignition(s) and the EIC32 unit simply functions as a user interface and display.

In addition to being a user interface to installed and configured P-mag ignitions, the EIC32 has the ability to compare the timing mark of two P-mag ignitions and set an alarm condition when it identifies a possible timing divergence greater than two degrees. The EIC32 is not capable of providing timing divergence alarms with any other ignition or combination of ignitions due to the difference in timing curves, connectivity, etc.

When connected to 114 P model ignitions, the EIC32 displays the relative "health" of the ignition(s). This is possible because the 114 model ignitions report the level of current discharged through the firing event. If there is a direct short, then this value will be high. If the current discharge is functioning properly, the relative health of the coil pack, plug wire, and sparkplug will be displayed on the right side of the EIC32's Timing Divergence Information screen as a bar graph. This information is for trend monitoring only. A value above or below the midsection, as depicted by the green rectangle on the scale, does not necessarily indicate an issue.

The EIC32 can manage one or two Emag four-cylinder electronic ignitions. The EIC32 must be configured to communicate with the ignitions installed; left, right, or both. Note, the default setting is "Both".

For some operations, it may be desirable to change the configuration to communicate with only one ignition at a time. Changes may be performed at any time. Typically, once the configuration is set, it does not need to be changed unless an ignition is added or removed.

Note: All screen images displayed in this manual are facsimiles of the actual screens.

Quick Start

Prior to use, the EIC32 must be connected and configured to operate in the aircraft in which it is installed. See the following sections at the back of this manual for installation and setup instructions:

	Page
Concept of Operation	8
Wiring	49
Communication Configuration of the EIC32	53
Pulses per Revolution (PPR)	18

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Operation

Concept of operation

The installation of an EIC32 does not impact the independent nature of a dual ignition installation. The EIC32 is a passive monitoring tool that is capable of receiving streaming data from the ignitions or can be used to manually configure the ignitions. The EIC32 is not designed, nor is it capable of, issuing commands to the ignition(s) without user input.

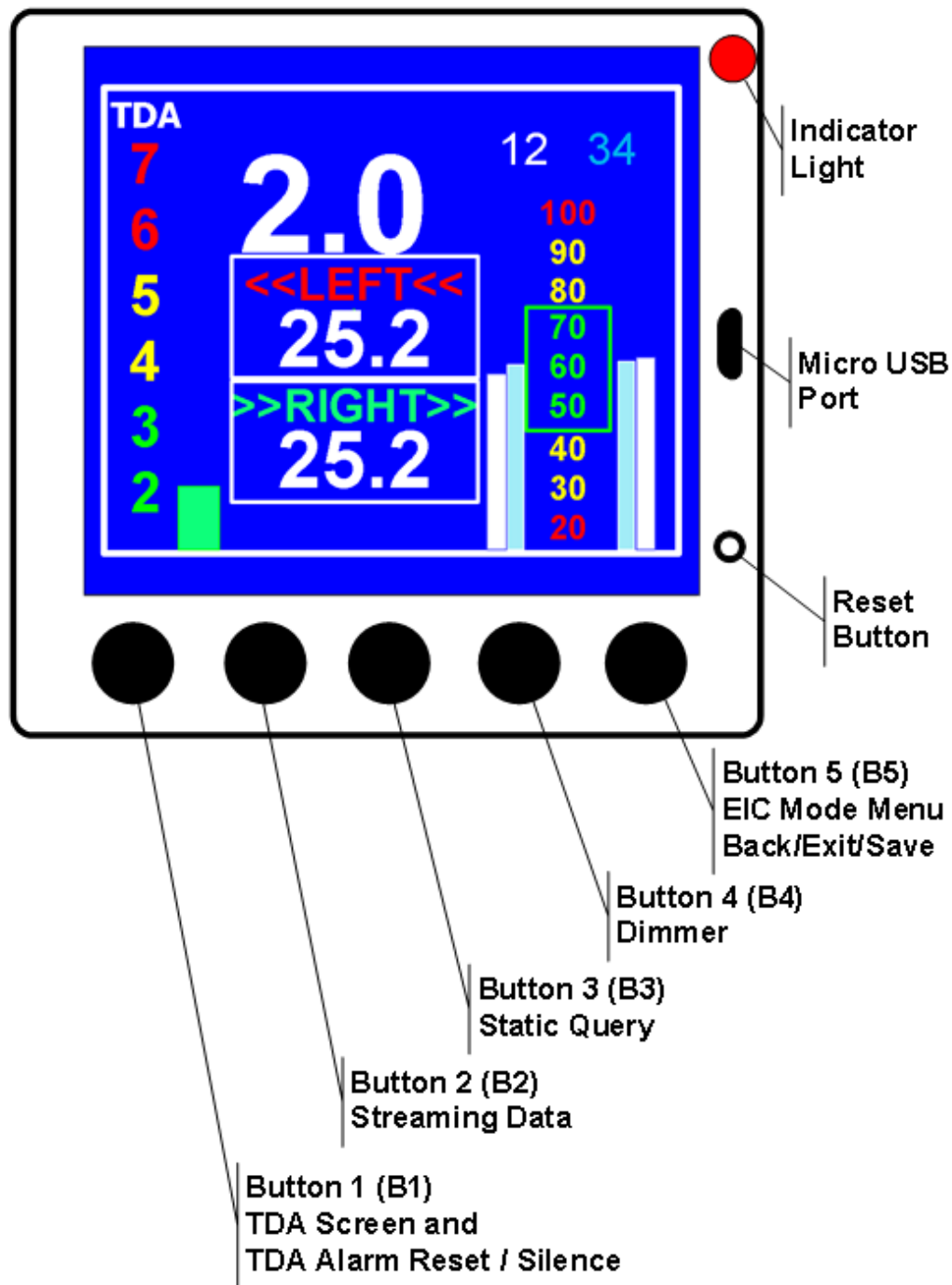
While a single ignition can be used in conjunction with the EIC32, several features of the EIC32 are not available when connected to a single electronic ignition. The Timing Divergence Warning capability requires two ignitions and the EIC32 must be configured for dual ignitions for this warning routine to function, thus this warning capability is only available when two P-mag ignitions are installed and properly configured.

The number one priority of your ignitions is to fire the sparkplugs at the correct time, every time. Thus, there will be occasions when the EIC32 will try to either retrieve or send data to the ignition(s) and the ignition(s) may not respond. The EIC32 has been optimized to work around this asynchronous communications issue; however, the importance of firing the sparkplugs is paramount, thus there may be occasions when a given command must be repeated by the pilot.

Prior to engine start, the EIC32 queries the ignitions and compares the shaft angle, relative to Top Dead Center (TDC), and it compares the configuration of both ignitions to make sure they are identical. Should either the shaft angle differ by more than two degrees or the P-mag configurations differ from one or another, the EIC32 will display an alert message. See section ??? for more details.

Timing Divergence Information (TDI) Screen

The TDI screen is the primary EIC32 display



The buttons B1 through B5, as read from left to right on the EIC32, are used to access various functions, depending on the screen displayed.

When a screen is displayed with multiple values that may be changed, the following button functions will be active:

- B1** – Move up one field
- B2** – Move down one field
- B3** – Increase the displayed value
- B4** – Decrease the displayed value
- B5** – Exit current screen / move back one level

On all other screens, the buttons operate as labeled.

The round opening on the right side of the display, between the micro USB port and button B5 is “reset”. Should the unit hang up or fail to process a command, pressing the reset button with a ballpoint pen will force the EIC32 to reboot. The EIC32 has internal code that is designed to catch system hangs and force a reboot on its own.

Clearing a “Timing Divergence Alarm” / Audio Alarm

Pressing and holding the B1 button until the LED comes ON and OFF once **resets the averaging routine** and does not turn ON or OFF the TDA alarm function. This will momentarily silence the audio alarm. However, if there is a timing issue, the audio alarm will sound again once the EIC32’s TDA routine reaches 6.0 degrees of difference or greater.

Pressing and holding the B1 until the **LED Comes ON and OFF Twice disables the TDA** warning screen as well as the associated audio alarm. An “Alarm OFF” label should appear at bottom of TDI screen. To re-enable the TDI screen press and hold B1 for two cycles of the LED, then release.

To rearm the TDA warning screen, press and hold the **B1** button until the red LED cycles from OFF, to ON, and back to OFF. This will indicate the TDA is armed.

- Note:
1. The TDI and TDA functions only operate when the EIC32 is connected to and configured for two operational P-mag ignitions.
 2. Should the connection to the tachometer signal on one ignition fail (broken wire, bad connection, etc.) the EIC32 will stop display TDA information. See Appendix A, Section ??? Lost Tachometer Signal for more information.

Timing Mark Synchronization Verification

When the EIC32 is installed on an engine with two P-mag electronic ignitions, is properly configured for dual ignitions, and the Timing Divergence Ignition (TDI) Screen is displayed, the EIComander will continuously monitor when each ignition fires and will display a “Timing Divergence Alarm” (TDA) should the timing difference between the two spark events, adjusted for RPM exceed six (6) degrees.

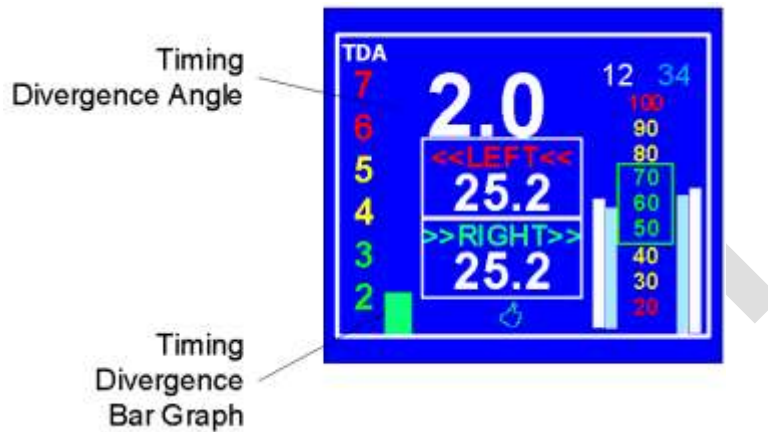


Figure 1: Timing Divergence Information (TDI) Screen

Should the timing difference between two ignitions diverge greater than six (6) degrees, the EIC32 will change the timing divergence bar graph to red, display the Timing Divergence Alarm screen on the right in Figure 2, flash its red LED, and produce an audio alarm.

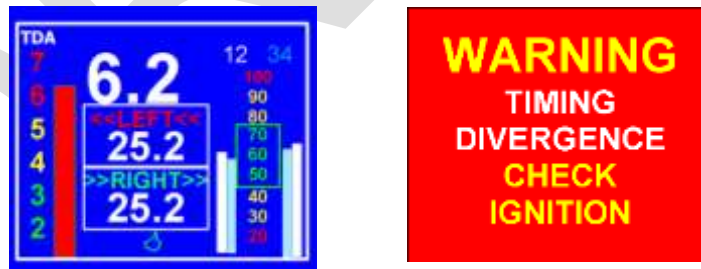


Figure 2: Timing Divergence Ignition (TDI) on left and Alarm (TDA) Warning Screen on right

Timing Configuration Basics

The P-mag ignition has two default timing configurations, often referred to as “A” and “B” curve. These are stored in two different memory locations within the ignition. The “A” memory location cannot be changed; however, the “B” memory location is fully configurable. The EIC32 utilizes the “B” memory by pushing its timing configurations to this location. Thus, if you wish to run the “A” curve, as

defined in the E-MAG Ignition manual, the EIC32 sends the “A” configuration to the “B” memory location. If a custom timing configuration is created and sent to the ignition(s), that custom configuration overwrites the configuration stored in the “B” memory location.

Initial Timing Configuration

IMPORTANT: When the EIC32 is first installed, the ignition(s) will default to the “B” timing configuration. Thus, the user must send the desired configuration to the ignition(s) prior to engine start.

Depending on the engine, the user may wish to create a custom configuration for their engine. It is up to the operator to determine the proper timing configuration for their engine installation.

It is strongly recommended that an identical configuration be sent to both ignitions. Failure to do so will result in a TDA.

Timing Curve Configurations

The EIC32 provides the ability to maintain and manage five (5) different timing configurations as shown below and on Table XX.

A Config – Same as defined in the EMAG Ignition Installation and Operating Guide
(Defaults: RPM: 3072, Advance Max 33.6, Adv Shift 0.0, RMSD 0, and LED Sensor mode)

B Config – Same as defined in the E-MAG Ignition Installation and Operating Guide except the maximum RPM may be reduced to 2560.

C Config – User defined

D Config – User defined

E Config – User defined (Temporary On-The-Fly configuration, if used.)

Changes to Configurations A and B are limited to reducing the maximum advance and maximum RPM.

The B curve:

Config A: RPM – Preconfigured to 3072 and can be lowered to 2560
Max Advance – Preconfigured to 33.6 and can be lowered to 19.6
Advance Shift – Preconfigured to 0.0 and cannot be changed.

Config B: RPM – Preconfigured to 3072 and can be lowered to 2560

Max Advance – Preconfigured to 37.8 degrees and can be lowered to 19.6 degrees

Advance Shift – Preconfigured to +4.2 degrees and can be changed to -12.6 to 5.6 degrees

Config C: Preconfigured to match the A configuration. The RPM limit can be raised to 3328 or lowered to 2560 in increments of 256. The maximum advance can be set to any value between 19.6 and 46.2, inclusive, in 1.4 degree increments. The Advance Shift can be set to any value between -12.6 and + 12.6, inclusive, in 1.4 degree increments.

Config D: Not preconfigured but are initialized with the default A configuration settings. Limits are the same as “Config C”.

Config E: Not preconfigured but is initialized or overwritten whenever **B2-Retain** is pressed while making an “**On-The-Fly**” change. The configuration is named “***TMP**”. If no “**On-The-Fly**” changes are made, this configuration can be set and utilized in the same manner as configurations C & D. Limits are the same as “Config C”.

Configuration C, D, and E may be renamed, as desired. Configuration names are limited to three (3) characters.

- Notes:**
1. The P-mag's MAX RPM limit is adjustable in 256 RPM increments. This is due to the P-mag software coding written in binary 8-bit format. This is the same reason timing configurations are adjusted in increments of 1.4 degrees.
 2. The Advance Shift is the timing used for full power, high manifold pressure, timing. The Advance Max is the maximum advance the P-mag will allow under all conditions. (Plus 1.4 degrees.) Table ??? lists the default A and B timing configurations. If you have an engine that requires a timing of 20 degrees BTC, then you should create a custom timing configuration that starts at 19.6 degrees (-7.0 Advance Shift) and advances out to an Advance Max of 26.6 degrees.

Actual Timing	Advance Shift	
40.6	14.0	
39.2	12.6	
37.8	11.2	B – Advance Max
36.4	9.8	
35.0	8.4	
33.6	7.0	A – Advance Max

32.2	5.6	
30.8	4.2	B – Advance Shift
29.4	2.8	
28.0	1.4	
26.6	0.0	A – Advance Shift
25.2	-1.4	
23.8	-2.8	
22.4	-4.2	
21.0	-5.6	
19.6	-7.0	

Table ???

3. The RPM Max and can be set as desired. Keep in mind that too low an RPM Max could cause the ignition to cut out during certain phases of flight.
4. The Run Mode Start Delay (RMSD) instructs the ignition to wait X number of revolutions prior to firing the ignitions. Any number other than zero (0) could cause unburnt fuel to be pumped into the exhaust manifold, which then burns off with a bang after the ignition starts firing again. It is the recommendation of EIC32 that this number remain zero (0).
5. The LED Sens field controls the display of the LEDs on the back of the P-mag that are used for timing. The EIC32 does not allow this field to be changed.

Deleting an Active Timing Configuration

Timing configurations A and B cannot be deleted. Timing configurations C, D, and E may be deleted but only when they are not the configuration in use. The active configuration is identified by the green ">" pointer on the **IGN Config** screen as shown on Figure XX.



