PROPELLER (HARTZELL) - DESCRIPTION AND OPERATION

1. General

A. There are two possible Hartzell propeller installations for the Model 208/208B airplanes. Airplanes 208B5000 and On have a HC-B3TN-3AFX/T10890CNB propeller assembly installed. Airplanes 20800001 thru 20800188 and airplanes 208B0001 thru 208B0217 have a Hartzell Model HC-B3MN-3/M10083 propeller assembly installed.

(1) The Model HC-B3TN-3AFX/T10890CNB propeller is a three-bladed, constant-speed, full-feathering, reversible, governor-regulated propeller equipped with aluminum blades.

(2) The Model HC-B3MN-3/M10083 propeller is a three-bladed, constant-speed, full-feathering, reversible, governor-regulated propeller equipped with composite blades.

B. A propeller control lever on the control quadrant in the cockpit establishes a setting in the propeller governor through a linkage to the engine compartment. This setting (of the governor pilot valve) establishes propeller speed by balancing governor-boosted oil pressure/flow against a servo piston in the propeller hub with the action of return springs in the hub and centrifugal counter-weights on the blade shanks acting to drive the servo piston in the opposite direction. Since the servo piston is linked to the blades, its position thus governs their setting or blade angle and hence determines propeller speed. Increasing oil pressure against the piston drives the blades toward low pitch (high RPM) and into reverse while the return springs and the counterweights acting against the piston, drives the blades toward high pitch (low RPM) and into feather. The source of propeller system oil is the engine pressure lubrication system boosted to a higher pressure by the propeller governor gear pump.

2. Description

A. The propeller assembly consists of a hollow steel spider hub which supports three propeller blades and also houses an internal oil pilot tube and feather return springs. Movement of propeller blades is controlled by a hydraulic piston mounted at the front of propeller spider hub. The servo piston is connected by a link to the trailing edge root of each blade. Centrifugal counterweights on each blade and feathering springs in servo piston tend to drive servo piston into the feather or high pitch position. This movement is opposed by the propeller governor oil pressure. The governor oil pressure is applied to servo piston via passages in governor body, an oil transfer tube, and oil transfer housing on propeller shaft, and via the hollow centerbore of propeller shaft and propeller hub. An increase in governor oil pressure moves blades toward low pitch position (increased RPM). A decrease in governor oil pressure allows the blades to move toward high pitch position (decreased RPM) under the influence of feathering springs and blade counterweights (Refer to Figure 1).

B. The servo piston is also connected by three spring-loaded sliding rods to a feedback ring mounted at rear of propeller. Movement of feedback ring is transmitted by a carbon block through the propeller reversing lever to Beta valve on propeller governor. This movement is used to control propeller blade angle from the normal forward low pitch stop to full reverse position.

C. The HC-B3TN-3AFX/T10890CNB propeller assembly propeller blades are made from high strength aluminum alloy. The propeller blades and bearing assemblies are mounted on the arms of a steel hub unit. They are attached to the hub with a two-piece blade clamps. The hub has a cylinder that is threaded in it. A feathering spring assembly is installed in the cylinder. A piston is installed over the cylinder and connected with a link arm to each blade clamp. The hydraulically actuated piston linear motion is transmitted to each blade through the link arms and blade clamps to the propeller to cause the blade angle to change.

D. The Model HC-B3MN-3/M10083 propeller assembly high-strength, lightweight composite blades consist of an aluminum blade shank retention section, into which is molded a high-density foam filler, varying layers of Kevlar material covering blade foam section, and a metal cap molded into blade leading edge. Completing the assembly is a Kevlar filament winding which creates blade primary retention. Secondary retention is an integral part of the assembly and is retained by blade clamp of propeller assembly. Blade balance is achieved by the incorporation of a balance tube centrally located in blade foam core and retained by aluminum blade shank. It is essential that the propeller blades be properly maintained in accordance with Hartzell Propeller Products recommended service procedures. Refer to procedures the Hartzell Composite Blade Inspection, Repair, and Overhaul Instructions Manual No.135C-13 found in the Introduction List of Publications.

Figure 1 : Sheet 1 : Hartzell Propeller Assembly Cutaway