Manual 136
61-00-36
Revision 1
August 2013

Propeller Owner's Manual

Reversible Propeller Model
( )HC-E( )Y( )-7

Pressure Control Unit
B-4270-( )

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REVISION HIGHLIGHTS:

Revision 1, dated August 2013, incorporates the following:

- Revised Cover for Revision 1
- Added Revision Highlights section
- Added Record of Revisions section
- Added Airworthiness Limitations section

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RECORD OF REVISIONS

Rev. No.	Issue Date	Date Inserted	Inserted By
Original	June 21, 1982	June 21, 1982	HPI
Rev. 1	Aug/13	Aug/13	HPI

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AIRWORTHINESS LIMITATIONS

The Airworthiness Limitations section is FAA approved and specifies maintenance required under 14 CFR §§ 43.16 and 91.403 of the Federal Aviation Regulations unless an alternative program has been FAA approved.

FAA APPROVED

by: _____ date: 8/16/13

for Manager, Chicago Aircraft Certification Office,
ACE-115C
Federal Aviation Administration

Rev. No.	Description of Revision
1	Added Airworthiness Limitations section to manual

AIRWORTHINESS LIMITATIONS

1. The FAA establishes specific life limits for certain component parts as well as the entire propeller. Such limits require replacement of the identified parts after a specified number of hours of use.
2. The following data summarizes all current information concerning Hartzell life limited parts as related to propeller models affected by this manual. These parts are not life limited on other installations; however, time accumulated toward life limit accrues when first operated on aircraft/engine/propeller combinations listed and continues regardless of subsequent installations (that may or may not be life limited).
   A. Propeller models affected by this manual currently do not have any life limited parts.
   B. There are no new (or additional) Airworthiness Limitations associated with this equipment and/or installation.

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for Manager, Chicago Aircraft Certification Office,
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TRW HARTZELL PROPELLER
OPERATOR'S MANUAL NO. 136

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1. OPERATION:

A. The propeller is basically a TRW Hartzell constant speed propeller controlled by a conventional governor.

CAUTION: REMOVAL OF CYLINDER WITHOUT POSITIVE CONTROL IS FORBIDDEN. REMOVAL OF SPRING WITHIN HUB EXTENSION WITHOUT POSITIVE CONTROL IS FORBIDDEN.

B. Operation is such that the counterweights provide only sufficient force to neutralize blade twisting moment. Governor oil pressure rotates the blades into low pitch (high RPM) and reverse blade angles, while springs contained within the hub assembly rotates the blades towards high pitch (low RPM) position.

C. A pressure control unit is located between governor and propeller to sense and control the oil pressure supplied from the governor to the propeller.

D. In normal operation when low pitch is required, oil pressure from the governor is directed to the propeller to move the piston forward until the stop collar contacts the low pitch stop unit. Blade angle will not decrease below low pitch for two reasons:

(1) When propeller RPM is above a slow idle, the centrifugal locks in the low pitch stop unit are engaged in the hub and will not allow the stop collar to move forward.

(2) The pilot control is positioned on a detent such that the control plunger compresses the pressure control spring against the relief valve. This limits the oil pressure to the propeller to a maximum which is insufficient to compress the propeller spring.

E. Reverse operation is accomplished when the centrifugal locks are released from the hub by decreasing RPM and the pilot control is repositioned to increase the oil pressure to the propeller.

F. A presssure gage will be visible to the pilot to relate oil pressure to the propeller under all operating conditions.

2. INSTALLATION INSTRUCTIONS:

A. The compact propellers are manufactured with five basic flange mountings; "F", "K", "L", "N" and "R".

B. The "F" flange has six 1/2 inch studs on a four-inch bolt circle, plus two 1/2 inch dowel pins. These dowel pins are located to provide a specific angular relationship of the propeller with respect to the crankshaft, made necessary by the vibrational characteristics of the combination. The particular dowel pin location is identified by the first letter in the hub model designation, such as BHC-C2YF.

C. The "L" flange is a SAE No. 2 flange with 7/16 inch studs while the "K" flange is also SAE No. 2 flange with 1/2 inch studs. The "R" is same as "K" except it has five drive bushings instead of four.

D. Installation of "F" and "N" flange:

(1) Install the spinner bulkhead on the propeller hub, using the four long bolts which clamp the two halves together. In most cases extra long bolts, together with the proper spacers, are furnished with the spinner. Torque the 3/8-24 nuts to 22 ft. lbs.

