



SPECIAL AIRWORTHINESS INFORMATION BULLETIN

Aircraft Certification Service
Washington, DC

U.S. Department
of Transportation

**Federal Aviation
Administration**

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<http://www.faa.gov/aircraft/safety/alerts/SAIB>

This is information only. Recommendations aren't mandatory.

Introduction

This Special Airworthiness Information Bulletin (SAIB) alerts you, owners, operators, pilots, mechanics, and certificated repair facilities of **all turboprop airplanes using propellers with four or more blades**, to check propeller idle RPM settings and any propeller RPM restrictions or limitations, and to **adhere to the propeller RPM restrictions or limitations**. We recently learned of several turboprop aircraft with engine idle speeds set within the propeller restricted RPM range, which could become a potential safety of flight issue.

Background

We have become aware of a potential safety of flight issues that could exist on numerous turbine powered aircraft using propellers with four or more blades. The subject propellers are installed on, but not limited to the following aircraft:

Manufacturer	Models
Air Tractor, Inc.	AT-501, AT-502, AT-502A, AT-502B, AT-503, AT-503A, AT-602, AT-802
Bombardier, Inc.	DHC-6-100,-200,-300
Cessna Aircraft Company, The	441
Fairchild	Merlin, Metroliner
Mitsubishi Heavy Industries, Ltd.	MU-2B Series

Manufacturer	Models
Pilatus Aircraft Limited	PC-6, PC-7, PC-12
Piper Aircraft, Inc., The New	PA-31T, T1, T2, T3
Raytheon Aircraft Company	A100 Series, A200, B100 Series, B200, B300, C90 Series, C99
Short Brothers PLC	SC-7 (Skyvan), SD3-30, SD3-60
SOCATA - Groupe Aerospatiale	TBM 700
Twin Commander Aircraft Corporation	690 Series

The propeller installations are controlled by the various airframe manufacturers Type Certificate (TC) or by Supplemental Type Certificate (STC) holders.

The minimum propeller idle RPM operating restriction is the result of a specific vibratory resonant condition known as a “reactionless mode”. Ground operation at or near a reactionless mode vibratory resonance might cause very high stresses in propeller blades and hubs. These high stresses are more severe when operating in a tailing wind condition. Often times the flight crew cannot feel the resulting high propeller vibratory stress that can occur at certain propeller RPM’s. If the propeller is operating within a restricted RPM range or below a minimum RPM restriction for an extended period of time, the propeller blades and hub may become un-airworthy due to fatigue. Hub or blade failure has the potential to cause a catastrophic event due to

blade separation. These propeller RPM restrictions might be either below or above the propeller idle RPM range and are of equal importance. The RPM restrictions might vary with different airframe, engine/ propeller applications.

The propeller operating restrictions or limitations are found in the Airplane Flight Manual (AFM) or Airplane Flight Manual Supplement (AFMS). The propeller RPM restrictions or limitations might not be marked on the instrumentation or placarded when proper rigging of the engine and propeller prevents the propeller from operating in a restricted region. Therefore, it might not be evident, without checking the AFM or AFMS that the propeller is operating in a restricted region if the RPM has not been rigged correctly.

You must ensure the propeller is rigged in accordance with applicable TC holder or STC holder propeller installation and rigging instructions, and set proper minimum propeller RPM, engine idle speed, and engine torque settings. Depending on the application, it is possible that the mechanic could improperly rig the ground RPM or the pilot could manually control the engine such that the propeller is operating at a restricted RPM. Since either the mechanic or pilot could cause improper operation and since they might be unaware of the serious effects of such operation, both the AFM and the Airplane Maintenance Manual (AMM) should contain a clear statement of the propeller operating restriction and an informative warning.

The following is a suggested AFM warning note:

WARNING
STABILIZED GROUND OPERATION
WITHIN THE PROPELLER RESTRICTED
RPM RANGE CAN GENERATE HIGH
PROPELLER STRESSES AND RESULT IN
PROPELLER FAILURE AND LOSS OF
CONTROL OF THE AIRCRAFT.

The following is a suggested AMM warning note:

WARNING
STABILIZED GROUND OPERATION
WITHIN THE PROPELLER RESTRICTED
RPM RANGE CAN GENERATE HIGH
PROPELLER STRESSES AND RESULT IN
FATIGUE DAMAGE TO THE PROPELLER.
THIS DAMAGE CAN LEAD TO A
REDUCED PROPELLER FATIGUE LIFE,
PROPELLER FAILURE, AND LOSS OF
CONTROL OF THE AIRCRAFT. THE
PROPELLER RESTRICTED RPM RANGE
IS DEFINED IN THE AIRPLANE FLIGHT
MANUAL. CONTACT THE AIRCRAFT OR
PROPELLER MANUFACTURER FOR
CORRECTIVE ACTIONS IF A PROPELLER
RESTRICTION OR LIMITATION IS
VIOLATED.

Recommendation

We strongly recommend that you:

- Check the AFM or AFMS to determine if there are any propeller RPM restrictions or limitations.
- Check the accuracy of the tachometer.
- Check the propeller RPM settings to determine if the propeller is operating within a propeller restricted RPM range or below a minimum propeller RPM.
- Contact the propeller manufacturer for corrective action if the propeller has been operated in such a way as to violate the operating restrictions or limitations.
- Correct the propeller RPM setting, if necessary. Refer to the applicable installation and rigging instructions for the adjustment of engine torque, engine idle speed, and propeller RPM setting.
- Adhere to the propeller RPM restrictions or limitations.
- Make sure a clear statement of the propeller operating restriction and an informative warning is in the AFM and the AMM.

For Further Information Contact

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FAA Contact; Tim Smyth, Aerospace Engineer, FAA Chicago Aircraft Certification Office, Propulsion Branch, ACE-118C, 2300 East Devon Avenue, Des Plaines, IL 60018; phone: (847) 294-7132, fax: (847) 294-7834

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