

Overview of EIS Installation

Thank you for purchasing an Electroair Ignition System for your aircraft. We are confident that you will be happy with the performance of your EIS on your aircraft. The next several pages will take you step-by-step through the process of installing your EIS on your aircraft. We hope you will enjoy the experience and that this manual will provide you with clear direction and guidance through this process. This manual will cover the following general installation steps:

1. General Overview and recommendations
2. Removal of old ignition components
3. Set-up and installation of the Crank Shaft Timing Wheel Assembly(CSTW)
4. Installation of the EIS Controller and Coil Pack
5. Spark Plug Harness
6. Wiring
7. Final installation steps
8. Options

We strongly recommend that you read through this entire installation procedure before installing your new EIS on your aircraft. Make sure that any questions you might have are answered before the actual installation. Also, make sure any extra components that you might need, e.g. cable ties, circuit breakers, switch terminations, etc., are all available. And above all else, use good common sense and judgment. An electronic ignition system is a high voltage device. If an EIS is improperly installed or miss-fired, you could cause severe damage to the EIS, your aircraft, or even yourself.

Please contact us if you have any questions during this installation process. Good luck and happy flying!!

Electroair

Installation of EIS

1. General overview and recommendations

- a. Read through the entire installation instructions before beginning the installation to make sure you understand each step. **CALL US** if you have any questions or there are items that are unclear.
- b. The installation of the EIS should take between 4-6 hours, depending on your skill set for working on the engine & ignition system.
- c. Review your own skill set. If this is the first time installing an ignition system of any kind, we recommend that you have someone available with some ignition experience in order to help you.
- d. If you are installing a Crank Shaft Timing Wheel (CSTW), we strongly recommend that you have help in this procedure. There are instances where two sets of hands are useful. And we also recommend that one of the installers be familiar with removing and installing components on engines.
- e. Always use good safety and work practices. Use appropriate safety equipment (glasses, etc.) and precautions. The EIS is a high voltage system and if installed or tested incorrectly can cause substantial damage to both the system and YOU.

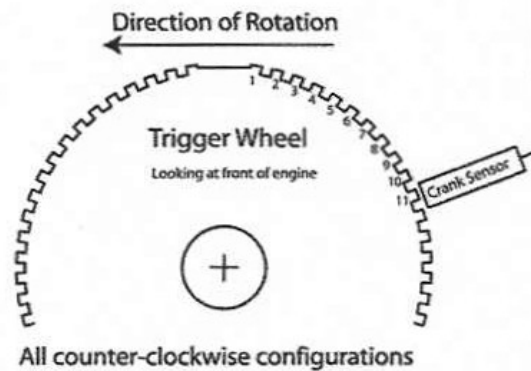
2. Removal of old ignition components

- a. Remove cowling. Verify that Master Switch is off and battery is disconnected.
- b. Remove ignition harness from spark plugs.
- c. Remove ignition computer & coils.
- d. Remove distributor cap, rotor head, and distributor cap mounting plate.
 - i. Once all three parts are removed, the distributor shaft should be exposed through the mounting plate stand.
 - ii. Install a thin bead of Loctite 515 onto the raised circle on the top of the mounting plate stand.
 - iii. With the Loctite placed, install EA-031D, Distributor Shaft Cover, on top of the mounting plate stand.
 - iv. Tighten the cap screws on EA-031D to a torque value of 10 foot-pounds
- e. **OPTIONAL:** Only use these directions if the removal of the distributor shaft & gear is desired. **CAUTION:** This removal procedure should only be completed by someone with extensive experience with Jabiru engines. The following procedure, if done improperly, could lead to severe damage to the engine and/or engine components.
 - i. Start by removing both distributor caps and rotors.
 - ii. Remove the rear accessory cover. Refer to the Jabiru Instruction & Maintenance Manual, published for the intended engine, for detailed information on the accessory cover. When pulling the accessory cover off of the engine both distributor shafts & gears will fall off of the engine. When removing the accessory cover, hold the distributor shaft & gear, which is not intended for removal, to make sure this gear does not fall out of the engine.
 - iii. Once the intended distributor shaft & gear is out of the engine, reinstall the accessory cover.

