

# SERVICE MANUAL

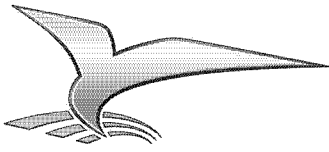
## ***MARINE ENGINES***

**4BY-150**

**4BY-180**

**6BY-220**

**6BY-260**



**YAMAHA**<sup>®</sup>

**BY**  
**series**  
**SERVICE MANUAL**

**4BY**  
**6BY**

**P/N: 0BBY0-G00102**

**MARINE**  
**ENGINES**

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This *Service Manual* has been developed for the exclusive use of service and repair professionals such as Yanmar authorized Distributors and Yanmar authorized Dealers. It is written with these professionals in mind and may not contain the necessary detail or safety statements that may be required for a non-professional to perform the service or repair properly and / or safely. Please contact an authorized Yanmar repair or service professional before working on your Yanmar product.

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**California  
Proposition 65 Warning**

Diesel engine exhaust and some of its constituents are known to the state of California to cause cancer, birth defects, and other reproductive harm.

**California  
Proposition 65 Warning**

Battery posts, terminals, and related accessories contain lead and lead compounds, chemicals known to the state of California to cause cancer and reproductive harm.  
Wash hands after handling.

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## Section 1

# INTRODUCTION

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This manual gives specific instructions for the proper repair of Yanmar BY series marine engines.

Please follow the procedures carefully to ensure quality service.

Yanmar recommends that you read this *Service Manual* completely before starting repairs.

Along with standard tools, Yanmar recommends the use of special tools necessary to perform repairs correctly.

Yanmar products are continuously undergoing improvement. This *Service Manual* has been checked carefully in order to avoid errors. However Yanmar is not liable for any misrepresentations, errors of description or omissions. Contact an authorized Yanmar marine dealer or distributor for any questions you have regarding this *Service Manual*.

## REVISION HISTORY

This manual is a living document. Periodic manual revisions are published to document product improvements and changes. This practice ensures the manual has the most current information.

As manual revisions become necessary, individual pages are prepared and sent to those who need the information. If a page, or number of pages should be replaced, the replacement information is sent along with a revised Revision Control Table. Discard the older, obsolete information.

At times, the revision involves inserting additional pages in one or more sections. Replace the Revision Control Table and insert the new pages.

This method of revision control represents the most cost-effective solution to providing current, updated information as needed.

## Revision Control Table

Revision Date Revision Number	New Page Numbers Involved	Remarks	Initiating Dept.
DEC 2006 Rev. 01	All	Re-release	YMU
NOV 2007 Rev. 02	3-2, 12-12 to 12-22	Table of Contents correction, pin identification information update	YMU
NOV 2007 Rev. 02	3-17, 3-18, 3-22, 4-3, 4-6, 4-10, 4-11, 5-54 and 12-11	Removed back pressure and negative intake pressure information, updated marine gear information, units of measure, periodic maintenance intervals, camshaft bearing cap marks, ECM legend	YMI

## Section 2

# SAFETY

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Yanmar is concerned for your safety and the condition of your marine engine. Safety statements are one of the primary ways to call your attention to the potential hazards associated with Yanmar marine engines. Follow the precautions listed throughout the manual before operation, during operation and during periodic maintenance procedures for your safety, the safety of others and to protect the performance of your marine engine. Keep the decals from becoming dirty or torn and replace them if they are lost or damaged. Also, if you need to replace a part that has a decal attached to it, make sure you order the new part and decal at the same time.



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

### **DANGER**

Indicates a hazardous situation which, if not avoided, *will* result in death or serious injury.

### **WARNING**

Indicates a 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 machine, personal property and / or the environment or cause the equipment to operate improperly.



## SAFETY PRECAUTIONS

**⚠ DANGER**

The safety messages that follow have DANGER level hazards.

There is no substitute for common sense and careful practices. Improper practices or carelessness can cause burns, cuts, mutilation, asphyxiation, other bodily injury or death. This information contains general safety precautions and guidelines that must be followed to reduce risk to personal safety. Special safety precautions are listed in specific procedures. Read and understand all of the safety precautions before operation or performing repairs or maintenance.

