SECTION 5 - ENGINE MECHANICAL

MERCURY
SNOWMOBILES

PART D - HURRICANE, MARK I and MARK II (644cc) MODELS

MERCURY
MARINE

INDEX

ENGINE ASSEMBLY (COMPLETE)

REMOVAL

1. Remove battery cables from battery terminals. (Remove battery on Mark I and some Mark II models.)
2. Remove bulkhead located on right front side of chassis (if so equipped). (Figure 1)

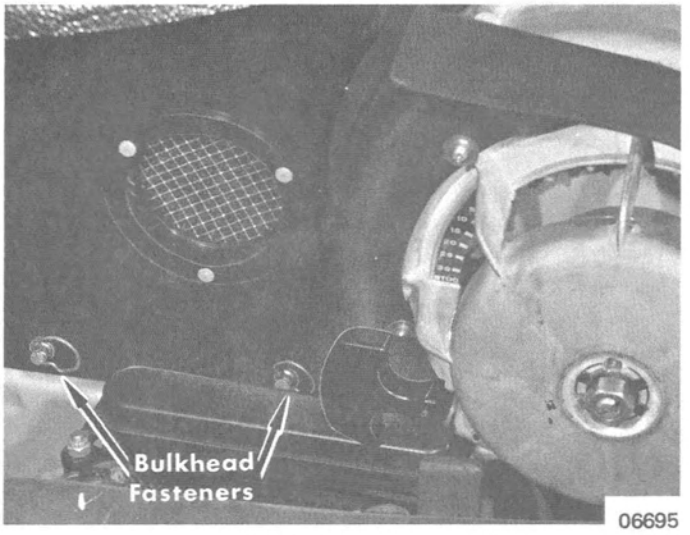

Figure 1. Bulkhead Removal

   a. Release 2 bulkhead fasteners by twisting ¼-turn counterclockwise.
   b. Pull bulkhead out to clear chassis and down to remove from top retaining clips.
3. Remove carburetor air inlet elbow (if so equipped).
4. Remove drive belt. (Refer to Section 2B.)
5. Remove fuel inlet cover and screen from fuel pump (if so equipped). (Figure 2)
6. Disconnect fuel primer line from tee (located on top of engine). (Figure 3)

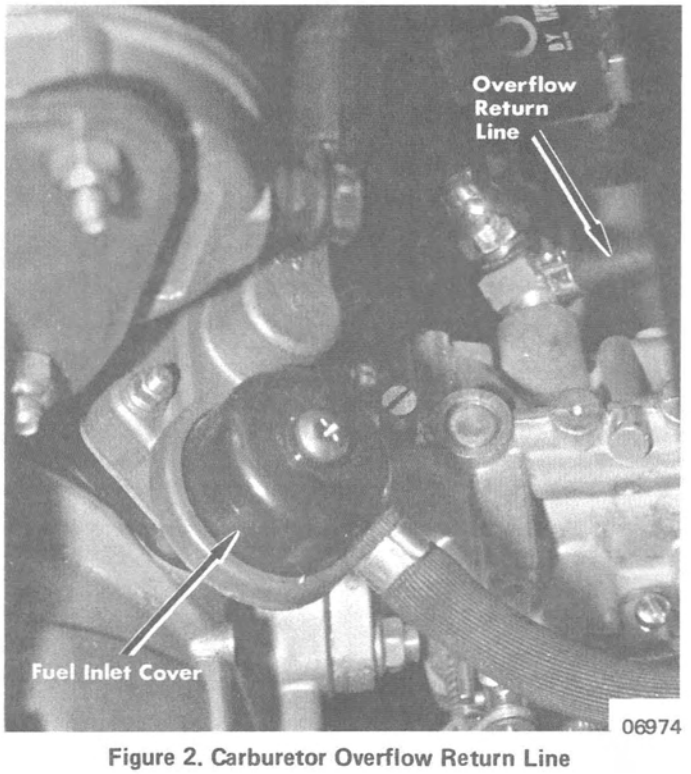

Figure 2. Carburetor Overflow Return Line

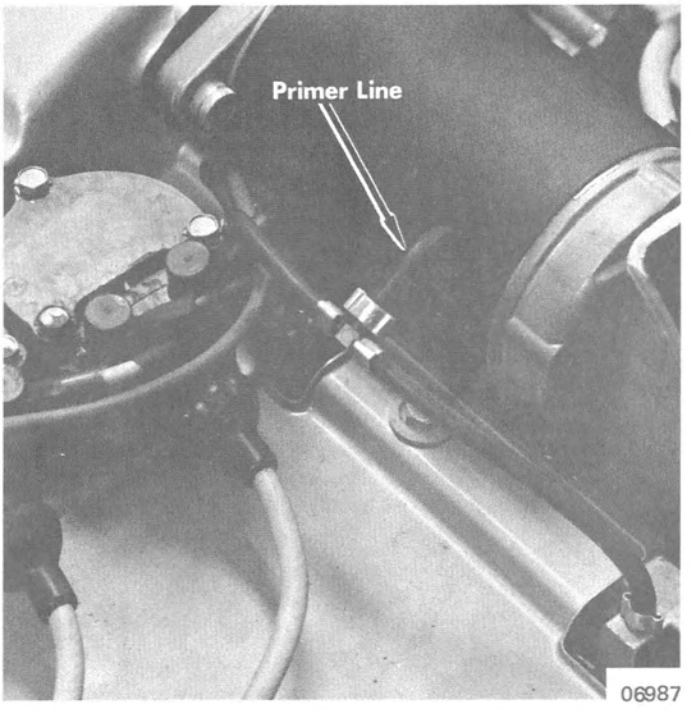

Figure 3. Fuel Primer Line Location

7. Disconnect throttle control cable from carburetor throttle lever(s). Disconnect throttle lever return spring (if so equipped).
8. Disconnect choke cable from carburetor choke lever(s).
9. Remove attaching nuts and remove air intake and cable bracket from carburetor with cables attached.

   NOTE: On Mark II models with Chassis Serial No. 3591478 and below, do not remove cable bracket from carburetor. Remove cables from bracket.

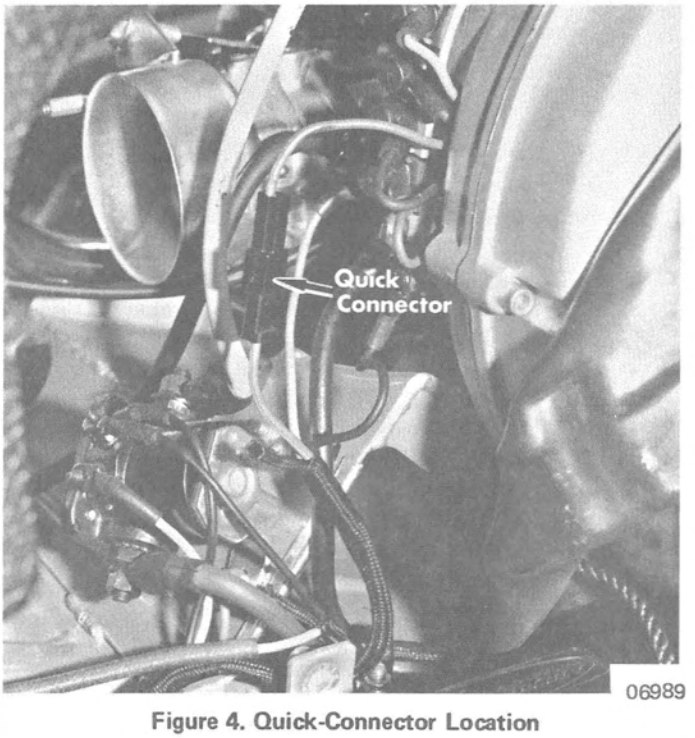

Figure 4. Quick-Connector Location

10. Disconnect the following wiring connections:
    a. Yellow cable from starter motor.
    b. Salmon and black wires from switch box (1972 Hurricane).
    c. Separate red ignition lead at "quick-connector" (1972 Hurricane and Mark II). (Figure 4)

    NOTE: Mark I and Mark II models are equipped with a "quick-connector" engine harness located by solenoid. Disconnect harness and remove from "J" clip.

11. Remove carburetor overflow return line from carburetor. (Figure 2)

    NOTE: On Mark II models, disconnect fuel line and fuel return line at tee's.

12. Remove drive sheave from crankshaft (refer to Section 2C).
13. Remove 4 nuts from underside of engine mounts. (Figure 5)
14. Remove engine from chassis.

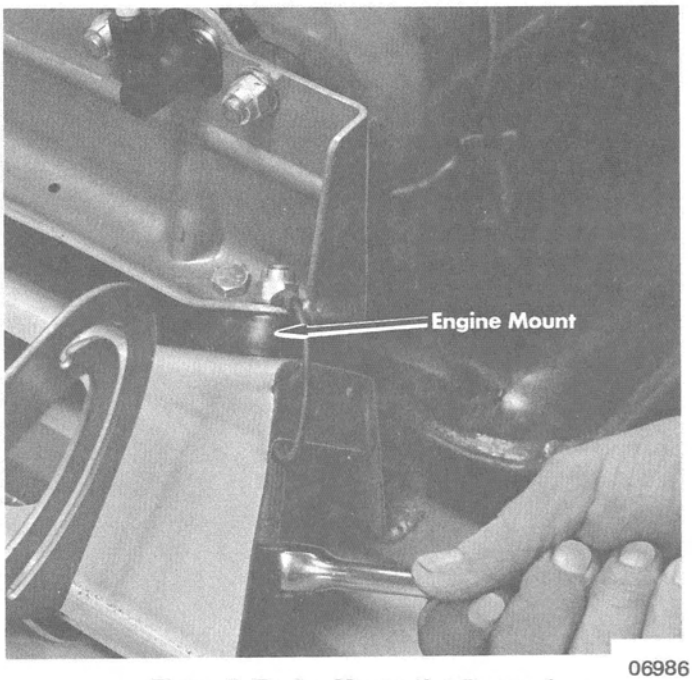

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Figure 5. Engine Mount Nut Removal

INSTALLATION

1. Position engine on chassis and secure with engine mount nuts. Torque to specifications.
2. Attach carburetor overflow return line to carburetor. (Figure 2)
3. Install air inlet bracket on carburetor (if so equipped). Connect throttle and choke cables to carburetor(s) and adjust. (Refer to Section 7A.) Hook up throttle return spring.
4. Connect fuel primer line to tee. (Figure 3)
5. Install fuel inlet cover and screen on fuel pump.
6. Make the following electrical connections:
    a. Red ignition wire at "quick-connector" (1972 Hurricane and Mark II).
    b. Salmon and black wires to switch box (1972 Hurricane).
    c. Yellow cable to starter motor.

