MOONEY INTERNATIONAL CORPORATION

The Symbol of Performance ™

MOONEY SPECIAL LETTER 15-23
Date: 10-29-2015

SUBJECT: To ADVISE MOONEY OWNERS/OPERATORS of the **CONTINENTAL MOTORS® AIRCRAFT ENGINE SERVICE BULLETIN No. SB15-6 Dated: October 15, 2015 - NiC3™ Cylinder Assemblies (see attached).**

MODELS/ S/N AFFECTED: Per CONTINENTAL MOTORS® AIRCRAFT ENGINE SERVICE BULLETIN No. SB15-6 Dated: October 15, 2015 - New and Rebuilt: IO346, GTSIO520, IO520, LIO520, LTSIO520, TSIO520, IO550, IOF550, TSIO550, and TSIOF550 (see attached).

TIME OF COMPLIANCE: Per CONTINENTAL MOTORS® AIRCRAFT ENGINE SERVICE BULLETIN No. SB15-6 Dated: October 15, 2015 - At cylinder repair, replacement, or engine major overhaul (see attached).

INTRODUCTION: Per CONTINENTAL MOTORS® AIRCRAFT ENGINE SERVICE BULLETIN No. SB15-6 Dated: October 15, 2015 - NiC3 cylinders are initially being offered as an optional replacement for Continental Motors cylinders. Currently, only cylinders with 5.25” bore diameters are available. The nickel silicon carbide plating process applies a corrosion and wear resistant protective coating to the cylinder barrel. Continental Motors plans to expand the NiC3 cylinder offerings to our full product line in the near future (see attached).

INSTRUCTIONS: Refer to: **CONTINENTAL MOTORS® AIRCRAFT ENGINE SERVICE BULLETIN No. SB15-6 Dated: October 15, 2015 - NiC3™ Cylinder Assemblies (see attached).**

WARRANTY: Refer to: **CONTINENTAL MOTORS® AIRCRAFT ENGINE SERVICE BULLETIN No. SB15-6 Dated: October 15, 2015 - NiC3™ Cylinder Assemblies (see attached).**

REFERENCE DATA: Refer to: **CONTINENTAL MOTORS® AIRCRAFT ENGINE SERVICE BULLETIN No. SB15-6 Dated: October 15, 2015 - NiC3™ Cylinder Assemblies (see attached).**

PARTS LIST: Refer to: **CONTINENTAL MOTORS® AIRCRAFT ENGINE SERVICE BULLETIN No. SB15-6 Dated: October 15, 2015 - NiC3™ Cylinder Assemblies (see attached).**

CONTINENTAL MOTORS® AIRCRAFT ENGINE

SERVICE BULLETIN

CATEGORY 3

SB15-6

Contains Useful Information Pertaining To Your Aircraft Engine

TECHNICAL PORTIONS FAA APPROVED

SUBJECT: NiC3™ Cylinder Assemblies

PURPOSE: Provide dimensional fits and limits

COMPLIANCE: At cylinder repair, replacement, or engine major overhaul

MODELS AFFECTED: New and Rebuilt: IO346, GTSIO520, IO520, LIO520, LTSIO520, TSIO520, IO550, IOF550, TSIO550, and TSIOF550

I. BACKGROUND INFORMATION

This service bulletin provides the following information:

1. Identification of NiC3™ cylinders
2. Cylinder bore dimensions - New minimum/maximum and service limits (for continuing subject cylinders in service between major overhaul(s))
3. Piston to subject cylinder clearance specifications
4. Piston ring gaps and designated location in subject cylinder to measure ring gaps
5. Piston dimensions
6. Compatibility with existing cylinders
7. Break-In Instructions for engines fitted with NiC3 cylinders

NiC3 cylinders are initially being offered as an optional replacement for Continental Motors cylinders. Currently, only cylinders with 5.25” bore diameters are available. The nickel silicon carbide plating process applies a corrosion and wear resistant protective coating to the cylinder barrel. Continental Motors plans to expand the NiC3 cylinder offerings to our full product line in the near future.

NiC3 cylinder bore dimensions are different than nitride or through-hardened cylinders due to the cylinder bore plating process. A piston ring design, manufactured with alternate materials, with different dimensions than the piston rings used in nitride or through hardened cylinder barrels, is required to interface with the NiC3 cylinder bore. The piston rings are marked accordingly. Published TBO limits are not affected by the installation of NiC3 cylinders.

To determine cylinder bore circularity, measure first in the plane through the spark plug holes at diameter “F” in Figure 2; repeat the measurement at a right angle (90°) to the first measurement and then subtract the smaller dimension from the larger. The difference must not exceed the circularity limit specified.