Avoid injury or equipment damage due to engine falling. ALWAYS secure the engine solidly to prevent the engine from falling during service.



NEVER permit anyone to install or operate the engine without proper training.

- ◆ Read and understand this *Service Manual* before you operate or service the engine to ensure that you follow safe operating practices and maintenance procedures.
- ◆ Safety signs and labels are additional reminders for safe operating and maintenance techniques.
- ◆ See your authorized Yanmar marine dealer or distributor for additional training.

**⚠ WARNING**

The safety messages that follow have WARNING level hazards.

**Explosion Hazard**

Avoid serious personal injury or equipment damage. While the engine is running or the battery is charging, hydrogen gas is being produced and can be easily ignited. Keep the area around the battery well-ventilated and keep sparks, open flame and any other form of ignition out of the area.

Avoid serious personal injury or equipment damage. ALWAYS turn off the battery switch (if equipped) or disconnect the negative battery cable before servicing the equipment.

Avoid unexpected equipment movement. Shift the marine gear into the NEUTRAL position any time the engine is at idle.

**Fire Hazard**

Avoid personal injury or equipment damage. Have appropriate safety equipment available.

- ◆ Keep fire extinguishers handy in case of fire. Clearly indicate the location of the fire extinguishers with a safety sign.
- ◆ Ensure that the type of fire extinguishers are appropriate for material that might catch fire. Check with local authorities.
- ◆ Have all fire extinguishers checked periodically for proper operation and / or readiness.
- ◆ Post evacuation routes prominently. Periodically conduct fire drills.

Avoid personal injury. ALWAYS read and follow safety-related precautions found on containers of hazardous substances like parts cleaners, primers, sealants and sealant removers.

Wipe up all spills immediately.

**⚠ WARNING****Entanglement Hazard**

Rotating parts can cause severe injury or death. NEVER wear jewelry, unbuttoned cuffs, ties or loose fitting clothing and ALWAYS tie long hair back when working near moving / rotating parts such as the flywheel or PTO shaft. Keep hands, feet and tools away from all moving parts.

Avoid personal injury. ALWAYS stop the engine before beginning service.

Avoid personal injury. NEVER leave the key in the key switch when servicing the engine. Attach a "Do Not Operate" tag near the key switch while performing maintenance on the equipment.

**Sever Hazard**

Avoid personal injury. The propeller may rotate during towing or if the engine is running at idle speed. NEVER service the engine while being towed or when the engine is running.

Avoid personal injury. If the vessel has more than one engine, NEVER service an engine if either of the engines are running. In multi-engine configurations the propeller for an engine that is shut down may rotate if any of the other engines are running.

Rotating parts can cause severe injury or death. NEVER operate the engine without the guards in place.

Avoid personal injury. NEVER operate the engine while wearing a headset to listen to music or radio because it will be difficult to hear the warning signals.

**Electrical Hazard**

Make welding repairs safely.



- ◆ ALWAYS turn off the battery switch (if equipped) or disconnect the negative battery cable and the leads to the alternator when welding on the equipment.
- ◆ Remove the multi-pin connector to the engine control unit. Connect the weld clamp to the component to be welded and as close as possible to the welding point.
- ◆ NEVER connect the weld clamp to the engine or in a manner which would allow current to pass through a mounting bracket.
- ◆ When welding is completed, reconnect the leads to the alternator and engine control unit prior to reconnecting the batteries.

**Exhaust Hazard**

Avoid serious injury or death. NEVER block windows, vents, or other means of ventilation if the engine is operating in an enclosed area. All internal combustion engines create carbon monoxide gas during operation and special precautions are required to avoid carbon monoxide poisoning.

**Burn Hazard**

Avoid serious injury. Some of the engine surfaces become very hot during operation and shortly after shut-down. Keep hands and other body parts away from hot engine surfaces.

Handle hot components with heat-resistant gloves.

**Sudden Movement Hazard**

Avoid personal injury or equipment damage. The engine lifting eyes are engineered to lift the weight of the marine engine only. ALWAYS use the engine lifting eyes when lifting the engine.

To prevent accidental equipment movement, NEVER start the engine in gear.

