

CHAMPION AIRCRAFT CORPORATION
Osceola, Wisconsin

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SERVICE HELPS AND HINTS #14

SUBJECT: Removal and installation of Champion and Chief Propellers - Tapered Crankshaft Engines.

A few cases have been reported from the field, where difficulty has been encountered in removing the propellers from the Model 11AC Chief. This trouble has usually resulted in damage to the threads of the crankshaft and to the propeller hub nut. It is thought possible, that this trouble may be the result of incorrect installation procedure in the field. Two reasons contribute to this thought, as follows:

- (1) Extreme care is taken, here at the factory, in installing the propeller and especially in preventing the over-tightening of the propeller hub nut, which could result in galling of the threads upon propeller removal.
- (2) A slight amount of crankshaft and play may be felt by violently shaking almost any propeller hub in the fore and aft direction. It is thought possible that this end play may be mistaken for propeller looseness, with the result that the propellers are being over-tightened, thus causing the removal difficulty.

In an effort to reduce the possibility of Champion owners and operators encountering this difficulty, the following procedures are recommended during the subject operations on the Continental A-65-8 tapered shaft engine:

REMOVAL

1. Remove cotter key in hub nut and end of crankshaft. Use penetrating oil on Thread of Nut, constantly.
2. Select bar approximately 1/2" in diameter and not over 18 inches long. Insert end of bar through hub nut and by a steady torque in a counter-clockwise direction (facing aft with respect to the airplane) gently crack hub nut loose, but do not loosen over 1/2 - 3/4 turn. This should require no more torque on end of torque bar, than can be conveniently applied by one man. This initial loosening represents the initial overcoming of the friction between the crankshaft and the hub nut threads, caused by the hub nut holding the hub onto the taper of the shaft. Prior to this initial loosening, the snap ring in the hub nut should have been up against the forward side of its groove in the hub nut.
3. At this point, the hub nut should turn freely, probably with the fingers, and the snap ring should be riding in the center portion of its groove.

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4. Continue to loosen the freely turning hub nut, until beginning to feel resistance. This should occur at approximately one (1) to three (3) additional turns. This resistance occurs when the snap ring butts against the aft side of its groove and when additional loosening of the nut will begin to break the hub loose from the taper on the shaft. Extreme caution should be TAKEN at and beyond this point, as this is the point where the trouble is believed to be occurring. Do not force the nut rapidly past this point. Do not hammer end of torque bar.
5. As this resistance is felt, the torque bar should be moved slowly and evenly to prevent thread injury due to galling, or due to the cadmium plate rolling, on the hub nut threads. If the slightest seizing is felt, the torque bar should be backed off an inch or so, and then brought back smoothly, in the direction to loosen. At this point, it usually helps to apply a little vibration or shock by hitting the tip of the propeller briskly with the hand or fist, by placing a wood block across the end of the shaft and tapping with a hammer, or by tapping the end of the shaft with a wooden mallet, to help break the seal between the hub and the shaft. This seal may be rather strong, inasmuch as a taper is involved, and also since any oil, however light, used to lubricate the shaft while installing the propeller, contributes to the seal on such a tapered shaft. Best results will probably be obtained by working the hub nut off in this manner while simultaneously applying this shock to break the seal. If it appears that the seal is tight, it may be a wise precaution to insert a thin spacer or two, such as a feeler gauge or end of a thin screw driver, between the snap ring and the shaft to prevent the snap ring being forced out of its groove. This possibility exists, especially, if the snap ring and/or groove is worn, since it is this snap ring which actually drags the hub off of the shaft.
6. The above procedure should loosen the propeller to the point where it can easily be removed from the shaft. If the nut cannot be worked loose by the jockeying of the torque bar, it is indication that the threads are jammed. Further forcing will only strip the plating from the hub nut and jam up the threads. In most cases which have been reported, the shaft threads have incurred more injury than the hub nut thread. If it appears the point is being reached, where this jamming is about to occur, it would be wisest to split the hub nut off the shaft to prevent further injury to the crankshaft threads.

INSTALLATION

1. Turn crankshaft so that keyway is upward.

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2. The engaging surfaces, including the threads, of both the shaft and hub, including hub nut, should next be thoroughly cleaned of any grease, oil or rust inhibitors by scrubbing with gasoline. These surfaces should then be wiped dry with a clean dry rag. Do not touch with bare fingers after wiping dry.
3. Coat the surfaces with an extremely light coat of light oil, such as sewing machine or instrument oil, by wiping these surfaces with a clean rag onto which this oil has been sprinkled.
4. Fit key into its keyway on the shaft.
5. By looking aft down end of shaft, line up key with its keyway in the hub and slip hub gently onto shaft taking care not to bang threads in hub nut up against threads on shaft.
6. Start hub nut onto shaft with fingers taking extreme care not to cross thread. A little graphite, white lead, or thread lube may be applied to the threads at this stage if desired.
7. Continue to run the nut up almost all the way by hand. When it starts to tighten, torque up using a bar not over 18 inches long and using no more force on the end of the bar than can be conveniently applied by one man. Do not hammer bar. In general, this should result in the hub nut being turned approximately 90° past the point where the nut can be tightened by hand. If the nut is overtightened, it may again roll up the plating on the threads and jam them, resulting in the necessity of splitting the nut to remove the propeller. It is not necessary to have this nut exceedingly tight, as the taper eliminates this necessity.

Your Distributor and Dealer will be glad to assist in any case beyond your control.

Sincerely,

CHAMPION AIRCRAFT CORPORATION

Engineering Service Department

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