MICHIGAN MOTORZ

Marine Engines & Parts

MARINE ENGINE BREAK - IN PROCEDURES

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Congratulations on your decision to purchase a quality replacement engine from Michigan Motorz.
We appreciate your business and confidence in the Michigan Motorz brand, our products, and our personalized customer service and support.

This document explains, in detail, the break-in procedures that apply to the engine you've purchased.

Please keep it available for future reference.

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If you have any questions, feel free to contact us at
1-877-666-8679, Option 7 (Warranty & Tech Support).

Have your engine invoice number ready.

ENGINE BREAK-IN PROCEDURES

BREAK-IN INTRODUCTION

Taking the time and care to break-in your NEW or REMANUFACTURED marine engine is *very* important. When the engine is broken-in properly, your engine will last longer, run better, and require fewer repairs over its lifetime. Your engine does not require an elaborate break-in procedure, just a little care and common sense for the first few hours.

NOTICE: You MUST change your oil and filter after 10 hours of use.
Fine break-in material is suspended in the oil and trapped in the filter during a normal break-in process. Failure to change the oil at 10 hours greatly increases the risk of engine damage causing low oil pressure and internal knocking, and will not be covered under the warranty policy.

BREAK-IN TIPS

For *Flat-Tappet* camshaft engines, please see page 6 first.

- BIG BLOCKS (7.4L, 8.1L, 8.2L, etc.) and LS engines (with a front-cover oil pump): You MUST prime the oil system properly prior to starting. Failure to do so will lead to engine damage.

- During initial start-up, raise the idle speed to a MINIMUM of 1,500 RPM. This aids oil flow internally. Do *NOT* start an engine and let it idle at 500-700 RPM idle speed. Failure to do so can lead to engine damage.

- ALWAYS let the engine warm up to normal operating temperature before accelerating.

- Avoid fast accelerations and don't carry or pull a heavy load during this period.

- Check the engine oil frequently. During the first 100 hours, especially during break-in, the engine can use more oil than usual. Maintain oil at proper level but be careful that you do NOT overfill the sump.

- Vary the boat speed during break-in. Do not run on the same RPM for very long.

- Observe gauge readings and check for loose mountings, fittings, nuts, bolts, and clamps.

- Report any abnormal operation, noises, or vibrations to Michigan Motorz as soon as possible.

- Re-torque exhaust riser (elbow) bolts after the first 20 minutes of operation, and again at the 5th hour of operation, and once again at the 10th hour of operation. See your engine service manual for proper torque requirements. *Failure to do so may cause ruptured riser gaskets, leading to water ingestion/hydrolocking, and void all applicable warranties.*

BREAK-IN STEPS

1. **For the 1st hour, do not exceed 2000 RPM and vary RPM continuously.**
   - Check/re-torque exhaust elbows/risers to your engine manufacturers specifications.

2. **For the 2nd hour, do not exceed 3000 RPM.**

3. **For the next 5 hours, do not exceed 4000 RPM.**
   - Check/re-torque exhaust elbows/risers to your engine manufacturers specifications.

NOTE: If your engine was previously broke-in on the engine dyno, you may skip the first 3 steps, however, you will still need to perform a 10-hour oil and filter change after your first 10 hours of use.

During the final 3 hours of engine break-in, and after warming the engine to normal operating temperature, it is permissible to operate at full throttle for five to ten minutes at a time. Momentarily reduce then increase engine speed to assist break-in of piston rings and bearings. Occasionally reduce engine speed to idle to provide cooling periods. After the break-in, your engine may be operated at any RPM within the limits for the engine.

ENGINE OIL REQUIREMENTS

After the first 10 hours of operation, change your engine oil and oil filter and perform an engine checkup. If you do not know how to do this procedure, have a certified MARINE mechanic or your local boat dealer properly do this for you. Michigan Motorz recommends using 15W-40 oil meeting the API specifications of SJ/CH4/CG4 is acceptable. Synthetic oil that meets the API specifications of SJ/CH4/CG4 is acceptable to use AFTER 100 hours of operation with the recommended conventional oil.

SYNTHETIC OIL:

DO NOT USE SYNTHETIC OIL DURING THE BREAK-IN PROCESS. ONLY USE CONVENTIONAL OIL. AFTER 100 HOURS, YOU MAY SWITCH TO SYNTHETIC BLEND OR FULL SYNTHETIC OIL.

THE USE OF SYNTHETIC OIL DURING BREAK-IN GREATLY REDUCES PROPER BREAK-IN OF PISTON RINGS AND CYLINDER WALLS.

NOTE: As temperature increases, you may need to increase the weight of your oil.

Alaska, Canada, Northern USA		Texas, Florida, Southern USA
COLDER CLIMATE ----------	----------	WARMER CLIMATE
15W-40 Oil -	**20W-40 Oil** -	**25W-40 Oil**

FLAT-TAPPET CAMSHAFT ENGINES

FLAT-TAPPET CAM ENGINE OIL REQUIREMENTS

If you purchased a flat-tappet engine, YOU MUST USE **LUCAS ZINC ADDITIVE** (or equivalent) for your oil during the engine break-in period, which can be purchased at most local auto-supply stores. This will greatly increase a flat-tappet engine lifespan and prevent premature camshaft failure.