Figure XX: Active Configuration Pointer

Timing configurations may be deleted if they are not active. If the timing configuration to be deleted is active, select an inactive timing configuration and send it to the IGNITION(s).

The button sequence to delete a timing configuration is:

B1-CONF → **B2-EIC→IGN** → select the configuration to be deleted → **B5** → **B2-DELETE**.

2. be changed.

Creating a Custom Timing Configuration

The following steps indicate how to create a custom configuration. After sending a new configuration to the ignitions, perform a “Static Query” and verify that both ignitions received your desired configuration.

Creating and saving a custom timing configuration is a two-step process. First the configuration must be created and then it must be activated by sending it to the ignitions.

Image ??? lays out the steps for creating a new configuration and image ??? details how to send that new configuration to the ignitions.

As mentioned above, confirm the ignitions received your configuration by performing a static query.

DRAFT

Image???

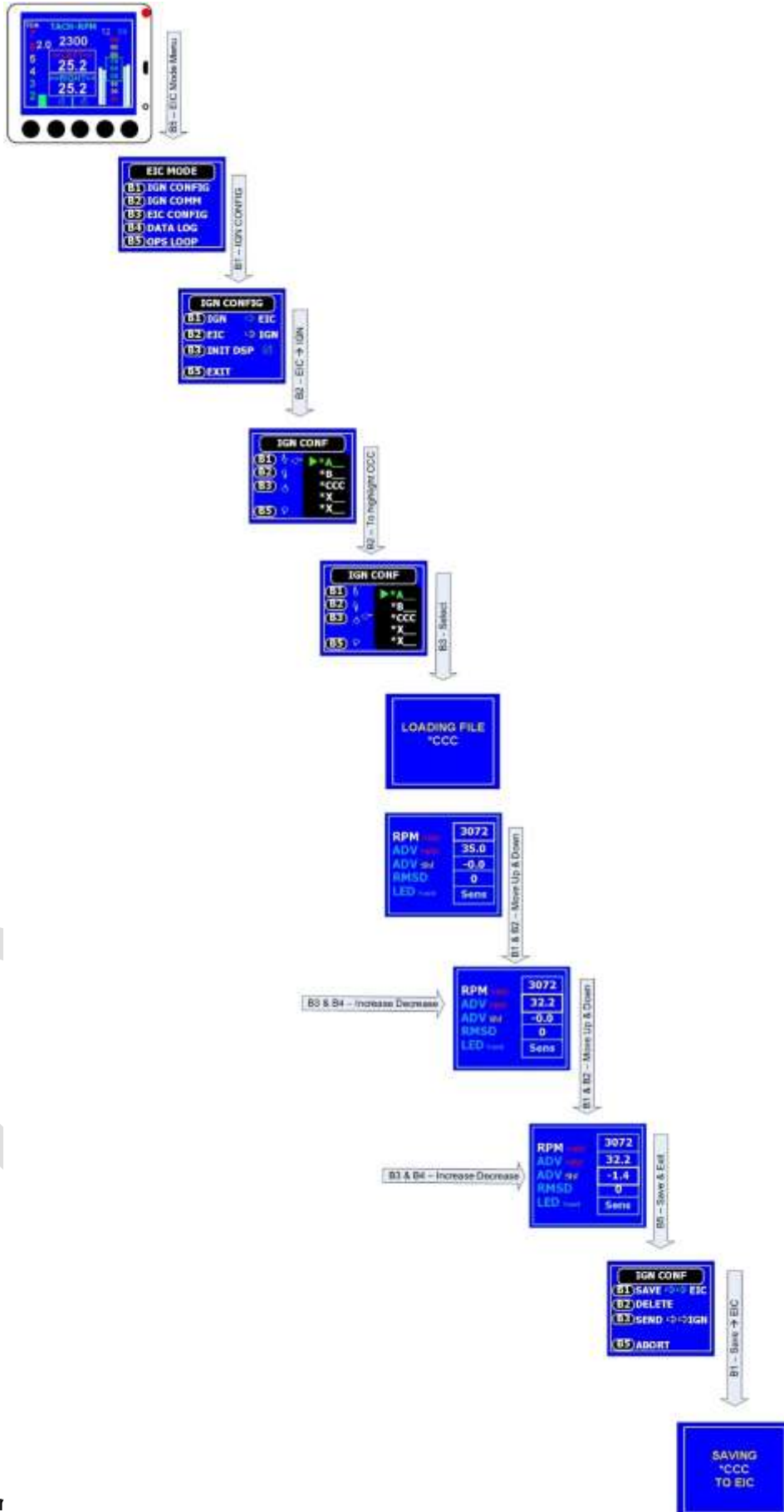
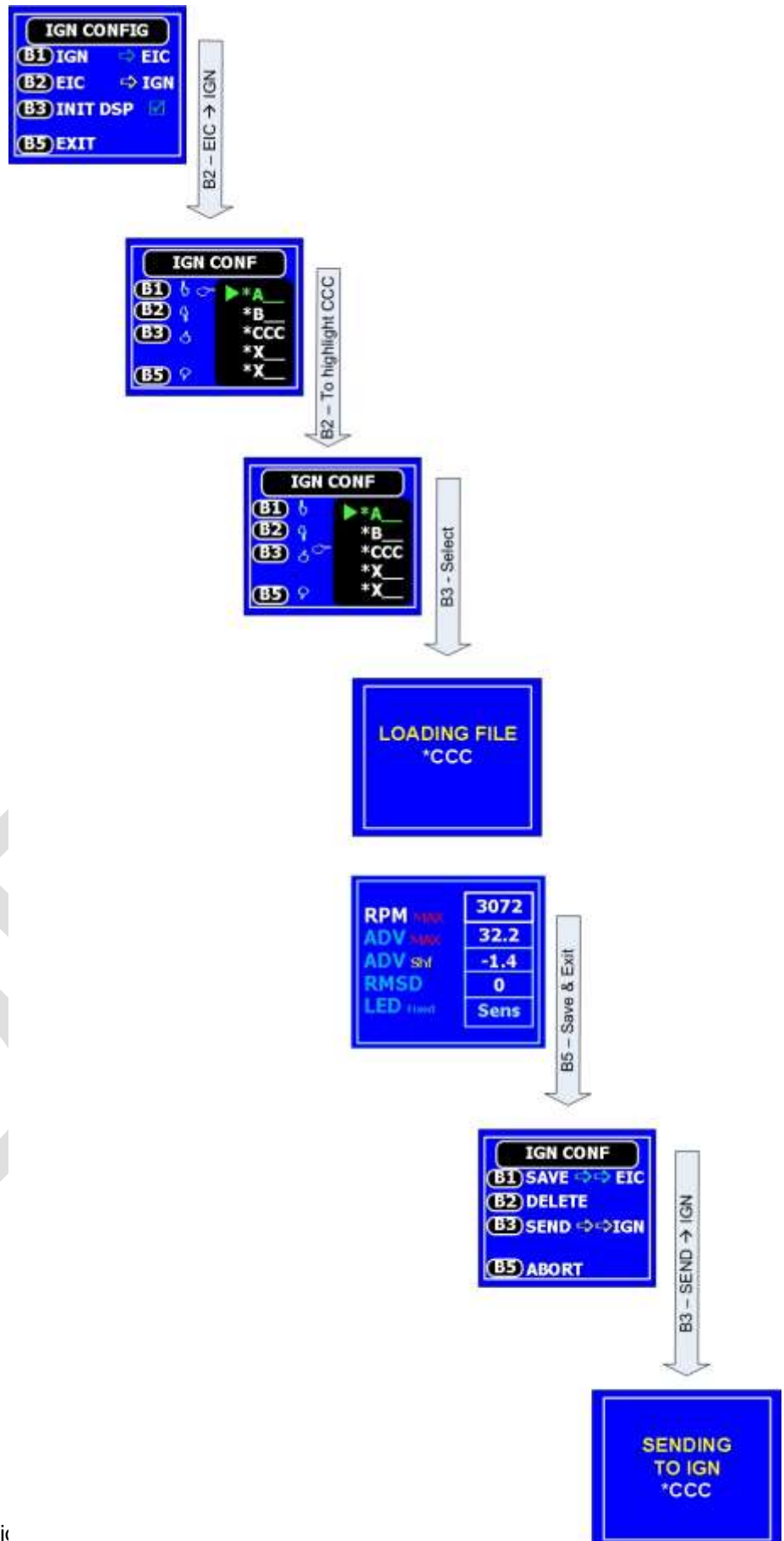


Image ???



Aux Settings; Temperature Scale, Pulses per Revolution (PPR), System Test, and RPM display

The Temperature Scale allows the EIC32 to switch between displaying ignition temperatures in degrees Celsius and degrees Fahrenheit. (Default setting is degrees Fahrenheit.)

The Pulses per Revolution (PPR) instructs the ignitions how many tach pulses to send to an electronic tachometer every revolution. (Default setting is 2 PPR.)

The allowed values are 0, 1, 2, 4, 6, 7, and 8. (Setting the PPR to zero (0) provides a PPR of $\frac{1}{2}$ for those with the Westech sine wave $\frac{1}{2}$:1 ratio Tach signal generators.)

WDTReboot Test is used to verify the EIC32's internal software is functioning properly.

If the is displayed, the optional RPM tachometer will be displayed on the TDI screen. (Default is off,)



B5 - EIC Mode Menu

EIC MODE

- B1 IGN CONFIG
- B2 IGN COMM
- B3 EIC CONFIG
- B4 DATA LOG
- B5 OPS LOOP

B3 - EIC CONFIG

EIC CONFIG

- B1 LDR IGNITION
- B2 AUDIO ALARM
- B3 AUX SETTINGS
- B4 EEPROM REST
- B5 EXIT

B3 - AUX SETTINGS

TEMP SCALE

- B1 TOGGLE F|C
- F C
- Fahrenheit Celsius
- B5 SAVE/EXIT

B1 - TEMP SCALE

AUX SETTINGS

- B1 TEMP SCALE
- B2 PPR
- B3 WDTReboot Test
- B4 RPM
- B5 SAVE/EXIT

B2 - PPR

SET PPR

PPR: 002

- B3 DEC PPR
- B4 INC PPR
- B5 SAVE/EXIT

B3 - WDTReboot Test

EIC32 Reboot Test
No Configuration Changes

B4 - RPM

AUX SETTINGS

- B1 TEMP SCALE
- B2 PPR
- B3 WDTReboot Test
- B4 RPM
- B5 SAVE/EXIT

Setting TDC

It is **NOT** possible to set ignition timing TDC via the EIC32. However, upon power up, the EIC32 sends a command to the ignition(s) that will take them out of setup mode, making it impossible to set the TDC on the ignition(s) as described in the E-mag Ignition manual.

There are two options available to avoid the EIC32 from forcing the ignition(s) out of setup mode; 1) Do not power up the EIC32 when applying power to the ignition(s) or 2) Put the EIC32 in TDC setup mode.

TDC SETUP

It is the user's responsibility to read and understand the E-mag Ignition manual on how to set the TDC.

1. With the master switch OFF and no power to either the ignition(s) or the EIC32, move the propeller to TDC, and make sure no one is standing within the prop arch.
2. To place the EIC32 into TDC Setup mode, cycle the power to the the EIC32, if on. If the EIC32 is off, turn it on. As the EIC32 powers up, the LED warning light will illuminate, as it does, press button **B1**. This will pause the EIC32's initiation sequence and it will display the following screen, Figure XX:



Figure XX: TDC Set Up Screen

3. Set the TDC according to the ignition's manual and then press any button on the EIC32 to take it out of **TDC SETUP** mode.
4. Cycle the power to the ignition(s) and the EIC32.

Notes: 1. It is important to cycle the power to the ignition(s) prior to setting the ignition timing. This is required to reset any possible configuration settings that may not have been saved to the ignition(s) memory.

2. Refer to the E-MAG Ignition Installation and Operating Guide for details.

TDC Verification

If the ignitions are powered up and the engine is not running when the EIC32 is powered up, the EIC32 will automatically query the ignitions and compare their current TDC position and issue a warning, if the timing marks of the two ignitions are greater than two degrees apart. In the example below, one ignition's timing is currently at 3 degrees past TDC (93 deg) and the other ignition's timing is currently at 6 degrees past TDC (96 Deg).



The steps listed below can be used to display the current TDC position on the EIC32, if the engine is not running. This is useful for verifying the correct ignition timing configuration. It is recommended that the TDC is verified after the initial installation and following any maintenance on the aircraft's ignition system(s).

1. With the engine shut down, turn off both ignitions.

WARNING

2. Verify both ignitions are turned off and not operating before proceeding. Injury or death may occur, if either ignition fires.
3. Set the engine to TDC.
4. It is important that TDC is used and not a value before TDC, as is normal for traditional magnetos.
5. There is a timing mark on the back of the flywheel, align the TDC / zero mark with the engine case split line.
6. Apply power to the ignition(s) and the EIC32.
7. Press **B1-IGN→EIC** to acquire the ignition(s) static data.
8. Press **B3** to display the third **Static Data** screen.

The current firing angle of the ignition(s) will be displayed in the box labeled **PROPdeg, Figure XX**. These numbers should be close to zero (0). Due to gear lash, it is not uncommon to see numbers that are one or two degrees apart.

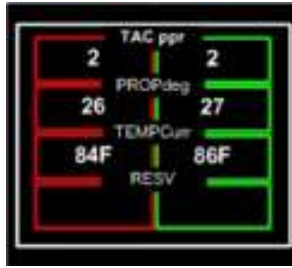


Figure XX: Screen Showing PROPdeg field

Note: It is suggested a small mark be placed on the spinner which aligns with a cowl part line when the engine is at TDC. This will allow the operator to set the engine to TDC and verify the timing from the EIC32 without removing the cowling.

Changing Ignition Values

There are two ways to make changes to the ignition values; “**Mass Change**” and “**On-the-Fly**”. **Mass Changes** are predefined ignition settings that are sent to the ignition(s) en mass. **On-the-Fly** changes are performed on one ignition at a time, such as when defining new ignition settings. The ignition values may be changed with the engine running or shut down.

Care should be taken when changing ignition values. Incorrect ignition values could damage your engine causing engine stoppage which may result in destruction of property, injury, and/or death. It is up to you, as the pilot, to determine the safe operational parameters for your ignition/engine installation and operational environment.

WARNING

Changing Timing Configurations

Pushes a predefined ignition configuration (Configurations A, B, C, D, or E) to all installed and selected ignitions.

Care must be taken when pushing a new configuration to the aircraft’s ignition. It is advisable to utilize only configurations that have been tested and found to present no undesirable operational issues.

The **IGN CONF** (Ignition Configuration) screen, Figure XX, provides the means to select, create, change, and delete timing configurations within the EIC32. Only stored configurations may be uploaded to both ignitions simultaneously. It is up to the pilot to determine if a configuration stored within the EIC32 is suitable for flight.



Figure XX: Ignition Configuration Screen

1. Navigate to the **IGN CONF** screen and press **B2-EIC>IGN** (EIC32 to Ignition communication).
2. Move up and down by using buttons B1 (up) and B2 (down) to select the desired configuration. The text of the selected configuration will change from yellow to white.
Note: The Green ">" symbol points to the last configuration sent to the ignition(s). If a different configuration is sent to the Ignition(s), the green ">" will automatically update to point to the newly sent configuration.
3. Press button **B5** to select the highlighted configuration.
4. The selected configuration will be presented for review. Values may be changed, if desired by pressing buttons **B3** and **B4** to increase and decrease the displayed value.
5. Press button **B5** to switch to the **CONF ACTION** screen to save, delete, active, or abort the changes.
6. If changes were made, press **B1-SAVE>EIC** to save the updates to the EIC32.
7. If the newly saved configuration is to be sent to the ignition(s), it must be reacquired (reloaded) by pressing button **B2 "EIC->IGN"**. Select the recently saved configuration. After reviewing the configuration, press **B5** to go to the **Conf Action** screen
8. Activate a configuration by pressing button **B3-SEND>IGN** to it the ignition(s). The ignition(s) will be updated based on the previously selected configurations (left/right/dual). After the update is performed, the EIC32 will return to the **CONF ACTION** screen.
9. To remove a selected configuration from the EIC32's memory, press button **B2-DELETE**.
10. Press **B5-ABORT** to return to the **IGN CONF** screen.

