HARTZELL ENGINE TECHNOLOGIES

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Aircraft Turbocharger Installation Instructions

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NOTE: Follow the instructions & specifications of the Supplemental Type Certificate holder (STC) typically a kit or modifier company or Type Certificate Holder (TC) typically the engine or aircraft manufacturer, regarding the operation, testing, and service of Hartzell Engine Technologies LLC (HET) Aircraft Turbochargers. HET holds no TC's for any turbocharged engines, turbochargers or turbocharger control systems or components.

WARNING: TURBOCHARGERS OPERATE AT HIGH SPEED & HIGH TEMPERATURES. TO AVOID INJURY AND EQUIPMENT DAMAGE, EXTREME CAUTION MUST BE USED AT ALL TIMES DURING TURBOCHARGER OPERATIONS! KEEP FINGERS & FOREIGN OBJECTS AWAY FROM OPENINGS. AVOID CONTACT WITH HOT TURBOCHARGER SURFACES AND OTHER HOT CONNECTING PARTS.

CAUTION: Pre-oil and fully install the turbocharger before starting the engine. (See pre-oil and installation in III below.) All ducting, lines, and devices must be connected and operational. Failure to follow these and the STC or TC holders service procedures and instructions can result in premature turbocharger failure, engine loss, and/or injury. ***HET (KAPS) Service Bulletin SB 023 (latest revision) must be complied with upon installation.***

I. GENERAL

A. These instructions are for general reference only. Consult the instructions and/or manuals provided by the STC or TC holder for the current information on installation, maintenance, or testing regarding specific engines and airframes for which the STC or TC has been issued. Further information may be found in HET's manuals p/n 400600-0000 (Overhaul & Maintenance) or 400888-0000 (Troubleshooting Ref. Guide).

B. Determine why the turbocharger is being replaced. Engine air induction, fuel, exhaust, and oil supply or scavenge problems are often mistaken for turbocharger bearing and/or seal problems.

1. Even momentary reductions in oil supply pressure and flow to the turbocharger can result in significant damage. Engine bearings or other engine components may not show similar damage due to the basic operating principles of the turbocharger and the remote locations which they are installed.
2. Severe turbocharger oil leaks are most often caused by restrictions or problems in the oil return systems. Restrictions, usually from deposits, can prevent full scavenging, oil pressure to the the center housing will then flood with oil forcing oil to leak in several areas. Leaks, and/or restrictions in any part of the intake or exhaust system or any condition that results in low boost pressure can also result in Turbocharger oil leaks.
3. Carefully investigate these types of problems. Evidence can be lost or become unrecognizable during or after disassembly, removal or investigation. A turbocharger oil leak is usually an indication of a correctable engine system problem rather than a sign of a defective turbocharger that needs replacement. However, if a problem is found, the turbocharger must be repaired or replaced immediately prior to further operation.

C. Be certain there is no foreign material in the air inlet system or in the exhaust manifold. Even small or soft objects may cause extensive damage to the turbocharger wheels. Take care to avoid getting dirt or debris into any of the turbocharger openings.

D. New and replacement turbochargers may have bolts missing or deliberately left loose to facilitate installation (Kits or gaskets, not supplied by HET, may be required by airframe and/or engine manufacturer's manuals or specific instructions.) If the turbocharger bolts and nuts are all tight, all lock tabs are bent up and compressor and turbine housings are correctly aligned, proceed to **Step III** Otherwise proceed to **Step II.**

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II. REALIGNMENT OF THE END HOUSINGS

A. Loosen the compressor V-band nut (or bolt) and turbine housing bolts the minimum required to permit the end housings to rotate on the center housing. Caution should be taken as excessive loosening of the housings will allow contact with the wheel resulting in damage. No more than 1 1/2 turns of the bolts should be necessary to allow a loose fit.

B. To begin the realignment, temporarily secure the turbocharger to the engine exhaust manifold outlet flange with two or more bolts.

C. Rotate the center housing so that the oil inlet and outlet pads will mate with the engine lines. The oil outlet (largest hole must be at bottom with the center line of the hole, not more than 35 degrees from vertical. Snugly tighten at least two bolts to lock the center housing to the turbine housing.

D. Rotate the compressor housing until it lines up with the intake manifold or intercooler ducting. The connection must not place a load on the compressor housing outlet. Snugly tighten the V-band or at least two bolts to lock the housing in place.

E. Remove the turbocharger from the engine and tighten the V-band nut and/or all bolts. Alternately tighten bolts and nuts from side to side to prevent cocking of the housing. Fully seat the V-band by taping the bend lightly with a soft mallet as you slowly approach the torque setting. Refer to torque values specified in the applicable TC or STC manual. (See I-General-A above.)

F. Bend the lockplate tabs up against a flat on each nut or bolt head in a direction that will tend to tighten the bolt or nut. Do not re-use lockplates. V-band nuts are self-locking.

III. INSTALLATION AND PRE-OILING OF TURBOCHARGERS

A. Clean exhaust manifold mounting flange. Inspect flanges for erosion and flatness. Install a new gasket if used, (never re-use gaskets). Refer to the appropriate manuals for cleaning and gasket part numbers.

B. Inspect oil drain and supply lines, fittings and devices for kinks, deposits, or restrictions. Check for any other signs of deterioration or defect. Discrepancies found in lines, fittings, or devices may indicate conditions that require immediate investigation and correction.

C. Install turbocharger on the engine using new gaskets and/or "O" rings, but do not connect the compressor inlet and oil supply line at this time. TIghten the nuts (or bolts) attaching the turbocharger to any brackets and the exhaust manifold using the TC or STC instructions and torque values. (See I-General-A above.)

D. Fill the oil inlet hole on the turbocharger with clean engine oil and spin the compressor wheel by hand several times to coat the bearings with oil. Prepare and turn engine over with starter, until a full and steady stream of oil flows from the turbocharger supply line. Refill the oil inlet hole and connect the oil supply line using the TC or STC instructions and torque values. Check the engine oil per the aircraft AFM or POH and fill to proper levels.

E. Verify by hand, that compressor wheel spins freely. If the compressor wheel is not free to spin or if there is an indication of rubbing or scraping, the reason must be determined and corrected before proceeding. NEVER RETURN THE TURBOCHARGER TO SERVICE WITH A RUBBING CONDITION. Connect the compressor induction system using TC or STC instructions and torque values.

IV. ENGINE START

A. Before attempting to START the engine, crank the engine with the ignition and fuel off for 10 to 15 seconds to assure the oil pressure gauge indicates pressure. (Take all precautions to avoid injury during this process!)

B. Start the engine and idle or develop only low output for 3-4 minutes. If oil pressure deteriorates or fluctuate, shut down immediately and investigate cause.

C. Inspect for oil leaks, correct anomalies as required. (Note: Normal oil seepage may occur during initial operation due to pre-oiling procedures or storage. This can result in small duration leaks or a minor amount of oil smoke from high temperature parts of the turbocharger.) The turbocharger is only one component in the aircraft. Aircraft return to service may require many more steps be taken than contained on this tag.