(2) Clean the engine shaft and hub flange.

(3) "F" flange - insert the PRP-909-6 "O" ring into the groove located inside the hub at the flange mounting.

(4) "N" flange - insert the PRP-914-45 "O" ring into the groove located inside the hub at the flange mounting.

(5) Install the propeller on the engine shaft.

(6) "F" flange - torque the 1/2 inch nuts to 60 to 70 ft. lbs. except for the Continential IO-520 which is 70 to 80 ft. lbs.

(7) "N" flange - torque the 9/17 inch nuts to 90 to 100 ft. lbs.

E. Installation of "K", "L", "N" and "R" flange models:

(1) Install spinner adaptor ring to engine starter gear.

(2) Clean engine shaft and propeller hub at flange.

(3) Insert the PRP-909-6 "O" ring into the groove located inside the flange mounting.

(4) Install propeller onto engine shaft. Torque the 7/16 inch studs used in the "L" flange to 50 ft. lbs. Torque the 7/16 inch bolts or studs used in the "L" flange propellers to 50 ft. lbs., the 1/2 inch bolts on studs used in the "K" and "R" flange propellers to 60 to 70 ft. lbs. and the A-3254 stud used in the "N" flange propellers to 90 ft. lbs. Safety wire pairs of studs or bolts together. Exception: For IO-720 engine use 90 to 100 ft. lbs.

(5) Install spinner dome. The spinner nose is supported by the cylinder, only for the feathering models. Safety wire the nut used to secure the nose in place.

3. INSTALLATION OF PRESSURE CONTROL UNIT AND GOVERNOR:

A. The pressure control unit is installed between the governor and the engine pad. Inorder to provide for the added thickness of the pressure control unit, longer studs are installed in the engine. The pressure control unit is installed first, using a gasket between the unit and engine pad. The governor is installed using another identical gasket. The lever on the pressure control unit must be positioned in accordance with the aircraft manufacturer's recommendation and the lever then linked to the pilot control lever per aircraft manufacturer's recommendations.

4. PRESSURE CONTROL UNIT ADJUSTMENT:

A. Locate screw, lock nut and bracket unit at end of plunger.

B. Adjustment of screw is to satisfy D.(2) of "Operation".

C. Adjustment of screw will produce the following results:

(1) Pushing plunger into valve body will cause higher propeller pressure.

(2) Allowing plunger to exit body will cause lower propeller pressure.

D. At start up a pressure too high will cause propeller to reach blade angles lower than low pitch stop setting. With pressure too high at low RPM (below 1000 RPM) the stop collar would be able to overpower preloaded propeller spring and move low pitch stop unit before centrifugal locks could engage to prevent reversing (beta operation). The results would be that maximum RPM could be easily attained with much less than maximum throttle.

E. Start up with a pressure too low would not allow governor to counterbalance propeller internal forces and drive blade pitch to a low enough angle to obtain maximum RPM. At maximum throttle the propeller would be underspeeding.

F. A pressure just sufficient to reach maximum RPM + 15 PSI is the desired location for the screw. In the propeller the stop collar has just contacted the low pitch stop unit and the additional 15 psi is not sufficient to overpower the preloaded propeller spring.

5. PILOT CONTROL OF TRW HARTZELL PRESSURE REVERSING SYSTEM:

A. Normal propeller operation is the same as most TRW Hartzell constant speed propellers which are controlled by a conventional governor.

B. Control of blade angle between low pitch and full reverse is accomplished by using the pilot control only.

C. Reverse angle operation is initiated by first reducing propeller RPM to low speed idle to unlock the centrifugal locks. The pilot control is released from a restraining detent and repositioned to increase the oil pressure supplied to the propeller to decrease blade angle below low pitch.

D. Increase propeller pressure until a flat pitch (no thrust condition) is reached. This will correspond to a physical intermediate stop on the pilot control. Power must be increased to increase propeller RPM to some desired level below maximum governor RPM setting. No further throttle manipulation should be necessary.

E. Reverse, zero and forward thrust may now be controlled moving the pilot control backward, midway or forward.

(1) During reversing operation the forward movement of the pilot control should only be up to the detent. If it were pushed onto the detent, the propeller would go into low pitch and lock into position due to the centrifugal locks which prevent inadvertent reversing.

F. The propeller will return to normal constant speed operation when the pilot control is pushed onto the detent. Reverse operation is now locked out unless C, D and E are repeated.