

TCM SB08-12 and The Classic Starter Adapter Interference Problem

by Tom Carr

It has been brought to CPA's attention that there can be an interference problem when installing a classic starter adapter on O-470, IO470, TSIO470, IO520, LIO520, LTSIO520, TSIO520, IO550 and IOF550 sandcast engines that have the new crankshaft gear, called out in SB08-12, installed. A sandcast engine has a crankcase where the belt driven alternator/generator is mounted aft of number 2 cylinder. A permold engine uses a crankcase that has the gear driven alternator mounted to the case just forward of number 5 cylinder. Original TCM engines used in the 180s, 182s, 185s, 205s, 206s, 207s and 210s were sandcast engines. The Cessna twin engine models, T303s, 310s and 320 thru 320C models used sandcast engines. All T310s and all 320D and later models used permold engines.

SB08-12 dated 9/09/2008 announced the replacement of the existing sandcast case crankshaft gears 536421 and 653631 with the larger crankshaft gear part number 657175 currently used in the permold case engines. The 657175 gear is wider than the superseded gears by about 0.125 inch. That extra width means more engagement with the starter adapter gear shaft and the less chance of gear tooth failure in this area from kickbacks and prop strikes. Sounds like a good improvement, but there is a catch.

In TCM bulletin SB97-6A, MANDATORY REPLACEMENT PARTS, to be replaced during maintenance, preventive maintenance and overhaul, the new larger crankshaft gear is to be installed in place of the superseded smaller gears. That is listed as item #31 in SB97-6A.

Now we have to go back some years and look at TCM bulletin M92-10 dated 14 August 1992, which announced the improved starter adapter that no longer used the adapter housing sleeve (commonly referred to as a friction collet) that pinched down on the outside diameter end of the internal spring. The adapter shaft gear rides inside that spring. During an engine start the starter motor winds that spring which reduces the spring inside dimension allowing it to make contact with the shaft, which starts the gear shaft rotating. The gear shaft turning starts the crankshaft turning and the engine hopefully starts. For a better understanding of how the starter adapter works take a look at the article starting on page 4184 in the January 1999 CPA magazine. Past magazines are available on the CPA web site.

Here is the catch I mentioned earlier. The improved starter adapters detailed in M92-10 do not use the friction collet design and are thereby shorter in the overall length inside the



The gear on the left is the old style while the gear on the right is the 657175 part number configuration. The increased height in the new gear is very obvious. The gear bolts hitting the Classic starter adapter is very possible and clearance must be checked.