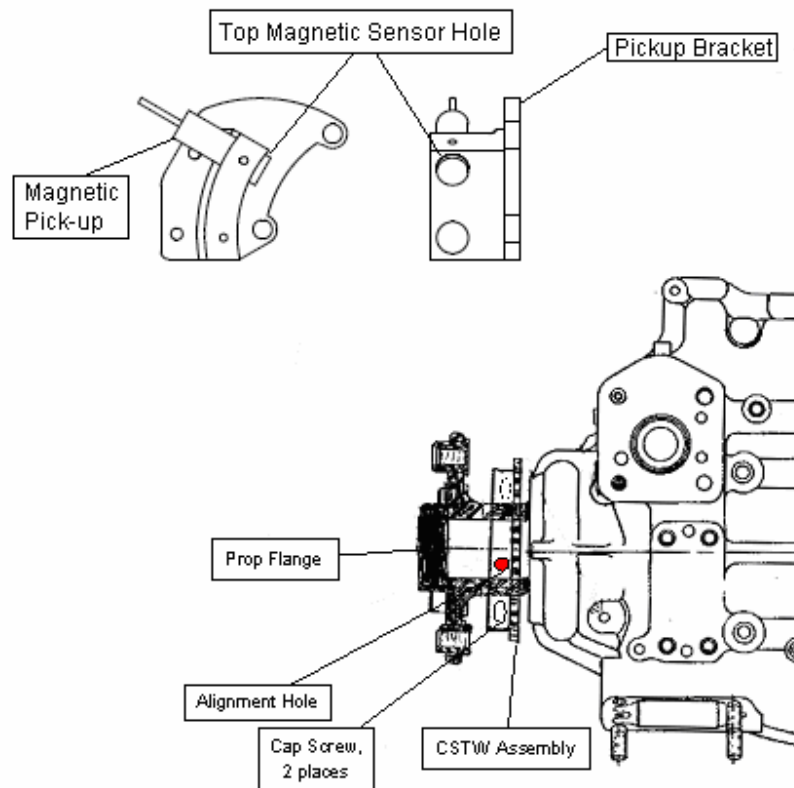
- iv. After the accessory cover is installed, reinstall rotor and distributor cap on the remaining distributor shaft.
- v. Where the distributor shaft was removed, on the accessory cover, remove the distributor cap mounting plate and the mounting plate stand.
- vi. In the divot, where the mounting plate stand sat, install a thin bead of Loctite 515.
- vii. With the Loctite placed, install EA-031E, Distributor Cover, in the divot where the mounting plate stand sat.
- viii. Tighten the cap screws on EA-031E to a torque value of 10 foot-pounds

3. **Set-up and installation of Crank-Shaft Timing Wheel (CSTW);**

- a. **Verify that the master switch is off and battery is disconnected.**
- b. Rotate the engine until number one cylinder is on Top Dead Center (TDC).
- c. You will need access to the crankshaft between the block and the prop flange. Remove those components necessary to accomplish this. Note: Exploded view of CSTW installation on a Jabiru is at the bottom of this section.
- d. Clean the crank area just in front of the crank shaft seal. **CAUTION:** the exposed portion of the crank shaft is tin plated. An abrasive (like sand paper or scotch brite) will remove the plating. We recommend using a liquid cleaner/degreaser.
- e. Temporarily fit the CSTW on the crank with the timing teeth toward the block. Slide the CSTW toward the prop flange.
- f. Install the pick-up bracket.
 - i. Jabiru installation is as follows:
 1. Remove the two bolts, on the left hand side of the engine, from the front oil cover.
 2. With the two left hand bolts removed, slide the pick-up bracket, with the sensor housing toward the prop, into the slots where the bolts were removed from. If done properly, the clearance holes on the pick-up bracket will line up with the holes on the oil cover.
 3. Install and tighten enclosed allen head cap screws, on the pick-up bracket, to a torque value of 18 foot-pounds.
- g. Loosen the CSTW and rotate it on the crank shaft until the hole in the collar is aligned with the center of the top magnetic sensor hole on the pick-up bracket.
- h. Remove the CSTW and apply Loctite (Loctite # 242) to the crank shaft side of CSTW and to the two cap screws.
- i. Carefully replace the collar to the crank shaft and line up the hole in the collar with the center of the top magnetic sensor hole as described in 4.g.
- j. With the protruding pin, of EA-Dowel, facing toward the prop, insert EA-Dowel, pin first, into the top magnetic sensor hole until the pin is resting on the CSTW.
- k. Quickly maneuver the CSTW so that the pin on EA-Dowel falls into the hole in the collar on the CSTW. Note: The pin on EA-Dowel will position the trigger wheel so that the tail end of the eleventh tooth past the minus two teeth will be aligned with the center of the magnetic sensor. A figure of this positioning is shown below.