    NOTE: Mark I and Mark II models are equipped with a "quick-connector" engine harness located by solenoid. Connect harness and install under "J" clip.

7. Install drive sheave on crankshaft and reinstall drive belt. (Refer to Section 2.) Torque sheave retaining bolt to specifications.
8. Install carburetor air inlet elbow on carburetor (if so equipped). Torque nuts to specifications.
9. Reinstall bulkhead (if so equipped). (Figure 1, preceding)
10. Attach battery cables to battery terminals and install battery, if removed.

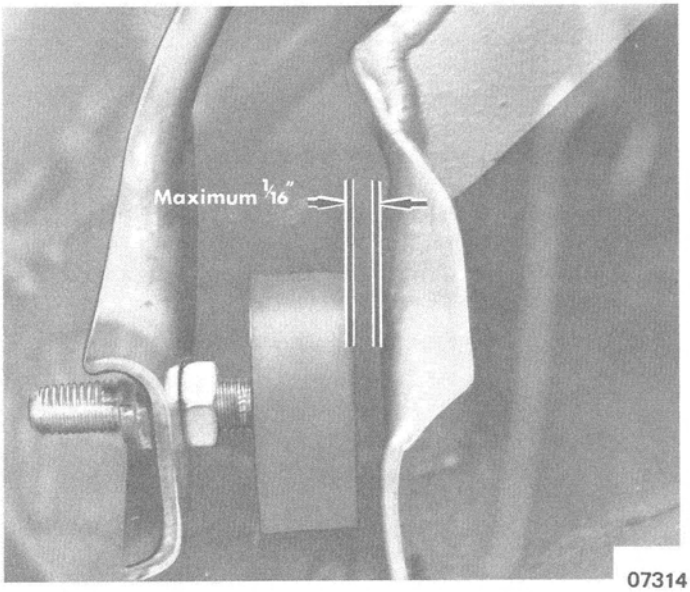

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Figure 6. Rubber Bumper Adjustment

WARNING: When attaching battery cables, DO NOT reverse battery cables on battery terminals. DO NOT spark battery cables against terminals to check polarity. Damage to charging system components may result if these precautions are not observed.

11. Adjust rubber bumper to specification shown in Figure 6.

SHORT BLOCK REPLACEMENT

GENERAL

The section covers removal and installation of engine components for replacement of a complete short block. Refer to short block repair section for repair of any internal components.

REMOVAL

1. Remove engine from vehicle and place in Engine Work Stand (C-91-62491). Use ½-20 x 1½" screw (C-10-49101) to attach engine to stand.

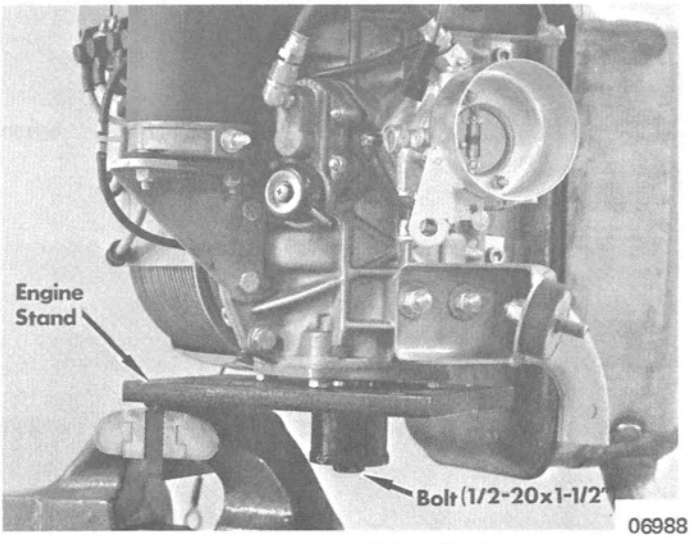


Figure 1. Engine Installed in Work Stand

2. Remove muffler and exhaust pipes. (Refer to Section 7B.)
3. Remove spark plugs.
4. Remove front engine mount bracket. (Figure 2)

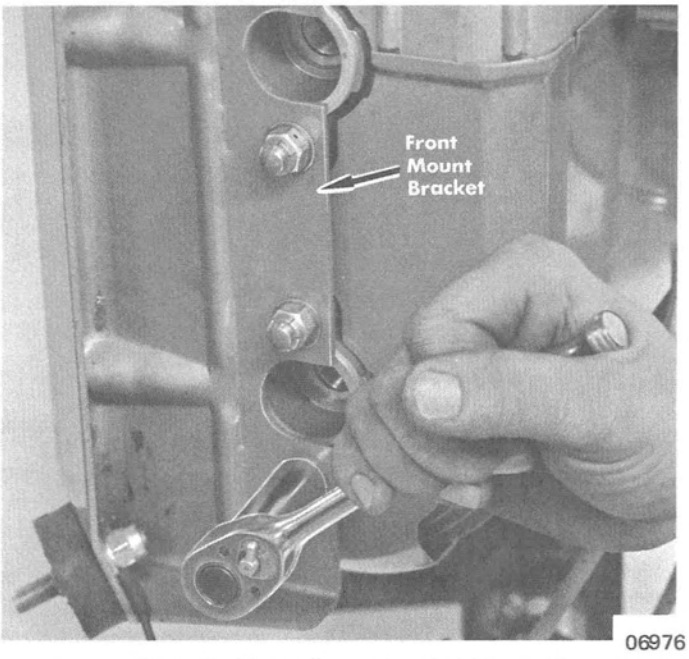


Figure 2. Front Mount Bracket Removal

5. Remove rear engine mount brackets.
6. Remove engine shroud.
7. Remove screws (2) which secure starter motor mounting bracket to crankcase. (Figure 3)

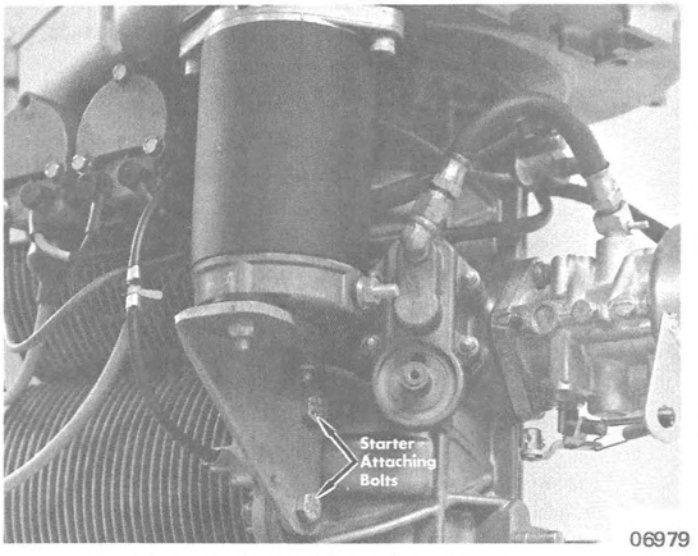


Figure 3. Starter Motor Attaching Screws

NOTE: The starter motor on Mark I and Mark II can be removed at this time. Remove black lead from starter motor.

8. Remove rubber air shroud from fan housing (if so equipped).

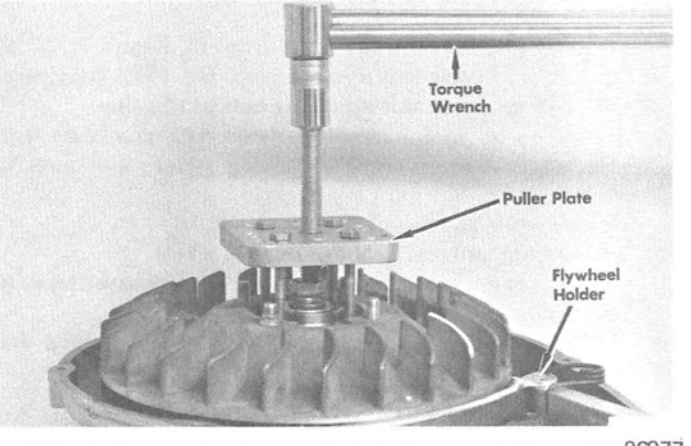


Figure 4. Flywheel Puller Installed

9. Remove fan housing and rewind starter assembly.

   NOTE: On Mark I and Mark II models, before removing fan housing, remove wiring harnesses from housing, rectifier and ignition coils.

