June 2019

# OWNER'S MANUAL

## ILMOR Engines

**Ilmor Engines**

OWNER'S MANUAL
For
ILMOR ENGINES

ILMOR

**Ilmor Marine, LLC**

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Every effort has been made to ensure accuracy and quality in publication of this document. At the time of printing, content is the most current available. Consumers are encouraged to check www.ilmor.com/en regularly for additional information. The website will also track service bulletins and other technical information that may have impact on the consumer's engine operation. Ilmor's obligation regarding such matters is delineated within the Ilmor Limited Warranty Statement.

Due to technological advancements and continuous improvement of our products and products of our component suppliers, Ilmor reserves the right to change specifications without notification. Photographs and illustrations used in this Owner's Manual are intended only as representative reference views and may not depict actual model component parts.

# WELCOME

Ilmor Marine, LLC (Ilmor) is pleased to welcome you to boating enjoyment available only through use of the extraordinary Ilmor engines. Ilmor is a recognized leader in the marine industry, having originated through championship-caliber, high-performance engines. Ilmor's line of engines deliver the necessary power to plane with pulse-pounding quickness without sacrificing reliability or smoothness. Performance, style, durability, and ease of maintenance are what make Ilmor the best choice for your boating application!

# INTRODUCTION TO MANUAL

*Please read Owner's Manual completely prior to operating engine and boat for the first time. The Owner's Manual contains information critical for safe operation and maintenance of your marine products purchased from Ilmor that is required to activate and keep the limited warranty statement in effect throughout the applicable warranty period. Continuing appropriate maintenance and care can ensure long-term enjoyment of the engine. DO NOT OPERATE ENGINE WITHOUT FIRST READING THE ENTIRE OWNER'S MANUAL AND ALL SUPPORTING DOCUMENTATION, AS WELL AS THE BOAT OWNER'S MANUAL.*

For locating the nearest authorized Ilmor service center, please visit https://www.ilmor.com/Resources/Find-a-Dealer or call 844-GO-ILMOR (464-5667).

# SAFETY INSTRUCTIONS

Prior to operating boat for the first time, operators MUST read entire Owner's Manual. Reread manual prior to first operation at beginning of the boating season. Keep Owner's Manual on-board the boat in a dry secure location, such as a glove box, for referral. Read entire boat Owner's Manual, paying particular attention to proper operation and safety concerns addressed within that publication.

It is a boat owner's and operator's responsibility to be aware of safety issues and concerns in the proper operation of the boat. All people on board, regardless of age, physical limitations, and/or previous boating experience (or lack of experience), bear responsibility for determining the appropriate behavior and safety precautions required on the boat, including care around the engine, engine compartment, transmission, and all moving parts.

A properly prepared and maintained engine is less likely to stall, misfire, or otherwise operate in a manner that could place the boat occupants, as well as others on the same body of water, in unsafe situations. Safety and maintenance of the powertrain are best described in this Owner's Manual and at www.ilmor.com/Resources/Warranties-Manuals. For additional information, contact the nearest Ilmor service center or call 844-GO-ILMOR.

The following safety precautions are published for information. Ilmor does not, by the publication of these precautions, imply or in any way represent that they are the sum of all dangers present. If installing, operating, or servicing an Ilmor product, it is the owner/operator responsibility to ensure full compliance with all applicable safety codes and requirements. All requirements of the Federal Occupational Safety and Health (OSH) Act must be met when Ilmor products are operated in areas that are under the jurisdiction of the United States of America. Ilmor products operated in other countries must be installed, operated, and serviced in compliance with any and all applicable safety requirements of that country.

For details on safety rules and regulations in the United States, contact your local office of the Occupational Safety and Health Administration (OSHA).

Failure to adhere to and comply with safety dangers, warnings, cautions, and notices that appear in this manual can lead to serious illness, injury or death, and/or damage to the boat or property of others. Beyond these warnings, boaters have a personal responsibility to utilize a common-sense safety approach to the boating experience, including keeping individuals off or away from the swim platform, and stern area of the boat during engine operation. Personal flotation devices (PFD) save lives and ensure positive experiences.

Ilmor offers many proactive, safe approaches to the boating experience, but the consumer is ultimately responsible for the positive and safe operation of the boat.

Please note, safety information statements are categorized for information purposes only, and are not presented in any particular order of importance. Each of the statements referenced below, and in other sections of this manual, provide important safety-related information and must be read and followed to avoid injury or damage, as applicable. The owner/operator is strongly encouraged to read the dangers, warnings, cautions, and notices in the context presented by reading and reviewing those sections.

## DANGERS, WARNINGS, CAUTIONS, AND NOTICES

DANGER, WARNING, CAUTION and NOTICE are used throughout this manual to highlight important information. Be certain that the meanings of these alerts are understood by all who work on or near the equipment. Specific safety information is highlighted with symbols designed to draw particular attention to specific information. These will include:

Safety alert symbol appears with most safety statements. It means attention, become alert, personnel safety is involved! Please read and abide by the message that follows the safety alert symbol.

***DANGER! Indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.***

***WARNING! Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.***

***CAUTION! Indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.***

*NOTICE: Indicates a situation which can cause damage to the engine, personal property and/or the environment, or cause improper operation of equipment.*

## GENERAL SAFETY CONCERNS

***DANGER! Always avoid exhaust areas and engine compartment during the venting of engine exhaust. Engine exhaust emits carbon monoxide, which is colorless, odorless and poisonous even in small concentration. Carbon monoxide can cause serious injury or death in a short period of time.***

Whenever an engine is operated within the confines of an engine compartment, it is extremely important to follow the boat manufacturer's instructions regarding venting of the engine compartment prior to or during low-speed/idle operation.

One of the most critical safety matters affecting boaters is the matter of carbon monoxide emission. This is a colorless, odorless and poisonous gas that accumulates rapidly, both within confined areas and in open areas. Exposure to carbon monoxide can be fatal within minutes, even in low concentrations. Avoid exhaust vent areas of the boat, particularly during slow-speed operation.

***WARNING! Never attempt to stop or slow rotating parts. Keep away from rotating parts. The engine compartment serves as a guard. Be sure the ignition is OFF and the engine is not running whenever the compartment is open, except as directed by the boat manufacturer, to vent exhaust fumes or during maintenance. Use extreme care whenever operating the engine with the compartment open. Clothing or body parts can get caught in moving parts which could result in serious injury or death.***

Onboard personnel must be vigilant whenever the engine is running with engine compartment open. Avoid all moving parts. When possible, adjustments to the engine or anything accessible from the engine compartment while the engine is running should be performed by an authorized Ilmor service center, or authorized boat manufacturer dealer. Exercise extreme caution if self adjustments are necessary while the boat is in use or in preparation for use.

It is the owner/operator's responsibility to perform all safety checks to the engine(s) prior to, during, and after operation. When properly followed, the maintenance schedules listed in this manual will ensure long-term operation and performance of the engine. When service and maintenance are required, return the boat to an authorized Ilmor service center. Failure to follow procedures outlined in this Owner's Manual or through published technical information at www.ilmor.com/en may void the warranty.

The precautions listed in this Owner's Manual, as well as published technical information are not all-inclusive. Any replacement part, fluid or substance that is not specified as recommended should not be used as it may result in engine failure. This could lead to voiding the warranty, as well as placing people in an unsafe situation.

## SAFETY NOTICES

***DANGER! Avoid exhaust areas and engine compartment during venting of engine exhaust. Engine exhaust emits carbon monoxide, which is colorless, odorless and poisonous even in small concentration. Carbon monoxide will cause serious injury or death in short periods of time.***

***WARNING! Always use genuine Ilmor replacement parts intended for the engine. The electrical and ignition components have been designed to comply with U.S. Coast Guard regulations intended to minimize the possibility of fire and/or explosion. The use of non-approved replacement parts from aftermarket or other sources will void the warranty and could result in fire and/or explosion, which could result in serious injury or death.***

***WARNING! Never realign or alter engine wiring. Doing so may result in damage to the engine not covered under warranty, and sufficient voltage may be present to cause serious injury and/or death.***

***WARNING! Ensure ignition key and main battery power switch are in the OFF position, and no spark or flame is present when servicing fuel/water separator. Failure to do so could result in fire and/or explosion, which could result in serious injury or death.***

***WARNING! Replace fuel system parts with only Ilmor-authorized parts. If the engine fuel system requires attention, adjustment or replacement, the procedure must be performed by an authorized Ilmor service center. Fuel lines are pressurized and can only be disconnected with specialized tools. Failure to follow this directive will void the warranty and may result in damage to the boat and/or serious injury or death.***

⚠ *WARNING! When servicing fuel system components, always have an appropriately-rated fire extinguisher nearby and adequate workspace ventilation. Failure to do so could result in fire or carbon monoxide poisoning, which could result in serious injury or death.*

⚠ *WARNING! The fuel system is under pressure. Allow the engine to completely cool down before servicing the fuel/water separator filter. Failure to do so could result in fire and/or explosion, which could result in serious injury or death.*

⚠ *WARNING! Ensure no fuel leaks are present and engine compartment is well ventilated with no gasoline vapors present before performing any fuel system maintenance. Failure to do so could result in fire and/or explosion, which could result in serious injury or death.*

⚠ *WARNING! Battery posts, terminals and related accessories may contain lead and lead compounds. These chemicals are known to the State of California to cause cancer, birth defects, or other reproductive harm. Wash hands after handling.*

⚠ *WARNING! Operating, servicing, and maintaining a recreational marine vessel can expose you to chemicals including engine exhaust, carbon monoxide, phthalates, and lead, which are known to the State of California to cause cancer and birth defects or other reproductive harm. To minimize exposure, avoid breathing exhaust, service your vessel in a well ventilated area and wear gloves or wash your hands frequently when servicing this vessel. For more information go to www.P65warnings.ca.gov/marine.*

⚠ *CAUTION! Maintain safe distance from other operating vessels, docks, shallow waterway bottoms, and/or debris that may result in damage to the vessel. Failure to do so may result in serious injury and/or damages not covered under warranty.*

⚠ *CAUTION! Leaks or restrictions in the cooling system may result in engine overheating. Ensure sufficient water supply to the engine, and that equal amounts of water is flowing out of the exhaust system. Immediately shut off engine if excessive heat is detected by odor or sight. Failure to do so may result in more serious consequences, including but not limited to damage to the engine, which is not covered under warranty, and/or damage to the boat, which may result in injury to personnel.*

*NOTICE: The raw water pump system must remain free and clear of debris at all times. Operating the engine with a blocked raw water pump may cause overheating conditions, resulting in damages to powertrain components. Be sure to inspect/replace the raw water pump regularly. Never operate the engine in waters where debris is likely to become ingested into the raw water pump system. See SPECIFICATIONS & SERVICE section for recommended service intervals.*

*NOTICE: Lack of water to the engine cooling system could cause the raw water impeller to fail, and lead to severe engine problems. Any leaks or restrictions to the inlet or outlet side of the engine cooling system should be repaired immediately before continued operation of the engine.*

*NOTICE: Engines operating in brackish or salt water should be flushed with fresh water after every use. Void water on open cooled side.*

*NOTICE: Do not operate the engine without a properly installed serpentine belt. If serpentine belt is severely worn, misaligned or has failed, catastrophic engine failure may occur. Resulting engine damage will not be covered by the warranty.*

## EXHAUST SYSTEM

Ilmor engines are equipped with wet marine exhaust systems where raw water enters exhaust elbows (downturn adapters) and mixes with exhaust gases. Mixing water with exhaust gases reduces internal combustion noise from the engine. This mixing is important because it also provides cooling to the exhaust rubber components that direct the exhaust outside the vessel. After the water-exhaust gas mixture passes through the mufflers, it exits back into the body of water.

Ilmor engine exhaust systems are equipped with a catalytic converter system. Ilmor strongly recommends that ONLY an authorized Ilmor service center should perform maintenance on the catalytic converter system.