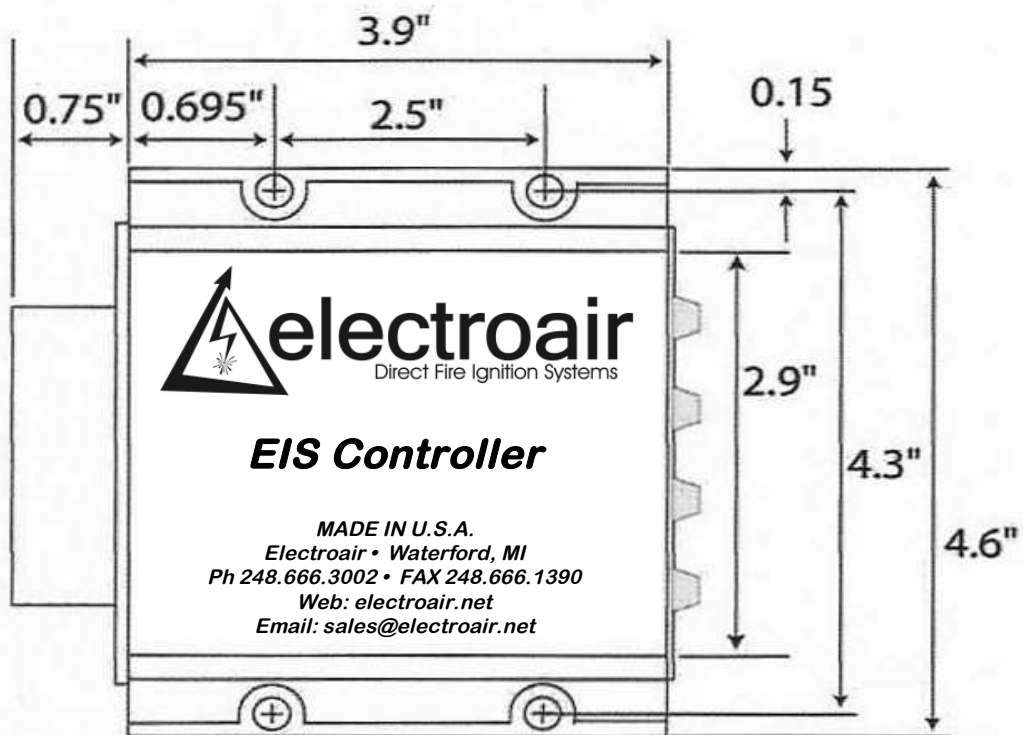
- l. With the pin on EA-Dowel placed into the hole on the CSTW, tighten the cap screws on the CSTW to a torque value of 20-25 inch-pounds. Be very careful that the gap between the two collar halves remains equal on both sides. If this gap is not held constant, the CSTW will not be concentric around the crank shaft and the timing pick-up will not function properly. **CAUTION:** Do not tighten the CSTW screws to the point that there is no gap between the collar halves. This means that you have over-torqued the screws, stretched the aluminum collar, and the CSTW now needs replacing. Note: It is very important the engine is still positioned at TDC, for the number one cylinder, when bolting the CSTW down.
- m. Wipe off any excess Loctite from the CSTW or crank shaft after the CSTW has been bolted down.
- n. Remove EA-Dowel from the top magnetic sensor hole on the pick-up bracket and install the magnetic pick-up into this hole. Using a feeler gage or equivalent, set the gap, between the magnetic sensor and the CSTW, to a minimum of 0.024" and tighten the set-screws. This is a temporary setting.
- o. Rotate the engine and check the gap at several points around the rotation. **CAUTION:** Do not leave the feeler gage between the CSTW and magnetic pick-up when rotating the engine – this could cause damage to the pick-up if it were to jam or wedge itself between the pick-up and timing wheel teeth. The gap should not vary more than +/- 0.005". If it does, mark those points. Verify that the CSTW gap around the crank is consistent and correct if necessary. High points on the CSTW can be corrected by filing the appropriate teeth. If this is done, only remove a small amount of material at a time and re-check the gap. Removing too much material will make the CSTW non-functional and will require you to purchase a replacement. Also, make sure any flashing on the teeth that are filed is also removed.
- p. Once the gap between the timing teeth and the magnetic pick-up is determined to be consistent, loosen the set-screws on the magnetic pick-up. Apply a thin coating of Loctite #242 to the sides of the pick-up and to the set-screws.
- q. Slide magnetic pick-up back in to the pick-up holder and set the gap between the pick-up and timing wheel to 0.024" using a feeler gage. Tighten the set-screws.
- r. Route the magnetic pick-up wire harness up the center of the block and then on top of the engine. Use cable ties as necessary to secure routing.



