CMI A-65, A-75, C-75, C-85, Tappet Inspection

Recommendations for commonly occurring in-service observations of tappets, Part Number 21608, S21608. New and reconditioned articles.

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Background

Aircraft Specialties will occasionally get calls from customers who have found tappets (P/N 21608, S21608) not rotating, thus leaving an impression on the tappet face where the cam rides. This condition is not dire and should not be cause for alarm.

Rotation of the tappet is accomplished by taper on the cam lobe interacting with the spherical radius on the tappet face. This relationship provides a torque input near the edge of the tappet face as the rotating cam lobe pushes on the tappet. Variables such as tappet bore clearance, type of oil used, and FOD left behind from case processing can directly affect the ability of the tappet to spin when the rotating cam lobe contacts it. The reasons are as follows:

* The ratio of head diameter to shank diameter is low, thus the amount of torque that can be applied by the cam to rotate the tappet is very small. This was a design decision made by the OEM. Also related to this ratio is the effect of tappet bore clearance and particulates left over from case work (sand, glass beads, metal cuttings, etc.) to more easily hinder the rotation of the tappet. See fig 1 for a comparison of head sizes between the 21608 and 530851, (*used in O-200/300*).
* Receiving inspection often finds a large number of 21608 tappets which did not rotate. (*See fig 3*). Of these, most have evidence on the stems indicating FOD was present in the oil system. (*See fig 2*).
* Lengthy use of straight mineral oil exacerbates the probability of the condition occurring.
* The impressions left by the cam on the tappet face do not grow appreciably over time. There is no compelling reason to teardown an engine just for this reason. (*see recommendations*)
    * A 21608 tappet will not spall or fail catastrophically due to the material type utilized.

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Examples of 21608 tappets removed from service:

Fig. 1 Comparison of 21608 and 530851 head sizes.

Fig. 2 Glass beads in oil transfer relief area.

Fig. 3 In-coming lot of 21608 tappets.

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Recommendations

* Aircraft Specialties recommends operators utilize the approved CMI troubleshooting guidance for cam and tappet issues prior to considering an engine tear-down or other extreme maintenance. Reference CMI SID 05-1.
* Minimize the use of mineral oil. Use only to the extent necessary to get a proper break-in. Remove & replenish with anti-dispersant oil (W) as soon as practical.
* Proper cleaning. We can't stress enough the heroics involved in cleaning the case and associated components. Don't trust anyone in the supply chain. Do this job yourself and be diligent about it. Read everything available on the subject for ideas on how to do this well.
  * Focus a LOT of attention on oil galleys. Glass beads hide in corners where cross drilling occurs in the case. Remove all galley plugs and utilize the OEM recommended cleaning procedures. Re-install plugs.
* At overhaul - Use an engine shop with a separate, formal Inspection/ QA process. Experience has shown this practice provides value to the end-user.
* If you believe a warranty remedy may be required for a cam or tappet condition where one or more articles were manufactured or reconditioned by Aircraft Specialties, please notify us prior to starting any work.
  1. Aircraft Specialties warranty does not cover lifter or cam replacement required due to distress originating from corrosion or lack of lubrication.
  2. Aircraft Specialties warranty will not cover lifter or cam replacement unless authorized by a Aircraft Specialties Services representative prior to the work being done.
  3. Aircraft Specialties may require the inspections, metallurgical analysis or repair be done at facilities selected by Aircraft Specialties Services.
  4. Aircraft Specialties warranty will not cover inspection for such conditions in the absence of the indications described in the CMI bulletin SID 05-1.

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