***⚠ CAUTION! Never allow excessive exhaust temperature that will damage the exhaust hose, and are symptomatic of a leak or restriction in the cooling system. If safe to do so, shut off engine immediately if excessive heat is detected by odor, sight, or engine cooling faults. Failure to do so may result in more serious consequences including, but not limited to, damage to the engine not covered under warranty and/or damage to the boat that may result in personal injury.***

Exhaust manifolds are water-cooled to regulate exhaust temperatures. If an odor of burning rubber (or other materials) exists, shut down the engine immediately and move to a safe location. Prepare an on-board fire extinguisher and check for water/exhaust, gas leaks or restrictions of the engine exhaust and cooling system. Often as a symptom of cooling system issues, overheating will damage exhaust manifolds and hoses. Contact your nearest authorized Ilmor service center immediately if the engine exhaust exhibits any of the above symptoms.

## FUEL SYSTEM

Ilmor gasoline engines are designed with either a multi-port injection (MPI) or a gasoline direct injection (GDI) fuel delivery system. Ilmor uses the most up-to-date engine technology to meet emissions, monitor powertrain characteristics and meet emission and driveability requirements of marine applications today.

***⚠ WARNING! Replace fuel system parts only with Ilmor-authorized parts. All fuel system lines and connections must meet the requirements of U.S. Coast Guard (USCG) regulations. Hoses must meet or exceed SAE Standard J1527 DEC85, and hoses used for fuel delivery must meet or exceed specification in USCG regulations, Sec. 183.540 for recreational boating. All fuel hoses must meet the 15 g/m2 limit for fuel permeation. All plumbing for the Ilmor engine fuel system, and the boats in which Ilmor authorizes placement, must meet or exceed all requirements.***

## COOLING SYSTEM

Unlike automotive cooling systems that use radiators (air-to-fluid heat exchangers) for cooling, marine engines have two different types of cooling systems for transferring engine heat. Closed cooling systems use fluid-to-fluid heat exchangers. Open cooling systems use water only to transfer heat directly from the engine. Cooling water is provided by the body of water in which the boat is operated. A raw water pump draws water into the engine where it is distributed to the engine's cooling system.

NOTICE: *Marine growth occurs in brackish, salt water, and even in fresh (salt-free) water. It is important to flush the cooling system with fresh tap/treated water after each use.*

Ilmor engines use two main types of cooling systems. Available cooling system types are determined by the model of engine selected:

1. Open Cooling System

In an open cooling system, the entering water flows directly through the cooling passages of the engine exhaust manifolds and discharges out the tailpipes.

2. Closed Cooling System (Ocean Performance Series)

In a closed cooling system, the entering water is directed to the heat exchangers to transfer engine heat, and discharges via the tailpipes or the One-Drive®.

***WARNING! Never operate engine without adequate and uninterrupted water flowing through the cooling system. This requires the boat to be in an operational-sized body of water or connected to the suction side of a raw water pump by an Ilmor-approved water supply in a dealership. If the engine operates without water in the cooling system, the exhaust system will overheat and could potentially create an on-board fire. The raw water pump impeller could be compromised as well. Damage caused to the powertrain due to water starvation may void the warranty and may result in serious injury and/or death.***

Ensure engine seacock remains clear of debris at all times. Even small amounts can clog or block the pick-up located beneath the boat. The engine seacock MUST have an uninterrupted input of water whenever engine is running. See Check Sea Strainer section in the operation chapter of this manual for more information.

## Open Cooling System

The open cooling system was designed for fresh water use only. Even when boating in apparently clean fresh water, it is highly recommended to flush the cooling system after each use. This helps eliminate marine growth or fouling of the cooling system.

In an open cooling system, fresh water is drawn through the engine seacock by the raw water pump. The raw water pump is located on the engine. The seacock is located on the submerged hull of the boat where it can draw water continuously. Engine circulation pump circulates fresh water throughout the engine and exhaust manifolds, and then discharges the water out the exhaust tailpipes.

## Closed Cooling System

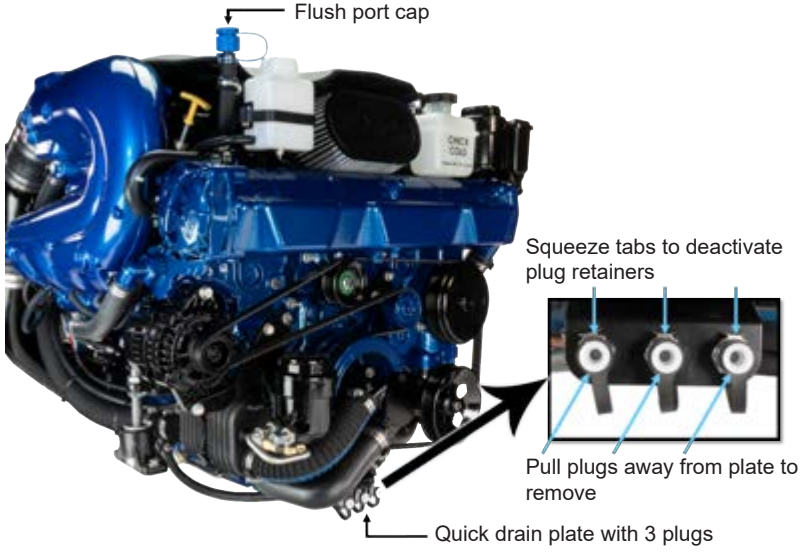
The closed cooled system is the required application for boats operating in consistently brackish or salt water. The system provides maximum protection for the engine against corrosion, fouling, and marine growth. As noted above, it is extremely important to flush the cooling system after each use.

In a closed cooling system, fresh water is drawn through the engine seacock, or water inlet ports on the One-Drive® gear housing, by the raw water pump. From there, it is distributed to the heat exchangers and then to the exhaust adapters before exiting the exhaust tailpipes or One- Drive gear housing. The engine circulation pump recirculates coolant through the engine and exhaust manifolds. Raw water never enters the engine or exhaust manifolds.

## Quick Drain Procedure (GDI-S Models)

This system allows the operator to drain the engine raw water system. Ilmor recommends performing this procedure after each use of the engine operation. It prevents build up marine growth, corrosion, and blockage in the raw water system. The steps below describe how to use this integrated feature.

Quick drain




***⚠ CAUTION! Not opening the flush port cap for the siphon break may result in unwanted water flow into the bilge compartment. Be sure to remove the cap!***

1. Verify engine is OFF.
2. Remove emergency stop lanyard from safety switch. Leave throttle/shift control lever in neutral.
3. Close the seacock (if equipped).
4. Remove the flush port cap, which will act as a siphon break for the raw water system.
5. Open the three valves by squeezing each port and removing each plug.

***⚠ CAUTION! If the plugs are not reinserted properly or are missing, potential overheat damages to the engine and water intrusion into the bilge may occur.***

6. Allow the raw water to completely drain from the system.
7. Reinsert each port plug to their respective port on the quick drain plate.
8. Reinstall the flush port cap.
9. Open the seacock (if equipped).
10. Install emergency stop lanyard to the safety switch.

***⚠ CAUTION! Ilmor requires the use of propylene glycol antifreeze used in the raw water cooling system during extended storage and/or winterization. See authorized dealer for this service as outlined in the STORAGE & WINTERIZATION section of this manual.***

## Flushing Procedure

1. Pressurized winterizing kits will consist of a container, a corresponding flushing attachment for the engine seacock inlet, and an attaching hose. This method will require 5-6 gallons of marine/RV antifreeze.

- One-Drive® – use flushing muffs over the water inlet holes on the gear case
- Inboard – use the hull-style muff attachment that covers the engine seacock from the exterior

2. Secure the pickup attachment over the engine seacock inlet. The attachment should be tight enough against the inlet to prevent antifreeze from spilling. Use tape or a strap, if necessary.
3. Pour antifreeze in the container to fill the entire cooling system. If accessories are attached to the engine cooling system, additional marine/RV antifreeze will be necessary.
4. START the engine and turn ON the winterizing kit simultaneously.
5. Allow enough time for the engine's cooling system to fill.
6. Monitor the rate of intake of the antifreeze from the kit. The engine should create a vacuum against the attachment. This should help draw antifreeze into the engine cooling system.
7. If the engine fails to draw in the antifreeze, STOP the engine and turn OFF the winterizing kit IMMEDIATELY! Return to Step 2 and verify connections.

*NOTICE: Any exposure to brackish or salt water requires a closed cooling system. Operating your open cooled engine in brackish or salt water can and will void your warranty.*

## ELECTRICAL SYSTEM

***⚠ CAUTION! Any repair, replacement, and/or installation of an electrical system component must meet or exceed the standards, requirements, and excerpts posted within American Boat and Yacht Council (ABYC) Standard E-11 (AC and DC Electrical Systems on Boats), as well as U.S. Coast Guard (USCG) regulations contained in U.S. EPA CFR Title 33 Part 183. Failure to do so could result in damage to equipment or personal injury.***

The engine electrical system is a 12-volt negative ground system. Avoid reverse polarity which could lead to extensive damage of the electronics. Any damage occurring because of reverse polarity will not be covered by warranty.

Reverse polarity presents a serious shock risk. Turning off a breaker appears to remove power from the circuit because it turns off whatever is connected to that circuit. With reverse polarity, ground is disconnected and not power. The circuit is still live.

Reverse polarity can occur when the battery terminals are incorrectly connected to the wiring harness. When the polarity is reversed, the current flows in the wrong direction causing damage to electrical components.

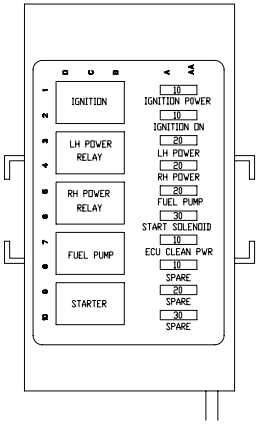
***⚠ WARNING! Always disconnect the negative battery cable (-) first before disconnecting the positive battery cable (+). After the negative battery cable is disconnected, the positive battery cable can be disconnected. This minimizes the possibility of electrical contact which may result in serious injury or death.***

***⚠ WARNING! Always connect the positive (+) battery cable first. After the positive cable is connected, then the negative (-) battery cable can be attached. This minimizes the possibility of electrical contact.***

Positive battery post is connected to the large post on the starter motor with marine grade single ought (1/0) starter wire and appropriate terminal connection. After connection is made, all other positive engine circuits will be connected to the battery positive from this junction. The supplied heavy red rubber boot must be used on the starter motor terminal to shield the terminal and prevent accidental contact.

## Power Distribution Module (PDM) – Custom Inboard Series

In addition to boat circuit breakers, the engine is also equipped with a fuse box that controls various engine electronic functions. Fuse box is mounted on the rear of the inboard engines and on the front of the engine.




## Electronic Power Distribution Module (ePDM)

The ePDM is mounted on the rear of the engines. The ePDM replaces the need for a mechanical fuse box, improving reliability and system monitoring abilities. The ePDM is installed on all MY20 engines except Custom Inboard Engine applications, which will begin ePDM installations later in model year 2020. The ePDM is sealed with a tamper-proof sticker. Never remove the cover from the ePDM as this will void your warranty.

DO NOT remove the cover from the ePDM

## Boat/Engine Interface Wiring

The engine electrical system is primarily self-contained in a preassembled unit. The boat wiring interface follows established practices and conforms to regulatory guidelines. Every reasonable effort was exerted to make the electrical connection simplified and straightforward. Consumers are strongly encouraged to seek assistance from an authorized Ilmor service center when dealing with electrical issues.

## ENGINE SENSORS

The engine is equipped with many sensors. These sensors provide performance information such as engine speed, engine coolant temperature, engine oil pressure, and much more.

The engine management system uses these sensor to alert the operator of any irregularities during engine operation. Most sensors trip audible or visual alarms on gauges or other dash displays. DO NOT ignore alarms. Owners are urged to take the boat to an authorized Ilmor service center for analysis if or when a malfunction is suspected after sensing an alarm.