CSTW Installation - Exploded View; NOT TO SCALE

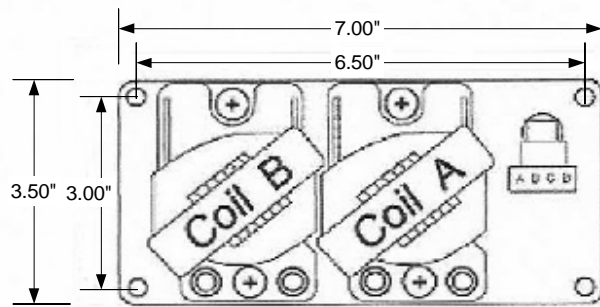
4. Installation of EIS Controller and Coil Pack

- a. Select appropriate locations for the EIS Controller and Coil Pack to be mounted.
 - i. Remove harness attached to EIS Controller and set aside for later installation.
 - ii. Install the EIS Controller where temperatures will not exceed 150F. Because of this, we recommend that the EIS Controller be mounted on the cockpit side of the firewall with the shortest practical distance from the coil pack for the wiring harness runs. Dimensions for the controller are laid out below:

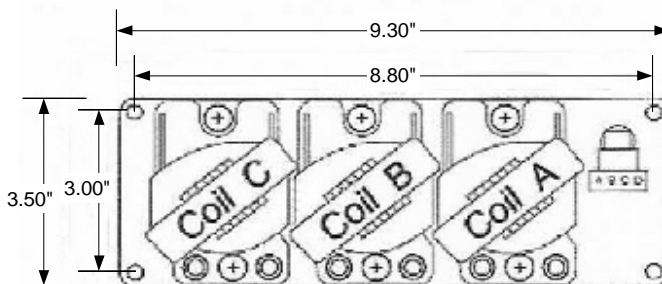


EIS Controller Dimensions

- iii. The EIS Controller uses a case ground as a secondary ground. To complete the path for the secondary ground, scrap some of the anodize coating from around one of the mounting holes. Route a separate ground wire from the Buss ground and attach at the point on the controller where the anodize coating has been removed. (Typically, the ground wire would be terminated with an eyelet and installed under the head of one of the mounting screws). Verify continuity to Ground.
- iv. Mount the coil pack on top of the Intake Manifold (same location as the old coil pack). This will insure that the spark plug wire harness will fit correctly. If the mounting holes do not line up, you may fabricate a small bracket to complete this installation. The unit also comes with a ground wire which will be installed in section 6. Coil Pack dimensions are below:



Four-Cylinder Coil Pack Dimensions



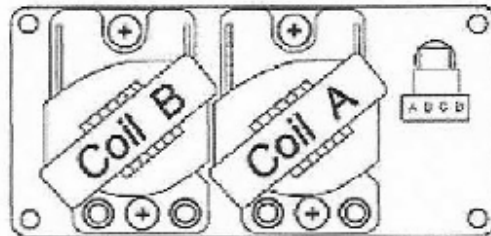
Six-Cylinder Coil Pack Dimensions

- v. Prior to any drilling, verify that there is clearance from any components on the other side of the firewall.
- b. After all considerations have been made regarding the placement of the EIS Controller and Coil Pack, drill the mounting hole and install both units using standard AN hardware.