**⚠ WARNING****Lifting Hazard**

Avoid serious personal injury. Additional equipment is necessary to lift the marine engine and marine gear together. ALWAYS use lifting equipment with sufficient capacity to lift the marine engine.

If you need to transport an engine for repair, have a helper assist you in attaching it to a hoist and load it on a truck.

**Alcohol and Drug Hazard**

NEVER operate the engine while you are under the influence of alcohol or drugs or are feeling ill.

**Exposure Hazard**

To avoid injury, ALWAYS wear personal protective equipment including appropriate clothing, gloves, work shoes, eye and hearing protection as required by the task at hand.

**Tool Hazard**

Avoid personal injury or equipment damage. Always remove any tools or shop rags used during maintenance from the area before operation.

**⚠ CAUTION**

The safety messages that follow have CAUTION level hazards.



Avoid personal injury. ALWAYS wear eye protection when servicing the engine or when using compressed air or high-pressure water. Dust, flying debris, compressed air, pressurized water or steam may injure your eyes.

**Poor Lighting Hazard**

Avoid personal injury or equipment damage. Ensure that the work area is adequately illuminated. ALWAYS install wire cages on portable safety lamps.

**Tool Hazard**

Avoid personal injury or equipment damage. ALWAYS use tools appropriate for the task at hand and use the correct size tool for loosening or tightening machine parts.

**NOTICE**

**The safety messages that follow have NOTICE level hazards.**

Any part which is found defective as a result of inspection or any part whose measured value does not satisfy the standard or limit must be replaced.

ALWAYS tighten components to the specified torque. Loose parts can cause equipment damage or cause it to operate improperly.

Only use replacement parts specified. Other replacement parts may affect warranty coverage.

NEVER attempt to modify the engine design or safety features such as defeating the engine speed limit control or the diesel fuel injection quantity control.

Modifications may impair the engine's safety and performance characteristics and shorten the engine's life. Any alterations to this engine may void its warranty. Be sure to use Yanmar genuine replacement parts.



ALWAYS be environmentally responsible.

Follow the guidelines of the EPA or other governmental agencies for the proper disposal of hazardous materials such as engine oil, diesel fuel and engine coolant. Consult the local authorities or reclamation facility.

NEVER dispose of hazardous materials by dumping them into a sewer, on the ground or into ground water or waterways.

If any indicator illuminates during engine operation, stop the engine immediately. Determine the cause and repair the problem before you continue to operate the engine.

Make sure the engine is installed on a level surface. If a Yanmar Marine Engine is installed at an angle that exceeds the specifications stated in the Yanmar Marine Installation manuals, engine oil may enter the combustion chamber causing excessive engine speed, white exhaust smoke and serious engine damage. This applies to engines that run continuously or those that run for short periods of time.

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### Section 3

# GENERAL SERVICE INFORMATION

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## GENERAL SERVICE INFORMATION

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## SAFETY PRECAUTIONS

### WARNING

#### **Fire Hazard**



Avoid injury or equipment damage from fire. Undersized wiring systems can cause an electrical fire.

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#### **Electrical Hazard**



Avoid personal injury or equipment damage. ALWAYS keep the electrical connectors and terminals clean. Check the electrical harnesses for cracks, abrasions, and damaged or corroded connectors.

