



U.S. Department  
of Transportation  
**Federal Aviation  
Administration**

# SAFO

Safety Alert for Operators

SAFO 15007  
DATE: 6/19/15

Flight Standards Service  
Washington, DC

**[http://www.faa.gov/other\\_visit/aviation\\_industry/airline\\_operators/airline\\_safety/safo](http://www.faa.gov/other_visit/aviation_industry/airline_operators/airline_safety/safo)**

*A SAFO contains important safety information and may include recommended action. SAFO content should be especially valuable to air carriers in meeting their statutory duty to provide service with the highest possible degree of safety in the public interest. Besides the specific action recommended in a SAFO, an alternative action may be as effective in addressing the safety issue named in the SAFO.*

**Subject:** Pratt & Whitney R-985-AN-14B Flyweight Hardware Failures

**Purpose:** This SAFO advises aircraft owners, operators and mechanics about potential engine failures due to fatigued flyweight screws and associated expanders that are incorrectly modified and/or under-torqued during installation.

**Background:** Since June of 2013, there have been three documented engine failures caused by failed flyweight screws. These failures occurred during flight, resulting in forced landings. At the time of the failures, engine time since overhaul ranged from 2.5 hours to 671.6 hours. The engine crankshaft assemblies were overhauled by three different repair facilities. Additionally, inspections of at least four other engines have found cracked screws (P/N 23902, reference image on pg 4) and under torqued and/or improperly modified expanders (P/N 44718, reference image on pg 4) used to secure the screws in the flyweights.

Additional engine models that could be affected by this issue due to similar design include all Pratt & Whitney Wasp Jr (R-985 Series) and Wasp (R-1340 Series) engines, reference image on pg 3.

The list of aircraft that use these engines include, but are not limited to:

- Air Tractor AT-301 and 401;
- Ayres Thrush;
- Beechcraft D17 and 18 series;
- Boeing-Stearman 75: de Havilland DHC-2 and DHC-3;
- Gee Bee;
- Grumman G-21 and G-164;
- Howard DGA-6, -11, -15;
- North American T-6; and
- Weatherly 201 and 620.

It should be noted that individual crankshaft assemblies not yet installed in the above engines are also subject to this alert as well as serviceable parts in stock or in work.

**Discussion:** Inspections of several engines, including those undergoing overhaul, have found multiple instances where steps have formed on the internal threads of the flyweight screws into which the expander is threaded securing the screw in the flyweight. These steps may impede the proper torqueing of the expander which could lead to fatigue cracking of the screws and resulting failure. The Federal Aviation

Administration (FAA) is currently not aware of any document that approves the removal of steps in the threads of the screw. If, during inspection of the screw, any of the following are found, the screw should be replaced:

- Steps in the threads of the screw;
- The surface of the screw is not smooth or has tool marks; or
- The surface treatment on the screw has been removed.

The current overhaul manual recommends a torque of approximately 1300 inch-pounds to install the screw and a recommended screw stretch of 0.001 to 0.0015 inch. If, at any time during the course of torquing the screw, the screw stretch exceeds the limitations listed in the overhaul manual, the screw should be replaced.

After torquing the flyweight screw, the overhaul manual requires the expander plug be threaded into the screw and torqued 200 to 225 inch-pounds. The manual then provides a maximum measurement of 0.060 inch for the expander to protrude beyond the end of the screw. During engine inspections, multiple expanders have been found that have been modified by removal of up to half of the height of the expander. The FAA is currently not aware of any document, process or guidance that authorize removing material from the expander to meet the projection measurements. If, during inspection of an engine, an expander is found to have been modified in any way, the expander should be replaced. Continued use of an altered expander plug, which may not engage the proper amount of threads in the screw, could result in improper torque and subsequent fatigue failure of the screw.

**Recommended Action:** Owners, operators, mechanics and repair facilities should be familiar with the content of this SAFO.