*NOTICE: Always pay attention to the audio and visual alarms. Boats are equipped with a variety of audible and visual alarms that alert operators to potential performance issues. No alarm, whether it sounds an alert or provides information on the gauges, should ever be ignored. The powertrain sensors are often the earliest indication of problems, and if ignored, may result in serious damage to the equipment that is not covered under warranty.*

## ALARMS

Read the accompanying boat owner's manual for important information regarding alarms and gauges.

The Ilmor engine alarm system displays a visual alarm whenever any monitored engine parameter is not in operating range. If an alarm is present, throttle back immediately, if safe, and identify which gauge is out of range. Alarm display varies between boat models. Most boat models use a centrally mounted gauge with specific engine response. In boats equipped with more than one engine, there will be separate alarms for each engine. Refer to the boat manufacturer's operator manual for more information.

The alarm activation will display if the following conditions occur:

- Water temperature (Engine Coolant Temperature Higher than Expected)
- TPS Error (Engine Throttle Not Responding)
- FPP Error (Foot Pedal Signal Error)
- Fuel Injector Error (Injector Circuit Shorted)
- Low oil pressure
- One-Drive® steering faults
- One-Drive® trim faults
- Exhaust Raw Water Temperature Sensor (GDI-S models only)

NOTE: *The engine monitor alarm will display when ignition is turned to running position. The alarm will shut off momentarily. After the engine is started the alarm will not alert again. If the alarm sounds or displays at any other time, or for any other reason, contact an authorized Ilmor service center before restarting the engine.*

### Water Temperature

Alarm appears if the engine coolant exceeds preprogrammed limits. If this occurs, return the engine or engines to idle for cool-down. If the temperature is still increasing, shut engine off immediately, if safe. Confirm that the seacock is open and that the sea strainer is clear. If neither of these is the cause, take the boat to an authorized Ilmor service center.

Water temperature gauge

## Oil Pressure

Alarm appears if the engine oil pressure falls below recommended value for current engine speed. If this occurs, shut engine off immediately, if safe. Check oil level. Running the boat at this point represents an unknown risk. It would be best to have the boat serviced before resuming normal operation.

Oil pressure gauge


## Voltmeter

Displays the status of battery charge and charging system. With engine running voltmeter should read between 13 and 14.7 volts.

Voltmeter

# FUELING THE ENGINE

***DANGER! Never start engine if gasoline odor is present or if gasoline leaks appear along the fuel line, fuel tank, in the bilge, or around the engine. Remove key from ignition switch and call an authorized boat and/or Ilmor service center for repair. Avoid spilling gasoline when fueling. If gasoline is spilled, immediately wipe up all traces with dry rags and dispose of rags properly on-shore. Gasoline and gasoline vapors may cause fire or an explosion when starting the engine which will result in serious injury or death.***

***WARNING! Replace fuel system parts with only Ilmor-authorized parts. All fuel system lines and connections must meet the requirements of U.S. Coast Guard (USCG) regulations. Hoses must meet or exceed SAE Standard J1527 DEC85, and hoses used for fuel delivery must meet or exceed specification in USCG regulations, Sec. 183.540 for recreational boating. All fuel hoses must meet the 15 g/m2 limit for fuel permeation. All plumbing for the fuel system on Ilmor engines, and the boats in which Ilmor authorizes placement, must meet or exceed all requirements. Failure to do so may result in serious injury or death.***

***WARNING! Inspect entire fuel system for leaks and/or deterioration prior to operation, especially after substantial periods of non-use or storage. Ensure inspection includes fuel tank, fuel lines, fuel pump, regulator, fuel rails, carbon canisters, and all fuel system fittings. Never operate engine when any fuel component shows any indications of corrosion, leaks, deterioration, swelling, hardening or softening. Notify an authorized Ilmor service center and/or boat manufacturer's dealer for replacement parts prior to operating the boat.***

The boat fuel system has been specifically developed for use in a marine environment. A number of marine-specific safety measures are incorporated in the fuel system from tank to lines to connections. Please note, these measures include pressurized fuel lines that do not include user-serviceable parts.

Any fuel system services and repairs must be performed by authorized service personnel only with specialized tools and replacement parts that meet the manufacturer's Original Equipment Manufacturer (OEM) specifications.

Ilmor recommends a daily inspection to ensure no fuel lines are leaking. Never start the boat if there is evidence of fuel leaks or fumes.

Read carefully the boat manufacturer's Owner's Manual section on fueling for additional information and details. This is a critical component of safe and enjoyable boating.

## Fuel Requirements

All Ilmor engines (5000MPI, 6.0L MPI/-S, 7.4L MPI/-S, 5.3L GDI/-S, and 6.2L GDI/-S) require a minimum of 87 octane gasoline. **It is highly recommended to use a minimum of 90 octane gasoline for 6.2L GDI/-S engines.** Ilmor recommends 0% Ethanol (E0) gasoline where available. Ilmor prohibits the use of gasoline with ethanol content greater than 10%. The octane number is based on the pump octane number, which is (R + M)/2, where R is the research octane number, and M is the motor octane number.

If the engine is subject to heavy usage, the minimum gasoline fuel requirement is Unleaded 90 (R+M)/2 Octane up to 10% Ethanol. Heavy usage is defined as operators using their vessel under the following conditions: loaded with additional ballast and/or weight to achieve total maximum capacity over the OEM specification, commercial or training purposes as defined in the Ilmor warranty, at water temperatures below 55°F (13°C), at elevations greater than 6000 feet (1830 meter) above sea level, and/or wide open throttle operation for more than 5% of total boating time.

For optimal performance, 93 octane fuel is recommended.


Fuels other than specified will negatively alter performance and emissions and could damage the engine. Use of lower octane fuels will cause spark knock (pinging). Continued heavy spark knock can cause severe engine damage. The engines have knock detection systems that offer the best engine performance by controlling knock through precise ignition timing. Higher-octane fuel causes less knock for the ignition system to process and adjust timing.

Poor-quality or old fuels can cause problems such as loss of performance, rough idling, hard starting, and hesitation. If the engine experiences any of these symptoms, first try another brand of gasoline and then replace the old gasoline with fresh gasoline if required.

Many engine manufacturers believe U.S. Environmental Protection Agency's (EPA) detergent levels in gasolines do not provide sufficient deposit controls to allow for optimal engine performance. TOP TIER Detergent Gasoline standards were created to ensure gasolines have all the necessary additives and detergents to reduce buildup of deposits in an engine. Ilmor recommends purchasing fuel from a supplier that meets TOP TIER specifications for their fuel. For a list of TOP TIER retailers, check www.toptiergas.com, and click on Retailers.

*NOTICE: Always use a high-quality gasoline from a reputable source. Damage to the engine by use of low-quality gasoline or gasoline with an octane rating below the minimum level listed for Ilmor engines will void the warranty on the engine.*

## Oxygenated Gasoline or Gasoline Containing Alcohol

*NOTICE: Use of unspecified fuels will void warranty.*

**E-85 fuels are not to be used.** Use of this fuel may cause engine performance to suffer and may damage vital fuel system components.

**Leaded fuels may NOT be used in the engine.**

Gasoline containing levels higher than 10% ethanol or gasoline containing any methanol is **NOT TO BE USED** in the engine. If the presence of alcohol in the gasoline is unknown, frequent inspections of the fuel system are required.

The fuel tank level should NEVER be below 1/4 tank full. In the event the engine runs out of fuel, cycle ignition key 5 times and attempt to start engine. If the engine fails to start and run, repeat this process again up to 3 times. See your authorized dealer for further assistance and your boat owner's manual for more information.

## When Boat Is Placed Out Of Service

Ilmor recommends STA-BIL fuel stabilizer if the boat consumes less than a tank of fuel every 30 days. Today's fuels are more susceptible to degradation, and the use of a quality stabilizer helps ensure fewer problems if the boat is used only on a limited basis.

If boat has not been operated for more than 30 days and fuel is present in the tank (even stabilized fuel), engine may run with reduced performance until the existing fuel has been used. Ilmor will not pay for repairs to components that are damaged from poor-quality fuel as this is not covered under the engine warranty.

*NOTICE: Perform proper storage procedures when storing boat. Extended storage with fuel in the system can affect fuel stability and may require system inspection and fuel filter replacement when the boat returns to service. Fuel systems on all boats equipped with Ilmor engines MUST be properly prepared for storage periods exceeding 30 days, as outlined in this Owner's Manual. Owners are encouraged to seek assistance from an authorized Ilmor service center to properly prepare the powertrain for periods of inactivity exceeding 30 days. Damage due to improper storage or winterization preparations is not covered under warranty.*

## Fuels Outside the United States and Canada

If boat is operated outside the United States or Canada, it may be more difficult to obtain lead-free fuel. As the engine components are manufactured to function properly only with unleaded gasoline.

# BEFORE EACH USE

## Check Engine Oil (Cold)

***⚠ CAUTION! Never use oil additives. Doing so may result in equipment damage not covered under warranty.***

*NOTICE: Before operation, follow procedure for checking oil level after engine start-up located later in this chapter.*

Check engine oil level prior to starting even though a more accurate level reading occurs on an engine running at operational temperature. Perform oil level check with the boat level, at rest, and in the water. Cold oil level check is only for safe engine starting operation. For oil fill measurements the WARM level check must be performed as outlined in Check Engine Oil (Warm).

1. Open engine compartment and locate the yellow handle engine oil dipstick on the side of the engine.
2. Remove dipstick and wipe it off on a clean rag. Insert dipstick fully, wait five seconds, and remove to read level. Check that oil level on dipstick is between FULL and ADD marks. See picture below.

*NOTICE: Always follow your oil maintenance service interval.*

Recommended Cold oil level

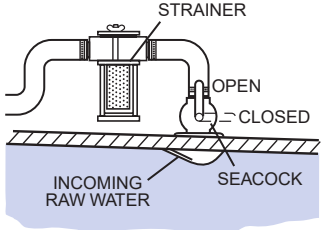
**DO NOT OVERFILL!**


## Check Sea Strainer

***⚠ CAUTION! Check sea strainer before starting engine, or allow engine to cool after shutting down. Failure to do so may result in burns to personnel from hot engine components.***

1. Ensure engine is shut down and engine safety starting switch is disconnected. Leave throttle/shift control lever in neutral.
2. Open engine compartment and locate seacock. Verify it is in CLOSED position. Remove screw, screen, and O-ring from cap/lid.
3. Check sea strainer for obstructions, wear, or damage.
4. Reinstall O-ring, screen, and screw on the cap/lid. Make sure O-ring is in place before tightening screw. Do not overtighten.
5. Move seacock to OPEN position.

Typical seacock and strainer




*NOTICE: Ensure seacock is in the OPEN position before operating boat. If not, engine will overheat and raw water pump impeller could be compromised, causing severe engine problems. Ensure sea strainer cap/lid is installed correctly and O-ring is not pinched. Failure to do so will cause air to be introduced into the system and could cause the raw water impeller to be compromised, causing severe engine problems.*

*NOTICE: Monitor all gauges and warning lights for alarms. Ignoring elevated temperatures on a temperature gauge or any other evidence of engine operating at temperatures above recommended levels can result in serious damage to the engine. Any resulting damage will not be covered by the warranty.*

*NOTICE: Checking sea strainer is a critical function of routine maintenance. Even waterways that appear clean may have debris such as pine needles or moss that can enter the cooling system and create a blockage. Failure to check sea strainer can result in serious overheating of the engine. Damage to the engine and/or transmission caused by overheating is not covered by warranty. Always pay attention to your temperature gauge, even if you are carefully performing this check. Failure of the raw water impeller or blockage of the transmission cooler are frequent causes of overheating.*

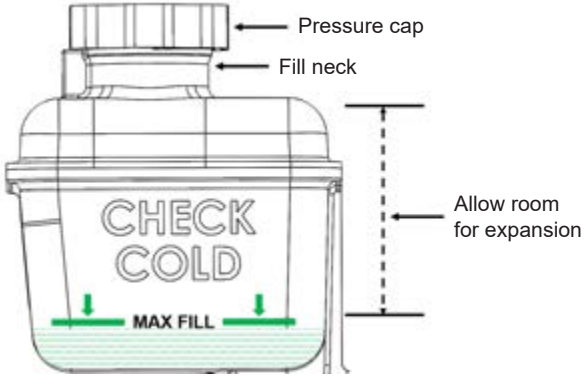
## Check Coolant Level

***⚠ WARNING! Contents under pressure! Do not remove the cooling system cap when the engine is warm. Allow ample time for engine to cool before checking coolant level. Wear proper personal protective equipment when checking coolant. Failure to do so may result in severe or fatal burns.***

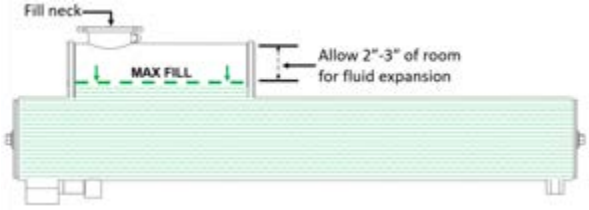
This check applies to boats equipped with closed-cooling systems. When possible, perform check prior to starting engine.