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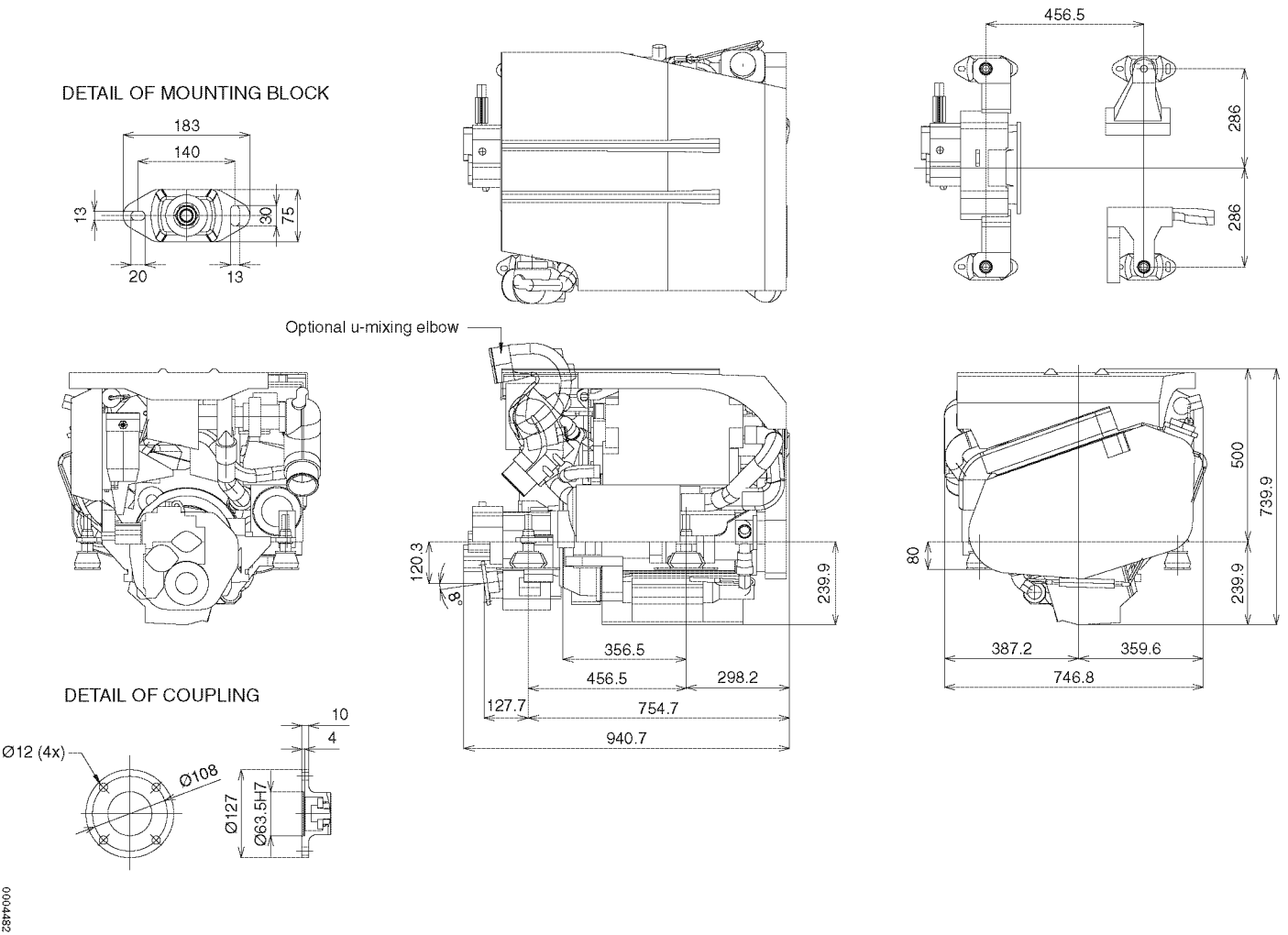
NEVER turn off the battery switch (if equipped) or short the battery cables during operation. Damage to the electrical system will result.



**ENGINE OUTLINE DRAWINGS**

Note: All dimensions are metric. Contact Yanmar Marine for the most current drawings.