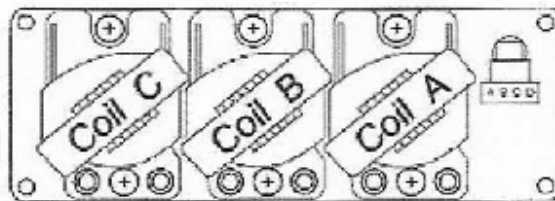
5. Spark Plugs and Spark Plug Wire Harness

- a. You can now install the spark plugs that will be connected to Electronic Ignition System.
 - i. We recommend that you use new spark plugs. If you are re-using the old spark plugs, make sure that they are clean.
 - ii. Gap the spark plugs to 0.030"-0.035". Check the engine application data to verify that your plugs can be used in your engine.
- b. Use the new spark plug harness that you have obtained for your engine and install using the following guidelines.
 - i. Route the spark plug wires from the coil pack to the spark plugs. Make sure to keep spark plug wire routings away from exhaust pipes and do not run two wires parallel to each other without a minimum of ¼" of separation between the wires.
 - ii. To finish the connection, install the spark plug end first.
 - iii. Attach the other end of the spark plug wires to the coil pack at their appropriate coil tower. Reference the firing order for your engine. The drawing below shows the Coil Tower ID numbers. The firing order for a four-cylinder coil pack is A1-B1-A2-B2. The firing order for a six-cylinder

coil pack is A1-B1-C1-A2-B2-C2. Connect the spark plug wires using that firing order. **Note: specific cylinders need to be connected to specific coil towers.** Please contact us if you have any questions.



B2 B1 A2 A1
Coil Tower ID's for 4-cylinder



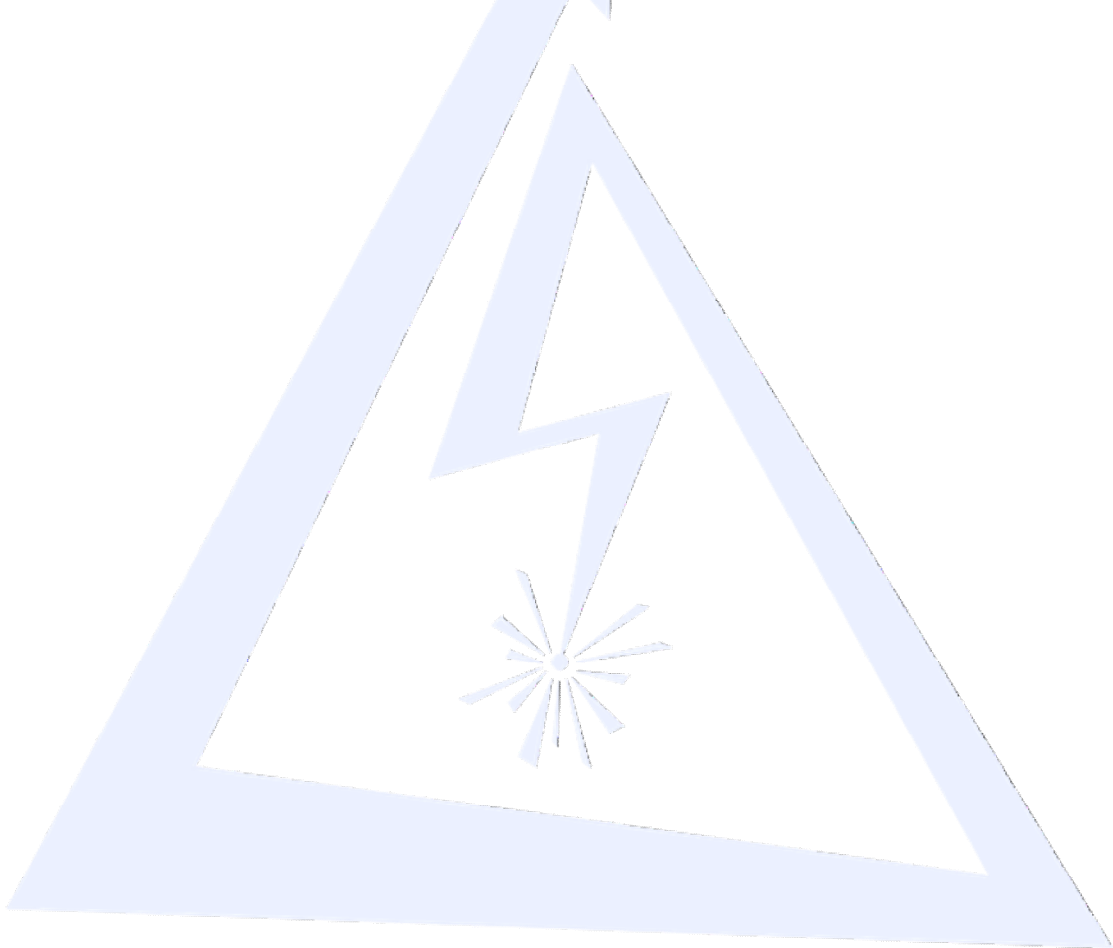
C2 C1 B2 B1 A2 A1
Coil Tower ID's for 6-cylinder

