

Read Before Installation!

INFORMATION FOR INSTALLING THE NEW HKS 700E ENGINES

Dear New HKS Engine owner,

Congratulations, you have just purchased the most efficient, and the highest quality, Aircraft engine available today for the Light Sport and Ultralight market. These instructions will help to assure that your installation goes smoothly so that you receive maximum efficiency and top performance from your HKS 700E.

In the following, we will go over some specific information regarding the installation and operation of your new HKS 700E engine. There are some differences between a typical installation of a Rotax engine and the new HKS 700E. Please review this information carefully. The APSU electrical schematic diagram has been included for reference purposes for new owners. The APSU diagram is more detailed than the HKS diagram found in the installation manual and provides redundant grounds and power supply's so that there is no common link between the two ignition systems.

1. CARBURETOR SUPPORT SYSTEM The new 700E engines come from the HKS factory with a carburetor support system. If your installation has custom intake manifolds, a system to support the carburetors must be used.

2. HKS SCHEMATIC VS. THE APSU INSTALLATION DIAGRAM There are two different Electrical diagrams supplied with the HKS engine. One is the electrical schematic in the HKS Installation Manual and an Installation diagram supplied by APSU in this package. There is a difference. The HKS Schematic is a general, electrical outline. The APSU diagram is much more specific regarding the redundant wiring required for a safe installation. Please use the APSU installation diagram when designing your installation.

3. IGNITION SWITCHES The 700E has a DC "smart" CDI system to allow for ignition advance and retarding. As the system is DC, we recommend that the ignition switches used be DC rated, such as a Carling toggle type switch, (PN 1X878) available from APSU or Grainger.

4. PNEUMATIC AND ELECTRIC FUEL PUMPS. Pay attention to the supplemental fuel pump requirement specified in the 700E installation manual. The pneumatic pump that is supplied by HKS is to be used as a primary pump for gravity fuel feed installations only. The engine will run with this pump in a non-gravity feed installations, but the required extra margin of fuel pressure can vary depending on the height of the engine/fuel tank and the specific installation. APSU recommends the use of a low pressure 2-4 PSI, Facet fuel pump (PN. 40105) or equivalent as a primary pump with the Pneumatic pump as a redundant back up pump.

5. HIGH OIL PRESSURES OF THE NEW 700E The new 700E has higher operating oil pressures than most four stroke engines. The new engine requires a gauge that reads to at least 100 PSI. The oil pressure range specified is a MINIMUM of 17 PSI at idle and MINIMUM of 85 PSI at 6200 RPM.

6. CHANGE IN RECOMMENDED OIL TYPES AND VISCOSITY The new 700E requires the use of a light weight (5W-30) oil to assist with the high flow rates and max oil pressures of the engine. We recomend the use of high quality synthetic oils and frequent oil changes (25 to 40 hours) . At a minimum, a synthetic/mineral blend of 5W-30 is recommended for most uses. We use Penzoil Performax synthetic 5W-30, the Penzoil stock number is 56067. You can contact Pennzoil at 1-800-468-8397. Other suitable oils are Mobil one in 5W-30 or 10W-30. Or Castrol Syntech 5W-30. For operations with Aviation 100LL or other leaded fuels, a mineral/synthetic is recommended. This type of oil has the high temperature stability from the synthetic part and is able to keep lead in suspension with the mineral part.

7. INSTALLING AND ADJUSTING THE THROTTLE AND CHOKE CABLES

a. To install the choke cable to the Bing CV carb. Begin by removing the small return spring on the choke lever (its the small rounded rectangular lever on the carb side) remove the spring carefully from the top.

b. Slide the threaded adjuster into the slot on the yellow cad plated throttle/choke plate. Screw the lead barrel end fitting into the carb. housing all the way and tighten the jam nut .

c. Carefully reattach the return spring. Adjust the choke by threading the adjuster so that the choke is all the way off with a slight amount of slack when the choke lever is all the way off. Make certain that both chokes are adjusted evenly. To fully engage the choke, the choke lever must be pulled all the way out.

d. To install the throttle cable to the Bing CV carb. Begin by checking the throttle stop adjustment screw. Back off the screw (roughly 1,1-1/4 turns) until you can either see a small air gap, or use a thin .001-.005 feeler gauge. Make certain that you count the number of turns it takes to close the throttles completely (and create a clearance at the throttle stop screw). Then turn the idle screws back in exactly the same number of turns on both carbs.

e. This will synchronize the carburetors at idle. Please note that the throttle mechanism of the carb is not the slide on the intake of the carb, it is the throttle plate that the throttle cable attaches to.