1. Verify engine is OFF and engine safety starting switch is disconnected. Leave throttle/shift control lever in neutral.
2. Open engine compartment. Locate closed-cooling system tank installed on the engine.
3. Remove reservoir cap and check level. Verify coolant is at the

GDI/-S series closed-cooling reservoir cap and tank




MPI-S series only closed-cooling reservoir cap and tank




MAX FILL line while the engine temperature is equal to ambient air temperature (COLD).

*NOTICE: Do not fill tank beyond MAX FILL line while the engine is cold. When engine temperature increases, the coolant will expand.*

4. If coolant level is below the MAX FILL line, add 5-year extended warranty propylene glycol coolant premixed 50/50 with water. The cooling system will take between 5.8 gal (22 L) and 6.8 gal (26 L) of coolant.
5. If tank is empty or nearly empty, notify an authorized Ilmor service center for immediate assistance as the engine cooling system will likely require purging. Purging should only be completed by a trained Ilmor service technician.

*NOTICE: Maintain correct coolant level. Failure to maintain coolant at the proper level will cause potentially serious engine damage. The warranty does not cover engine damage due to overheating or any other cause associated with improper coolant levels.*

## Check Power Steering Fluid (-S Models)

***CAUTION! Check power steering fluid before starting engine, or allow engine to cool after shutting down. Failure to do so may result in burns to personnel from hot engine components.***

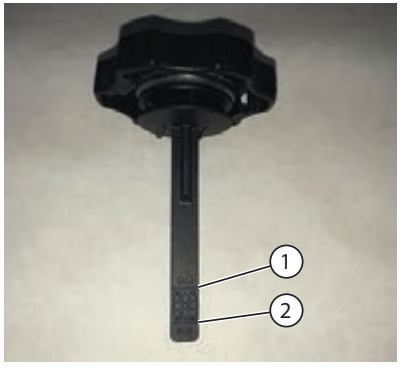
This procedure applies to engines equipped with power steering systems.

1. Center steering and verify engine is shut down.
2. Open engine compartment. Locate power steering pump on front port side of engine, and remove fill cap with integrated dipstick (level gauge).
3. Verify fluid level is between the MIN and MAX mark.
4. Adjust fluid until level is between MIN and MAX mark. Use only fluid outlined in the Specifications & Service chapter of this manual.

Fill Cap with integrated dipstick (level gauge)

MPI-S

GDI-S




1 MAX Mark

2 MIN Mark

***NOTE:*** *Power steering fluid does not require changing.*

For remote power steering reservoir systems, see boat manufacturer's manual for proper maintenance instructions, or contact your authorized Ilmor service center for assistance.

## Check Serpentine Belt

1. Verify engine ignition and battery switches are in the OFF position.
2. Open engine compartment cover and visually inspect serpentine belt for material defects or indications of wear to include missing material, cracking, layer separation, splits, cuts, etc.
3. Verify pulleys are secure, aligned, dry, smooth, and undamaged.
4. Close engine compartment cover and start engine.
5. Listen for abnormal noises coming from the serpentine belt system. Squealing, chirping, growling, grinding, or any other noise inconsistent with normal operation should be addressed immediately by repairing or replacing belt or pulleys. See authorized Ilmor service center.

## Check Battery Connections and Hold-Downs

***⚠ WARNING! Keep sparks, flames, and smoking materials away from battery charging area. When charging, batteries generate small amounts of dangerous highly-explosive hydrogen gas. Failure to follow OEM instructions for charging battery may cause electrical shock or even explosion which could result in serious injury or death.***

***⚠ WARNING! Avoid spilling battery electrolyte or allowing it to come into contact with skin. Battery electrolyte fluid is dangerous. It contains sulfuric acid, which is poisonous, corrosive, and caustic. If exposed to battery electrolyte, flush the area with large amounts of clean water and immediately seek medical attention.***

***⚠ CAUTION! Check battery connections and hold-downs before starting engine, or allow engine to cool after shutting down. Failure to do so may result in burns to personnel from hot engine components.***

1. Ensure engine is OFF and engine safety starting switch is disconnected. Leave throttle/shift control lever in neutral.
2. Locate battery or batteries. They may be placed in a variety of locations, depending on boat model. Refer to boat manufacturer's Owner's Manual for details.
3. Check that battery post connections are clean and tight. If not, see Inspect and Clean Battery Connections and Hold-Downs section in the maintenance chapter of this manual.

Battery post connections


## Check Battery for Full Charge

1. After starting the engine, verify voltmeter reads between 13 and 14.7 volts. An erratic reading can be a sign of low voltage.

Voltmeter

*NOTE: The voltmeter is the best indication of the state of the battery, but it is not foolproof. Even if the voltmeter indicates the battery is producing current while running the boat, yet during a previous outing there was reason to suspect a problem with the battery or batteries, then an issue may still exist. If so, check with an authorized Ilmor service center for assistance.*

2. If charge is low, or if battery is old and/or fails to hold a charge at the expected level, the boat may not start. For additional questions about battery or batteries, contact boat manufacturer's authorized dealer.

***⚠ CAUTION! Jump-starting a battery from another boat or battery is dangerous. Jumping a dead battery while it is attached to the alternator will put undue stress on the alternator, and may cause damage to equipment.***

3. If battery is below 12 volts, charge with a battery charger before attempting to start.

## Inspect Engine and Engine Cables

***⚠ CAUTION! Inspect engine and engine cables before starting engine, or allow engine to cool after shutting down. Failure to do so may result in burns to personnel from hot engine components.***

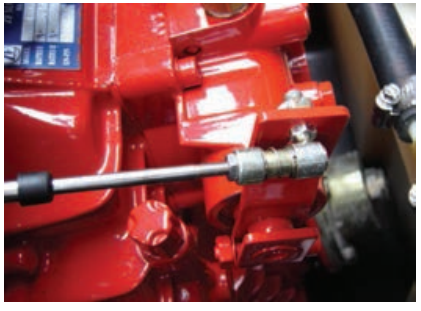
### LOOSE OR MISSING HARDWARE

1. Ensure engine is OFF and the engine safety starting switch is disconnected. Leave the throttle/shift control lever in neutral.
2. Open engine compartment and inspect engine, engine components, and mounts for loose and missing hardware. If found visit an authorized Ilmor service center for maintenance.

### CHECK FOR KINKS, WEAR AND INTERFERENCE OF THROTTLE AND SHIFT CABLES

Follow each cable back under the floorboards and feel for any kinks or wear on the outer jacket. Immediately replace cable if any sign of cable damage is found. Visit an authorized Ilmor service center for further assistance.

Check cable connections



## Inspect Fuel and Exhaust Systems for Leaks

***⚠ DANGER! If at any time during operation there is an unexplained odor, or if anyone onboard shows signs of unexplained drowsiness or sleepiness, immediately shut down the engine and determine if the odor or unexplained behavior is the result of malfunctions in the fuel or exhaust systems.***

***NOTE:*** *This is a preliminary inspection only. Operator and onboard personnel should stay alert while boating for any signs of fuel or exhaust leaks.*

1. Ensure engine is OFF and the engine safety starting switch is disconnected.
2. Open engine compartment and check fuel and exhaust systems for leaks, gaps, or cracks.
3. Start engine and check for fuel and exhaust leaks.
4. If any leaks, gaps, or cracks are discovered, contact authorized Ilmor service center immediately for repair.

## AFTER EACH USE

**Flushing the Engine**

1. Place a flushing device on the engine seacock on the bottom of the hull. Some applications may have a hose connection on the deck of the boat. Please review your boat manufacturer's owner's manual. Turn the garden hose ON and start the engine.
2. Cycle engine speed from idle to 2,000 rpm in 10-second intervals,allowing the engine to reach operating temperature. Engine needs to be at its operating temperature for 15 minutes. The garden hose flow rate may need to be adjusted if engine will not warm up; it must warm up to open the thermostat, which is required for proper flushing. If the engine will not warm up, remove thermostat and flush engine with fresh water for 5 minutes while cycling the engine speed from idle to 2,000 rpm in 10-second intervals. Fresh water boats should be flushed when going to storage or not being used for periods in excess of 30 days.

NOTICE: *Brackish or salt water boats should be flushed with fresh water after every use. Will void water on open cooled side. Boat-in-water flushing can be achieved with a flushing device. Engine seacock will need to be closed while supplying fresh water to the inlet of the raw water pump and allowing it to circulate through the engine.*

## NEW ENGINE BREAK-IN

***⚠ DANGER! Prior to operating bilge, open engine compartment and check for fumes, leaks, or presence of fluids. If clear, operate bilge blower for at least 4 minutes before starting engine and when at idle or slow-running speed after starting the engine. This will remove any explosive gasoline and/or battery fumes that may be in the engine compartment. Failure to do so may result in explosion or fire, resulting in serious injury or death.***

***⚠ WARNING! Never operate engine without adequate and uninterrupted water flowing through the cooling system. This requires the boat to be in an operational-sized body of water or connected to the suction side of a raw water pump by an Ilmor-approved water supply in a dealership. If the engine operates without water in the cooling system, the exhaust system will overheat and could potentially create an onboard fire. The raw water pump impeller will also fail. Damage caused to the boat will void the warranty and may result in serious injury and/or death.***

***⚠ CAUTION! Ensure there is ample room around the boat when trying to start the engine. Contact with other boats, docks, shallow waterway bottoms, or debris may result in serious injury and/or damage to boat that is not covered under warranty.***

*NOTICE: Failure to follow new engine break-in and operating procedures as described in this manual will void the warranty. Before operating the boat for the first time, you must read this Owner's Manual completely, as well as the boat manufacturer's Owner's Manual.*

Proper break-in of the engine and transmission is critical to ensuring long powertrain life. Proper new engine break-in procedures during the first 25 operating hours will ensure maximum powertrain performance.

The break-in period allows the engine and transmission components to properly seat components and start normal wear.

Although the Ilmor powertrain may have been lake-tested by the boat manufacturer, the break-in period starts when the retail consumer takes possession of the boat and follows the instructions provided in this Owner's Manual.

*NOTICE: Change factory break-in oil before 25 hours of proper operation, and after a minimum of 10 hours. Oil change should be performed by an authorized Ilmor service center.*

During the break-in period, maintain correct oil level to ensure internal affected components are well lubricated. Watch instrument panel gauges closely. Gauges are the first line of defense against engine damage. Well before serious damage occurs to an engine, gauges can alert the operator to circumstances that can lead to major damage.

Any abnormal vibrations or unusual noises may be symptomatic of additional problems that are not registered by gauges or alarms. Do not ignore alarms. Have an authorized Ilmor service center check out anything that seems unusual. It may be a minor issue that requires a simple tightening of screws or bolts, but it may also signal serious internal issues.

Plane boat quickly, as low speeds can place more strain on the engine operation. This does not mean to slam the throttle/shift control lever forward; rather a steady, quick hand will help achieve the desired goal.

Adjusting and varying engine speeds can also help the engine during break-in. Keeping engine at a constant revolutions per minute (rpm) for more than 3 or 4 minutes at a time places undue stress on the rings and bearings inside the engine.