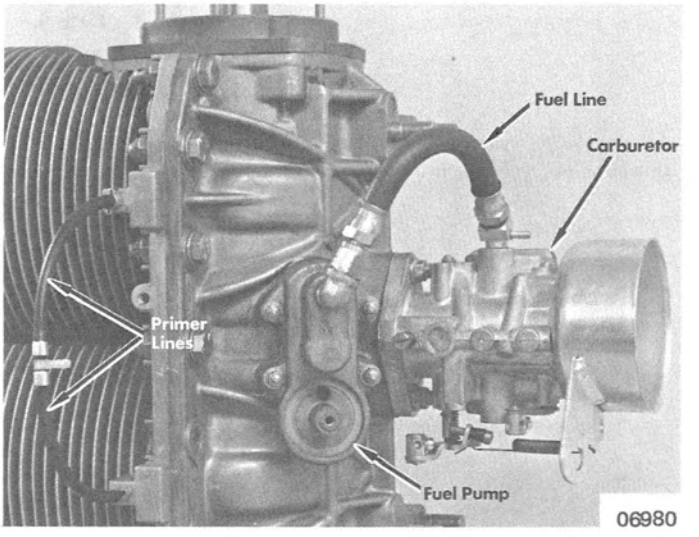
10. Remove rewind starter ratchet from flywheel fan assembly. Loosen flywheel retaining bolt ¼".
11. Remove flywheel fan assembly as follows:
    a. Install End Cap Puller (C-91-25733A3) on flywheel. (Figure 4)

CAUTION: Puller plate screws can cause damage to advance counterweights, if over-tightened. DO NOT use a wrench. Hand tighten only.

b. Hold flywheel with Flywheel Holder (C-91-52344), tighten puller center bolt to 45 ft. lbs. (6.2mkg) maximum and tap center bolt ONCE to free flywheel. If flywheel does not pop loose, tap each side of flywheel alternately, using wood block and hammer (while maintaining torque on center bolt) until flywheel is free.
c. Remove fan and flywheel assembly from engine.

12. Remove backplate attaching bolts and 4 stator attaching nuts. On Hurricane 1972, loosen starter motor attaching nuts. Lift back plate, starter, stator and contact housing off engine as one unit.
13. Remove carburetor(s), fuel pump and fuel primer lines. (Figure 5)

Figure 5. Carburetor, Fuel Pump, Fuel Primer Line Location



INSTALLATION

1. Install carburetor(s), fuel pump and fuel primer lines on short block. (Figure 5)
2. Position backplate assembly on short block and secure to engine as outlined following:
   a. Clean threads of 4 end cap bolts.
   b. Install a tab washer (C-14-20091) beneath head of each bolt.
   c. Apply Epoxy (C-92-65150-1) to threads of each bolt.
   d. Install 4 end cap bolts and torque to specification.
   e. Bend one tab (of each tab washer) against bolt head and the other tab into notch in end cap.

   NOTE: End cap bolt heads can be drilled and safety-wired to prevent loosening, in addition to using epoxy and tab washers.

3. Position contact housing as shown in Figure 6 (if so equipped). Install stator on engine. On 1972 Hurricane, DO NOT tighten stator attaching nuts at this time.
4. Secure starter motor mounting bracket to crankcase with attaching screws. Torque attaching screws and nuts to specifications.
5. Install engine air shroud.
6. Install front and rear engine mount brackets.
7. Install exhaust pipes and muffler. Torque exhaust pipes to specifications.
8. Retime engine as outlined in Section 3C "Timing and Adjusting".

   NOTE: Mark I and Mark II models cannot be retimed until engine is running. Refer to Section 3C "Timing and Adjusting".

9. Install flywheel fan assembly and torque to specifications. Secure starter ratchet to flywheel.
10. Tighten starter motor attaching nuts.
11. Install fan housing cover and rewind starter assembly.

    NOTE: On Mark I and Mark II models, attach wiring harnesses to fan housing, rectifier and ignition coils. Attach black lead from backplate to starter motor.

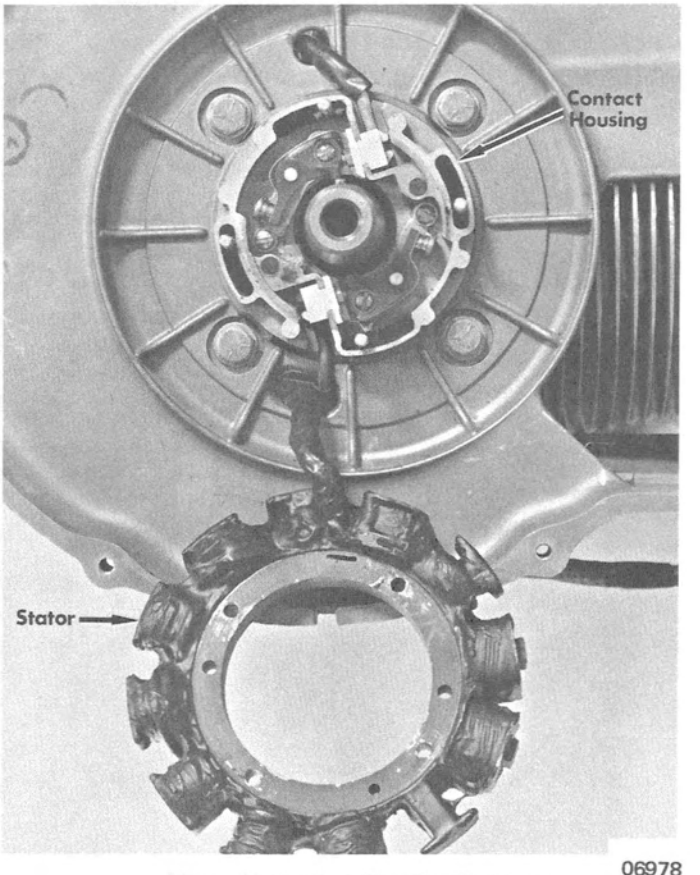


Figure 6. Contact Housing Position

12. Attach rubber air shroud to fan housing cover on 1972 Hurricane.
13. Reinstall engine in vehicle.

    NOTE: If the rewind starter ratchet and fan are found to be loose on 1972 Hurricane (644cc) engine, use Loctite Type "A" (C-92-32609-1) on flywheel studs and torque nuts to 240 in. lbs. (277kg-cm). Install fan housing. Use Loctite Type "A" on the seven screws and torque to 65 in. lbs. (75kg-cm). (Refer to Section 8 for other specifications.)

SHORT BLOCK REPAIRS

This section covers repairs which can be completed on the basic short block. To remove engine component prior to short block repairs, refer to preceding section.

CYLINDER BLOCK and CRANKCASE ASSEMBLY

REMOVAL

1. Attach short block to Engine Stand (C-91-62491), using 2 center mount bracket studs on cylinder block. (Figure 1)
2. Remove 4 end cap attaching bolts from PTO side end cap.
3. Remove cylinder block to crankcase attaching bolts.
4. Pry crankcase off. Be careful not to damage crankcase sealing surface.
5. Lift crankshaft and end caps out of cylinder block.

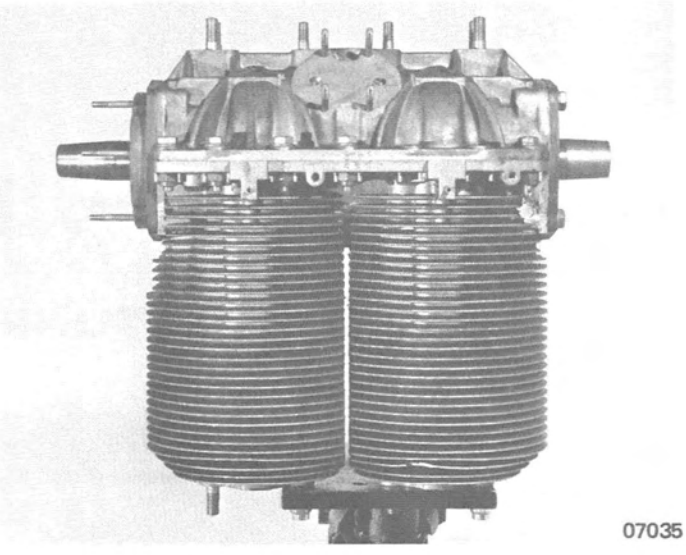


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Figure 1. Short Block Attached to Engine Stand

CYLINDER SLEEVE REPAIRS

Repairs to cylinder sleeve depend upon amount of wear present. If inspection revealed that cylinder sleeve was slightly worn, honing may clean up the cylinder. If not, cylinder should be bored to next smallest oversize diameter that will resurface the sleeve.

HONING

1. Follow hone manufacturer's recommendations for correct hone use, cleaning and lubrication for use of hone, proper cleaning and lubrication during honing.
2. During honing operation, cylinder bore occasionally should be thoroughly cleaned, and piston should be selected for individual cylinder and checked for correct fit.
3. When finish honing a cylinder bore, move up-and-down at a sufficient speed to obtain very fine uniform surface finish marks in a cross-hatch pattern of approximately 45° to 65° included angle. Finish marks should be clean, but not sharp, and free from imbedded particles and torn or folded metal. (Figure 2)
4. Thoroughly clean cylinder bores with hot water and detergent. Scrub well with stiff bristle brush and rinse thoroughly with hot water. It is necessary that a good cleaning operation be performed. If any abrasive material is allowed to remain in cylinder bores, it will rapidly wear new rings and cylinder bores. Also, bearings will wear if lubricated by contaminated oil. Bores should be swabbed several times with light engine oil and clean cloth, then wiped with a clean, dry cloth. Cylinder should not be cleaned with kerosene or gasoline.