New cylinder bore dimensions must be used at engine overhaul. Service limits may be used to return cylinders to service on engines that have not reached their published TBO. Do not return any cylinder to service that does not conform to the dimensional limits specified in this service document. Authorized oversize (AO) NiC3 cylinders are not available.

Piston ring gaps and cylinder dimensions must be maintained within the specifications provided in this bulletin. Piston specifications are presented in tabular form, (Table 5, page 6).

II. CYLINDER IDENTIFICATION

Cylinder part numbers are permanently marked on the base flange (Figure 1). The serial number of the assembly is stamped on the bottom cylinder head cooling fin. Two silver stripes, parallel with the cylinder bore, are applied to the edge of the cylinder head fins between push rod tubes to identify the cylinder bore is treated with nickel silicon carbide plating.

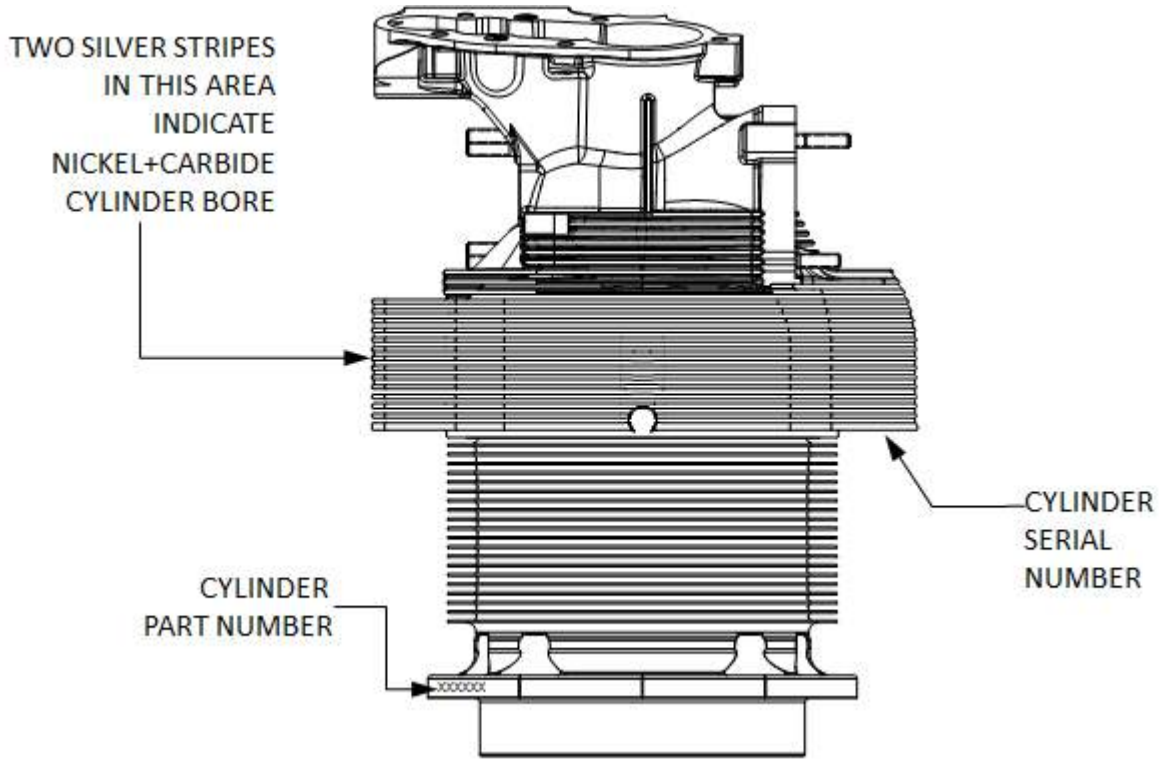

Figure 1. Cylinder Identification
5.25 Inch Cross-Flow Cylinder with Straight Barrel Fins Depicted

III. APPLICATION

NiC3 cylinders are available for the engines listed in Table 1. The cylinder part numbers in the first column are approved for the engines listed in the far right column.

Table 1. Cylinder Part Number Cross Reference
5.25" Cylinders

NiC3 Cylinder Part Number	Nominal Bore	Barrel Fin Configuration	Applicability
658621	5.25	tapered	IO550-D, E, F, L IOF550-D, E, F, L
658611		straight	IO520-A, B, BA, BB, C, CB, D, E, F, J, K, L, M, MB IO550-A, B, C IOF550-B, C TSIO520-AF, B, BB, C, CE, D, DB, E, EB, G, H, J, JB, K, KB, L, LB, M, N, NB, P, R, T, UB, VB, WB
658622		straight	L/TSIO520-AE LIO520-P IO346-A, B
658623		tapered	IOF550-N, P, R TSIOF550-D, J, K, P
658624		tapered	IO550-N, P, R TSIO550-G, K, N
658630		straight	GTSIO520-C, D, H1, H2, H5, H6, H9, H10
658613		straight	IO550-G TSIO520-BE TSIO550-A, B, C, E GTSIO520-H7, H8,K, L, M, N

IV. CYLINDER FITS & LIMITS

WARNING

Verify the cylinder, piston, and piston ring assembly configurations conform to the designated part numbers for the installation. Installation of incorrect parts will cause engine damage and engine malfunction. Never use chromium plated rings in NiC3 cylinders.