**4BY with KMH40A**

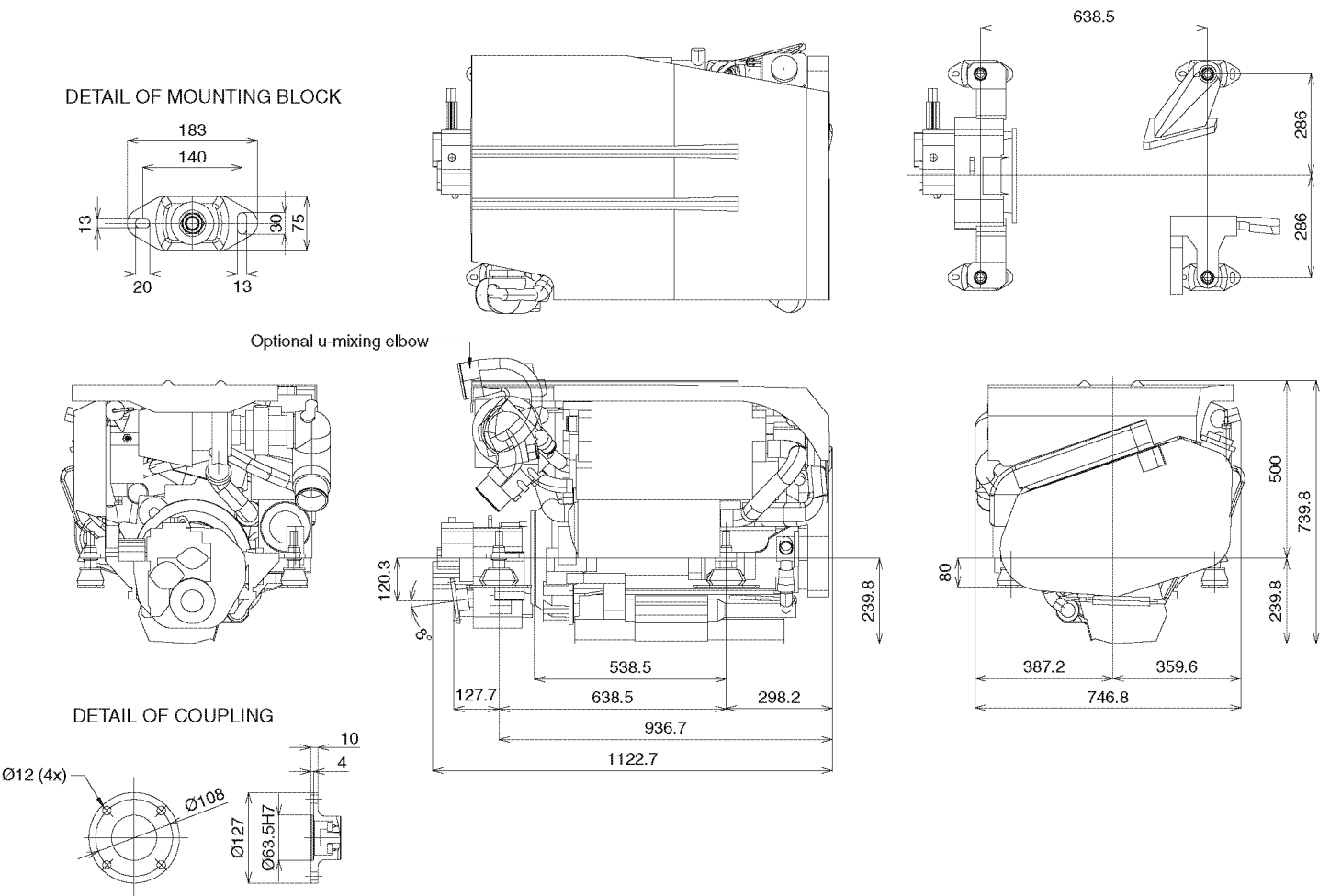


**Figure 3-1**

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**6BY with KMH40A**