You MUST perform an initial 20-minute camshaft break-in at 2,000+ RPM before performing a sea-trial and the 10-hour engine break-in.

1. We recommend a ***MINIMUM*** of 1,700 PPM (parts per million) zinc content or higher during the engine/camshaft break-in process.
2. (1) 16 oz. bottle of Lucas TB-Zinc Plus additive will raise your zinc content to 5,000 PPM for 4½ quarts of engine oil.

NOTE: Zinc additives are *not* needed for roller cam engines.

If you have any questions, please contact us at 1-877-MMOTORZ (1-877-666-8679).

Camshaft and lifter failures caused by improper camshaft break-in are NOT COVERED UNDER WARRANTY.

FLAT-TAPPET CAM ENGINE BREAK-IN PROCEDURE

NOTE: THIS IS ONLY FOR THE CAMSHAFT.
YOU STILL NEED TO FOLLOW THE "ENGINE BREAK-IN PROCEDURE".

BEFORE YOU BEGIN THE CAM BREAK-IN

1. **Pour Oil Directly on the Camshaft.** Prior to installing the intake, pour oil directly on the camshaft, ensuring it is thoroughly lubricated.

2. **Use Break-In Oil (with zinc).** Traditional motor oils don't contain the same level of ZDDP (Zinc Dialkyl-Dithio-Phosphates) as they used to, which is an important ingredient for protecting flat tappet cams during break-in. Using break-in oil or adding a ZDDP additive to your regular oil can help ensure that your cam gets the protection it needs during the break-in process. Failure to do so will lead to engine damage.

3. **Prime the Oil System.** Before you start the engine for the first time, it's crucial to prime the oil system. This means using an oil pump primer tool or manually turning the engine over several times to ensure that oil is circulated throughout the engine before it is started. Failure to do so will lead to engine damage.

DURING THE CAM BREAK-IN

4. **Initial Start-Up.** Start the engine and immediately bring it to 2,000 -2,500 RPM and hold it there. It's important to not let the engine idle during break-in as it won't provide enough oil flow to the camshaft. The higher RPM will create crank windage (oil spray) onto the bottom-side of the camshaft as it rotates.

5. **Vary the RPM.** Keep the engine running at this speed for the first 20-30 minutes of operation, but vary the RPM within the 2,000-2,500 RPM range. This will help ensure that the lifters are rotating properly and that they get a good, even wear pattern on the cam lobes. At this elevated RPM, the crankshaft creates "windage" and helps spray engine oil onto the camshaft. Without running at this RPM, the camshaft will be relatively dry.

6. **Monitor Oil Pressure and Temperature.** During this process, keep a close eye on your oil pressure and engine temperature. If you notice any sudden drops in oil pressure or any extreme changes in temperature, shut the engine down immediately and troubleshoot the issue.

AFTER THE CAM BREAK-IN

7. **Change the Oil.** After the engine has cooled down from its initial break-in, it's a good idea to change the oil and filter. This will help remove any metal particles that may have been dislodged during the break-in process. Remember, not following the proper break-in procedure can lead to premature camshaft wear and even camshaft failure. It's always worth taking the time to do it correctly.

VOLVO / OMC HUB COUPLER WARNING

4.3L ENGINES USING THE HUB COUPLER

Michigan Motorz is making the engine installer aware of an issue when installing an “old style” Volvo Penta Coupler for an inboard/outboard application to the 4.3L Engine. The Volvo “hub” style coupler attached to the center of the flywheel (using the flywheel bolts of replacement studs).

The current production 4.3L engine from GM has an area of the crankshaft that sticks out past the flywheel outer surface (about .050”). The extra portion of the crankshaft sticking out does not allow the OMC/Volvo style coupler to fit snug against the flywheel (like it was originally designed to do). In this case, the coupler feels tight with a wrench but will allow the flywheel to move back and forth on its mounting bolts or studs and **wobble**, contacting the bell housing, thus causing a knocking noise during engine operation.

When installing the 4.3L engine into an older Volvo I/O application, please make sure this extra portion of the crankshaft (flywheel end) does not interfere with the coupler after installation. If you experience this problem, please contact Michigan Motorz as soon as possible to purchase a new style coupler.

Michigan Motorz would also like to note that this is a design change from General Motors and is the same for all 4.3L engines of this model, regardless of the OEM Manufacturer (OMC, Volvo Penta, etc.).

The cost of the replacement coupler (or any other needed parts) and/or the labor to remove and replace any portion thereof, including the engine will not, under any circumstances, be covered under the manufacturer of this products warranty. Please feel free to contact Michigan Motorz.

ALL OTHER ENGINES USING THE HUB COUPLER

As with any coupler, proper torque is required to prevent a “knock” from occurring. With the hub coupler, studs and nuts are used to attach the coupler to the crank. The studs must be installed using lock-tite and torqued properly to prevent the coupler from becoming loose.