

This manual covers the steps to install the SDS EM-5 fuel injection and ignition system components on IO-550 engines.

**Checking Clearance for Hall Sensor Bracket to Crankcase**

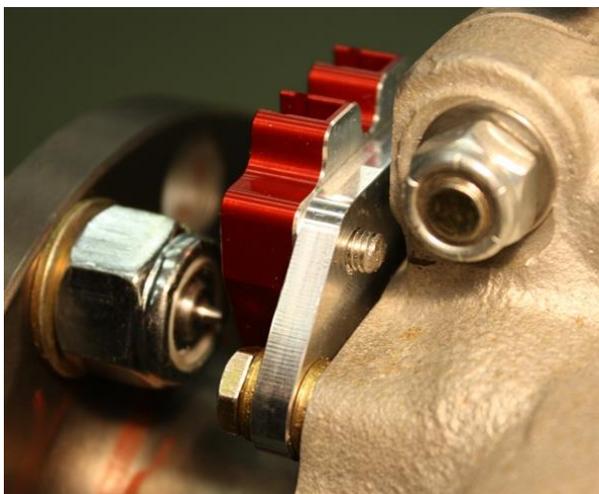
It may be necessary on some engines to file the uppermost front case split boss slightly to be sure it clears the Hall bracket. See the photo below. Run a straight edge up vertically from the crankshaft seal retainer plate front face. If the straight edge clears the crankcase boss, no action is required. If not, file just enough material from the front boss face to allow clearance.



**Hall Sensor and Bracket**

Install the red Hall sensor to the supplied bracket using the 10-32 Allen head hardware and lock washers supplied. Tighten to 35-50 inch pounds.

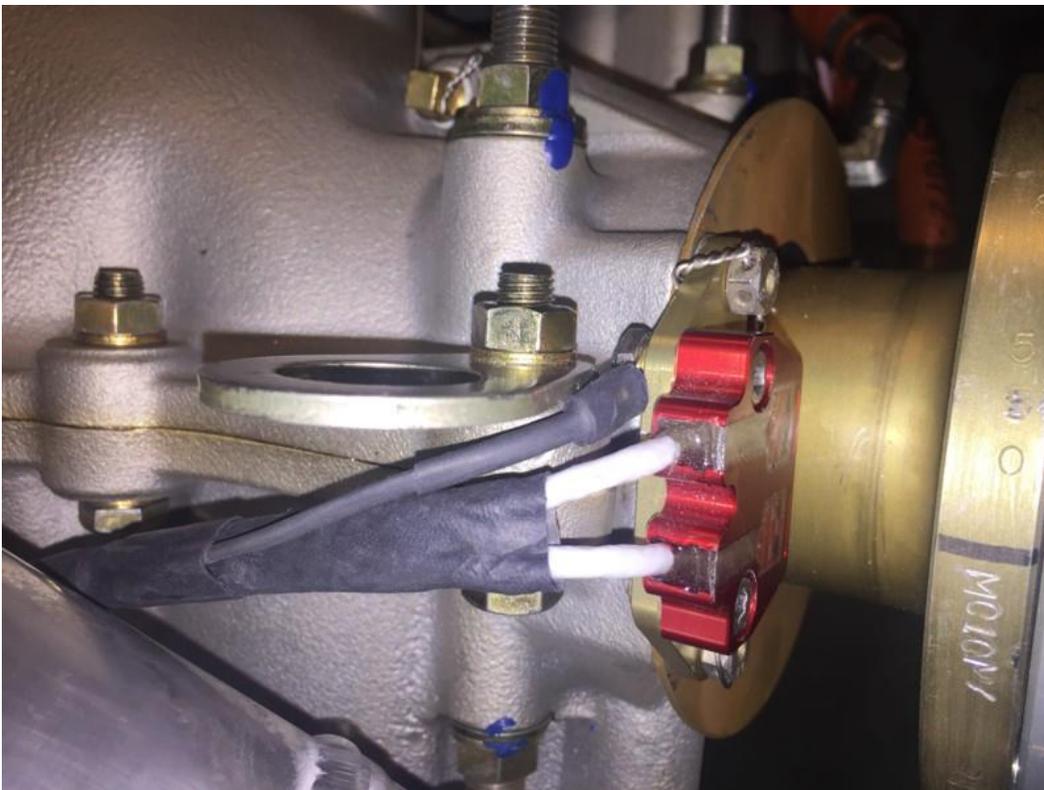
Remove the two AN3 upper crankshaft seal retaining plate bolts. Place one washer under the bolt heads against the bracket and insert bolts through the bracket and seal retainer into the engine case. Torque to 35-50 inch pounds.