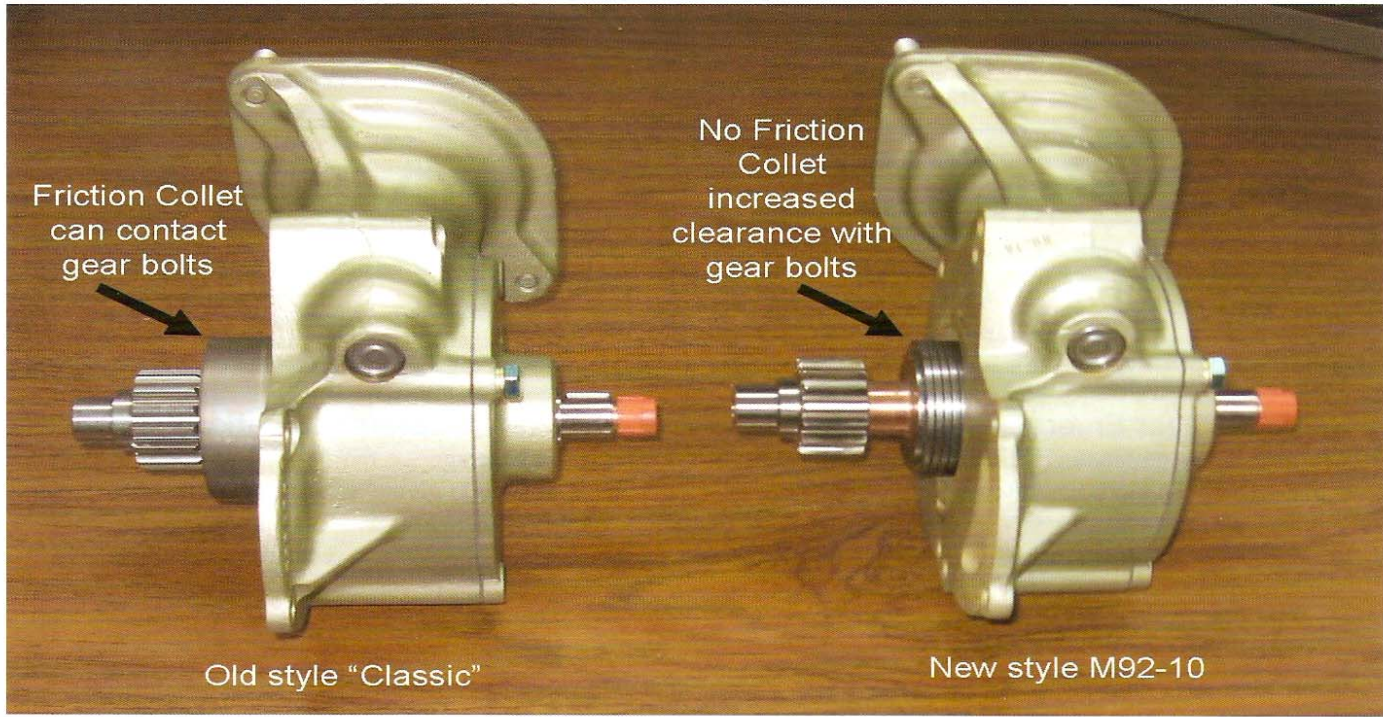
engine when compared to the earlier starter adapters which are commonly referred to as classic designed. So during an engine overhaul or maintenance action when your engine gets the new wider crankshaft gear and if you still have a classic starter adapter, there is a very good chance the friction collet will hit the crankshaft gear retaining bolts. Finding this out before the engine is started would be the preferred option rather than seeing all the metal in the oil screen or filter and trying to figure out where all that ferrous metal is coming from.

The Test

The following paragraph comes from Continuing Airworthiness Notice- 85-004 published by the Civil Aviation Authority of New Zealand.

"If crankshaft gear P/N 657175 is fitted with an old type adaptor P/N 635050A() () per the instructions in SB08-12 the CAA recommends the following assembly procedure and inspection to check for interference between the crankshaft gear attach bolt heads and the clutch spring adapter housing sleeve, before starting the engine.

Fit the starter adapter to the crankcase by pressing into position by hand. Do not use the attachment bolts to pull the starter adaptor into place. With the adapter in position fit and tighten the attachment bolts. Before starting the engine, turn the engine over one complete revolution by hand and determine whether there is any interference between the crankshaft gear attach bolts and the adapter housing. If any interference is found contact the engine manufacturer for corrective action."



At this point in time CPA has heard the corrective action comment coming back from TCM says; replace the starter adapter as called out in M92-10 with the new design configuration.

CPA member Ron Newburg, who is president of Niagara Air Parts and one of the most knowledgeable persons in the field when it comes to the TCM starter adapters, mentions the CAA test does not really cover it all. Ron states:

“When measuring the actual clearance from the starter adapter mounting deck on the crankcase, to the tops of the bolts securing the crankshaft gear, it is imperative that the crankshaft is pushed fully towards the back of the engine. TCM’s service limit actually allows crankshaft movement “fore and aft” of up to .025 thou! Compare this measurement to the installed height of the friction collet on the starter adapter. Bear in mind that the starter adapter gasket, when compressed, after torquing down the adapter, will provide about .025 thou. additional clearance. (The gasket is .030 thou. thick before compression).”

There have been some cases reported where the installing facility relocated the friction collet deeper into the classic style casting to provide clearance between the collet and gear bolts. CPA would highly advise against that procedure since, one, where is the approval for that modification and two, that results in more compression loading of the spring which will shorten the adapter life span by preventing proper engagement of the spring and shaft gear. CPA was told TCM was looking into the clearance issue but nothing

published so far. Many thanks to Ron for bringing this issue to CPA’s attention.

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