## First Hours of Operation (First 25 Hours)

***DANGER! Prior to operating bilge, open engine compartment and check for fumes, leaks or presence of fluids. If clear, operate bilge blower for at least 4 minutes before starting engine, and when at idle or slow-running speed after starting the engine. This will remove any explosive gasoline and/or battery fumes that may be in the engine compartment. Failure to do so may result in explosion or fire, resulting in serious injury or death.***

1. Start engine and idle at 600 to 800 rpm to warm engine to normal operating temperature. See Specifications and Service chapter in this manual for specific operating temperatures of each engine model.
2. Move throttle/shift control lever forward to planing speed smoothly and quickly. Return throttle back to slower planing speed.
3. Vary engine speed for the first hour without exceeding 3,000 rpm, and carry only a light load in the boat. Reduce throttle/shift control lever to idle (neutral) occasionally for a cool-down period.
4. Boat MUST be returned to an authorized Ilmor service center for a mandatory oil change between 10 and 25 hours of operation. This allows service staff to determine whether any internal issues exist.


## After First Hours Of Operation (After First 25 Hours)

1. After engine break-in and oil change have been completed, engine may be operated more continuously at speed, but never beyond the maximum allocated speed. It is always advisable to give the engine an occasional cool-down period.
2. Throughout the life of the engine, allow for a warm-up period before operation. Abuse of the engine and transmission are never covered under warranty. Regular maintenance as outlined in this Owner's Manual is very important to ensure a long, trouble-free powertrain life.
3. Subsequent oil changes should be performed per the maintenance schedule outlined in this manual or quarterly if the boat is not used regularly. See maintenance chapter in this manual for more details.

*NOTICE: Always use recommended engine oil. Failure to follow the engine oil recommendation listed in this Owner's Manual can result in accelerated engine wear and engine component failure. Engine damage due to incorrect oil usage, oil changes, and oil levels, or other failure to follow engine oil procedures can be costly and may void the warranty.*

## BEFORE STARTING ENGINE

*NOTICE: Failure to follow break-in and operating procedures as described in this Owner's Manual will void the warranty. Before operating boat for the first time, read Owner's Manual completely, as well as the boat manufacturer's Owner's Manual.*

1. After performing all the checks and inspections outlined in this Owner's Manual, lift the engine compartment cover.

***⚠ DANGER! Open engine compartment and check for fumes, leaks or presence of fluids in bilge before starting engine. Failure to do so could result in fire or explosion, and severe injury or death.***

2. Operate bilge blower for at least 4 minutes with engine compartment cover open. Leave bilge blower ON throughout the starting process and until the boat has planed.
3. The boat is likely equipped with sea strainer valves and seacocks. Ensure these are open prior to starting the engine.

## START ENGINE

***⚠ WARNING! Never operate engine without an adequate and uninterrupted amount of water flowing through the cooling system. Failure to do so could result in fire or explosion from overheating, and cause severe injury or death.***

*NOTE: Always start engine with throttle/shift control lever in neutral position. The boat is equipped with a neutral-start safety switch that will not allow engine to start while in gear.*

1. Attach engine safety starting switch tether (also known as a lanyard) between an article of the operator's clothing and the switch, whose location will be identified in the boat manufacturer's Owner's Manual.
2. Move throttle/shift control lever to neutral position. This allows electronic controls within the engine to automatically and correctly meter fuel and air flows.

***⚠ CAUTION! Ensure there is ample room around the boat when starting the engine. Ilmor powertrain systems have safety sensors and safety features integrated into their systems to prevent an 'in-gear' start situation. These features and sensors should not be tampered with. Failure to do so may result in severe injury or damage to equipment.***

### Pushbutton Start

1. Turn ignition switch to the ON position. Wait 5 seconds to allow the fuel pump to build fuel pressure within the system.
2. Press START button no more than 1 second. The automatic start feature will crank engine until it is running.

*NOTE: DO NOT hold START button for more than 1 second. Continuing to hold START button will cause engine to not start (simulates a STOP request).*

### Key Switch Start

1. Turn ignition switch to the ON position. Wait 5 seconds to allow the fuel pump to build fuel pressure within the system.
2. Turn ignition key to the START position.
3. Release ignition key once engine begins to crank. Automatic start feature will crank engine until it is running.

*NOTICE: If engine fails to crank, or cranks slowly, check engine battery voltage. If engine battery voltage is below 11.0V (Volts) when the ignition key is turned to the ON position, the available voltage is too low to effectively crank/start engine. Battery must be combined (paralleled) with additional batteries on the boat to start the engine. Locate parallel switch and turn to the ON (COMBINE) position. Turn off any additional electrical circuits that may be causing excessive electrical draw on the battery. Proceed to start the engine. Once the engine is running, move the battery selector switch back to the normal operating position. Combining batteries is intended for emergency starting situations only.*

*NOTICE: Allow for 2 minutes of rest for every 3 start attempts. This allows the starter motor enough time to cool between start attempts. Without this resting period, the starter may overheat and damage. Damages such as these are not covered under warranty.*

Always allow engine to warm up to normal operating temperature before boating. See Specifications and Service chapter in this manual for specific engine model operating temperatures. After engine has warmed to operating temperature, check engine oil level prior to moving. See Check Engine Oil Level section in the Maintenance chapter of this manual.

## SHIFT GEARS

Ensure engine is at normal operating temperature prior to placing boat in gear.

When shifting gears, always move the throttle/shift control lever smoothly and quickly into gear. Hesitations and slow gear movement can damage shifting mechanism in the transmission. Always allow engine speed to fall to idle (600 to 800 rpm) before making a gear shift.

Throttle/shift control lever must move forward from neutral to engage forward gear. Lever controls both gearing and throttle response, so continuing to move lever forward will increase speed.

Reverse occurs when throttle/shift control lever is pulled back from neutral.

*NOTICE: Never move between FORWARD-NEUTRAL-REVERSE when engine is above 800 rpm. Always allow speed to decrease to 600-800 rpm before completing shift. Failure to do so may result in damage that is not covered under warranty.*

## STOP THE BOAT

Stopping a boat requires advance planning and operations that must be completed before stopping. Make personal and passenger safety the priority of vessel operation. Always be aware of your surroundings and consider the effects of your resulting stopping wake when operating the vessel.

*NOTICE: The following steps do not take into account effects of area conditions such as tides, currents, winds, weather, and/or passing wakes of other nearby vessels. These variables will affect the overall time and distance of the stopping procedure. These recommendations are for IDEAL stopping conditions only. Emergency stopping situations call for actions that are at the sole discretion of the vessel operator to deem necessary for safety. Ilmor is NOT responsible for any resulting damages or injuries that may occur during emergency situations.*

1. Once vessel has overcome trailing wake and engine speed is between 600-800 rpm, move throttle/shift lever to the NEUTRAL position. Vessel will continue to coast and make forward movement. When performing this action, be sure to reduce throttle fast enough to bring the vessel to a stop before your target, but also slow enough to not allow trailing wake to overtake boat stern. This resulting wake may cause unwanted forward movement, wash into the boat, and/or potentially cause engine damage not covered by warranty.
2. With engine speed between 600-800 rpm and shift position in NEUTRAL, move throttle/shift lever to the REVERSE position to counteract any forward movement, if required. Additional REVERSE throttle may be necessary to achieve quicker results. Never exceed 1,000 rpm in REVERSE unless in an emergency.
3. Shift between FORWARD - NEUTRAL - REVERSE positions appropriately and as necessary until the vessel has stopped completely at the desired location.

See your boat Owner's Manual for additional stopping tips and support.

## OTHER CONSIDERATIONS

Wide-open throttle exists to allow boaters to get out of dangerous encounters or situations, but it represents the upper limit of the engine's capacity. This places undue strain on the engine components and should be used in emergency situations only.

See also the boat manufacturer's Owner's Manual for operational hints and tips that can enhance the enjoyment of the boat's and powertrain's integration.

## HEAVY DUTY USAGE

Heavy usage is defined as operators using their vessel under the following conditions: loaded with additional ballast and/or weight to achieve total maximum capacity over the OEM specification, commercial or training purposes as defined in the Ilmor warranty, at water temperatures below 55°F (13°C), at elevations greater than 6000 feet (1830 meter) above sea level, and with full throttle operation for more than 5% of total boating time. Vessels operating under these conditions will be required to have more frequent service intervals as specified.

## COMMERCIAL USAGE

Commercial use is defined as any work- or employment-related use of the product, or any use of the product that generates income, or any part of the warranty period, even if the product is only occasionally used for such purposes.

# MAINTENANCE SCHEDULE

Ilmor recommends that maintenance is performed by an authorized Ilmor service center. Service technicians there have proper equipment, training, and resources to best meet service needs. Please note that routine maintenance is not covered by the Ilmor Limited Warranty. For details, consult limited warranty statement.

Installation, repair, servicing or operation of any Ilmor products must comply with federal, local, and international boat building standards (ABYC, USCG, RCD, etc.). Always maintain safety as a priority when using or servicing Ilmor products. Apply caution and refer to local and federal regulations when using Ilmor products.

These statements are recommended guidelines. The operator or service professional must determine whether or not the boat and/or Ilmor product is safe to operate, according to circumstances and good judgment. If there is any doubt, please seek assistance from an authorized Ilmor service center.

In addition to the routine services addressed earlier, there are a number of other maintenance procedures that require periodic attention. The following table indicates the maintenance schedule:

**Scheduled Maintenance Chart**

| | Engine Service Item | Before Each Use | Annually (Season Start) | First 25 hrs | Every 50 hrs | Every 75 hrs | Every 100 hrs | Every 125 hrs | Every 150 hrs | Every 300 hrs | Every 500 hrs | Every 2 Years | Every 3 Years | Every 5 Years |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Maintenance procedures are best performed by a certified Ilmor service center | | | | | | | | | | | | |
| | | I = INSPECT | | | | | | | | | R = REPLACE | | | |
| ALL ENGINES | Air Filter/Spark Arrestor | | I | | | | | | | | | R | | |
| | Cooling System Crossover Tube (G4 Only) | | | | | | | | I | R | | | R | |
| | Engine Coolant (Closed Cooled Only) | I[1] | I[1] | I[1] | | | | | | | | R | | |
| | Coolant Pressure Cap (Closed Cooled Only) | | | | | | | | R | | | | | |
| | Engine & Transmission Coolers | | I | | | | | | | | | | | |
| | Raw Water/Sea Pump | | I | I | | | | | I | | R | | | R |
| | Raw Water/Sea Pump Impeller | | R[3] | | | R[3] | | | | | | | | |
| | Raw Water/Sea Pump Impeller (6.0L MPI Only) | | | | | | | R | | | | R | | |
| | Anodes | | I | | I | | | | | | | | | |
| | Serpentine Belt | | I | | | | | | | R* | | | | |
| | Spark Plugs and Wires | | I[2] | | | | | | R | | | | | |