f. Remove the return spring from the half moon shaped throttle lever. Loosen the bottom nut on the cable adjuster and slip it into the slot on the throttle/choke plate. Slip the lead barrel into the slot of the lever.

g. Adjust the cable using the nuts so that the throttle plates in both carbs move off the stop at the same time. Cycle the throttle 5-10 times and check the adjustment again. Tighten down the adjuster nut and check it again. Again, a feeler gauge can be a big help in getting it just right. These are just static adjustments to get carb sync. close before using a set of vacume gauges (available at Lockwood Av. Supply 1-800-527-6829).

h. Carburetor adjustments. These directions are included for later tuning of the carburetor. NOTE! The combustion condition of both cylinders is very important to achieve a smooth running engine. Carburetor adjustments are a flight critical operation; if you do not have experience in this operation, please get qualified assistance. For many installations the propeller should be removed. The 700E has adequate flywheel mass to allow the engine to be run at lower RPMs in this manner.

i. Idle speed adjustment. Attach the vacuum gauges to both carburetors.

NOTE! The nipple for the vacuum gauge is attached at the side of the float chamber. Remove the screw and attach the vacuum gauge tube.

- Set the idle mixture screw out approx. 1-1/4 turn.
- Warm the engine up.
- Keep throttle lever OFF.
- Keep 1400 rpm, adjusting both idle stop screws so that the vacuum readings are same.
- Pinch off the carburetor balance hose (note: idle RPM will increase) check for balance.
- Remove the pinch from the balance hose and check the idle at 1400 RPM and check balance again. (If adjustments are being done without a prop, adjust the idle speed to 1450 RPM, not 1400.)
- Confirm smooth running at idling. Due to variations in throttle linkages this procedure may need to be done several times.

j. Throttle cable adjustment

NOTE! This adjustment is very important. Both throttle valves must start to open at the same time.

- After idle adjustment, let the engine run at 2000 rpm.
- With the balance tube pinched off, check both vacuum readings using the procedure outlined above.
- Adjust the throttle valve position by turning the outer-tube adjustment nut so that the vacuum readings are same.

- Tighten the lock-nuts.
- Remove the vacuum gauges.

DANGER! The rotating propeller is extremely dangerous! Adjustments must be done with the utmost caution from behind the engine. The aircraft must be tied down or properly chocked. Do not perform this operation without a safety observer.

USING THE HKS SUPPLIED CHOKE HANDLE The lever type choke handle supplied by HKS will only partially activate the “choke” or the enrichment system of the Bing Carburetor. It is required to over-rotate and pull the lever out of the plastic base-mount to get the choke to operate completely.

USE OF STROBES AND OTHER ACCESSORIES WITH THE 700E. The HKS 700E uses a lighting coil type charging system with AC voltage output via the three white wires found on the round 3 wire female plug. There is a harness supplied with the engine that connects the round 3 wire plug from the engine to the 5 wire plug of the voltage Rectifier-Regulator. The output of the Rectifier-Regulator is 210 Watts, DC. All electrical accessories must be DC. Nothing (other than a Tachometer signal wire) should be connected to the AC wires. Any load on the AC output can interrupt the charging circuit. Part of the pre-flight check, prior to taking off is to check the system voltage. The static voltage should be 12.5 Volts + -. The Voltage with the engine running must be 14.0 Volts +

ELECTRICAL GROUND INFORMATION All Electrical accessories including CDIs, Coils and Rectifier-Regulator, must be grounded directly to the engine, using individual wires for each. By using the engine for ground (rather than the negative terminal of the battery) if the battery ground cable fails, all electrical equipment will still be grounded and will continue to operate properly. If the battery negative terminal was used for ground and the ground cable to the engine failed, not only would the engine stop (no ground to the CDIs, Coils, ect...) but upon trying to start the engine, the starter motor would try to find ground through the CDIs. This will destroy the CDIs. Do not use the airframe as a conductor for grounding.

THE MAXIMUM OIL PRESSURE DURING WARM UP AND TAKEOFF. The max. oil pressure is regulated to 93 PSI with an automatic relief valve. Wait until a minimum CHT temperature of 210 F. is reached prior to taking off.

THE NEW HKS SPARK PLUGS. Require a spark plug gap of .040. Due to the high compression ratio of 11.3 to 1, the HKS 700E requires the use of very special spark plugs. The spark plugs require replacement only every three hundred hours.

REPLACEMENT OIL FILTERS. The HKS 700E does not require the use of a special oil filter. The applicable replacements include; Napa Gold 1394, Wix 51394 and STP S4967.

Should you have any further questions, please call APSU for assistance. We can be reached at:

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