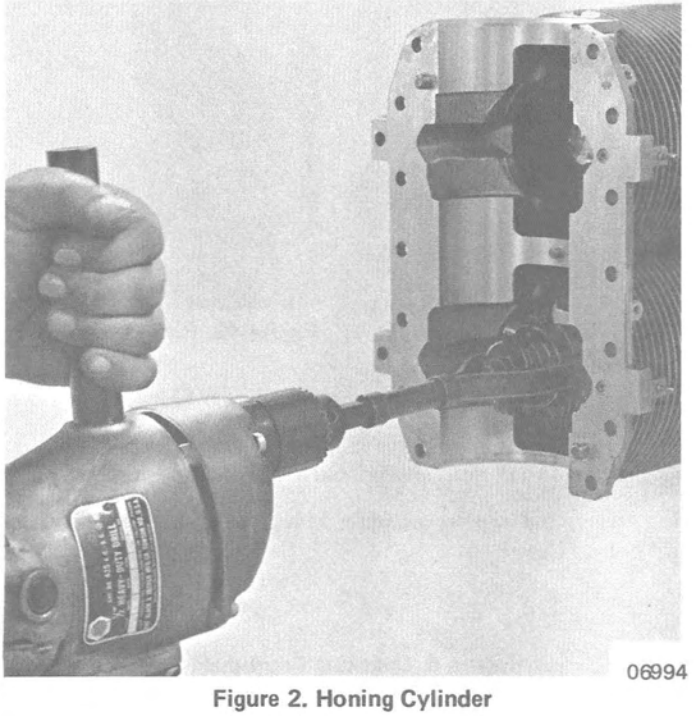

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Figure 2. Honing Cylinder

INSPECTION

1. Hone cylinder to clean up any score marks or scuffs in cylinder bore.
2. Measure piston diameter with a micrometer at center of piston skirt.
3. Measure cylinder sleeve diameter with an inside micrometer at approximate center of sleeve. (Figure 3)

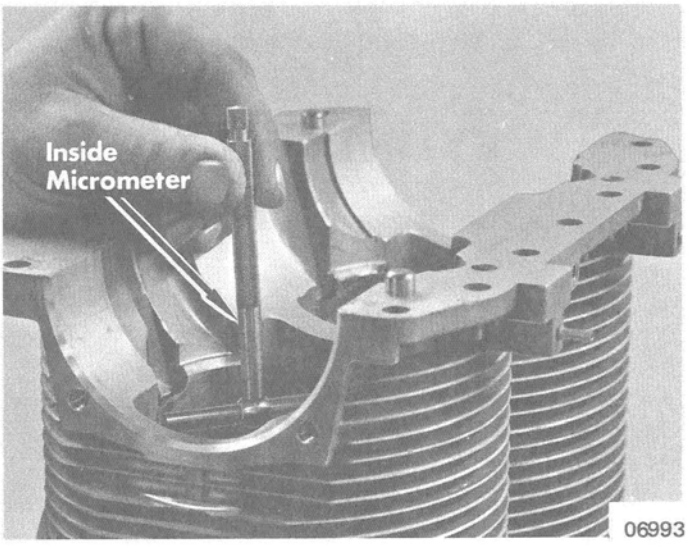


Figure 3. Checking Cylinder

CYLINDER BORING

1. Carefully follow instructions furnished by manufacturer of the boring equipment.
2. Replacement pistons are available in .015" oversize. Bore and finish hone cylinder to dimensions shown in following chart:

.015" OVERSIZE CYLINDER/PISTON DIMENSIONS

Model	Cylinder Bore Diameter	Piston Skirt Diameter	Skirt Clearance
Hurricane	3.138"-3.139"	3.134"-3.135"	.004"-.006"

INSTALLATION

1. Coat cylinder sleeves and piston rings with oil.
2. Install ring compressors (C-91-62591, Figure 4A or C-91-65494, Figure 4B) on pistons.

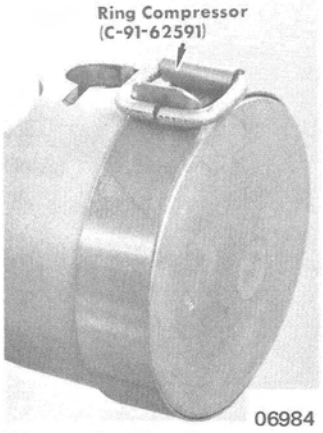


Figure 4A. Ring Compressor

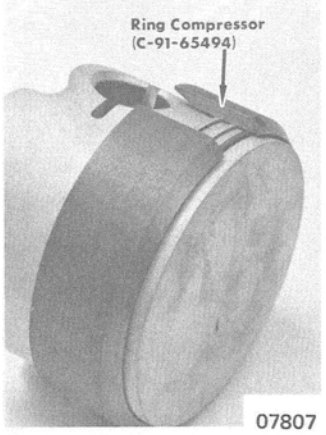


Figure 4B. Ring Compressor

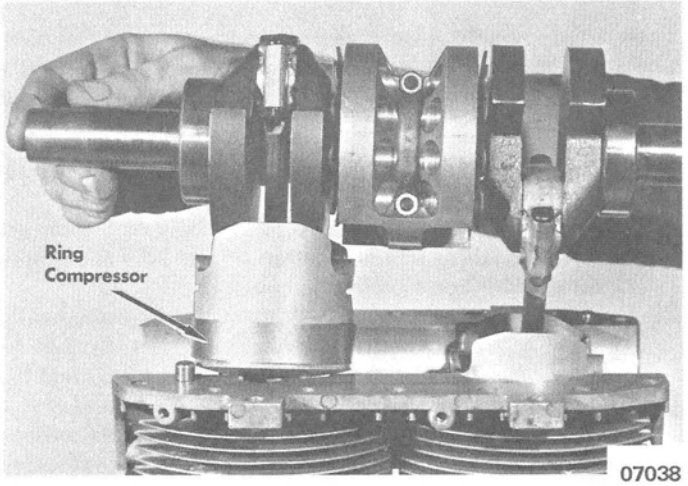


Figure 5. Installing Crankshaft and Pistons

3. Install crankshaft and pistons in cylinder block. (Figure 5)

   NOTE: Check for broken rings. Depress ring. If ring is broken, it will not "spring" back when depressed.

4. Attach end caps to cylinder block with PTO side end cap bolts. (Figure 6)

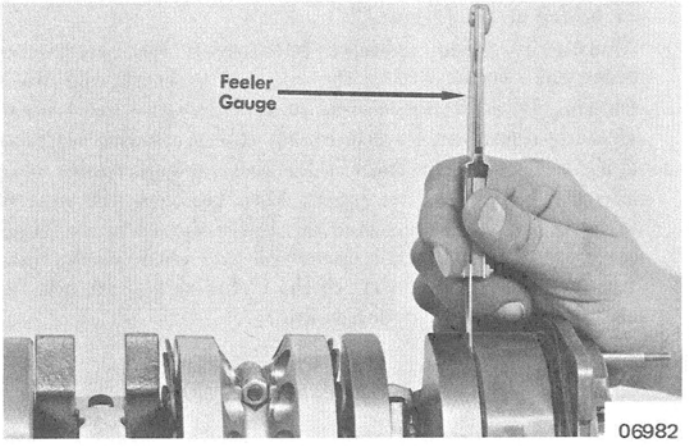


Figure 6. Checking Crankshaft End Play

5. Tap crankshaft either way with leather mallet to obtain a true seat. Measure end play between crankshaft throw and end cap. End play of .004"-.008" (.10mm-.20mm) is permissible. Shims may be added or removed to decrease or increase amount of end play.
6. Remove attaching bolts from end caps.
7. Install new sealing gasket in crankcase. Apply a THIN coat of Gasket Sealer (C-92-72592-1) to both surfaces of crankcase and cylinder block. (Figure 7)

CAUTION: Gasket sealer MUST NOT block or restrict crankcase bleed passages.

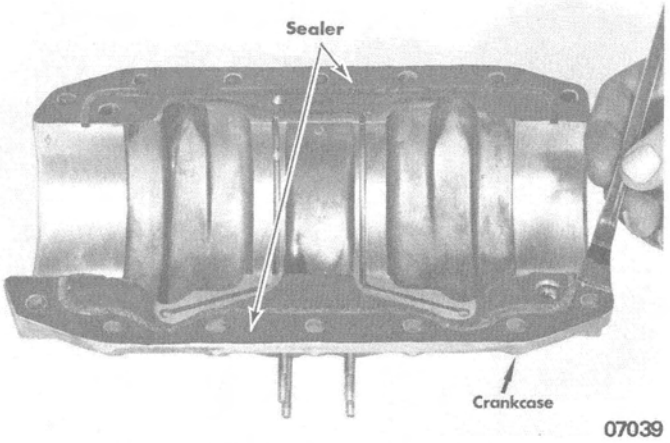


Figure 7. Applying Crankcase Sealer

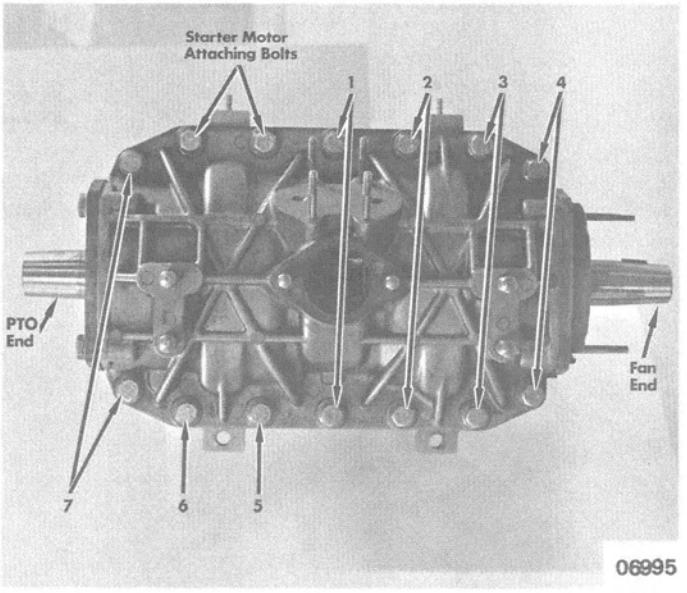


Figure 8. Crankcase Bolt Torquing Sequence

8. Install crankcase on cylinder block.
9. Torque crankcase attaching bolts in sequence shown in Figure 8.
10. Apply Loctite Type "A" (C-92-32609-1) to threads of PTO side end cap bolts. Secure PTO side end cap to cylinder block and crankcase with bolts. Torque bolts to specification.