## Scheduled Maintenance Chart

| | Engine Service Item | Before Each Use | Annually (Season Start) | First 25 hrs | Every 50 hrs | Every 75 hrs | Every 100 hrs | Every 125 hrs | Every 150 hrs | Every 300 hrs | Every 500 hrs | Every 2 Years | Every 3 Years | Every 5 Years |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Maintenance procedures are best performed by a certified Ilmor service center | | | | | | | | | | | | |
| | | I = INSPECT | | | | | | | | | R = REPLACE | | | |
| ONE-DRIVE® ENGINES ONLY | Fuel/Water Separator | | R | | | | | | R* | | | | | |
| | Engine Oil and Filter | I[1] | R | R | | R* | | | | | | | | |
| | High Pressure Fuel Filter | | | | | | | | R* | | | | | |
| | Gear Oil and Filters | I[1] | R | R | | | | | R* | | | | | |
| | Power Steering Fluid | I[1] | | | | | | | | R | | | | |
| | Power Steering Fluid In-Line Filter (GDI-S Only) | | I[1] | | | | | | | | | | | |
| | Trim Pump Fluid | I[1] | | | | | | | | R | | | | |
| | Powertrain Alignment | | | I | | | | | I | | | | | |
| | Trim Pump Relays Dielectric Grease | | R | | | | R | | | | | | | |
| IN-BOARD ENGINES ONLY | Engine Oil and Filter | I[1] | R | R | R* | | | | | | | | | |
| | Engine Timing (MV8 5.7L Only) | | I | I | | | | | | | | | | |
| | Pressure Relief Valve (Open Cooled Only) | | I | | I | | R | | | | | R | | |
| | Powertrain Alignment | | I | I | | | | | I | | | | | |
| | ZF Transmission - Oil & Filter | I[1] | I[1] | I[1] | | | | | | R* | | | | |

| | |
|---|---|
| * | If the engine is subject to heavy usage, it is required to perform these maintenance items at half time of the interval shown. Heavy usage is defined as operators using their vessel under the following conditions: loaded with additional ballast and/or weight to achieve total maximum capacity over the OEM specification, commercial, or training purposes as defined in the Ilmor warranty; at water temperatures below 55°F (13°C); at elevations greater than 6,000 feet (1,830 meter) above sea level; or wide open throttle operation for more than 5% of total boating time. Vessels operating under these conditions will be required to have more frequent service intervals as specified. |
| 1 | Check for contamination, debris, and leaks.<br>Check for fluid fill level. If the level dropped below minimum indicator, top the fluid to the recommended fluid level. |
| 2 | Inspect spark plug wires for chafing and heat damage. |
| 3 | Inspect the MV8 5.7L, MV8 6.0L, MV8 6.2L, 6.0L MPI-S, 7.4L MPI-S, and 7.4L MPI engine models for corrosion/damage of the Raw Water Pump - Woodruff Key (PV05722). Replace if required. |

## CHECK ENGINE OIL (WARM)

An accurate engine oil level reading will occur only after the engine has run for at least 5 minutes at idle. Run engine while boat is in body of water.

1. After operating the engine at idle for at least 5 minutes, turn engine off and disconnect engine safety-starting switch.
2. Open engine compartment. Engine oil dipstick is located on the side of the engine.
3. Allow approximately 5 minutes before checking. Remove dipstick and wipe it off on a clean rag.
4. Reinsert dipstick. Wait 5 seconds and remove dipstick for reading. Check that oil level is between the ADD and FULL marks on the dipstick.
5. Add oil if necessary through the oil fill neck and only enough to bring oil within the two marks, see picture below. Oil level below the ADD mark or above the FULL mark may result in damage to the engine that may not be covered by the warranty. Use oil as specified in Specifications and Service chapter in this manual.

⚠ ***CAUTION!*** DO NOT USE OIL ADDITIVES.

6. Reinstall dipstick and ensure it is properly seated to prevent oil loss.


## CHECK TRANSMISSION FLUID/OIL LEVEL

Transmission requires lubrication to function properly. Your dealer can verify the type of transmission in the boat. The amount of transmission fluid/oil varies according to the model. See requirements for transmission fluid/oil in the transmission manufacturer's manual.

*NOTICE: Always use the recommended transmission fluid/oil. Damage to the engine by use of low-quality or nonrecommended transmission fluid/oil as listed for V-Drive and direct drive transmissions will void the warranty. Overfill or underfill may also result in serious damage to the engine and is not covered under warranty.*

## SERPENTINE BELT

### Inspect Serpentine Belt

⚠ ***CAUTION! Check belt before starting engine, or allow engine to cool after shutting down. Failure to do so may result in burns to personnel from hot engine components.***

On engines with serpentine belt systems, belt tension is maintained by the automatic belt tensioner.

1. Ensure engine is OFF and the engine safety starting switch is disconnected. Leave the throttle/shift control lever in neutral. Open engine compartment and locate the serpentine belt.
2. Check serpentine belt tension at the top, midway between the circulating pump pulley, and the alternator pulley. The belt should be tight enough so that it will deflect no more than 1/4 to 1/2 in. (6 to 13 mm) when pressed with the thumb or finger.

3. Too-loose or too-tight tension is indicative that it is time for service on the belt. This should be done by a trained Ilmor service technician.

*NOTE: If the belt is too tight, excessive belt and bearing wear can occur. If the belt is too loose, slippage can occur, resulting in low alternator output and rapid belt wear.*

4. Visually check serpentine belt system.

- Ensure belt lies between the accessory pulley edges and is seated within the groove of the pulleys.
- Check the belt alignment on the pulleys.
- Check belts for signs of wear, such as cracking, fraying, splits or brittle places.
- Look for missing grooves or places where the belt's layers have separated.
- Look for a buildup of rubber deposits, as well as worn spots that could catch the belt and cause it to break.

5. Visually inspect the pulleys for surface damages, cracks, cuts, rust, and pitting.

6. Listen for irregular audible noises near the engine belt drive area. These sounds likely mean the serpentine belt is worn, loose or damaged, or there is water on the pulley system surfaces. Slick spots can cause a belt to slip and may be a precursor to overheating and belt cracking. See your authorized Ilmor service center if audible noises exist after replacement.

## Replace Serpentine Belt

*NOTE: A properly installed serpentine belt will be automatically adjusted by the belt tensioner. When the belt is off, attention should also be given to the wear condition of the grooves on the underside of the belt where it makes contact with the pulleys. If you are unsure of the wear pattern, check against a new belt. If there is any uncertainty, seek assistance from your authorized Ilmor service center. If the belt is too loose and or too tight, it will cause the electrical system to malfunction. This could occur during operations, and strand the boaters. Therefore, this maintenance function should be taken very seriously.*

*NOTICE: If the serpentine belt comes off or wears through, catastrophic engine failure may occur. Do not operate the engine without a properly installed serpentine belt. Any resulting damage will not be covered by the warranty.*

1. A serpentine belt routing label is placed on the front of the engine for identifying the correct belt routing. If the label is missing, do NOT operate or service the belt until a label is furnished, or correct routing of the belt is identified and understood.
2. Using an appropriately sized socket wrench, remove tension from the belt by moving the tensioner to its maximum travel position.
3. Remove serpentine belt by unwrapping it from each of the pulleys.
4. Inspect serpentine belt for wear.
5. After determining the serpentine belt replacement needs, reinstall and route the serpentine belt according to the belt routing label affixed to the engine.
6. Ease the tensioner back into place and ensure that the belt is properly routed around all of the pulleys.
7. Listen for irregular audible noises near the engine belt drive area. These sounds likely mean the serpentine belt is worn, loose or damaged, or there is water on the pulley system surfaces. Slick spots can cause a belt to slip and may be a precursor to overheating and belt cracking. See your authorized Ilmor service center if audible noises exist after replacement.

## CLEAN ENGINE COMPARTMENT AND PREVENT CORROSION

The engine compartment should receive a good, general cleaning of the interior as well as the engine and transmission exteriors. There is reward in the cleaning beyond enhancing the overall value of the boat. Cleaning with simple soap and water may reveal if any corrosion has occurred.

***⚠ CAUTION! Always cover the spark arrester before cleaning to ensure water does not enter throttle body or intake! Be sure to avoid electrical components and connection of water exposure.***

Corrosion can occur in any type of water and on any metal surface, even when components are stainless steel. But corrosion is of particular concern for boats that will be operated in salt water, even if the system is closed cooling. Salt water may still enter the engine compartment due to the engine compartment cover being open to vent carbon monoxide and prevent explosive fumes. Also, the exhaust system will always be subject to contact with salt water in these conditions.

Galvanic corrosion, or electrolysis, is the decomposition of metal due to the effects of electrolytic action. When two dissimilar metals are immersed in a conductive fluid such as salt water, an electric current is produced, much like the action of a battery. As the current flows, it takes with it tiny bits of the softer metal. If left unchecked, severe damage may occur over time.

A boat properly prepared for operation in salt water will have sacrificial anodes mounted on the transom, and possibly elsewhere underwater. These anodes are intended to reduce the effects of galvanic corrosion to critical metal areas of the boat. The sacrificial anodes should be checked regularly, and when significant erosion is shown, the anodes should be replaced. More information regarding the sacrificial anodes is contained in the boat manufacturer's Owner's Manual.

*NOTICE: Always properly clean the engine and transmission if exposed to salt water. Exposure to salt water causes corrosion, leading to significant damage to metal, including stainless steel. If evidence of corrosion shows on the engine, carefully clean the engine and transmission with fresh water and a mild soap solution after use in salt water. A protective marine oil may be applied to exposed metal to halt the acceleration of corrosion. Failure to properly clean boat or address boat corrosion matters will void product warranty.*

## INSPECT AND CLEAN THE BATTERY CONNECTIONS AND HOLD-DOWNS

***⚠ CAUTION! Always wear protective glasses or goggles and protective clothing when working around batteries. You must follow battery manufacturer's instructions on safety and maintenance procedures. Failure to do so may result in severe injury.***

1. Check the battery post connections are clean and tight.
2. If not, loosen and remove negative terminal connection first. Avoid metal contact between both battery connections at the same time. Tools such as wrenches and pliers may cause spark if the battery terminals are bridged.
3. Remove battery hold-downs and remove the battery from the boat.
4. Clean any corrosion from the battery posts and connections with a battery terminal cleaning brush, or by using a plastic bristle brush and a premixed solution of baking soda and warm distilled water (for every 3 parts of baking soda, mix 1 part of distilled water. Use care to avoid allowing the solution to enter the battery vents.

5. Remove all corrosion material from the boat, wipe clean and dry the battery with a disposable rag. Note that this is a generic cleaning method. Battery manufacturers may specify other methods of cleaning. Verify with the battery manufacturer's website the correct cleaning method before undertaking any cleaning.
6. Reconnect positive terminal first, and then the negative. Tighten the terminals.

***⚠ CAUTION! Take care to reattach battery cables correctly to avoid reverse polarity.***

7. Coat both terminals completely with a thin coating of marine grease to protect against water or any potentially corrosive substance. Be sure the rubber boot covers the positive terminal completely.

*NOTICE: Never install accessories or add-on equipment that is not approved by Ilmor. Add-on equipment may adversely affect the alternator output or overload the electrical system. Any damage caused as a result will not be covered by the warranty.*

The boat manufacturer specifies a type of marine battery with a certain level of cold-cranking amps at 0°F (−18°C). Check the boat manufacturer's owner's manual to determine what this specification is.

Before disconnecting the battery, ensure ignition key and all accessories are in the OFF position. Take care to reattach battery cables correctly to avoid reversed polarity, which is addressed in the electric system section in the FUNCTIONS & DESCRIPTION chapter of this manual.

## STORAGE AND WINTERIZATION

Proper storage and/or winterization preparations are just as important as how a powertrain is maintained in use. Since special preparations are necessary, the boat owner should have the work done by an authorized Ilmor service center. Damage that occurs from improper storage and/or winterization is not covered under warranty and must be avoided. For longer than 6month storage, the fuel will need to be replaced every 6 months. Follow scheduled maintenance chart as well.

*NOTICE: Do not use fogging oil on Ilmor engines. This will damage the catalyst and can void your engine warranty.*

***⚠ CAUTION! Failure to correctly winterize the engine may result in catastrophic engine failure not covered under Ilmor warranty or personal injury. Please see your nearest authorized Ilmor service center for assistance.***

## Fuel System Treatment

Boats that are going to be stored for extended periods (more than 30 days) or winterized should have special treatment for the fuel system. Always follow the boat owner's manual on how to properly winterize the fuel tank prior to storage.

***⚠ WARNING! Follow boat manufacturer's instructions on how to properly winterize the fuel tank prior to storage. Fuel leaking into the boat and potentially into the storage area could result in substantial damage to the boat, and contact with any spark (such as a flame-producing pilot light in a heater) could also result in serious injury, death or property damage.***

A marine-grade fuel stabilizer, such as STA-BIL, may be used during long-term storage and winterization of the engine. Follow the directions provided by the stabilizer's manufacturer.

## Battery Winterization

Check the battery and/or boat manufacturer's requirements.

