

Troubleshooting

A. Introduction

The following troubleshooting information is provided to allow the pilot and/or mechanic to isolate potential propeller problems. This information is directed mainly toward personnel involved with operating or maintaining piston engine aircraft. The procedures below should be used as a guide, and are general in nature. They should not be used in lieu of the authorized, published procedures applicable to a specific propeller system.

B. Hunting and Surging

Hunting is characterized by a cyclic variation in engine speed above and below desired speed. Surging is characterized by a large increase/decrease in engine speed, followed by a return to set speed after one or two occurrences.

(1) If propeller is hunting, a repair facility should check:

- (1) Governor
- (2) Fuel control
- (3) Synchrophaser, or synchronizer.

(2) If propeller is surging:

Cycle propeller to release trapped air from the propeller. If surging reoccurs, it is most likely due to a faulty governor.

(3) Hunting and/or surging may also be caused by friction or binding within the governor control, or internal propeller corrosion which causes the propeller to react slower to governor commands. The propeller and governor must be tested at a propeller repair facility to isolate these faults.

C. Engine Speed Varies with Flight Altitude (or Airspeed)

(1) Small variances in engine speed are normal and are no cause for concern.

(2) Increase in engine speed while increasing airspeed:

(a) Non-feathering propeller:

- 1 Governor is not increasing oil volume in propeller.
- 2 Engine transfer bearing leaking excessively.
- 3 Excessive friction in blade bearings or pitch changing mechanism.

(b) Feathering or Aerobatic propeller:

- 1 Governor is not reducing oil volume in propeller.
- 2 Air charge, if required, too low.
- 3 Excessive friction in blade bearings or pitch changing mechanism.

(3) Decrease in engine speed while increasing airspeed:

(a) Non-feathering propeller:

- 1 Governor pilot valve is stuck and is excessively increasing oil volume.

(b) Feathering or Aerobatic propeller:

- 1 Governor pilot valve is stuck and is excessively decreasing oil volume.
- 2 Feathering command engaged on propeller pitch control.

- (4) Increase in engine speed while decreasing airspeed:
 - (a) Non-feathering propeller:
 - 1 Governor pilot valve is stuck and is excessively decreasing oil volume.
 - (b) Feathering or Aerobatic propeller:
 - 1 Governor pilot valve is stuck and is excessively increasing oil volume.

- (5) Decrease in engine speed while decreasing airspeed:
 - (a) Non-feathering propeller:
 - 1 Governor is not reducing oil volume in propeller.
 - 2 Excessive friction in blade bearings or pitch changing mechanism.
 - (b) Feathering or Aerobatic propeller:
 - 1 Governor is not increasing oil volume in propeller.
 - 2 Air charge, if required, too high.
 - 3 Engine transfer bearing leaking excessively.
 - 4 Excessive friction in blade bearings or pitch changing mechanism.

D. Loss of Propeller Control (Non-feathering propeller only)

- (1) Propeller goes to Uncommanded Low Pitch (High RPM)
 - (a) See recommendations under D.1.(a), below.
- (2) Propeller goes to Uncommanded High Pitch (Low RPM)
 - (a) Governor pilot valve sticking.
- (3) RPM Increases with Power and Airspeed, Propeller RPM Control has Little or No Effect.
 - (a) Excessive friction in blade bearings or pitch changing mechanism.
 - (b) Internal oil leakage to opposite side of piston and into hub.

E. Loss of Propeller Control Feathering or Aerobatic propeller

- (1) Propeller goes to Uncommanded High Pitch (or feather)
 - (a) Loss of propeller oil pressure - check:
 - 1 Governor pressure relief valve for proper operation.
 - 2 Governor drive for damage.
 - 3 Adequate engine oil supply.
 - 4 Engine transfer bearing leaking excessively.
 - (b) Start locks not engaging (feathering or Aerobatic propellers only)
 - (c) Air charge pressure too high (feathering or Aerobatic propellers only).
- (2) Propeller goes to Uncommanded Low Pitch (High RPM)
 - (a) Governor pilot valve sticking.
- (3) RPM Increases with Power and Airspeed, Propeller RPM Control has Little or No Effect.
 - (a) Excessive friction in blade bearings or pitch changing mechanism.
 - (b) Air charge lost or low, if required.
 - (c) Broken feathering spring (feathering propellers only).

(4) RPM Control Sluggish

(a) Air charge lost or low (feathering propellers only).

F. Failure to Feather or Feathers Slowly (feathering propellers only)

(1) Air charge lost or low.

(2) Check for proper function and rigging of propeller/governor control linkage.

(3) Check governor drain function.

(4) Propeller must be checked at a propeller repair facility for misadjustment or internal corrosion (usually in blade bearings or pitch changing mechanism) that results in excessive friction.

