

CANADIAN AERO MANUFACTURING

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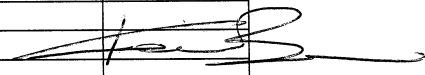
INSTRUCTIONS FOR CONTINUED AIRWORTHINESS

Starter Adapter Modification

STC SE02-2

Document: CI-05-01 Revision: D Effective date: January 30, 2003 Print date: 1/30/03

This ICA is Transport Canada Accepted

Revision	Effective date for new revision	Data of withdrawal of previous revision	Person making revision	Organization	TCCA signoff
D	January 30, 2003	January 30, 2003	Ron Newburg	CAM	
C	December 13, 2002	December 13, 2002	Ron Newburg	CAM	
B	August 12 2002	August 12 2002	Jim Watson	CAM	
A	July 12 2002	July 12 2002	Jim Watson	CAM	

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1.0 Introduction

- 1.1 These instructions apply to Starter Adapters 642083-M, 642085-M, & 642087-M. These TCM starter adapters were produced by TCM for installation on "Permold" 520 & 550 series engines, and have one or more modifications incorporated to improve reliability. The modified adapter is installed to the engine with no change in procedure, and has an eligibility as described in section 2.1. This ICA describes the differences, and required additional maintenance elements.
- 1.2 Persons working on the starting system for these aircraft are cautioned to ensure that the starter cannot be energized unexpectedly, and that precautions are taken to prevent the engine firing if the propeller is turned during the work.
- 1.3 A special fixture CAMF-0306 is required to accomplish alignment of the adapter during reassembly. Its use is described in paragraph 3.4.6.
- 1.4 The uninstalled starter adapter may be stored indefinitely. The only shelf life limited item is the "O" ring in the lid or pump plate. This "O" ring may remain installed as long as the adapter remains assembled. This part should be replaced at disassembly, or any time a leak is suspected.
- 1.5 Reference publications associated with these tasks are those provided by TCM for the engines involved, and the manufacturer of any other approved installed parts..
- 1.6 Distribution of this ICA is accomplished at the time of sale of an STC modified adapter, and via the CAM website. Should there be an amendment, the new version will be available on the CAM website.
- 1.7 Revisions of this ICA are done by entire replacement only. All pages are at the same revision status, and are in effect as shown in the Record of revisions table on the cover page.

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2.0 Installation & removal instructions

2.1 Eligibility for the 642083-M, 642085-M, & 642087-M Starter Adapters is as per the following eligibility list:

Completed adapter	Engine models eligible (no A/C)	Engine models eligible (A/C) ¹
642083-M	IO-346 IO-520 B, BA, BB, C, CB, M, MB IO-550 A, B, C, E, G, N, R	None
642085-M	TSIO-520 B, BB, BE, D, DB, E, EB, J, JB, K, KB, L, LB, UB, VB, WB TSIO-550 A, B, C, E	None
642087-M with drive sheave fitted ²	None	TSIO-520 B, BB, BE, D, DB, E, EB, J, JB, K, KB, L, LB, UB, VB, WB TSIO-550 A, B, C, E

Note 1: This STC is not intended to permit the installation of a 642087-M adapter onto an engine installed in an aircraft not fitted with air conditioning, or other accessory requiring the sheave drive.

Note 2: This STC does not make provision for installation of a 642087 adapter, which has no drive sheave, fitted, to engines in aircraft with no air conditioning, or other accessory requiring the sheave drive. If this combination is desired, it may be accomplished per existing TCM eligibility list.

2.2 Installation & removal are accomplished in the same manner as the adapter being replaced. Refer to the prevailing TCM publications. It should be noted that the eligibility list permits the use of adapter models previously not installed on certain engines. If, during installation it is found that a 642083-M adapter is being installed on an engine requiring a turbo scavenge pump, the adapter is not to be installed. Contact CAM for further assistance.

2.3 Adjustments, checks & tests of the engine after installation of the adapter should be accomplished as described in prevailing TCM publications.

2.4 The installation of this STC on an engine means that TCM CSB02-2B is no longer applicable to that engine because of the engine's configuration change. This configuration change addresses all aspects of the CSB.

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3.0 Maintenance Requirements

3.1 The maintenance schedule for this starter adapter is as follows:

3.1.1 Every 50 or 100 hours of operation, or annually, concurrent with the maintenance schedule prevailing for the aircraft, confirm correct function by operational check, and inspect externally for oil leaks or other damage.