- Notes:
1. If changes are made to a configuration, they must be saved prior to being sent to the ignition(s).
 2. When creating a new configuration, the EIC32 will require the entry of a configuration name. Configuration names may contain up to three characters.
 3. An asterisk (*) immediately to the left of a configuration name indicates the configuration has been initialized.
 4. A green greater than sign (>) to the left of a configuration name indicates that configuration is currently active.

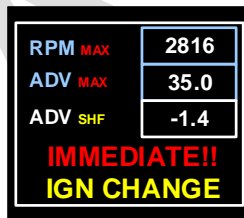
WARNING

“On-the-Fly” Change

“On-the-Fly” changes are designed to allow for ignition tuning while the engine is running. This is an advanced feature and care should be taken to reduce the risk to the aircraft, pilot, and passengers. The changing of ignition timing parameters while flying is inherently risky and is NOT recommended.

CAUTION

CAUTION: “On-the-Fly” changes are immediately transmitted to the selected ignition as the Increase (B3) and Decrease (B4) buttons are pressed, Figure XX. For your safety, it is imperative to increment / decrement each setting one step at a time, observe and evaluate the results for satisfactory engine operation prior to making additional changes to the active setting. For example, it would NOT be wise to operate the engine with a constellation shift of 0 degrees ignition timing and then to suddenly command the ignition to shift the timing curve by +12.6 degrees. It is possible that that such a change may not be suited to the engine’s operating regime.



RPM MAX	2816
ADV MAX	35.0
ADV SHF	-1.4

IMMEDIATE!!
IGN CHANGE

Figure XX: Immediate Ignition Change Screen

Due to the risks involved with adjusting the timing configuration of a running engine, the following parameters are enforced:

1. Only one ignition at a time may be modified in this mode
2. The active configuration may not be modified
3. Only the following three parameters may be changed:
 - a. Maximum Engine RPM limit (shown as RPM MAX)
 - b. Maximum Ignition Advance Limit (shown as ADV MAX)
 - c. Ignition Advance Curve Shift (shown as ADV SHF)

Notes:

1. The ignition responds to changes in RPM in steps of 256 RPM. Therefore, the RPM will increment/decrement by 256 intervals.
2. Changes to ignition timing will increment/decrement in steps of 1.4 deg. For example, if the timing offset started at 0, pressing the B3 button once would increase it 1.4 degrees. Pressing it twice would increase it to 2.8 degrees, etc.

3. The EIC allows for a negative shift. This is provided for engines with timing requirements less than the standard "A" configuration of 26 degrees before TDC.

DRAFT

WARNING

Making “On-The-Fly” changes:

1. Upload an inactive configuration. (The following steps will use configuration “C” for demonstration purposes.) Using the **IGN CONF** function, load configuration “C” to one or both of your ignitions.

- Notes:**
- a. Configurations “A” and “B” may not be modified by the “On-The-Fly” function.
 - b. It is recommended that the configuration to be modified should be loaded to the ignition(s) prior to engine start, in anticipation of **On-the-Fly** changes.
 - c. It is recommended that changes should be made to only one ignition at a time with the second ignition turned off. This keeps the second ignition from masking the changes made and allows the pilot to turn on the unchanged ignition and turn off the modified ignition, should a setting be entered that could compromise continued engine operation. See the section on selecting Left / Right / Dual ignitions, as shown on page XX section 1.2.3.
 - d. After a configuration has been satisfactorily tested on one ignition, the configuration can be saved to the EIC32 and sent to both ignitions or using this function, the other ignition can be brought on line and adjusted manually. Figure

ADV	CUR	33.2
RPM	CUR	2150
Volt		11.8
Temp	CUR	83F
C1/2-C3/4		48 56

2. Then using procedures described above, from the **IGN CONF** screen, select and send configuration “C” to the selected ignition.
3. Press button **B5** to return to the **EIC Mode** screen and select **B2-IGN COMM**. Notice that if one ignitions had previously been selected the **IGN COMM** screen with the two choices will not be displayed, as shown on Figure XX. The screen to select Left / Right / Dual will only appear, if the current communication configuration is set to Dual. If this screen is displayed, select either the Left or Right ignition.

4. The EIC32 will retrieve and display the current settings from the Left or Right ignition. The first screen displayed contains the current advance, RPM, board voltage, temperature, and coil pack status data of the ignition. The labels will be in green to signify it is streaming data from the Ignition(s). Pressing button B1 will display firmware version, maximum RPM setting, maximum advance setting, timing shift angle, and maximum ignition temperature.

FW	REV	40
RPM	Max	3072
ADV	Max	35.0
ADV	Shf	5.6
TEMP	MAX	105F

Only three ignition parameters may be changed in this mode; Max RPM, Max Advance, and Advance Shift.

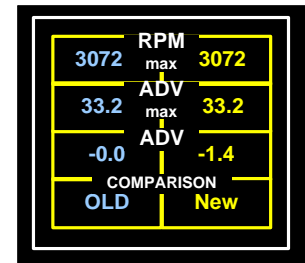
Note: Above approximately 2000 RPM The ignitions stops reporting coil data and the four coil data bar graphs will drop to zero. Perform coil check below 1800 RPM.

5. Press buttons **B1** and **B2** to switch between the settings and current values screens.
6. Pressing button **B3** while on the FW / RPM / ADVmax / ADVshf / TEMP screens displayed will take you to the **IMMEDIATE CHANGE** screen.
7. The “**IMMEDIATE CHANGE**” screen will display the following three parameters:
 - a. RPMmax
 - b. ADVmax
 - c. ADVshf
8. Use buttons **B1** (up) and **B2** (down) to select the parameter to change. The label will turn from blue to white indicating which parameter is selected.

Press **B3** (increase) and **B4** (decrease) to set the selected values. The LED will flash each time **B3** or **B4** is pressed. This indicates the new value has been sent to the ignition selected.

9. After changing any value, press **B5** to retrieve the updated data from the ignition to verify the desired change(s) occurred.
 - i. **Check engine gauges** after making any ignition changes to verify safe engine operation.
 - ii. Although these changes have been sent to the selected ignition, they are not stored in the ignition’s permanent memory. Powering down the ignition will clear the new settings.

10. Press **B5** to exit to the “**DISPLAY**” screen.
11. Press **B5** to exit to the “**FUNCTION**” screen.
12. Press **B2-ConfSave** to save the current setting to the EIC32’s memory. This displays a two column screen; “**OLD**” values on the left and “**NEW**” values on the right.



13. Press **B5** to display the **CONF ACTION** screen.
14. Select one of the three options from the **CONF ACTION** screen listed below:
 - a. **B1-TEMP** – Retains the modified configuration until the ignition is powered down. Upon ignition power down, the ignition return to its last saved configuration.
 - b. **B2-RETAIN** – Stores the modified configuration in the ignition’s permanent memory and in the last configuration position within the EIC32 with the name “***TMP**” which becomes the current configuration. Upon ignition power down and power up, the modified configuration will be active.
 - c. **B3-A CONF** – Reset the ignition to the “**A Config**”. This is to be used in the event an undesirable timing configuration was configured on the ignition. Prior settings will be lost.
 - d. **B5-Exit** – Exit and return to the **FUNCTION** screen.
 - e. **B5-Exit** – Exit and return to the **EIC MODE** screen.

Setting Screen Brightness

From the TDI Screen, press and hold button “B4”, Figure XX.

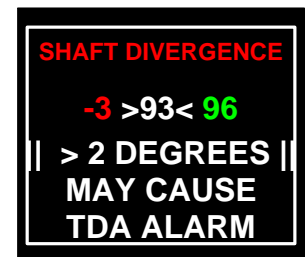
Figure XX:

The unit will cycle through ten brightness levels. Release the buttons when the desired level is attained.

Automatic Preflight Timing Verification

Upon power up, the EIC32 will query both ignitions and compare their known TDC mark and configurations against each other. Should the timing difference between the two ignitions exceed two degrees and/or they two ignitions be configured differently, a warning screen will be displayed. Should this Shaft Divergence warning screen or the configuration difference screen be displayed prior to engine start, verify the ignition timing and configurations.

The EIC32 will display a countdown timer while it is querying the ignitions. If the EIC32 cannot communicate with the ignitions, a “NO COMM with IGNITION” message will be displayed. This message will be displayed if the ignitions are powered off when the EIC32 is powered up. (The position of the P-leads will have no impact on this prestart timing check.)



Manual Preflight Timing and Configuration Verification

Prior to flight, it is possible to verify the timing divergence and configuration match when more than one P-mag ignition is installed. If the ignitions are not powered up when power is applied to the EIC32, this verification check is recommended prior to engine start.

From the **EIC MODE** screen press button **B1-IGN CONFIG** to switch to the **IGN CONF** screen. Press **B1-IGN → EIC** to command the EIC32 to retrieve the static data from the ignitions. Buttons **B1**, **B2**, and **B3** will display the three screens of static data. Screen **B2** will display the configuration data and screen **B3** will the current “Prop Deg” (or crankshaft angle relative to the Top Dead Center mark will be displayed.

This can be performed while the engine is running but the “Prop Deg” will be different because the EIC32 queries one ignition, pauses, and then queries the other. The required pause between each query while the engine is spinning means the crankshaft will be at different positions when the data is retrieved.

Ignition Harness Preflight Verification

If 114 series P-mag ignitions are installed, the EIC32 can report the relative health of the ignition harness(es). (This feature is not available in the 113 series E & P-mag ignitions)

Display the TDI screen. The TDI screen may be displayed at any time prior to flight, during flight, or after flight.



Preflight Image 1



Preflight Image 2



Preflight Image 3

Figure XX: YYYYYYYY

Preflight Image 1: The timing difference between the two installed ignitions is 2.0 degrees, the current advance for both ignitions is 29.0 degrees, and the coil packs one and two on both the left and right ignitions indicate that the condition of the ignition harness and sparkplugs are within tolerance.

Preflight Image 2: The timing divergence is 5.5 degrees and is in the yellow caution range. The ignition timing discrepancy should be addressed prior to flight. The current advance for both ignitions is 29.0 degrees. The plugs and ignition wires connected to the left ignition and firing cylinders three and four (3&4) should be inspected for a possible loose/broken wire, disconnected and/or defective plug.

Preflight Image 3: The timing divergence is out of limits and corrective action should be taken prior to flight. The condition of the wiring harness for the right ignition is questionable and should be inspected. The right ignition harness and plugs firing cylinders one and two (1&2) should be inspected for a short or fouled plug.

Note: Above approximately 2000 RPM The ignitions stop reporting coil data and the four coil data bar graphs will drop to zero. Perform coil check below 1800 RPM.

WARNING

The EIC32 is not capable of determining if the timing is set properly in relation to the engine's TDC. It is only capable of comparing the difference in timing of two identical ignitions. While unlikely, it is possible that both ignitions' timing could slip out of specification by the same amount at the same time. In the event this occurs, it is up to the pilot to recognize this condition and take the appropriate action prior to flight or terminate the flight immediately.

Data Logging

The EIC32 will automatically store ignition parameters in a .CSV formatted file to its internal memory. This allows the owner/operator to retrieve their ignition data and review it with any commonly available spreadsheet application, such as Excel or Note Pad.

Upon initial powerup, the EIC32 queries the P-mag(s), retrieves the current configuration, and stores it in the log file.

While the engine is running, the EIC32 will retrieve and log the operational parameters of the P-mag(s).

Should the pilot change the ignition configuration while the engine is running, the EIC32 will write those changes to the log file.

The duration of data stored is determined by the user configured sample rate. Duration of the data collected can range from one hour (at higher samples per second) up to three hours.

At the end of the preconfigured sample time range, the EIC32 will overwrite the log data while preserving the configuration information retrieved at EIC32 power up.

Each time the EIC32 is powered up, a new log file is created; starting with LOG1.CSV and incrementing the file number with each new file.

If the ignitions are not powered up when the EIC32 sends the initial query, a "**NO COMM with IGNITION**" message will be displayed and the configuration data will not be written to the log file.

Downloading Ignition Data Log

Access the **DATA LOGGER** screen from the **EIC MODE** screen by pressing **B4 DATA LOG**, as show on Figure XX.

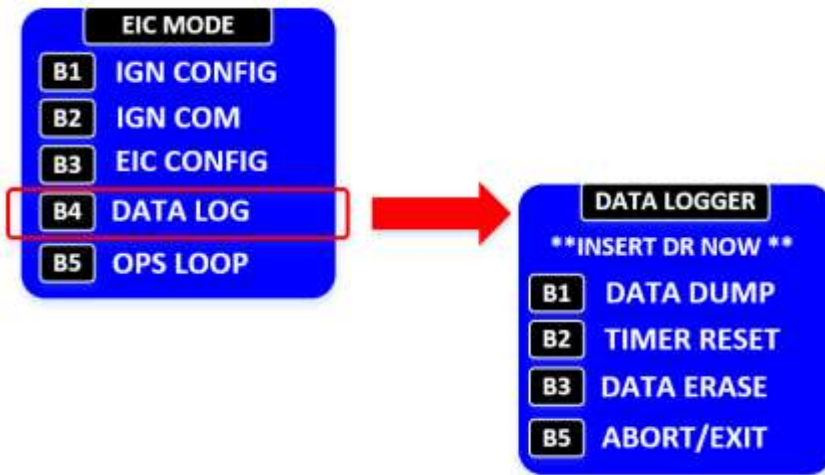


Figure XX: YYYYYYYYY

Insert a Micro USB drive into the USB port on the right side of the EIC32 as shown in Image XXX. USB 2.0 flash drives formatted to FAT32 with 512-byte sectors standards are recommended. However, other drive types and formats may work.



Image XXX

Press Button **B1 DATA DUMP**. The following screens will be displayed while the EIC32 is copying the data to a USB drive,

Figure XX.

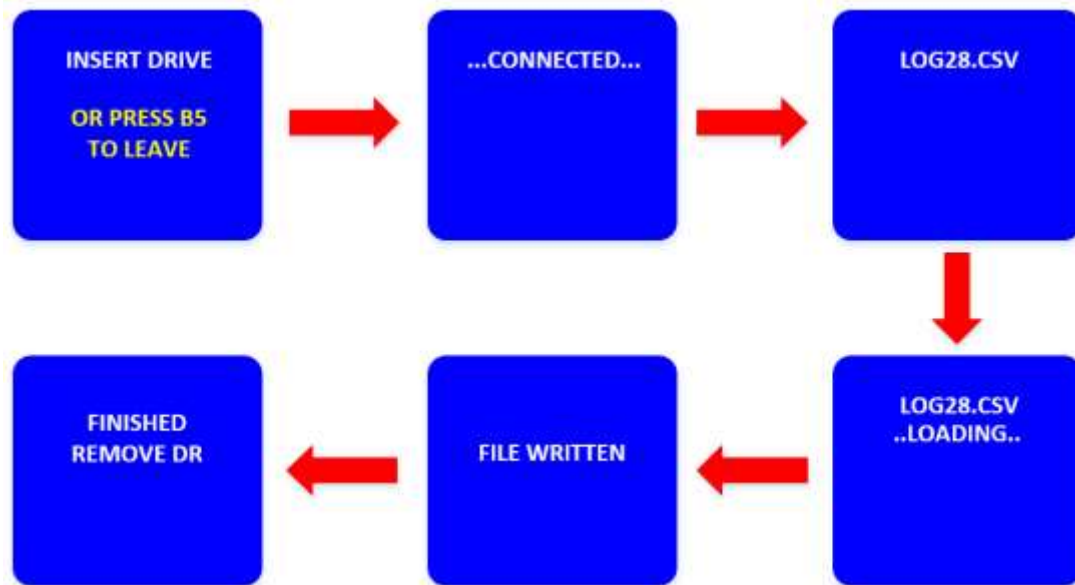


Figure XX: YYYYYYYYY

Data Log Format

The EIC32 EIC32 will automatically store ignition parameters in a .CSV spreadsheet format, as shown on Table XX.