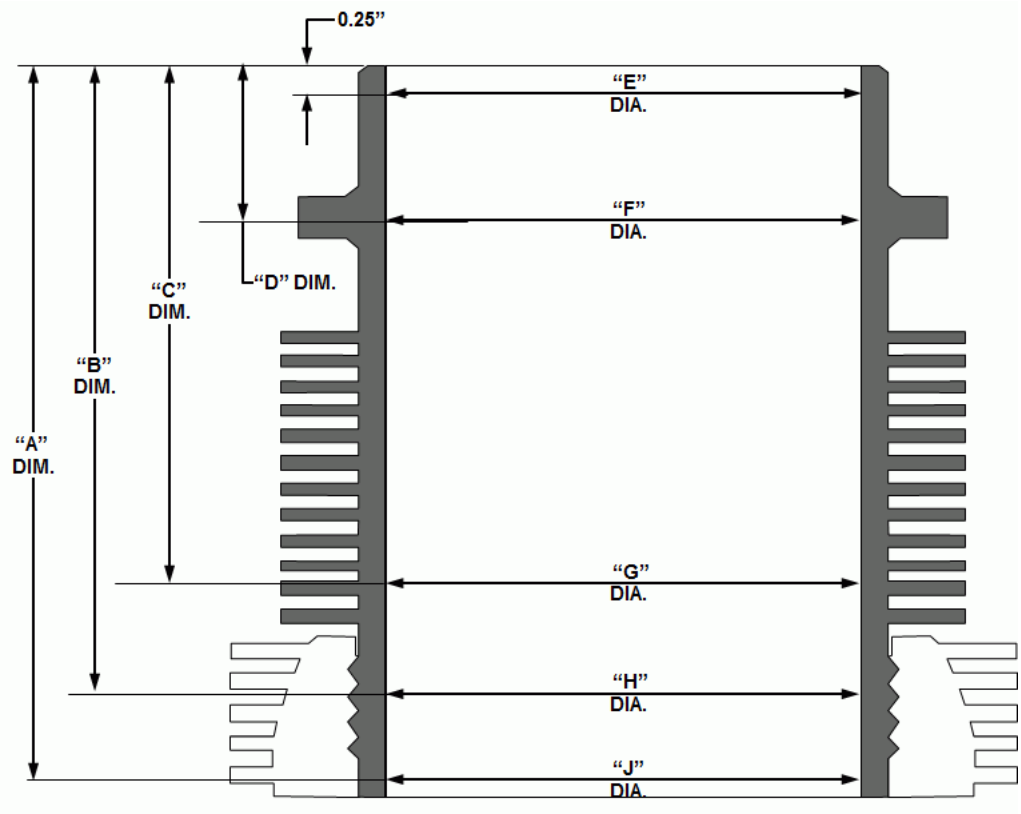

Figure 2. 5.250 Inch Cylinder Measurement Locations

Table 2. 5.250 Inch Cylinder Barrel Dimensions
IO346, IO520, LIO520, GTSIO520, LTSIO520, TSIO520, IO550, IOF550, TSIO550 & TSIOF550

"A" DIM	"B" DIM	"C" DIM	"D" DIM	"E" DIA	STANDARD		SERVICE LIMIT		TAPER	CHOKE		TOTAL CHOKE
					"F" DIA	Circularity T.I.R.	"F" DIA	Circularity T.I.R.	F to G	G to H	H to J	
6.500	5.750	4.500	1.150	5.2540 5.2510	5.2530 5.2510	0.002	5.256	0.004	-0.001 0.000	-0.003 -0.001	-0.006 -0.003	-0.009 -0.004

Table 3. 5.250 Inch Piston to Cylinder Clearance

Engine Model	Piston in Cylinder (new)
IO346, TSIO550, TSIOF550	0.008 - 0.011
IO520, GTSIO520, LIO520, LTSIO520, TSIO520, IO550, IOF550	
Measure clearance below 4th ring groove, perpendicular to piston pin bore at "F" diameter.	