PISTON and RING ASSEMBLY

REMOVAL

1. Remove crankshaft assembly and place in Engine Stand (C-91-62491). (Figure 1)

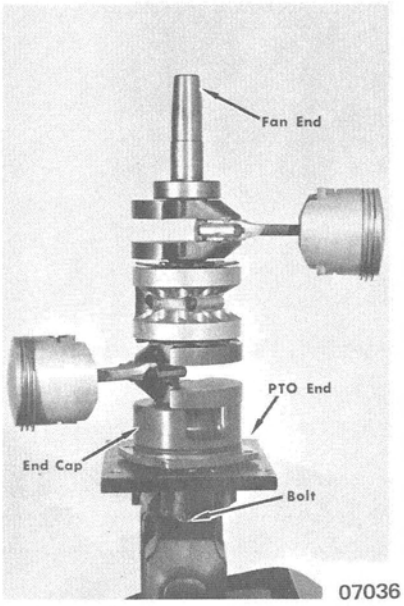


Figure 1. Crankshaft Assembly in Engine Stand

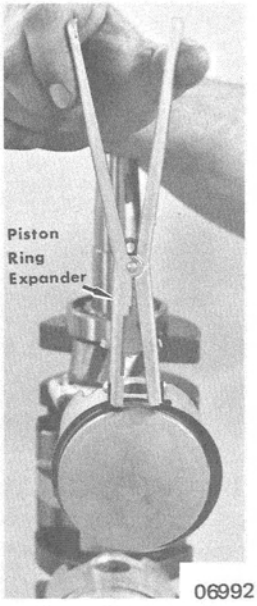


Figure 2. Removing and Installing Piston Ring

2. Remove piston rings with Piston Ring Expander (C-91-24697). (Figure 2)
3. Remove piston pin lockrings with Lockring Tool (C-91-52952A1).
4. Place Piston Pin Tool (C-91-46739A2) into top of piston.

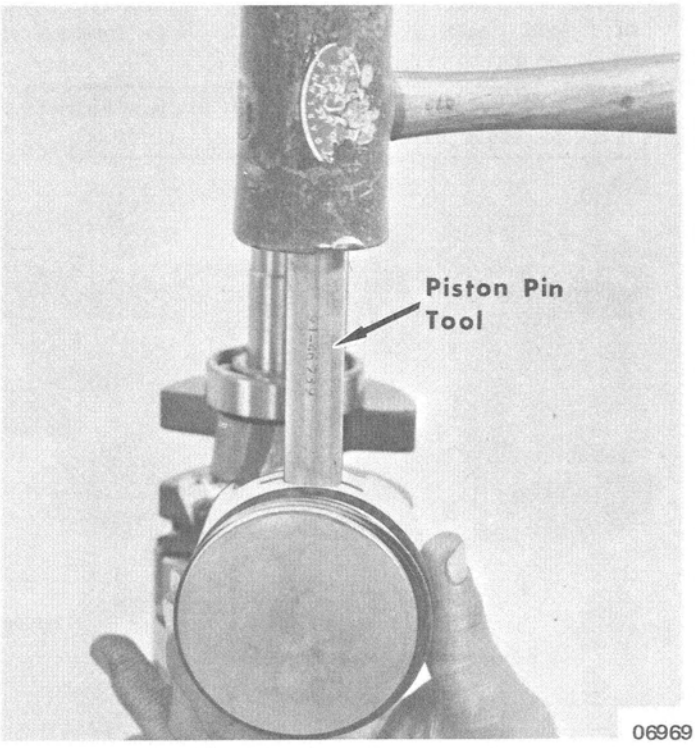


Figure 3. Removing Piston Pin

Support bottom of piston with hand, then drive pin out of piston. (Figure 3)

5. Remove tool from piston and remove piston from connecting rod. Be careful to catch washers and needle bearings in hand when removing piston from connecting rod.

CLEANING and INSPECTION

1. Check piston for scoring, detonation or pre-ignition damage.
2. Inspect piston ring grooves for wear, burn and/or distortion.
3. Check piston pin "fit" to piston. If piston pin is loose, tight, bent or otherwise damaged, complete piston and pin assembly must be replaced, as piston and pin are not sold separately.
4. Inspect piston pin bearings as outlined in "Inspection, Connecting Rod", following.
5. Clean piston ring grooves thoroughly, using recessed end of broken ring.
6. Clean carbon and varnish deposits from top sides of piston with soft wire brush or carbon remover solution. When wire brushing top of piston, do not burr or round machined edges.
7. Gum, varnish and softer carbon deposits can be removed by soaking in a carbon remover solution.
8. Polish piston skirt with crocus cloth to remove burrs.

INSTALLATION

1. Place a bead of Multipurpose Lubricant (C-92-49588) around Piston Pin Tool (C-91-46739A2). Place needle bearings (29) on a clean surface and roll them onto tool. (Figure 4)

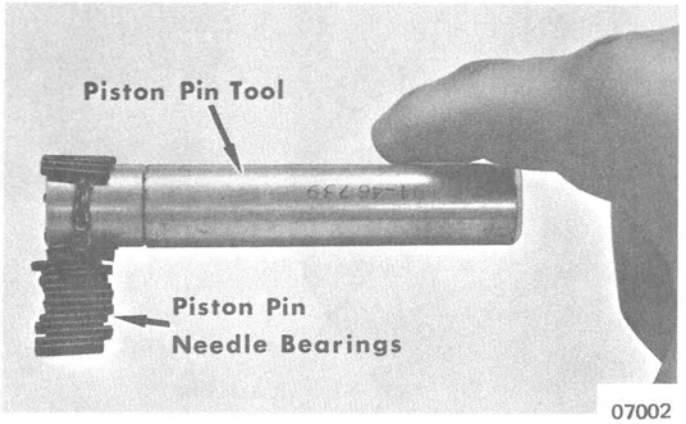


Figure 4. Rolling Needle Bearings onto Piston Pin Tool

2. Insert bearings into race of connecting rod. Place small amount of Multipurpose Lubricant on bearing retainer washers and install on connecting rod.

NOTE: Check that ALL 29 needle bearings are installed in connecting rod race. (Figure 5) If all bearings are installed, awl will not fit between bearings.

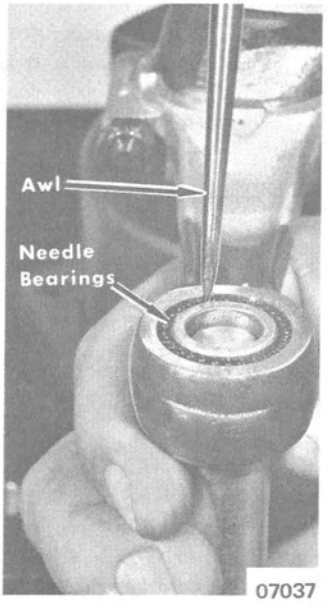


Figure 5. Checking for Missing Needle Bearings

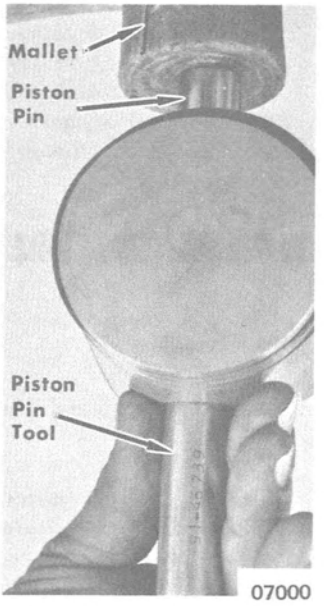


Figure 6. Installing Piston Pin

3. Place piston on connecting rod with "E" (stamped on top of piston) toward exhaust port.

4. Push Piston Pin Tool (C-91-46739A2) through piston and set open end of piston pin on small end of tool. Using leather mallet, tap piston pin into position. (Figure 6)

IMPORTANT: DO NOT re-use lockrings. Use only new lockrings and make sure that they are completely seated in groove.

5. Using Lockring Installation Tool (C-91-60837A1), install piston pin lockrings in piston. (Figure 7)

6. Install new piston rings on pistons with Piston Ring Expander (C-91-24697). (Figure 2)

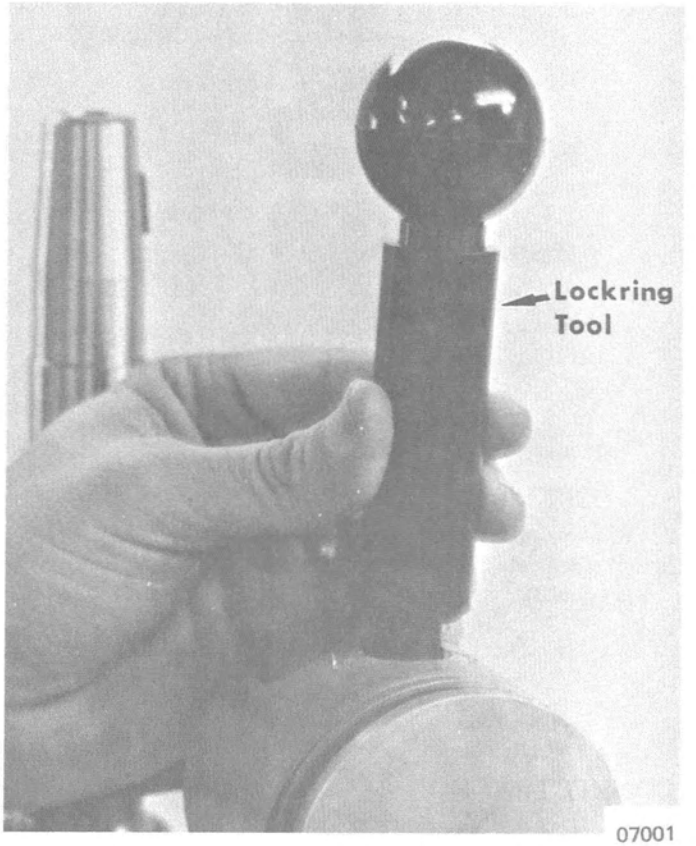


Figure 7. Installing Piston Pin Lockring

NOTE: Mark I and Mark II models with Chassis Serial No. 3591478 and below use 2 silver and one black piston ring on each piston. The special (black colored) compression ring is used in the top ring groove only. Mark II model with Chassis Serial No. 3787640 and above use three dark colored piston rings which can be installed in any ring groove.