## Recommissioning After Storage/Winterization

Ilmor recommends that recommissioning after storage/winterization be performed by an authorized Ilmor service center. Service technicians there have the proper equipment, training, and resources to best meet your service needs.

*NOTICE: It is extremely important to monitor gaseous emissions throughout the life of the engine. To maintain emissions levels within the certified standards, the owner/operator is responsible for ensuring that engine maintenance is performed as described in this Owner's Manual. The owner/operator must never modify the engine in any manner that alters the allowable gaseous emission levels to exceed the certified specifications.*

## EMISSIONS CONTROL INFORMATION LABEL

At the time of manufacture, Ilmor affixes each engine with a tamper-resistant Emission Control Information (ECI) label. This label affirms the required emissions compliance statement, along with the engine family, the Family Emission Limit (FEL), and engine displacement (if applicable).

The ECI label contains the date of manufacture. For inboard/sterndrive engines, the label is located at the rear of the engine on an angled face of the engine block.

**Do not remove or tamper with ECI labels. If a replacement label is required, promptly contact Ilmor for assistance.**

Engines that display a Conformité Européenne (CE) mark require a Declaration of Conformity. The Declaration of Conformity verifies the engine's conformance to the appropriate European Community Directive. The CE mark is included on the ECI label.

*NOTE: If engine is installed so that the engine's ECI label is hard to read during normal engine maintenance, a duplicate label must be placed on the vessel, as described in 40 CFR 1068.105.*

ECI label


# EMISSIONS CONTROL SYSTEM INFORMATION

Emission control system information for all engines having the ECI label are as follows: Positive Crankcase Ventilation (PCV), Sequential Multiport Fuel Injection (SFI) or Gasoline Direct Injection (GDI), Three-Way Catalytic (TWC) converter, Heated Oxygen Sensors (HO2S), Naturally Aspirated (NAT), On-Board Diagnostics Marine (OBD-M), low-permeation fuel line (hose), Electronic Throttle Control (ETC), and Electronic Engine Control (electronic EC).

# CALIFORNIA AIR RESOURCE BOARD (CARB) STAR LABEL

## CARB Overview

CARB is the clean-air agency in the California Government. Stated goals include attaining and maintaining healthy air quality, protecting public from exposure to toxic air contaminants, and providing innovative approaches for complying with air pollution rules and regulations.

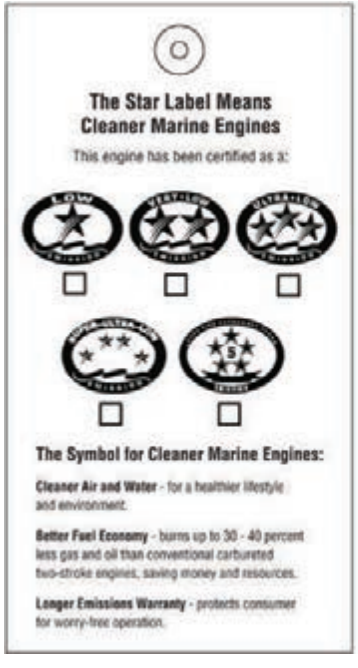
Beginning January 1, 2009, any boat sold or registered in California must have a Star Label affixed to the port side of the hull either forward or aft of the vessel registration as shown in the following illustration.
A conventional power (373 kW / 500 bhp or less) Ilmor GDI engine has a Five Star – Extremely Clean Emission rating. This indicates that the engine has 50% lower emissions than Four Star Super Ultra Low Emission engines.

A Star Label is placed on each certified Ilmor engine. A conventional power (373 kW / 500 bhp or less) Ilmor engine has a Four Star - Super Ultra Low Emission rating. This indicates that the engine has 90% lower emissions than
One Star - Low Emission engines. The Four Star Label identifies the engine as meeting the CARB sterndrive/inboard marine Tier 4 engine exhaust emission standards. A high-performance (>373 kW / 500 bhp) Ilmor engine has a three Star - Ultra Low Emission rating. This indicates that the engine has 65% lower emissions than
One Star - Low Emission engines. The three Star Label identifies the engine as meeting the CARB sterndrive/inboard marine Tier 3 engine exhaust emission standards.



## Environmental Label

*NOTICE: The dealer is responsible for the Environmental Label (hang tag). The dealer must mark the correct box on each hang tag to match the Star Label on the engine and the boat. The Dealer must display the hang tag in a visible location on the boat prior to displaying the boat for sale in California. If only the engine is displayed, a hang tag must be placed in a visible location on the engine. Failure to correctly display the hang tag may result in a citation and possible fine to the dealer from the CARB.*





## OBD-M

All Ilmor engines are equipped with OBD-M to comply with 2009 and later California-mandated OBD-M specification. The Malfunction Indicator Lamp (MIL) or a Check Engine warning will appear on the dash when emission system problems occur on the boat.

If the MIL is set due to an emissions-related fault, a Diagnostic Trouble Code (DTC) will register. The MIL functions to notify the operator that a problem has occurred so that the owner/operator can arrange for service as soon as possible. DTCs are stored in the Engine Control Unit memory and can be retrieved with a diagnostic scan tool such as Diacom PC Software.

System malfunction information assists the service technician in quickly diagnosing system issues. When the MIL lights, the owner/operator should contact an authorized Ilmor service center to arrange a diagnostic scan at the earliest possible opportunity.

The diagnostic scan tool will be connected to a flat 6-pin Data Link Connector (DLC). The connector is located on the flywheel side near the top of the engine. Note that the protective DLC cover must be removed prior to connecting the scan tool.

Check cable connections

# CALIFORNIA AND U.S. EPA EMISSION CONTROL WARRANTY STATEMENT

## Warranty Rights and Obligations

CARB, U.S. EPA, and Ilmor are pleased to explain the emission control system warranty on your 2013 model year and later sterndrive/inboard engine. In the United States, new sterndrive/inboard engines must be designed, built and equipped to meet all State and Federal mandated anti-smog standards.

Ilmor must warrant the emission control system on the sterndrive/inboard engine for the periods of time listed in the subsection below, provided there has been no abuse, neglect or improper maintenance. The engine emission control system may include parts such as carburetor or fuel injection system, ignition system, and catalytic converter. Other parts included may be hoses, belts, connectors, and other emission-related assemblies.

Where a warrantable condition exists, Ilmor will repair the sterndrive/inboard engine at no cost to the owner, including diagnosis, parts, and labor.

## Warranty Terms

Select electronic emission-related control parts from model year 2020 and later sterndrive/inboard engines are warranted for 3 years or 480 hours, whichever first occurs.

Select mechanical emission-related components are warranted for 3 years or 480 hours, whichever first occurs. This includes engines with maximum power less than or equal to 373 kW (500 bhp). Engines with maximum power greater than 373 kW (500 bhp) but less than or equal to 485 kW (650 bhp) are warranted for 3 years or 150 hours of operation, whichever occurs first.

Warranty coverage based on hourly period is only permitted for engines that are equipped with hour meter as defined in § 2441(a)(13), or equivalent. If any emission-related engine part is defective under warranty, the part will be repaired or replaced by Ilmor.

For more information on current and/or historical product Warranty policies and guidelines, please visit **www.Ilmor.com/Resources/Warranties-Manuals** or call 844-GO-ILMOR (464-5667).

## Owner Warranty Responsibilities

The owner of the sterndrive/inboard engine is responsible for performing required maintenance listed in the owner's manual. Ilmor recommends retaining all receipts covering maintenance on the sterndrive/inboard engine to document compliance with scheduled maintenance. File all powertrain serial numbers and service records with local authorized Ilmor service center.

Ilmor may deny warranty coverage if sterndrive/inboard engine, or a part, has failed due to abuse, neglect, improper maintenance or unapproved modifications.

Owner is responsible for presenting sterndrive/inboard engine to an authorized Ilmor service center as soon as a problem occurs. The warranty repairs will be completed in a reasonable amount of time, not to exceed 30 days.

If there are any questions regarding owner warranty rights and responsibilities, please contact Ilmor at 844-GO-ILMOR (464-5667) or at **www.Ilmor.com/Resources/Warranties-Manuals.**

## General Emissions Warranty Coverage

Ilmor must warrant that the engine is:

1. Designed, built and equipped so as to conform with all applicable regulations adopted by the CARB pursuant to its authority in Chapters 1 and 2, Part 5, Division 26 of the Health and Safety Code, and by the U.S. EPA pursuant to 40 CFR 1045.
2. Free from defects in materials and workmanship that cause the failure of a warranted part to be identical in all material respects to that part as described in the engine manufacturer's application for certification.

**EXCLUSIONS:**

Failures other than those resulting from defects in material or workmanship are not covered by this warranty. This warranty does not extend to emission control systems or parts which are affected or damaged by owner abuse, neglect, improper maintenance, the incorporation of, or use of, add-on(s) or modified part(s), or the unapproved modification of any part.

This warranty does not cover replacement of expendable maintenance items made in connection with required maintenance service as listed in the maintenance section of the product Owner's Manual, examples of which include spark plugs and filters. If a part is repaired or replaced under this warranty, the life of the warranty is not extended beyond original expiration date.

**DISCLAIMER:**

This warranty is applicable only where the California and U.S. EPA emission control system warranty regulation is in effect. At the discretion of Ilmor, the use of add- on(s) or modified part(s) not exempted by the CARB or the U.S. EPA may be reason for not warranting a claim. When a non-exempted add-on(s) or modified part(s) causes failure to a warranted part, the warranted part will not be covered.

## Mechanical Emission-Related Components Warranty

| Systems Covered by this Warranty | Parts Description |
|---|---|
| Fuel Metering | Intake valve(s) |
| Air Induction | Intake manifold air filter* |
| Lubrication | Crankcase ventilation |
| Crankcase Ventilation | PCV pipe<br>Fresh air pipe<br>PCV hose connector<br>Valve cover grommet<br>Oil filler cap |
| Exhaust | Exhaust manifold (tailpipe not included)<br>Exhaust valve(s) |
| Miscellaneous Items | Clamps<br>Fittings<br>Sealing gaskets or devices<br>Mounting hardware |

* Covered up to, but not including, the first required replacement only. See the Maintenance Schedule in the Owner's Manual.

## Electronic Emission-Related Control Parts Warranty

| Systems Covered by this Warranty | Parts Description |
|---|---|
| Fuel Metering | Fuel injectors<br>Air/fuel ratio feedback and control system<br>Pressure regulator (when installed) |
| Ignition | Electronic ignition system<br>Spark plugs*<br>Ignition coil(s)<br>Ignition wire(s)<br>Distributor** |
| Miscellaneous Items | Camshaft position sensor<br>Crankshaft position sensor<br>Engine coolant temperature sensor<br>Intake air temperature sensor<br>Knock sensor<br>Manifold absolute pressure sensor<br>Throttle position sensor<br>Electronic control unit<br>Electronic throttle control<br>Camshaft position actuator solenoid valve<br>Oil pressure sensor |

* Covered up to, but not including, the first required replacement only. See the Maintenance Schedule in the Owner's Manual.

** 5.7L/5000MPI only.

# Direct Emission-Related Control Parts Warranty

| Systems Covered by this Warranty | Parts Description |
|---|---|
| Catalytic Converter | Catalytic converter(s)<br>Oxygen sensor |
| Evaporative System | Low-permeation (non-metal) fuel hose(s) |

The following chart is offered as assistance in identifying and correcting minor issues that may occur. Problems are listed in the order of most-likely to least-likely of occurrence. Not all possible problems, causes and solutions are listed here.

When experiencing problems, check surroundings before shutting down the engine. Stopping the power suddenly would result in placing other boats and boaters in jeopardy, continue until it is safe to slow or stop, and analyze the situation.