6. Wiring Hook-Up

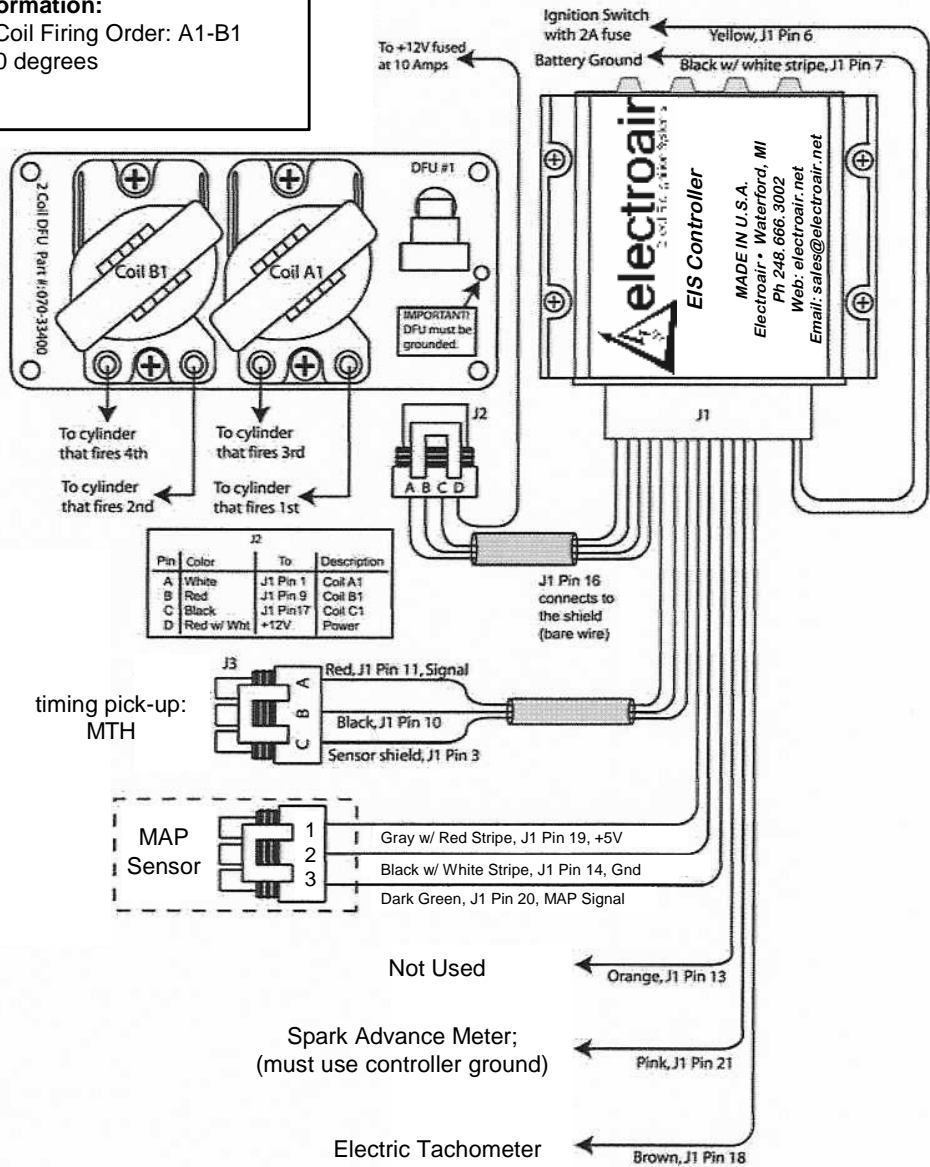
- a. **Verify that the master switch is off and battery is disconnected.**
- b. The electrical connections that will be made are as follows:
 - i. Ground for Coil Pack
 - ii. Timing sensor
 - iii. Coil Pack
 - iv. Switched Power & Ground for EIS Controller
- c. Notes: The main harness is not completely assembled so it can be installed through tight clearances such as a hole in the fire wall. Terminal ends for the Timing Pick-up have been supplied. You will need to supply terminations for switches, circuit breakers, and the bus bar. The main harness has been tied off into five separate bundles. Each bundle is labeled 1,2,3,4, & 5. We will work with each harness bundle separately. A wiring diagram with pin-out information has been supplied on the pages 10 & 11 of this section for reference. **CAUTION:** Follow these wiring instructions very carefully to insure a correct hook-up of your EIS. Skipping ahead or taking short cuts increases the risk of an incorrect