7. When placed in grooves, rings should rotate freely. Lubricate rings with oil, then rotate and align ring openings with locating pins in piston ring grooves.
8. Reinstall crankshaft assembly in block.

CONNECTING ROD

REMOVAL

1. Remove crankshaft assembly and place in engine stand. (Figure 1)

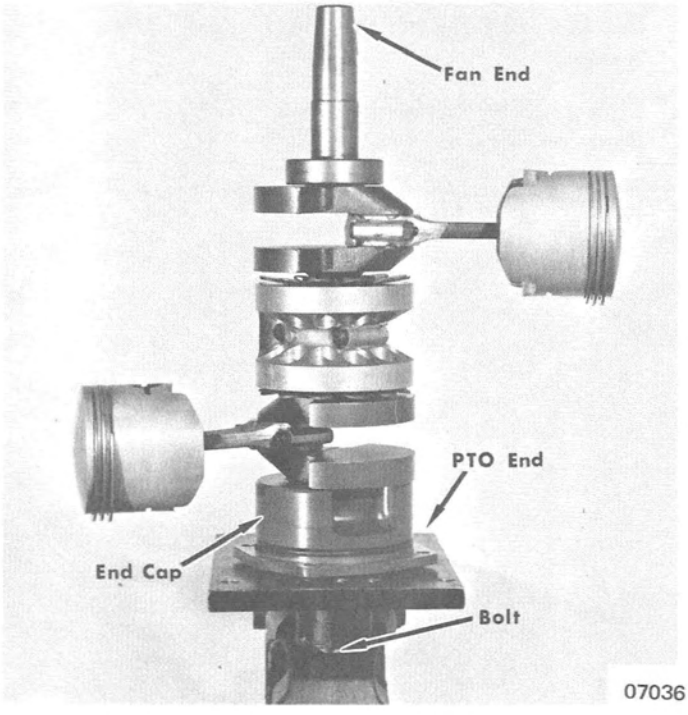


Figure 1. Crankshaft Assembly in Engine Stand

2. Remove piston from connecting rod.
3. Remove elastic stop nuts from connecting rod bolts. (Figure 2)

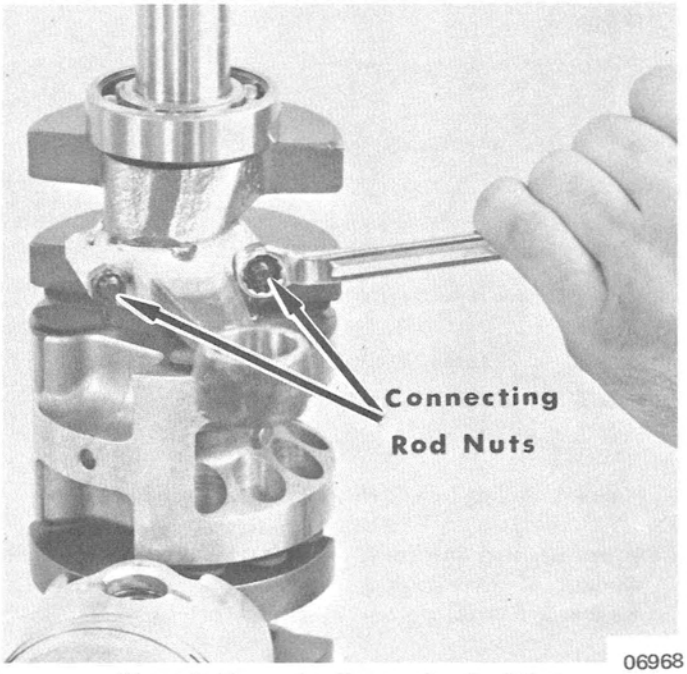


Figure 2. Removing Connecting Rod Nuts

4. Hold rod cap and pull upper half of connecting rod free. Remove rod cap.

NOTE: Rematch connecting rod and cap with mating dots (or etched line) on same side. When making repairs, it is necessary that each bearing assembly for each individual rod be kept separate. DO NOT intermix bearings and bearing carriers from different rods.

CLEANING and INSPECTION

CONNECTING ROD

1. Check all bearing surfaces for pit marks. Replace parts if surfaces are damaged.
2. Place rod flat on surface plate. If light can be seen under portion of machined surfaces, or if rod has slight wobble on plate, rod is bent and must be replaced.
3. If necessary to clean crankshaft bore of connecting rod, clean lightly with crocus cloth. DO NOT polish crankshaft bore of connecting rod with emery cloth to roughen the surface. Bearing setup requires that connecting rod surface must be smooth.

NOTE: Clean crankshaft journals as outlined under "Crankshaft, Cleaning and Inspection".

BEARINGS

1. Inspect bearings and carrier for wear.

NOTE: Bearing carrier assembly is available only with roller bearings. Individual roller bearings are not available separately. If carrier bearings are worn or require replacement, they must be replaced as a complete bearing carrier assembly. When repairs are made, it is essential that bearing assemblies for individual rods be kept separate. DO NOT intermix bearings and carriers from different rods.

2. Clean bearings before reassembling connecting rod.

INSTALLATION

1. Coat each half of connecting rod bearing race with Multipurpose Lubricant (C-92-49588) to hold roller bearing assembly halves in place.

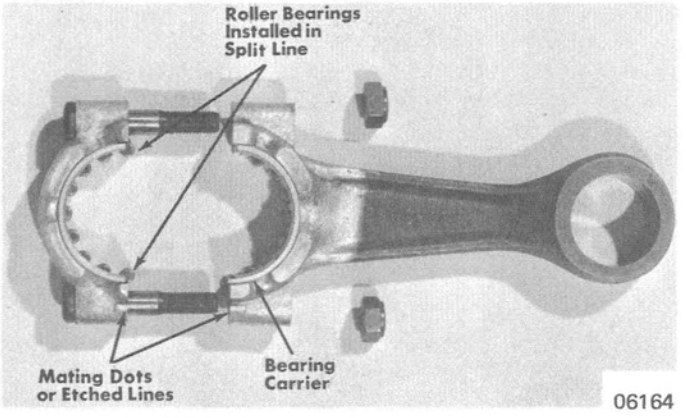


Figure 3. Roller Bearings Installed on Rod

2. Place one half of bearing carrier on race of rod cap. Place roller bearing in each slot of carrier. One roller bearing is placed in split line of bearing carrier at each end. (Figure 3)
3. Place other half of bearing carrier on race of upper part of rod. Place roller bearing in each slot of carrier. (Figure 3)
4. Place rod cap around crankshaft journal and hold in place.

   NOTE: Make sure that matching dots (or etched lines) are aligned with each other before proceeding with Step 5.

5. Install upper half of connecting rod on rod cap. Secure with elastic stop nuts and torque to specification.
6. Rotate connecting rod after torquing to make sure it rotates freely and without roughness. Always recheck matching dots (or etched lines) on reassembled rods for correct and perfect match.
7. Install piston on connecting rod and reinstall crankshaft assembly in block.

MAIN BEARING ASSEMBLY

1. Remove crankshaft assembly and place in engine stand. (Figure 1)
2. Scribe a mark on top of main bearing surface for reference when reassembling main bearing to crankshaft.

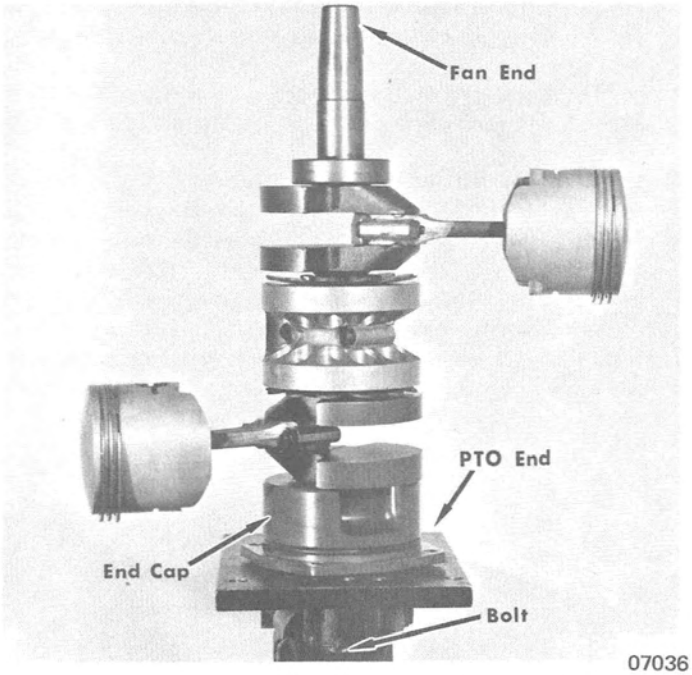


Figure 1. Crankshaft Assembly in Engine Stand

3. Separate main bearing halves by removing 2 phillips head screws. (Figure 1) Be careful not to bend or distort reed valves and/or reed valve stops during removal.
4. Remove snap ring from outer race and remove outer race. Remove needle bearing from crankshaft journal. (Figure 2)
5. Remove reed valve retaining screws and remove reed valves and stops from main bearing.

NOTE: Mark II model engines do not have internal reeds. Reed blocks are located between intake manifold and crankcase.