Table XX: YYYYYYYYY

	A	B	C	D	E	F	G	H	I	J	K	L	M
1	File: LOG2.CSV; code: EIC3201LB 02062019 P1; SW Version: 107; Duration = 1 Hr												
2	TIME	Pmag	FWrev	STdly	LEDmode	Tmax	RPMmax	ADVmx	ADVshf	VOLTbus	PPR	SHAFdeg	Tcurr
3	1562	R	35	0	Sens	61	3328	33.6	-1.4	11.5	2	354	23
4	1564	L	35	0	Sens	65	2816	33.6	-1.4	11.5	2	353	23
5	Time	Pmag	TDA	RPM	AdvC	MAP	Volts	TempF	Coil1	Coil2			
6	6503	R	20	2260	25.2	43.4	7.7	111	56	52			
7	6504	L	20	2264	25.2	43.4	7.7	98	46	48			
8	6504	R	20	2270	25.2	43.4	7.7	105	52	56			
9	6505	L	21	2275	25.2	43.4	7.7	98	50	50			
10	6505	R	21	2268	25.2	43.4	7.7	111	60	50			
11	6506	L	21	2270	25.2	43.4	7.7	98	42	46			
12	6507	R	21	2280	25.2	43.4	7.7	111	56	58			
13	6507	L	21	2292	25.2	43.4	7.7	98	50	52			
14	6508	R	21	2284	25.2	43.4	7.7	111	56	58			
15	6508	L	21	2288	25.2	43.4	7.7	98	44	50			
16	6509	R	21	2281	25.2	43.4	7.7	111	56	60			
17	6510	L	21	2276	25.2	43.4	7.7	98	48	46			
18	6510	R	21	2268	25.2	43.4	7.7	111	56	54			
19	6511	L	21	2256	25.2	43.4	7.7	93	48	52			

The data is divided into two sections; Initial Configuration Header and Runtime Data.

Initial Configuration Header

Upon power-up, if the EIC32 can communicate with the P-mags, it will retrieve and log their settings at power up, as shown on Table xx.

Table XX: YYYYYYYY

	A	B	C	D	E	F	G	H	I	J	K	L	M
1	File: LOG2.CSV; code: EIC3201LB 02062019 P1; SW Version: 107; Duration = 1 Hr												
2	TIME	Pmag	FWrev	STdly	LEDmode	Tmax	RPMmax	ADVmx	ADVshf	VOLTbus	PPR	SHAFdeg	Tcurr
3	1562	R	35	0	Sens	61	3328	33.6	-1.4	11.5	2	354	23
4	1564	L	35	0	Sens	65	2816	33.6	-1.4	11.5	2	353	23

The first line will contain the log file name, EIC32 software version, and the logging duration setting.

The second row two lists the header label for the P-mag configuration followed two rows that contain the configurations of the right and left P-mags. A description of the labels is shown on Table XX.

Table XX: YYYYYYYY

Label	Description
Time	The timing mark is simply a counter as we do not tie into any clock or calendar source.
Pmag	Left or Right ignition, as connected to the EIC
STdly	Run Mode Start Delay. (RMSD)
LEDmode	Always set to "Sens".
Tmax	Maximum temperature, as reported by the P-mags.
RPMmax	Maximum RPM limit. If the P-mag sense this RPM, it will stop firing the ignition.
ADVmx	Maximum allowable advance.
ADVshf	The advance shift. (0 equates to 26.2° Before TDC)
VOLTbus	The internal P-mag voltage.
PPR	Tachometer signal pulses per revolution.
SHAFdeg	The current degrees, relative to TDC for both ignitions

Runtime Data

After the P-mag powers up and the engine is running, the EIC32 will log all the following data once per second (1 Hz).

The fifth line of the .CSV file will contain the column header followed by the "streaming data". Starting at row six (6) the EIC32 will begin logging the P-mag data, one row per second, as shown on Table XX and XX.

Table XX: YYYYYYYY

	A	B	C	D	E	F	G	H	I	J
5	Time	Pmag	TDA	RPM	AdvC	MAP	Volts	TempF	Coil1	Coil2
6	6503 R		20	2260	25.2	43.4	7.7	111	56	52
7	6504 L		20	2264	25.2	43.4	7.7	98	46	48
8	6504 R		20	2270	25.2	43.4	7.7	105	52	56
9	6505 L		21	2275	25.2	43.4	7.7	98	50	50
10	6505 R		21	2268	25.2	43.4	7.7	111	60	50
11	6506 L		21	2270	25.2	43.4	7.7	98	42	46
12	6507 R		21	2280	25.2	43.4	7.7	111	56	58
13	6507 L		21	2292	25.2	43.4	7.7	98	50	52
14	6508 R		21	2284	25.2	43.4	7.7	111	56	58
15	6508 L		21	2288	25.2	43.4	7.7	98	44	50

Table XX: YYYYYYYY

Label	Description
Time	The EIC32 is not tied to a clock source so it is unable to provide a time of day time stamp. However, it does provide a count every second, which is stored in column A, under the "Time" header.
Pmag	Pmag: left (L) or right (R), depending on which P-mag is reporting.
TDA	Timing Divergence Angle, in whole numbers. Although the EIC32 only displays timing divergences greater than 2.0 degrees, it will log the actual values. i.e.: A value of 19 is actually 1.90 timing difference between the two ignitions.
RPM	Current tach RPM.
AdvC	Current firing angle, as reported by the P-mags.
MAP	Manifold number, as reported by the P-mags.
Volts	Voltage as reported by the P-mags.
TempF	Current temperature in degrees Fahrenheit (or Celsius), as reported by the P-mags.
Coil1	Coil pack data as reported by the P-mag.
Coil2	Coil pack data as reported by the P-mag set to a 100 point scale. This is a measure of the current discharge through the coil pack, plug wire, and sparkplug.

Log Time

The EIC32 can log data from one to four hours. The by extending the length of time before the EIC32 starts to overwrite the data reduces the sample rate of data logged.



Pressing button **B2 LOG TIME** will cycle the log timer from one to four.

When the desired log time is displayed in the window, press button **B5 ABORT/EXIT** to close the log time window and save the displayed setting.

Data Erase

Reset Data Tracking Timer

The EIC32 does not have an internal clock, thus we have set a countdown timer that is written to the log file for future reference.

Pressing **B2-TIMER RSET** resets the timer to zero (0).

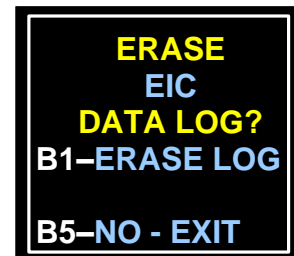
Delete Data Tracking Logs

This option will delete the data logs stored on the EIC32.

Pressing the **B3-DATA ERASE** button will display the following screen. Press **B1-ERASE LOG** to delete all log files residing on the EIC32. Press **B5-NO - EXIT** to abort the erase operation and return to the **DATA LOGGER** screen.

Exit Data Log Screen

Press **B5-ABORT/ EXIT** to return to the **EIC MODE** screen.



Screen Flow

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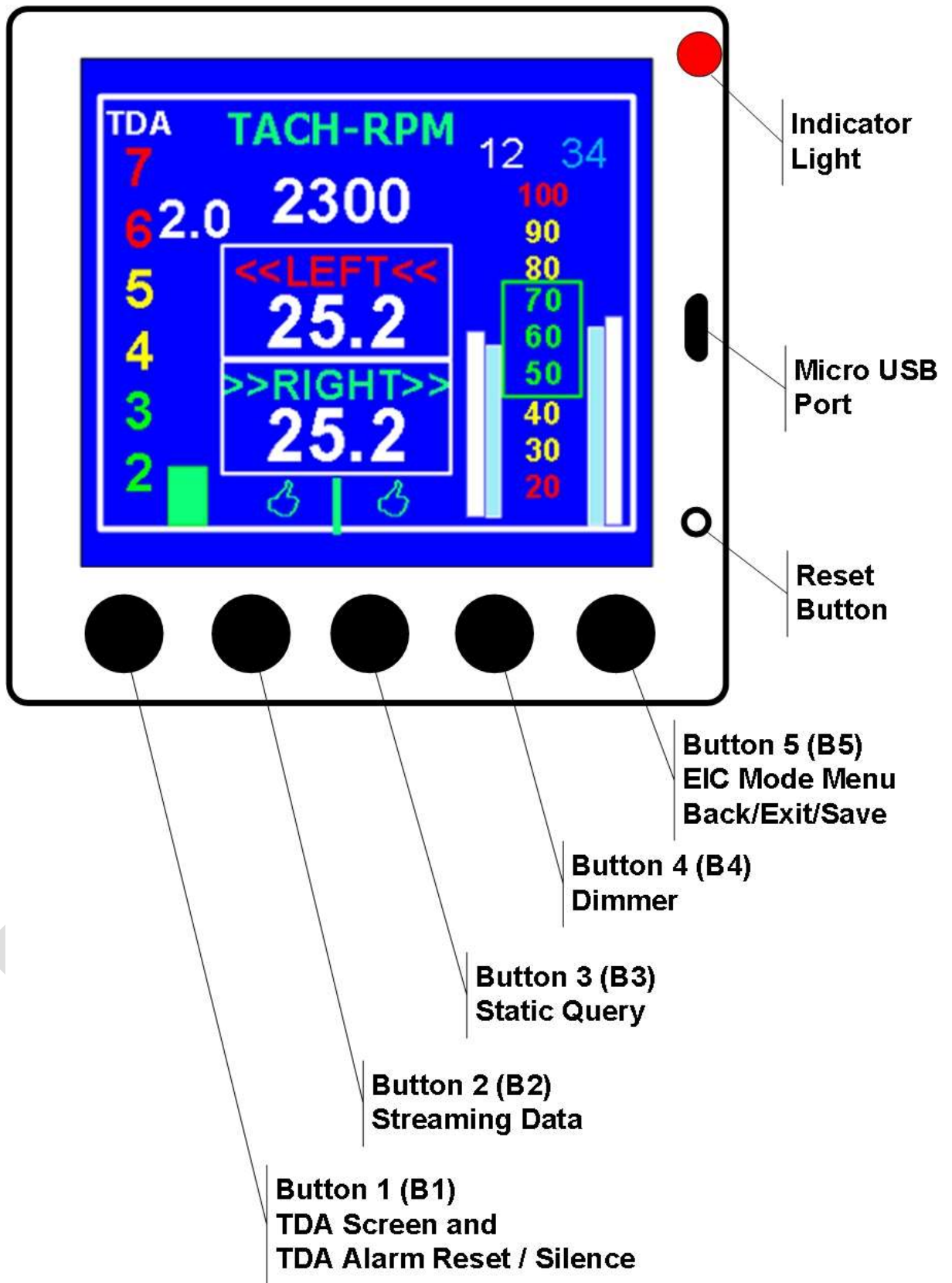