- installation and either a poor performing EIS or the possibility of damaging equipment. Please call us if you have any questions.
- d. Connect the Coil Pack ground wire to an airframe or battery (preferred) ground. The Coil Pack ground wire is the black wire that is fastened on the Coil Pack base plate. This wire will need to be appropriately terminated at the ground connection (a connector is not provided for this). **CAUTION: The Coil Pack MUST be grounded. Failure to ground the Coil Pack may result in SEVERE ELECTRICAL SHOCK! Also, a poorly grounded Coil Pack may result in poor engine performance and can cause ENGINE DAMAGE.**
 - e. Verify that the screws holding the coils and ground wire in place are tightened and securely in place.
 - f. Connect the EIS Controller harness assembly to the EIS Controller. You will begin routing the various harness bundles from here.
 - g. Route harness bundle #2 to the magnetic sensor on the pick-up bracket.
 - i. If the pick-up bracket and magnetic sensor has been installed and/or routed correctly, there will have a black, three-way connector coming from the magnetic pick-up. Route bundle #2 to that three-way connector.
 - ii. Bundle #2 has already been terminated to go into the appropriate mating connector body that will attach to the magnetic pick-up harness. Once bundle #2 has been routed past any tight clearances (such as a hole in the fire wall), install the supplied connector body to the terminated wires. The wires go into the following connector cavities:
 1. Red wire goes into cavity 'A'
 2. Black wire goes into cavity 'B'
 3. Bare wire goes into cavity 'C'
 - iii. You will hear an audible 'click' when the terminated wires have been properly installed into the connector body and the wire should not be able to be pulled out.
 - iv. Loop any excess wire and cable tie or clamp the loop to a convenient location that does not interfere with any components (a location on the inside of the firewall is suggested).
 - v. Connect bundle #2 (now terminated with a connector body) to the connector from the magnetic pick-up. Verify that the connection is secure.
 - h. Route harness bundle #3 to the Coil Pack.
 - i. Separate the 'Red w/ White Stripe' wire from the other wires that are bundled (gray wrap) and terminated with a four-way connector (this wire is for power).
 - ii. Loop any excess wire of the gray bundle and cable tie or clamp the loop to a convenient location that does not interfere with any components (a location on the inside of the firewall is suggested).
 - iii. Connect the four-way connector to the mating connector on the Coil Pack.
 - iv. Route the 'Red w/ White Stripe' wire through a 10 amp breaker to the Essential Bus Bar. Trim and terminate as required.
 - i. Toggle Switch Set-Up: Route harness bundle #4 to Essential Bus Bar for switch termination.
 - i. Trim & Terminate the 'Black w/ White Stripe' wire to the bus ground.

- ii. Trim & Terminate the 'Yellow' wire to a panel mounted switch that is protected with a 2 amp breaker. Label panel mounted switch "Electronic Ignition System", and proper "ON/OFF" orientation. This switch should be a SPST switch.
- iii. Connect the 2-amp breaker to Essential Bus Bar.
- j. Bundles #1 & #5 contains MAP Sensor wires (bundle #1), two extra outputs for an electric tach and a spark advance meter (bundle #5: spark advance uses two wires: pink for signal & black for controller ground). These bundles should be looped and tied to an appropriate place inside the cockpit for later use. Alternatively, bundle #5 can be trimmed out of the harness connector if those options will not be used. Wiring diagrams for the electric tach and/or spark advance meter are supplied with our option kits #EA-009, Electric Tach and #EA-010, Spark Advance Meter. Please contact the factory for more details.