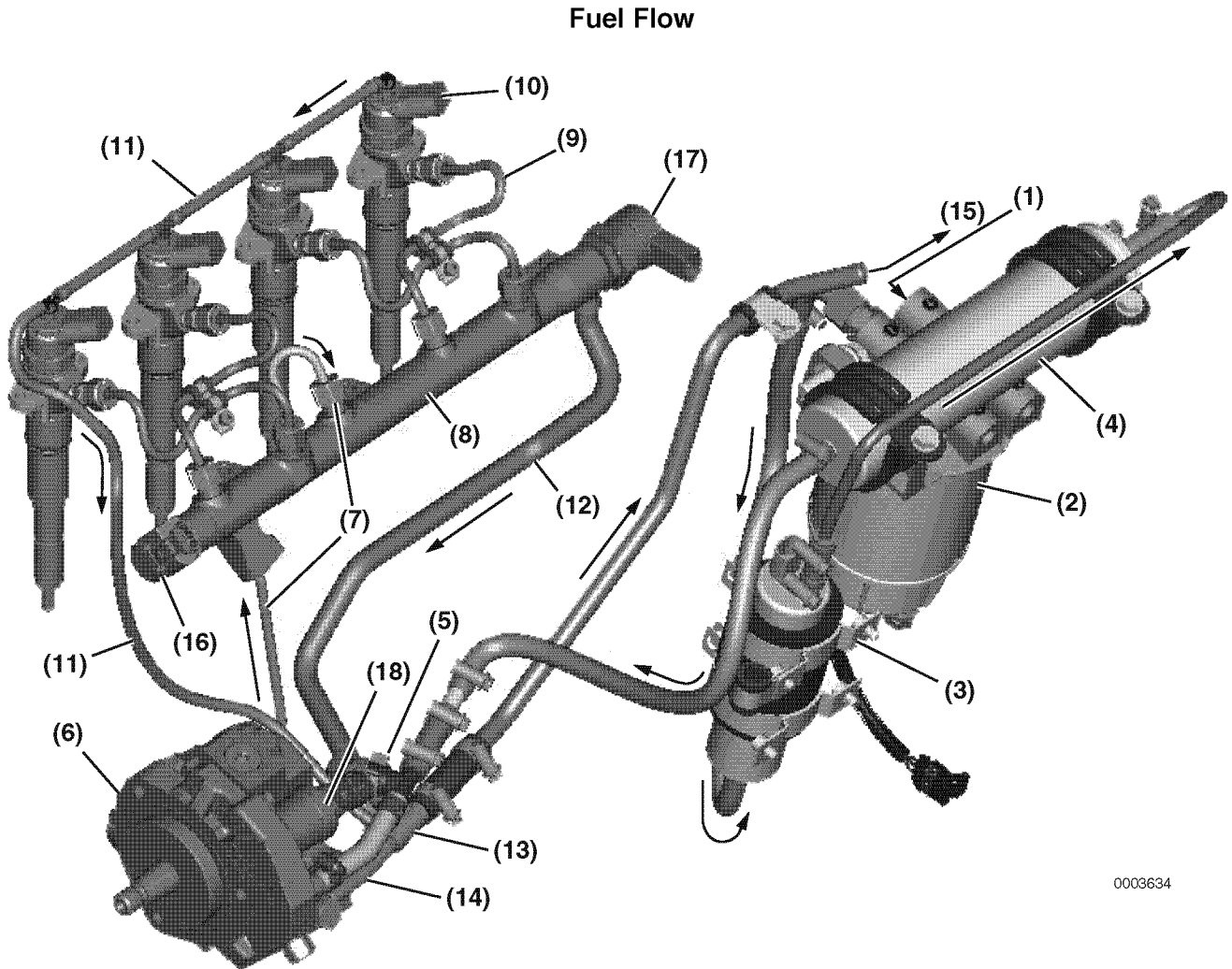
Note: All dimensions are metric. Contact Yanmar Marine for the most current drawings.