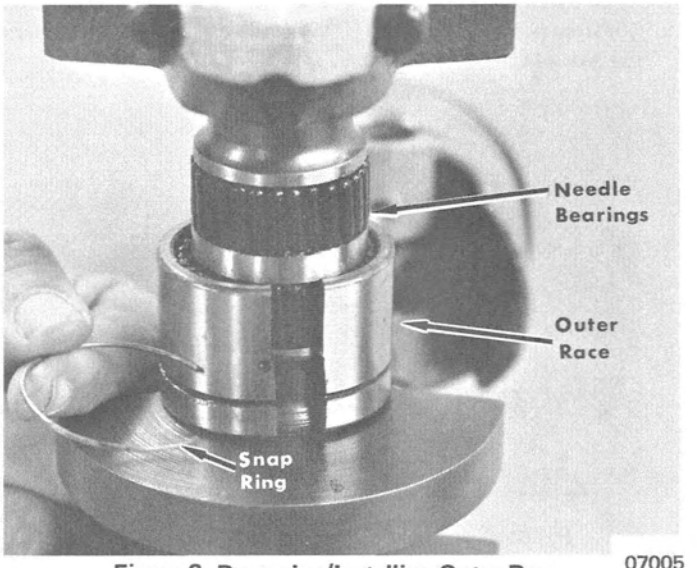


Figure 2. Removing/Installing Outer Race

CLEANING and INSPECTION

NOTE: Mark II model engines do not have internal reeds. Reed blocks are located between intake manifold and crankcase.

1. Check for chipped, bent or damaged reed valves.
2. Check wear from reed valves on face of main bearing block. Reface block on lapping plate to remove all mars on surface. If all mars or indentations cannot be removed by lapping, replace block.
3. Clean needle bearings and outer race.
4. Inspect needle bearings and outer race for wear or flat spots.

NOTE: Needle bearings are inexpensive, and it is good preventive maintenance to replace all needle bearings during overhaul. If damage is found on outer race, needle bearing damage or wear also usually will be found. If one needle bearing is replaced, ALWAYS replace all bearings and race.

INSTALLATION

NOTE: Mark II model engines do not have internal reeds. Reed blocks are located between intake manifold and crankcase.

1. Coat reed valves with oil. Place reed valves and stops on main bearing.
2. Apply Loctite Type "A" (C-92-32609) to threads of reed stop screw and thread into main bearing. Torque screws to specification.

NOTE: Reed valves must have no preload (adhere tightly to main bearing surface) or an opening over .007". Check all reed valve openings as shown in Figure 3. If opening is over .007", replace reed valve.

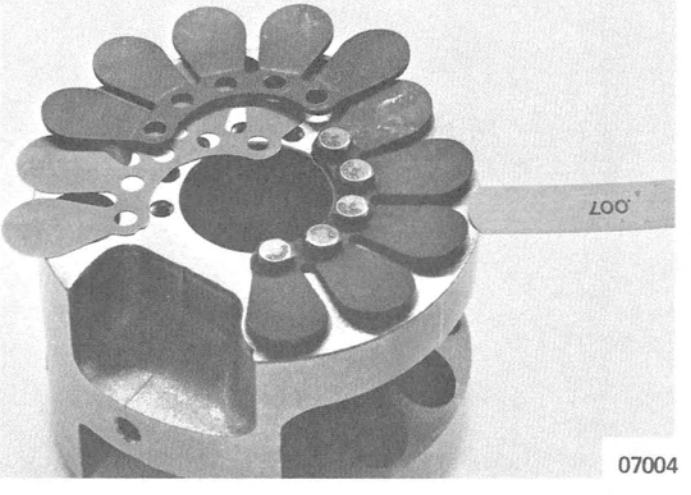


Figure 3. Checking Reed Valve Opening

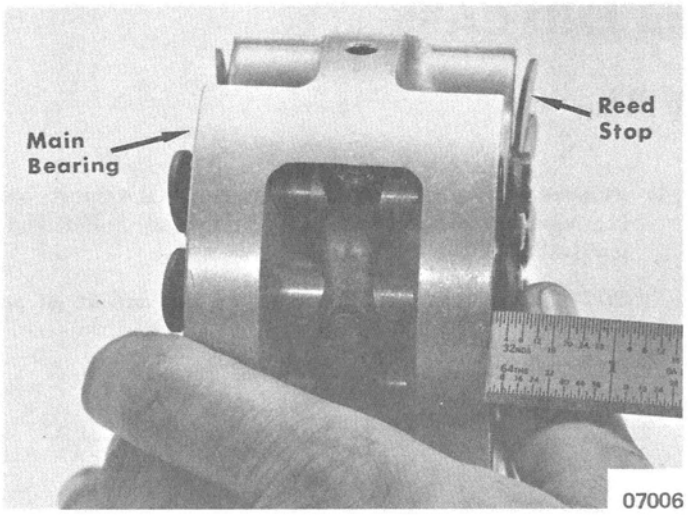


Figure 4. Checking Reed Stop Opening

3. Check reed stops (Figure 4) for correct opening. (Refer to "Specifications" Section 8.)
4. Place small amount of Multipurpose Lubricant (C-92-49588) on crankshaft journal bearing race. Place needle bearings on crankshaft and install outer bearing race and snap ring. (Figure 2)
5. Check that all needle bearings have been installed as shown in Figure 5. If all bearings are installed, outer race will split when point of an awl is pushed between needle bearings.
6. Rotate outer race to be certain that needle bearings do not bind.
7. Place main bearing halves on crankshaft and secure with 2 phillips head screws and nuts.

NOTE: Be sure that main bearing is installed on crankshaft with scribe mark toward top (fan side) of crankshaft when in stand.

8. Install crankshaft assembly in block. Check that main bearing is installed correctly. (Figure 6)

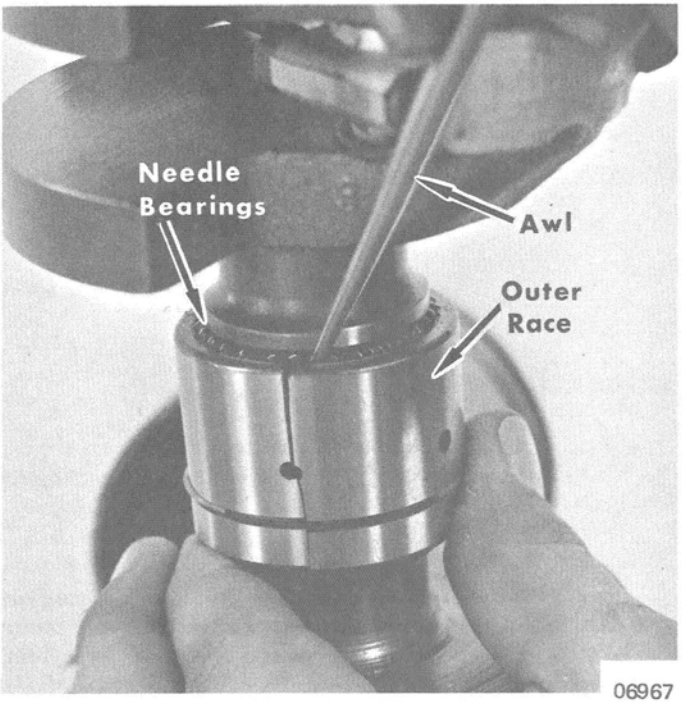
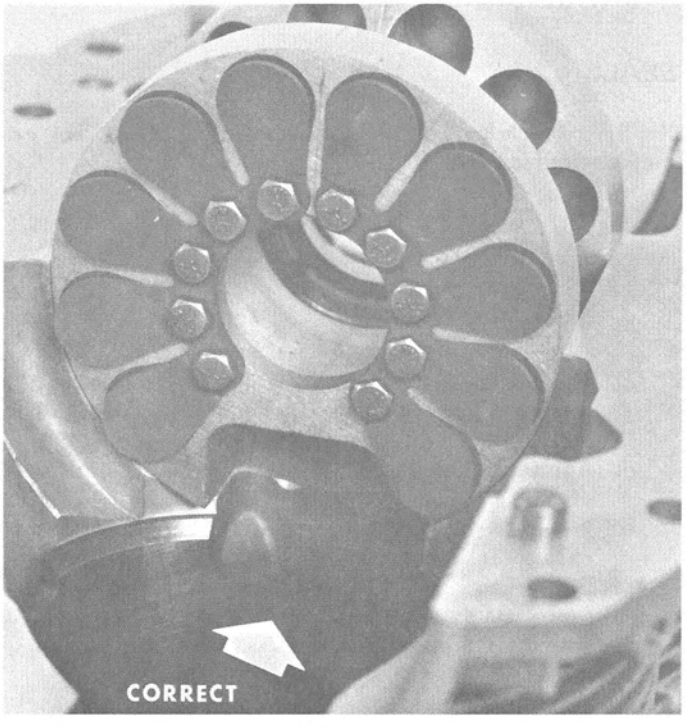


Figure 5. Checking Needle Bearing Installation



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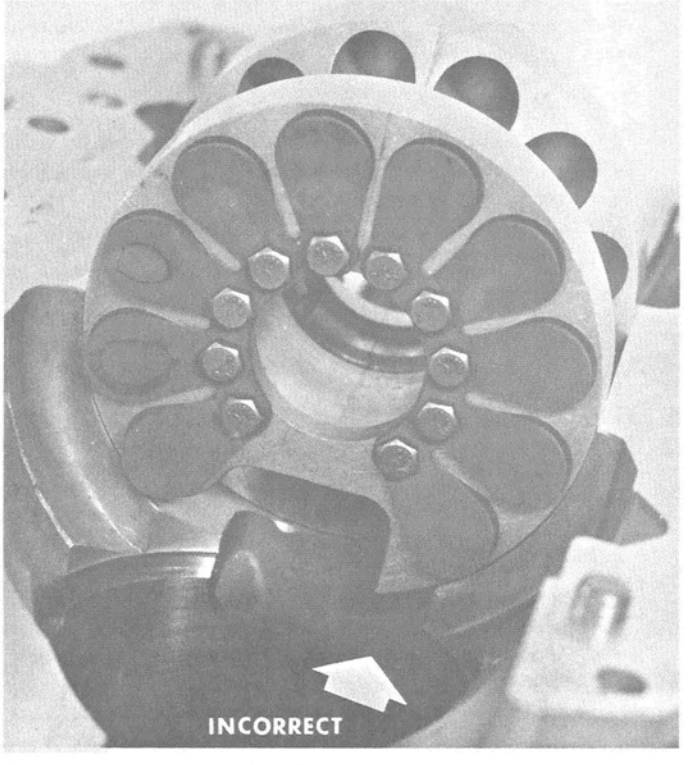

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Figure 6. Main Bearing Position

CRANKSHAFT and END CAPS

REMOVAL

1. Remove crankshaft assembly and place in engine stand.
2. Remove connecting rods and pistons from crankshaft.

   NOTE: Pistons need not be removed from connecting rod, however, pistons should be rerung before reinstalling.