Figure XX: EIC32

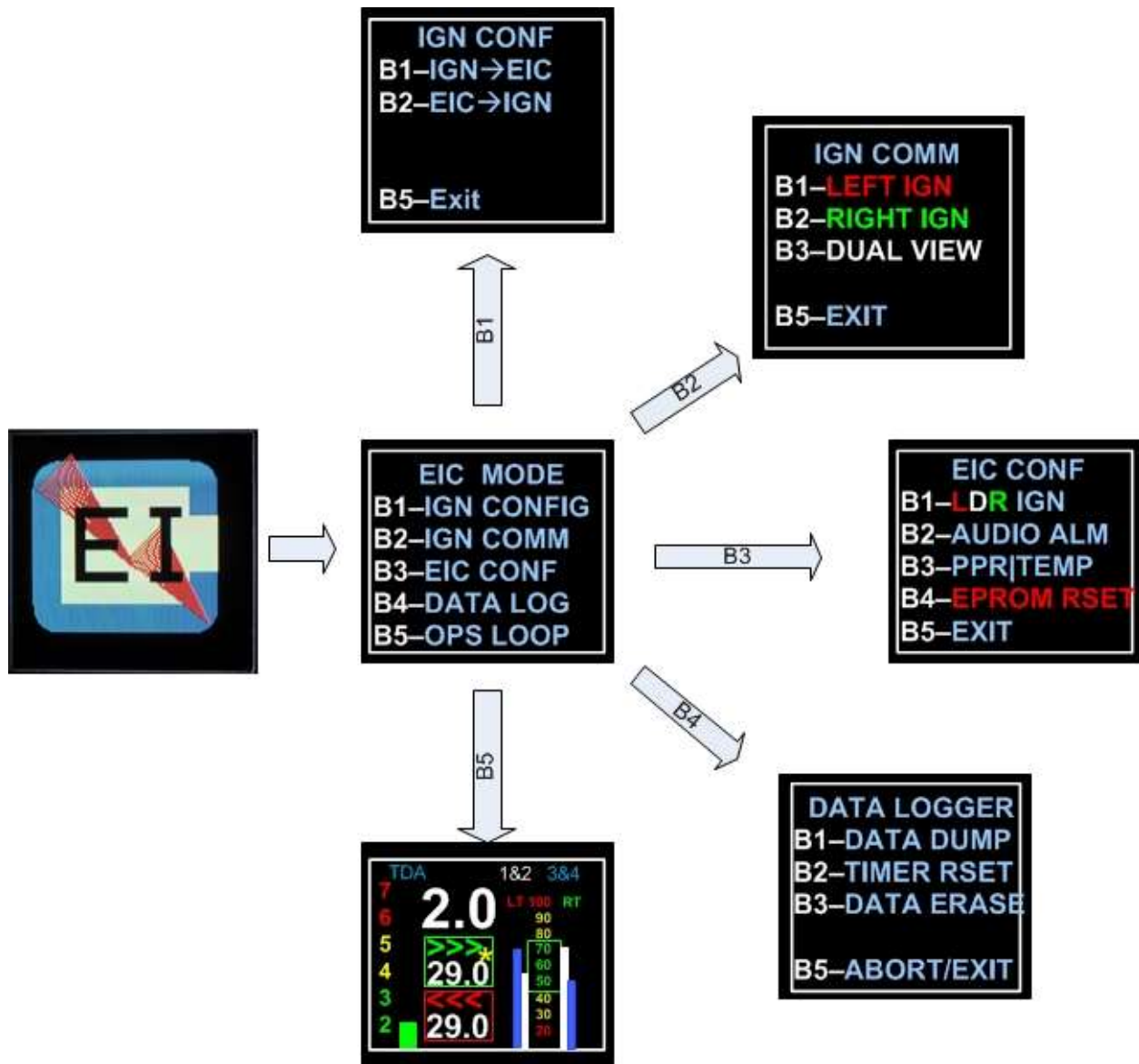


Figure XX: Top Menu – EIC MODE

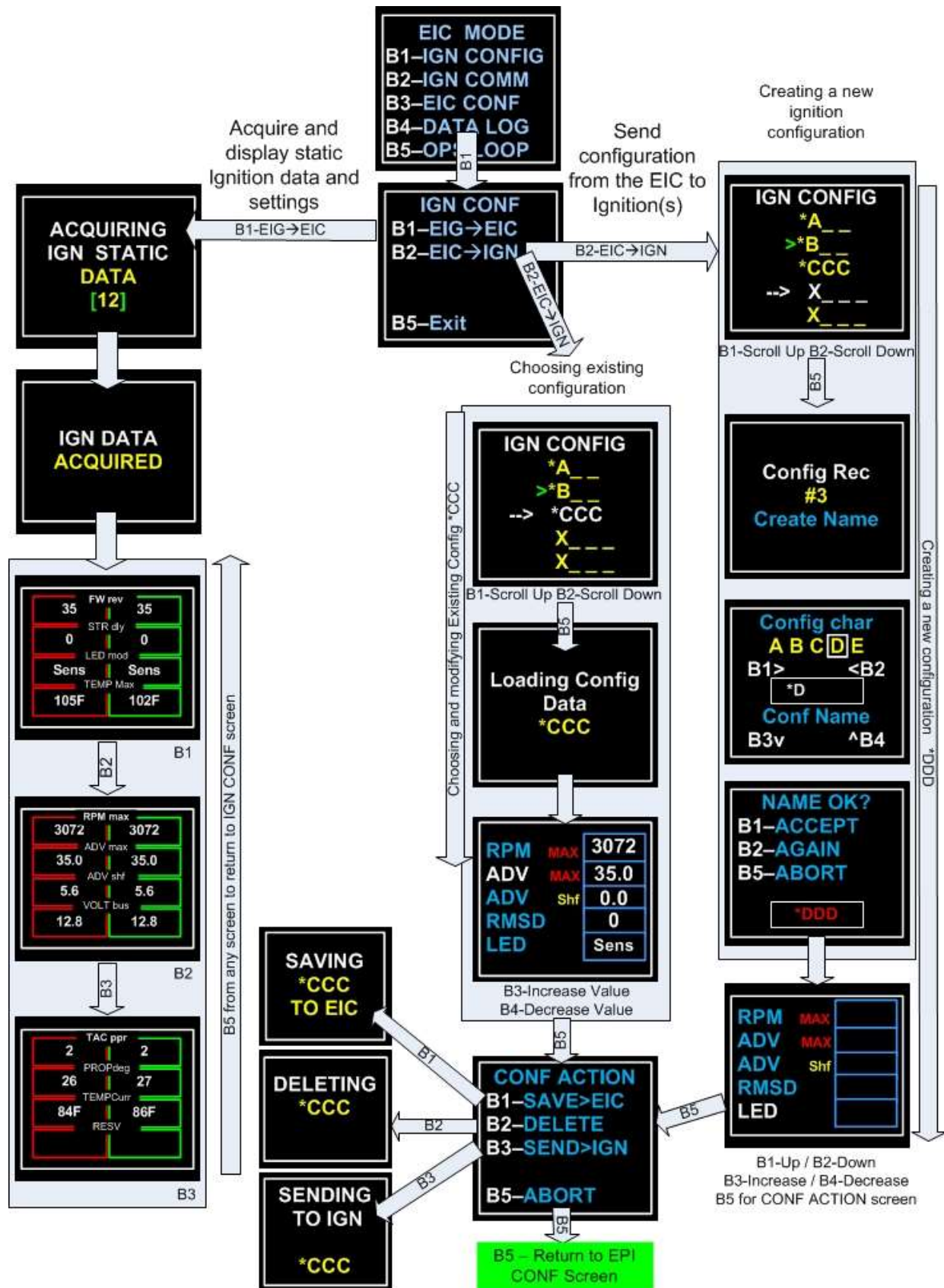


Figure XX: Ignition Configuration Menu

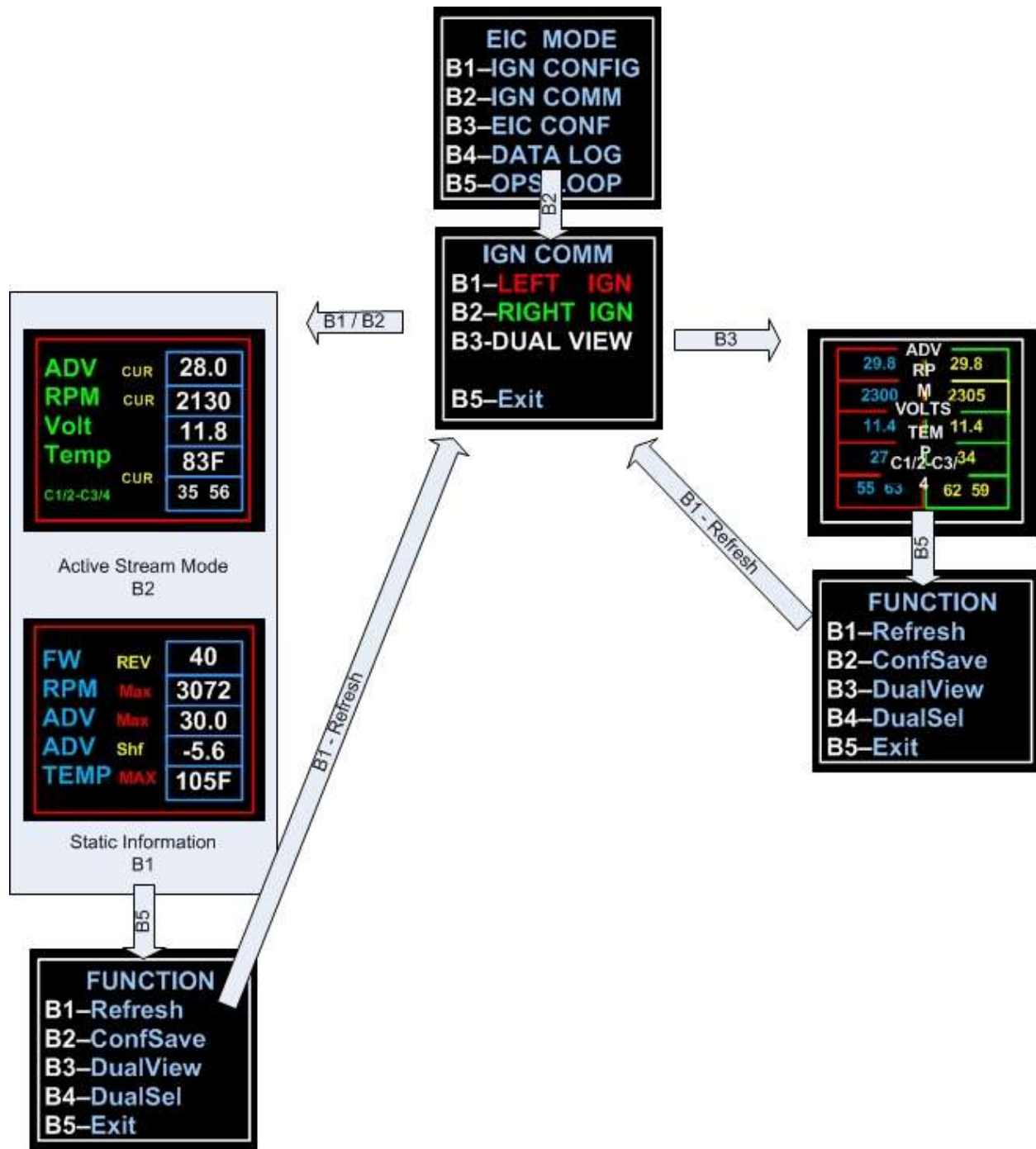


Figure XX: Ignition Communication Menu

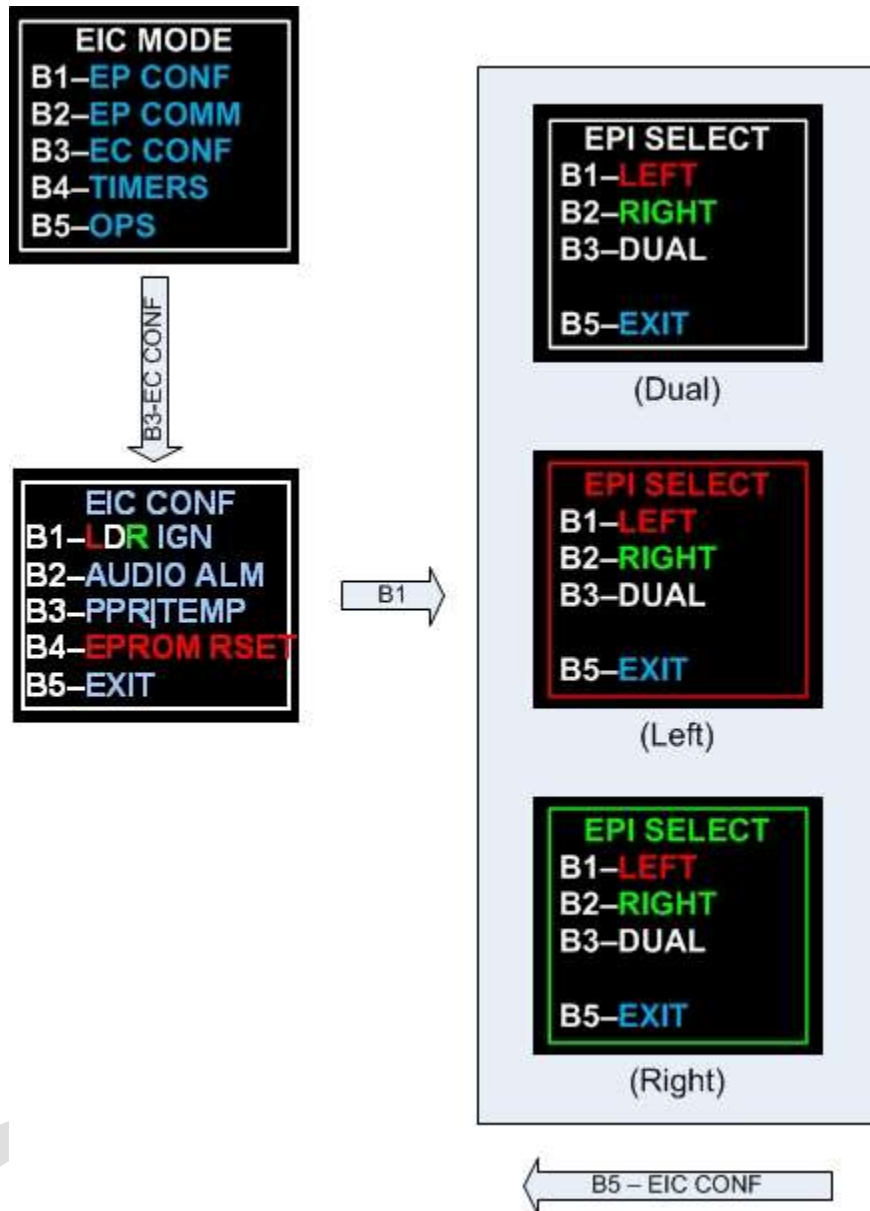


Figure XX: Left, Right, or Dual Menu



Figure XX: Data Log Management Menu

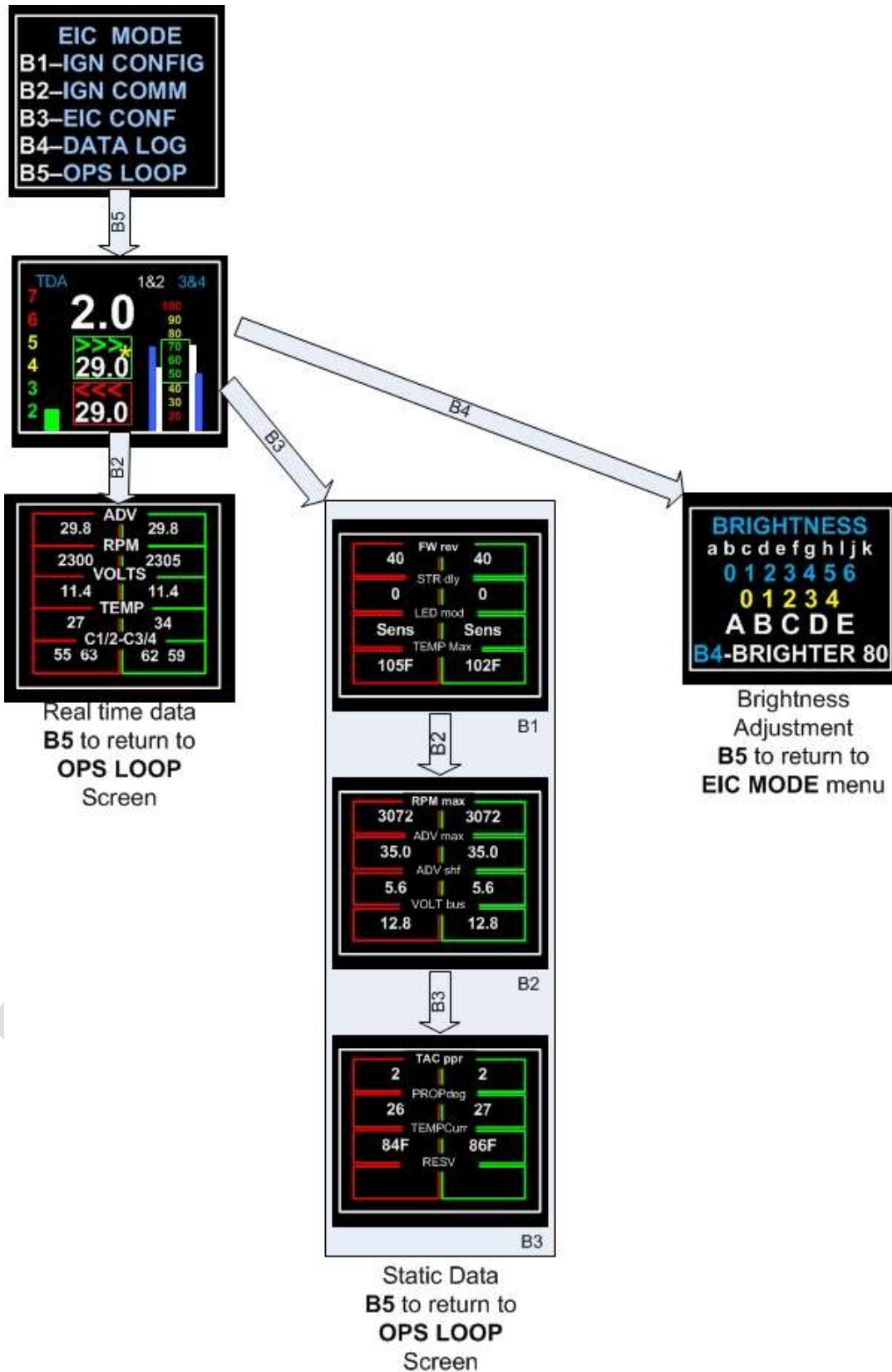


Figure XX: Operations Screen

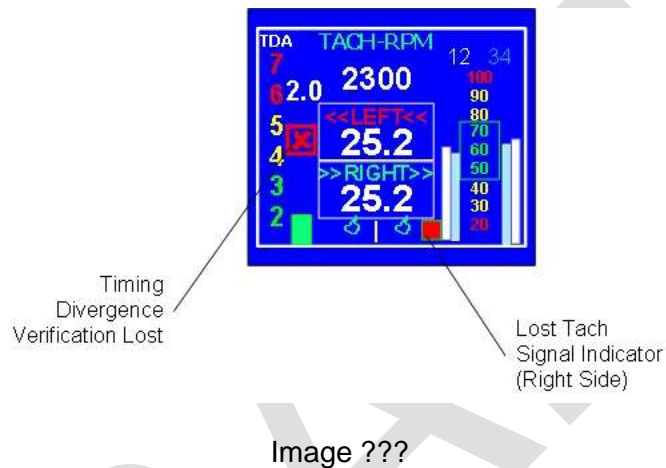
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Appendix A – Operational Anomalies

Lost Tachometer Signal

Should the EIC32 lose communication with the tachometer signal from either the left or right ignition after engine start, it will display a red box below the firing angle window. A red box on the left of center indicates the tachometer signal from the left ignition is lost and a red box to the right of center indicates the signal from the right ignition is lost, as depicted in Image ???, below.

When a tachometer signal is lost the EIC32 the Timing



Prestart EIC32 Display

Lost Tach Signal Indicator

Prior to starting the engine, the EIC32 will TDA screen will not display a timing divergence number or bar graph or coil pack data bar graphs. It will display a red X box in place of the TDA bar graph and two red boxes below the lower firing angle box indicating the EIC32 is not receiving tachometer signals from both P-mags.

As soon as the engine starts, the red X box and the two lost tach signal boxes will disappear. The timing difference number and bar graph will be displayed as will the coil pack data bar graphs.

It is normal and expected that a TDA value of approximately 2.5 degrees will be displayed and decrease to 2.0 degrees.