3.1.2 At the time of engine overhaul or, if abnormal operation is noticed or internal failure suspected, overhaul as per paragraph 3.4 of this ICA.

3.2 At any time that the adapter is disassembled, the following parts are to be discarded, and replaced with new parts:

- All anti friction bearings
- All seals, gaskets, and "O" rings
- All lock washers

3.3 There are no servicing tasks applicable to these starter adapters other than repair or overhaul.

3.4 Overhaul

3.4.1 Overhaul of the starter adapter is accomplished by completely disassembling the adapter, discarding parts, which are not permitted to be reused, and cleaning and examining each remaining part for its condition. Parts that are found fit, along with new parts, as required, are then to be reassembled. Refer to "Table of fits & limits, and permissible wear" as described in 3.5

3.4.2 It should be noted that the 642085-M and 642087-M adapters have a pump housing assembly which has been aligned and dowelled. These two parts must be used together only, and it is recommended that the two dowel bolts be left in position. If replacement is required, contact CAM.

3.4.3 Also note that the installation of this STC may have included part substitution. This might result in minor differences between the TCM parts list for the adapter, and its actual configuration. The adapter is to be reassembled with parts required by this STC when overhauled.

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- 3.4.4 At overhaul, all ferrous parts are to be inspected by Magnetic Particle Inspection, all aluminum parts are to be inspected by Liquid Penetrant Inspection, and all other parts are to be visually inspected for their condition. Aluminum parts are to be painted for corrosion protection.
- 3.4.5 Assemble the adapter using methods described in prevailing TCM manuals, other instructions pertaining to parts in the adapter, and standard industry practice. If more detailed information is required, contact CAM.
- 3.4.6 For 642085-M and 642087-M adapters it will be necessary to assemble the pump housing with the adapter fitted into the alignment fixture CAMF-0306. This fixture has been specially made to hold the adapter so as to assure that the alignment of the adapter will be correct when it is installed to the engine. ***Even though the pump body parts have been dowelled, this step is still required to assure a safe adapter.***

Set the adapter with the shaft gear and worm wheel assembly installed, and the pump endplate and bearing in place, into the fixture. The sleeve in the housing will fit closely into the three fingers of the fixture, and the pilot end of the shaft gear will fit into the hole in the center of the fixture. With the adapter in the fixture as described, the pump housing may be installed to the endplate. Install the end bearing (642087-M), apply the sealing thread and adhesive as required, and fit the pump housing over the shaft gear and dowel bolts. If the pump body does not fit freely over the shaft and bolts, contact CAM. Install the required washers and nuts, and torque to 180 to 200 inch pounds.

Once assembled, reach between the fingers of the fixture and turn the gear. If it will not turn freely, the adapter is not safe for installation. Disassemble the adapter, and determine the reason for the misalignment. Contact CAM for assistance if necessary.

- 3.4.7 Overhaul has been accomplished when each part of the adapter has been cleaned and inspected by the means identified for that type of part, all parts requiring replacement have been replaced with new, the adapter has been reassembled with all parts conforming to the sizes specified for "new", and it is in a fit condition safe for flight. The adapter may be overhauled with an under and/or over sized clutch spring.

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3.5 Table of fits & limits, and permissible wear

Description	Dimension type	First part	Dimension small	Dimension large	Second part	Dimension small	Dimension large	Tolerance tight	Tolerance loose	Tolerance service
Standard Clutch Spring on shaft gear friction drum	Diameter	CAM539800	1.938"	1.940"	VARIOUS	1.931"	1.932"	.006"	.009"	.013"
M 15 Clutch Spring on shaft gear friction drum	Diameter	CAM539800M15	1.923"	1.925"	VARIOUS	1.916"	1.917"	.006"	.009"	.013"
M 28 Clutch Spring on shaft gear friction drum	Diameter	CAM539800M28	1.910"	1.912"	VARIOUS	1.903"	1.904"	.006"	.009"	.013"
M 43 Clutch Spring on shaft gear friction drum	Diameter	CAM539800M43	1.895"	1.897"	VARIOUS	1.888"	1.889"	.006"	.009"	.013"
Clutch spring in sleeve	Diameter	CAM539800	2.374"	2.376"	633039	2.338"	2.345"	.038"	.029"	.027"
P 04 Clutch spring in sleeve	Diameter	CAM539800P4	2.378"	2.380"	633039	2.345"	2.350"	.035"	.028"	.028"
M43 Clutch spring in sleeve	Diameter	CAM539800M43	2.331"	2.333"	633039	2.295"	2.302"	.038"	.029"	.027"
Pilot end of shaft gear	Diameter	VARIOUS	.7495"	.750"	VARIOUS	X	X	X	X	X
Worm gear shaft in bearing	Diameter	VARIOUS	X	X	VARIOUS	X	X	-.0007"	-.0001"	X
Bearings in Bores (all)	X	X	X	X	X	X	X	-.0001"	-.001"	X
Shafts in bearings (all)	X	X	X	X	X	X	X	-.0005"	-.0001"	X
Scavenge pump impeller in pump body bore	Diameter	VARIOUS	X	X	VARIOUS	X	X	.0115"	.014"	.016"
Scavenge pump impeller in pump body bore	Thickness	VARIOUS	X	X	VARIOUS	X	X	.0115"	.014"	.016"