G. Failure to Unfeather

(1) Check for proper function and rigging of propeller control linkage.

(2) Check governor function.

(3) Check for excessive oil leakage at engine transfer bearing.

(4) Propeller must be checked at a propeller repair facility for misadjustment or internal corrosion (usually in blade bearings or pitch change mechanism) that results in excessive friction.

H. Start Locks (Anti-feather Latches) Fail to Latch on Shutdown (feathering propellers only)

(1) Propeller was feathered prior to shutdown.

(2) Shutdown occurred at high RPM with prop control off the low pitch stop.

(3) Air charge too high.

(4) Excessive engine transfer bearing oil leakage.

(5) Excessive governor pump leakage.

(6) Broken start locks.

Problems G(1) and G(2) above may be solved by restarting the engine, placing the propeller control in the proper shutdown position, and then shutting down the engine.

Problems G(4), G(5), and G(6) should be referred to an authorized repair facility.

I. Vibration

CAUTION: ANY VIBRATION, WHICH CAN BE DESCRIBED AS APPEARING SUDDENLY, OR IS ACCOMPANIED BY UNEXPLAINED GREASE LEAKAGE SHOULD BE INVESTIGATED IMMEDIATELY BEFORE FURTHER FLIGHT.

NOTE: Vibration problems due to propeller system imbalance are normally felt throughout the RPM range, with the intensity of vibration increasing with RPM. Vibration problems that occur in a narrow RPM range are a symptom of resonance, which is potentially harmful to the propeller. Avoid operation until an authorized repair station can check the propeller.

(1) Check:

- (a) Control surfaces, cowl flaps, exhaust system, landing gear doors, etc. for excessive play which may be causing vibration which is unrelated to the propeller.
- (b) Isolation of engine controls and lines.
- (c) Engine mount wear.
- (d) Uneven or over lubrication of propeller.
- (e) Proper engine/propeller flange mating.
- (f) Blade track.
- (g) Blade angles: Blade angle must be within tolerance between blades and on the propeller as a whole. Refer to the Propeller Overhaul Manual for blade angle check procedure.
- (h) Spinner for cracks, improper installation, or "wobble" during operation.
- (i) Static balance.
- (j) Airfoil profile identical between blades (after overhaul or rework for nicks - verify at propeller repair station).
- (k) Propeller installation - remove and reinstall propeller 180° from original installation position.
NOTE: "R" flange propellers installed on an "R" engine flange cannot be reinstalled 180° from original installation position.
- (l) Hub damage or cracking.
- (m) Grease or oil leakage.
- (n) Bends or blade deformation.

NOTE: Dynamic balancing is recommended after installing or performing maintenance on a propeller. While normally an optional task, it may be required by the engine or airframe manufacturer to make certain the propeller/engine combination is balanced properly before operation. Refer to the engine or airframe manuals.

J. Propeller Overspeed

(1) Check:

- (a) Tachometer error.
- (b) Low pitch stop adjustment.
- (c) Governor Max. RPM set too high.
- (d) Loss of oil pressure (non-feathering propellers only)
 - 1 Oil starvation
 - 2 Governor failure
- (e) Loss or lowered air charge (feathering propellers - results in momentary overspeed)
- (f) Governor pilot valve jammed to supply high pressure only (feathering or Aerobatic propellers).
- (g) Oil leaking past piston causing hydraulic lock of piston in cylinder (non-feathering propellers only).

K. Propeller Underspeed

(1) Check:

- (a) Tachometer error.
- (b) Excessive transfer bearing oil leakage (feathering or Aerobatic propellers).
- (c) Governor oil pressure low (feathering or Aerobatic propellers).
- (d) Governor oil passage clogged.
- (g) Oil leaking past piston causing hydraulic lock in cylinder (feathering or Aerobatic propellers).

L. Oil or Grease Leakage

NOTE: A new propeller may leak slightly during the first several hours of operation. This leakage may be caused by the seating of seals and O-rings, and the slinging of lubricants used during assembly. Such leakage should cease within the first ten hours of operation.

CAUTION: GREASE LEAKAGE WHICH CAN BE DESCRIBED AS EXCESSIVE AND APPEARING SUDDENLY, ESPECIALLY WHEN ACCOMPANIED BY VIBRATION SHOULD BE INVESTIGATED IMMEDIATELY BEFORE FURTHER FLIGHT.

(1) Check:

- (a) Damaged blade shank to hub O-ring seal.
- (b) Damaged hub seal (at hub parting line).
- (c) Damaged engine transfer O-ring at hub/engine flange interface.
- (d) Cracked hub. A cracked hub is often indicated by grease emerging from a seemingly solid surface, especially in the blade arm area.