- Certain maintenance actions accomplished between overhauls may provide visual access to the engine flyweights, i.e. cylinder replacement, etc. Owners, operators and repair facilities are urged to inspect the assemblies at those times for any signs of displacement of the screws, expanders, or flyweights. If any abnormalities are observed, the engine should be immediately removed from service and disassembled for further inspection, and the owner/operator should ensure that any affected flyweight screws and expanders are replaced.
- During overhaul these screws and expanders should be replaced with serviceable parts.

**Contact:** Questions or comments regarding this SAFO should be directed to David Menzimer, Manager, Northwest Mountain Region, Flight Standards Division, Technical Branch, General Aviation, ANM-230 at (425) 227-2829.

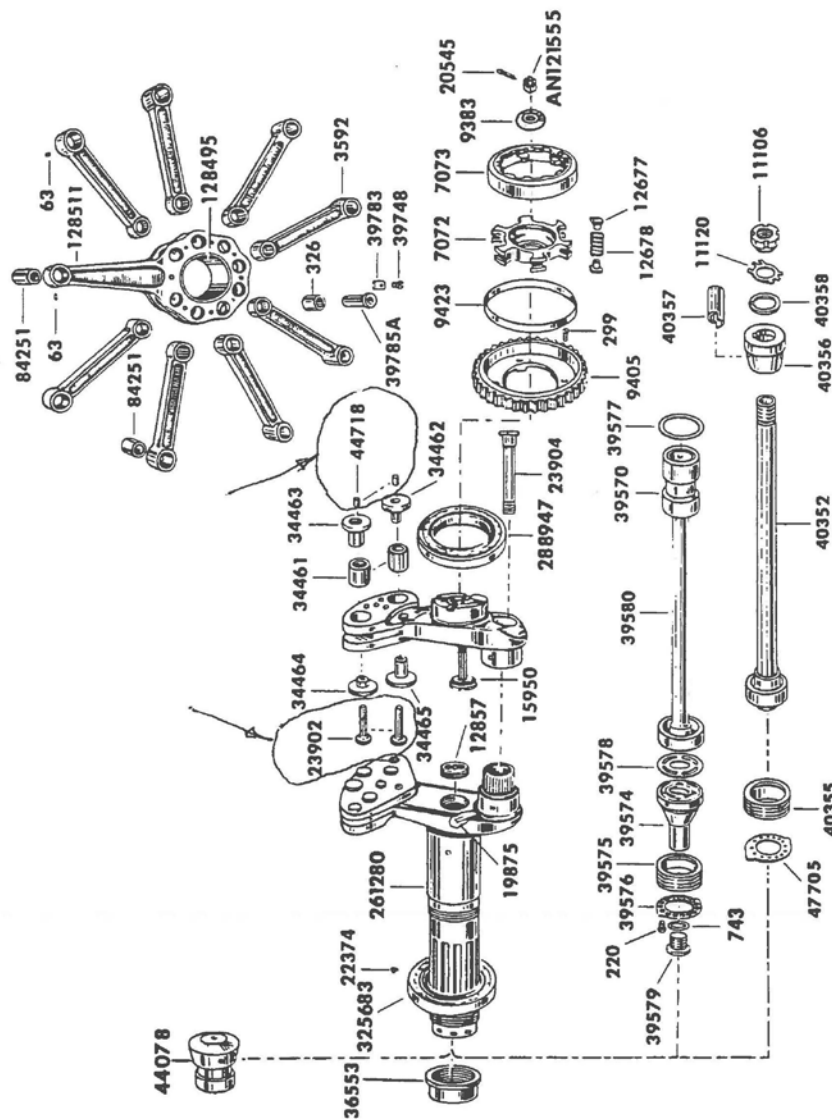


Figure 4. Crankshaft and Connecting Rods

Revised August 1968

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Parts diagram courtesy of Pratt & Whitney



Photos courtesy of Covington Aircraft Engines, Inc.