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- 3.6 Damaged parts must be replaced. Contact Canadian Aero Manufacturing for further information.
- 3.7 The internal parts of the adapter only need inspection when exposed during maintenance of other associated engine parts, other than at engine overhaul when the entire adapter must be overhauled.
- 3.8 There are no specialized maintenance techniques required for overhaul of the adapter other than those required for reworking damaged areas.
- 3.9 Magnetic particle and liquid penetrant inspection techniques will be required at overhaul.
- 3.10 No special surface treatments are required after maintenance. Painting the exposed parts of the adapter is required.
- 3.11 Testing the adapter after maintenance is to include three elements:
 - 3.11.1 Fit the assembled adapter into fixture CAMT-0306, and turn the gear to assure that the alignment is correct. If the shaft gear does not turn freely, the adapter will have to be disassembled and reassembled correctly.
 - 3.11.2 With the adapter still in the fixture, using a large slotted screwdriver, turn the worm shaft input drive enough to turn shaft gear. This is to confirm that the worm shaft spins with no resistance. When released, the worm shaft must freely unwind several turns. Repeat this as often as necessary to ensure that one complete revolution of the shaft gear is checked in this manner. This check is done to detect any hang ups between the worm and worm wheel.
 - 3.11.3 After installation to the engine, perform several engine starts to confirm proper operation. **Exercise caution when starting any aircraft engine.**

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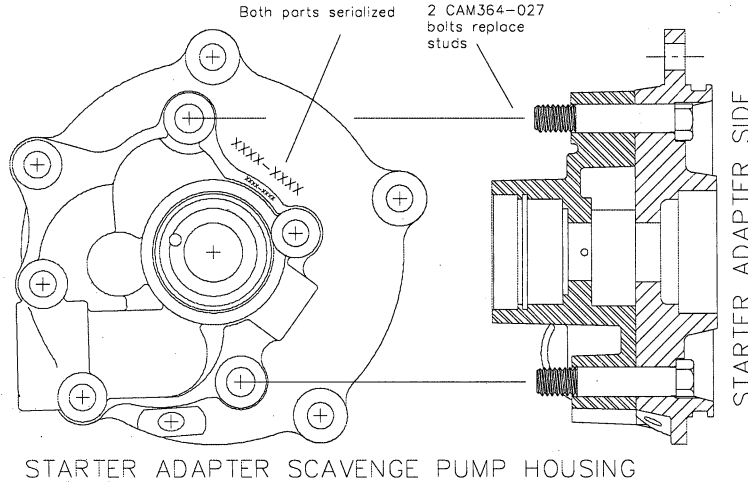
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4.0 Drawing of Modified Pump Housing



5.0 Electrical: There are no electrical changes or inspections associated with this adapter as modified by this STC.

6.0 Troubleshooting

Malfunction	Possible cause	Suggested action
When start selected, engine does not turn over	Electrical fault, or starter motor failure	Inspect and repair as necessary aircraft electrical system, and or starter motor
	Starter adapter internal failure, including damaged or broken clutch spring, or worn out sleeve.	Remove and overhaul adapter, replace parts as necessary.
When start selected, engine turns over slowly / starter drags	Clutch spring and or shaft gear friction drum worn, or sleeve worn.	Remove and overhaul adapter, replace parts as necessary. Under / oversize clutch springs are available to extend adapter life.
Failure of turbo charger lubrication system (if so equipped)	Failure of adapter scavenge pump	Remove and overhaul adapter, replace parts as necessary.

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7.0 Placards & Markings

7.1 There are no placards or markings required with the installation of this adapter

8.0 Structure

8.1 There are no structural changes or repairs associated with this adapter

The preceding constitutes the entire ICA for starter adapters modified in accordance with STC SE02-2

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