Table 4. Piston Ring Specifications
5.250 Inch Cylinder - All IO346, IO520, GTSIO520, LIO520, LTSIO520, TSIO520, IO550, IOF550, TSIO550, TSIOF550

Ring	Primary Part Number	Alternate Part Number	Gaps		Side Clearance	Service Limits
			5.250 Gage Diameter	New Dimensions		
Ring Set	658634	CN110	N/A	N/A	N/A	- -
Top Ring	658635	AEC648005PL	0.024 - 0.034	0.035 - 0.050	0.003L - 0.006L	0.006
Second Ring	658636	252509CC	0.030 - 0.040	0.035 - 0.050	0.0045L - 0.007L	0.007
Oil Control Ring	658637	252545CC	0.024 - 0.033	0.025 - 0.045	0.003L - 0.0045L	.0075
Fourth Ring / Skirt[1]	658638	252546CC	0.025 - 0.035	0.030 - 0.050	0.007L - 0.009L	0.010

1. See Section VII regarding specific installation instructions for fourth ring.

WARNING

Verify the cylinder, piston, and piston ring assembly configurations conform to the designated part numbers for the installation. Installation of incorrect parts will cause engine damage and engine malfunction. Never use chromium plated rings in NiC3 cylinders.

CAUTION: Piston ring gap at top of ring travel must not be less than 0.0075" at the "J" Diameter in Figure 2.

NOTE: Measure piston ring gaps at 1.0 - 1.5 inch in the cylinder bore according to Figure 3.

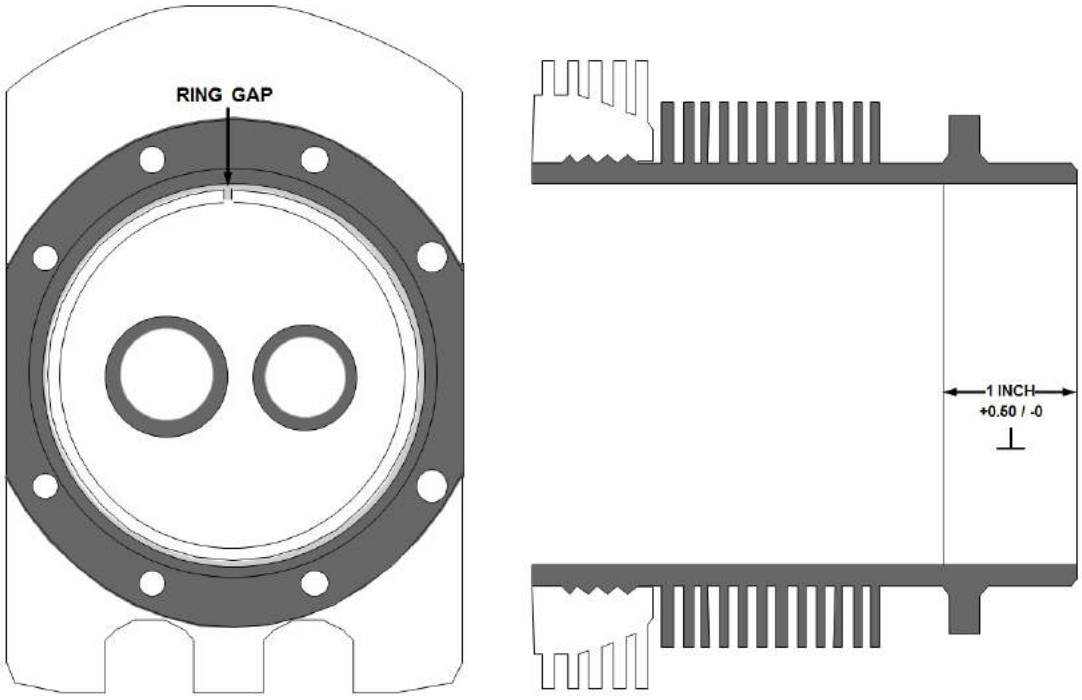

Figure 3. Ring Gap Measurement Location

Table 5. Engine to Piston Cross Reference

Engine Model	Manganese Phosphate Coated Piston	Piston Diameter[1]
IO346-A, B TSIO550-B, C, E, G, K, N TSIOF550-D, J, K, P	657989	5.2422-5.2432
GTSIO520-C, D, H, K, L, M, N TSIO520-AF, B, BB, BE, C, CE, D, DB, E, EB, G, H, J, JB, K, KB, L, LB, M, N, NB, P, T, UB, VB, WB	654840	5.2420-5.2430
IO520-A, B, BA, BB, C, CB, D, E, F, J, K, L, M, MB, N, NB	654850	5.2420-5.2430
IO520-P LIO520-P LTSIO520-AE TSIO520-AE	654836	5.2420-5.2430
IO550-A, B, C, D, E, F, G, L, N, P, R IOF550-G, N, P, R	654857	5.2420-5.2430

1. Measure below fourth ring groove, perpendicular to the piston pin.

V. CYLINDER REMOVAL AND INSTALLATION

Removing a NiC3 cylinder in order to perform maintenance or repairs, and then reinstalling the same cylinder requires special honing instructions that differ from bare steel, nitride, chrome plated, Cermichrome, or through-hardened cylinders. Return NiC3 cylinders to service according to the following procedures:

Refer to the Cylinder Removal and Installation instructions in the primary ICA for the applicable engine. Instructions in the primary ICA are applicable except for the cylinder bore, piston fit, and ring gap dimensions provided for NiC3 cylinders listed in Section IV.