Always be aware of surroundings and how your actions may impact others.

| Problem | Possible Cause | Potential Solution |
|---|---|---|
| **Engine will not turn over.** | Safety switch tether not connected.<br>Throttle/shift control in gear.<br>Main circuit breaker open.<br>Battery terminal corroded.<br>Battery weak or worn out.<br>Loose or corroded battery wiring connectors.<br>Defective starter solenoid.<br>Defective neutral safety switch.<br>Defective starter motor. | Connect the safety switch tether.<br>Shift to neutral.<br>Reset the circuit breaker.<br>Clean the battery terminals.<br>Charge or replace the battery.<br>Clean and tighten the battery wiring connectors.<br>Replace the starter solenoid. See authorized Ilmor service center.<br>Replace the neutral safety switch. See authorized Ilmor service center.<br>Replace the starter motor. See authorized Ilmor service center. |
| **Engine turns over, but will not start.** | Safety switch tether not connected.<br>No fuel in the tank.<br>Fuel filter clogged.<br>Contaminated fuel.<br>Weak or shorted ignition coil.<br>Weak or faulty fuel delivery system. | Connect the safety switch tether.<br>Fill the fuel tank.<br>Replace the fuel filter. See authorized Ilmor service center.<br>Drain fuel and replace fuel filter. See authorized Ilmor service center.<br>Replace the ignition coil. See authorized Ilmor service center.<br>See authorized Ilmor service center. |
| **Engine misses or idles rough.** | Weak or faulty ignition components.<br>Contaminated or incorrect fuel filters.<br>Plugged PCV valve.<br>Vacuum leak. | See authorized Ilmor service center.<br>Drain fuel and replace fuel filter. See authorized Ilmor service center.<br>Have dealer replace the PCV valve.<br>See authorized Ilmor service center. |

| Problem | Possible Cause | Potential Solution |
|---|---|---|
| **Poor boat performance.** | Weak or faulty ignition components.<br>Contaminated fuel.<br>Plugged spark arrestor.<br>High intake air temperature.<br>Low oil pressure.<br>Incorrect boat profile.<br><br>Fuel filter clogged. | See authorized Ilmor service center.<br>Drain fuel and replace fuel filter. See authorized Ilmor service center.<br>Clean the spark arrestor.<br>Verify engine bay is vented adequately.<br>See authorized Ilmor service center.<br>Correct the trim tab, One-Drive® position and/or remove any excess weight within the vessel.<br>Have dealer replace the fuel filter. |
| **Poor fuel mileage.** | Plugged spark arrestor.<br>Inefficient driving habits.<br>Plugged PCV valve.<br>Weak or faulty ignition system components.<br>Incorrect boat profile. | Clean the spark arrestor.<br>Plane the boat quickly, then slow down to desired speed.<br>Have dealer replace the PCV valve.<br>See authorized Ilmor service center.<br>Correct the trim tab, One-Drive® position and/or remove any excess weight within the vessel. |
| **Serpentine belt noise.** | Misalignment in the pulley system.<br>Water on the pulley system.<br>Worn belt.<br>Corroded pulley surfaces. | See authorized Ilmor service center.<br>Remove any bilge water from engine compartment.<br>Replace serpentine belt.<br>Clean or replace pulley. |

# INBOARD ENGINES

| Engine Model | 5.3L GDI | 6.0L MPI | 6.2L GDI | 7.4L MPI |
|---|---|---|---|---|
| Number of Cylinders | V-8 | V-8 | V-8 | V-8 |
| Power* | 365 HP (272 kW) @ 5400 RPM | 373 HP (278 kW) @ 5200 RPM | 430 HP (321 kW) @ 5400 RPM | 522 HP (390 kW) @ 5800 RPM |
| Torque* | 400 ft-lb (543 NM) @ 4100 RPM | 407 ft-lb (552 NM) @ 4200 RPM | 479 ft-lb (650 NM) @ 4000 RPM | 524 ft-lb (711 NM) @ 4400 RPM |
| Displacement (L) | 5.33 | 5.96 | 6.16 | 7.44 |
| Compression Ratio | 11.0:1 | 9.6:1 | 11.5:1 | 10.7:1 |
| Firing Order | 1-8-7-2-6-5-4-3 | | | |
| Gasoline - Fuel Recommendations** | Unleaded 90-93 (R+M)/2 Octane up to 10% Ethanol | Unleaded 87-93 (R+M)/2 Octane up to 10% Ethanol | Unleaded 90-93 (R+M)/2 Octane up to 10% Ethanol | Unleaded 87-93 (R+M)/2 Octane up to 10% Ethanol |
| Max Engine RPM | 5,600 | 5,200 | 5,600 | 5,800 |
| Engine Oil Type | Pennzoil Platinum Full Synthetic 5W-30 | Rotella T4 15W-40 | Pennzoil Platinum Full Synthetic 5W-30 | Mobil 1 Full Synthetic 15W-50 |
| Engine Oil Approx. Service Volumes*** | 7 qt (6.6 L) | 5 qt (4.7 L) | 7 qt (6.6 L) | 5.5 qt (5.2 L) |

# INBOARD ENGINES

| Engine Model | 5.3L GDI | 6.0L MPI | 6.2L GDI | 7.4L MPI |
|---|---|---|---|---|
| Coolant Type (if equipped) | Propylene Glycol/Water 50/50 Mix | | | |
| Coolant Capacity (if equipped) | 5 gal (18 L) to 6 gal (22 L) | | | |
| Normal Operating Temperature Range | 160°F (71°C)- 190°F (88°C) | 130°F (54°C)- 190°F (88°C) | 160°F (71°C) - 190°F (88°C) | 130°F (54°C)- 190°F (88°C) |

*These engine specifications are the declared values for United States Environmental Protection Agency (EPA).

**If the engine is subject to **heavy usage**, the minimum gasoline fuel requirement is Unleaded 90 (R+M)/2 Octane up to 10% Ethanol. **Heavy usage** is defined as operators using their vessel under the following conditions; loaded with additional ballast and/or weight to achieve total maximum capacity over the OEM specification, commercial or training purposes as defined in the Ilmor warranty, at water temperatures below 55°F (13°C), at elevations greater than 6000 feet (1830 meter) above sea level, and/or wide open throttle operation for more than 5% of total boating time.

***Oil capacities will vary depending on the volume of oil recovered during service. After changing the engine oil and filter, recheck the oil level. Refer to the Maintenance Section of the Ilmor MV8 Owner's Manual for proper procedures and additional information.

# ONE-DRIVE® ENGINES

| Engine Model | 5.3L GDI-S | 6.0L MPI-S | 6.2L GDI-S | 7.4L MPI-S |
|---|---|---|---|---|
| Number of Cylinders | V-8 | V-8 | V-8 | V-8 |
| Power* | 365 HP (272 kW) @ 5400 RPM | 382 HP (285 KW) @5200 RPM | 430 HP (321 kW) @ 5400 RPM | 483 HP (360 KW) @5400 RPM |
| Torque* | 400 ft-lb (543 NM) @ 4100 RPM | 411 ft-lb (557 NM) @ 4200 RPM | 479 ft-lb (650 NM) @ 4000 RPM | 516 ft-lb (700NM) @ 4400 RPM |
| Displacement (L) | 5.33 | 5.96 | 6.16 | 7.44 |
| Compression Ratio | 11.0:1 | 9.6:1 | 11.5:1 | 10.7:1 |
| Firing Order | 1-8-7-2-6-5-4-3 | | | |
| Gasoline - Fuel Recommendations** | Unleaded 87-93 (R+M)/2 Octane up to 10% Ethanol | | Unleaded 90-93 (R+M)/2 Octane up to 10% Ethanol | Unleaded 87-93 (R+M)/2 Octane up to 10% Ethanol |
| Max Engine RPM | 5600 | | | |
| Engine Oil Type | Mobil 1 Full Synthetic 15W-50 | | | |
| Engine Oil Approx. Service Volumes*** | 7 qt (6.6 L) | 5 qt (4.73 L) | 7 qt (6.6 L) | 5.5 qt (5.2 L) |
| Coolant Type (if equipped) | Propylene Glycol/Water 50/50 Mix | | | |
| Coolant Capacity (if equipped) | 5 gal (18 L) to 6 gal (22 L) | | | |
| Normal Operating Temperature Range | 160°F (71°C) - 190°F (88°C) | | | |

*These engine specifications are the declared values for United States Environmental Protection Agency (EPA).

**If the engine is subject to **heavy usage**, the minimum gasoline fuel requirement is Unleaded 90 (R+M)/2 Octane up to 10% Ethanol. **Heavy usage** is defined as operators using their vessel under the following conditions; loaded with additional ballast and/or weight to achieve total maximum capacity over the OEM specification, commercial or training purposes as defined in the Ilmor warranty, at water temperatures below 55°F (13°C), at elevations greater than 6000 feet (1830 meter) above sea level, and/or wide open throttle operation for more than 5% of total boating time.

***Oil capacities will vary depending on the volume of oil recovered during service. After changing the engine oil and filter, recheck the oil level. Refer to the Maintenance Section of the Ilmor MV8 Owner's Manual for proper procedures and additional information.

# CUSTOM INBOARD ENGINES

| Engine Model | 5.3L GDI-S | 6.0L MPI-S | 6.2L GDI-S |
|---|---|---|---|
| Number of Cylinders | V-8 | V-8 | V-8 |
| Power* | 320 HP (239 KW) @ 5000 RPM | 382 HP (285 KW) @5200 RPM | 430 HP (321 kW) @ 5600 RPM |
| Torque* | 370 ft-lb (502 NM) @ 4200 RPM | 411 ft-lb (557 NM) @ 4200 RPM | 446 ft-lb (605 NM) @ 4400 RPM |
| Displacement (L) | 5.73 | 5.96 | 6.16 |
| Compression Ratio | 9.4:1 | 9.6:1 | 10.7:1 |
| Firing Order | 1-8-4-3-6-5-7-2 | 1-8-7-2-6-5-4-3 | |
| Gasoline - Fuel Recommendations** | Unleaded 87-93 (R+M)/2 Octane up to 10% Ethanol | | |
| Max Engine RPM | 5,400 | 5,600 | 5,800 |
| Engine Oil Type | Rotella T4 15W-40 | Pennzoil Platinum Full Synthetic 5W-30 | |
| Engine Oil Approx. Service Volumes* | 5 qt (4.7 L) | | 4.5 qt (4.26 L) |
| Coolant Type (if equipped) | Propylene Glycol/Water 50/50 Mix | | |
| Coolant Capacity (if equipped) | 5 gal (18 L) to 6 gal (22 L) | | |
| Normal Operating Temperature Range | 130°F (54°C) - 190°F (88°C) | | |

*These engine specifications are the declared values for United States Environmental Protection Agency (EPA).

**If the engine is subject to **heavy usage**, the minimum gasoline fuel requirement is Unleaded 90 (R+M)/2 Octane up to 10% Ethanol. **Heavy usage** is defined as operators using their vessel under the following conditions; loaded with additional ballast and/or weight to achieve total maximum capacity over the OEM specification, commercial or training purposes as defined in the Ilmor warranty, at water temperatures below 55°F (13°C), at elevations greater than 6000 feet (1830 meter) above sea level, and/or wide open throttle operation for more than 5% of total boating time.

***Oil capacities will vary depending on the volume of oil recovered during service. After changing the engine oil and filter, recheck the oil level. Refer to the Maintenance Section of the Ilmor MV8 Owner's Manual for proper procedures and additional information.

# SERVICE LOG

| Service | Date | Date | Date | Date | Date | Date |
|---|---|---|---|---|---|---|
| Engine Coolant | | | | | | |
| Engine Oil & Filter | | | | | | |
| Engine Timing (5000MPI ONLY) | | | | | | |
| Engine Fuel Filter(s) | | | | | | |
| Heat Exchanger(s) | | | | | | |
| One-Drive® Fluid, Filters & Magnet | | | | | | |
| Power Steering Fluid | | | | | | |
| PRV (Pressure Relief Valve) | | | | | | |
| Raw Impeller | | | | | | |
| Sacrificial Anodes (Engine) | | | | | | |
| Sacrificial Anodes (One-Drive®) | | | | | | |
| Serpentine Belt | | | | | | |
| Shaft Alignment | | | | | | |
| Spark Arrestor | | | | | | |
| Spark Plug Wires | | | | | | |
| Spark Plugs | | | | | | |
| Transmission Fluid | | | | | | |

## NAUTICAL NOTES