

MANDATORY service bulletin

M87-25
Supersedes M86-17

Technical Portions Are
FAA Approved

15 December 1987

SUBJECT: **PISTON PIN REPLACEMENT AND THRU BOLT TORQUE CHECK**

NOTE . . . The thru bolt torque check requirement of this service bulletin supersedes Service Bulletin M86-17.

MODELS

AFFECTED: TSIO520BE - This engine is used on the Piper Malibu Aircraft
S/N 528001 through 528337

COMPLIANCE: Before further flight.

A broken piston pin, P/N 643846, has been confirmed to have been the cause of a recent engine failure.

The following action is therefore required on the above referenced engines.

- I. A. Insure that the magnetos are properly grounded. Remove one spark plug (the most accessible) from each cylinder. Attach a spring scale to the propeller blade at the 36 inch station. Rotate the propeller in normal direction of rotation via the attached scale and record the pounds required to rotate the propeller. Normal range is approximately 10 to 20 pounds. While holding opposite propeller blades as close to the hub as possible, move the crankshaft fore and aft to assure the crankshaft has end play.

NOTE...If the recorded pounds are not within the normal range or there is no crankshaft end play, contact your local Teledyne Continental Motors representative (See Page 4) for disposition.

WARNING...Use extreme caution in the area of the propeller while performing this check.

- B. Gain access to the eight (8) crankcase thru bolt nuts. With a cylinder base wrench, loosen the eight (8) thru bolt nuts and back them off approximately 1/2 inch. Liberally lubricate the exposed thru bolt threads and the nuts with clean 50 weight engine oil. Torque the nuts to a preliminary torque of 350 inch pounds, then repeat final torque to 700 inch pounds each. It may be necessary to retain the opposite nuts to prevent thru bolt rotation.

(Continued)

- C. Repeat paragraph IA above and record the pounds required to rotate the propeller. If after torquing the thru bolts per paragraph IB, the effort (pounds) to rotate the propeller has increased above that previously recorded or there is no crankshaft end play, contact your local Teledyne Continental Motors representative (See Page 4) for disposition. If no special disposition is required, proceed to Section II.
- II. A. Gain access to the piston pins by removal of all cylinders.

NOTE...DO NOT REMOVE THE PISTON FROM THE CYLINDER. REMOVE ONLY TO A POINT TO GAIN ACCESS TO THE PISTON PIN. REMOVE THE PISTON PIN, THEN THE PISTON AND CYLINDER AS ONE UNIT.

- B. With cylinders and pistons removed, visually inspect the number 1, 2, 3, and 4 crankcase main bearings for any signs of bearing rotation within the case; bearing movement fore or aft within the case or crankcase material distress. Particular attention should be given to number 2 and 3. The crankshaft should be moved fore and aft while performing this inspection. The crankshaft will also require rotation to allow for unobstructed view of the bearings.

NOTE...The crankcase main bearings are numbered from number 1 in the rear of the engine and progressing forward. (Toward the propeller flange).

Figure A depicts how bearing should generally appear.

Figure B depicts a bearing that has shifted.

NOTE...Contact your local Teledyne Continental Motors representative (See Page 4) for disposition of any bearing appearing as in Figure B or with any signs of crankcase material distress.

- C. If no problems are detected during the inspection outlined in paragraph IIB, proceed with the installation of new piston pins P/N 630046 and the reassembly of the engine.
- D. The cylinders should be installed in sequence and torqued in sequence per the instructions in Figure C. New cylinder gasket sets should be used, 6 each P/N 646565A1.

NOTE...Liberally apply clean 50 weight engine oil on the rod bushing, piston pin and valve mechanism during engine reassembly.

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- III. A. Finalize reassembly of the cylinders to the point of rocker cover installation. At this point repeat paragraph IA above and record the pounds required to rotate the propeller. If the effort (pounds) to rotate the propeller has increased above that previously recorded in paragraph IC or there is no crankshaft end play, contact your local Teledyne Continental Motors representative (See Page 4) for disposition. If no discrepancies are noted, finalize reassembly of the engine.
- B. Perform appropriate testing, make appropriate log book entry stating compliance to this service bulletin and return the engine to service.

WARRANTY: The action to comply with this service bulletin is covered by the TCM Gold Medallion Warranty subject to its terms and conditions. Warranty claims may be filed through any TCM distributor.

When submitting the warranty claim for compliance with this service bulletin, you must enter the pounds required to rotate the propeller as recorded in paragraph IA, IC, IIIA. It should be recorded in the CONDITIONS REPORTED SECTION of the warranty claim.

EXAMPLE: Compliance with Service Bulletin M87-25

Paragraph IA - 12 pounds
Paragraph IC - 12 pounds
Paragraph IIIA - 14 pounds

TCM will allow 32 hours labor at current posted shop rates to comply with this service bulletin and the following parts:

6 each P/N 630046 piston pin
6 each P/N 646565A1 gasket set

(Continued)

Address:

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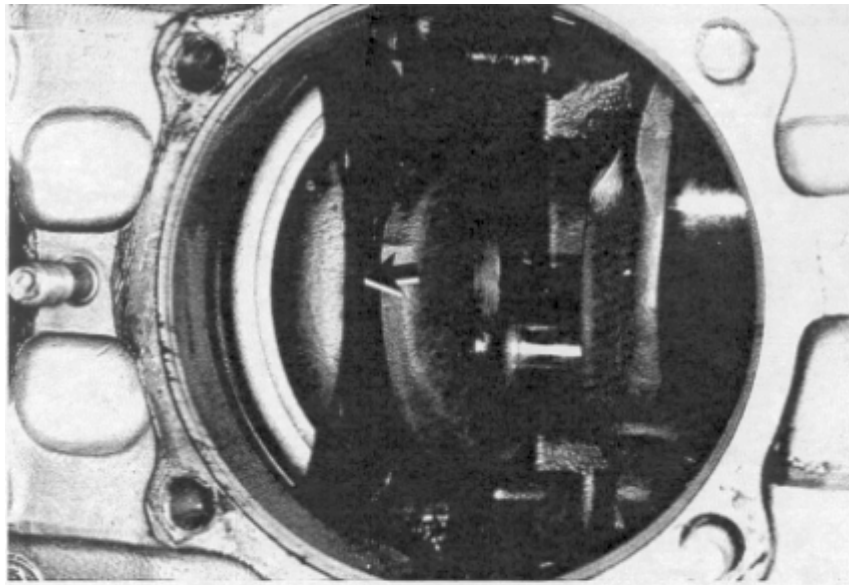


FIGURE A

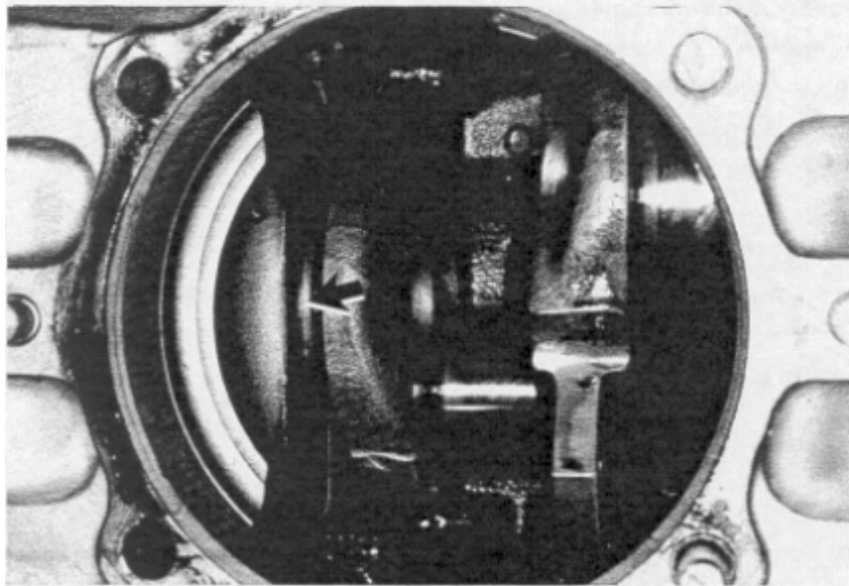
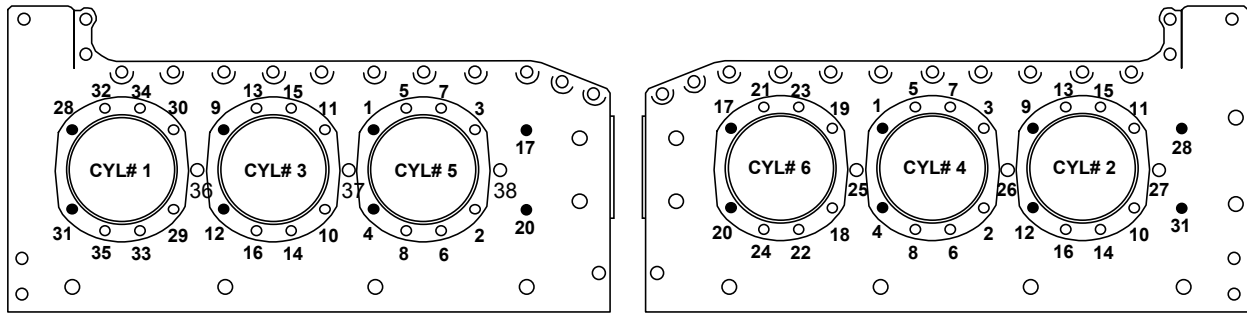


FIGURE B
(Continued)



CAUTION...Before proceeding note that the six nuts utilized with the seventh stud (positions 25, 26, 27, 36, 37, 38) have a conical seat and can only be used in these positions.

NOTE...Nuts on both ends of thru bolts must be torqued and all studs and thru bolt threads are to be lubricated with clean 50 weight engine oil before installing nuts.

ASSEMBLY AND PRELIMIANRY TORQUE

1. Install cylinders 4 & 5. Tighten stud nuts (2, 3, 5, 6, 7, 8) and thru bolts (1 & 4) to 300-400 inch lbs. in sequence shown above.
2. Install cylinders 2 & 3. Tighten stud nuts (10, 11, 13, 14, 15, 16) and thru bolts (9 & 12) to 300-400 inch lbs. in sequence shown above.
3. Install cylinder #6. Tighten stud nuts (18, 19, 21, 22, 23, 24) and thru bolts (17 & 20) to 300-400 inch lbs. in sequence shown above.
4. Install cylinder #1. Tighten stud nuts (29, 30, 32, 33, 34, 35) and thru bolts (28 & 31) to 300-400 inch lbs. in sequence shown above.
5. Install 7th stud brackets & nuts (25, 26, 27, 36, 37, 38) and tighten to 300-400 inch lbs. (See Caution above).
6. Finish torquing thru bolts and stud nuts to their final torque values in sequence shown above.

FINAL TORQUE VALUES

		INCH LBS.
Thru Bolts	1, 4, 9, 12, 17, 20, 28, 31	690-710
Stud Nuts	2, 3, 5, 6, 7, 8, 10, 11, 13 Thru 16, 18, 19, 21 Thru 27, 29, 30, 32, Thru 38	490-510

NOTE...Repeat torquing sequence with final torque values to insure that all thru bolts and stud nuts have been torqued.

FIGURE C