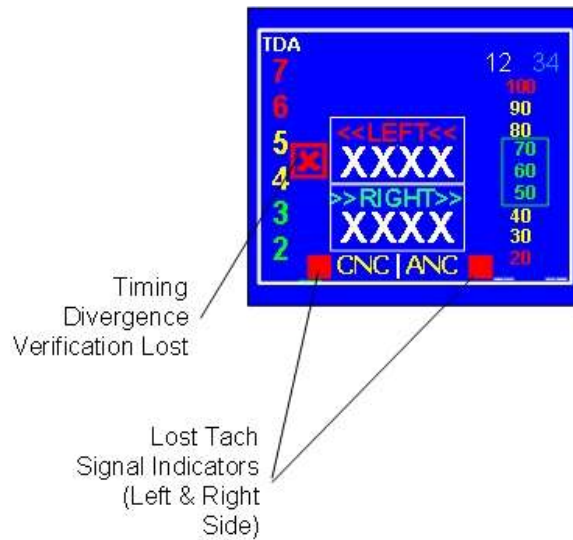


Image: ???

Prestart Configuration and Shaft Angle Check

Prior to engine start, the EIC32 will query the P-mag ignitions to verify the configurations of both ignitions are set the same and that the firing angles of both ignitions are within two degrees of each other. Image ???

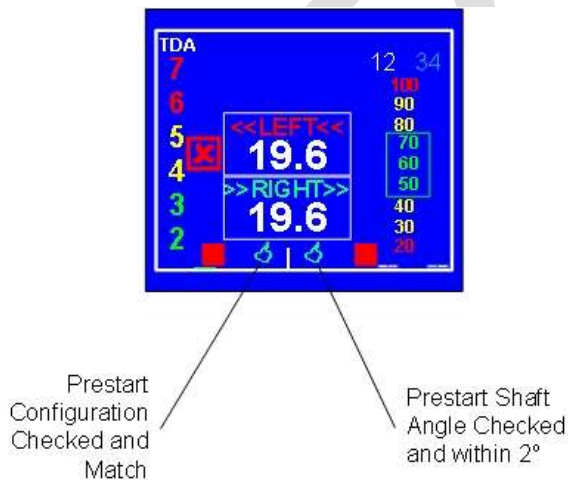


Image ???

Should the ignitions not have power applied to them when the EIC32 is powered up the EIC32 will not be able to perform its prestart checks and a Configuration Not Checked (CNC) or Angle Not Checked (ANC) notation will be displayed in place of the thumbs up icon.

Should the EIC32 be rebooted after the engine is running, the EIC32 cannot perform an angle check, thus the ANC message will be displayed in place of the right thumbs up icon. Image ???

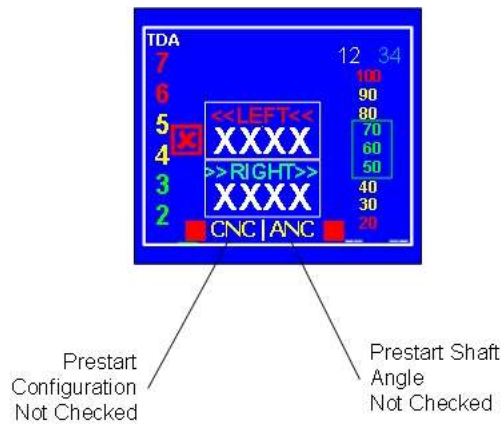


Image ???

Appendix B



Installation & Configuration

Installation

The EIC32 display module is a self-contained unit that fits in a standard aviation 2-1/4" (5.715 cm) hole with a four-hole screw/bolt pattern. The display bezel is 3" (77 cm) wide, 2-5/8" (67 cm) high, and 5-3/5" (14.2 cm) thick. Depth of the instrument is 2" (5.2 cm). When using a standard two row DB15 plug and "shell", the total installed depth required is 3 1/4" (8.3 cm).

Installed weight is less than 3.5 ounces, not counting wire and connector.

Locate a suitable location that does not interfere with any aircraft function such as, but not limited to, control operation, throttle, mixture, propeller, carburetor heat controls and more. It is up to you, as the installer to determine a suitable and safe mounting location for the EIC32.

CAD drawings

Image ????: Front of case. Back of case is centered on the round protrusion.

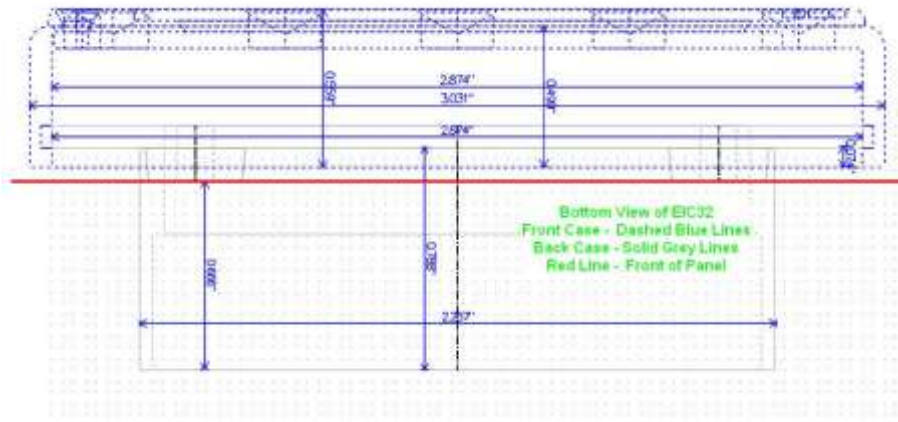
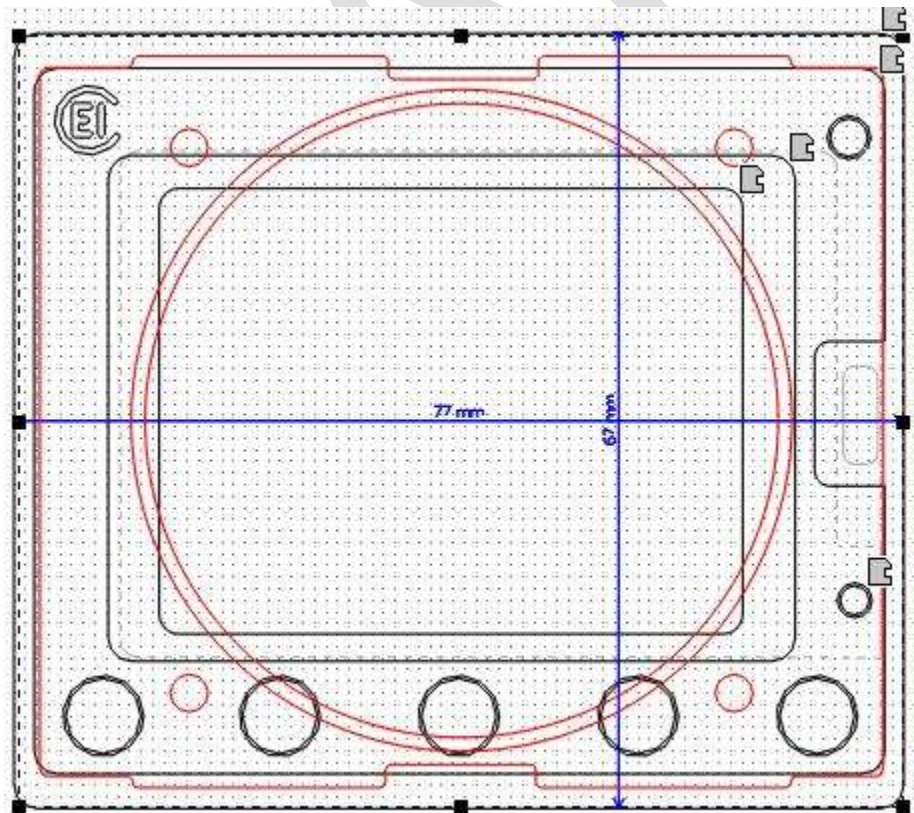


Image ????: Profile view

Wiring

Power to the EIC32 should be provided independent of either ignition. This is



required so the EIC32 unit will continue to function and provide adequate notification(s) should the electronic ignition's power source fail for any reason.

The following table and diagram indicate the proper wiring configuration for connecting the EIC32 to P-mag ignitions.

The power and communication requirements for the EIC32 unit are minimal, thus 22 AWG wire for all connections will be adequate.

The EIC32 requires a 12-volt power feed, protected by a 3-amp circuit breaker or fuse, minimum. The EIC32 can be wired in conjunction with an EFIS and should power up when the aircraft's Master Switch is turned on.

Ground to the EIC32 is provided through the ignition(s). This was designed to eliminate the potential of ground loop interference.

The wiring harness must terminate with a two row, 15 Pin "D-Sub", Male connector, with a hood and appropriate hardware to secure the connector to the EIC32.

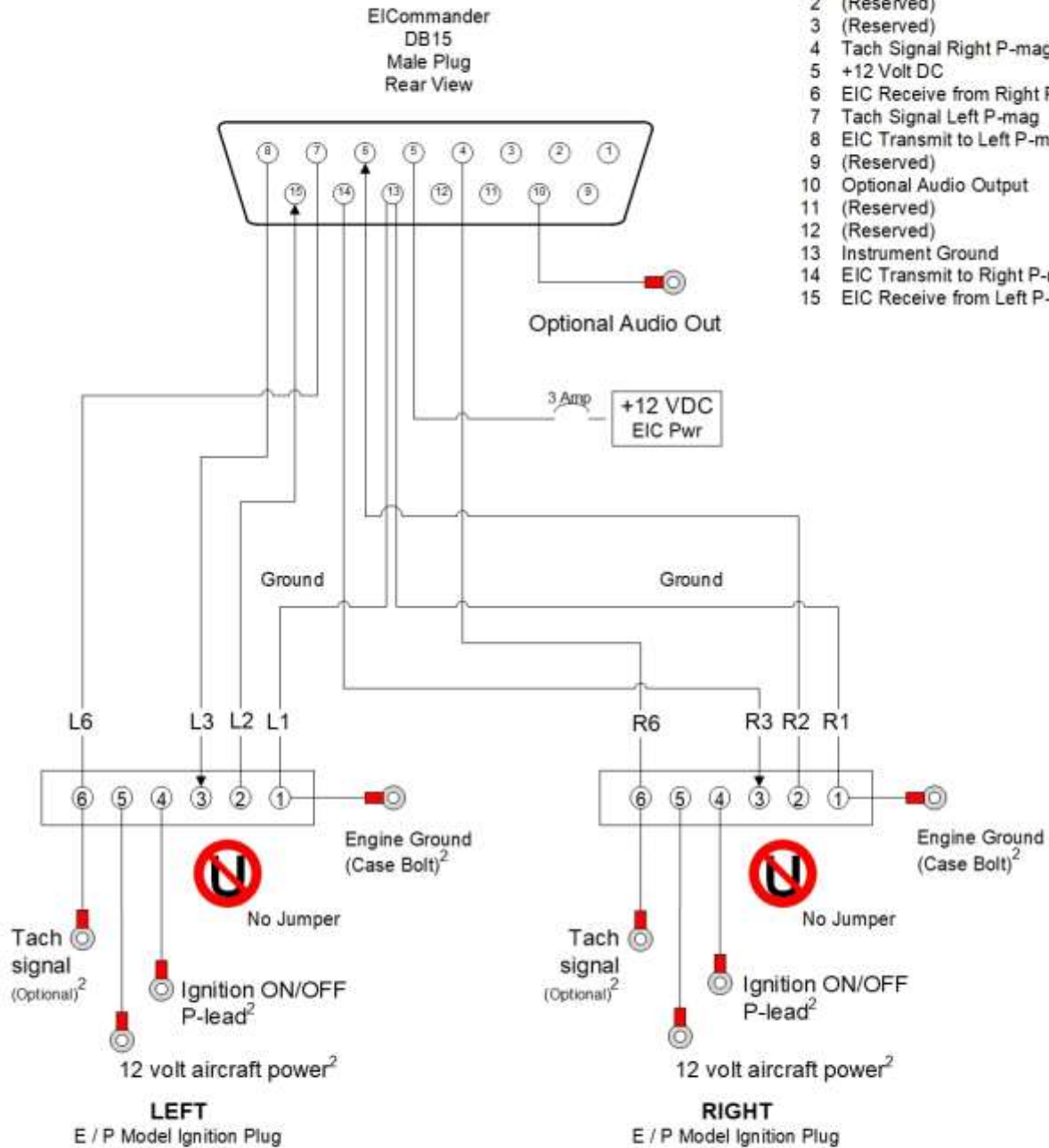
DRAFT

Wiring configuration

EICommander Wiring Schematic Model V2

EICommander Pin-out

DB15 Pin	EIC Function
1	(Reserved)
2	(Reserved)
3	(Reserved)
4	Tach Signal Right P-mag
5	+12 Volt DC
6	EIC Receive from Right P-mag
7	Tach Signal Left P-mag
8	EIC Transmit to Left P-mag
9	(Reserved)
10	Optional Audio Output
11	(Reserved)
12	(Reserved)
13	Instrument Ground
14	EIC Transmit to Right P-mag
15	EIC Receive from Left P-mag



Notes:

1. When using only one P-mag, connect the tach signal to EICommander pin 7.
2. See E-mag Electronic Ignition manual for ignition wiring details. The ignition should be wired as described in the ignition's installation manual.

Figure ???

Wiring Check List

✓	DB15 Male Pin#	Function
<input type="checkbox"/>	1	(Reserved)
<input type="checkbox"/>	2	(Reserved)
<input type="checkbox"/>	3	(Reserved)
<input type="checkbox"/>	4	Tach Signal Right P-mag
<input type="checkbox"/>	5	+12 Volt DC
<input type="checkbox"/>	6	EIC Receive from Right P-mag
<input type="checkbox"/>	7	Tach Signal Left P-mag
<input type="checkbox"/>	8	EIC Transmit to Left P-mag
<input type="checkbox"/>	9	(Reserved)
<input type="checkbox"/>	10	Optional Audio Output
<input type="checkbox"/>	11	(Reserved)
<input type="checkbox"/>	12	(Reserved)
<input type="checkbox"/>	13	Instrument Ground
<input type="checkbox"/>	14	EIC Transmit to Right P-mag
<input type="checkbox"/>	15	EIC Receive from Left P-mag

Figure ???

P-mag Connector Reference:

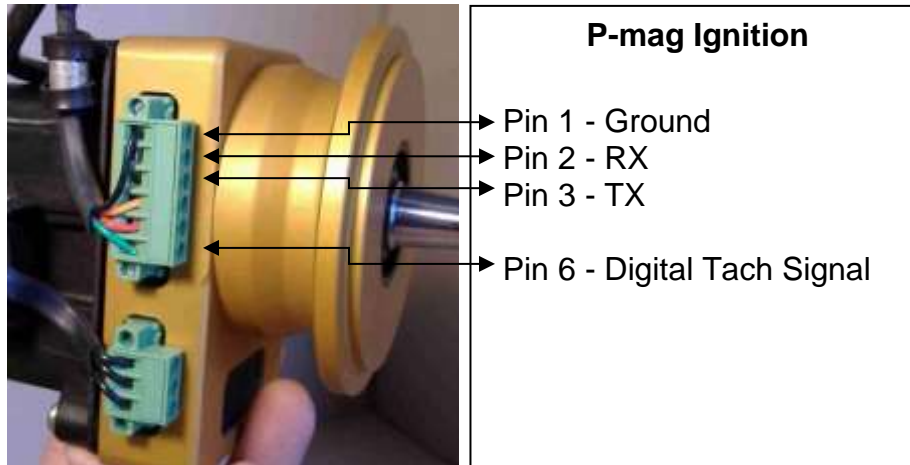


Figure ???

Jumper – Pins 2 & 3

When installing the EIC32, remove and discard the jumper between P-mag pins 2 & 3, if installed.

Connecting the EIC32 to the Wiring Harness

After the wiring is completed and verified, insert the 15 position Sub D plug into the back of the EIC32 and secure it.