Install the supplied fire sleeve over the sensor cables.



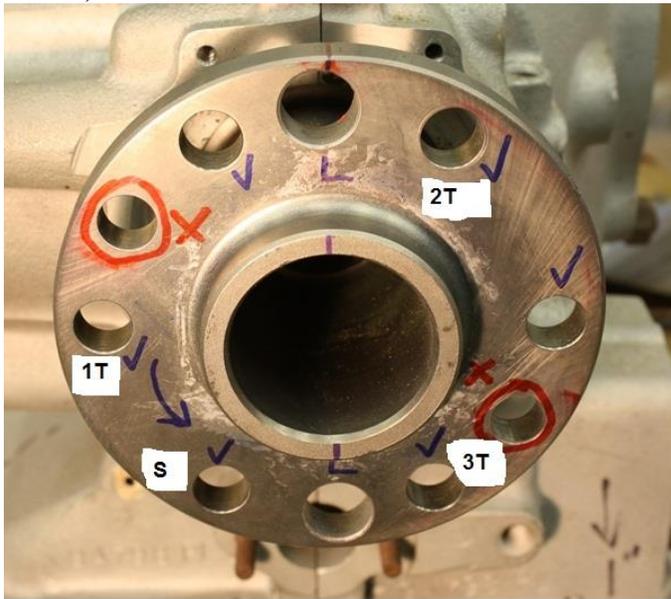
Hall sensor mounted



### **Prop Stud Placement (Important)**

Place the crankshaft with the TC mark aligned with the LOWER crankcase split. Note the position of the studs in relation to the TC mark on the prop flange edge.

The ones marked T are for the 3 trigger magnets, 1T, 2T, 3T (blue end of magnet facing the sensor). The one marked S is for the synch magnet (blue end facing away from sensor).



Magnet/ stud placement on crank flange with crank at TDC 1

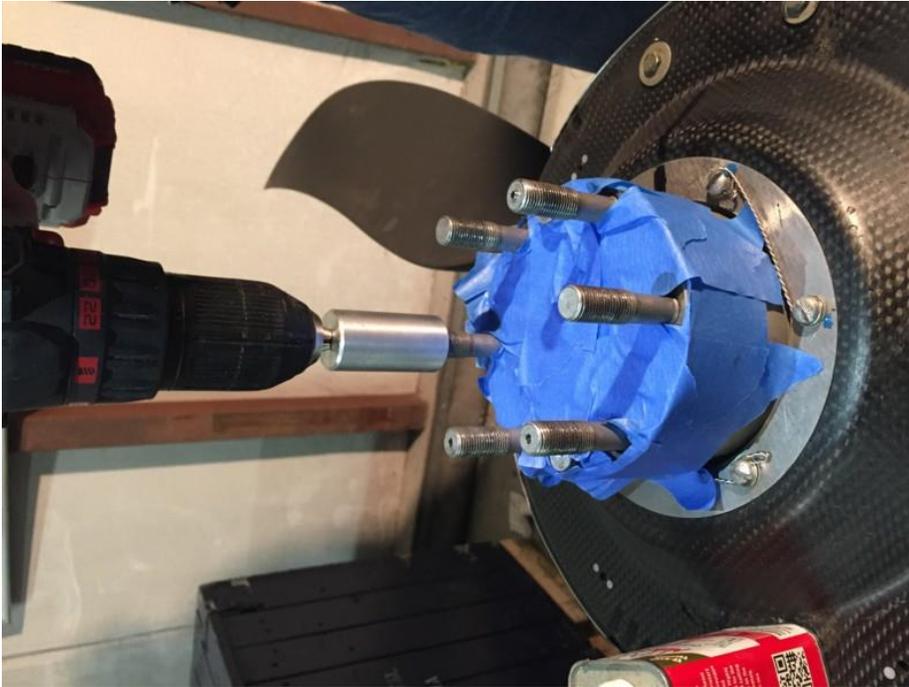
Some engines lack TDC marks on the hub. See the last page for alternate TDC method.

NOTE: T/C MARK LINES UP WITH LOWER CASE SPLIT.

### **Magnet Mounting**

The magnets are mounted into holes you will drill into 4 of your 6 prop stud ends using the photo above to mark which studs to drill and the fixture supplied in the kit. Screw the fixture over the studs. Drill about .187 deep into the bolt end using a #30 drill, check frequently for hole depth. Clean the chips away and insert a magnet to check for about .050 protrusion past the bolt end. Carefully drill incrementally deeper until you get the magnet to protrude this distance. Repeat on the 3 other studs.