WARNING

Follow all instructions in the primary ICA, including usage of sealants, lubricants, and adhesives, and application of fastener torque. Failure to comply with instructions for continued airworthiness may lead to catastrophic engine failure or death.

1. Remove cylinder(s) from the engine according to the primary ICA.
2. If piston is removed from cylinder, the piston and rings may be re-installed in the same cylinder. If the cylinder bore is honed, new piston rings must be installed. If piston rings are removed for any reason, discard the piston rings and replace with new set of piston rings, approved for NiC3 cylinder applications and gapped for the cylinder in which the piston and rings will be installed.
3. Inspect the piston to identify the part number compatibility ("Engine to Piston Cross Reference" in Table 5) with the cylinder. Only the piston part numbers listed in Table 5 are eligible for use with NiC3 cylinders.

   CAUTION: Check piston ring end gap in the choke area as well as in the straight portion of the bore. Ring gap at the top of ring travel must not be less than 0.0075 inch.

4. Check and adjust ring gap and side clearance for the cylinder in which the rings will be installed according to the instructions in the primary ICA using the dimensions specified in Table 4. ***Always*** break the sharp edges at the ring gap to prevent the ring from digging into the groove and preventing normal rotation.
5. Install the piston rings and according to the instructions in Section VII.
6. Cylinder bore cleanliness can be evaluated by using clean cellophane tape and a white sheet of paper. Wrap a length of tape (sticky side out) around two or three fingers. Pat the tape at many locations on the cylinder bore and after cutting the tape, place it sticky side down on a white sheet of paper. A high particle count indicates a dirty surface and requires that the bore be re-cleaned according to the "Cylinder Cleaning" instructions on page 10.
7. Install cylinder(s) on the engine according to the primary ICA.
8. Follow the Run-in (Section VIII) and Break-in (Section IX) procedures in this document.
9. If high cylinder head or oil temperature persists after installation, or if very high oil consumption is noted after several hours of operation, then successful break-in will probably not occur. Remove the affected cylinders, hone the barrel surface and reinstall the cylinder with new rings.

A. Cylinder Inspection

Inspect the cylinders according to the instructions in the primary ICA. Repair to the valves and valve train, spark plug and fuel injector bosses using the instructions in the primary ICA. Regrinding the cylinder bore is not practical, due to the hardness of the nickel silicon carbide plating, therefore ***cylinder bore grinding is not permitted***.

1. Perform a fluorescent penetrant inspection (according to primary ICA instructions) on the cylinder head to determine airworthiness using suitable measuring equipment.
2. Verify the cylinder bore is within service limits.
3. Check bore for distress.
4. Check seats and guides and replace as necessary, according to the primary ICA.

B. Cylinder Bore Honing

Cylinder bores treated with nickel silicon carbide plating may be returned to service using the Rejuvenation Kit (Part No. AETKIT01) and these instructions:

Preparation

1. Two people are required to work together to perform the process; one to secure the cylinder in a holding fixture on a work bench and spray honing oil and the other to operate the hone.
2. Secure cylinder in the horizontal position on a bench top.
3. Clean bore thoroughly with mineral spirits prior to honing.

Diamond Honing

1. Fill spray bottle with honing oil (Part No. SS20-1) (both supplied in the kit).
2. Install diamond honing stones (Part No. AET00002) on the honing tool (Part No. AET00001) securing the stones with the cotter pins supplied with the kit. Install the diamond honing stones so that the diamond material is on the leading edge when the tool is rotated in a clockwise direction.
3. Using the spray bottle, saturate the barrel with honing oil.
4. Verify that the spring tension nut on the honing tool is at maximum pressure.
5. Insert honing tool into a drill motor that rotates clockwise at 400 to 600 RPM.
6. Insert stones into bore, turn on drill and hone for 1 minute at the rate of 40 to 60 stokes per minute with an intermittent spray of honing oil at the rate of one trigger pull per 2 to 4 strokes (1 stroke = 1full travel in and 1 full travel out). Exercise caution not to hit the dome and let the stones extend 1/3 of their length beyond the skirt end. If the dome is accidentally struck, polish the raised metal smooth.
7. Clean bore and check for bright areas. If bright areas are present, re-spray with honing oil and continue honing and spraying for 30 seconds.
8. Clean bore of all honing residue according to the “Cylinder Cleaning” instructions on page 10 of this document.