Communication Configuration of the EIC32

It is important to correctly configure the EIC32 prior to use. The EIC32 must be configured for dual or single P-mag ignition installation and if single, the location (left or right) of the installed P-mag ignition.

To configure the EIC32, follow the steps listed below:

1. Engine shut down and secured. (Use caution to make sure the propeller is not turned during while configuring the EIC32, the ignition may be “hot”.)
2. Ground the P-mag(s) P-lead.
3. Apply power to the P-mag(s).
4. Apply power to the EIC32 (The EIC32 Logo Screen will be displayed.)
5. Press button **B5** to display the **EIC MODE** screen.
6. Press button **B3 EIC CONF** to display the EIC32 configuration screen. This screen is used to configure the EIC32, not the electronic ignition.
7. Press button **B1 LDR IGNITION**, to select Left, Dual, or Right ignitions(s).
8. Select the location of the P-mag ignition (Left, Right, or Both). Color coding is used throughout the EIC32 screens to signify which ignition is active. **RED** for the left ignition, **GREEN** for the right, and **WHITE**, if two units are installed:
 - a. **B1 LEFT**
 - b. **B2 RIGHT**

c. **B3 DUAL**

The EIC32 will signify which channel (left, right, or both) it is communicating with by displaying a **RED**, **GREEN**, or **WHITE** box around the periphery of the active screen. In addition, the color of the title will change to match the screen outline.

9. Press button **B5 EXIT** to save and exit the EIC Configuration screen.

Notes: a. In a dual P-mag installation, there may be times when communications with a single ignition is desired. Return to this screen and select either **B1-LEFT** or **B2-RIGHT** any time. When configured for single ignition operation, data will be displayed on the side of the screen matching the ignition (left or right) that the EIC32 is communicating with. The appropriate side will display data from the selected ignition and the other side will remain blank, indicating no data (no communication) with the second ignition. If communicating with both ignitions, then data from both ignitions will be displayed simultaneously.

When operating in single ignition mode, the TDA warning is disabled.

- b. When the EIC32 has been configured for dual P-mags, there are several places within the operational menus where the selection of left or right ignition is required. For example, if the engine is running, you are permitted to make On-The-Fly (OTF) changes to the parameters of only one ignition at a time for safety reasons. Therefore, the program will ask you to select either the left or right ignition. After adjusting one ignition, the other may be selected and modified or the active configuration may be saved and pushed to both ignitions simultaneously.

Screen Maintenance

Protective Cover

The EIC32 is shipped with a removable plastic cover on the display. This is to protect the screen during shipment.

After installation, remove the cover for best viewing by grasping the green tab and gently pulling it to the opposite corner of the display. It is best to pull the protective cover off at an angle which parallels the screen as best as possible.

Screen Cleaning

To remove fingerprints, dust, etc. from the display use Scotch brand Mending Tape, No 810, or equivalent.

Lightly apply the tape to the screen and gently pull one end in such a way as to produce the smallest angle possible. A few applications may be required.

DO NOT use liquid cleaners on the screen as they may damage the display.

Performing Software Updates

Software UpdatesP

As shipped, your EIC32 should have the latest software available. However, should new software release become available, it will be available for downloading on our website, WWW.EICOMMANDER.COM or by contacting EICommander at info@eicommander.com.

Performing a software update on the EIC32 is a quick and easy process. However, caution must be exercised when performing the updates so as not to negatively impact the EIC32 or the electronic ignitions.

CAUTION

When updating the EIC32 the electronic ignitions should remain powered off to eliminate the possibility of corruption during the software update process.

When updating the EIC32, the engine should not be running.

Requirements

The EIC32 requires the following:


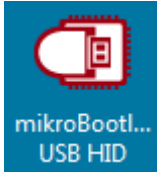
- Windows 7 or higher based PC.

(Early versions of the EIC32 must use a Windows 7 computer to perform updates. If the software version of your EIC32 does not end in W10, please contact EICommander.)

- Micro B USB cable (Some cell phone charger cables may work.)
- “mikroBootloader USB HID” bootloader program
- .HEX software update file

Loading the Software Updates

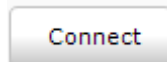
The steps listed below must be followed exactly. Updating the EIC32 will not overwrite existing settings within the EIC32 or on your electronic ignitions.

<input checked="" type="checkbox"/> Step	Description	Notes
<input type="checkbox"/> 1	Contact EICommander at info@ecommander.com for a free copy of the Bootloader program and copy of the current software release.	
<input type="checkbox"/> 2	Install the “mikroBootloader USB HID” bootloader program on your computer.	
<input type="checkbox"/> 3	Save the current software release on your computer in a convenient and easy to remember directory.	
<input type="checkbox"/> 4	Connect the micro B USB cable to the port on the right side of the EIC32’s front bezel with the USB logo facing left. Plug the other end to a USB port on your computer.	
<input type="checkbox"/> 5	Start the “mikroBootloader USB HID” program.	
	mikroBootloader Icon:	
		

mikroBootloader Screen:



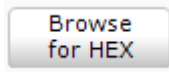
- 7 Power up the EIC32 or press the “Reset” button using a ballpoint pen. When the “Device” and “MCU Type” information boxes on the “mikroBootloader” program are populated, click:



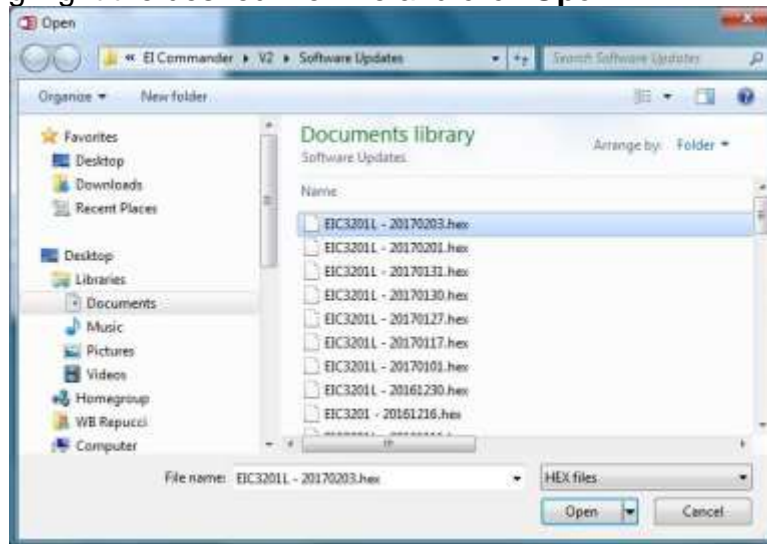
You may have to repeat step seven a few times until you see the connect message. Note the “Connect” button will change to “Disconnect”, as depicted in this image:



- 8 After the bootloader program connects to the EIC32, click the “Browse for Hex” button and select the file saved in step three, above.



A standard Windows file open dialog box will be displayed. Highlight the desired .hex file and click **Open**.

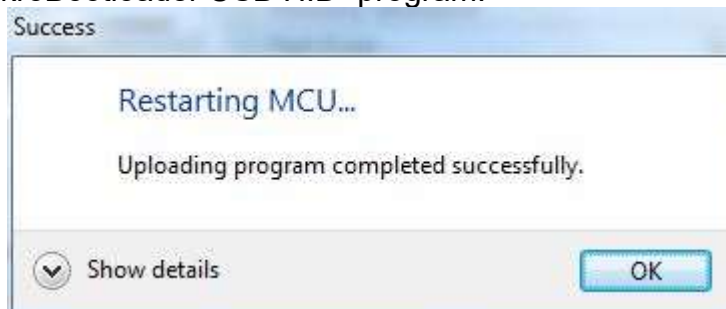


- 9 Click on “Begin Uploading”.



The upload takes approximately a minute and a half to complete.

- 10 When the “mikroBootloader USB HID” program is finished uploading the file, the following window will be displayed. Click on **OK** and you will be returned to the “mikroBootloader USB HID” program.



Note the messages “Completed successfully.”, “Disconnected.”, “Reset...”, and “Reset device to reenter bootloader mode.”



- 11 Close the “mikroBootloader USB HID” program.
- 12 Disconnect the USB cable from the EIC32.
- 13 Verify the EIC32 is operating correctly by powering up the electronic ignition(s), the EIC32, and retrieve the static data from the Electronic ignition(s).

Note: If the “mikroBootloader” PC application cannot connect to the EI Commander, the mikroBootloader’s “Device” window will not display “EIC3201”, indicating it is possible that the PC’s USB port is “hung”. USB ports can be reset by opening the Windows Control Panel, Device Manager, Universal Serial Bus controllers, right click on the desired USB port, click on “Disable Device”, right click on the desired USB port, click on “Enable Device”, and try connecting to the EIC32 with the mikroBootloader.

Trouble Shooting

NO COMM WITH IGN Verify the ignition(s) are wired correctly and has power.

In Dual mode but only displaying data from one IGN Verify dual mode configuration.
Verify the ignition is powered up.
Verify wiring.
No error message is displayed if one ignition is powered down.

No Communication with IGN Verify wiring.
Verify configuration (left, right, dual)

Lost communication with one IGN Verify the ignition is powered up.
Verify the ignition is not grounded.
Display the dual static screen, see [B1-EP CONF](#) to reset the ignition.

TDA Alarm

Possible Causes:

1. Changing the timing of one ignition by more than six (6) degrees by using the "On-The-Fly" change screen. (Probably most frequent cause.)
2. Different timing configurations sent to the ignition(s).
3. One ignition's manifold pressure tube is leaking or not connected - causing divergence due to different manifold pressure received by the two ignitions.
4. One TACH signal lost for any reason (broken wire or loose wire, etc.). The EIC32 will display a small red box below the firing angle window indicating if it is the left or right tach signal that is lost. The EIC32 will also display a red X box over the Timing Divergence bar graph in the event a tach signal is lost.
5. Ignition TDC position is not set to the same prop angle for both ignitions.
If both ignition's TDC do not match, the most likely cause is they were never set or set incorrectly. However, it is possible that one ignition is defective.
6. Possible wear condition on one ignition's timing gear.
Remove both ignitions and inspect gear for wear. Replace with a PMA'ed gear and reinstall ignition according to the manufacture's recommendations.

7. One ignition has a malfunction and has lost its timing mark.

Coil Data

Above approximately 2000 RPM The ignition stops reporting coil data and the four coil data bar graphs will drop to zero. Perform coil check below 1800 RPM.

Bi-Polar IGN Configuration

If the ignitions are set to different configurations, one set to configuration A and one set to B, the TDA alarm will be activated. Send identical configurations to both ignitions.

DRAFT

Glossary / Definitions

*	EIComander status indicator.
ADV	The current degrees of advance, as reported by the ignition(s).
AdvC	The current degrees of advance, as reported by the ignition(s). (Log file header)
ADV CUR	The current degrees of advance, as reported by the ignition(s).
ADV MAX	The maximum allowable timing advance. See the E-mag Ignition manual for details.
ADV Shf	The maximum degrees of shift, up or down, assigned to the timing advance curve, as reported by the ignition(s).
ANC	Angle Not Checked
C1/2-C3/4	Coil pack status at reported by the ignition(s). C1/2 – Coil pack for cylinders 1 and 2. C3/4 – Coil pack for cylinders 3 and 4.
Coil1	Reference to P-mag coil pack 1
Coil2	Reference to P-mag coil pack 2
COMPARISON	Identifier for the new vs. old or prior configuration.
EIC CONF	Configure the EIC32.
EICAD	A program provided by E-MAG Ignitions for monitoring and tuning E and P model electronic ignitions.
EIC→IGN	Send information from the EIC32 to the selected ignition(s).
E-MAG Ignitions	The manufacture of E and P model electronic ignitions. See http://www.emagair.com/Index.htm
FW REV	Firmware revision, as reported by the ignition(s).

IGN	Reference to either E or P model electronic E-MAG Ignitions.
IGN COMM	Communicate with the ignition(s). Retrieve and send information to select ignition(s).
IGN CONF	Configure the ignition(s).
IGN→EIC	Retrieve information from the ignition(s) to the EIC32.
LED MOD or LEDmode	LED Mode, as reported by the ignition(s). Controls the display of the LED light used for timing the P-mags.
MAP	Manifold Pressure
OTF	On-The-Fly changes. Allows for changing the timing of one ignition while the engine is running.
P-Mag	Self-powering electronic ignition produced by Emag Electronic Ignition (WWW.EMAGAIR.COM)
PPR	Pulses per Revolutions. Used by tachometers to calculate the engine RPM's.
PROP DEG	Current position of the crankshaft relative to TDC, as reported by the ignition(s).
RMSD	Run Mode Start Delay. Instructs the ignition to fire the sparkplugs after "X" number of crankshaft revolutions.
RPM	Revolutions per Minute. Used to measure engine speed.
RPM MAX	Maximum allowable RPM, as reported by the ignition(s). Also known as the "rev limiter".
RPM CUR	The current RPM, as reported by the ignition(s).
SHAFdeg	The angle of the crankshaft relative to the P-mag's Top Dead Center setting.
STR DLY or STdly	Run Mode Start Delay, as reported by the ignition(s).

TAC PPR	Tachometer Pulses Per Revolution, as reported by the ignition(s).
TDA	Timing Divergence Alarm. The timing difference, in degrees, detected by the EIC32. Displayed as a whole number in the log file. Ex: 21 = 2.1 degrees.
TDC	Top Dead Center. The position of an internal combustion's cranks shaft when cylinder #1 is at the top its compression stroke.
TDI	Timing Divergence Information screen
TEMP CUR or Tcurr or TempF or TempC	Ignition internal temperature as reported by the P-mags in either degrees Fahrenheit or Celsius.
TEMP MAX or Tmax	Maximum temperature recorded, as reported by the ignition(s).
Time	The second counter since the EIC32 started.
V	Volts
Volt or Volts or VOLTbus	Current voltage, as reported by the ignition(s).

Screen Definitions



Figure ???: Logo screen: EIC32 logo. Displayed upon power up or reset.

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Figure ???: Version and Credit screen: Displays the current software version and date.



Figure ???: Pause for P-mag Timing Setup screen: Pressing any button while this screen is displayed pauses the EIC32 initialization processes and allows for the setting the P-mag Top Dead Center position by blowing in the manifold pressure tube, as described in the P-mag Installation guide.

Page: ???



Figure ???: Acquiring Ignition Static Data and Crank Angle: The EIC32 is retrieving the current configuration data for both P-mags and their current shaft angle. This information is used for comparison prior to engine start.

Page: ???



Figure ???: Acquiring Static Data: The EIC32 is retrieving the current configuration data for both P-mags. This information is used for comparison prior to engine start and to write to the log file.

Page: ???

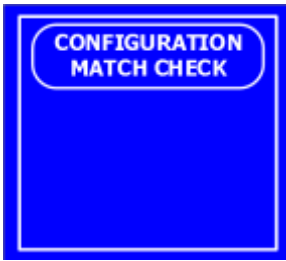


Figure ???: Configuration Match Check: The EIC32 is comparing the configuration of both ignitions and has determined they are configured the same.

Page: ???



Figure ???: Configuration Match: The “thumbs up” symbol indicates the ignitions are configured the same and it is OK to proceed with engine start.

Page: ???

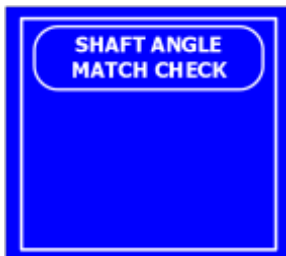


Figure ???: Shaft Angle Match Check: The EIC32 is comparing the shaft angle of both ignitions to verify they are within two (2) degrees of each other.

Page: ???



Figure ???: Shaft Angle Match: The “thumbs up” symbol indicates the ignition shaft angles are within two (2) degrees of one and other and it is OK to proceed with engine start.

Page: ???



Figure ???: Audio Alarm Check: The EIC32 sounds the preconfigured audio alarm to verify it is functioning properly. If no tone is heard, investigate for a misconfiguration or broke wire audio wire.

Page: ???



Figure ???: Eicommander Initialization Complete: The EIC32 has completed all of its prestart checks.