**Figure 3-2**

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ENGINE PIPING DIAGRAMS

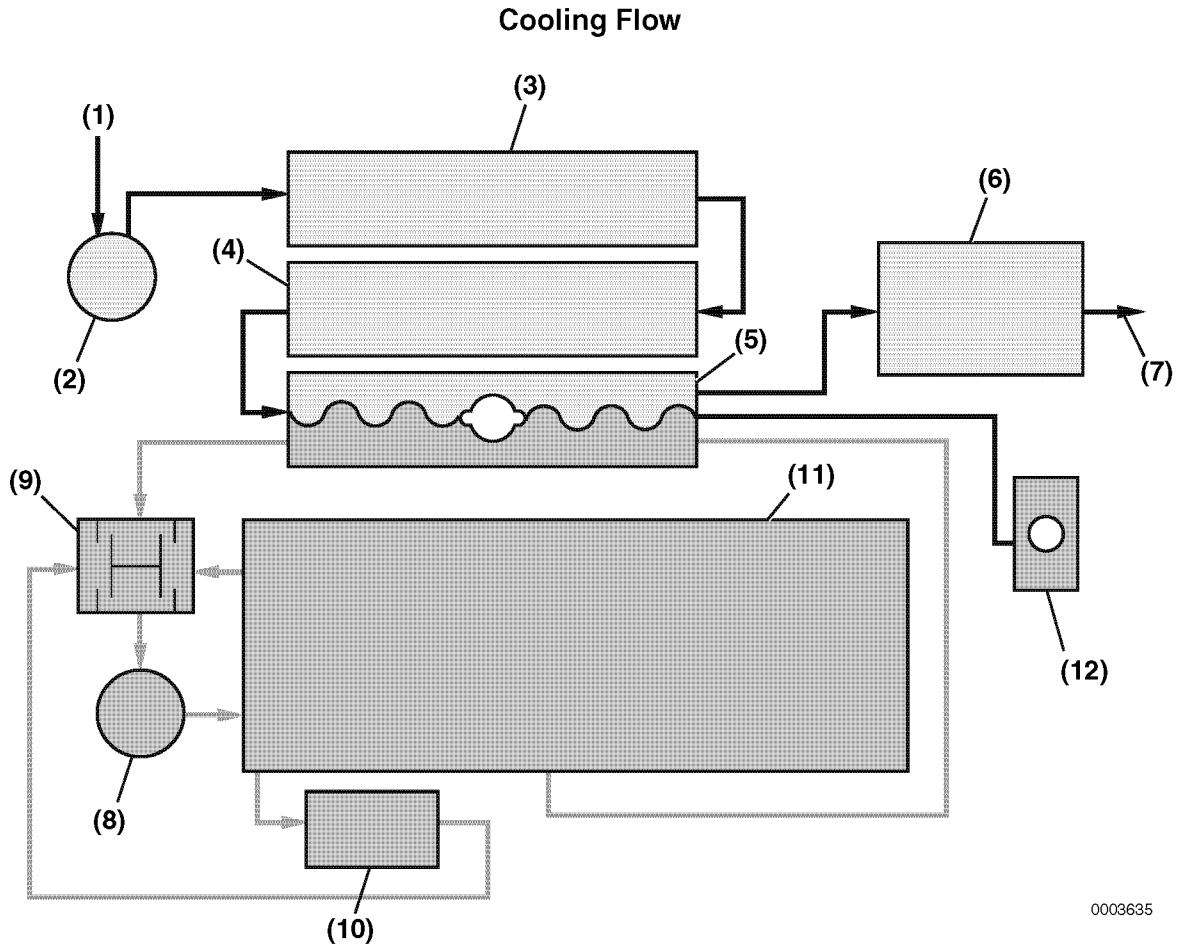


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Figure 3-3

Note: Typical 4BY engine shown. 6BY is similar.

- |   |   |
|---|---|
| 1 – Fuel from Tank                        | 10 – Fuel Injector (1 each cylinder)                    |
| 2 – Fuel Filter / Water Separator         | 11 – Fuel Injector Return Fuel Hose                     |
| 3 – Fuel Feed Pump                        | 12 – Common Rail Return Fuel Line                       |
| 4 – Fine Fuel Filter                      | 13 – Tee  |
| 5 – Inlet Fuel Temperature Sensor         | 14 – Fuel Return from High-Pressure Pump                |
| 6 – High-Pressure Fuel Pump               | 15 – Return Fuel to Fuel Tank                           |
| 7 – High-Pressure Fuel Supply Line        | 16 – Fuel Pressure Sensor                               |
| 8 – Common Fuel Rail                      | 17 – Fuel Pressure Regulator (ECU-Controlled)           |
| 9 – Fuel Injection Line (1 each injector) | 18 – High-Pressure Fuel Flow Regulator (ECU-Controlled) |



**Figure 3-4**

Note: Typical 4BY engine shown. 6BY is similar.

- |                           |                              |
|---------------------------|------------------------------|
| 1 – Seawater Supply       | 7 – Exhaust / Seawater Exit  |
| 2 – Seawater Pump         | 8 – Engine Coolant Pump      |
| 3 – Hydraulic Oil Cooler  | 9 – Thermostat               |
| 4 – Charge Air Cooler     | 10 – Engine Oil Cooler       |
| 5 – Engine Heat Exchanger | 11 – Engine Coolant Passages |
| 6 – Exhaust Elbow         | 12 – Coolant Recovery Tank   |