Drilling fixture placed over prop studs

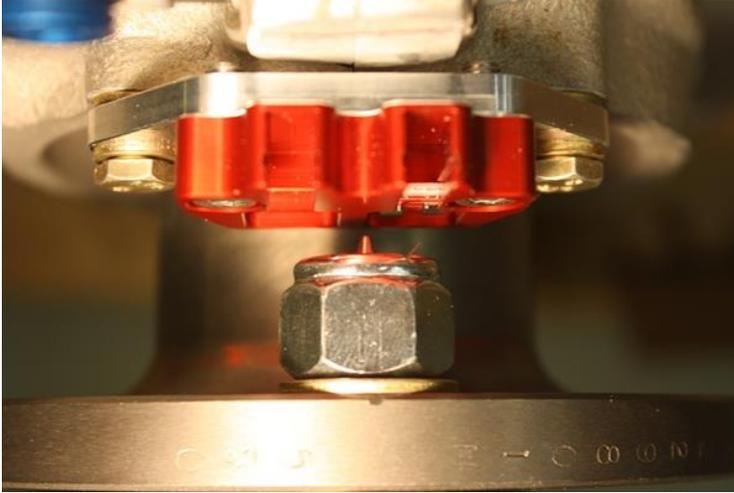


Clean the holes and tips with compressed air and acetone so they are free of chips and oil. Mix up a small amount of 5 minute epoxy and using a piece of 1/16 welding rod, insert a small amount of epoxy into the bolt holes. Using a piece of wooden doweling or aluminum stock (non ferrous material), push 3 of the magnets into the holes with the blue end facing out and one magnet with the blue end facing into the bolts.

**IMPORTANT-** The 3 trigger magnets spaced 120 degrees apart have the blue end facing the sensor.

The synch magnet has the blue end facing away from the sensor, into the stud.

You should have a small meniscus of epoxy surrounding the magnet.



### **Magnet Air Gap**

You should aim for .045- .100 air gap between the tip of the magnets and the red Hall Effect sensor face. Use washers under the prop bolt heads to achieve this distance.

### **Fuel Block**

Remove the 2 front most top crankcase through bolts as shown the in photo below. Replace the stock bolts with the longer, supplied ones using one washer under the head, then slide the bracket over the bolts, then one more washer against the case and then the nuts. Torque to 180-220 in lbs.



Screw in the supplied fittings as desired using a SMALL amount of Teflon pipe sealant compound, ( just enough to fill the threads of the fittings). NEVER use silicone (RTV) for sealing fittings. Tighten the fittings until snug and orientated as desired. Fuel should

enter one end of the block through the AN6 fitting and head to the regulator from the AN6 fitting on the other end. There is provision for a fuel pressure takeoff as well.



### **Fuel Injector Mounting**



Locate the weld-on injector bosses near the ports on each intake runner in turn so that you have clearance to the cowling and room for the fuel fittings and injector electrical connectors. Using a Sharpie marker through the center of the boss, mark the central point

on the runner. Pilot drill the mark with a 1/8 drill and then enlarge the hole with a step drill to 3/8. Use a 13/32 twist drill to oval the hole to match the injector boss footprint by standing the drill up to a 45 degree angle. File and deburr the hole to match the injector boss shape. Tig weld each boss in place.

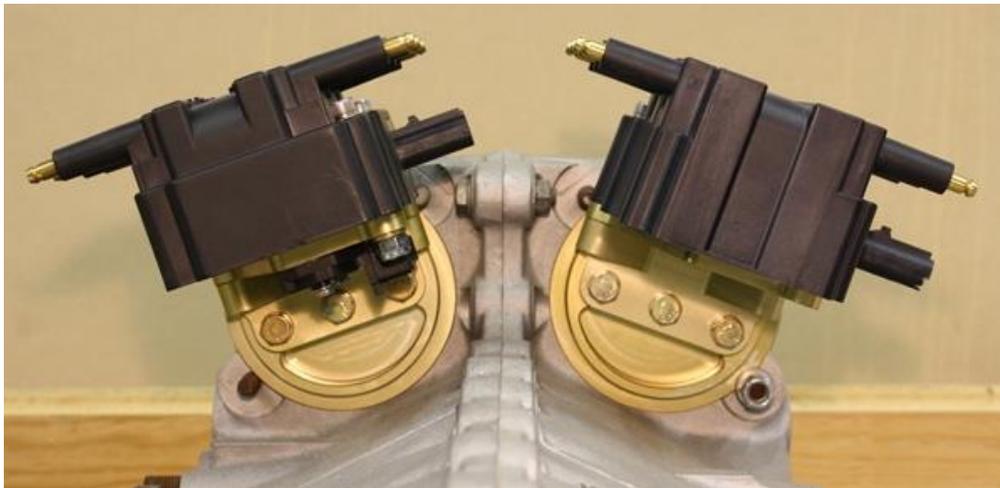
See a tutorial here: <http://www.sdsefi.com/bossmount.htm>

Install the 90 degree fuel fittings into the injector top caps with Teflon thread sealant (Never RTV), tighten and orientate as desired.