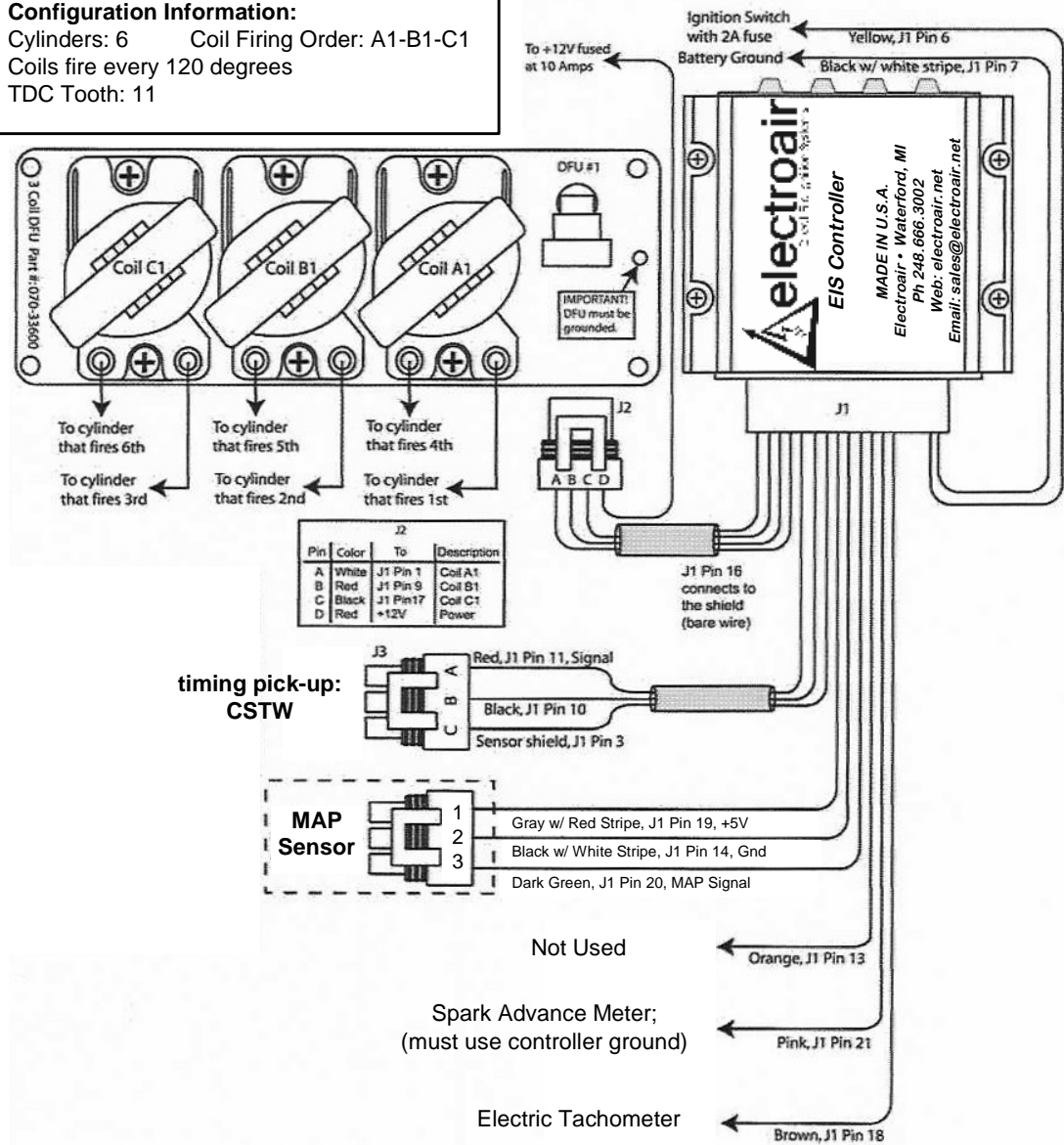


Configuration Information:
 Cylinders: 4 Coil Firing Order: A1-B1
 Coils fire every 180 degrees
 TDC Tooth: 11



4-Cylinder Electrical Overview

Configuration Information:
 Cylinders: 6 Coil Firing Order: A1-B1-C1
 Coils fire every 120 degrees
 TDC Tooth: 11



6-Cylinder Electrical Overview

7. Final Installation Steps

- a. Calibration and Timing settings: Your unit has been pre-set at the factory based on the information you gave when you placed your order and should not need any adjustment in the field. Please contact us if you feel that your unit is not performing optimally.
- b. Re-attach and reinstall any connections or components that were removed or loosened during this installation.
- c. Secure all new wires, harness, connections and lines to prevent failures due to vibration.
- d. Connect battery connections and close any open circuit breakers.
- e. Recover all tools that may have been used (you don't want any tools 'floating' around inside the airplane).
- f. Proceed to the operational section and perform a test run-up before flying.

8. Installation Options available from Electroair

- a. Other options will be announced when available.