Micro Honing

1. Remove diamond-honing stones from honing tool and install micro honing brushes (Part No. AET00003). Again, have the brush on the leading edge when the tool is rotated in a clockwise direction.
2. Spray bore with honing oil and achieve 100% coverage.
3. Insert brushes into bore, turn on drill and micro hone for 6 to 8 strokes using the same stroke rate and technique as used with the diamond stones. ***Do not exceed ten strokes***.
4. After micro honing, the cylinder bore will be relatively smooth as compared to a steel bore and the cross hatch will be visible but faint. The surface finish should measure 3 - 8 micro-inches Ra.

VI. CYLINDER CLEANING

WARNING

Cylinder must be thoroughly cleaned after honing. Honing debris left in the cylinder will contaminate the engine through the oil supply, causing severe damage.

CAUTION: When utilizing compressed air, wear OSHA approved safety glasses, goggles or face shield. Never exceed 30 psi when using compressed gases for cleaning purposes (OSHA 1910.242(b)).

1. Soak the engine cylinders in mineral spirits for 15 minutes. Dry the cylinder with compressed air. Verify the cylinder is free of dirt and deposits. If the cylinder is satisfactorily cleaned after a mineral spirit bath, proceed to step 4.
2. If caked on carbon deposits remain, remove oil and loose materials from engine cylinders by spraying or brushing on a mild alkaline cleaner.
   a. Spray the cylinder with steam to remove all traces of alkaline residue.
   b. After the cylinder dries, inspect it again for traces of alkaline residue; respray with steam if alkaline residue is still present (to prevent corrosion) and repeat step 1.
3. For persistent carbon, varnish and gum deposits, dry blasting may be required.
   a. Seal and protect all machined surfaces on the cylinder such as the cylinder mount flange nut seats, barrel wall, small holes, and finished surfaces.

WARNING

Use only natural media, such as crushed nut shells or fruit pits for dry blasting. Do not use sand, glass, shot or metal grit when dry blasting. These abrasives can damage engine components. This type of shot will become embedded in aluminum parts rendering them useless.

   b. Dry blast the cylinder to remove persistent carbon, varnish and gum deposits according to instructions in the primary ICA.
4. Clean the cylinder with hot, soapy water and a stiff bristled (non-wire) scrub brush to remove blasting materials from the cylinder.
5. Thoroughly rinse the cylinder with hot water.
6. Wipe the cylinder bore with clean, soft white cloth and inspect cloth for cleaning debris. Repeat cleaning process until the cloth is free of debris.
7. Dry the cylinder completely.
8. Coat all bare steel surfaces thoroughly with clean, 50-weight aviation oil for protection prior to installation.

VII. PISTON RING INSTALLATION

1. Install piston rings on the new piston using a ring expander:
   a. Install a new expander ring in the oil control ring groove.
   b. Install a new oil control ring in the oil control ring groove of the piston with the part number oriented to the top of the piston. Position the oil control ring gap 180° away from the expander spring gap.
   c. Install a new second compression ring in the #2 ring groove with the part number oriented to the top of the piston.
   d. Install a new top compression ring in the #1 ring groove with the part number oriented to the top of the piston.

      CAUTION: The oil scraper ring must be installed with the taper inverted in NiC3 cylinders.

   e. Install a new oil scraper ring into the fourth ring groove with the part number oriented ***away from*** the top of the piston.
   f. Orient the piston ring in each groove 180° from the piston ring in the groove above.
2. Inspect all ring side clearances with the ring edge flush with the piston outside diameter. All ring side clearances must conform to Table 4 specifications.