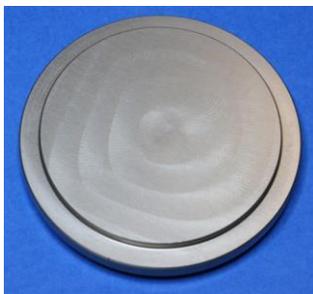
### **Coil Pack Mounting**

The coil packs mount in place of the magnetos. Bolt the coil pack bracket to the magneto covers using the bolts provided. Torque to 90-110 inch lbs. And either use 292 blue Loctite or lockwire to secure the bolts.

Apply a LIGHT coating of RTV on the cover faces or use new magneto gaskets. Install the clamps and nut hardware to secure the coil packs. They may be rotated slightly for clearance from other obstructions. Tighten the nuts to 180-220 inch lbs.



There are 2 types of mag cover plates available, one with a smooth face used when removing the magneto gear (1) and one with a raised bearing surface to support the gear shaft when you wish to drive a rear mounted accessory (2).



1



2

## **Spark Plug Adapters**

SDS supplies brass 18 to 14mm plug adapters and copper washers. Thread these into the spark plug holes and torque to 22 foot lbs. Screw the new spark plugs in and torque to 18 foot lbs.

## **Fuel lines**

The braided fuel lines and 90 degree AN fittings complete the connection to the fuel block and injectors.

## **Engine Temperature Sensor**

The engine temperature sensors are only used for starting and warmup enrichment. They can be mounted anywhere that gets warm fairly quickly after engine start. The cylinder/head areas are best, alternately anywhere where there is oil present- sump, oil cooler fittings etc. The engine temp sensor is the one with the solid brass nose.



Engine temp sensor shown mounted in oil cooler fitting block

## **Air Temp Sensor**

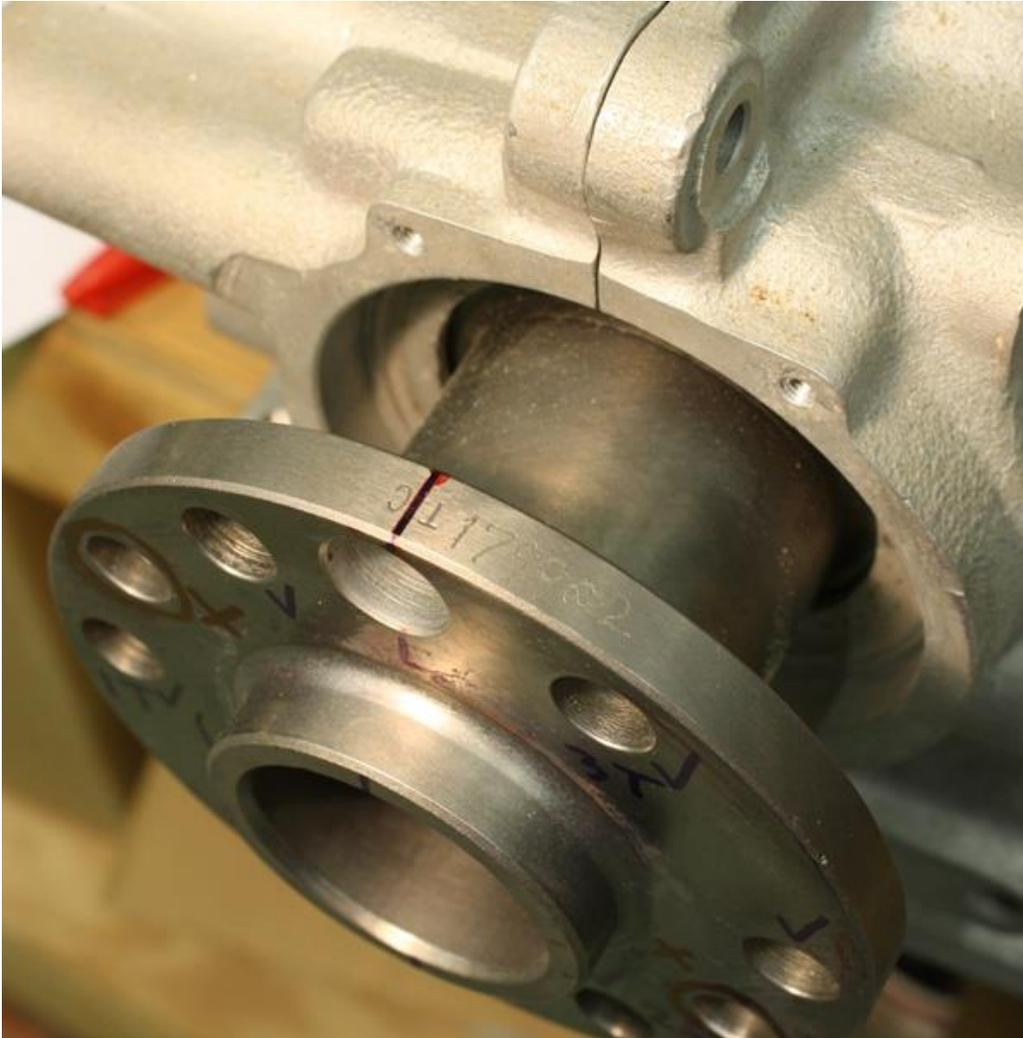
The 1/8 NPT intake air temp sensor can be mounted in the airbox/ air filter area or any location near the throttle body where it will see engine induction airflow. Do not mount into the intake spider due to conduction concerns on hot start situations. The air temp sensor has the exposed black tip.