3. Remove center main bearing assembly.
4. Remove crankshaft from engine stand and remove ball bearings from crankshaft with Universal Puller Plate (C-91-37241).

   NOTE: Replacement crankshafts are stocked as an assembly with ball bearings installed.

5. Remove oil seals and bearings from end caps.

CLEANING and INSPECTION

CRANKSHAFT

1. Check all bearing surfaces for rust and pit marks.
2. Check for chatter marks on crankshaft and connecting rod bearing surfaces.

   NOTE: Chatter marks can be seen with a good magnifying glass. These marks will cause a sound (like gear noise) when engine is in operation and resemble a very tiny washboard. This surface condition can be repaired if a total of not over .001" (.025mm) is removed while eliminating marks. If both connecting rod and crankshaft have chatter marks, a total of not over .002" (.051mm) on both parts can be removed.

3. Crankshaft journal can be cleaned, if necessary, by using 320 grit carborundum cloth. DO NOT polish crankshaft journals, or bearing may skid.

BEARINGS

1. Clean and dry bearings before checking.
2. Grasp outer race firmly with one hand and, with other hand, attempt to work inner race in-and-out. There should not be excessive play.

   IMPORTANT: DO NOT spin bearing with compressed air.

3. Spin outer race after lubricating with oil. Discard if bearing sounds or feels rough. Bearing should have smooth action and no rust stains.
4. Check roller and needle bearings for wear. Whenever repairing an engine, it is recommended that these bearings be replaced.

SEALS

Replace oil seals and "O" rings when repairing engine. This can prevent trouble later.

INSTALLATION

1. Press bearings onto crankshaft (if removed).
2. Install bearings and oil seals in end caps as follows:

   CAUTION: Press cartridge-type roller bearing into end cap with lettered side up. (Opposite side has a greater radius for easier installation.) After installation, check that bearings are free and not frozen or sticking, which is caused by improper installation or tight fit. Be careful that Loctite does not get on roller bearings or lip of oil seal.

   a. Spray LocQuic Primer Grade "T" (C-92-59327-1) on roller bearing surface of end cap.
   b. Apply a THIN coating of Loctite Type "A" (C-92-32609-1) to outer surface of roller bearing which contacts end cap.
   c. Using suitable mandrel, press new roller bearing into end cap flush with end cap inner face. Press bearing into end cap with lettered side up.
   d. Apply a THIN bead of Loctite Type "A" to outer edge of end cap oil seal.
   e. Press new oil seal (lip of oil seal facing inward) into end cap until bottomed-out on shoulder.
   f. Be sure all excess Loctite is carefully wiped from end cap assembly. Lubricate inner lip of end cap oil seal with Multipurpose Lubricant (C-92-63250).

3. Secure crankshaft in engine stand.
4. Reinstall center main bearing on crankshaft.
5. Reassemble pistons and connecting rods on crankshaft.
6. Reinstall crankshaft assembly in block. (See Figure 6, preceding.)

INTAKE MANIFOLD and REED BLOCK - MARK II

REMOVAL

1. Remove engine from chassis.

   NOTE: On models with Chassis Serial No. 3787640 and above, engine removal is not necessary for removal of intake manifolds and reed blocks.

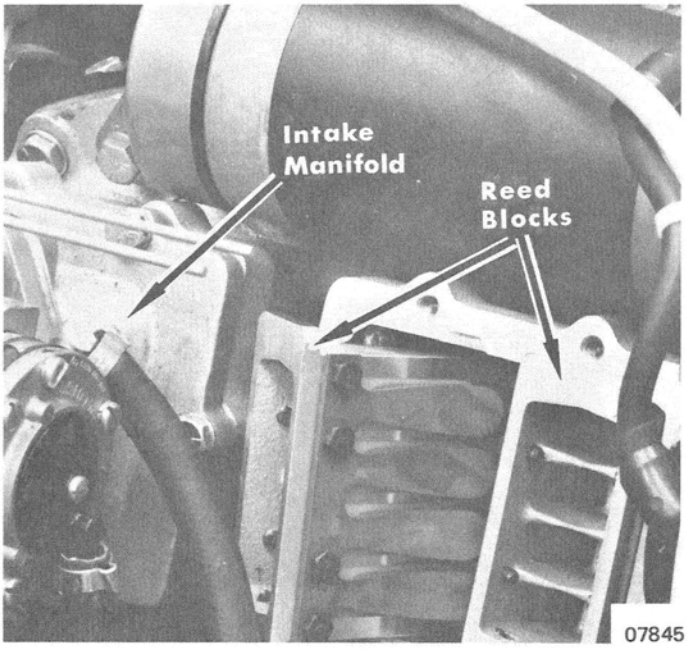

Figure 1. Removing Reed Blocks

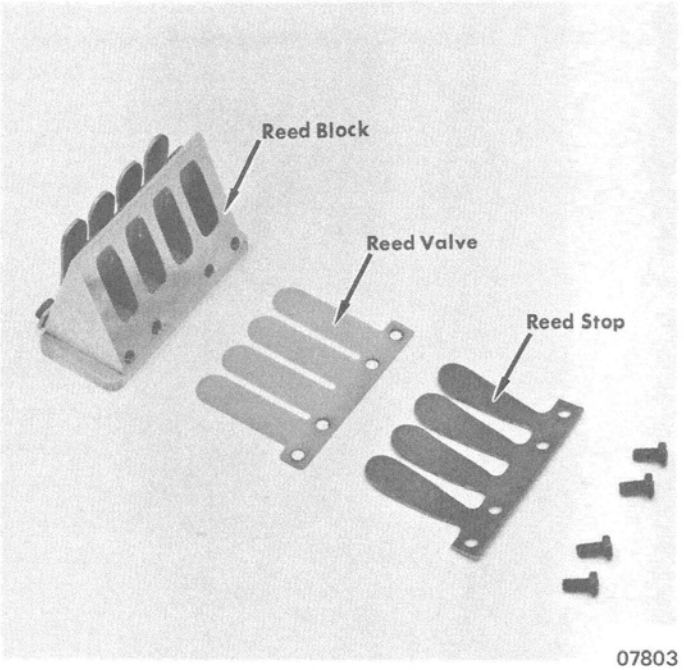

Figure 2. Reed Block

2. Remove carburetor air baffle (if so equipped), carburetors and intake manifolds from engine.
3. Remove reed blocks from crankcase. (Figure 1)
4. Remove reed stops and reeds from reed blocks. (Figure 2)

CLEANING and INSPECTION

1. Remove gaskets and clean gasket surfaces of intake manifold.
2. Check for chipped, bent or cracked reeds.
3. Check for wear (indentations) and flatness on face of reed block. Replace reed block if warped or indentations are present.
4. Inspect intake manifold for cracks. Check gasket surfaces for scratches or grooves.

INSTALLATION

1. Apply a film of light oil to reed blocks and reed stops.
2. Place reeds and reed stops on reed blocks.
3. Apply Loctite Type "A" (C-92-32609) to threads of reed stop screws and thread into reed block. Torque screws to specifications. (Refer to "Specifications" Section 8.)
4. Check reed stops (Figure 3) for correct opening. (Refer to "Specifications" Section 8.)
5. Install reed blocks in crankcase. Using new gaskets, position intake manifolds on crankcase.
6. Apply Loctite Type "A" (C-92-32609) to threads of intake manifold cap screws (or nuts) and thread into crankcase. Torque cap screws (or nuts) to specifications. (Refer to "Specifications" Section 8.)
7. Install carburetors with new gaskets. Torque to specifications.
8. Fasten carburetor air baffle (if so equipped) to carburetors.
9. Install engine in chassis, if removed.

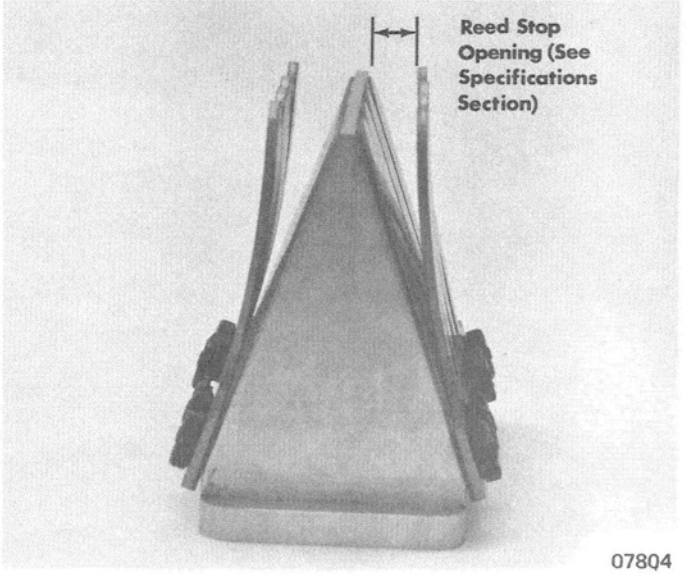

Figure 3. Reed Stop Opening