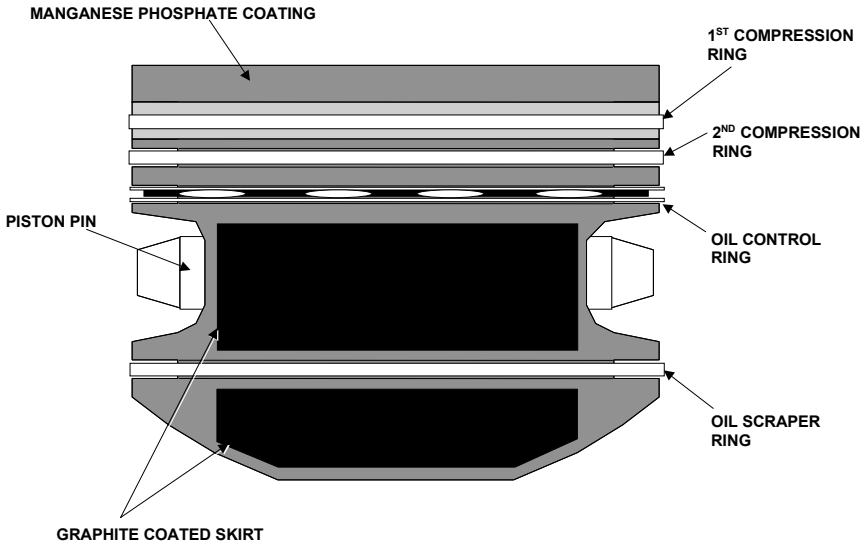

Figure 4. Piston Ring Installation Order

3. Lubricate the piston pin, piston, and ring assemblies with clean 50-weight aviation engine oil.
4. Place the new piston and ring assembly with the cylinder assembly for which it was previously sized and gapped. Insert the piston pin in the piston pin bore; the piston pin must slide freely in the piston pin bore.
5. Using a ring compressor, install each piston in its cylinder, with top three rings in the cylinder barrel and the piston pin bore accessible for connecting rod installation.

VIII. FOLLOW ON MAINTENANCE

After replacing one or more cylinders, perform the following steps:

WARNING

Do not use the starter to rotate the engine during engine pre-oiling. Persistent engagement of the starter to rotate the crankshaft will exceed the starter duty cycle and may result in premature starter failure.

1. Change the engine oil according to the "Engine Oil Servicing" in the primary Instructions for Continued Airworthiness (ICA) for the engine model. Service the engine oil sump to the proper capacity with oil conforming to SAE J-1966 or MIL-C-6529 Type II fly-away oil.
2. If the ignition harness and spark plugs were installed during engine assembly, disconnect the ignition harness from the upper spark plugs and remove the upper spark plugs from the engine.
3. Inspect the cylinder bore to verify a uniform, thin coating of oil is present. If the cylinder bore appears dry, pre-oil the cylinder walls and combustion chamber:

   CAUTION: Apply only a light coating of oil to the cylinder bore for pre-oiling. Heavy oil residue in the cylinder may result in over-servicing the oil sump, spark plug fouling, or hydraulic lock.

   a. With the piston at the Bottom Dead Center position, use a common garden sprayer with clean reservoir and nozzle to apply a light coating of SAE J - 1966 aviation engine oil through the top spark plug hole of each engine cylinder.

   b. Rotate the crankshaft by hand as opposite cylinders are sprayed. Repeat the process for each cylinder until each cylinder bore has a light coating of oil.
4. Install and torque the spark plugs and ignition lead wires according to the instructions in the primary ICA.
5. Verify lubrication lines, fittings, hoses, screens, and filters are in place prior to pre-oiling.

WARNING

Do not operate the engine unless the oil is properly serviced.

6. Check the oil level in the sump using the oil gauge rod (dip stick). Verify the engine oil is at the proper level for the engine model according to instructions in the primary ICA.
7. Check the ignition timing according to the primary ICA for the engine model and adjust, if necessary, to meet engine timing specification.
8. Install the engine in the aircraft or an engine test stand (per the applicable test stand or airframe manufacturer's instructions).

   a. *On an engine test stand:*

      1) A test club mated to the propeller flange, capable of sustaining the minimum moment of inertia specified for the engine to absorb the brake horsepower (BHP) at the RPM specified in test operating limits. Use the test club or flight

propeller in combination with the cell, test stand, cooling apparatus and operating limits for which it was calibrated.

2) A cooling air scoop designed to fit over the tops of all cylinders, with padded seals for rear cylinders and valve rocker covers, to direct an adequate flow of air downward through the cylinder fins.

3) Vanes to direct cooling air to the center cylinder and the oil cooler.

4) An air duct to the alternator vent tube.

5) An air filter and housing attached to the air throttle inlet flange. The filter area must be sufficient to avoid air flow restrictions. Clean the filter before each test. Calculations of filter area should be based the volume of air required by the engine at full throttle and on the filter capacity per unit of area. Increase the calculated area of a clean filter by at least 50% to allow for dirt accumulation.

b. *On the aircraft with a flight propeller:*
The aircraft configured with a flight propeller may be considered a suitable test stand for Post-Overhaul engine testing contingent on the following:

1) The flight propeller may be used contingent upon cautious observation of engine cylinder head temperature.

2) The aircraft instruments must be calibrated prior to initiation of the Post- Overhaul engine testing

3) Each cylinder should be fitted with a cylinder head temperature (CHT) sensing device. If the aircraft instruments monitor only one cylinder, CHT must not exceed 400°F and oil temperature must not exceed 200°F throughout all phases of engine testing.

4) Position the nose of the aircraft into prevailing winds

9. Start the engine and perform a ground run-up according to the primary ICA for the engine model, except:

a. Limit the first run-up after engine installation to three minutes. Operate the engine between 1200 and 1800 RPM to minimize cam lobe stress. If oil pressure is not observed within 30 seconds of engine start, shut down the engine and investigate the cause.

b. Allow the engine to cool (CHT less than 100°F) and check for leaks. Limit subsequent ground run-up to four minutes, not to exceed 2000 RPM to complete ground checks and adjustments before flight.