## **MAP Sensor Connections**

The MAP sensor vacuum ports are connected to barb fittings which are threaded into the intake plenum, downstream of the throttle body.

## Timing Marks and Setting Magnet Position

The crankshaft flange has a TC mark on the edge which indicates TDC when aligned with the LOWER crankcase split. Mark is shown here with the crank at BDC.



Put a white mark on the edge of the prop flange at the T/C mark

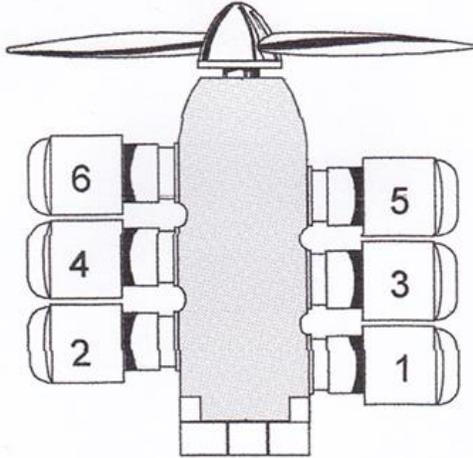
These will be used to set the Magnet Position Value as outlined in the main SDS ignition manual by using a timing light. When doing so, be sure that the timing values are all set to zero in the idle RPM and MAP ranges you are checking timing at. **THE TDC MARK LINES UP WITH THE BOTTOM CASE SPLIT.** After you set the Magnet Position, you can alter your RPM timing values to whatever you desire.

Some engines lack TDC marks on the hub. See the last page for alternate TDC method

## Coil / Plug Wire Routing

We recommend you connect one coil pack to the top plugs, the other to the bottom plugs.

 Firing order of the engine is 1-6-3-2-5-4.



## Fuel Pump Cover

Fit the fuel pump cover in place with a thin coating of RTV on the sealing surface.



## **Wideband Oxygen Sensor Mounting**

Your kit comes with a stainless steel boss to mount the O2 sensor. The sensor needs to be located in the exhaust system so it's at least 12 inches from atmosphere. Drill a 7/8 hole in your exhaust pipe using a hole saw and TIG weld into position. This can be on a single pipe, where a pair collects or where all 4 pipes merge, depending on your exhaust system design.

## **ECU Mapping**

Your ECU has a base map entered which was derived from our own engine testing so it should allow your engine to start up and run fairly well. Be aware that all engines are slightly different so your map is likely to require more fine tuning by you. Refer to the main manual for instructions on how to do that, using the supplied wideband O2 sensor.

## **Finding TDC on Engines with no Prop Hub TDC Mark**

Some engines lack the TDC mark on the edge of the prop hub so you'll need to remove the plug as shown in the following photo to find TDC and mark the hub yourself to later checking timing with a timing light. You can put your mark to either line up with the top or bottom case split in this case.