Page: ???



Figure ???: Acquiring TDA Data: The EIC32 is acquiring the final parcel of data required prior to displaying the TDI screen

Page: ???



Figure ???: Configuration Mismatch screen: The EIC32 displays where differences in the two configurations were identified. In this example, the RPM rev limiter, the maximum advance, and advance shift were all different. It is recommended you confirm the verification of both ignitions and send the offending ignition the proper configuration. This is commonly found after an ignition is reinstalled after it has been returned from Emag Ignitions for service.

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Figure ???: No Comm with Left (or Right) Ignition: The EIC32 is unable to communicate with either the left or right ignition through the ignition's serial port. Restart the EIC32 and if the problem continues, check the wiring for the ignition listed.

Page: ???



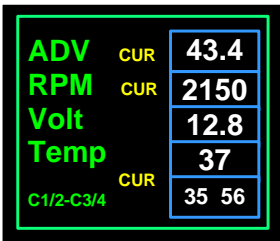
Figure ???: Shaft Angle Not Checked No Data from Pmag: The EIC32 is unable to verify the shaft angle difference between the two P-mags because it is unable to query one or both ignitions. Check to make sure both ignitions are powered up. The status of the P-lead is not relevant.

Page: ???



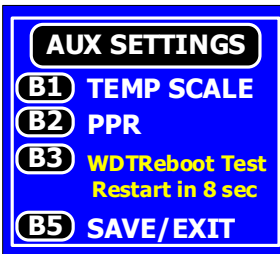
Figure ???: TDI Screen ANC: If the EIC32 is not able to communicate with one or both P-mags, it will display large white “XXXX” in the firing angle box for the ignition(s) it is unable to communicate with and display “ANC” underneath the lower firing angle box. **ANC** stands for Angle Not Checked.

Page: ???



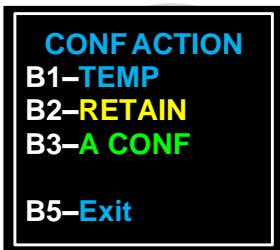
Active stream mode screen: Displays the current ignition advance, RPM, voltage, ignition temperature, and ignition harness status. This examples shows current ignition advance at 43.4 deg before TDC, current RPM at 2150, ignition volatage at 12.8 V(internal), ignition Temperature at 37 deg (C or F deg depending on configuration selected in the AUX SETTING screen shown below) and ignition harness status at 35% for coil driving cylinder 1 and 2, and 56% for coil driving cylinder 3 and 4.

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Auxiliary Settings: Temperature scale (Fahrenheit / Celsius) and Pulses Per Revolution (PPR). On this screen you can select the temperature scale to degrees F or C and/or desired Pulse Per Revolution, to save settings press B5.

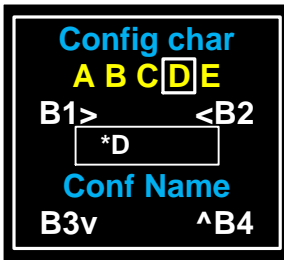
Page: ???



Confirm Action menu: This screen is used to tell the EIC32 how to process the recently made ignition changes.

- B1-TEMP** Temporary change, do not retain the current setting in the EIC32 or ignition’s memory.
- B2-RETAIN** Save the current setting to the ignition’s memory
- B3-A CONF** Send the factory default “A” configuration to the ignitions immediately.
- B5-Exit** Exist the current screen.

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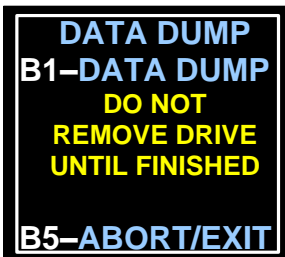
Configuration Naming screen: Buttons B1 and B2 will select the desired character by moving the highlight box right and left. Buttons B3 and B4 will scroll to the next group of five alpha/numeric characters. Press button B5 to select the highlighted character. Maximum configuration name length is 3 characters.

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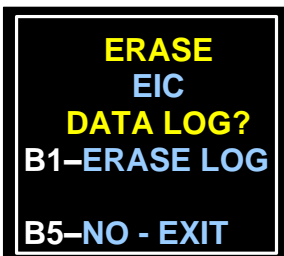
Informational screen: The EIC32 is creating a new timing configuration. In the example displayed, the third memory location has been selected and before the mandatory configuration naming screen is displayed.

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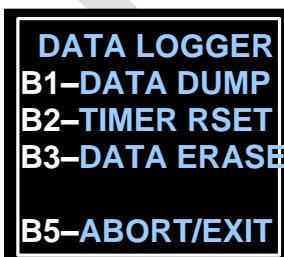
Data dump/transfer screen: Used to download ignition log files from internal EIC memory to a USB drive.

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Data log file erase screen: Used to erase the internally recorded data

Page: 20



Data Logger Screen: Main menu for data log transfers, data timer mark reset, and data log purge.

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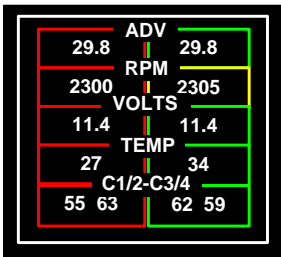


Erasing File *XXX: The EIC32 is in the process of removing a timing configuration from its internal memory.

Note: Configurations *A and *B may not be erased.

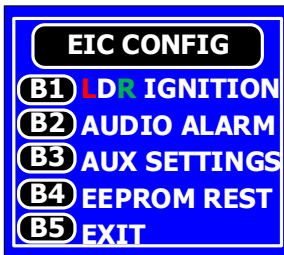
(Informational screen)

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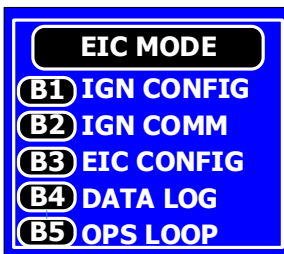
Dual View screen of the Operating configuration values – such as limits or operating values: Displaying the current total advance, RPM, internal voltage, internal ignition temperature, and the status of the ignition harness.

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EIC CONFIGure screen: Main EIC32 configuration screen.

Page: ???



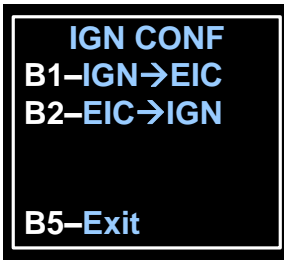
Main Menu Screen: Allows navigation into different areas of the EIC.

Page: ??



Ignition selection Info screen. When the EIC32 is configured for Dual ignitions, this screen will appear and user must select the Left or Right ignition. If only one ignition is installed and/or the EIC32 is configured for Left **OR** Right, this screen will not be displayed when button **B2-EP Comm** is selected on the prior screen and the EIC32 will automatically retrieve data from the configured ignition.

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Ignition configuration screen: Users can view/select Info from ignition to EIC(B1) or send info.....

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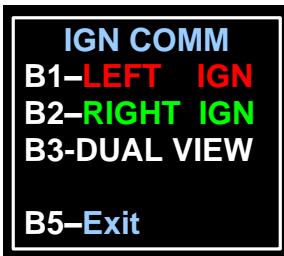
Informational screen: The EIC32 has completed retrieving data from the ignition(s) and is formatting the data for display.

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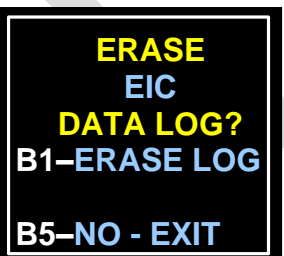
EIC32 configuration main menu: You can.....

Page: **Error! Bookmark not defined.**



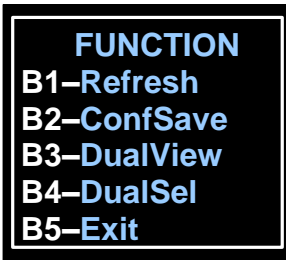
Ignition Communication configuration menu:

Page: **Error! Bookmark not defined.**



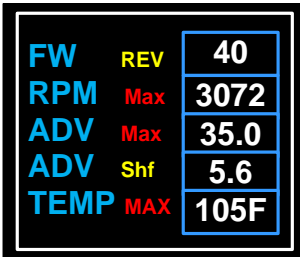
Erase / purge log files confirmation screen.

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Function menu: This screen indicates the various functions available while communicating with the ignition in Comm mode.

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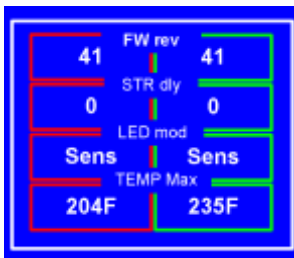
Static information display screen. Firmware version, maximum RPM AKA rev limiter, maxing timing advance, timing curve shift value, and maximum temperature, in Fahrenheit, recorded by the ignition. In this example the selected ignition is

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Figure ???: IGN CONF: Ignition configuration selection screen. Button B1 moves the pointer up and B2 moves it down. Button B3 selects the configuration the triangle is pointing to. Button B5 exits the screen without making a selection.

Page: ???



Data retrieval and display screen 1. Displays the configurable elements retrieved from the P-mag ignitions.
 FW rev: Ignition firmware revision number
 STR dly: Run mode start delay
 LED mode: Controls the LED on the back of the ignition. Cannot be changed from "Sens".
 Temp Max: The maximum temperature recorded by the ignitions,
 Note: If this screen is selected and only one side is populated with data, check the EIC32 configuration and/or the connection to the ignition whose data is missing.

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Data retrieval and display screen 2. Displays the configurable elements retrieved from the P-mag ignitions.
 RPM max: The maximum RPM. Above this value, the ignitions will stop firing the sparkplugs.
 ADV Max: The maximum firing angle (timing) relative to the TDC setting. Note. The P-mags will fire 1.4 degrees more than this setting.

ADV shf: The Advance Shift applied, plus or minus to 26.6 degrees, relative to the TDC setting.

VOLT bus: The internal voltage reported by the ignition. This does not correlate to the aircraft's voltage.

Note: If this screen is selected and only one side is populated with data, check the EIC32 configuration and/or the connection to the ignition whose data is missing.

Page: ???



Data retrieval and display screen 3. Displays the configurable elements retrieved from two ignitions.

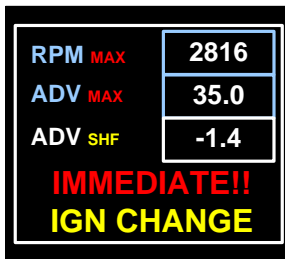
TAC ppr: Pulses per Revolution for the tachometer signal output

PROPdeg: Current crankshaft position relative to TDC

TEMPCurr: Current temperature

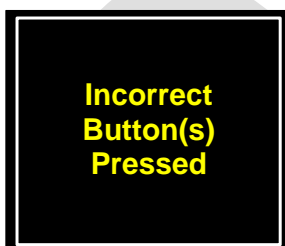
RESV - Reserved for future use (Displays EIC32 software version)

Page: ???



Immediate Change screen: Used to command RPM, Max Advance, and/or Max Shift changes to the active ignition.

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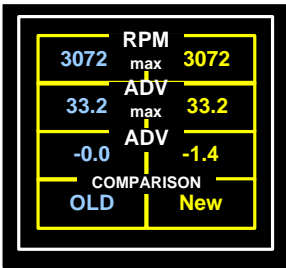
Informational screen: A function button was pressed that has no assigned function or task in the current display screen.

Page: General Error message, not restricted to any menu tree.



May Not Erase Config A or B: EIC32 will not allow the configurations A or B to be deleted. This informational screen will be displayed if an On-The-Fly (OTF) change is attempted without first sending a configuration other than "A" or "B" to the P-mag ignitions.

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New vs. Old Screen: on the Fly configuration change comparison screen. This screen the old (current) value and the new value (s) that will be sent to the ignition. In this example the ADV will be decreased by 1.4 deg. That means 0 Deg (26.2) will change to -1.4 deg (24.6 deg before TDC).

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No Comm With Ignition: The EIC32 could not communicate with one or both ignitions. Verify the wiring and retry the function. In this example the EIC has no Communication with either ignition as indicated by white box around the display. If the EIC32 can communicate with only one ignition, the box outlining the display will turn either **Green** (right ignition) or **Red** (Left ignition) to indicate which ignition it is communicating with.

(Informational screen)

Page: N/A



No Comm with Left Ignition: EIC32 cannot communicate with the left ignition.

(Informational screen)

Page: N/A



No Comm With Right Ignition: EIC32 cannot communicate with the right ignition.

(Informational screen)

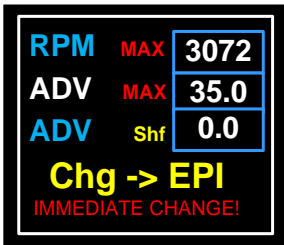
Page: N/A



Not Dual Ign Mode Config: A function was attempted that required two P-mag ignitions and the EIC32 to be configured for **DUAL** mode. Message screen is displayed anytime a Dual Mode feature is requested when the EIC32 is not configured for dual P-mag ignitions.

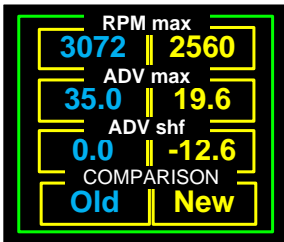
(Informational screen)

Page: N/A



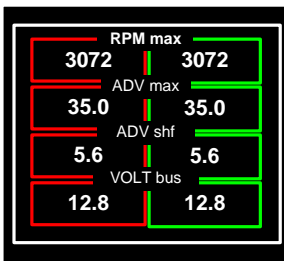
On The Fly (OTF) Screen. Changes made in this screen will immediately change the values on the ignition.

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B2-ConfSave screen: Display the current and On The Fly (OTF) proposed settings prior to selecting their disposition as shown on the next CONF ACTION screen.

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Data retrieval and display screen 2. Displays the configurable elements retrieved from two ignitions.

Maximum RPM at which point the ignitions will stop firing the sparkplugs, maximum allowable advance, advance shift, internal voltage.

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Saving to EIC Memory: EIC32 is pausing to save data to the internal memory.

(Informational screen)

Displayed after each save operation.



Saving XXX to EIC: The EIC32 is in the process of saving a timing configuration to its internal memory.

(Informational screen)

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Sending to IGN: The EIC32 is in the process of sending a timing configuration to one or both ignitions. In this example the EIC32 is sending an update to both ignitions, as indicated by white box around display. If sending updates to only one ignition, the white box around display will turn either **Green** (Right ignition) or **Red** (Left ignition).

(Informational screen)

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Pulses per Revolutions setup screen: This screen allows the user to change the PPR the ignitions send out to match that of your electronic tachometer. In this example the ignition will send 2 electronic pulses per 1 ignition revolution. Two (2) Pulses per Revolution is the default setting.

Page: ???



Pre-startup timing divergence warning screen: This screen alerts the pilot that there is a difference in the crankshaft angle relative to the TDC setting. In this example the angle difference between the two ignitions is six degrees. The left ignition is 68 degrees past TDC and the right ignition is 74 degrees past TDC, resulting in a timing difference of six (6) degrees

Page: ???



Preflight screen indicating a successful timing difference check by the green "thumps up". Upon engine start, the red X box and the two red loss of tach signal boxes directly below the right firing angle box will disappear and the Timing Divergence bar graph and coil pack data bar graphs will be displayed.

Page: ???



The Timing Divergence Information screen depicting "normal" operations.

Page: ???



Timing Divergence Alarm screen indicating the timing difference between the two ignitions is 6.5 degrees.

Page: ???



TDC timing setup screen.

Page: ???



Warning Timing Divergence informational screen: The timing difference between the two installed and configured ignitions is greater than six (6) degrees.

Page: ???

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1.00 Release Notes

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Appendix A: Abbreviations

Appendix B: Screen Definition

Appendix C: Screen Flow diagrams

Appendix D: Installation and Configuration

Appendix E: Software upgrades

Appendix F: Data Logging

Appendix G: Troubleshooting

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