10. Perform an engine operational check according to the primary ICA for the engine model to verify oil pressure, fuel pressure and flow, and manifold pressure (turbocharged engines only). Adjust, if necessary, to meet engine specifications. During the engine operational check, apply full power for 10-20 seconds to ensure full rated power is available and make necessary adjustment.

11. Perform a flight check prior to release to service.

a. Keep aircraft weight to a minimum. Only required crew should be aboard for flight test.

b. Flight check is not recommended if OAT is above 90°F.

c. On take-off, use minimum power to reach 40 MPH (IAS) before applying required takeoff power.

d. Use take-off power only as long as necessary to get to BEST CLIMB SPEED. Reduce manifold pressure to minimum required for clean in-flight attitude. Leave propeller in flat pitch for at least 5 minutes after take-off. For aircraft not equipped with a variable pitch propeller or manifold pressure gauge, reduce power to 75%. Use minimum rate of climb with maximum air speed consistent with terrain.

e. When desired altitude is reached and cylinder head and oil temperatures are satisfactory, aircraft should be operated at 75% power until 20 - 30 minutes of flight time have elapsed. The engine should then be operated at various power settings and engine operating parameters observed until at least 45 minutes of flight time have elapsed. Apply all power changes gradually, especially power reductions.

f. During the flight check, any time that a persistent high oil or cylinder head temperature is noted, make a precautionary landing and inspect the engine installation to determine the cause.

g. Limit initial flight check to 30 minutes of satisfactory flight time. Land the aircraft and perform a visual inspection of the engine. Check engine oil level and note oil consumption; investigate oil consumption, if excessive, before further flight.

CAUTION: Avoid long ground runs and prolonged climbs at low air speeds.

h. Record flight check results in the engine log book before releasing the engine to service.

i. Minimize ground operations and continuous climb at low airspeed until the engine has accumulated at least 25 operating hours.

NOTE: Cylinder overheating can cause cylinder bore glazing and/ or piston scuffing at any time during engine operation but cylinder assemblies are most susceptible to these conditions during the first 25 to 50 hours of operation. Whenever glazing and/or scuffing become severe, the only remedy is to remove the offending cylinder(s), mechanically remove the glaze, replace the piston if necessary and install a new set of rings

IX. ENGINE BREAK-IN INSTRUCTIONS

Break-in is the most important time in the life of your engine and is critical in determining its performance capability. Seventy-five (75%) percent of the total normal wear of an engine occurs during the break-in period.

The operator should become informed about the type of ring faces and cylinder bore materials which are installed on the overhauled engine. The value of the information lies in two areas, 1) the susceptibility to overheating, and 2) the time in the break-in period when oil consumption will most likely stabilize.

While ring to bore seating will normally take place within the first several hours of operation, optimum oil consumption is frequently not achieved until 50 hours or more of operation have been accumulated. However, there are times when cylinders will glaze or prematurely lose their ability to "grind-in" the ring face. This condition is usually marked by lack of any reduction of oil consumption (oil is usually found on the belly of the airplane due to excessive crankcase pressure) during the first 10 hours of operation. By removing the spark plugs and checking for fouled electrodes, the offending cylinder(s) can be identified. The only remedy is to remove the cylinder(s), re-hone the bore for ring finish and reinstall using new rings.

Break-In Procedure

1. Verify the engine has been run-in according to the "Follow On Maintenance" instructions in Section VIII.
2. For the initial flight after release to service, fast idle (850-1,000 RPM) engine for 3-4 minutes. Shut down and inspect for oil leaks. During ground runs, do not permit cylinder head temperatures to exceed 400°F or oil temperature to exceed 200°F.
3. Start engine, run up normally, taxi and take off immediately. (Minimize ground time.) Reduce manifold pressure as soon as practical. Slowly reduce engine speed to maximum continuous RPM (top of green) for fixed pitch propellers, reduce power to 75%.
4. Cycle the propeller only enough to verify control. This will ensure the propeller hub has oil pressure prior to take-off.
5. Maintain a shallow climb to keep cylinder head temperatures as low as possible.
6. Level off at altitude and maintain 75% power for at least 30 minutes. During the first 50 hours of the break-in period, piston rings will seat best if cruise is maintained at 65% to 75% power. Oil consumption will also be optimized under these operating conditions. Normal ground idle may be used after the engine temperatures and oil consumption have satisfactorily stabilized.
7. Keep flying weight to a minimum to reduce power requirements during take off.
8. Follow break in lubrication instructions in the primary ICA.

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